A phylogenetic study of the South African representatives of the tribe Andropogoneae (Poaceae).

Francisca Holder

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Supervisor: Prof JJ Spies

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LIST OF ABBREVIATIONS

Bgl1 — Bacillus grobigii I

BLFU — Geo Potts Herbarium, Department of Botany & Genetics, University of the Orange Free State, Bloemfontein.

bp — base pair

BT —bootstrap

CI — Consistency index

CO_2 — Carbon Dioxide

CTAB — Hexadecyltrimethyl amonium bromide

d H_2O — distilled water

DAF — DNA amplification fingerprinting

DNA — Deoxyribonucleic acid

dNTP — Deoxynucleotide triphosphate

EDTA — Ethylene diaminetetra acetic acid

ethanol — Ethylalcohol

HCl — Hydrochloric acid

HCOH — formaldehyde

HI — homoplacy index

Hind III — Haemophilus influenzae Rd III

Hinf 1 — Haemophilus influenzae RF 1

HNO_3 — Nitric acid

i.e. — *it est* (that is)

ITS — Internal transcribed spacer

$K_2Cr_2O_3$ — potasiumdichromate

km — kilometers

M — molar

m/v — mass per volume

$MgCl_2$ — Magnesium chloride

ml — milliliter

mM — millimolar

NaCl — sodium chloride

Na_2CO_3 — sodium carbonate

$Na_2S_2O_3$ — sodium thiosulfate

PAUP — phylogenetic analysis using parsimony

PCR — polymerase chain reaction

pmol — picomoles

RAPD — Random amplified polymorphic DNA

RC — rescaled consistency index

RFLP — restriction fragment length polymorphisms

RI — retention index

RNA — Ribonucleic acid

rpoC$_2$ — RNA polymerase II gene

SNL — signal to noise

subsp. — subspecies

TAE — Tris-acetic acid EDTA

Taq — *Thermus aquaticus*

Tris — 2-amino-2-(hydoxymethyl)-1,3-propanediol

UOFS — University of the Orange Free State

UV — ultraviolet light

V — Volt

v/v — volume per volume

% — percentage

°C — degrees Celsius

µg — micrograms

µl — microlitre

µM — micromoles

Chapter 1
Introduction.

That grasses are interesting and important plants are a fact recognised by botanists all over the world, yet it would appear that people in general have hardly appreciated either their interest or their importance. Apart from their almost universal distribution, and quite apart from the fascinating interest attaching to those extraordinary tropical giants, the Bamboos, West Indian Sugar-cane, the huge Reed-grasses of Africa, the Pampas-grasses of South America; and from the utilitarian value of the cereals — Maize, Rice and Wheat — everyone must be struck by the significance of the enormous tracts of land covered by the grasses in all parts of the world (Ward 1901).

1.1 Poaceae

The grasses form the family Poaceae, a well defined natural group of plants. This family is by no means the largest in terms of species (9 700) and genera (770), coming after Asteraceae and Fabaceae, but its importance is beyond doubt for it provides the grasslands which occupy a third of the lands surface (Schantz 1954), and the cereal crops upon which much of the worlds population depends for its food (Clayton and Renvoize 1986). In southern Africa 194 genera and 967 species, with 847 indigenous species and 329 endemic species (Gibbs Russell *et al.* 1990) represent this family.

Between 1958 and 1966 new systems for the classification of Poaceae were recognised. Most of these systems recognised more than the two initial subfamilies (Panicoideae and Festucoideae). During the last 30 years the number of subfamilies has stabilized at five (Renvoize 1981, Campbell 1985, Watson *et al.* 1985), namely Pooideae Macfarlane and Watson, Bambusoideae Asch and Graeb, Chloridoideae Rouy, Arundinoideae Tateoka and Panicoideae A. Br. (Soderstrom *et al.* 1986). Another subfamily the Centothecoideae Soderstrom is also recognised (Clayton and Renvoize 1986). Recently the GPWG (2001) reclassified the Poaceae into 13 subfamilies namely Anomochlooideae Pilg. ex Potztal, Pharoideae (Stapf) L.G. Clark and Juds, Peulioideae

L.G. Clark. M. Kobay. S. Mathews, Spangler and E.A. Kellogg, Bambusoideae Luerss. Grundz, Ehrhartoideae Link, Pooideae Benth., Fl. Hongk, Aristidoideae Caro, Arundinoideae Burmeist., Danthonioideae Barker and H.P. Linder, Centothecoideae Soderstr., Panicoideae Link, Chloridoideae Kunth ex Beilschm. and *Incertae Sedis*. Of interest to us is the subfamily Panicoideae.

1.2 Panicoideae

This is the largest subfamily including about 3 270 species. Most of the genera fall into two large tribes, the Andropogoneae and Paniceae (Campbell 1985, Kellogg and Campbell 1987).

Earlier systematists (Bentham 1878, Hackel 1890, Hooker 1897) included Zoysieae, Melinideae and Oryzeae as well as the main tribes Paniceae and Andropogoneae and the small tribe Maydeae among the Panicoideae. Stapf and Hitchcock (Bews 1929) later removed the Zoysieae and Oryzeae and placed them among the Pooideae. Stapf increased the number of tribes beyond those recognised by Hackel. From a phylogenetic standpoint this may or may not be advisable, but in the case of two new tribes formed by Stapf, the Arundinelleae and Phoreae, the distinction made is helpful (Bews 1929). Clayton and Renvoize (1986) also included the Steyermarkochloeae and the Eriachneae in the Panicoideae, whereas Watson and Dallwitz (1992) placed them in the Arundinoideae. Each of these systems allots the same genera to each tribe, two in each case, suggesting that the tribes themselves internally cohere (Chapman 1996). Most systematists, however, only recognised two main tribes for the Panicoideae, for they see the Maydeae as no more than a subtribe of the Andropogoneae, which are the more advanced, the other and relative primitive tribe being the Paniceae. In 2001 the GPWG divided the subfamily into six tribes, Andropogoneae Dumort, Arundinelleae Sapf, Hubbardieae C.E. Hubb, Isachneae Benth, Paniceae R. Br. and Steyermarkochloeae Davidse and R.P. Ellis.

On morphological level it is a fascinating group whose genera lend themselves to arrangement in an orderly sequence of increasing morphological complexity (Clayton and Renvoize 1986). Spikelet characters are diagnostic for the subfamily Panicoideae and distinguish it from the other subfamilies (Ellis 1986). In each spikelet there is one

perfect terminal floret, with a male floret or empty lemma below it (Brown 1810, 1814, Bews 1929, Chapman 1996, Clayton and Renvoize 1986, Watson and Dallwitz 1986, Kellogg and Campbell 1987). In this respect, therefore, the Panicoideae are uniformly advanced. The large tribe of the Andropogoneae shows a distinct advance in having the lower glume always larger than the whole floret, and firmer in texture than the lemmas, usually much hardened and very efficient from a protective standpoint (Bews 1929). In the Panicoideae the reduced one seeded spikelets, falls entire and the axis disarticulate below the glumes. The fruit is thus better protected, especially in the Andropogoneae, where the larger lower glume closely embraces the whole spikelet, and is usually thick and hard. The axes of the racemes or spikelets in the Andropogoneae also break up at maturity.

Not only do the surrounding structures, lemmas and palea serve to protect the fruit, they also are effective in assisting dispersal. They increase the surface exposed to the wind, decrease the specific gravity and in many cases act like the wings in a winged fruit or seed (Bews 1929). Hairs and awns also sometimes assist in wind-dispersal. After dispersal, hygroscopic awns may assist the fruits to become buried in the soil by coiling and untwisting and causing the fruit to rotate. A pointed prickly callus helps in the same direction. The fruits of some xerophytic, advanced types are extraordinary efficient in this way, e.g. *Heteropogon contortus* (L.) Roem. and Schult.

Among the Panicoideae the relative primitive Paniceae are hygrophilous or mesophytic, often forest-margin forms, with only a few xerophytic types, whereas the very highly evolved Andropogoneae are the dominant grasses of enormous areas of tropical and subtropical savannah with, however, a fairly large number of tall coarse, rather hygrophilous types as well and even one or two aquatics (Bews 1929).

Anatomically it is a rather diverse assemblage, with no unique, diagnostic features. Most panicoid grasses have elongated, fingerlike microhairs and horizontally elongated, cross- to dumbbell-shaped silica bodies. Keels are often present and the vasculate is always simple (Ellis 1986). The physiological anatomy of this subfamily is exceptionally variable with all known types being present (Ellis 1977). The supertribe Andropogoneae is homogenous for the C_4 photosynthetic pathway (Sedulsky 1986, Chapman 1996).

Their leaf anatomy are mixed and, therefore, unhelpful in establishing outgroup relationships, though their cuneate lodicules link them to the other tropical subfamilies.

The Panicoideae appear to have had a distinct origin from the Pooideae, but may connect somewhat remotely with ancestral forms, which resemble the Bamboos. It is obvious that the whole of the Panicoideae are rather highly developed in so far as reduction of the number of flowers in the spikelets is concerned. But, this reduction occurs in primitive members of the tribes of the Pooideae as well. Though a very important evolutionary trend, it is after all only one among many. It has taken place within all the separate circles of affinity. Clayton (1981) considered the subfamily Arundinoideae to have provided the ancestral stock for the Panicoideae. Of the other subfamilies it resembles the Chloridoideae in C_4 photosynthesis, chromosome base number and broadly tropical distribution. These two subfamilies differ in numerous ways, however: spikelets, embryos, microhair distal-cell shape and silica bodies. In photosynthetic pathway, 20% of the genera of Panicoideae are non-kranz, of the kranz genera, 89% are of the mestome-sheath (MS) subtype of kranz anatomy (Brown 1977). Chloridoids, on the other hand uniformly have the parenchyma-sheath (PS) subtype. The caryopses of the Panicoideae contain lower levels of glutamine and methionine and higher levels of proline, alanine and leucine than the Chloridoideae (Yeoh and Watson 1981). The levels of proline and glycine in the Panicoideae are intermediate between levels in subfamily Chloridoideae and the tribe Andropogoneae.

Andropogoneae also appears to be related to Arundinelleae and there is sufficient similarity between primitive members of that tribe and of Arundineae to envisage a common ancestry for the group. The origin of Paniceae is more obscure because there are no obvious precursors. Clayton (1981) stated that the subfamily Panicoideae represents a problem and that there is no direct link between the main tribes Paniceae and Andropogoneae. This statement is supported by systematic and cluster analysis (Hilu and Wright 1982, Hilu 1985).

Of interest in this study is the subfamily Andropogoneae.

1.2.1 Andropogoneae

This tribe makes up about half of the grass subfamily Panicoideae with approximately 85 genera and 960 species (Hartley 1958, Clayton and Renvoize 1986, Le

Roux and Kellogg 1999). The genera of the Andropogoneae are typically tropical with only a few species extending beyond the tropics into warm temperate regions.

The anatomy is of the "Kranz MS" type (Brown 1977). These features characters such as a single bundle sheath, chlorenchyma cells arranged radically around the bundles and slender finger-like hairs. This type of anatomy is associated with C_4 photosynthesis (Renvoize 1981).

The most characteristic feature of the tribe is, however, the possession of fragile racemes bearing paired spikelets (Clayton 1972, Connor 1986, Clayton 1986, Clayton and Renvoize 1986, Le Roux and Kellogg 1999). The one spikelet is usually sessile and hermaphrodite, whereas the other is pedicelled and male, sterile or extremely reduced (Hilu and Wright 1982, Clayton 1986, Clayton and Renvoize 1986, Davidse 1986, Le Roux and Kellogg 1999). This makes the entire plant andromonoecious (Le Roux and Kellogg 1999). This unique spikelet structure was hypothesised to be evidence of the monophyly of the subfamily (Kellogg and Campbell 1987) and has been supported by all studies to date (Kellogg and Watson 1993, Kellogg 1998, Masson and Gamer *et al.* 1998, Spangler *et al.* 1999, Mathews *et al.* 2002). Furthermore the great plasticity of this morphological unit gives the Andropogoneae their distinctive flavour (Renvoize 1981). With the only unusual flavonoid reported so far in grasses, arthraxin, a derivative of luteolin, which is reported in *Arthraxon hispidus* (Thunb.) Makino and *Miscanthus tinctorius* (Steud) Hack.A. (Kaneta and Sugiyama 1969). Flavonoid sulphates are usually present in the tropical and subtropical subfamilies for example the Panicoids (18% of species), Chloridoideae (15%) and Arundinoideae *senso lato* (40%). This chemical difference is linked in part with the distribution of the C_4 photosynthetic pathway (Harbourne and Williams 1986).

Large terminal panicles occur in some of the more primitive genera, but there is a strong tendency, throughout the tribe, to the reduction of the inflorescence, ultimately to a single short raceme. The racemes may be exerted terminally from the spatheole by elongation of the common peduncle or, if paired, they may burst forth laterally by deflection of the stalks supporting the individual racemes. By exploiting the morphological variation in the raceme-segment and panicle, the tribe has evolved some of the most complex structures found in Poaceae and, therefore, a pattern of the advancement along raceme-segment and inflorescence axis can be drawn (Figure 1.1) (Clayton and Renvoize 1986). Another distinctive development in Andropogoneae is the

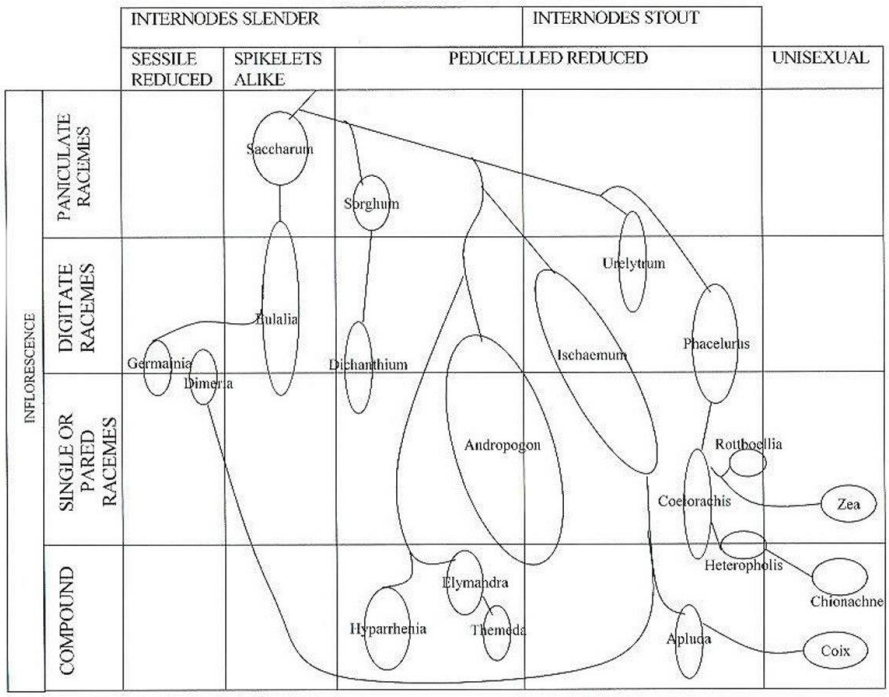

Figure 1.1: Evolution of Andropogoneae. Schematic diagram showing selected genera on two axes of increasing morphological complexity (Clayton and Renvoize 1986).

reduction of the inflorescence and proliferation of axillary branching until, in extreme cases, the branch system come to imitate a panicle (Clayton 1986).

The upper lemmas are membranous and often greatly reduced (Clayton 1986). The tribe divides naturally into two parts: species with an upper lemma and those with the upper lemma entire and awnless.

The original classification of Andropogoneae consists of Dimerieae, Sacchareae, Ischaemeae, Euandropogoneae and Rottboellae (Hackel 1889). Clayton (1972, 1973) recognised ten subtribes with respect to the awns (Table 1). Clayton and Renvoize (1986), on the other hand only recognise five of these subtribes: Saccharinae, Sorginae, Ischaeminae, Andropogoninae and Rottboelinae (Figure 1.2-1.6) and Watson and Dallwitz (1992) only three: Andropogoninae, Rottboeliinae and Maydeae.

Table 1: The ten subtribes recognised by Clayton (1972, 1973) with respect to the presence or absence of awns.

Awned genera	**Awnless genera**
Andropogoninae	Rottboelliinae
Anthistirrinae	Coicinae
Dimeriinae	Tripsacinae
Saccharinae	
Sorghinae	
Germaniinae	
Ischaemastrae	

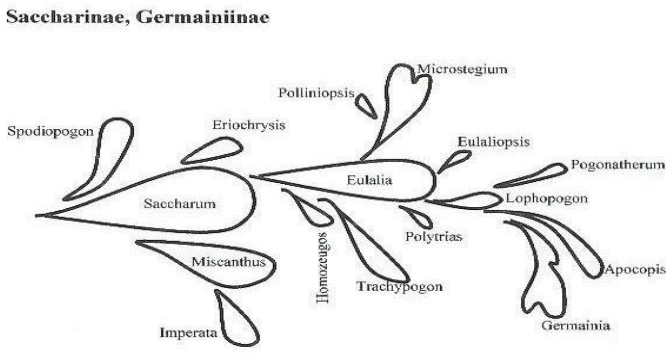

Figure 1.2: Subtribe Saccharinae as recognised by Clayton and Renvoize (1986).

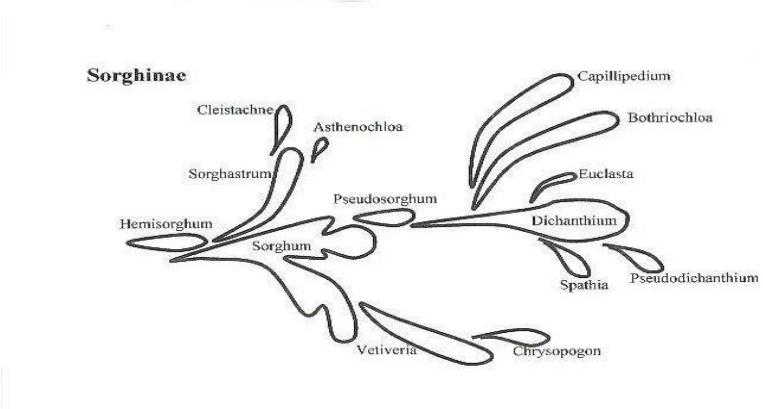

Figure 1.3 Subtribe Sorghinae as recognised by Clayton and Renvoize (1986).

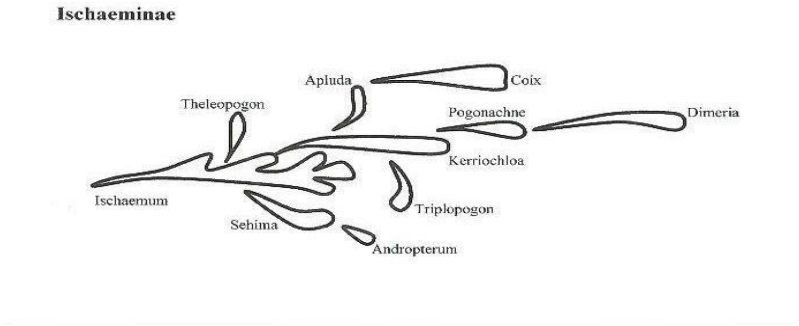

Figure 1.4: Subtribe Ischaeminae recognised by Clayton and Renvoize (1986).

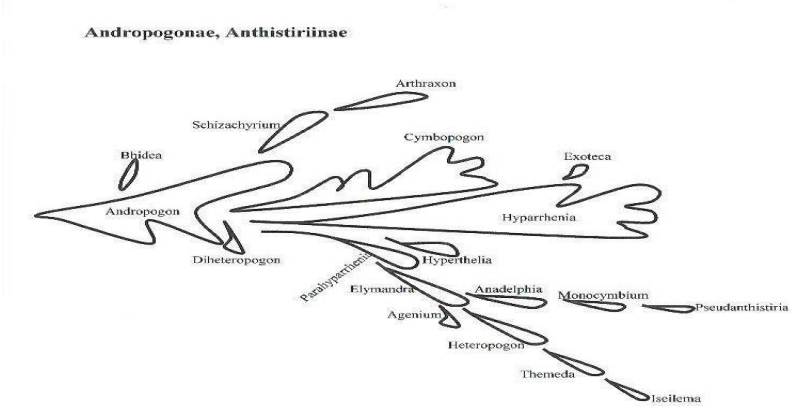

Figure 1.5: Subtribe Andropogonae as recognised by Clayton and Renvoize (1986).

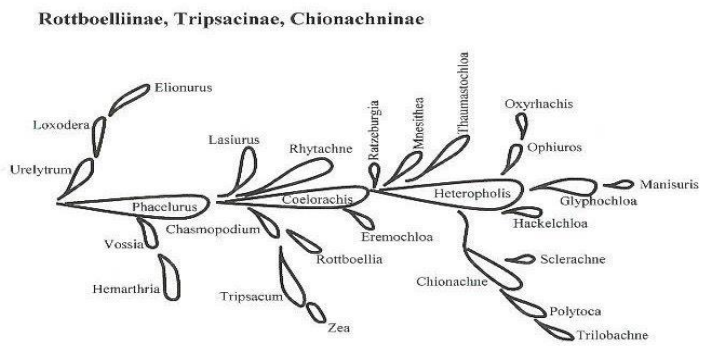

Figure 1.6: Subtribe Rottboelliinae as recognised by Clayton and Renvoize (1986).

The only important modification to the circumscription of the tribe concerns the genera placed in Maydeae, a tribe whose heterogeneous nature has long been a cause of disputes (Clayton 1986). Celarier (1956) favours the inclusion of the Maydeae in the Andropogoneae and considers the Maydeae a natural extension, through specialization of the Andropogoneae. The inclusion of the Maydeae in the Andropogoneae would also not change the pattern of geographical distribution due to the relatively few species involved (Hartley 1958). In 1958, Hartley composed a geographical distribution map of the Andropogoneae by using 300 floras and floristic lists, each of which is represented on the map by a point located at the approximate geographical centre of the region covered by the flora (Figure 1.7).

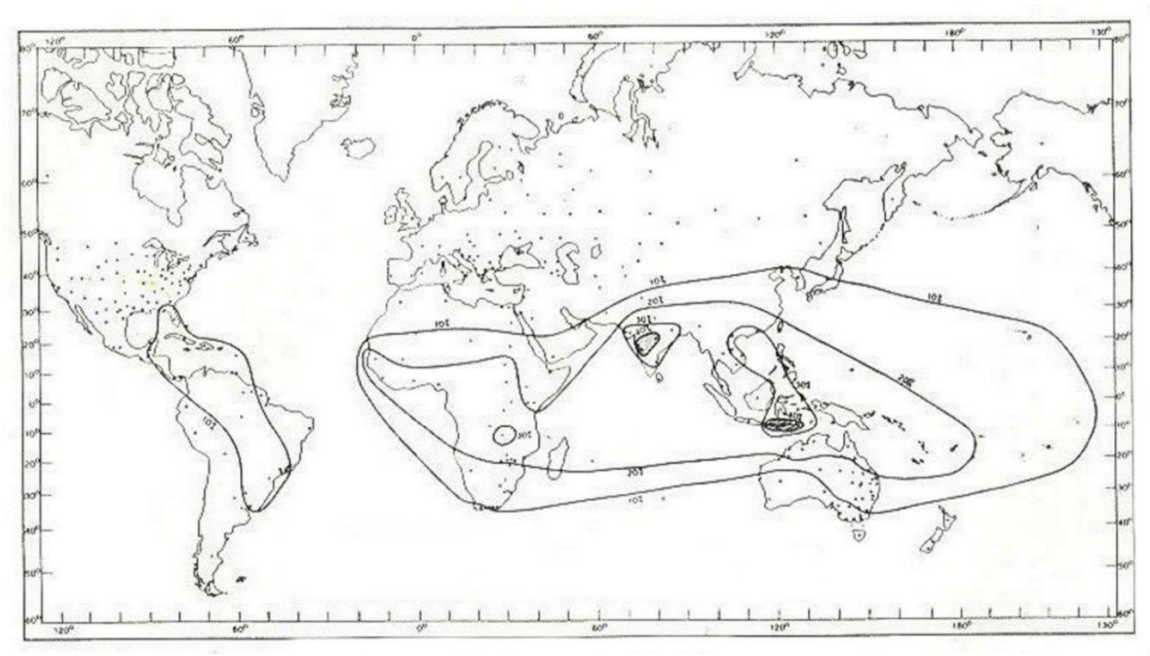

Figure 1.7: Map of world distribution of the Andropogoneae (Hartley 1958).

The most prominent features of this map are (1) the concentration of the tribe in the tropical and subtropical parts of the world, (2) the majority of species in Indo-Malaysia and (3) the relative lower concentration of the tribe in the western hemisphere in comparison to the eastern hemisphere.

In 1958, Hartley indicated that the distribution of the Andropogoneae is related to the climatic factors, such as winter temperature and rainfall. This is reflected in the predominantly distribution of the tribe in the tropical and subtropical parts of the world.

The main centre of specific differentiation is noted to be in southern Asia. Both taxonomists and cytogenetisists have regarded this taxa rich region to contain the most primitive members of the subtribe. Saccharineae and especially the genus *Miscanthus* Anderss. are included here. *Miscanthus* not only has a generalised type of inflorescence from which the more specialised forms are derived, but also shows relationships to other tribes of the grasses (Avdulov 1931, Keng 1939, Celarier 1956). Saccharinae is also a typically tall, hygrophilous grass, which are considered to be ecologically primitive (Bews 1929).

Hartley (1958) confirmed the tribe's adaptation to hot moist conditions, but care must be taken in drawing conclusions about the centres of origin and evolution from these data. In Africa for instance the percentage of species of Andropogoneae does not approach the high levels reached in some parts of Asia, but this does not mean that the tribe has spread into Africa from a centre of origin in Asia. It may in fact well be due to the absence of comparable levels of summer rainfall in Africa.

Evidence also suggests that if spreading has occurred at all, it must have been during the very early history of the tribe. The presence of *Miscanthidium* in Africa, which is closely related to, or perhaps congeneric with *Miscanthus*, indicates that the primitive forms reached Africa at a very early stage, if it did not indeed, originate there. It is also possible that parallel evolution and spread occurred in Africa and Asia, with the tribe retaining its tendency to develop differentiation in regions of high winter temperature and summer moisture (Hartley 1958). The continuing tradition of regional Flora production for Africa and India has provided a reasonable account of the unrevised genera applicable to most of Africa and much of Asia, but otherwise knowledge of their species is uncoordinated and scattered throughout literature (Clayton 1986), making the identification difficult. The problem stems from continuity of variation. Some genera have been studied in detail (De Wet and Harlan 1968, Clayton 1969 a, b, De Wet and Harlan 1970, Clayton 1975, Tothill and Hacker 1976, Soenarko 1977, De Wet 1978), but adequate accounts for many unrevised genera must still be provided (Clayton 1986).

From the information available, it is clear that the African representatives form an integral part of the tribe. For this study, however, we will only concentrate on the South African representatives of the tribe.

1.2.1.1 South African representatives

The South African representatives of this tribe consist of approximately 40 genera and 110 species. These species are represented from the Highveld to the Free State to Lesotho and Kwazulu Natal.

1.2.1.1.1 *Andropogon* L.

Andropogon consists of ~100 species, of which 15 species are indigenous to South Africa, i.e. *A. amethystinus* Nutt, *A. appendiculatus* Nees, *A. brazzae* Franch. W. BE., *A. chinensis* (Nees) Merr., *A. distachyos* L., *A. eucomus* Nees, *A. fastigiatus* SW., *A. festuciformis, A. gayanus* Kunth, *A. huillensis* Rendle., *A. lacunosus* J.G. Anders., *A. laxatus* Stapf, *A. mannii* Hook, *A. ravus* J.G. Anders., *A. schirensis* A. Rich. Stapf (1899) described 43 species for the "Flora of Tropical Africa", of which the most important are: *A. distachyos* L., found in tropical Africa and in the Mediterranean region, from the Canaries to Syria; *A. eucomus* Nees, widespread over the southern half of the continent; *A. amplectens* Nees, from French Guinea and Abyssina through Angola and southward through Zimbabwe, Gauteng and KwaZulu Natal; *A. schirensis* Hochst, all over Africa from Sierra Leone to KwaZulu Natal and *A. gayanus* Kunth, a polymorphic species up to ten feet tall, very common in the Cape Verde Island across the continent to Sudan and Zimbabwe. The species are mostly perennial and together they form an important part of the open savannas of Africa. *Andropogon gayanus,* an important pasture species, as well as some others occur in the high grass savannas of the moist tropical belt (Bews 1929, Clayton and Renvoize 1986).

The genus is divided into four sections according to the shape of the sessile, i.e. *Andropogon, Leptopogon, Piestium* and *Notosolen.*

The most studied specimen of the genus *Andropogon* seems to be *A. gayanus,* probably due to its pasture importance. From one of these studies, Humphreys (1981) concluded that it is a tussock forming grass with erect (apogeotropic) culms having long

internodes. Clayton and Renvoize (1986) also concluded that *A. gayanus* have an external ligule and false petioles and leaf nectaries. Fisher *et al.* (1994) also discovered the globally important fixation of carbon in the New World savannah *A. gayanus*.

The importance of this genus is mostly for prevention of erosion and pasture purposes (van Oudtshoorn 1999).

1.2.1.1.2 *Arthraxon* P. Beauv.

This genus consists of seven species with one indigenous species,i.e. *A. lanceolatus* (Roxb.) Hochst., all delicate grasses, which are perennial or annual. Their habitats include rocky slopes, shady glades and old farmlands.

It is a homogeneous genus with several unusual features, which makes it difficult to place. The only possible comparison being with *Schizachyrium*, which awn is also sometimes basal though from a bifid lemma (Clayton and Renvoize 1986).

1.2.1.1.3 *Bothriochloa* Kuntze

This aromatic grass is found throughout the tropics in open grassy places (Clayton and Renvoize 1986). Of the 35 species only three are indigenous to South Africa, i.e. *B. bladhii* (Retz.) S.T. Blake, *B. insculpta* (A. Rich.) A. Camus, *B. radicans* (Lehm.) A. Camus. These are perennial grasses (Watson and Dallwitz 1992).

Due to the complex pattern of hybridisation created by rapacious introgression from *B. bladhii* (De Wet and Harlan 1970), the boundaries between *Bothriochloa, Capillipedium* and *Dichanthium* are somewhat blurred. Williams and Gillard (1971) also found that the occurrence of *B. bladhii* decreased with increasing tree density in nature. Because of a capacity for genetic mixing in *B. bladhii*, De Wet and Harlan (1966) called it a compilospecies. However, apart from this one miscellaneous species, the genus is morphologically and genetically distinct.

De Wet and Scott (1965) studied the essential oils and taxonomic implications of *Bothriochloa* and Heslop-Harrison (1961) came to the conclusion that the glume pits play a role in the cleistogamous flowering by obstructing the emergence of the anthers.

Most of the times the occurrence of these grasses in a veldt is an indication of overgrazing and plays an important part in the prevention of soil erosion (van Oudshoorn 1999).

1.2.1.1.4 *Chrysopogon* Trin.

This genus is commonly found in the tropical and warm temperate regions of the Old World, mainly in Asia and Australia, with one indigenous species in South Africa, i.e. *C. serrulatus* Trin. (Clayton and Renvoize 1986). Their habitat range from open disturbed places, subdesert to rain forest. Some species are used as thatching grasses in some parts of Africa and *C. aciculatus* is often used for lawns in the humid tropics.

The genus *Chrysopogon* are tufted perennial grasses (Clayton and Renvoize 1986, Watson and Dallwitz 1992).

Chrysopogon does seem to intergrade with *Vetiveria* via *Chrysopogon sylcaticus*, and the separation of these genera is arbitrary, particularly in Australia (Clayton and Renvoize 1986). It is, however, somewhat justified by the treatment of species with triads as a single entity.

1.2.1.1.5 *Cleistachne* Benth.

This is a coarse annual grass consisting of one species, i.e. *C. sorghoides* Benth.. Their habitats are mostly old farmland in tropical Africa and India and due to the extreme reduction of the racemes this genus can be baffling, but its spikelets do ally it to *Sorghum* (Clayton and Renvoize 1986).

1.2.1.1.6 *Coelorachis* Brongn.

This tall perennial grasses are distributed throughout the tropics and consists of ~20 species, with one indigenous to South Africa, i.e. *C. capensis* (Trin.) Roberty. Its habitat includes grassland and open woodland, often favouring damp soils (Clayton and Renvoize 1986, Bews 1929).

Coelorachis is closely related to *Rhytachne*, with no character being wholly reliable and a few species are difficult to assign (Bews 1929, Rosengurt 1984, Clayton and Renvoize 1986).

1.2.1.1.7 *Coix* L.

The genus *Coix* consists of five species that are annual or perennial. They are helophytic to mesophytic, shade species or species of open habitats. Habitats further include forest margins and swamps (Clayton and Renvoize 1986, Gibbs Russell *et al.* 1990, Watson and Dallwitz 1992).

Coix lacryma-jobi L. (Job's tears) has been introduced throughout the tropics (Clayton and Renvoize 1986). This species is widely cultivated for the sake of its false fruits, which are used as beads and in the making of rosaries. It is also employed as a fodder crop and the utricles are sometimes ground up for flour (Bews 1929, Clayton and Renvoize 1986).

1.2.1.1.8 *Cymbopogon* Spreng.

This genus consists of ~40 species (6 indigenous to South Africa, i.e. *C. dieterlenii* Stapf ex Phill., *C. excavatus* (Hochst.) Stapf ex Burtt Davy, *C. marginatus* (Steud.) Stapf ex Burtt Davy, *C. plurinoidis* (Stapf) Stapf ex. Burtt Davy, *C. prolixus* (Stapf) Phill., *C. validus* Stapf Burtt Davy) distributed in the tropics and subtropics and introduced to tropical America. This is a tall, mostly perennial grass with aromatic leaves.

It is a homogeneous genus of narrowly circumscribed species, which are sometimes difficult to distinguish. The variation in this genus is indicated by five series according to the racemes, spikelets and glumes, namely: Series *Proceri,* Series *Refracti,* Series *Citrati*, Series *Cymbopogon* and Series *Rusae* (Clayton and Renvoize 1986). Series *Proceri* is considered to be primitive due to their straight bases.

Cymbopogon shows an affinity to *Andropogon* according to the concave two-keeled sessile spikelet, but there are distinguishing features between the two genera. The aromatic flavour of the leaves is such an example. This aromatic oil in *Cymbopogon* is

extensively used in perfumery (Lavania 1988, Chapman 1996) and *C. citratus* are used as a culinary herb (Watson and Dallwitz 1992, van Oudtshoorn 1999).

1.2.1.1.9 *Dichanthium* Willem.

This genus consists of ~20 Old World tropical species, with one indigenous species and one naturalized species in South Africa, i.e. *D. annulatum* (Forsk.) Stapf, *D. aristatum* (Poir.) C.E. Hubbard (Clayton and Renvoize 1986). Their habitats are open places, from subdesert to marshland, particularly when subjected to disturbance. It is mostly annual grasses (Chapman 1996) with occasional aromatic leaves and is used for grazing (van Oudtshoorn 1999).

Although *Dichantium* is recognised by its homogamous pairs and obtuse sessile spikelets, some species lack these features and resembles *Bothriochloa*, from which they are separated by the solid pedicels (Clayton and Renvoize 1986).

1.2.1.1.10 *Diheteropogon* Stapf

This is an annual or perennial grass distributed in tropical and South African savanna (Clayton and Renvoize 1986), i.e. *D. amplectens* (Nees) Clayton, *D. filifolius* (Nees) WD Clayton, and used for grazing and control of soil erosion (van Oudtshoorn 1999).

Diheteropogon is a small homogeneous genus, which links *Andropogon* section *Piestium* to *Pararhyparrhenia*, with a barely justified separation from *Andropogon*.

1.2.1.1.11 *Elionurus* Kunth ex Willd

The genus *Elionurus* consists of 15 species, throughout Africa, America and Australia, with two species indigenous to South Africa, i.e. *E. muticus* (Spreng.) Kunth, *E. tripsacoides* Humb. & Bonpl. It is a climax or subclimax grass in savanna or often on dry soils. They are generally tufted perennials and not well grazed because of its pungent odour and aromatic taste, which is not commercially exploited. *Elionurus* is said to be a homogenous genus, with an alliance to *Loxodera*, because of the resemblance in the

short callus and lobbed internode tip (Bews 1929, Roberts 1973, Clayton and Renvoize 1986, Roberts and Fourie 1989).

1.2.1.1.12 *Elymandra* Stapf

This genus consists of 6 species, with one indigenous, i.e. *E. grallata* (Stapf) Clayton. These species are annual or perennial grasses with tall culms found in the shade or open habitats. Although there is some variance between the species, all have the olive-green homogamous spikelets and dark sessile spikelet. There seems to be a correlation between the number of homogamous pairs and fertile spikelets, which decrease as the number of pairs increase (Clayton and Renvoize 1986). Connor (1986) also suggested that there are 4-5 times as many male spikelets as perfect spikelets in *Elymandra*. The pedicelled spikelet callus of *Elymandra* also suggests a relationship to *Parahyparrhenia* (Clayton and Renvoize 1986).

1.2.1.1.13 *Eriochrysis* P. Beauv.

This is a tufted perennial grass with seven species of which two are indigenous to our region, i.e. *E. brachypogon* (Stapf) Stapf., *E. pallida* Munro.. Their habitats include swamps and moist places (Watson and Dallwitz 1992). It is a homogeneous genus, which is allied to *Saccharum*, but is distinguished by the compact rufous racemes and slightly dimorphic spikelets (Clayton and Renvoize 1986).

1.2.1.1.14 *Eulalia* Kunth

This genus consists of ~30 species from the Old World tropics, with two indigenous to our region, i.e. *E. aurea* Gravier, *E. villosa* (Thunb.) Nees. They are tufted perennial grasses found in grasslands and sometimes in moist places (Watson and Dallwitz 1992).

Eulalia villosa is a significant weed species and *E. aurea* an important native pasture species.

Eulalia is related to *Saccharum*, but differ in the digitate racemes and their tendency for wind-dispersed spikelets to rely upon hairs from glumes and internodes rather than from the callus. It does, however, seem that the genus stands at the junction of several divergent lines, with links to *Polytrias*, *Lophopogon* and *Homozeugos* (Clayton and Renvoize 1986).

1.2.1.1.15 *Hackelochloa* Kuntze

This coarse annual species (*H. granularis* L. Kuntze) is distributed throughout the tropics in weedy places. Apart from a unique spikelet shape the genus differs little from *Heteropholis* (Bews 1929, Clayton and Renvoize 1986, Gibbs Russell *et al.* 1990).

1.2.1.1.16 *Hemarthria* R.Br.

The genus *Hemarthria* consists of 12 species, distributed through the old world tropics, from India, Australia, America through to Africa (*H. altissima* (Poir.) Stapf & C. E. Hubb.) and the Mediterranean region and are used for grazing in some parts of Africa (Bews 1929, Clayton and Renvoize 1986, van Oudtshoorn 1999). This grass is hygrophilous, usually occurring in or near water. Some species have culms of 4.57-6.10m. long, often floating. *Hemarthria* is a rambling perennial grass, with evidence of a fused pedicel, linking it to *Heteropholis*, but evidence suggests a more close relationship to *Phacelurus* (Bews 1929, Clayton and Renvoize 1986).

1.2.1.1.17 *Heteropogon* Pers.

This genus is distributed in the tropics and subtropics of both hemispheres. Its habitat includes dry open places on poor soils, and in North America it is found in rocky places from Texas to Arizona (Bews 1929, Clayton and Renvoize 1986). This wide range of geographical distribution is associated with considerable morphological variation and phenological behavior (Tothill 1966, 1968, Tothill and Hacker 1976). *Heteropogon contortus* (L.) Roem. & Schult. is a significant weed species and native pasture species

(Watson and Dallwitz 1992). These grasses can be either annual or perennial (Clayton and Renvoize 1986), i.e. *H. contortus, H. melanocarpus*.

Some species of *Heteropogon* also adapted a needle-sharp, sessile spikelet callus, which penetrates clothing, as an efficient dispersal mechanism (Clayton and Renvoize 1986). The homogamous spikelets in *Heteropogon* as well as the developed pedicelled spikelet callus, suggest a loose relationship with *Elymandra.*

1.2.1.1.18 *Hyparrhenia* Fourn.

This species are annual or perennial, usually caespitose with tall culms. The genus consists of 55 species and is distributed mostly in Africa (20 indigenous, i.e. *H. anamesa* Clayton, *H. collina* (Pilg.) Stapf, *H. cymbaria* (L) Stapf, *H. dichroa* (Steud.) Stapf, *H. dregeana* (Nees) Stent., *H. filipendula* (Hochst.) Stapf, *H. fili-var pilosa* (Hochst.) Stapf, *H. finitima* (Hochst.) Stapf, *H. gazensis (*Rendle) Stapf, *H. hirta* (L.) Stapf, *H. newtoni var macra, H. newtonii* (Hack.) Stapf, *H. nyassae* (Rendle) Stapf. syn, *H. pilgeriana* C.E. Hubb., *H. peocilotricha* (Hack.) Stapf, *H. quarrei* Robyns, *H. rudis* Stapf, *H. rufa var rufa* (Nees) Stapf, *H. schimperi* (A. Rich.) Stapf, *H. tamba* (Steud.) Stapf, *H. umbrosa, H. variabilis* Stapf), extending to tropical America, Asia, Australia and to the Mediterranean countries (Bews 1929, Humphreys 1981, Clayton and Renvoize 1986). It is one of the most important genera in high grass savannah, as well as in drier types of grassland (Bews 1929). It is widely used for thatching in Africa and well grazed by animals when immature. It is also a successful coloniser of bare soil, particularly in gravely or stony situations and may be used to revegetate eroded shale slopes and certain poor soils (Roberts 1973, Clayton and Renvoize 1986).

Hyparrhenia is linked to *Cymbopogon* through superficial resemblance with *H. glabriuscula*, which is rated as one of the most primitive species (Clayton and Renvoize 1986).

1.2.1.1.19 *Hyperthelia* Clayton

This genus consists of six species with one indigenous to South Africa, i.e. *H. dissoluta* (Nees ex Steud.) Clayton syn. It is distributed throughout Africa and introduced

to tropical America, the remaining species localized in southern Sudan and Central African Republic. They are tall annual or perennial grasses, which is used for thatching and sometimes harvested for grain (Clayton and Renvoize 1986, van Oudtshoorn 1999).

The genus is related to *Hyparrhenia*, but it has more features in common with *Parahyparrhenia.*

1.2.1.1.20 *Imperata* Cirillo

This rhizomatous perennial grass consists of eight species with one indigenous to our region, i.e. *I. cylindrica* (L.) Raeuschel. The genus is distributed throughout the tropics extending to warm temperate areas in both hemispheres (Bews 1929, Clayton and Renvoize 1986). Varieties occur all over Africa and Asia, and are among the dominant grasses in high grass savannas. Some species are distinctly hygrophylous, but others are psammophilous, or occur as weeds in cultivated land (especially in lands where rice, cotton, coffee and tea are cultivated). Economically these species are also important for they are used for fuel, paper, thatching and ornamental purposes (van Oudtshoorn 1999).

The homogeneous genus *Imperata* is allied to *Miscanthus*, but the contracted panicles and deficient floral parts distinguish the two genera (Clayton and Renvoize 1986). Phenotypically these two genera are also clearly distinguishable.

1.2.1.1.21 *Ischaemum* L.

This genus consists of ~60 species, mostly in southern Asia and Australia with two in South Africa, i.e. *I. schaemum afrum* (J.F. Gmel.) Dandy, *I. fasciculatum* Brongn.. Their habitats are mostly damp or shady places and they are scattered through grasslands but not as a rule dominant (Bews 1929, Clayton and Renvoize 1986). They are tufted perennial grasses, with *I. muticum* and *I. rugosum* used as native pasture species (Watson and Dallwitz 1992). There is no adequate treatment of the genus available, but the variation of the sessile spikelet and pedicelled spikelets lead to the recognition of five sections (Clayton and Renvoize 1986), namely: *Fasciculata*; *Ischaemum*; *Coelischaemum*; *Aristata* and *Aurea*.

The sections evolved in this order, with Sect. *Fasciculata* closely related to *Eulalia*. The genus is sometimes difficult to distinguish form *Andropogon*, but the shape of the rachis is usually characteristic (Clayton and Renvoize 1986).

1.2.1.1.22 *Microstegium* Nees

These are creeping or climbing grasses, which can be either annual or perennial with 15 species commonly adventive (Watson and Dallwitz 1992).

The genus is distributed trough tropical Asia and Africa and consists of 15 species with one indigenous to South Africa, i.e. *M. nudum* (Trin.) A. Camus. *Microstegium* resembles *Eulalia* due to the presence of the cordate lemmas (Clayton and Renvoize 1986).

1.2.1.1.23 *Miscanthus* Anderss.

This is a tufted or rhizomatous perennial tall grass, distributed mainly in Asia, but extending to Africa. There are ~20 species in this genus of which 2 are indigenous to our region, i.e. *M. capensis* (Nees) Anderss., *M. junoeus*. Their habitats are open places, such as hillsides and marshes and several of the larger species are grown as ornamentals (Bews 1929, Clayton and Renvoize 1986, Chapman 1996). Some species are also used in the purifying of water ecosystems (van Oudtshoorn 1999).

An interesting oddity is the suppression of the leaf lamina, resulting in a quill-like blade, formed from the midrib. *Miscanthus* is closely allied to *Saccharum*, with which it hybridises (Clayton and Renvoize 1986).

1.2.1.1.24 *Monocymbium* Stapf

This perennial grass is distributed in Africa and in South Africa, through the Gauteng and KwaZulu Natal (Bews 1929, Clayton and Renvoize 1986, *M. ceressiforme* (Nees) Stapf). They are usually indicators of sour soil and is often subdominant in *Themeda* grass-veldt (Bews 1929, van Oudtshoorn 1999).

The conspicuous spatheoles of *Monocymbium*, gives it an entire different look from *Anadelphia* even though they are rather similar genera. The fact that there are no intermediate species does, however, makes this separation justifiable (Clayton and Renvoize 1986).

1.2.1.1.25 *Oxyrhachis* Pilg.

Oxyrhachis consists of only one species, distributed in Africa and Madagascar, i.e. *O. gravillima*. It is a perennial with linear, folded, or rolled leaf blades found at upland streamsides and marshy places. *Oxyrhachis* is an isolated genus, which shows resemblance to *Ophiuros* (Clayton and Renvoize 1986, Gibbs Russell *et al.* 1990).

1.2.1.1.26 *Phacelurus* Griseb.

This genus consists of ~9 species with one indigenous to South Africa, i.e. *P. franksae* Griseb. The distribution of this genus includes Indo-China and Japan.

The genus consists of perennial grasses, with linear, flat or folded leaf blades and 200-600mm high culms and grow in shady places or open habitats (Clayton and Renvoize 1986, Gibbs Russell *et al.* 1990).

This is a variable genus, whose characters are poorly correlated. Attempts at subdivision have had to rely on the subjective weighting of single characters, therefore it is best to treat the species as a single diffuse cluster. Of the other genera *Phacelurus* is the closest to *Ischaemum*.

1.2.1.1.27 *Rhytachne* Desv.

This genus consists of ~ 12 species, with three indigenous to South Africa, i.e. *R. latifolia, R. robusta, R. rottboellioides*. The genus consists of plants that are annual or perennial growing in pans and riversides or grassland (Gibbs Russell *et al.* 1990). The distribution of this genus includes Madagascar and tropical South America, with a habitat of moist or seasonally flooded grassland. This genus was derived from *Phacelurus* via *Phacelurus gabonensis*, according to Clayton and Renvoize (1986).

1.2.1.1.28 *Rottboelia* L.f.

Rottboelia is a small genus with four closely allied species (Clayton and Renvoize 1986) of which one is indigenous to South Africa (*R. cochinchinensis* (Lour.) W.D. Clayton). Clayton and Renvoize (1986) describe this species as a serious tropical weed. The habitat of this species is variable and includes swamps, disturbed places or dry soils in woodlands.

Rottboelia species are coarse annuals, growing up to 12 feet high. Their leaf blades are broad and flat. According to Chapman (1996), *Rottboelia* is one example among several known to switch from cleistogamy to chasmogamy.

1.2.1.1.29 *Saccharum* L.

Saccharum consists of ~33 species, adapted to temperate to subtropical areas. Important genus in moist to wet habitats. *Saccharum* is commonly split into several genera, but the characters relied on are more appropriate to infrageneric categories (Clayton and Renvoize 1986). The most commonly division into awned (*Erianthus*) and awnless species, seems artificial and Narenga, with its coriaceous glumes, seems no more than the expression of a trend found elsewhere in the genus. Stapf retains *Erianthus ravennae* Beauv. in this genus as *S. ravennae* L.

In South Africa and US the species of this genus behaves as perennials under cultivation (Bews 1929). It grows up to 6 or 8 feet tall, with solid yellowish-green canes and thick rich green leaves.

This genus is a native of India, but is now widely distributed in cultivation. There are many varieties, some of which are used as forage grasses for all classes of stock (Bews 1929). Probably the most important feature of this genus is the use of *S. officinarum* sugar cane, which is harvested as thick culms and pressed through heavy rollers to extract the juice. Three products are produced: sugar; molasses and bagasse. Since all three are the result of photosynthesis, they represent energy capture and could therefore be used for fuel. The sugar and molasses being fermented to ethanol and the bagasse burned (Chapman 1996).

1.2.1.1.30 *Schizachyrium* Nees

This genus consists of ~60 species with six indigenous to South Africa, i.e. *S. brevifolium* (Sw.) Nees, *S. exile* (Hochst.) Pilger., *S. jeffreysii* (Hack.) Stapf, *S. rupestre* (K.Schum.) Stapf, *S. sangiuneum*, *S. ursulus* Stapf. It occurs in the tropics of both hemispheres and forms an important part of the wild prairie hay. Their habitat includes sandy beaches and savannah (Bews 1929, Clayton and Renvoize 1986). It is a tall, sometimes delicate, annual or perennial grass with sexual and asexual reproduction (Connor 1986).

This genus is closely allied to *Andropogon* Sec. *Leptopogon* but is distinguished by its single racemes.

1.2.1.1.31 *Sehima* Forssk.

This genus consists of 6 species ranging from South Africa (2 indigenous, i.e. *S. galpinii* Stent., *S. ischaemoides*) to India and Australia. It is a tufted perennial or annual grass in dry bushland and grows on lava rocks and on seasonally waterlogged black clay's (Bews 1929, Clayton and Renvoize 1986, Watson and Dallwitz 1992).

This genus is remarkably uniform even though they are variable in some key characters. The shape and nervation of the pedicelled spikelet being its most particular characteristic. Some do regard this genus as a segregate of *Ischaemum* (Clayton and Renvoize 1986). An important feature of this genus is that it only grows in clayey soil.

1.2.1.1.32 *Sorghastrum* Nash

This close relative of Sorghum consist of ~20 species and range from Africa to tropical America. Two of these species is indigenous to South Africa, i.e. *S. friesii* (Pilg.) Pilger, *S. stipoides* (Kunth.) Nash and is found in savanna and woodland margins. It is either an annual or perennial grass (Bews 1929, Clayton and Renvoize 1986).

Sorghastrum avenaceum survives repeated burnings. Their flowering stems can grow up to seven feet tall and the leaves can reach two feet in length and are tapered.

Sorghastrum nutans have a tall stalked seadhead with rust-gold, soft seeds. The sheet is usually hairy but can have sparse or no hairs. This species is similar to *Stipa sportea* and *Andropogon gerardi*. It is a fair grazing grass for wildlife and makes good grazing for livestock.

The generic circumscription of this genus is stretched by some species, whose pedicels bear fertile awned spikelets, which also indicates a strong alliance with *Saccharum* (Clayton and Renvoize 1986).

1.2.1.1.33 *Sorghum* Moench

The genus *Sorghum* Moench consists of ~2 species and is widely distributed throughout the tropics and subtropics of the Old World. In South Africa two species are indigenous. This genus consists of annual or perennial, tufted or sometimes rhizomatous, mostly robust grasses (Clayton and Renvoize 1986, Gibbs Russell *et al.* 1990). Their leaf blades are usually flat with the inflorescence a paniculate, either open or contracted. The spikelets are overtly heteromorphic with the pedicellate much narrower and awnless (Gibbs Russell *et al.* 1990).

Lasiorhachis, with pedicelled spikelets that are fertile and rudimentary within the same panicle, lies between *Saccharum* and *Hemisorghum*, but it are not distinct enough to stand on its own. Other species well known in this genus includes: 1) *S. guineense* "Guinea corn", with three varieties and numerous races; 2) *S. dura*, the most common cultivated sorghum in Egypt; 3) *S. caffrorum*, the "Kafir corn" or "Amabela" of South Africa.

This genus is vary variable, and is usually subdivided into sections, *Chaetosorghum, Heterosorghum, Parasorghum, Sorghum and Stiposorghum* (De Wet *et al.* 1970, De Wet *et al.* 1972, Harlan and de Wet 1972, De Wet 1978). Section *Parasorghum and Stiposorghum* appears to be some what distant from the rest of the genus. Duvall and Doebley (1990) and Sun *et al.* (1994 b) found *Parasorghum* to be paraphyletic in molecular phylogenetic studies.

Section *Sorghum*, which includes cultivated sorghum, a complex of closely related annual taxa from Africa (*S. bicolor*), and a complex of perennial taxa from southern Europe and Asia (*S. halepense*). This section is also related to *Saccharum*, with

which it will hybridize. Numerous classifications of this section are available (Snowden 1936, Murty *et al.* 1967, Jakusyevsky 1969, Harlan and De Wet 1971, 1972).

Sorghum bicolor is one of the most economically important crops in the world (Dogget 1976, 1988, FAO Yearbook Production Report 1993, Arriola and Ellstrand 1996) and has received much attention, but the rest of the genus has not received that much attention (Garber 1950, Harlan and De Wet 1972, Lazarides *et al.* 1991).

Sorghum bicolor is an annual grass that is wind pollinated and outcross at a rate of 10-15% (Ellstrand and Foster 1983, Eastin and Lee 1985, Dogget 1988, Arriola and Ellstrand 1996). The morphological wild varieties of *S. bicolor* differ from each other primarily in respect to inflorescence structure and distribution (de wet and Harlan 1971).

It has been suggested (Vinall and Getty 1921, Hadley 1953, Baker 1972, Dogget 1988, Ariolla and Ellstran 1996) that *S. bicolor* hybridizes with *S. halepense* (Johnsongrass) under field conditions. *Sorghum halepense* is a perennial grass that is wind pollinated and reproduces vegetatively as well as through sexual means (Arriola and Ellstrand 1996).

Sorghum is the staple food of millions of people, mainly in Africa and India. The genus is an excellent silage and is also directly used for grazing. It does, however, contain hydrocyanic acid and can be poisonous if it is welted. The *Sorghum* culm is also used to make syrup and fuel.

1.2.1.1.34 *Thelepogon* Roth.

This is a coarse annual grass, which is mainly found in tropical Africa, extending to Indonesia. Its habitat include seasonally soils and disturbed ground.

Of the other genera it resembles *Ischaemum*, distinguished only by the barren pedicel (Clayton and Renvoize 1986).

1.2.1.1.35 *Themeda* Forssk.

Themeda is in many ways one of the most advanced genera in the tribe with 18 species and one indigenous to South Africa, i.e. *T. triandra* Forssk. They cover immense areas of the subtropical grassland and are very important grazing species in South Africa.

It is a dominant grass, which will increase when fires occur frequently, providing overgrazing does not take place (Bews 1929, Clayton and Renvoize 1986 and van Oudtshoorn 1999). It is the “Rooigras” or “Red grass” of South Africa or “Insinde” (Zulu) and is a valuable forage grass. This is a relatively mesophytic surface rooting perennial (Bews 1929 and Clayton and Renvoize 1986).

1.2.1.1.36 *Trachypogon* Nees

This genus consists of ~13 species and is distributed through Africa (1 indigenous to South Africa, i.e. *T. spicatus* (L.f) Kuntze), *Madagascar* and the warmer regions of America. It forms a dense covering in the high rainfall areas and plays an importuned role in the protection of soil erosion. In some parts of America, it is an important constituent of the grazing areas (Bews 1929, Clayton and Renvoize 1986, Gibbs Russell *et al.* 1990, van Oudtshoorn 1999). It is mostly tufted perennial (Bews 1929, Clayton and Renvoize 1986).

The genus *Trachypogon* has a similar raceme structure to *Germania*, but it was achieved by a different route, for it resembles *Homozeugos* rather than *Lophopogon* (Bews 1929, Humphreys 1981, Clayton and Renvoize 1986, , Gibbs Russell *et al.* 1990).

In 1929 Stapf described the nomenclature of the species of *Trachypogon* in the "Flora of Tropical Africa", to be controversial. He extends it to cover *T. montufari* of Farnier (and of Hitchcock), but the other species of *Trachypogon* are more local (Bews 1929).

1.2.1.1.37 *Urelytrum* Hack.

This genus consists of seven species, with one indigenous to South Africa, i.e. *U. agropyroides* (Hack.) Hack. The genus consists of annual or perennial grasses with 600-2500 mm high culms. The leaves are auriculate with linear, flat or rolled (convolute) leaf blades.

According to Clayton and Renvoize (1986) *Urelytrum* have the thickened internodes and awnless upper lemma, that is characteristic of their subtribe *Rottboelinneae*, but some features, in particular the callus, are reminiscent of the subtribe

Ischaemum and *Andropogonineae*. There is also an alliance between some *Urelytrum* and *Schizachyrium* species.

1.2.1.1.38 *Vetiveria* Bory

The genus *Vetiveria* consists of ~10 species, with one indigenous to South Africa, i.e. *V. nigritana* (Benth.) Stapf. *Vetiveria* grows about 2m tall and is a densely tufted perennial grass, which is almost seedless. Its habitat is flood plains and stream banks. It is a deep rooted grass that is able to withstand both draught and flooding, with tough foliage that makes it unpalatable to livestock. This grass is mostly cultivated for its aromatic roots. It is the "Khas - Khas" or "Khus Khus", the source of "Vetiver" oil (Bews 1929, Clayton and Renvoize 1986, Gibbs Russell *et al.* 1986, Chapman 1996).

According to Chapman (1996), Vetiver grasses represents the student of grasses. They are related to *Sorghum* subgen. *Parasorghum* and *Vetiveria pauciflora*, with its 2-3 spikelet pairs per raceme also links the genus to *Chrysopogon*.

1.2.1.1.39 *Vossia* Wall. and Griff.

This genus consists of one species, *V. cuspidata* Griff. and is distributed throughout tropical Africa and India. It is an aquatic perennial, which can be found close to water, or often floating. The culms are 1000-2000mm high, with floating culms up to 7m long. The leaf blades are broad and flat (Bews 1929, Clayton and Renvoize 1986, Gibbs Russell *et al.* 1990).

Gibbs Russell *et al.* (1990) describe this genus as hydrophytic or helophytic and as a segregate from *Phacelurus*.

1.2.1.1.40 *Zea* L.

Maize's agricultural importance has lead to the use of *Zea* as a model for genetics, molecular biology and systematics (Doebley 1990, Kellogg and Brichler 1993 and Buckler and Holtsford 1996a). The genus consists of ~4 species. They originated in America, but were cultivated from prehistoric times by the races of American aborigines

from Peru to the middle of North America. Introduced into the Old World, it spread rapidly and is grown extensively everywhere in the warmer regions of the world. They are now the chief crop in Africa, being cultivated by natives and Europeans.

In 1980 (Doebly and Iltis) used multivariate techniques to show that maize and the teosintes fell into two groups, one which consisted of maize plus two annual teosintes. These they treated in an emended *Z. mays* as subsp. *mays*, subsp. *mexicana* (Schrader) Iltis, and subsp. *parviglumis* Iltis and Doebley, respectively, *Z. mays* was then the sole species in *Zea* sect. *Zea.* The other phenetic group is comprised of three species, *Z. luxurians* (Durieu and Ascherson) Bird, *Z. diploperenis* Iltis, Doebley and Guzman, and *Z. perenis* (Hitchcock) Reeves and Mangelsdorf, all included in *Zea* sect. *Luxuriantes.*

The genus consists of annual or rarely parenial species with broad leaves. *Z. mays* is morphologically so different from the other species in the genus, that it is sometimes placed in a separate genus. Although the differences are extreme to the eye, they were found to be under relatively simple genetic control and are such as would be expected between species subjected to disruptive selection.

Zea L. "Maize", 'Indian Corn", Mealie" is widely cultivated, being one of the most important of all the cereal grasses, giving comparatively high yield under suitable conditions. It is an important staple cereal of tropical regions, and also extensively grown as a forage crop and is an important source of oil, syrup and alcohol (Clayton and Renvoize 1986).

The phenetic systematics of *Zea* are confirmed by studies of variation in isozymes (Doebley 1984, Doebley *et al.* 1984, 1987a), in chloroplast DNA restriction sites (Timothy *et al.* 1979, Doebley *et al.* 1987a, 1987b, Doebley 1990), in DNA-DNA hybridization (Hake and Walblot 1980) and in ribosomal and 5S RNA genes (Zimmer *et al.* 1988, Buckler and Holtsford 1996a, 1996b).

From phylogenetic studies (Buckler and Holtsford 1996a, 1996b) it is clear that *Zea* L. is a sister species of *Tripsacum.*

1.3 Cytogenetics

During the past century the part of biological science which deals with evolution and classification has entered a new era, dominated by cytology and genetics and their use for solving evolutionary and taxonomic problems (Stebbins 1956).

No group of plants has been more radically affected by this new approach than the grass family. Because of the many uses of grasses, classification or taxonomy does more than satisfy the curiosity about the diversity of living things and the way in which they evolved. Cereal and sugar cane breeders have learned that many species of wild grasses are closely related to the cultivated crop species and hybrids between them can be obtained. Therefore, the most useful system of classification is one which reflects as nearly as possible the true genetic and evolutionary relationships of the species.

The use of cytogenetics in plant taxonomy is thus important for the determination of phylogenetic relationships (Celarier 1956). It is, therefore, crucial to know what the basic chromosome numbers are, how they originated and their significance in establishing phylogenetic trends (Celarier 1956). The tribe Andropogoneae has been studied extensively over the last millennium, but there is still an uncertainty about the true base chromosome number (Celarier 1956).

Celarier (1956) suggested that the base chromosome number is five, because of the occurrence of many taxa with the haploid chromosome numbers as multiples of five. Other chromosome numbers suggested for the tribe includes nine (Avdulov 1931), seven (Moriya and Kondo 1950) and six (Janaki-Amal 1940), but they are rare and there are no diploid species known with six or seven as the base number. The most common numbers recorded for the tribe are multiples of ten or five (Darlington and Janaki-Ammal 1945, Delay 1951).

The basic number of five was first recorded by Karper (1929) and later confirmed by several others (Longley 1932, Karper and Chisholm 1936, Hushkins and Smith 1932, 1934, Ayyenger and Ponnaiya 1941, Garber 1947, 1950, Garber and Snyder 1951, Celarier and Harlan 1957, De Wet 1958, Olorode 1975, Dujardin 1978, Spies and Du Plessis 1986 a, b, 1987 a, b, Sinha *et al*. 1990, Spies *et al*. 1994, Strydom *et al*. 2000).

Earlier studies of the tribe Andropogoneae indicated basic chromosome numbers of both five and ten for *Andropogon, Chrysopogon, Cymbopogon, Eulalia, Elionurus, Imperata, Monocymbium, Themeda, Trachypogon* and *Vetiveria* (Appendix 1).

In *Bothriochloa, Dichanthium, Diheteropogon, Hyparrhenia, Ischaemum, Microstegium, Phacelurus, Sorghastrum, Urelytrum* and *Zea* only the base number of ten has been observed, which was confirmed by the observation of a high multivalent frquency in Hyparrhenia tamba with 2n = 20 by Spies and Du Plessis (1987 a, b), whereas in *Coix* and *Sorghum* the base number of five has been confirmed (Appendix A).

Cleistachne and *Coelorachis* revealed nine as their basic chromosome number and in 1986, Spies and Du Plessis also observed nine as a basic chromosome number in *Andropogon lacunosus* J.G. Anders.

Both basic numbers of nine and ten have been observed in *Arthraxon, Hemarthria* and *Rottboelia* (Appendix 1), whereas nine and 15 have been reported in *Miscanthus* (Avdulov 1931, Bremer 1934, Celarier 1956), and ten and 15 in *Hyparrhenia*. Later studies by Spies and Du Plessis (1987 a, b) also indicated five as the basic number for *Hyparrhenia.* Other numbers include 11 in *Heteropogon*, with aneuploidy suspected (Spies and Du Plessis 1986 a, b, 1987 a, b), 17 and 20 in *Sehima* and seven in *Hackelchloa.*

Heterochromatized knobs are found on the chromosomes of *Zea, Tripsacum* and *Coix lacryma-jobi* but not on *Coelorachis cylindrica, C. ramosa* or *Elionurus argenteus* (Chandravadana and Galinat 1976). Dennis and Peacock (1984) found close similarities between the knob sequences of *Tripsacum* and *Zea*.

Like many other organisms maize (*Zea*) have supernumary or B chromosomes (Langley 1927, McClintock *et al.* 1981, Jones and Rees 1982, Kellogg and Brichler 1993, Rosato *et al.* 1996 and Chiavarino *et al.* 1998). It is reported that B chromosomes are maintained due to various mechanisms of "drive" consisting of:

1. The suppression of meiotic loss when they are in single dose,
2. Nondisjunction at the second pollen grain mitosis (Roman 1947, Carlson 1978, Carlson and Tau-San Chou 1981, Carlson and Roseman 1992),
3. Preferential fertilization by the sperm nucleus carrying the B chromosomes produced during the nondisjunction process (Roman 1948, Carlson 1969) and
4. A higher competitive ability of B-carrying pollen grains (Beckett 1982).

B chromosomes are not generally present in all individuals of a species or even in a population and their number varies with little or no detectable effect on the phenotype. Cytogenetically all B chromosomes are similar and they are highly heterochromatic. Because of their sporadic occurrence, their origin has been a puzzle. B chromosmes have been observed in various genera of the tribe Andropogoneae (Appendix A).

A phenomena that is commenly observe in Andropogoneae is polyploidy. Polyploids have three or more complete sets of chromosomes in their nuclei instead of the two found in diploids. The level of ploidy can be extremely high. The highest level thus far found in Andropogoneae is 12-ploid (Appendix A).

A particular distinctive feature of the evolution and speciation of flowering plant is allopolyploidy – the combination of different diploid nuclear genomes from two or more different ancestral species or genera. Understanding polyploidy assumes even greater significance when it is considered that most important crops are polyploids (eg. Coffee, cotton, maize, potato, sugarcane and wheat) (Leitch *et al*. 1997).

Novel uses of molecular techniques have opened up powerful ways of investigating the genomic or DNA sequence constitution of polyploids.

In this study the cytogenetic data will be used in conjunction with phylogeny to determine the relationships within the tribe Andropogoneae and to establish any correlation between the polyploid level and phylogeny.

1.4 Phylogeny

Phylogenies are providing major insights into our understanding of evolution (Eggleton and Vane-Wright 1994, Harvey *et al.* 1996, Walsh *et al*. 1999). If the evolutionary history of an organism is traced back it connects through shared ancestors to lineages of other organisms (Lipscomb 1998), therefore all is connected through a phylogenetic cladogram.

The first step of a phylogenetic reconstruction is the identification of plesiomorphic (primitive characters) and apomorphic (derived characters) character states. For phylogenetic reconstructions only synapomorphic characters (shared derived characters) can be used. When these synapomorphic characters are found, the phylogeny is reconstructed step by step. This is the search for a sister group. The concept of sister

groups is independent of extinction. It is thus possible to start with any species or monophyletic group, and search for the sister group by surveying the synapomorphies (Bremer and Wanntorp 1978).

There are two ways of grouping taxa together based on synapomorphies. The Hennig Argumentation (Hennig 1966) and the Wagner Method (Kluge and Farris 1969, Farris 1970). In the Wagner method character states are measured on an interval scale and no "a priori" restrictions are imposed on character state changes. Since this procedure minimizes the number of changes, it also minimizes the number of extra change or homoplasy. Thus, the most parsimonious cladogram is obtained (Swofford and Maddison 1987). More homoplasy in the most parsimonious cladogram do not imply that the data provide less information for choosing among cladograms. The consistency index (CI) is an appropriate measure of homoplasy (=deviation from hierarchy). The retention index (RI) seems more appropriate for fit between different cladograms for the same data set (Goloboff 1991). To search for the most parsimonious cladogram, several methods are used, e.g. exhaustive search, branch and bound and branch swapping.

A consensus cladogram is used to show the information about taxa relationships that all the equally parsimonious cladograms have in common. A consensus cladogram is not a character distribution scheme, but merely indicates common, as well as unshared components. Consensus cladograms are consequently neither parsimonious nor unparsimonious. The cladistic parsimony criterion should only be used in relation to the length of cladograms and not in relation to consensus cladograms, which are without length (Anderberg and Tehler 1990). There is a variety of consensus techniques, including:

- Strict (Sokal and Rohlf 1981, Page 1989), a cladogram that is derived by combining only those components from a set of cladograms that appear in all of the original cladograms,
- the Adams consensus cladogram which places taxa that conflict at the node all the conflicting positions have in common (Adams 1972),
- the Combinable components or Semistrict consensus cladogram that is similar to a Strict consensus cladogram, except it will combine those clades that are not contradicted by all of the cladograms (Bremer 1990) and

- the Majority Rules consensus cladogram, which considers the most frequent placement of a taxon in all the cladograms as its placement in the consensus, cladogram (Swofford 1991).

Of these, the most commonly used is Strict consensus, mainly on the grounds that it is the most conservative (Barret *et al.* 1991). Other criteria than those followed by the Strict consensus may be used to choose among the many equally parsimonious cladograms. Such an example is successive weighting. Homoplastic characters being less reliable are down weighted, hence successive weighting employs evidence that would otherwise be discarded, namely, that the characters themselves indicate that some are less reliable than others (Farris 1969, Carpenter 1994). The weighted characters are then used to create a new cladogram. New unit character consistencies are calculated and the characters re-weighted, until the cladograms on successive iterations are identical. The technique thus selects the most consistent characters (Carpenter 1988).

Heritable characters of taxa are the products of their history and are of value in its elucidations. Thus, different data sets, when subjected to reliable methods of phylogenetic analysis are expected to converge onto the true species phylogeny for their group (Miyamoto and Carcraft 1991, Sheldon and Bledsoe 1993, Miyamoto *et al.* 1994 and Miyamoto and Fitch 1995).

These data sets used must be obtained from the appropriate molecular method. Studies of nucleic acids (DNA, RNA) are the most powerful approach to chemosystematics (the use of chemical constituents of plants to assess inter- and intraspecific relationships and to infer phylogeny) of plants (Woodland 1991).

There are two basic methods used to obtain primary sequence information (Clegg and Darbin 1990, Woodland 1991). Restriction endonucleases can be used for analysis of molecular differences among DNA samples. The other choice is the complete sequencing of genes from representative taxa (Clegg and Darbin 1990).

DNA sequencing is more expensive and requires more sophisticated protocols than does restriction analysis, but it represents a more straightforward approach to comparative systematics and is most valuable for higher-level phylogenetic comparisons (Woodland 1991).

1.4.1 Chloroplast DNA in phylogeny

The variation in chloroplast DNA has proven to be valuable in the reconstruction of plant phylogenies. The chloroplast genome of higher plants consists of circular DNA of about 120-217 kilobase pairs (kb), arranged into two single copy regions divided by inverted repeats. Earlier studies of chloroplast genome evaluation indicated conservation in size, structure, gene content and linear order of genes among major lineages of land plants (Palmer 1985, 1991, Palmer and Stein 1986). This suggested that a change in structure arrangement or content of the chloroplast genome may have significant phylogenetic implications.

The changes in the genome have been attributed to inversions and additions/deletions that may be found in noncoding DNA, which are used for determining relationships among more closely related species (Palmer *et al.* 1988, Clegg *et al.* 1991, Morton and Clegg 1993). Examples of this strategy used for chloroplast DNA evolution analysis, include studies of:

- the *rbcL* region of the Arundinoideae (Barker *et al.* 1995),
- between *Brassica* species (Lannér 1998), *Korthalsella* species (Molvray *et al.* 1999), Acanthaceae (McDade and Moody 1999), *Pelargonium* species (Bakker *et al*. 1999), Astragalus species (Wojciechowshi 1999) and *Doronicum* species (Fernandez *et al.* 2001), based on *trnL-trnF* sequence data,
- the plastid DNA sequences of *Pleurothallidinae* (Priggeon *et al*. 2001), *Cranichideae* with emphasis on *Spiranthinae* (Salazar *et al.* 2003) and from *Cyperaceae* subfamily *Mapanioideae* (Simpson et al. 2003),
- The chloroplast genes of the cotton genus *Gossypium: Malvaceae* (Cronn *et al*. 2002),
- chloroplast sequence data of *Capparaceae* and *Brassicaceae* (Hall *et al*. 2002),
- the *rbcL*, *trnL-F* and *ndhF* sequences of *Urticalean rosids* (Sytsma *et al*. 2002),
- the *ndhF* region of *Panicum* (Aliscion *et al*. 2003),

- *rbcL* and *trnL-F* plastid DNA sequences of *Ophioglossaceae* (Hauk *et al*. 2003),
- the DNA sequence variation from three cpDNA fragments: *rbcL, atpB* and *trnL-F* of the Hawaiian fern genus *Adenophorus* (Ranker *et al.* 2003).

The *trnL-trnF* region is suitable for evolutionary studies because of the succession of conserved *trn* genes and several base pairs of non-coding regions and the higher rate of molecular evolution of the single-copy regions (Wolfe *et al.* 1987, Taberlett *et al.* 1991).

In 1991 Taberlett *et al.* developed the primers for the amplification of three non-coding regions (Figure 1.8) i) *trnT* (coding for threonine) ii) *trnL* (coding for leucine) and iii) *trnF* (coding for phenylalanine). The first primer pair amplifies the intergenic spacer between *trnT* and *trnL* 5' exon, the second the *trnL* intron and the third pair the intergenic spacer between the *trnL* 3' exon and *trnF*.

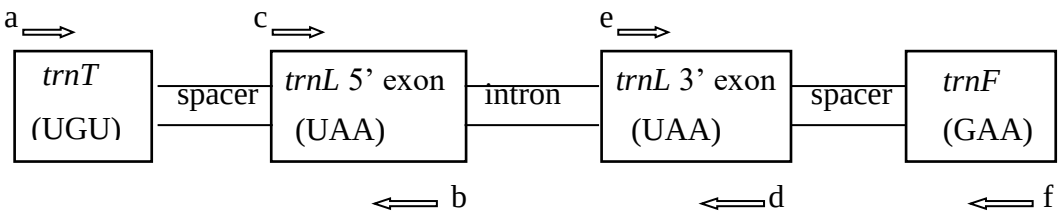

Figure 1.8:. A schematic representation of the *trn* region in the Chloroplast genome with the primers a-f developed for the amplification of this region (Taberlett *et al*. 1991).

Several scientists have observed a faster evolution in the spacer portion of the *trnL-trnF* region, than in the intron (Gielly and Taberlett 1994, 1996, Kita *et al.* 1995, Gielly *et al.* 1996). This suggests a stronger selection for the intron than for the spacer (McDade and Moody 1999).

This combination of regions evolving at different rates increase the phylogenetic range over which these sequences are useful, with the more slowly evolving regions providing support for the older divergences and the more rapidly evolving regions providing support for the closer relatives (McDade and Moody 1999).

In comparison to other chloroplast loci the parsimony-informative variation of *trnL-F* is comparable to *ndhf* in terms of rate of substitutions. These two regions combined, provides twice the rate of informative substitutions as does *rbcL*. The *trnL-F*

region does, however, exceed the number of informative length mutations within *ndhf* and *rbcL*. This region offer on a whole, more phylogenetically informative variation per nucleotide sequenced than does *ndhf* or *rbcL,* it is also relatively free from homoplasy compared to the other two.

A phylogenetic study on the Andropogoneae, based on *ndhf* sequences has recently been conducted by Spangler *et al.* (1999). For this study, however, the *trnL-trnF* region will be sequenced to determine the relationships within and between the genera of the tribe Andropogoneae and to determine the mutation rate within and between the genera.

1.4.2 Nuclear DNA in phylogeny

Even though plant nuclear DNA is analyzed less easily than cpDNA, it does possess two attributes that make it useful phylogenetically. First, certain nuclear sequences appear to evolve more rapidly than any cpDNA sequences, allowing a finer level of discrimination at the population level than for cpDNA. Second, the nuclear genome is inherited biparently, whereas the chloroplast genome is inherited maternally. Thus, a hybrid plant will possess the nuclear complement of both parents but only the cpDNA of the maternal plant. The nuclear DNA used in such a study must be i) evolutionary conservative, ii) phylogenetically interpretable, iii) easily examined in the laboratory and iv) sufficiently large for phylogenetic reconstruction (Hamby and Zimmer 1992).

An example of this is the internal transcribed spacers (*ITS*) region of 18-26S nuclear ribosomal DNA. This region includes three components (Figure 1.9): the 5.8 S subunit, an evolutionary highly conserved sequence and, importantly from the perspective of this study, two spacer regions designated *ITS1* and *ITS2*. The *ITS* regions are part of the transcriptional unit of nuclear ribosomal DNA (nrDNA), but the spacer segments of the transcript are not incorporated into mature ribosomes. Instead *ITS1* and *ITS2* regions of the nrDNA transcript may function in the maturation of nrRNA's.

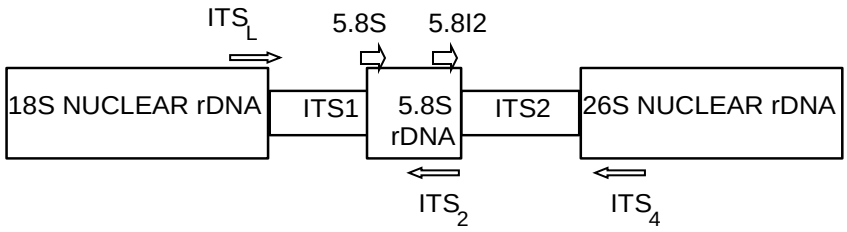

Figure 1.9: Repeat unit of 18-26S nuclear ribosomal DNA, minus the intergenic spacer and the larger part of the 26S subunit (White *et al*. 1990, Sun *et al.* 1994).

Several aspects of the *ITS* region promote *ITS* use for phylogenetic analysis. Firstly, along with the other components of the nrDNA multigene family, the *ITS* region is one of the most highly repeated sequences in the plant nuclear genome. The entire nrDNA repeat unit, including the subunits, *ITS1*, *ITS2*, the intergenic spacer (*IGS*) and the external transcribed spacer (*ETS*), is present in up to many thousands of copies, arranged in tandem repeats of a chromosomal locus or at multiple loci (Rodgers and Bendich 1987, Hamby and Zimmer 1992). This high copy number promotes detection, amplification, cloning and sequencing of nrDNA. Secondly, and most importantly from the phylogenetic standpoint, this gene family undergoes rapid concerted evolution (Arnheim *et al.* 1981, Hills *et al.* 1991), via unequal crossing over and gene conversion, a property that promotes intragenomic uniformity of repeat unit and accurate reconstruction of species relationships from these sequences (Hamby and Zimmer 1992, Sanderson and Doyle 1992). Thirdly, the small size of the *ITS* region and the presence of highly conserved sequences flanking each of the two spacers makes this region easy to amplify.

The successful sequencing of the *ITS* region is commonly used in phylogenetics (Brochman *et al.* 1998, Emshwiller and Doyle 1998, Downie *et al.* 1998, Fenton *et al.* 1998, Freudenstein 1999, Gernandt and Liston 1999, Hsiao *et al* 1998, Kelly 1998, Kim *et al.* 1999, Kornkven *et al.* 1998, Alice and Campbell 1999, Douzery *et al.* 1999, Lee and Downie 1999, Li *et al.* 1999, Noyes and Rieseberg 1999, Panero *et al.* 1999, Plunkett and Downie 1999, Steane *et al.* 1999 a, Steane *et al.* 1999b, Vargas *et al.* 1999, Pridgeon *et al*. 2001, Coleman 2002, Nimri *et al.* 2002, Watson *et al*. 2002, Muellner *et al* 2003, Schnabel *et al*. 2003, Urbatsch *et al*. 2003, van den Heede 2003).

Spies and Kellogg (unpublished data) sequenced the *ITS* region of some representatives of the tribe Andropogoneae and in 1994 Sun *et al.* sequenced this region to infer phylogenetic relationships in *Sorghum* and Buckler and Holstford (1996a,b) also determined the phylogenetic relationships of some species of *Zea*.

In this study we will sequence the *ITS* region of the South African representatives of the tribe Andropogoneae to determine the phylogenetic relationships and to determine the mutation rate within and between the genera of Andropogon.

1.5 Aim.

The morphological variation among members of the tribe Andropogoneae in South Africa provides an interesting context to examine evolutionary relationships within this group. Within the grass family this tribe is considered to be advanced and widespread polyploid. This study is the beginning of research on South African representatives, with the main aim to determine the usefulness of the different genes in providing answers on the South African situation where a lot of variation among the members of the tribe exist.

This study will determine the phylogenetic relationships from chloroplast and nuclear DNA sequences, as well as from the basic chromosome numbers in the tribe. Thus sequencing of the chloroplast region, *trnL-F,* and the nuclear ribosomal DNA, *ITS* region, will be compared with cytogenetic data. The sequences will then be used to determine the divergence within some genera of the tribe Andropogoneae.

Chapter 2

Materials and Methods

2.1 Materials.

The plants used in this study were collected in the veldt. Voucher herbarium specimens (Table 2.1) are housed in the Geo Potts Herbarium (BLFU).

In this study Taq polymerase (Advanced Biotechnology's, Surrey, UK) and DNA Molecular marker VI (pBR328 DNA cleaved with a mixture of *Bgl* I and *Hinf* I) (Boehringer Mannheim Cat. no. 1062590) were used. Different primers were used for *ITS* sequencing (DNAgency Cat. No. GK 071101 and GK 071102) and *trnL-F* sequencing (Whitehead Scientific, 930030, 930031, 930032, 930033). The Thermo Sequence^{TM} dye terminator cycle sequencing pre-mix kit (Amersham Life Science, US 79765 and US 79865), and the BigDye terminator Cycle sequencing ready reaction (PE Applied Biosystems, 4303152) were used to sequence the amplified nrDNA and chloroplast DNA. All the other chemicals used were of analytical grade.

2.2 Methods.

2.2.1 Cytogenetics.

Young inflorescence were collected and fixed in Carnoy's (1886) fixative. The fixative was replaced with 70% (v/v) ethylalcohol 24-48 hours after fixation. The anthers were squashed in 2% (m/v) aceto-carmine (Darlington & La Cour 1976) on a microscope slide. Improved staining of the chromosomes was achieved by adding iron acetate (Thomas 1940) and heating the slide over a spirit flame. Liquid CO_2 (Bowen 1956) was used to separate the cover slip from the microscope slide for mounting the slides permanently. Removal of the cover slip was followed by dehydration in ethylalcohol and mounting in Euparal. At least twenty cells per specimen were studied for each meiotic stage, except where otherwise indicated.

2.2.2 Photography.

A Nikon microphot-FXa photomicroscope and Ilford Pan-F films, as well as a Nikon Coolpix 990 digital camera were used for the photomicrographs. A selection of the photos is used in this study.

Table 2.1: List of specimens studied, their voucher numbers and localities according to the degree reference system (Edwards & Leistner 1971).

Andropogon amathystinus Steud.

FREE STATE.—2828 (Bethlehem): Witsieshoek vacation resort (-DB), *Spies 6677, 6679, 6685.*

Andropogon appendiculatus Nees

MPUMALANGA.—2729 (Volksrust): Hartebeesfontein (-CC), *Spies 6543.*

FREE STATE.— 2729 (Volksrust): Giddys Home (-DC), *Spies 6566.* 2827 (Senekal): 33km from Senekal to Ficksburg (-DB), *Spies 6638.* EASTERN CAPE PROVINCE.—3027 (Lady Gray): 35km from Aliwal North to Lady Gray (-CA), *Spies 6946, 6949.*

Andropogon distachyos L.

FREE STATE.—2828 (Bethlehem): Witsieshoek vacation resort (-DB), *Spies 6684;* 24km from Fouriesburg to Clarens (-CA), *Spies 5869*.

Andropogon eucomus Nees

MPUMALANGA.—2530 (Lydenburg): 32km from Carolina to Belfast (-CC), *Spies 5107.*

FREE STATE.—2829 (Harrismith): Sterkfontein (-CA), *Spies , 6587.*

Andropogon schirensis A. Rich

FREE STATE.—2827 (Senekal): 5km from Nebo to Fouriesburg via Generaalsnek (-DB), *Spies 4821.* 2829 (Harrismith): Sterkfontein (-CA), *Spies 5084, 6581*.

KWAZULU/NATAL.—2729 (Volksrust): 99km from Harrismith to Normandien (-DC), *Spies 5084.*

Aristida adscensionis L. (Trin. & Rupr.) Henrard

FREE STATE.—2926 (Bloemfontein): 2km from Reddersburg to Smithfield (-CA), *Spies 6713.*

Arthraxon lanceolatus (Roxb.) Hochst. var. *lanceolatus*

MPUMALANGA.—2430 (Pilgrim's Rest): On top of Blyderiviers Poort (-DB), *Spies 1424*.

Bothriochloa bladhi (Retz.) S.T. Blake

MPUMALANGA.—2530 (Lydenburg): 27km from Lydenburg to Machadodorp (-AD), *Spies 5143.*

FREE STATE.—2926 (Bloemfontein): UOFS campus (-AA), *Spies 5173*.

Bothriochloa insculpta (A. Rich.) A. Camus

GAUTENG.—2528 (Pretoria): Soutpan experimental farm (-AC), *Spies 3321*.

NORTHERN CAPE.—2820 (Kakamas): Augrabies waterfall (-CB), *Spies 5681*. 2824 (Kimberley): 21km from Kimberley to Griekwastad (-DA), *Spies 7489*.

KWAZULU/NATAL.—2832 (St. Lucia): 22km from Cape Vidal to St. Lucia (-AD), *Spies 2407*.

Bothriochloa radicans (Lehm.) A. Camus

FREE STATE.—2827 (Senekal): 6km from Nebo to Fouriesburg (-DB), *Spies 4831*. 2927 (Maseru): 26km from De Wetsdorp to Hobhouse (-DB), *Spies 4784*.

Brachiaria serrata (Thunb.) Stapf syn.

FREE STATE.—2828(Bethlehem): 10km from Fouriesburg to Clarens (-CA), *Spies 6654.*

Cymbopogon dieterlenii Stapf ex Phill.

FREE STATE.—2827 (Senekal): 41km from Rosendal to Ficksburg via Nebo (-DB), *Spies 6642*.

Cymbopogon excavatus (Hochst.) Stapf ex Burtt Davy

FREE STATE.—2828 (Bethlehem): 34km from Fouriesburg to Clarens (-CA), *Spies 5877*. 2829 (Harrismith): Sterkfontein (-CA), *Spies 6577.*

Cymbopogon marginatus (Steud.) Stapf ex Burtt Davy

WESTERN CAPE.—3219 (Wupertal): On top of Uitkyk Pass (-AC), *Spies 4397*. 3420 (Bredasdorp): 1km from De Hoop (-AB), *Spies 5051*.

Cymbopogon plurinodis (Stapf) Stapf ex. Burtt Davy

GAUTENG.—2528 (Pretoria): Soutpan experimental farm (-AC), *Spies 3296, 3322.*

FREE STATE.—2827 (Senekal): 6km from Nebo to Fouriesburg (-DB), *Spies 4842.* 2926 (Bloemfontein): UOFS campus (-AA), *Spies 6404, 6406.* 2927 (Maseru): 19km from De Wetsdorp to Hobhouse (-DB), *Spies 4772.*

EASTERN CAPE PROVINCE.—3324 (Steytlerville): 53km from Patensie to Willowmore in Baviaanspoort (-CB), *Spies 5206.*

Cymbopogon prolixus (Stapf) Phill.

MPUMALANGA.—2629 (Bethal): 46km from Ermelo to Breyton (-DB), *Spies 5101*.

FREE STATE.—2828 (Bethlehem): Witsieshoek vacation resort (-DB), *Spies 6682.*

Cymbopogon sp.

WESTERN CAPE.—3119 (Calvinia): 5km from Algiers to Citrusdal in Nieuwoudt Pass (-CA), *Spies 5800.*

Digitaria tricholaenoides Stapf

FREE STATE.—2826 (Brandfort): Glen camp (-CD), *Spies 6691*. 2827 (Senekal): Nebo (-DB), *Spies 6636.*

Diheteropogon amplectens (Nees) Clayton

FREE STATE.—2828 (Bethlehem): 19km from Fouriesburg to Clarens (-CA), *Spies 4821*.

Diheteropogon filifolius (Nees) WD Clayton

FREE STATE.—2828 (Bethlehem): 34km from Fouriesburg to Clarens (-CA), *Spies 5872, 5874*.

Elionurus muticus (Spreng.) Kunth

SWAZILAND.—2631 (Mbabane): Sebebe Hill, 10 km North-east of Mbabane (-AC), *Spies 2537*.

MPUMALANGA.—2629 (Bethal): 46km from Ermelo to Breyten (-DB), *Spies 5104.* 2729 (Volksrust): Hartebeesfontein (-CC), *Spies 6539.*

FREE STATE.—2729 (Volksrust): Giddys Home (-DC), *Spies 6559.* 2828 (Bethlehem): 10km from Clarens to Golden Gate (-DA), *Spies 6664.* 2927 (Maseru): 42km from De Wetsdorp to Hobhouse (-CA), *Spies 4792.*

KWAZULU/NATAL.—2729 (Volksrust): 93km from Harrismith to Normandien (-DC), *Spies 5074.*

EASTERN CAPE PROVINCE.—3026 (Aliwal North): 35km from Lady Gray to Aliwal North (-AA), *Spies 6945.* 3027 (Lady Gray): 28km from Barkley East to Rhodes (-DC), *Spies 6054.*

Eulalia villosa (Thunb.) Nees

KWAZULU/NATAL.—2729 (Volksrust): 99km from Harrismith to Normandien (-DC), *Spies 5085.*

Helictotrichon longifolium (Nees) Schweick.

FREE STATE.—2729 (Volksrust): Giddys Home (-DC), *Spies 6560*.

Hemarthria altissima (Poir.) Stapf & C. E. Hubb.

SWAZILAND.—2631 (Mbabane): Motshane 16km from Mbabane to Oshoek (-AC), *Spies 5698.*

Heteropogon contortus (L.) Roem. & Schult.

MPUMALANGA.—2729 (Volksrust): Hartebeesfontein (-CC), *Spies 6538.*

FREE STATE.—2729 (Volksrust): Giddys Home (-DC), *Spies 6552.* 2827 (Senekal): 33km from Senekal to Rosendal (-BC), *Spies 6628;* 6km from Nebo to Fouriesburg (-DB), *Spies 4841.*

EASTERN CAPE PROVINCE.—3026 (Aliwal North): 15km from Lady Gray to Aliwal North (-AA), *Spies 4271, 4741*; 10km from Lady Gray to Aliwal North (-AA), *Spies 6942.*

Hyparrhenia anamesa Clayton

FREE STATE.—2827 (Senekal): 8km from Clocolan (-DC), *Spies 4807.*

Hyperthelia dissoluta (Nees ex Steud.) Clayton syn.

MPUMALANGA.—2530 (Lydenburg): 27km from Lydenburg to Machadodorp (-AD), Spies 5145.

Hyparrhenia filipendula (Hochst.) Stapf. var. *filipendula*

MPUMALANGA.—2530 (Lydenburg): 27km from Lydenburg to Machadodorp (-AD), *Spies 5144.*

Hyparrhenia hirta (L.) Stapf

MPUMALANGA.—2530 (Lydenburg): 5km from Belfast to Dullstroom (-CA), *Spies 5112.* 2629 (Bethal): 9km from Ermelo to Breyten (-DB), *Spies 5100.*

FREE STATE.—2827 (Senekal): 5km from Nebo to Fouriesburg via Generaalsnek (-DB), *Spies 4822*, 15km from Senekal to Rosendal (-BC), *Spies 6618.* 2828 (Bethlehem): 10km from Clarens to Golden Gate (-DA), *Spies 6656.*

KWAZULU/NATAL.—2729 (Volksrust): 97km from Harrismith to Normandien (-DC), *Spies 5079.*

EASTERN CAPE PROVINCE.—3324 (Steytlerville): 7km from Humansdorp to Patensie (-DD), *Spies 5184.*

Hyparrhenia pilgeriana C. E. Hubb.

EASTERN CAPE PROVINCE.—3027 (Lady Gray): 15km from Barkley East to Lady Gray (-DC), *Spies 4738.*

WESTERN CAPE PROVINCE.—3319 (Worcester): After tunnel on Du Toitskloof Pass (-CA), *Spies 4603*. 3419 (Caldon): Caledon (-AC), *Spies 4649*. 3420 (Bredasdorp): 4km from Bredasdorp to Swellendam (-CA), *Spies 4851.*

Hyparrhenia quarrei Robyns

FREE STATE.—2829 (Harrismith): Sterkfontein (-CA), *Spies 6586*

KWAZULU/NATAL.—2729 (Volksrust): 106km from Harrismith to Normandien (-DC), *Spies 5088.*

Hyparrhenia tamba (Steud.) Stapf

MPUMALANGA.—2729 (Volksrust): Hartebeesfontein (-CC), *Spies 6537*.

FREE STATE.—2829 (Harrismith): Sterkfontein (-CA), *Spies 6585*.

Hyparrhenia rudis Stapf

FREE STATE.—2829 (Harrismith): Sterkfontein (-CA), *Spies 6576*.

Hyparrhenia sp.

WESTERN CAPE.—3420 (Bredasdorp): 11km from Bredasdorp to Cape Agullas (-CA), *Spies 5033*.

Imperata cylindrica (L.) Raeuschel

MPUMALANGA.—2530 (Lydenburg): 5km from Belfast to Dullstroom (-CA), *Spies 5114*.

FREE STATE.—2829 (Harrismith): Sterkfontein (-CA), *Spies 6582*. 2827 (Senekal): Nebo (-DB), *Spies 6632*.

KWAZULU/NATAL.—2729 (Volksrust): 10km from Newcastle to Cundycleugh (-DD), *Spies 5090*.

Ischaemum fasciculatum Brongn.

SWAZILAND.—2631 (Mbabane): Sebebe Hill (-AC), *Spies 2563*.

KWAZULU/NATAL.—2832 (Mtubatuba): 6km from Hluhluwe to Sordwana (-AA), *Spies 2358*.

Miscanthus capensis (Nees) Anderss.

FREE STATE.—2829 (Harrismith): Sterkfontein (-CA), *Spies 6584*. 2828 (Bethelehem): 10km from Clarens to Golden Gate (-DA), *Spies 6655*.

Monocymbium ceresiiforme (Nees) Stapf

KWAZULU/NATAL.—2829 (Harrismith): Oliviershoek Pass (-CA), *Spies 6578*.

Panicum schinzii Hack.

FREE STATE.—2925 (Jagersfontein): 46km from Petrusburg to Kimberley (-AB), *Spies 6696*.

Paspalum dilatum Poir.

FREE STATE.—2827 (Senekal): 20km from Senekal to Rosendal (-BC), *Spies 6617*.

Phacelurus franksae Griseb.

EASTERN CAPE PROVINCE.—3028 (Matatiele): 78km from Rhodes (-CC), *Spies 4705*.

Setaria sp.

FREE STATE.—2729 (Volksrust): Giddys Home (-DC), *Spies 6567*.

Sorghum bicolor (L) Moench subsp. a*rundinaceum* (Desv.) De Wet & Harlan

FREE STATE.—2926 (Bloemfontein): UOFS grounds (-AA), *Spies 6588, 6589.*

Themeda triandra Forssk.

MPUMALANGA.—2530 (Lydenburg): Hartebeesfontein (-CC), *Spies 6525.*

FREE STATE. —2729 (Volksrust): Giddys Home (-DC), *Spies 6555*. 2926 (Bloemfontein): UOFS campus (-AA), *Spies 6382*. 2828 (Bethlehem): 10km from Clarens to Fouriesburg (-CB), *Spies 6652*.

EASTERN CAPE PROVINCE.—3027 (Lady Gray): Near Dordrecht on the way to Lady Gray (-DC), *Spies 2489.*

Trachypogon spicatus (L. f.) Kuntze

FREE STATE.—2828 (Bethlehem): 19km from Fouriesburg to Clarens (-CA), *Spies 4846*. 2829 (Harrismith): Sterkfontein (-CA), *Spies 6580.*

KWAZULU/NATAL.—2829 (Harrismith): Oliviershoek Pass (-CA), *Spies 6579.*

WESTERN CAPE.—3321 (Ladysmith): 62km from Barrydale to Riversdal over Garcia Pass (-CC), *Spies 5205, 5480.*

Tristachya leucothrix Nees

FREE STATE.—2729 (Volksrust): Giddys Home (-DC), *Spies 6549.* 2827 (Senekal): 33km from Senekal to Rosendal (-BC), *Spies 6627*. 2828 (Bethlehem): 38km from Clarens to Phutaditjhaba via Golden Gate (-DA), *Spies 6671*.

Urelytrum agropyroides (Hack.)Hack.

GAUTENG.—2528 (Pretoria): 1km from Cullinan to Pretoria (-DA), *Spies 2081*.

2.2.3 DNA extraction.

The leaves of the different specimens (Table 2.1) were collected and stored in a saturated sodium chloride (NaCl) and hexadecyltrimethylammonium bromide (CTAB) solution (Rogstad 1992). The leaves were washed with distilled water and cut into pieces. One gram of the material was ground to a fine powder in liquid nitrogen. The tissue was immediately resuspended in warm (65°C) 1% CTAB (500µl) extraction buffer

[1% (m/v) CTAB, 50mM Tris-HCl (2-amino-2(hydroxymethyl)-1,3-propanediol) (pH 8,0), 10mM ethylene diaminetetra-acetic acid (EDTA), 0.7M NaCl (Hills & Moritz 1990), to which 1% (v/v) ß-mercapto-ethylalcohol had been added prior to use]. This mixture was incubated for half an hour at 65°C. After incubation the same volume of chloroform:iso-amylalcohol (24:1) was added to the mixture and thoroughly mixed. This solution was centrifuged at 3 000g for five minutes. The supernatant (which contained the DNA) was transferred to a clean eppendorf tube. Ethylalcohol (two times the volume of the supernatant), containing 3M sodium acetate (25:1), was added to the supernatant to precipitate the DNA at -20°C for half an hour. This eppendorf tube was centrifuged at 10 000g for 10 minutes. The supernatant was discarded and the pellet washed with 70% (v/v) ethylalcohol, containing 10mM ammonium acetate. This pellet was air dried and dissolved in sterile water (Rogstad 1992). The DNA was visualised by intercalating it with Ethidium Bromide and studying it on an ultraviolet (UV) light illuminator.

For the extraction of DNA from herbarium specimens the same method was used but a 4% CTAB solution was used instead of the1% CTAB as previously mentioned, with 0.5% PVP (Polyvinyl-Pyrrolidone) added to the CTAB extraction buffer.

2.2.4 Gel electrophoresis.

An agarose gel [0.8% for genomic DNA] was prepared by melting the desired amount of electrophoresis grade agarose in 1x TAE buffer [Tris (48.44g), acetic acid (11.42ml) and EDTA (2.92g) (pH 8.0)]. This mixture was cooled down to 55ºC and Ethidium Bromide was added to a final concentration of 0.05 µg/ml. Electrophoresis was done in 1x TAE running buffer.

The DNA samples (6 µl) were mixed with 2 µl 6x loading buffer [0.25% (m/v) bromophenol blue, 0.25% (m/v) xylene cyanol and 40% (m/v) glycerol in water] and loaded into the slots of the submerged gel. The DNA fragments were separated at 80V for 30 minutes and examined under ultraviolet (UV) light.

2.2.5 Taguchi optimisation.

The optimisations of the PCR based sequencing analysis were done according to the Taguchi method (Cobb & Clarkson 1994). According to this method, four reaction component optima can be assessed by using nine reactions. Each reaction component is varied in an orthogonal array by three different concentrations of each variable (Table 2.2). The primer, dNTP, $MgCl_2$ and DNA concentrations were the variable components and DNA polymerase and buffer concentrations were kept constant.

Table 2.2: The orthogonal arrangement of the components to be optimised by the Taguchi method (Cobb & Clarkson 1994). Three different volumes of the four components, which are to be optimised, are varied in an orthogonal array.

Reactions	**[Primer] 3.5pmol/ µl**	**[dNTP] 2mM/ µl**	**[$MgCl_2$] 25mM/ µl**	**[DNA] 1:40/ µl**
1	1	2	3	2
2	2	3	3	2.5
3	3	4	3	3
4	1	3	4	3
5	2	4	4	2
6	3	2	4	2.5
7	1	4	5	2.5
8	2	2	5	3
9	3	3	5	2

2.2.6 PCR Sequencing.

The *trnL-F*, as well as the *ITS1* and *ITS2* regions, were amplified by using the polymerase chain reaction (PCR). For *ITS* sequencing 40 cycles of 94°C for 30 seconds, 50°C for 30 seconds and 72°C for 90 seconds were applied. Amplification of *ITS1*

(Figure 1.1) was obtained by using the primers ITS_L and ITS_2 {ITS_L—5'-TCG TAA CAA GGT TTC CGT AGG TG-3' and ITS_2—5'-GCT GCG TTC TTC ATC GAT GC-3'} (White *et al*. 1990). The *ITS2* region was amplified using the 5.8S or the 5.8I2 in combination with ITS_4 primers {5.8S—5'-ACGACTCTCGGCAAC-3', 5.8I2—5'-GCCTGGGCGTCACGC-3' and ITS_4—5'-TCC TCC GCT TAT TGC TAT GC-3'} (White *et al*. 1990, Sun *et al.* 1994).

For *trnL-F*, primers c and d {c—5'-CGAAATCGGTAGACGCTACG-3' and d—5'-GGGGATAGAGGGACTTGAAC-3'} (Taberlet *et al*. 1991) were used to amplify the *trnL* (UAA) intron and primers e and f {e—5'-GGTTCAAGTCCCTCTATCCC-3' and f—5'-ATTTGAACTGGTGACACGCG-3'} (Taberlet *et al.* 1991) for the intergenic spacer between the *trn L* (UAA) 3' exon and *trnF* (GAA).

The amplified DNA template was diluted with sterile water (1:60; ~5ng). A total volume of 11µl of this DNA template was mixed with 1µl of one of the primers and 8µl of the sequence reagent pre-mix. This total reaction volume of 20µl was amplified in a Perkin Elmer thermal cycler. This reaction consists of 94°C for 60 seconds and then 25 cycles of 94°C for 30 seconds, 45°C for 15 seconds and 60°C for 4 minutes. Single stranded DNA was subsequently produced using the double stranded DNA templates and only one primer. Single stranded DNA fragments were purified according to the following protocol of the Thermo Sequence™ dye terminator cycle sequencing pre-mix kit: a volume of 68µl of concentrated ethylalcohol (-20°C) was added to each reaction and mixed using a vortex and placed on ice for 15-20 minutes to precipitate the DNA. This solution of DNA and ethylalcohol was centrifuged for 15 minutes at 10 000 g and the supernatant discarded. The pellet was washed with 250-500µl of 70% (v/v) ethylalcohol (-20°C) and briefly centrifuged. The supernatant was discarded and the pellets were vacuum dried for 2-5 minutes. The pellets were resuspended in 4µl of formamide loading dye. Each sample was heated to 70°C for 2-5 minutes and then placed on ice. The entire sample was loaded onto the sequencing gel and run on the ABI 377 automated sequencer for four to six hours.

2.3 Statistical analysis.

2.3.1 Analysis of Taguchi products.

Using the Taguchi method, the product yield for each reaction was used to estimate the effects of individual components on amplification. This is done by using the quadratic loss function, which Taguchi refers to as signal-to-noise ratios:

$$SNL = -10 \log [1/n \sum 1/y_i^2],$$

where SNL is the signal-to-noise ratio, n is the number of levels and y is the yield. The yield was calculated according to the equation P = (r x s) + 1, where P is the product yield, r is the number of products (in this case r = 1) and s is the size range. For each component the optimal conditions are those that give the largest SNL. The reactions are further refined by using the polynomial regression from SNL values for each component to obtain curves, the maximum of which represent the reaction optima.

2.3.2 Computer analysis.

For phylogenetic analyses the computer program Phylogenetic Analysis using Parsimony (PAUP) version 4.0 * beta version (Swofford 1998), which connect taxa, one at a time, until all the taxa have been added, were used. The heuristic search option with branch swapping was used. Each heuristic search comprised 500 replicates of random taxon addition with tree bisection-reconnection (TBR) branch swapping and MULPARS selected. A bootstrap was done from 1000 replications, using the heuristic option (Felsenstein, 1985). Relative levels of support for clades present in the most parsimonious trees were assessed by calculating decay values (Bremer 1988). A search for multiple islands of parsimony was also conducted in cases were the cladogram yielded a RI value of less than 0.67 (Maddison 1991).

Most sequence analyses were carried out using programs designed for, or adapted

to, the Apple Macintosh. Basic analysis was carried out using the Sequence Navigator DNA and Protein Sequence Comparison Software (Applied Biosystems 1994). The sequence of *ITS1, ITS2* and *trn L-F* regions were aligned using the computer program Clustal W version 1.6 (Thompson *et al*. 1994). Final alignment was visually examined and manually optimised for phylogenetic analysis, using Clustal X (Thompson *et al.* 1997).

2.3.3 Sequence divergence.

The rate of sequence divergence of all genes and spacers were measured using the formula by O'Donnell (1992).

Percentage Divergence = {(TS + TV + I\D) / sequence length} x 100

Where:
TS = Transitions
TV = Transversions
I\D = insertion\deletion; multi-base differences are scored as 1.

This formula permits a comparison of the phylogenetic informations on the relevant sequences (Gielly and Taberlet 1994).

Chapter 5
General Conclusions

The tribe Andropogoneae with its morphological variation was an interesting context to examine. Previously the evolutionary pattern in the tribe has been derived from phenetic (Clayton 1972, 1973) and cytotaxonomic (Celarier 1956-1959) studies.

The most characteristic feature of this tribe is the possession of fragile racemes bearing paired spikelets (Le Roux and Kellogg 1999), and inflorescence structure (Clayton 1972, 1973). The original classification of the tribe was not surprisingly done in accordance to these morphological features. The development of molecular systematics brought new insights into the classification of Andropogoneae. In 2001 the GPWG used molecular data to reclassify the grass family (Poaceae) and the tribe Andropogoneae. This tribe is however complex and everyday new data becomes available that can help answer taxonomic questions.

In 1999 Spangler *et al.* studied the *ndhF* region of Andropogoneae and in 2002 Mathews *et al.* combined the *phytochrome B*, *GBSSI* and *ndhF* data. This data supported the monophyly of the Andropogoneae and a sister relationship with *Arundinella* and suggest that the tribe Arundinelleae should be abandoned as a taxonomic group. This tribe is still recognized in the GPWG study in 2001. The *ITS* and *trnL-F* data in this study further support the sister relationship between Andropogoneae and Arundinelleae and the suggestion that *Arundinella* should be placed within the Andropogoneae.

The previous data sets do, however, support the division of the tribe into awned and awnless genera (Clayton 1972, 1973), whereas in this study, with the South African representatives, this feature is polyphyletic and the groupings are not supported.

The small number of samples per specimen in the previous studies could be responsible for this difference as sampling within a monophyletic group may improve the phylogenetic accuracy (Rosenberg and Kumar 2001), however sampling outside the group “pushes the common ancestor of the new data set” back in time and could decrease accuracy. Random sampling of additional taxa is also thought to decrease phylogenetic accuracy.

Analyzing a single large data set, consisting of a combination of different data sets versus analyzing the individual data sets and then examining the trees for congruence is a topic of contemporary debate in systematics. Mathews *et al.* (2002) combined the *GBSSI*, *PHYB* and *ndhF* data sets. This phylogeny resulted in strong support for clades, which rejected the subtribal classification of Clayton and Renvoize (1986). The combined *ITS* and *trnL-F* data of the South African representatives also rejected the subtribal classifications. Furthermore this data suggest that most genera in the tribe are polyphyletic. In 2002, Hodkinson *et al*. studied the *ITS* and *trnL-F* regions in *Mischanthus* and *Saccharum* and also found these genera to be polyphyletic. This polyphyletic nature of the tribe has been hypothesized by Mathews *et al.* (2002) and is now confirmed.

These variations within a genus can be explained by hybridization events. Since allopolyploidy was indicated by cytological studies (Chapter3), these hybridization events are further supported, suggesting the tribe is much more complex than originally thought. Allopolyploidy has generally been agrees to be widespread in plants. Because rDNA is biparentally inherited, additively of parental rDNA patterns is expected in hybrids and allopolyploids, as was observed in the *ITS* analysis, e.g. *Hyparrhenia* and *Bothriochloa bladhii*. A lack of additively was however previously observed in *Zea* (Zimmer *et al*. 1988), this is however a disadvantage for the molecular analysis of the origins of polyploid species. In this study we were able to demonstrate reticulate evolution in the tribe Andropogoneae in South Africa, because gene conversion apparently did not eliminate the divergent alleles in the allopolyploids.

The hybridization events also give an answer to the basic chromosome number of the tribe Andropogoneae. The event of n = 5 + 5 is a simpler explanation for n =10 than an aneuploid event leading from n = 9 to n = 10.

The phylogeny could not prove the basic chromosome number of n = 5 for the tribe Andropogoneae, however the lower polyploid levels were concentrated at the base of the tree, supporting the maturity of the polyploid complex. Therefore, systematics rejects the hypothesis of a basic number of n = 10 with n = 5 derived.

The “core Andropogoneae” group as observed by Spangler *et al.* (1999) and Mathews *et al.* (2002) is not supported by *ITS* and *trnL-F* data sets. Strong evidence of a sister lineage between *Hyparrhenia* and *Andropogon* exists. This relationship was also

noted in previous studies. The genes, ITS and trnL-F proved to be useful in delimiting various relationships in the tribe with the South African representatives.

This study only included specimens from South Africa, increased taxon sampling from especially southern Asia, which is regarded as the region containing the most primitive members of the tribe, will help elucidate the relationships in the tribe. Future studies need to concentrate on the gathering of as much data as possible from all sources available, including morphological characters. Most of what we know about phylogeny is based on morphology and this has been confirmed time and again by molecular studies (Donnoghue and Sanderson 1992). It is thus a mistake to set morphological data aside and base phylogenetic relationships only on molecular evidence.

The study of Andropogoneae is of importance to all mankind. They affect the environment, acting to prevent soil erosion. They are used in pharmaceuticals and most important as a food source, yet uncertainty remains about the number of genes present and the evolutionary patters. To meet the demands and challenges of the world, we need to increase our knowledge of plant genes in order to manage the environment and food supply.

Chapter 6

Summary

The tribe Andropogoneae makes up half of the grass subfamily Panicoideae, with approximately 85 genera and 960 species (Hartley 1958, Clayton and Renvoize 1986). The genera of the tribe are typically tropical with only a few species extending beyond the tropics into warm temperate regions. From information available it is clear that the African representatives form an integral part of the tribe. In this study we only concentrated on the South African representatives of the tribe.

The tribe Andropogoneae has been studied extensively over the last millennium, but there is still an uncertainty about the true basic chromosome number. Previous molecular studies include sequencing of the *ndhF, GBSSI* and *phytochrome B*.

The morphological variation in the tribe provides an interesting context to examine. This study focused on the sequencing of plastid chloroplast gene *trnL-F* and nuclear ribosomal DNA the Internal Transcribed Spacer (*ITS*) to determine the phylogenetic relationships within the tribe.

In this study the chromosome numbers of 58 specimens were determined. The genetic chromosome numbers varied with n = 5, 9, 10, 10, 11, 20, 30. For the first time the basic diploid number of n = 5 was observed in the genus *Andropogon. Urelythrum aggropyroides* was studied for the first time with a somatic chromosome number of 2n = 20.

The absence of multivalent and prevalence of bivalents in this study indicate that the genomes of the specimens studied are homologous. This lead us to the conclusion that the tribe consists of allopolyploid species, derived from interspecific hybridization and chromosome doubling.

Both the *trnL* intron and *trnL-F* intergenic spacer was sequenced. Analysis of the *trnL-F* gene included 56 accessions and 61 accessions for the *ITS* gene. Combined analysis of both *ITS* and *trnL-F* included 59 accessions. Sequencing data indicated *Cymbopogon* to be a diploid progenitor of *Hyparrhenia* and *Andropogon* of *Bothriochloa bladhii*. Reticulate evolution was demonstrated in nr*ITS* alleles. *ITS* and *trnL-F* data supports the inclusion of *Arundinella* in Andropogoneae and rejects the subtribal

classification of Clayton and Renvoize (1986). This data also does not support the division of the tribe into awned and awnless genera and does not support the “core Andropogoneae” lineage as previously been observed. Most genera in the tribe are polyphyletic, suggesting a much more complex nature for the South African representatives.

Molecular data could not prove the basic chromosome number but supported the maturity of the polyploid complex for the South African specimens.

Keywords: Poaceae, Panicoideae, Andropogoneae, cytogenetics, polyploidy, allopolyploidy, DNA sequencing, trnL-F, Internal transcribed spacer (ITS), reticulate evolution.

Chapter 7

Opsomming

Die tribus Andropogoneae vorm die helfte van die gras subfmilie Panicoidae, met ongeveer 85 genera en 960 spesies (Hartley 1958, Clayton and Renvoize 1986). Die genera in die tribus is gewoonlik tropies, met slegs ‘n paar wat buite die tropiese gebiede na gebiede met ‘n gematigde klimaat versprei het. Die Afrika verteenwoordigers vorm ‘n integrale deel van die tribus. Hierdie studie konsentreer hoofsaaklik op die Suid-Afrikaanse verteenwoordigers van die tribus.

Die tribus Andropogoneae is dikwels bestudeer gedurende die laaste millenium, maar daar bestaan nog steeds onsekerheid oor die ware basiese chromosoomgetal van die tribus. Vorige molekulêre studies het die nukleotiedvolgeordebepaling van *ndhF, GBSSI*, en *phytochrome B* ingesluit.

Die morfologiese variasie in die tribus verskaf ‘n interessante konteks om te bestudeer. Hierdie studie het hoofsaaklik gekonsentreer op die nukleotiedvolgeordebepaling van die chloroplaste gebied *trnL-F* en die kern ribosomale DNA se intern getranskribeerde streke (*ITS*), om die filogenetiese verwantskappe binne die tribus vas te stel.

Tydens hierdie studie is die chromosoomgetalle van 58 eksemplare bepaal. Die gametiese chromosoomgetalle het gewissel tussen n = 5, 9, 10, 11, 20, 30. Die basiese diploïede getal van n = 5 is vir die eerste keer in die genus *Andropogon* waargeneem. *Urelythrum aggropyroides* is vir die eerste keer betudeer, met ‘n somatiese chromosoom getal van 2n = 20.

Die afwesigheid van multivalente en die teenwoordigheid van bivalente in hierdie studie is ‘n aanduiding dat die genome van die spesies in die studie homeologies is. Dit dui daarop dat die tribus bestaan uit allopoliploïede spesies, wat afgelei is vanaf interspesifieke verbastering en chromosoomverdubbeling.

Beide die *trnL* intron en die *trnL-F* intergeniese streek se nukleotiedvolgorde is bepaal. Analises van die *trnL-F* geen het 56 eksemplare ingesluit terwyl 61 eksemplare vir *ITS* volgorde bepaling gebruik is. ‘n Gekombineerde analise van beide *ITS* en *trnL-F* het 59 eksemplare ingesluit. Nukleotiedvolgordebepaling dui aan dat die genus

Cymbopogon ‘n diploïede voorganger van *Hyparrhenia* is en *Andropogon* van *Bothriochloa bladhii*.

Retikulerende evolusie kom voor in die nr*ITS* allele. *ITS* en *trnL-F* data ondersteun die insluiting van *Arundinella* in die tribus Andropogoneae en verwerp die subtribus klassifikasie van Clayton en Renvoize (1986). Hierdie data ondersteun ook nie die verdeling van die tribus in geangelde en angellose genera en verder ondersteun dit ook nie die suiwer basiese Andropogoneae groepering soos in vorige studies waargeneem nie. Die meeste genera in die tribus is polifeleties, wat ‘n baie meer komplekse samestelling vir die Suid-Afrikaanse verteenwoorigers van die tribus voorstel.

Molekulêre data het nie bewyse gelewer vir die ware basiese chromosoomgetal nie maar het wel die volwasse aard van die poliploïede kompleks vir die Suid-Afrikaanse spesies ondersteun.

Sleutel woorde: Poaceae, Panicoideae, Andropogoneae, sitogenetika, poliploïede, allopoliploïede, DNA nukleotiedvolgordebepaling, *trnL-F*, Intergeniese getranskribeerde streke (*ITS*), retikulerende evolusie.

Chapter8

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Appendix A: List of the polyploid levels in Andropogoneae from all existing chromosome data.

Species	2n	Reference
Andropogon		
africanus Franch	40	Dujardin 1979
amethystinus Steudel	c.30	Hoshino & Davidse 1988
	40	Spies et al. 1994
angustatus (Presl) Steud	40	Pohl & Davidse 1971
appendiculaus Nees	20, 40, 60	Spies et al 1994
arctatus Chapman	20	Campbell 1982
arenarius Hackel	60	Campbell & Windisch 1986
ascinodis C.B. Clarke	40	Mehra 1982
bicornis L.	30	Davidse & Pohl 1972
	60	Pohl & Davidse 1971, Norrmann 1985, Campbell & Windisch 1986
brachystachyus Chapman	20	Campbell 1983
brazzae Franch	20	Dujardin 1979
canaliculatus Schumach.	20	Tateoka 1965c
Chinensis (Nees) Merr.	20, 40	Spies et al. 1994
distachyos L.	36	Faruqi et al. 1987
eucomus Nees	40	Spies & Du Plessis 1986, 1987
	20	Spies & Du Plessis 1987, Spies et al. 1991, Spies et al. 1994
exaratus	60, 60 + 2B	Norrmann 1985
floridanius Scribner	20	Campbell 1983
gayanus Kunth	20	Tateoka 1965c
	40	Okoli & Olorode 1983
gerardii Vitman	40	Davidse & Pohl 1972
	60	Gould 1968, Riley & Vogel 1982, Keeler et al. 1987
	70, 80	Keeler et al. 1987
	gam 30II, 5I+12II+8III +5IV+1V+2	Norrmann et al. 1997
glaziovii Hackel	VI	Campbell & Windisch 1986
glomeratus (Walt.) BSP	60	Gould & Soderstrom 1970
	20	Davidse & Pohl 1972
glomeratus (Walter) BSP var. glomeratus Mohr	10	Campbell 1983
" var. hirsutior (Hackel)	20	Campbell 1983
" var. pumilus Vasey	20	Campbell 1983
gyrans Ashe var. gyrans	20	Campbell 1983
" var. stenophyllus (Hackel) Campbell	20	Campbell 1983
hallii Hack	20	Riley & Vogel 1982
hirtifolius Presl	60	Gould 1965
huillensis Rendle	60	Spies & Du Plessis 1987
	c. 50	Spies et al. 1994
hypogynus Hack	80	Norrmann 1985, Campbell & Windisch
ischaemum L. var. ischaemum	60	1986
kilimandscharicus Pilger	40	Gould 1965
lacunosus J.G. Anders	20	Tateoka 1965c
lateralis	18	Spies & Du Plessis 1986
	60	Campbell & Windisch 1986, Norrman 1985, Norrmann et al. 1994
leucostachyus HBK	60 +1B	Norrman 1985
liebmannii Hackel var. pungensis (Ashe) Campbell	20	Pohl & Davidse 1971, Norman 1985
lindmanii Hackel	20	Campbell 1983
lividus Thwaites	60	Campbell & Windisch 1986
	20	Saxena & Gupta 1970, Christopher &

longiberbis Hackel		Samraj 1985
longipes Hack.	20	Campbell 1983
macrothrix Trin.	20	Christopher & Samraj 1985
	20	Norrmann 1985
patris Robyns	60	Campbell & Windisch 1986
polypticus Steud. var. decanensis Bor	20	Dujardin 1979
pseudapricus Stapf	20	Christopher & Samraj 1985
reevesii Gould	40	Dujardin 1979
selloanus (Hackel) Hackel	120	Gould 1965
	20	Norrmann 1985, Honfi et al. 1990
schirensis Hochst ex A. Rich	20	Norrmann & Quarin 1987
ternatus (Spr.) Nees	20	Spies et al. 1994
tectorum Schum. & Thann.	30	Norrmann 1985, Norrmann & Quarin
	18	1987
	20	Okoli 1982
tracyi Nash	30	Okoli 1983, Okoli & Olorode 1983
urbanianus Hitchc.	20	Okoli 1982, 1983, Okoli & Olorode 1983
virgatus Desv.	40	Campbell 1983
	20	Davidse & Pohl 1972
virginicus L. var. glaucus Hackel	60	Pohl & Davidse 1971
" var. virginicus	20	Campbell & Windisch 1986
	20	Campbell 1983
		Campbell 1983

Arthraxon		
breviaristatus Hack.	18	Mehra & Kalia 1975, Kalia 1978, Mehra 1982, Sinha et al. 1990
	36	Kalia 1978, Mehra 1982
castratus (Griffith) Nayayan ex Bar	18	Sinha et al. 1990
	36	Probatova & Sokolovskaya 1984a
centrasiaticus (Griseb.) Gamajun.	40	Christopher 1978
depressus Stapf	18	Christopher & Samraj 1985
echinatus (Nees) Hochst.	36	Cristopher & Samraj 1985
hispidus (Thunb.) Makino	36	Mehra & Sharnma 1975, Kalia 1978
inermis Hock.f.	18	Mehra 1965
lanceolatus (Rosb) Hochst.	18	Mehra & Sharma 1972
	30	Mehra & Sharma 1975, Sharma & Sharma 1979
	36	
lanceolatus (Roxb.) Hochst. var. lanceolatus	36	Mehra & Kalia 1975
lanciofolius (Trin.)Hochst..	18	Spies & Du Plessis 1986
	36	Mehra & Sharma 1975, Kalia 1978, Mehra 1982, Sahni & Bir 1985, Ahsan et al. 1994
langsdorffii (Trin.) Hochst. ex Rosch.	36	
micans (Nees) Hochst.	36	Mehra & Kalia 1975, Kalia 1978, Mehra 1982
microphyllus (Trin.) Hochst.	16	
nudans (Steud.) Hochst.	18	Probatova & Sokolovskay 1981, 1984a
prionodes (Steud) Dandy	16	Mehra & Sharma 1972 &1975
	20	Kalia 1978, Mehra 1982
	36	Mehra & Kalia 1975, Kalia 1978, Mehra 1982
	36	Kalia 1978, Mehra 1982
quirtinianus (A.Rich) Nash	10	Farugi et al. 1979, Ahsan et al. 1994
	36	Mehra 1965, Farugi et al. 1979, Ahsan et al. 1994
	38	Tateoka 1965c
	36	Sinde et al. 1975
sikkimensis Bar	16	Christopher 1978, Merha & Sharma 1975, Dujardin 1979a
	18	Gill et al. 1980
		Gould 1966, Gould & Soderstrom 1970, Pohl & Davidse 1971, Mortor 1993
		Merha & Sharma 1975
		Sharma et al. 1978
Bothriochloa		
barbinodis (Lag.) Herter	180	Gould 1966
caucasia (Trin.) C.E. Hubb	40	Sinha et al. 1990
ensiformis (Hook.f.) Henr.	20	Christopher & Samraj 1985
exaristata (Nash) Henrard	60	Allred & Gould 1982
glabra (Roxb.) A. Camus	34-44	Srivastava 1970 & 1980
	40	Tateoka 1965c, Gupta & Srivastava 1974, Srivastava 1979 & 1980, Sinha et al. 1990
grahamii (Haines) Bor	40	Borgaonkar 1964, Gupta & Srivastava 1974, Farugi et al 1979
grahamii (Haines) Bor x B. intermedia (R.Br.) A. Camus	40	Srivastava & Purnima 1990
	50	Srivastava & Purnima 1990
grahamii (Haines) Bor x D. annulatum (Forsskal) Stapf	120	Gould 1968
hybrida (Gould) Gould	30	Srivastava 1980
	40	

intermedia (R. Br.) A. Camus var intermedia		Celarier et al 1961, Kalia 1978, Srivastava 1979 & 1979a, Farugi et al.
	50	1979, Mehra 1982, Sinha et al. 1990, Srivastava & Purnima 1990
	40	Gupta & Srivastava 1974, Srivastava
	50	1979 &1980
intermedia (R.Br) A.Camus var. punctata (Roxb)	20	Mehra & Sharma 1975, Sinha et al. 1990
Keng	50, 60	Srivastava & Purnima 1990
intermedia (R. Br.) A. Camus x D. annulatum	c.60	Spies & Du Plessis 1986a, Strydom et al.
(Fors.) Stapf	20	2000
insculpta (A. Rich.) A. Camus		Spies & Du Plessis 1987
	40	Spies & Du Plessis 1987a
		Farugi et al. 1979, Koul & Gohil 1987,
ischaemum (L.) Keng		Ahsan et al. 1994
	30	Hindakova 1974, Petrova in Prokudin et
	50	al. 1977, Kliphuis & Wieffering 1979,
	20	Skalinska et al. 1968, Love & Love
	40	1982b
	60	Farugi et al. 1979, Ahsan et al. 1994
ischaemum var. songaricus (Rupr.) Celarier &	60	Gould 1968, Singh 1965
Harlan	120	Gill et al. 1980
kuntzeana (Hack.) Henr	n = 20+0–2B	Borgaonkar 1964
.	20	Allred & Gould 1983
laguroides (DC) Herter ssp. laguroides	40	Allred & Gould 1983
laguroides Herter ssp. torreyana (Steud) Allred &		Allred & Gould 1983
Gould		Kalia 1978, Mehra 1982
longipaniculata (Gould) Allred & Gould		Mitra & Datta 1967, Sahni & Bir 1985
odorata (Lisboa) A. Camus		Tateoka 1965c, Mitra & Datta 1967,
pertusa (L) A. Camus		Gupta 1969, Gould & Soderstrom 1970,
		Pohl & Davidse 1971, Davidse & Pohl
	36	1972, Gupta 1971, Gupta & Srivastava
	60	1974, Mehra & Sharma 1975,
	40	Christopher 1978, Sharma & Sharma
	120	1979, Gill et al. 1980, Roy 1981, Sinha et
	60	al. 1990
	120	Sharma et al. 1978
		Malik & Tripathi 1970
		Farugi et al. 1979
pseudoischaemum (Nees) Henr		Allred & Gould 1983
saccharoides ssp. reevesii (Gould) Allred & Gould		Ward & Spellenberg 1986
saccharoides var. torreyana (Steud) Gould		Gould & Soderstrom 1970
schlumbergi (Fourn. Ex Hemsl.) Henrard		
Chrysopogon		
aciculatus (Retz.) Trin	20	Gupta 1969, Saxena & Gupta 1970, Gupta 1971, Christopher 1978, Dujardin & Beyne 1975, Mehra & Sharma 1975,
asper (Heyna) Blatt. & McCann	20	Kalia 1978, Mehra 1982
		Muniyamma et al. 1976, Nagabhushana
aucheri (Boiss.) Stapf	20	Rao Sindhe 1980, Sinha et al. 1990
		Baquar & Saeed 1969, Farugi et al. 1979,
echinulatus (Nees) Watson	20	Ahsan et al. 1994
fulvus (Sprengel) Chiov.		Mehra 1965, Mehra & Sharma 1972
	20	&1975, Farugi et al. 1979
		Mehra & Sharma 1975, Christpher 1978, Sharma & Sharma 1979, Sinha et al.

	40	1990, Bir & Chauhan 1990a
gryllus (L) Trin	n = 10+0-2B	Sinha & Bir 1985
	20	Kalia 1978, Mehra 1982
	40	Mehra & Sharma 1975, Sharma & Sharma 1979, Sinha et al. 1990
gryllus subsp. Echinulatus (Nees) Cope	20	Christopher 1978, Petrova in Prokudin et al. 1977
hackelii (Hook.f.) Fisch	20	Ahsan et al. 1994
lancearius (Hook.f.) Haines	20	Sinde et al. 1975, Shanthamma 1976, Christopher & Samraj 1985
	40	Sinha et al 1990
montanus (Forssk.) Stapf	20	Sinha et al. 1990
	80	Sinha et al. 1990
orientalis (Desv.) A. Camus	20	Malik & Tripathi 1970
serrulatus Trin	20	Christopher & Samraj 1985
verticillatus (Roxb.) Trin	20	Saxena & Gupta 1969, Saxena & Gupta 1970, Farugi et al. 1979, Ahsan et al. 1994
zeylanicum (Nees) Thw.	20	Christopher 1978
		Christopher 1978
Coelorachis		
aurita (Steud.) A. Camus	18	Quarin 1979
balansae (Hack.) A. Camus	36	Quarin 1979
capensis Stapf	18	Spies & Du Plessis 1986a
khasiana (Hack.) Stapf	18	Kalia 1978, Mehra 1982
parodiana Henrard	18	Quarin 1979
selloana (Hack) A. Camus	18	Quarin 1979, Honfi et al. 1990
Coix		
aquatica Roxb.	10	Koul 1965, Venkateswarlu & Chaganti 1966, Venkateswarlu et al. 1976, Sapre & Barve 1983a, Sapre et al. 1985, Rao & Nirmala 1990, Rao & Nirmala 1994
	20	Venkateswarlu et al. 1976
	40	Venkateswarlu et al. 1976, Christopher & Singh 1986, Christopher et al. 1989
aquatica Roxb. x C. gigontea Koen ex Roxb	10-21	Sapre & Deshponde 1987
gigantea Koeng ex Roxb	12	Christopher & Jacob 1991, Jacob & Christoper 1992, Christopher et al. 1995a, Christopher et al. 1996
	n = 9II	Sapre & Barve 1983, Sapre & Barve 1987, Sapre & Naik 1990
	n = 10II	Sapre & Barve 1983
	5-8, 9,11,19,21,	Sapre & Barve 1984
	22,23	Sapre & Barve 1984, Christopher & Jacob 1991, Jacob & Christopher 1992, Christopher et al. 1995a, Christopher et al 1996 & 1997
	12	
	18	Sapre & Barve 1983 & 1984, Barve & Sapre 1985, Sapre et al. 1985, Rao & Nirmala 1994
	20	Mehra 1982, Sapre & Barve 1984, Barve & Sapre 1986, Sapre et al. 1985, Sapre & Naik 1990, Rao & Nirmala 1993 & 1994
gygantea x C. aquatica	24	

lacryma – jobi L. var. lacrymajobi	18, 24 10 20	Sapre & Barve 1983 & 1984 Sapre & Deshponde 1987 Venkateswarlu et al. 1976 Koul 1965, Malik & Mary 1970, Saxena & Gupta 1970, Davidse & Pohl 1971 & 1972, Olorode 1975, Venkateswarlu et al. 1976, Sindhe 1977, Christopher 1978, Dujardin 1979a, Mehra 1982, Wang et al. 1984b, Lin et al. 1985, Sarma & Sharma 1986, Sinha et al. 1990, Rao & Nirmala 1993, Christopher et al. 1997
lacryma-jobi L. var. ma-yuen (Rom du Gaill) Stapf	30 10	
lacryma-jobi L. x C. gigantea J.Ko	30 10 16	Christopher & Nirmala 1994 Mehra 1982 Christopher & Jacobs 1989 & 1990 Sinde et al. 1975 Christopher et al. 1997
Cymbopogon afronardus Stapf bombycinus (R.Br.) Domin caecius (Nees) Stapf	 20 20 n = 10II+0-6B 10II 20 40	 Tateoka 1965c Soenarko 1977 Sudharshan & Jagadishchandra 1984 Christopher & Raj 1986 Gupta 1965 & 1970, Christopher 1978, Lavania et al. 1988, Jagadishchandra 1992 Quraish & Faruqi 1979, Faruqi et al. 1979, Faruqi & Quraish 1985
citratus (DC) Stapf	40+0-6B 40 60	Jagadishchandra 1992 Gupta 1965 Soenarko 1977, Christopher & Raj 1986, Lavania et al. 1988, Sinha et al. 1990
coloratus (Nees) Stapf confertiflorus (Steud.) Stapf distans (Nees) Wats	 n = 20II, 40 20 20 40	 Christopher & Raj 1986 Gupta 1970 Gupta 1969 & 1970, Mehra & Sharma 1975, Quraish & Faruqi 1979, Faruqi et al. 1979
distans (Nees) Wats. Var. mundensis Gupta	60	Gupta 1969 & 1970, Mehra & Sharma 1975
excavatus (Hochst.) Stapf ex Burtt Davy	20 20	Saxena & Gupta 1969, Saxena & Gupta 1970
exsertus (Hack) A.Camus flexuosus (Nees ex. Steud.) Wats	40 20 n = 20II 8-20 20	Gupta 1970 Spies & Du Plessis 1987a, Hoshino & Davidse 1988, Spies et al. 1994 Spies & Du Plessis 1987a Kalia 1978, Mehra 1982 Christopher & Raj 1986 Lavania 1987
flexuosus (Nees ex. Steud.) Wats var cormbatorensis Gupta flexuosus (Nee.) W. Watson var. microstachys (Hook.) Bor gidarba (Ham. Ex Hook.) Haines	40 20-40 30 n = 10II+0-2B n = 20II 40	Gupta 1965 & 1970, Christopher 1978, Verma & Sobiti 1982, Verma & Sobti 1985a & 1985b, Christopher & Raj 1986, Banerji et al. 1987, Lavania et al. 1988, Sinha et al. 1990 Gupta 1970, Christopher 1978, Verma & Sobiti 1982, Christopher & Raj 1986 Gupta 1970 Malik & Tripathi 1970

iwarancusa (Sones) Schult	20	Christopher & Raj 1986
jwarancusa Schult	n = 10II	Christopher & Raj 1986
	20+2B,	Christopher & Raj 1986
	20+6B	Mitra & Datta 1967
	20+0-8B	Christopher & Raj 1986
	20	Verma & Sobti 1985b
		Sobti et al. 1979
		Gupta 1965 & 1970, Baquar & Saeed 1969, Kalia 1978, Mehra & Sharma 1975, Quraish & Faruqi 1979, Faruqi et al. 1979, Verma & Sobiti 1982, Mehra
	40	1982, Verma & Sobti 1985a & b,
jwarancusa (Jones) Schult var. assamensis Gupta		Christopher & Raj 1986, Sreenath &
khasianus (Hack.) Stapf ex Bor.	20	Chandra 1987, Lavania et al. 1988
	20	Baquar & Saeed 1969, Christopher &
	60+2B	Raj 1986, Sinha et al. 1990
	60	Gupta 1970
kravancorensis Bor		Kalia 1978, Mehra 1982
ladakhensis Gupta	20	Sobti et al. 1979
ladakensis Gupta	20	Gupta 1965 & 1970, Verma & Sobiti
lanceifolium L. Liou	20	1982, 1985a
marginatus (Steudel) Stapf ex Burtt Davy	40	Gupta 1970
	20	Gupta 1970c
martinii Wats	40	Gupta 1970c
	20	Ahsan et al. 1994
		Spies et al. 1994
	40	Du Plessis & Spies 1988
martinii (Roxb.) Wats var. motia		Gupta 1965, Mitra & Datta 1967, Gupta
	20+B	1970, Mehra & Sharma 1975, Bir &
	20	Chauhan 1990a
		Gupta 1965 & 1970, Mehra & Sharma
	n = 10II+0-	1975, Ahsan et al. 1994
	2B	Gupta 1965
martinii (Roxb.) var. sofia Gupta	20+0-2B	Verma & Sobiti 1982 & 1985a & b,
	20+6B	Lavaniea et al. 1988
	n = 10II, 20II	Christopher & Raj 1986
microtheca (Hook.f) A. Camus	40	Sobti et al. 1979, Verma & Sobiti 1985b
motia Gupta		Christopher & Raj 1986
nardus (Linn.) Rendle	20	Verma & Sobiti 1985b
	20 + 2B	Gupta 1970, Verma & Sobiti 1982 &
	20	1985a, Christopher & Raj 1986, Lavania
nardus var. confertiflorus		et al. 1988
	40	Mehra & Sharma 1972 & 1975
	20	Gupta 1970d
		Gupta 1965 & 1970, Christopher & Raj 1986, Sinha et al. 1990
	40	Gupta 1965 & 1970, Lavaniea et al. 1988
olivieri (Boiss.) Bor	60	Gupta 1965, Kalia 1978, Verma & Sobiti 1982, Mehra 1982, Verma & Sobiti
parkeri Stapf	20	1985b, Christopher & Raj 1986, Lavania et al. 1988
	n = 10II	Christopher & Raj 1986
	20	Gupta 1965, Mitra & Datta 1967, Mehra
	30	& Sharma 1975, Christopher & Raj 1986
parkeri var. jammuensis Gupta	40	Gupta 1969 & 1970, Quraish & Faruqi
parkeri Stapf x C. caesius (Nees) Stapf		1979, Faruqi et al. 1979

pendulus Wats	40	Chrisopher & Raj 1986
	60	Gupta 1970, Sahni & Bir 1985
	20	Gupta 1970
	30	Gupta 1970, Quraish & Faruqi 1979,
	40	Sharma & Kumar 1980, Christopher &
plurinodus (Stapf) Stapf ex Burtt Davy	60	Raj 1986
		Gupta 1970
	20	Faruqi et al. 1979
polyneuros (Steud) Stapf	40	Kalia 1978, Mehra 1982
	80	Gupta 1969
	n = 10II+0-	Lavania et al. 1988
procerus (R.Br.) Domin	1B	Gupta 1965 & 1970, Verma & Sobiti
prolixus (Stapf) Phill	n = 20II	1982, Verma & Sobiti 1985a
ramnagarensis Gupta	20	Spies & Du Plessis 1987, Strydom et al.
schoenanthus (L.) Sprengel	20	2000
	40	Du Plessis & Spies 1988
	20	Spies et al. 1994
	n = 20II+2B	Christopher & Raj 1986
stracheyi (Hook.f.) Raiz. & Jain	20+1B	Christopher & Raj 1986
	20	Gupta 1965 & 1970
travencorensis Bor	40	Soenarko 1977
	20	Spies & Du Plessis 1987, 1988
	40	Gupta 1970e
validus (Stapf) Stapf ex Burtt Davy	20	Christopher & Raj 1986
		Christopher & Raj 1986
	40	Pandy & Pal 1980a, Faruqi et al. 1987
	20	Gill et al. 1980
winterianus Jowitt.		Mehra & Sharma 1972
	30	Gupta 1969 & 1970
	60	Gupta 1965 & 1970, Christopher & Raj
	20	1986, Lavania et al. 1988
		Christopher 1978
		Spies & Du Plessis 1987a, Hoshino & Davidse 1988, Spies et al. 1994
		Spies & Du Plessis 1986a
		Spies et al. 1994
		Gupta 1965, Verma 1985, Lavania et al. 1988
Dichanthium		
annulatum (Forsskal) Stapf	20	Roy et al. 1965, Singh 1966, Gupta 1971, Sarkar et al. 1975a Sinha et al. 1980, Borgaonkar & Singh 1962
	40	Singh & Godword 1960, Borgaonkar & Singh 1962, Gupta 1969, Reddy & D'Cruz 1969 & 1969b, Baquar & Saeed 1969, Malik & Tripathi 1970, Gupta & Srivastava 1974, Kalia 1978, Faruqi et al. 1979, Sinha et al. 1980, Ray 1981, Mehra 1982, Bir & Singh 1983, Spies & Du Plessis 1986a, Bir et al. 1987, Koul &
	32	Gohil 1988, Bir & Chauhan 1990, Ahsan
	50	et al. 1994
		Bir & Chauhan 1990
	60	Gupta & Srivastava 1974, Srivastava & Purnima 1990

annulatum (Forssk.) Stapf var. annulatum	20, 40	Faruqi et al. 1979, Spies & Du Plessi
annulatum (Forssk.) Stapf var. fecundum	40	1986a, Bir & Chauhan 1990
annulatum (Forssk.) Stapf var. papillosum	60	Singh & M 1965
annulatum (Forssk.) Stapf x B. intermedia (R.Br.)	50	Singh & M 1965
A Camus	50	Singh & M 1965
annulatum (Forssk.) Stapf x B. grahamii (Haines)	20	Srivastava & Purnima 1990
Bor	40	Srivastava & Purnima 1990
aristatum (Poir.) C.E. Hubb.		Reddy & D'Cruz 1969
		Knox & Heslop-Harrison 1966, D'Cruz
	80	& Reddy 1969, Sinha et al. 1990,
	40	Strydom et al. 2000
	20	Gould 1968
bladhii (Reitz.) Clayton	40	Rao & Mwasumbi 1981a
caricosum (L.) A. Camus	40	Reddy & D'Cruz 1969 & 1969b
	40	D'Cruz & Reddy 1969, Sinha et al. 1990
foveolatum (Delile) Roberly	20	Ahsan et al. 1994
pallidum (Hook.f.) Stapf	60	Christopher & Samraj 1985
panchganiense Blatt. & McCann		Sing 1966
papillosum		Borgoankar & Sharma 1962
Elionurus		
adustus (Trin.) Ekm.	20	Gupta 1969
brazzae Franch	20	Dujardin 1978
hesii K. Schum	10	Dujardin 1978
muticus (Spreng.) Kuntze	20	Norrmann et al. 1994, Spies et al. 1994
	30	Strydom et al. 2000
royleanus Nees ex A. Rich	20	Ahsan et al. 1994
tripsacoides Humb. & Bonpl. var. ciliaris (HBK)	20	Gould 1965, Gould & Soderstrom 1970
Hack	10	Strydom et al. 2000
vilosa (Thunb.) Nees		
Eriochrysis		
brachypogon (Stapf) Stapf	20	Dujardin 1978 & 1979
cayennensis Beauv.	20	Pohl & Davidse 1971
Eulalia		
fastigiata (Nees) Haines	18	Prince 1965, Parkash 1979, Mehra 1982
hirtifolia (Hack.) A. Camus	20	Mehra & Sharma 1972
	40	Sindhe 1980
mollis (Griseb.) O. Kuntze	18	Mehra & Sharma 1972, Parkash 1979,
		Mehra 1982
phaeothrix (Hack.) Kuntze	20	Christopher & Samraj 1985
quadriversis (Hackel) Kuntze	n = 7+2B	Parkash 1979, Mehra 1982
speciosa (Debeaux) Kuntze	40	Parkash 1979, Mehra 1982
trispicata (Schult.) Henr.	18	Parkash 1979, Gill et al. 1980, Mehra
	20	1982
villosa (Thunb.) Nees	20	Faruqi et al. 1979
wightii (Hook.f.) Bor.	20	Hoshino & Davise 1988
		Christopher & Samraj 1985
Hackelchloa		
granularis (Sw.) Kuntze	14	Gupta 1969 &1971
granularis (L.) Kuntze	14	Christopher 1978, Dujardin 1978, Kalia
		1978, Pohl & Davidse 1971, Reeder
		1971, Mehra 1982, Christopher 1986, Bir

		& Sahni 1986, Ahsan et al. 1994
porifera (Hack.) Rhind.	30	Kalia 1978, Mehra 1982
Hemarthria		
altissima (Poir.) Stapf & C.E. Hubb.	20	Du Plessis & Spies 1988
	18	Davidse & Pohl 1972, Quesenberry et al.
	36	1982
		Davidse & Pohl 1972, Quarin 1977,
compressa (L.f.) R. Br.	n = 9+0-2B	Quesenberry et al. 1982
	n = 18+0-2B	Kalia 1978, Mehra 1982
	18	Kalia 1978, Mehra 1982
		Mehra & Sharma 1975e, Faruqi et al.
	36	1979, Sharma & Sharma 1979
		Gupta & Yashavir 1971, Mehra &
	54	Sharma 1975, Sinha et al. 1990
longiflor (Hook. f.) A. Camus	54	Quesenberry et al. 1982
protensa Steud	18	Kalia 1978, Mehra 1982
	20	Mehra & Kalia 1975, Kalie 1978, Mehra
uncinata R. Br.	36	1982
Uncinata R. Br. Var. spathacea (Damin) Vickery	36	Sinha et al. 1990
		Quesenberry et al. 1982
		Quesenberry et al. 1982
Heteropogon		
contortus (L.) Beauv.	39	Tothill & Hacker 1976
	40	Gupta 1969 &1971,Gupta & Srivastava
		1974, Mehra & Sharma 1975,
		Christopher 1978, Kalia 1978, Mehra
	50	1982
		Gupta 1969 &1971, Gupta & Srivastava
	60	1974, Tothill & Hacker 1976
		Gould 1968, Gupta 1969 &1971, Gupta
		& Srivastava 1974, Tothill & Hacker
	69, 70, 80, 90	1976, Borgen 1980, Bir et al. 1987
contortus (L.) Beauv. Ex Roem & Schult	20	Tothill & Hacker 1976
	36	Christopher 1978, Ahsan et al. 1994
	40	Bir & Chauhan 1990a
		Tateoka 1965c, Faruqi et al. 1979,
		Dujardin 1979, Gill et al. 1980, Rao &
	60	Mwasumbi 1981, Sinha et al. 1990,
		Ahsan et al. 1994
contortus (l.) Roem & Schult.	20	Davidse & Pohl 1972, Davidse & Pohl
	40	1972, Srivastava & Purnima 1990, Sinha
	46	et al. 1990
	56	Spies & Du Plessis 1986a
	58	Spies & Du Plessis 1986, 1987a
melanocorpus (Elliott) Elliott ex Benth	60	Spies & Du Plessis 1986
triticeus (R. Br.) Stapf ex Craib	22	Spies & Du Plessis 1987a
		Bir & Sahni 1983, 1985
		Srivastava & Purnima 1990
		Sinha et al. 1990
Hyparrhenia		
anamesa Clayton	40	Spies & Du Plessis 1988, Du Plessis &
		Spies 1988, Spies et al. 1994
	60	Spies & Du Plessis 1988, Spies et al.

conspersum Schrad. Ex Schult.	40	1994
cymbaria (L.) Stapf	30	Burson 1978
diplandra (Hack.) Stapf	40	Tateoka 1965b
dissoluta (Nees) C.E. Hubb.	40	Dujardin 1979
dregeana (Nees) Stapf	20	Davidse & Pohl 1972
familiaris (Steud.) Stapf	40	Spies & Du Plessis 1987
filipendula (Hochst) Stapf var.filipendula	40	Dujardin 1978
filipendula var. pilosa (Hochst. ex Hack) Stapf	20	Dujardin 1979, Spies et al. 1994
	40	Spies & Du Plessis 1987a
griffithii Bor.	36	Spies & Du Plessis 1987a, Spies et al.
hirta (L.) Stapf	c.20	1994
	30	Kalia 1978, Mehra 1982
	36	Romerozarco et al. 1988
	40	Talavera 1978, Devesa et al. 1990
		Faruqi & Quraish 1978, Humphies 1978
		Fernandez & Queiros 1969, Gould 1970,
	40+1B, c.48	Faruqi et al. 1979, Miraval 1983,
	45	Hoshino & Davidse 1988, Spies et al.
	54, 56	1994
	60	Gould 1970
		Fernandez & Queiros 1969, Baldini 1991
intermedium Manro ex Morong	20	Faruqi & Quraish 1978
involucrata	20,21,40	Gould 1970, Spies & Du Plessis 1986a,
jurgensii Hackel	20	1988, Devesa et al. 1990a
pilgeriana C.E. Hubb.	20, 80	Burson 1978
pubescens (Vis.) Chiov.	30	Olorode & Morakinyo 1980
quarrei Robyns	60	Burson 1978
rufa (Nees) Stapf	20	Spies et al. 1994
	30	Miraval 1983
	36	Spies & Du Plessis 1986a
	40	Tateoka 1965c, Sinha et al. 1990
smithiana (Hooker f.) Stapf	40	Rao & Mwasumbi 1981a
subplumosa	40	Tateoka 1965b, Nassar 1977
tamba (Steud.) Stapf	20	Dujardin 1979
	40	Morton 1993
variabilis Stapf	20	Olorode & Morakinyo 1980
	40	Spies & Du Plessis 1986a
		Spies & Du Plessis 1987a
		Tateoka 1965c
		Spies et al. 1994
Hyperthelia		
dissoluta (Nees ex Steud.) W.D. Clayton	20	Spies et al. 1994
	40	Dujardin 1978, Rao & Mwasumbi 1981a
Imperata		
cylindrica (L.) P. Beauve.	20	Gupta 1971, Christopher 1978, Faruqi et al. 1979, Rao & Mwasumbi 1981, Bir & Singh 1983, Sahni & Bir 1985, Bir et al. 1987, Sinha et al. 1990
	40	Faruqi et al. 1987, Sinha et al. 1990
	52	Faruqi et al. 1979
	60	Fernandez & Queiros 1969
cylindrica (L.) Beauv. var. africana (Anderss.) Hubb.	60	Tateoka 1965b, Harvey 1966a, Dujardin 1979
cylindrica (L.) Beauv. var. cylindrica	20	Kalia 1978, Mehra 1982

cylindrica (L.) Beauv. var. koenigii (Retz.) Dur. & Schinz.	20 20	Tateoka 1967 Kalia 1978, Mehra 1982
cylindrica (L.) Beauv. var. major (Nees) C.E. Hubb.		Price & Daniels 1968, Reeder &
conferta (Presl) Ohwi	20	Soderstrom 1968
	20	Pohl & Davidse 1971
contracta (HBK) Hitchc.		Norrmann et al. 1994
tenius Hack.		
Ischaemum		
afrum (J.F. Gmel.) Dandy	20	Spies & Du Plessis 1987a, Hoshino & Davidse 1988, Spies et al. 1991
aristatum L.	40	Oke 1971
	60	Oke 1971
ciliare Retz.	18	Pohl & Davidse 1971
	20	Oke 1971
commutatum Hack.	20	Christopher & Samraj 1985
diplopogon Hook.	20	Oke 1971
duthiei Stapf	20	Gill et al. 1980
fasciculatum Brongn.	20	Spies & Du Plessis 1987a
flumineum Bor.	40	Oke 1971
goebelii Hackel	38	Parkash 1979, Mehra 1982
hirtum Hock.	20	Parkash 1979, Mehra 1982
hubbardii Bor.	40	Parkash 1979, Mehra 1982
impressum Hack.	20	Oke 1971
indicum (Houtt.) Merr.	20	Davidse & Pohl 1978
	40	Reeder & Soderstrom 1968
indicum (Houtt.) Merr. Var. indicum	18	Christopher 1978
	40	Sindhe & Harayon 1976
indicum (Hoult.) Merrill var. wallichii (Hack.) Bor.	54	Christopher 1978, Parkash 1979, Mehra
kingii Hook.	20	1982
latifolium (Spreng.) Kunth	36	Oke 1971
mangaluricum (Hack.) Stapf	20	Pohl & Davidse 1971
		Sindhe & Narayon 1976, Christopher &
molle Hook.	20	Samraj 1985
	30	Christopher 1978
muticum L.	34	Oke 1971
nilagiricum Hack.	20	Christopher 1978
	40	Christopher 1978
pilosum Hack.	60	Sindhe & Narayon 1976
Rangacharianum Fish.	40	Oke 1971
ritchiei Stapf	20	Christopher 1978
rugosum Salisb.	18	Oke 1971
		Pohl & Davidse 1971, Parkash 1979,
	20	Davidse & Pohl 1978
		Singh & Godward 1960, Oke 1971, Bir
	40	& Sahni 1986
	44	Oke 1971, Bir & Sahni 1983, Bir &
	60	Sahni 1985
santapaui Bor.	20	Sindhe & Narayon 1976
	40	Oke 1971
semisagittatum Roxb.	20	Oke 1971
thomsonianum Stapf	20	Oke 1971
	40	Oke 1971
travancorense Stapf	20	Christopher 1978
zeylanicolum Bor.	20	Oke 1971, Sindhe & Narayon 1976
		Christopher 1978

		Christopher 1978
Microstegium		
ciliatum (Trin.) A. Camus	20	Kalia 1978, Mehra 1982
	40	Mehra & Sharma 1975
	n = 40+0-2B	Mehra 1982
	60	Mehra & Kalia 1976, Kalia 1978, Mehra 1982
	c60	
japonicum (Miq.) Koidz	20	Reeder & Soderstrom 1968
nudum (Trin.) A. Camus	20	Tateoka 1967
	42	Mehra & Sharma 1975, Kalia 1978,
petiolare (Trin.) Bov.	20	Mehra 1982
	n = 40+1-2B	Mehra & Sharma 1975, Sharma &
vagans (Nees) A. Camus	20	Kumar 1980
	60	Kalia 1978, Mehra 1982
	n = 30+2-4B	Kalia 1978, Mehra 1982
vimineum (Trin) A. Camus	40	Mehra & Sharma 1975 &1975e, 1977
vimineum (Trin.) var. polystachyum (Fr. & Sav.) Chwi	40	Mehra & Kalia 1976, Kalia 1978, Mehra 1982
vimineum (Trin.) var. willdenowianum (Nees) Bor	40	Mehra & Kalia 1975
		Mehra & Kalia 1976
		Tateoka 1967
		Kalia 1978, Mehra 1978
Miscanthus		
capensis (Stapf) Pilg.	30	Strydom et al. 2000
floridulus (labill.) Warb.	38	Price 1965, Price & Daniels 1968
nepalennis (Trin.) Hack.	40	Mehra & Sharma 1975, Kalia 1978,
nudipes (Griseb.) Hack.	40	Mehra 1982
	n = 20+4B	Mehra & Sharma 1972 & 1975
	n = 20+2-4B	Mehra 1982
purpurascens Anders.	38, 40	Kalia 1978
sacchariflorus (Maxim.) Hackel	38	Sokolovskaya 1966
	40	Sokolovskaya 1966, Zhang & Xie 1989
		Sokolovskaya 1966, Probatova &
sacchariflorus var. ganchaiensis	38	Sokolovskaya 1983
sacchariflorus var. sacchaiensis	76	Xie et al. 1989
sinensis Anderss.	40	Xie et al. 1989
		Probatova et al. 1989
Monocymbium		
ceresiiforme (Nees) Stapf	20	Dujardin 1978, 1979, Hoshino & Davidse 1988
Phacelurus		
speciosus (Steud.) C.E. Hubb.	20	Gould & Soderstrom 1970, Mehra & Sharma 1975 & 1977, Sharma & Sharma 1979, Ahsan et al. 1994
	80	Mehra 1965
typhoides	40	Ramulu & Rangasamy 1971
Rottboelia		
compressa L.	18	Bir et al. 1987
	38	Bir & Sahni 1983
digitata Sibth. & Sm.	20	Kozuharov & Nicolova 1975

exaltata L.f.	20	Mitra & Datta 1967, Pohl & Davidse 1971, Trouin 1972, Sindhe et al. 1975, Dujardin 1978a, Christopher 1984, 1984a, 1986, Christopher et al. 1989a,
	40	Mini 1994
	36	Chatterji 1975, Sindhe et al. 1975, Christopher 1978, Kalia 1978, Mehra 1982, Sahni & Bir 1985, Christopher
formosa R. Br.	18	1984, 1986
goalparennis Bor	20	Sindhe et al. 1990
latifolia Wall.	32	Singh & Godward 1960
		Kalia 1978
		Mallia et al. 1977a
Saccharum		
alopecuroideum (L.) Nutt	30	Burner & Webster 1994
arundinaceum Retz.	40	Xiao et al. 1992
	60	Sahni & Bir 1985, Xiao et al. 1992
baldwinii Spreng.	30	Burner & Webster 1994
bengalense Retz.	20	Kalia & Mehra 1989, Bir & Sahni 1983, 1985 & 1987, Sahni 1988, Bir et al.
	20+1-5B	1990b
	22	Kalia & Mehra 1989
	40	Bir & Sahni 1983, 1985 & 1987, Sahni 1988, Bir et al. 1990b
	60	Kalia & Mehra 1989, Bir & Sahni 1983, 1985 & 1987, Bir et al. 1987, Sahni 1988, Bir et al. 1990b
brevibarbe var. brevibarbe	60	Kalia & Mehra 1989, Bir & Sahni 1983, 1985 & 1987, Sahni 1988, Bir et al.
brevibarbe var. contortum (Baldwin ex Elliot) R.D.	60	1990b
Webster	60	Burner & Webster 1994
coarctatum (Fernald) R.D. Webster	60, 80	Burner & Webster 1994
edule Hassk.	70	Burner & Webster 1994
	30, 60, 90	Roach 1972
giganteum (Walter) Pers	20	Price & Daniels 1968, Roach 1972
griffithii Munro ex Boiss	40, 60	Burner & webster 1994
	40	Ahsan et al. 1994
officinarum L.	80	Faruqi et al. 1979
	108	Nair 1972, Iwo & Agboire 1992 Jagatheson & Sisodia 1967, Sisodia 1967, Nair 1972, Nair 1975, Sreenivason & Sreenivason 1984, Iwo & Agboire
	120	1992, Chen 1993, Zhuang et al. 1996
	70-81, 99	Price & Daniels 1968, Iwo & Agboire
	30, 48, 50,	1992
	54, 60, 64,	Nair 1972, Iwo & Agboire 1992
	68, 72, 88, 96	Price & Daniels 1968
	n = 84, 86, 88 c83	
officinarum L. clone Black Fiji	84	Iwo & Agboire 1992
officinarum L. clone 21 N.G. 2	107-114	Fernandez et al. 1978
officinarum L. clone N.C. 30	c92-93	Li & Price 1965
officinarum L. clone N.C. 76	100	Li & Price 1965
officinarum L. clone N.C. 92	84, 96, 102,	Li & Price 1965
officinale	104, 108, 112	Li & Price 1965

	40	Li & Price 1965
procerum Roxb.	60	
ravennae	c60	Hinojo et al. 1985
ravennae subsp. Parviflorum (Pilger) Maire	60	Kalia 1978, Mehra 1982
robustum Brandes & Jeswiet ex Grassl.		Bir & Sahni 1987
	80	Faruqi et al. 1987
	88, 92, 100, c85	Jagathesan & Rathambal 1969, Sreenivason & Sreenivason 1984
robustum Brandes & Jeswiet ex Grassl. Clone 28	n = 44II+7I	Jagathesan & Rathambal 1969
N.G. 219	c64	Sreenivason & Sreenivason 1984
robustum Brandes & Jeswiet ex Grassl. Clone 28	c64	Sreenivason & Sreenivason 1984
N.G. 129A	110	Li & Price 1965
sinense Roxb.	81, 82, 83	Li & Price 1965
sinense ' Mungro'	82, 83	Zhuang et al. 1996
sinenese 'Dhaulu'	91, 91+f, 92	Price 1968
sinense ' Saretha'	105-119, 124	Price 1968
sinense ' Nargori'	106-120	Price 1968
sinense 'Pansahi'	104-121	Price 1968
sinense unclassified	36, 38	Price 1968
spontaneum L.	40	Price 1968
		Sreenivasan & Sreenivasan 1984
	48	Sreenivasan 1975, Bir & Sahni 1983, 1985, 1986, 1987
	52	Sreenivasan 1975, Bir & Sahni 1986, 1987, Singh et al. 1991
	54	Faruqi et al. 1979, Srrenivasan & Sreenivasan 1984
		Bir & Sahni 1983, 1985, Srrenivasan &
	56	Sreenivasan 1984, Sinha et al. 1990, 1990a, Singh et al. 1991, Ahsan et al.
	58	1994
	60	Moriya 1965, Srrenivasan & Sreenivasan 1984, Bir & Sahni 1985
	62	Bir & Sahni 1983, 1985, Bir et al. 1987
	64	Faruqi et al. 1979, Bir & Sahni 1986, 1987, Sinha et al. 1990
	72	Singh et al. 1989
		Jagathesan & Sreen 1966, Christopher
	80	1978, Bir & Sahni 1986, 1987
		Sreenivasan 1975, Bir & Sahni 1986,
	90	1987, Zhuang et al. 1996
	116	Moriya 1965, Sreenivasan 1975,
	120	Srrenivasan & Sreenivasan 1984, Bir &
	112, 124, 126	Sahni 1986, 1987
	n = 57II+1I	Sinha et al. 1990
	c96	Srrenivasan & Sreenivasan 1984
spontaneum L. clone Burma	112	Jagathesan & Sreen 1966
spontaneum Glagah	40, 52, 62-66,	Sreenivasan 1975
spontaneum Glagah cvs	124, 128	Srrenivasan & Sreenivasan 1984
	n = 27, 28,	Li & Price 1965
spontaneum Coimbatore	30+1, 31+1, 32, 40, 56,	Nair 1972
	62, 64	Nair 1972
trinii (Hack.) Renvoize	60	
		Nair 1975

		Norrmann et al. 1994
Sehima		
nervosum (Rottl.) Stapf	40	Tateoka 1965c, Christopher 1978, Sinha et al 1990
nervosum var. robusta Stapf	40	Oke 1971
notatum (Hack.) A. Camus	30	Mehra 1965
sulcatum A. Camus	40	Oke 1971
Schizachyrium		
brevifolium (Sw.) Nees ex Buse	20	Dujardin & Beyne 1975, Kalia 1978, Dujardin 1979, Mehra 1982
	40	Christopher & Samraj 1985
cirratum (Hack.) Wook. & Stadl	20	Hatch 1980
condensatum (HBK) Nees	20	Pohl & Davidse 1971
delavayi (Hackel) Bor	20	Kalia 1978, Mehra 1982
exile Stapf	20	Christopher 1978
gracile (Spreng.) Nash	40	Davidse & Pohl 1972
hirtiflorum Nees	40	Davidse & Pohl 1972
	60	Pohl & Davidse 1971
	70, 100	Hatch 1980
platyphyllum (Franch.) Stapf	n = 12+1B	Dujardin 1979
pulchellum (Don ex Benth.) Stapf	20	Dujardin 1978
sangiuneum (Retz.) Alts.	40	Spies & Du Plessis 1987a
	50	Dujardin 1978, Norrmann et al. 1994
	60, 70	Norrmann et al. 1994
	80	Kalia 1978, Mehra 1982
scoparium (Michx.) Nash var. frequens (F.T. Hubb.) Gould	40	Gould 1968
	40, 80	Hatch 1980
semiberbe Nees	20	Dujardin 1979
thollonii (Franch.) Stapf		
Sorghastrum		
agrostroides (Speq.) Hitchc.	20	Pereira Flores 1983, 1986, Pereira Flores & Montenegro Valls 1987
albescens (Hackel) Flores	20	Pereira Flores 1983, 1986, Pereira Flores & Montenegro Valls 1987
bipennatum (Hack) Pilg.	20	Olorode 1975
	40	Dujardin 1979a
elliotii (Mohr.) Nash	20	Hatch 1980
incompletum (Presl.) Nash	20	Pohl & Davidse 1971
minarum (Nees) Hitchc.	20	Pereira Flores 1983, 1986, Pereira Flores & Montenegro Valls 1987, Norrmann et al. 1994
nutans L.	40	Love & Love 1981a, Riley & Vogel 1982, Vahidy et al. 1987
rigidifolium (Stapf) Chippindall	40	Tateoka 1965c
scaberrimum (Nees) Herter	20	Pereira Flores 1983, 1986, Pereira Flores & Montenegro Valls 1987
setosum (Griseb) Hitchc.	20	Davidse & Pohl 1972, Pereira Flores 1983, 1986, Pereira Flores & Montenegro Valls 1987, Norrmann et al. 1994
stipoides (H.B.K.) Nash	20	Pereira Flores 1983, 1986, Pereira Flores & Montenegro Valls 1987

Sorghum		
aethiopicum	20	Magoon et al. 1967c
almum Parodi	40	Reddi 1970
amplum Lazarides	10	Lazarides et al. 1991
angustum S.T. Blak.	10	Lazarides et al. 1991
arundinaceum (Desv.) Stapf	20	Magoon et al. 1967b, Magoon & Tayyab 1968, Gadella 1977c, Dujardin 1979
australiense Garbver & Snyder	20	Spies et al. 1991
bicolor (L.) Moench.	10	Morakinyo & Olorode 1988
	20	Vachova 1978, Gu et al. 1984, Feng et al. 1985, Morokinyo & Olorode 1988, Laurie & Bennett 1989, Wu 1990, Ahsan et al. 1994, Ingaki & Mujeeb-Kazi 1995,
	40	He et al. 1997
bicolor ssp. arundinaceum (Desv.) De Wet & Harlan	40	Laurie & Bennett 1989
	10	Spies & Du Plessis 1987
brachypodum Lazarides	10	Lazarides et al. 1991
bulbosum Lazarides	20	Lazarides et al. 1991
caudatum	20	Saini et al. 1982
cernuum	20	Magoon et al. 1967b
cernuum var. orbiculatum	20	Magoon et al. 1967c
conspicuum	20	Magoon & Tayyab 1968
coriaceum	20	Magoon & Tayyab 1968
dura	20	Saini et al. 1982
dura var. mediocre	10	Magoon et al. 1967c
ecarinatum Lazarides	10	Lazarides et al. 1991
extans Lazarides	30, 40	Lazarides et al. 1991
grande Lazarides	18	Lazarides et al. 1991
halepense (L.) Pers.	20	Bir et al. 1980a, Bir et al. 1987
	26	Christopher 1978, Faruqi et al. 1979, Bir & Sahni 1983
	40	Raman et al. 1966
	41-43	Gould 1968, Fernandez & Queiros 1969, Reddi 1970, Pohl & Davidse 1971, Gupta & Yashavir 1971, Gupta 1971, Ferakova 1976, Muniyamma et al. 1976, Kalia 1978, Faruqi et al. 1979, Mehra 1982, Bir & Singh 1983, Probatova & Sakolovskaya 1983, Warwick & Black 1983, Gu et al. 1984, Mulligan 1984, Gohil & Koul 1986, Bir et al. 1987,
	60	Faruqi et al. 1987, Ahsan et al. 1994,
	40	Warwick et al. 1997
halepense (L.) Pers. var. halepense	40	Fernandez & Queiros 1969
halepense var. muticum (Hackel) Hayek	30	Bir & Chauhon 1990
interjectum Lazarides	10	Devesa et al. 1991
intrans F. Mueller ex Benth.	20	Devesa et al. 1991
intrans x S. plumosum (R.Br.) P. Beauv.	40	Lazarides et al. 1991
laxiflorum F.M. Bailey	40	Gu et al. 1984, Lazarides et al. 1991
macrocheata Snowden	40	Lazarides et al. 1991
macrospermum Garber	20	Lazarides et al. 1991
margaritiferum	10	Reddi 1970
matarakense Garber & Snyder	20	Wu 1990
melaleucum	20	Magoon et al. 1967c
membranaceum	40	Lazarides et al. 1991, Spies et al. 1991

miliaceum (Roxb.) Snowden	20	Magoon & Tayyab 1968
miliforme	20	Magoon et al. 1967b, Magoon & Tayyab
nervosum	20	1968
nitens		Reddi 1970
	40	Magoon et al. 1967b, Magoon & Tayyab
	10	1968
nitidum (Vahl) Pers.		Magoon et al. 1967b
	10+1B	Sadasiwaiah & Mitra 1966, Magoon et
	20	al. 1967b, Magoon & Tayyab 1968a &
	40	1968
	40	Sadasiwaiah & Mitra 1966
panicoides Stapf in Prain	10	Magoon & Tayyab 1968a, Wu 1982, Rao
plumosum (R.Br.) P. Beauv. var. plumosum	20	& Rao 1990
propinquum	10	Wu & Pi 1975, Wu 1978
purpureo-sericeum Aschers & Schweinf.		Kalia 1978, Mehra 1982
	10	Gu et al. 1984
pupureo-sericeum subsp. aimidiatum (Stapf) Garber	20	Reddi 1970
roxburghii	20	Lazarides et al. 1991
roxburghii var. nanum	20	Magoon et al. 1967 a &b
saccharatum (L.) Moench.	20	Wu & Pi 1968, Wu 1971, Gu et al. 1984,
splendidum	10	Rao et al. 1989
stipoideum (Ewart & White) C.A. Gardner & C.E.		Roa et al. 1989
Hubb	20	Magoon & Tayyab 1968, Saini et al.
	20	1982
subglarescens		Magoon et al. 1967c
sudanense	20	Vachova 1978, Magoon & Tayyab 1968
	10, 20	Magoon & Tayyab 1968
technicum	10	Gu et al. 1984, Lazarides et al. 1991,
timorense (Kunth) Buse ex De Vries		Spies et al. 1991
versicolor	20	Magoon et al. 1967b
		Vachova 1978, Magoon et al. 1967b,
verticilliflorum (Steud.) Stapf	20	Magoon & Tayyab 1968, Saini et al.
		1982
virgatum	20	Magoon et al. 1967b
		Lazarides et al. 1991
vulgare		Wu 1982, Gu et al. 1984, Laurie &
		Bennett 1989, Sun et al. 1994
		Magoon et al. 1967b, Magoon & Tayyab
		1968, Renard et al. 1983
		Magoon et al. 1967b, Magoon & Tayyab
		1968, Saini et al. 1982
		Magoon et al. 1967a &b, Saini et al.
		1982
Thelepogon		
elegans Roth ex R. & S.	10	Sisodia 1970, Sinde et al. 1975
Themeda		
anathera (Nees) Hackel	20	Mehra & Sharma 1975, Birari 1980a
	60	&1981
		Mehra & Sharma 1975, Kalia 1978,
anathera var. glabrescens Hackel	n=10II+1f,	Sharma & Sharma 1979, Mehra 1982
	13, 20	
anathera var. hirsuta Anderss.	n=10II+1f,	Faruqi et al. 1979, Faruqi & Quresh 1987
	10, 11, 30	
anathera var. submarginata	n=10II+1f,	Faruqi et al. 1979, Faruqi & Quresh 1987

	10, 11, 30	
arundinacea (Roxb.) Ridley	20	Faruqi et al. 1979, Faruqi & Quresh 1987
	20+4B	Sinha et al. 1990
	22	Sinha et al. 1990
	40	Kalia 1978, Mehra 1982
	60	Mehra & Sharma 1975, Kalia 1978, Mehra 1982
caudata (Nees) A. Camus	40	Singh & Godward 1960, Kalia 1978,
cymbaria Hack.	20	Birari 1980a & 1981, Mehra 1982
dacrusii Birari	60	Birari 1980a &1981
hookeri (Griseb.) A.Camus	20	Christopher 1978
		Birari 1980a & 1981
intermedia (Hack.) Bor.	40	Mehra & Kalia 1976, Kalia 1978, Birari
laxa (Anderss.) A. Camus	20	1980a & 1981, Mehra 1982
longispatha Raiz. & Jain	50	Kalia 1978, Mehra 1982
mooneyi Bor.	20	Christopher 1978
quadrivalvis (L.) Kuntze	18	Birari 1980a & 1981
	40	Birari 1980a & 1981
	80	Sahni & Bir 1985
strigosa (Ham.) A. Camus	20	Birari 1980a & 1981
subsericans (Nees) Ridley	40	Christopher 1978
	54	Birari 1980a & 1981
tremula (Nees) Hook.	20	Mehra & Kalia 1975, Kalia 1978, Mehra
triandra Forsk.	20	1982
		Kalia 1978, Mehra 1982
	20+4B	Christopher 1978, Birari 1980a & 1981
	20+6B	Christopher 1978, Spies & Du Plessis
	21	1986a, Liebenberg 1986, Fossey & Liebenberg 1987
	22	Liebenber 1986
	24	Liebenber 1986, Liebenberg 1990
	30	Liebenberg 1986, Fossey & Liebenberg
	40	1987, Liebenberg 1990
		Fossey & Liebenberg 1987
		Fossey & Liebenberg 1987
	40+4B	Du Plessis & Spies 1988
	42	Mehra & Sharma 1975, Kalia 1978, Gill
	50	et al. 1980 & 1980a, Birari 1981, Mehra
	59	1982, Liebenberg 1990, Liebenberg et al.
	60	1993
		Liebenberg 1990
		Liebenberg 1990
	80	Liebenberg 1990, Liebenberg et al. 1993
	90	Liebenberg 1990
	100	Sharma & Sharma 1979, Liebenberg
	110	1990, Sinha et al. 1990, Fossey &
triandra Forsk. var. hispida (Nees) Stapf	40, 60	Liebenberg 1992, Liebenberg et al. 1993
villosa (Poir) A. Camus	40	Shanthamma 1976, Gill et al. 1980a, Birari 1981
		Gill et al. 1980a, Birari 1981
		Liebenberg et al. 1993
		Gill et al. 1980a, Birari 1981
		Tateoka 1965c
		Kalia 1978, Gill et al. 1980a & 1981, Mehra 1982

Trachypogon		
ligularis Nees	20	Davidse & Pohl 1972
montufari (HBK) Nees	60	Davidse & Pohl 1972
spicatus (L.F.) Kuntze	20	Olorode 1975, Strydom et al. 2000
	40	Dujardin 1978
Vetiveria		
lawsonii (Hook.f.) Blatt & McCann	20	Muniyamma et al. 1976
nigritiana (Benth) Stapf	20	Olorode 1975, Dujardin 1978
zizanoides (L.) Nash	20	Mitra & Datta 1967, Saxena & Gupta 1970, Pohl & Davidse 1971, Sindhe 1977, Sharma et al. 1978, Shanthamma et al. 1978, Christopher 1978, Kalia 1978, Mehra 1982, Bir & Sahni 1983, Bir et al. 1987, Lavania 1985, Sinha et al. 1990, Ahsan et al. 1994
Vossia		
cuspidata (Roxb.) Griff.	20	Mehra & Kalia 1976, Kalia 1978, Mehra 1982
	40	Dujardin 1978
Zea		
diploperennis	20	Molina 1982, Paupulet & Galinat 1982, Molina 1985
	20+1B	Molina 1982
perennis (Hitchc) Reeves & Mangelsdorf	40	Kato 1984, Molina 1985, Molina 1986
mays L.	20	Weber 1969, Das 1970, Vochova 1978, Chokairi & Gorenflot 1979, Sarr & Gorenflot 1979, Palmer 1971, Filion & Walden 1973, Maquire 1974, Sharma & Agarwal 1980, Joshi & Ranjekar 1982, Sapre & Barve 1983a, Maquire 1982, Sharma & Sharma 1984, Khuong & Schubert 1985, Aguiar Perecin 1985, Zhang et al. 1985, Khuong & Sharma 1986, Chen et al. 1987, Heslop-Harrison et al. 1988, Chen 1988, Laurie & Bennett 1989, Ahsan et al. 1994, Inagaki &
	20+0-6B	Mujeeb-Kazi 1995, Carvalho & Saraiva
	21, 22	1997
mays L. cultivars	20	Mogford 1981a, Aguiar Perecin 1985
	20+1-3B	Weber 1969
mays subsp. amylacea (Sturlev.) Zhuk.	20	Sharma & Sharma 1986
mays subsp. ceratina (Kuleshov) Zhuk.	20	Sharma & Sharma 1986
mays subsp. everta (Sturtev.) Zhuk.	20	Zhang & Li 1990
mays subsp. indentata (Sturtev.) Zhuk.	20	Zhang & Li 1990
mays subsp. indurata (Sturtev.) Zhuk.	20	Zhan et al. 1987, Zhang & Li 1990
mays subsp. sacharata (Sturtev.) Zhuk.	20	Zhang & Li 1990
mays subsp. semidentata Kuleshov	20	Zhang & Li 1990
mays subsp. tunicata Sturtev.	20	Zhang & Li 1990
		Zhang & Li 1990
		Zhang & Li 1990eddc3

Appendix B: CLUSTAL W (1.74) multiple sequence alignment data of the Andropogoneae specimens for *tnrL* intron.

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Andropogonappendiculatus6543      ----TCGGTATA-GGTTTTGTGG------------TTTGGGGG-----
Andropogonappendiculatus6677      GAA-TCGGTAG--CGCTACGTTGTATTCCCG--CCTTCCCAGGA-ACC
Andropogonappendiculatus6946      GAA-TGGAAACCTTGCTAGGTTTAACTCCCN---AAATCCAGAGCCCC
Andropogonappendiculatus6949      GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Aristidaadscencianis6713          GAA-TCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Bothriochloa7489                  GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Brachiaria                        GAA-TCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Brachyariaserrata6654             GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Cymbopogonexcavatus5877           GAAATCGGTACA-CGCTACGTTCAAGTCCCT--CTATCCCCACCGAAA
Cymbopogonexcavatus6577           ------------------------------------------------
Cymbopogonmarginatus4397          GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Cymbopogonprolixus6682            GAA-TCGGACC---GCTACGTTAAGTCCCA----ATTCAGAGAAACCC
Diheteropogonfilifolius5872       GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Elionurusmuticus5074              GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Elionurusmuticus6954              GAA-TCGGTAGA-CGATACGGTAATG--GGT--ATATCCCAGCCTGAA
Helictotrichonlongifolium6560     GAA-TCGGTAGA-CGCTACGTTAAGT--CCC--TCCTCCCAGCCGAAA
Hemarthriaaltissima5698           GAA-TGGAAACCTTGCTAAGTGTAACTTCCC---AATTCCGGAACCCT
Hyparrheniaanamesa4841            GAA-TCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Hyparrheniadissoluta5145          GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Hyparrheniahirta6550              GAA-TCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCACCAAACC
Hyparrheniapilgeriana4649         GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Hyparrheniapilgeriana4738         GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Imperatacylindrica5114            GAAATCGGTAGA-CGCTACGTTCAATTCCCT--CCTTCCCAGCCGAAA
Imperatacylindrica6582            GAA-TCGGTAGA-CGCTACGGT-TATTGCCT--CCTTCCCAGAAGAAC
Miscanthuscapensis6655            GTA-TGGGAAC--TGCTAAGTGTAACTCCCA---ATTCCCAGAACC--
Pannicumschinzii6652              GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Paspalum5                         GAA-TCGGTAGA-CGCTACGTTCAAGTCCCT--CTATCCCCGCCGAAA
Paspalumdilatum6617               GAA-TCGGTAGA-CGCTACGTTCAAGTCCCC--CCTTCCCAGCCGAAA
Phacelurusfranksae4705            GAAATCGGTAGA-CGCTACGTTCAAGTCCCT--CCTTCCCAGCCGAAA
Setarianigrostis6567              GAAATCGGTAGA-CGCTACGTTTAATTCCCC--CATTCCCAGCCGAAA
Sorghumbicolour6589               GAA-T-GGT-GA-CGCTACGTT--ACTCCCT--CCTTCCCAGCCGAAA
Sorghumhalepense9318              GAA-TCGGAACC-CGCTACGTTAAGT--CCC---ATTC--AGC-GAAA
Themedatriandra6555               GAAAT-GGTAG--CGGTACGTTCAAGTCCCCGACATAAGCTGCCACCT
Trachypogonspicatus4846           GAAATCGGTAGA-CGCTACGTTCAATTCCCT--CCTTCCCAGCCGAAA
Trachypogonspicatus6580           GAA-TGG-AAC--TGCTACGTTCAAGTGCCC-----TCCTAGGGGAAA
Zea                               TTTCT-ATCTA--AGTGAACTTCCAATTT-AGAACTAGT-TAATAACT
Icylindrical                      --------------------------TTCCA--AATTCAGAGAA-ACC
Sacharumofficinarum               --------------------------TTCCA--AATTCAGAGAA-ACC
Sorghumhalepnese                  --------------------------TTCCA--AATTCAGAGAA-ACC
Ttriandra                         --------------------------TTCCA--AATTCAGAGAA-ACC
Pschinzii                         ATG-GAAACCT--GCTAAGTGGTAACTTCCA--AATTCAGAGAA-ACC


Andropogonappendiculatus6543      ---GGT---GTGTGTTGGGCAA-TGTTGAGATA-TTCCCTTTTTTTTGAA
Andropogonappendiculatus6677      --TGGAATGATA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Andropogonappendiculatus6946      --TGGAATGAAA-G-TGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Andropogonappendiculatus6949      CTGGAAT-GACG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Aristidaadscencianis6713          -TGGGT-GGATGCAATGGGCAA-TCCTGAGCCAAATCC-CTCTTTTGAAA
Bothriochloa7489                  -TGGGAAAGATGCAATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Brachiaria                        -TCGGAATGACG-CATGGGCAA-TCCTGAGCCAAATCC-CTTTTT-GAAA
Brachyariaserrata6654             -TGGGAATGACGCAATGGGCAA-TCCTGAGCCAAATCC-CTCTTTTGAAA
Cymbopogonexcavatus5877           -TCGGTA-GATT-CTACGGCAA-TGCCCCGCGGGCTCC-CTTTATTTAAA
Cymbopogonexcavatus6577           ------------------------------------------------
Cymbopogonmarginatus4397          -TCGGTA-GATT-AATGGGCAA-TCCTGAGCCAACTCC-CTTTATTTGAA
Cymbopogonprolixus6682            --TGGAATGAAA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Diheteropogonfilifolius5872       -TCGGAA-GACG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Elionurusmuticus5074              -TCGGTG-GATG-AATGGGCAA-T----------CCCA-CCGTCCCCTTG
Elionurusmuticus6954              ATCGGTA-GACG-AATGGGCAA-TCCTGAACCAAATCC-CTTTATTGAAA
Helictotrichonlongifolium6560     -TTGG----ATG-AATGGGCAA-TCCTGAGCCAAATCC-GTGTTTTCTGA
Hemarthriaaltissima5698           --CGGAATGAAA-A-TGGGCAA-TCCTGAGCCAAATCC-CTTTTT-GAAA
Hyparrheniaanamesa4841            -TCGGTA-GACG-CATGGGCAA-TCCTGA-CCATCTCC-CTTT-TTT--A
Hyparrheniadissoluta5145          -TCGGAT-GAGA-AATGGGCAA-TCCTGA-CCAAATCC-CTTTTTTGAAA
Hyparrheniahirta6550              -TGGAAT-GACA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Hyparrheniapilgeriana4649         -TCGGTA-GACG-CTAGGGCAA-TCCTGAGCCATATCC-CTTGATTTGAA
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Hyparrheniapilgeriana4738          -TCGGTA-GATG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Imperatacylindrica5114             -TCGGTT-GACG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Imperatacylindrica6582             --TGGAATGATA-AATGGGCAA-TCCTGAGCCAAATCCACTTTTTTGAAA
Miscanthuscapensis6655             --TGGAATGAAA-AATGGGCAA-TCCTGAGCCTTTGGG-GGT----GAAA
Pannicumschinzii6652               -TCGGA-TGACG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Paspalum5                          -TCGGAA-GACG--CTGGGCTCCTGCTCCTCCATATCC-CTTTAATTCAA
Paspalumdilatum6617                -TGGGA-TGATG-CATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Phacelurusfranksae4705             -TCGGAT-GAGG-AATGGGCAA-TCCTGA-CCAAATCC-CTTTTTTGAAA
Setarianigrostis6567               -TGGAA-TGATA-CATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Sorghumbicolour6589                --TGGAATGATA-AATGGGCAA-TCCTGAGCCAAATCCACTTTTTTCAAA
Sorghumhalepense9318               -TCGG--TGATG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Themedatriandra6555                TGGCCTCTAATGTCGTAGCTAACCACGCAGCGCAATAT-ATGATCTG--A
Trachypogonspicatus4846            -TCGGTG-GATT-AAAGGGCAA-TGGTGAGC---CTCA-CCTTTTTTTTT
Trachypogonspicatus6580            --TCGGATGATA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Zea                                AAGATTAATAATTAAGATCTGACTTTACAGCCCTATAT-ATAATTTT--T
Icylindrical                       -TGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCCACTTTTTTGAAA
Sacharumofficinarum                CTGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCCCCTTTTTTGAAA
Sorghumhalepnese                   CTGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCCACTTTTTTCAAA
Ttriandra                          CTGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Pschinzii                          CTGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA


Andropogonappendiculatus6543       AAAGAAAGCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Andropogonappendiculatus6677       AAACAA-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Andropogonappendiculatus6946       AAACAA-GCGGTTCT--CAAACTAGAACCCAAAGGAAA-GGATAGGTGC
Andropogonappendiculatus6949       AAACAA-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Aristidaadscencianis6713           AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Bothriochloa7489                   AAACAA-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Brachiaria                         AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Brachyariaserrata6654              AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Cymbopogonexcavatus5877            AAACTT-CCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Cymbopogonexcavatus6577            --------------------------------------------------
Cymbopogonmarginatus4397           AAACTT-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Cymbopogonprolixus6682             AAACAA-GC-GGTTT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Diheteropogonfilifolius5872        AAACTA-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Elionurusmuticus5074               AAACTT-GCGG-TCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Elionurusmuticus6954               AAACAA-GTGGTTCG--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Helictotrichonlongifolium6560      AAACAACGAGGTTCT--CGAACTAGAATACAAAGGAAAAGGATAGGTGC
Hemarthriaaltissima5698            AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Hyparrheniaanamesa4841             --ACCA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Hyparrheniadissoluta5145           AAACAA-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Hyparrheniahirta6550               AAACAA-GCG-------CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Hyparrheniapilgeriana4649          AAACCA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAAATGC
Hyparrheniapilgeriana4738          AAACTA-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Imperatacylindrica5114             AAACAA-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Imperatacylindrica6582             AAACAA-GCGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Miscanthuscapensis6655             TGACTA-CATGGTCTACCTAATGATGATCCAAAGGTAATGGATAGGTGC
Pannicumschinzii6652               AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Paspalum5                          AAACCC-CTGCTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Paspalumdilatum6617                AA-CAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Phacelurusfranksae4705             AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Setarianigrostis6567               AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Sorghumbicolour6589                AAA----GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Sorghumhalepense9318               AA-CAA-GTGGTT-T--CCAACTAGAACCCAAAGGAAAAGGATAGGTGC
Themedatriandra6555                GGACAAAGA---TC---CATATTGGTC------GGTCCCGTAGCG-TCT
Trachypogonspicatus4846            AAACTA-GTGGGTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Trachypogonspicatus6580            AAACAA-GTGGTTCT--CTAAGTAGAATCCAAAGGAAAAGGATAGGTGC
Zea                                TGTTACATT---TC---TGTTATGTAA------GCCCACTTAG---CTC
Icylindrical                       AAACAA-GTG-------CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Sacharumofficinarum                AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Sorghumhalepnese                   AAA----GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC
Ttriandra                          AAACAA-GCGGTTCT--CAAACTAGAACCAAAAGGAAAAGGATAGGTGC
Pschinzii                          AAACAA-GTGGTTCT--CAAACTAGAACCCAAAGGAAAAGGATAGGTGC

Andropogonappendiculatus6543       AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Andropogonappendiculatus6677       AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Andropogonappendiculatus6946       AGAGACTCTATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Andropogonappendiculatus6949       AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Aristidaadscencianis6713           AGAGACTCAATGGAAGCTATTCTA--ACGAATCGAAGTAATTACGTTGTG
Bothriochloa7489                   AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Brachiaria                         AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
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Brachyariaserrata6654            AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Cymbopogonexcavatus5877          AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Cymbopogonexcavatus6577          ------------------------------------------------
Cymbopogonmarginatus4397         AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Cymbopogonprolixus6682           AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Diheteropogonfilifolius5872      AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Elionurusmuticus5074             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Elionurusmuticus6954             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Helictotrichonlongifolium6560    AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAGTTAATTACGTTGTG
Hemarthriaaltissima5698          AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTGCGTTGTG
Hyparrheniaanamesa4841           AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hyparrheniadissoluta5145         AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hyparrheniahirta6550             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hyparrheniapilgeriana4649        AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hyparrheniapilgeriana4738        AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Imperatacylindrica5114           AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Imperatacylindrica6582           AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Miscanthuscapensis6655           AGAGACTCCCATG--GCTGTTCTAGAATGGATCTGAGCGAT---------
Pannicumschinzii6652             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Paspalum5                        AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Paspalumdilatum6617              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTGCGTTGTG
Phacelurusfranksae4705           AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Setarianigrostis6567             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Sorghumbicolour6589              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Sorghumhalepense9318             AGAGACTCAATGGA-GCTGTTCTA--ACGAATCGAAGTAAT-ACGTTGTG
Themedatriandra6555              ACCGATTTTCGCGAAGCTGTCCTA--CCGGTTCGAAGTTATT--------
Trachypogonspicatus4846          AGAGACTCAATGGAAGCTTTTCTA--ACGAATCGAAGTAAT---------
Trachypogonspicatus6580          AGAGAATCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Zea                              AGAGGTTAGAGCATCGCATTTGTA--ACGAATCGGTTCAAT---------
Icylindrical                     AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Sacharumofficinarum              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Sorghumhalepnese                 AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Ttriandra                        AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Pschinzii                        AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG


Andropogonappendiculatus6543     ------------------------------------------------
Andropogonappendiculatus6677     ------------------------------------------------
Andropogonappendiculatus6946     ------------------------------------------------
Andropogonappendiculatus6949     ------------------------------------------------
Aristidaadscencianis6713         TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATA-----
Bothriochloa7489                 ------------------------------------------------
Brachiaria                       TTGGTAGGGGAACTGCCTCAAAATACTAGAAAGAAGGGCTTTATATTATA
Brachyariaserrata6654            TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATTT-ATA
Cymbopogonexcavatus5877          ------------------------------------------------
Cymbopogonexcavatus6577          ------------------------------------------------
Cymbopogonmarginatus4397         ------------------------------------------------
Cymbopogonprolixus6682           ------------------------------------------------
Diheteropogonfilifolius5872      ------------------------------------------------
Elionurusmuticus5074             ------------------------------------------------
Elionurusmuticus6954             ------------------------------------------------
Helictotrichonlongifolium6560    TTGTTAGTGGAATTCCTTCTAAATTTGAGAAAGAAGGGCTTTATA-----
Hemarthriaaltissima5698          TTGGTAGTGGAACT-CTTCGAAATTAGAGAAAGAAGGGCTTTATA-----
Hyparrheniaanamesa4841           ------------------------------------------------
Hyparrheniadissoluta5145         ------------------------------------------------
Hyparrheniahirta6550             ------------------------------------------------
Hyparrheniapilgeriana4649        ------------------------------------------------
Hyparrheniapilgeriana4738        ------------------------------------------------
Imperatacylindrica5114           ------------------------------------------------
Imperatacylindrica6582           ------------------------------------------------
Miscanthuscapensis6655           ------------------------------------------------
Pannicumschinzii6652             TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATA-----
Paspalum5                        TTGGTAGTGGAACTCCATCTAAATACTATAATTAATGGCTTTATACATTT
Paspalumdilatum6617              TTGGTAGTGGAACCTCTTCGAAATTAGAGAAAGAAGGGCTTTATA-----
Phacelurusfranksae4705           ------------------------------------------------
Setarianigrostis6567             TTGGTAGTGGAACTCCCTCGAAATACTAGAAAGAAGGGCTTTATA-----
Sorghumbicolour6589              ------------------------------------------------
Sorghumhalepense9318             TTGGTAGTGGAACTCCCTCGAAATACTAGAAAGAAGGGCTTTATA-----
Themedatriandra6555              ------------------------------------------------
Trachypogonspicatus4846          ------------------------------------------------
Trachypogonspicatus6580          ------------------------------------------------
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Zea                                 --------------------------------------------------
Icylindrical                        --------------------------------------------------
Sacharumofficinarum                 --------------------------------------------------
Sorghumhalepnese                    --------------------------------------------------
Ttriandra                           --------------------------------------------------
Pschinzii                           TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATA-----


Andropogonappendiculatus6543        ----------------------------------AACGATTAATCACA--
Andropogonappendiculatus6677        ----------------------------------AACGATTAATCACA--
Andropogonappendiculatus6946        ----------------------------------AACGATCAATCACA--
Andropogonappendiculatus6949        ----------------------------------AACGATTAATCACA--
Aristidaadscencianis6713            CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Bothriochloa7489                    ----------------------------------AACGATTAATCACA--
Brachiaria                          CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACG--
Brachyariaserrata6654               CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Cymbopogonexcavatus5877             ----------------------------------AACGATTAATCACAAA
Cymbopogonexcavatus6577             --------------------------------------------------
Cymbopogonmarginatus4397            ----------------------------------AACGATTAATCACAAA
Cymbopogonprolixus6682              ----------------------------------AACGATTAATCACA--
Diheteropogonfilifolius5872         ----------------------------------AACGATTAATCACA--
Elionurusmuticus5074                ----------------------------------AACGATTAATCACA--
Elionurusmuticus6954                ----------------------------------AACGATTAATCACA--
Helictotrichonlongifolium6560       CACCTAATAAACACGTATAGATACTGGCATAGCAAACGATTAATCACG--
Hemarthriaaltissima5698             CATCTTATATACACGCATATATACTGACATAGCAAACGATTAATCACG--
Hyparrheniaanamesa4841              ----------------------------------AACGATTAATCACA--
Hyparrheniadissoluta5145            ----------------------------------AACGATTAATCACA--
Hyparrheniahirta6550                ----------------------------------AACGATTAATCACA--
Hyparrheniapilgeriana4649           ----------------------------------AACGATTAATCACA--
Hyparrheniapilgeriana4738           ----------------------------------AACGATTAATCACA--
Imperatacylindrica5114              ----------------------------------AACGATTAATCACA--
Imperatacylindrica6582              ----------------------------------AACGATTATTCACA--
Miscanthuscapensis6655              ----------------------------------GCAGCTTAATCACA--
Pannicumschinzii6652                CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCATA--
Paspalum5                           AATACAC----CACGTATAGATACTGACATACCAAACTATTATTCACA--
Paspalumdilatum6617                 CATCTAATATACACGCATATATACTGACATAGCAAACGATTAATCACG--
Phacelurusfranksae4705              ----------------------------------AACGATTAATCACA--
Setarianigrostis6567                CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Sorghumbicolour6589                 ----------------------------------AACGATTAATCACA--
Sorghumhalepense9318                CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Themedatriandra6555                 ----------------------------------ACGAGT-TTCAGG--
Trachypogonspicatus4846             ----------------------------------TACGATTAATCACA--
Trachypogonspicatus6580             ----------------------------------AACGATTAATCACA--
Zea                                 ----------------------------------CCGATT-TTTTTT--
Icylindrical                        ----------------------------------AACGATTAATCACA--
Sacharumofficinarum                 ----------------------------------AACGATTAATCACA--
Sorghumhalepnese                    ----------------------------------AACGATTAATCACA--
Ttriandra                           ----------------------------------AACGATTAATCACA--
Pschinzii                           CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCATA--

Andropogonappendiculatus6543        GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
Andropogonappendiculatus6677        GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
Andropogonappendiculatus6946        GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
Andropogonappendiculatus6949        GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
Aristidaadscencianis6713            GAACCCATATCATAATATAGGTTCTTTATTTTATAT-------TTTTTTT
Bothriochloa7489                    GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Brachiaria                          GAACCCCTATCATAATAGGGGTTCTTTATTTTATAT------TTTTTTCT
Brachyariaserrata6654               GAACCCATATCATAATATAGGTTCTTTATTTTATATATATATTTTTTTTT
Cymbopogonexcavatus5877             GAACCCATATTATAATATAGGTTCTTTATTTT-----------------T
Cymbopogonexcavatus6577             -------CATNNGGCTACGTGTTGCGCAGTCG-----------------
Cymbopogonmarginatus4397            GAACCCATATTATAATATAGGTTCTTTATTTT-----------------T
Cymbopogonprolixus6682              GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Diheteropogonfilifolius5872         GAACCTATATTATAATATAGGTTCTTTTTTTTATTT------------TT
Elionurusmuticus5074                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Elionurusmuticus6954                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Helictotrichonlongifolium6560       GAACCCATATTATAATATAGGTTCTTTATTCTTTTT-------TAGAATG
Hemarthriaaltissima5698             GAACCCATATCATAATATAGGTTCCTTATTTTATTT------------TT
Hyparrheniaanamesa4841              GAACCTATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hyparrheniadissoluta5145            GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hyparrheniahirta6550                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hyparrheniapilgeriana4649           GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
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Hyparrheniapilgeriana4738          GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Imperatacylindrica5114             GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Imperatacylindrica6582             GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Miscanthuscapensis6655             GAACCCATATTCTAATATAGGTTCTTTATTACATTT------------TT
Pannicumschinzii6652               GAACCCATATCATAATATAGGTTCTTTATTTTATTT-----------TTT
Paspalum5                          GATTGCCTATCATAATATAGGTTCTTTAGTTTATATTTA---TTTTTTTC
Paspalumdilatum6617                GAACCCATATCATAATATAGGTTCCTTATTTTATTT-----------TTT
Phacelurusfranksae4705             GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Setarianigrostis6567               GAACCCCTATCATAATATAGGTTCTTTATTTTATAT------TTTTTTTT
Sorghumbicolour6589                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TG
Sorghumhalepense9318               GAACCCCTATCATAATATAGGTTCTTTATTTTATAT-----TTTTTTTTT
Themedatriandra6555                TAAGCCTTATGATAATCGTAGTCGTCTACGTCGC---------------G
Trachypogonspicatus4846            GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Trachypogonspicatus6580            GAACCCATATTATAATATAGGTTGTTTATTTTATTG------------TT
Zea                                CTATCGATGTTCTATGAACAAGAATTTCTCTTTT---------------C
Icylindrical                       GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Sacharumofficinarum                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Sorghumhalepnese                   GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TG
Ttriandra                          GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Pschinzii                          GAACCCATATCATAATATAGGTTCTTTATTTTATTT-----------TTT

Andropogonappendiculatus6543       AGAATGAAATTTGGAAGGATTATGAA-----ATAGAAAATTCATA
Andropogonappendiculatus6677       AGAATGAAATTTGGAAGGATTATGAA-----ATAGAAAATTCATA
Andropogonappendiculatus6946       AGAATGAAATTTGGAAGGATTATGAA-----ATAGTCGATTGATA
Andropogonappendiculatus6949       AGAATGAAATTTGGAAGGATTATGAA-----ATAGAAAATTCATA
Aristidaadscencianis6713           AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCTGA
Bothriochloa7489                   AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Brachiaria                         AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCTTA
Brachyariaserrata6654              AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTATGA
Cymbopogonexcavatus5877            AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Cymbopogonexcavatus6577            ---CTGAAACGTCCAAGAACTCTCGCTATCGCCAGATAATTCGTA
Cymbopogonmarginatus4397           AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Cymbopogonprolixus6682             AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Diheteropogonfilifolius5872        AGAATGAAATTTGGAAGGATTATGAA-----ATAGAAAATTCATA
Elionurusmuticus5074               AGAATGAAATTTGGAAGGATTATGAAGAGGTATAGAAAATTCATA
Elionurusmuticus6954               AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Helictotrichonlongifolium6560      AAATTTGAAATAGAAATGATTATGAA-----ATAATAAATTCTGA
Hemarthriaaltissima5698            TGAATGAAATTAGGAATGATTATGAA-----ATATAAAATTCTGA
Hyparrheniaanamesa4841             AGAATGAAATTTGGAAGGATTATGAA-----ATAGAAAATTCATA
Hyparrheniadissoluta5145           AGAATGAAATTTGGAAGGATTATGAAGAGGTATAGAAAATTCATA
Hyparrheniahirta6550               AGAATGAAATTTGGAAGGATTATGAAGAGGTATAGAAAATTCATA
Hyparrheniapilgeriana4649          AGAATGAAATTTGGAATGATTATGAA-----ATAGAAAATTCATA
Hyparrheniapilgeriana4738          AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Imperatacylindrica5114             AGAATGAAATTAG-AATGATTATGAA-----ATAGAAAATTCATA
Imperatacylindrica6582             AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Miscanthuscapensis6655             TGAATGAAATTCGGAATGATTATGAA-----ATACAACAACAGCA
Pannicumschinzii6652               AGAATGAAATTAGGAATGATTATGAA-----ATATAAAATTCTGA
Paspalum5                          AAAAAGAGATTACGAATAATTTTAAAA---TCGAGAAATTCTCCA
Paspalumdilatum6617                -GAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCTGA
Phacelurusfranksae4705             AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Setarianigrostis6567               AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCTGA
Sorghumbicolour6589                AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Sorghumhalepense9318               AGAATGAAATTAGGAATGATTAGGAA-----ATAGAAAATTCTGA
Themedatriandra6555                AAATTGAAATTAGGAATGATTATGAA-----ATAAAA-ATTCATA
Trachypogonspicatus4846            AGAATGAAATTTGGAAGGATTATGAA-----ATACAAAATTCATA
Trachypogonspicatus6580            AGAATGAAATTAGGAATGATTATGAA-----ATAGAA-ATTCATA
Zea                                CGAATAAAATGGGGAATCAGGGTCTA-----TTAGTC-GTTCAAG
Icylindrical                       AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCCTA
Sacharumofficinarum                AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Sorghumhalepnese                   AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Ttriandra                          AGAATGAAATTAGGAATGATTATGAA-----ATAGAAAATTCATA
Pschinzii                          AGAATGAAATTAGGAATGATTATGAA-----ATATAAAATTCTGA

Andropogonappendiculatus6543       ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Andropogonappendiculatus6677       ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Andropogonappendiculatus6946       ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Andropogonappendiculatus6949       ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Aristidaadscencianis6713           ATTTTTT-GAGAATTA----TTGTGAATCCATTCCAATCGAATATT
Bothriochloa7489                   ATTTTTT-GAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Brachiaria                         ATTTTTT-TAGAATTA----TTGTGAATCCATTCCAATCGAATATT
Brachyariaserrata6654              ATTTTTT-CATAATTA----TTGTGAATC-ATTCCAATCGAATATT
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Cymbopogonexcavatus5877          ATTTTTT-GAGAATTAATTATTGTGAATCTATTCCAATCGAATATT
Cymbopogonexcavatus6577          CTATGATCGTCGACTA-TTTTCGCGTGTCTACGCCAACAGATCATT
Cymbopogonmarginatus4397         ATTTTTT-GAGAATTAATTATTGTGAATCTATTCCAATCGAATATT
Cymbopogonprolixus6682           ATTTTTT-GAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Diheteropogonfilifolius5872      ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Elionurusmuticus5074             ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Elionurusmuticus6954             ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Helictotrichonlongifolium6560    ATTTTTTGTAGAATTA----TT--GAATC-ATTCCAATTGAATATT
Hemarthriaaltissima5698          ATTTTTT-TAGAATTA----TTGTGAATCCATTCCAATCGAATATT
Hyparrheniaanamesa4841           ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Hyparrheniadissoluta5145         ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Hyparrheniahirta6550             ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Hyparrheniapilgeriana4649        ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Hyparrheniapilgeriana4738        ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Imperatacylindrica5114           ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Imperatacylindrica6582           ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Miscanthuscapensis6655           TTAAATG-AAGAATTC----ATGTGAAGCTATTGCTTGCAAATATT
Pannicumschinzii6652             ATTTTTTTTAGAATTA----TTGTGAATCCATTCCAATCGAATATT
Paspalum5                        TTTTTTTCTAAAAATA----TAGAGAATCCTTTCCAANCNATTNNT
Paspalumdilatum6617              ATTTTTT-TAGAATTA----TTGTGAATCCATTCCAATCGAATATT
Phacelurusfranksae4705           ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Setarianigrostis6567             ATTTTTT-TAGAATTA----TTGTGAATCCATTCCAATCTAATATT
Sorghumbicolour6589              ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Sorghumhalepense9318             ATTTTTT-TAGAATTA----TTGTGGATCCATTCCAATCGAATATT
Themedatriandra6555              ATTTTTT-GAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Trachypogonspicatus4846          ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Trachypogonspicatus6580          ATTTTTT-TAGAATTA----TTGTGAATCTATTGCAATGGAATATT
Zea                              ACTCCAT-TTGTCATA----TATTCCATATATCACATTCGAAGATA
Icylindrical                     ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Sacharumofficinarum              ATTTTTT-TAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Sorghumhalepnese                 ATTTTTT-TAGAATTA-----TGTGAATCTATTCCAATCGAATATT
Ttriandra                        ATTTTTT-GAGAATTA----TTGTGAATCTATTCCAATCGAATATT
Pschinzii                        ATTTTTTTTAGAATTA----TTGTGAATCCATTCCAATCGAATATT

Andropogonappendiculatus6543     -GAGTAATCA-AATCCTT-CAA-TCATTGTTTTCG-----AGATCTTTT
Andropogonappendiculatus6677     -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Andropogonappendiculatus6946     -GAGTAATCA-AATCCTT-CAATTCATTGTTTTC-----GAGATCTTTT
Andropogonappendiculatus6949     -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Aristidaadscencianis6713         -TCATAATCA-AATCCTT-CAATTCATTGTTTTG------AGATCTTTA
Bothriochloa7489                 -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Brachiaria                       -GAGTAATCA-AATCCTT-CAATTCATTGTTTTG------AGATC----
Brachyariaserrata6654            -GAGTAATCA-AATCCTT-CAACTCATT---TTG------AGATCTTTA
Cymbopogonexcavatus5877          -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCCTTT
Cymbopogonexcavatus6577          AGGGGGAGACGGATCACGCCATATATATTATTTCA-----ATATC-TAT
Cymbopogonmarginatus4397         -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATC-TTT
Cymbopogonprolixus6682           -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Diheteropogonfilifolius5872      -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Elionurusmuticus5074             -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Elionurusmuticus6954             -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Helictotrichonlongifolium6560    -TAGTAATCA-AATCCTT-CAATTCAGT---TTG------GAGTCTTTA
Hemarthriaaltissima5698          -GAGTAATCA-AATCCTT-CAATTCATTATTTTGTTGG-CAGATCTTTT
Hyparrheniaanamesa4841           -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Hyparrheniadissoluta5145         -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Hyparrheniahirta6550             -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Hyparrheniapilgeriana4649        -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Hyparrheniapilgeriana4738        -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Imperatacylindrica5114           -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Imperatacylindrica6582           -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Miscanthuscapensis6655           -GACTAATCACAATGGAC-TAATACATTGTGTTG------AGATCATTT
Pannicumschinzii6652             -GAGTAATCA-AATCCTT-CAATTCATTGTTTTG------AGATCTTCA
Paspalum5                        -GACCAANCATAATNCTTCCAANTAANTTGGTN-------NNAACACGC
Paspalumdilatum6617              -GAGTAATCA-AATCCTT-CAATTCATTATTTTGTTTTCGAGATCTTAA
Phacelurusfranksae4705           -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Setarianigrostis6567             -GAGTAATCA-AATCCTT-CAATTCATTGTTTTG------AGATC----
Sorghumbicolour6589              -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Sorghumhalepense9318             -GAGTAATCG-AATCCTT-CAATTCATTGTTTTG------CGATC----
Themedatriandra6555              -GAGTTATCA-AATCCTT-CAATTCATTGGTTTCG-----AGATCTTTT
Trachypogonspicatus4846          -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Trachypogonspicatus6580          -GAGTAAT-AGAATGGTT-CAATTGATTATTTTTC----GAGATGTTTT
Zea                              -TCATATTCA-TGGAATA-CGATTCACT---TTCA-----AGATGCCTT
Icylindrical                     -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
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Sacharumofficinarum                -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Sorghumhalepnese                   -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Ttriandra                          -GAGTAATCA-AATCCTT-CAATTCATTGTTTTCG-----AGATCTTTT
Pschinzii                          -GAGTAATCA-AATCCTT-CAATTCATTGTTTTG------AGATCTTCA


Andropogonappendiculatus6543       AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Andropogonappendiculatus6677       AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Andropogonappendiculatus6946       CCTCAGTGGATTAATC-GGACGAGGATAAAGAGA--GACTAACA
Andropogonappendiculatus6949       AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Aristidaadscencianis6713           AAAAGTGG-ATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Bothriochloa7489                   AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Brachiaria                         AAAAGTGG-ATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Brachyariaserrata6654              AAAAGTGGGATTAATC--GACGAGGATAAAGAGA--GAGTCCCA
Cymbopogonexcavatus5877            TAAAAGCGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Cymbopogonexcavatus6577            ATAAGATGTGATAGTC-GAAAGTATACTAAAAGAATGACGTACC
Cymbopogonmarginatus4397           TAAAAGCGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Cymbopogonprolixus6682             AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Diheteropogonfilifolius5872        AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Elionurusmuticus5074               AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Elionurusmuticus6954               TAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Helictotrichonlongifolium6560      AAACAGGTGATTAATCCGGACGAGGACAAAGAGA--GAGTCCCA
Hemarthriaaltissima5698            AAAAAGTGGATTAAGC-GGACGAGGATAAAGAGA--GAGTCCCA
Hyparrheniaanamesa4841             AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Hyparrheniadissoluta5145           AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Hyparrheniahirta6550               AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Hyparrheniapilgeriana4649          AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Hyparrheniapilgeriana4738          AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Imperatacylindrica5114             AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Imperatacylindrica6582             AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Miscanthuscapensis6655             AAAAAGTGGATAAATC-GGCGGAGGATTAAGCGT--GGTTCATA
Pannicumschinzii6652               AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Paspalum5                          ANNAGTNGTNTTAATCCNGAGGGGGGTAAAAAGNAAGNNNCCNN
Paspalumdilatum6617                AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Phacelurusfranksae4705             AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Setarianigrostis6567               AAAAGTGG-ATTAATC--GACGAGGATAAAGAGA--GAGTCCCA
Sorghumbicolour6589                AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Sorghumhalepense9318               GAAAGTGG-TATACTC--GAATCGGACGAGGATAA-GAGTCCCA
Themedatriandra6555                AAAAAGTGGATTAATCCGGACGAAGATTAAGAGA--GATTCCCA
Trachypogonspicatus4846            AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Trachypogonspicatus6580            AAAAAGTGGATTAATC-GGATGAGGATAAAGAGA--GAGTAGAA
Zea                                GA----TGGTGAAAT--GGTAGAC----ACGCGA--GACTCAAA
Icylindrical                       AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Sacharumofficinarum                AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Sorghumhalepnese                   AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Ttriandra                          AAAAAGTGGATTAATC-GGACGAGGATAAAGAGA--GAGTCCCA
Pschinzii                          AAAAAGTGGATTAATC-GAACGAGGATAAAGAGA--GAGTCCCA

Andropogonappendiculatus6543       TTCTACATGTCAATACTGACAACATT--AATTTCTAGTAAAA
Andropogonappendiculatus6677       TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Andropogonappendiculatus6946       TTTTGAATCCCAACGGAATCGGG--ACACATAACTTTCAAAT
Andropogonappendiculatus6949       TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Aristidaadscencianis6713           TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Bothriochloa7489                   TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Brachiaria                         TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Brachyariaserrata6654              TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Cymbopogonexcavatus5877            TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Cymbopogonexcavatus6577            GTCAACGATTTCNGG--NNTATAGTTCTTTATTATTTTNANA
Cymbopogonmarginatus4397           TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Cymbopogonprolixus6682             TTCTACATGTCAATACTGACGGC--AGATGGATTTGAATCCC
Diheteropogonfilifolius5872        TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Elionurusmuticus5074               TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Elionurusmuticus6954               TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Helictotrichonlongifolium6560      TTCTACATGTCAATACTG--AACAATGAAATTTCTAGTAAAA
Hemarthriaaltissima5698            TGCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Hyparrheniaanamesa4841             TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Hyparrheniadissoluta5145           TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Hyparrheniahirta6550               TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Hyparrheniapilgeriana4649          TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Hyparrheniapilgeriana4738          TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
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Imperatacylindrica5114              TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Imperatacylindrica6582              TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Miscanthuscapensis6655              TTCGGTATGTCAATGCGATCGTC--TGACTTTACTTTCTAAC
Pannicumschinzii6652                TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Paspalum5                           TTNGAGGTGTCAATACNGGANNCAATAGGATTTTTNTNGNNA
Paspalumdilatum6617                 TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Phacelurusfranksae4705              TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Setarianigrostis6567                TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Sorghumbicolour6589                 TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Sorghumhalepense9318                TTCTACATGTCAATACTGACAACAATGAA-TTTCTAGTAAAA
Themedatriandra6555                 TCCTACATGTCAATACTGACAACAATGAAATTTCTAGTTAAA
Trachypogonspicatus4846             TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Trachypogonspicatus6580             TTATACATGTCNAT-CTGACAACAA-GAATAGAGGTTATGAT
Zea                                 ATCT-CGTG-CTAAAGAGCGTGAGGTTCGAGTCCT-CTTCAA
Icylindrical                        TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Sacharumofficinarum                 TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Sorghumhalepnese                    TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Ttriandra                           TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA
Pschinzii                           TTCTACATGTCAATACTGACAACAATGAAATTTCTAGTAAAA

Andropogonappendiculatus6543        GGA
Andropogonappendiculatus6677        GGG
Andropogonappendiculatus6946        TCC
Andropogonappendiculatus6949        GGA
Aristidaadscencianis6713            GGA
Bothriochloa7489                    GGA
Brachiaria                          GGA
Brachyariaserrata6654               GGA
Cymbopogonexcavatus5877             GGA
Cymbopogonexcavatus6577             ATG
Cymbopogonmarginatus4397            GGA
Cymbopogonprolixus6682              TCC
Diheteropogonfilifolius5872         GGA
Elionurusmuticus5074                GGA
Elionurusmuticus6954                GGA
Helictotrichonlongifolium6560       GGA
Hemarthriaaltissima5698             GGA
Hyparrheniaanamesa4841              GGA
Hyparrheniadissoluta5145            GGA
Hyparrheniahirta6550                GGA
Hyparrheniapilgeriana4649           GGA
Hyparrheniapilgeriana4738           GGA
Imperatacylindrica5114              GGA
Imperatacylindrica6582              GGG
Miscanthuscapensis6655              ACC
Pannicumschinzii6652                GGA
Paspalum5                           GAA
Paspalumdilatum6617                 GGA
Phacelurusfranksae4705              GGA
Setarianigrostis6567                GGA
Sorghumbicolour6589                 GG-
Sorghumhalepense9318                GGA
Themedatriandra6555                 GGG
Trachypogonspicatus4846             GGA
Trachypogonspicatus6580             TGG
Zea                                 GGC
Icylindrical                        GGA
Sacharumofficinarum                 GGA
Sorghumhalepnese                    GGA
Ttriandra                           GGA
Pschinzii                           GGA
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Appendix C: CLUSTAL W (1.74) multiple sequence alignment data of the Andropogoneae specimens for *tnrL-F* intergenic spacer.

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Diheteropogonfillifolius5872       CCTCC
Hyparrheniadissoluta5145a          ACCCC
Hyparrheniafillipendula5144        GCCCC
Sorghumhalepense9318               GACCC
Hyparrheniapilgeriana4738          GACCC
Trachypogonspicatus4846            GACCA
Phacelurusfranksae4705             GACCA
Hyparrheniaquarrei6586             GACCA
Andropogonappendiculatus6692       GATCC
Elionurusmuticus6559               GACTC
Elionurusmuticus6539               GACTC
Elionurusmuticus6954               GACTC
Hyparrheniahirta6656f              GAACC
Themedatriandra6383                GACCC
Themedatriandra6555                GACCC
Themedatriandra6525                GACCC
Andropogonschirensis6581           GACCC
Imperatacylindrica5114a            GACCC
Bothriochloainsculpta5681          GACCC
Bothriochloa7489                   GACCC
Heteropogoncontortus6628           GACC-
Hyparrheniapilgeriana4603          GACCC
Hemarthriaaltissima5698            GACCA
Andropogonamethestinus6679         GACCC
Andropogonamethestinus6685         GACCC
Andropogondistachyos6684           GACCC
Hyparrheniatamba6585               GACCC
Hyparrheniarudis6576               GACCA
Hyparrheniatamba6537a              GACC-
Cymbopogonexcavatus6577            GACCC
Cymbopogonsp5800                   GACCC
Andropogonappendiculatus6677       GACCA
Heteropogoncontortus6942           GACCA
Andropogoneucomus6587              GACCC
Cymbopogondieterlenii6642          GACCC
Cymbopogonprolixus6682             GACCC
Imperatacylindrica6632a            GACCA
Trachypogonspicatus6580            GACCC
Cymbopogonplurinodus6406           GACCC
Hyparrheniahirta6618               GACCC
Hemarthria9319                     GACCC
Sorghumbicolour6588                GACCA
Miscanthuscapensis6655             GACCC
Miscanthuscapensis6584             GACCC
Heteropogoncontortus6538           GACCC
Hyparrheniaanamesa4807             GACCC
Pdilatum6617                       GACCC
Zea                                ATAAT
Icylindrical                       AAATC
Sacharumofficinarum                AAATC
Sorghumhalepnese                   AAATC
Ttriandra                          AAATC
Pschinzii                          AAATC

Diheteropogonfillifolius5872       CNTTTTTAGGACCAAGTTCAG---GGAGA---TAGGGGTTTGGAA
Hyparrheniadissoluta5145a          TTATAGTCCTACACACGTCCC--TGCACA---AAAGGCACTCCTT
Hyparrheniafillipendula5144        TCTTAGCCCGACCCAAGTTTC--GGCACA---TAGGGCCCTATTT
Sorghumhalepense9318               TCTTACCGGACCCCCATATA---CCGATT---TCCCGGTTATTTT
Hyparrheniapilgeriana4738          TCTTACCGGACCC-AAATTTC--GGGAGA---TAGGGGTTATTTT
Trachypogonspicatus4846            TCGTTGTCCCANAAAAGTTTC---GCANA---TAGGGGTTATTTT
Phacelurusfranksae4705             AAGTTTTGAGCACCAAGTGCG--GGGAGA---TAGGGGTCATTGA
Hyparrheniaquarrei6586             AGTTCAGGAGATAGGGGGGTG--TGGTTT---TAAGGGTCAGGTA
Andropogonappendiculatus6692       ATATTTTGGGACCAAATTCCG---GGAGA---TAGGGG---ATAT
Elionurusmuticus6559               CGATTGTCGGACCAAAGTTCA---GGAGA---TAGGGG---AAAA
Elionurusmuticus6539               CGATTGGCGGCCCCCATTTCG---GGGGA---CANGGGCCNATTA
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Elionurusmuticus6954                CGTTTGTCGGACCAAGTTCAG---GGAGA---TAGGGGN-TATTT
Hyparrheniahirta6656f               A-GTTTCGGGAATAGGGTGGT--GGGAGAACATAAGGGATTGGTA
Themedatriandra6383                 AAGTTCAGCAGATAGGGTTGT--GGGAGAAAATAAGGGATTGGTA
Themedatriandra6555                 AAGTTCAGCAGATAGGGGTGT--GGGAGAAAATAAGGGATTGGTA
Themedatriandra6525                 AAGTTCAGCAGATAGGGTGGT--GGGAGAAAATAAGGGATTGGTA
Andropogonschirensis6581            A-GTTCAGGGAGATAGGGGGTGTGGGAGAAAATAAGGGATTGGTN
Imperatacylindrica5114a             AANTTTCAGGAGATAGGGGGTTTGGGAGAAAATAAGGGTTCGGTA
Bothriochloainsculpta5681           AAAATNG-GGAGAGACGGG--TTGGGAGAAAATAAGGCATTGGTA
Bothriochloa7489                    AAACTNGNCGAGATACCTTTGTTGGGAGAAAACATCGGGTAGAAT
Heteropogoncontortus6628            AAGTTCAGNAGAAAGGGTTGT--GGAAGANAACACGGGGTAGGGA
Hyparrheniapilgeriana4603           AANTTTAGGGAGATAGGGGTT-TGGGAGGAAATAAGGGATTGAAA
Hemarthriaaltissima5698             AGGTTCGGGAGATA-GGTATGGTGGAAAAAA-CAAGGGATTGGTA
Andropogonamethestinus6679          AGTT-CAGGGAGATCGGGGGT-TGGGAGAAACTAAGGG-TTGGTA
Andropogonamethestinus6685          AGTT-C-GTGAGATAGGGGGT-TGGGAGAAAATAAGGGATTGGTA
Andropogondistachyos6684            CGTTACAGGGAAGACGGGGTT-TGGGAGAAAATAAGGGCTTGGTA
Hyparrheniatamba6585                AAGTTCAGGG-GATAGCGGGTTTGGGAGAAAATACCGAATTCGTA
Hyparrheniarudis6576                AAGTTCAGGG-GATAGCGGGGTCGGGAGAAAAGAACCGGATTGAT
Hyparrheniatamba6537a               AAGTTCAGGGAGATAGGGGGT-TGGGAGAAAATAACGGATTGGTA
Cymbopogonexcavatus6577             AAGT-CAGGGGGATACGGGTT-TGGGAGCAAATAACGGGTCGGTA
Cymbopogonsp5800                    AAGT-TCGGGAGATAGGGGTT-TGGGAGCAAATAAAGGATTGGTA
Andropogonappendiculatus6677        AGGTTCAGGGAGATAGGGGTT-TGGGAGAAAATAACGGATTGGTA
Heteropogoncontortus6942            AGGTTCAGGGAGATAGGGGTT-TGGGGGCAAATAACGGATAGGTA
Andropogoneucomus6587               CGGT--CGGGAGATCGGGGTT-GGGGAGAAANAATGGGGTTGGTA
Cymbopogondieterlenii6642           AAGTTCAGGGAGATAGGGGTT-TGGGAGAAAATAAGGGATTGGTA
Cymbopogonprolixus6682              CAGT--CGGGAGATAGGGGTT-TGGGAGAAAATAAGGGATTGGTA
Imperatacylindrica6632a             --GTTCAGGGAAATACGGGGGT--GGGGGAAATAAGGGATTGGTA
Trachypogonspicatus6580             CG-TTCAGGGAAATCCGGGATTCCCGGCAAAATACGGGCTGGGTA
Cymbopogonplurinodus6406            C---TCGGGAAAATAGGGGTGTGCGGAGGAAATACGGGTTTGGGA
Hyparrheniahirta6618                G---TTCGGGAAATAGGGGTGGTGGAG-AACATAAGGGATTGGTA
Hemarthria9319                      G---TCCGGGAATTAGGGGGT-CCGGAGAACATCAAGGGTTGGGA
Sorghumbicolour6588                 G---TTCGGGAATTAGGGGGT-TGGGGGAAAATAAGGGATTGGGA
Miscanthuscapensis6655              ACGTTCAGGGAAATAAGGGGGTTGGGAGAAAATAAGGGATTGGTA
Miscanthuscapensis6584              AGGTTTAGGGAGATAGGGGGGTTGGGAGAAAATAAGGGATTGGTA
Heteropogoncontortus6538            AGGTTCAGGGAGATCGGGGGTTCGGGAGAAAATTAGGGATTGGTA
Hyparrheniaanamesa4807              ACCTTCCGCAAA-TAGGCCTCCCCCCCGCCCCTTCGGCACACCCA
Pdilatum6617                        AGCTTCCGGGAATTAGGGGCCCCTGGGGCCAACATTTTAGCCCAA
Zea                                 C-GGAGAATGCTCATTGAT--GAGCATTCCCGTAGAAGTATTC--
Icylindrical                        CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Sacharumofficinarum                 CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Sorghumhalepnese                    CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Ttriandra                           CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Pschinzii                           CGTCGACTTTATA-AGTCGT-GAG??????????????????????
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Diheteropogonfillifolius5872        G----------AAAATAAGG------GA----------TTGG
Hyparrheniadissoluta5145a           TTCTCCC----ATCTTTTGG------CACC-AAA----ATTC
Hyparrheniafillipendula5144         TTTCGGA----CACCATTG-------CAGATAA-----ATAA
Sorghumhalepense9318                TTTGTAA----GACCAAAGT------CAGATAA-----CATG
Hyparrheniapilgeriana4738           TCGGGTC----AATTGCAGG------GATAA-------ATAG
Trachypogonspicatus4846             TCGGACC----AAGTGCAGG------GAG---------ATAG
Phacelurusfranksae4705              TCGGGTC----AATAGGACC------ANGTTTCAG---GGAG
Hyparrheniaquarrei6586              CATGGGT----TTCCGGACC------AAGGTTCAG---GGAG
Andropogonappendiculatus6692        TCTTCGC----ACACA-AGG------CA-ATAAAC---CTTG
Elionurusmuticus6559                ACTGGCG----ACACG-GGC------CA-ATAAAC---CTTG
Elionurusmuticus6539                TCTGGGG----ACAAGCGGC------CA-ATAAAC---TTCA
Elionurusmuticus6954                TTTCGGG----TAAAG-AGA------AA-ATAAAC---CTTC
Hyparrheniahirta6656f               CCA-ACNTTAGGAGAAAAGAAGTA--TAGTTACCCAGTATTC
Themedatriandra6383                 TCC--CATTCGCAAATAAAGAAA---TAGTTACCA--AATTC
Themedatriandra6555                 TCC--CATTCGCAAACAAAGAAA---TAGTTACCA--AATTC
Themedatriandra6525                 TCC-CATTC-GCAAAAAAAGAAA---TAGTTACCA--AATTC
Andropogonschirensis6581            TCA-ACNTTG-GAGATAGGGGA----TAGTTACCC-GGATTC
Imperatacylindrica5114a             TCATAGAGTATGCAAAAAAAGAGTAATAGTTACCCA-AATTC
Bothriochloainsculpta5681           TCAAATA-TAGGAAA---CAAAGA--TAATAGTTACCAATTC
Bothriochloa7489                    CA---CATCA-TCTTACCGAAAGACATAGTTACCCA-TACTC
Heteropogoncontortus6628            T----CATTC-TAGGACTAGAGAAAATAGGTATCCA-TATTC
Hyparrheniapilgeriana4603           TA--TCATAAATAGGAGAAAAGAAAATAGTTACCCA-AATTC
Hemarthriaaltissima5698             TCCCTCATCGGAAGAAAAGAAATAAATATTTACCCA--ATTC
Andropogonamethestinus6679          TCC--CTTTAGGAAACAAGAATA---TAGTTACCCA-CACTC
Andropogonamethestinus6685          TCC--CTTTAGGAAACAAGAAAA---TAGTTACCCA-CACTC
Andropogondistachyos6684            TCC--CATTAGGAAACAAGAATA---TAGTTACCCA-CATTC
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Hyparrheniatamba6585                GCA-CCATTCGTAAACATAGAAA--CTAGTTACCCC-CATTC
Hyparrheniarudis6576                GCA-ACATT-GTAAATCTAGAAA--GTAGTTAGCCG--ATTC
Hyparrheniatamba6537a               TCA-ACATT-GGAAACAAAGGAAA-ATAGTTACCCA-AATTC
Cymbopogonexcavatus6577             CCA-TCATTCTGAAACATAGAAAA--TAGTAACCCA-ACTTC
Cymbopogonsp5800                    TCA-GCATTCGGACACGTAGAAAA--TAGTTACCCA-AACTC
Andropogonappendiculatus6677        TCA-ACATTAGTAAACAAAGAAAC--TAGTTACCCA-CATTC
Heteropogoncontortus6942            TCA-NCTATAGGAAAAATAGAAAA--TAGTTACCCA-CATTC
Andropogoneucomus6587               TCN-GTTATTGTTCAAGTAGAAAC--TAGTTACCCATCATCC
Cymbopogondieterlenii6642           TCA-GCTATCGGAAACGTAGAAAA--TAGTTACCCA-AATTC
Cymbopogonprolixus6682              TCA-GCTATNGGAAAAATAGAAAA--TAGTTACCCC-AATTC
Imperatacylindrica6632a             TCTG-CTATGGGAAAAAAAGAAA--ATAGTTACCCA-AATTC
Trachypogonspicatus6580             TCT--CTAACCAAAAACAAGAAG--ATAGTTGTCCC-CATTC
Cymbopogonplurinodus6406            TCAA-CTTTAGGAAAA-AAGGAA--ATAGGTTTCCC-GATTC
Hyparrheniahirta6618                TCAA-CTTAGGAAAAA-AAGAAT--ATGGTTACCCA-GATTC
Hemarthria9319                      GTCA-ACTTAGGAACA-AAGG----ATAGGTTCCCC-A-TTC
Sorghumbicolour6588                 TCAA-CTTTAGGAAAA-AAGG----NTTGTTACCCC-AATTC
Miscanthuscapensis6655              TCAA-CTTTAAGAAAAAGAGAC----AAGTTTCGGG-ACTTC
Miscanthuscapensis6584              TAATACTT-AGCACTAAGCTCA----GTGTCTCGGG-ACTTC
Heteropogoncontortus6538            TCACCCT--GACAC-AAGTCA-----TAGTTNCCCA-CATTC
Hyparrheniaanamesa4807              GAT-AAAAATCTAGACTCGGA-AAGGTCTAGNCCCA-CAGTT
Pdilatum6617                        GCCTTGCTCAGTTATTCTGGTAACAGTAGATATCCCCAATTA
Zea                                 AAT--CTGGCGCTCTCCTCTATC---TAATGAATA--CTTTA
Icylindrical                        AAA-CCCTCTTTTATTCCCTAACC-ATAGTTGTTAT-CCTTT
Sacharumofficinarum                 AAA-CCCTCTTTTATTCCCTAACC-ATAGTTGTTAT-CCTTT
Sorghumhalepnese                    AAA-CCCTCTTTTATTCGCTAACC-ATAGTTGTTAT-CCTTT
Ttriandra                           AAA-CCCTCTTTTATTCCCTAACC-ATAGTTGTTAT-CCTTT
Pschinzii                           ??????????????????????????????????????????

Diheteropogonfillifolius5872        TATAAAATAAGGGATTGGTATGGA----TTG---GTATT-------AT
Hyparrheniadissoluta5145a           AAGGAAATAGGGGTTTGGGACAAA----ATAAC-GGATTGGT----AT
Hyparrheniafillipendula5144         CAGTGTGT--GAGATAGAAATAAT----TACCA-AGTTTCAT---CTA
Sorghumhalepense9318                GTGGGCGTT-GGGAAAGAAATAAC----AGGTT-TGTCTCAC---CT-
Hyparrheniapilgeriana4738           CATGGGTTGGAGGATAAAAATTAA----GTACC-AAGTTTGT---CCT
Trachypogonspicatus4846             CGGGGGGGGAGGGAGAAAA--TAG----GTACC-GGTATCGT---CAT
Phacelurusfranksae4705              ATAGGGGTTTGGGAGAAAA-TAAG----GGATT-GGTACCAT---CAA
Hyparrheniaquarrei6586              CGTAGGTGTTGGGAGAGAACTAAG----GGATA-GGTATCAT---CAT
Andropogonappendiculatus6692        ACCCCGGT--G-CTCCTAAATATC----GGACC-ACGTTCAGGGAGAT
Elionurusmuticus6559                --CACTGT--G-CTCA-AAATATC----GGACC-ACGTTCAGGGAGAT
Elionurusmuticus6539                -CCACTGT--GGCTCTAAATTATC----GGACC-ACGTTCAGGGAGAT
Elionurusmuticus6954                A-CNCNGT--G-CTCATAAAAATC----AGACC-ACGTTCAGGGAGAT
Hyparrheniahirta6656f               TGA-GTGGATC-GAAAGACGTAAGATGGAGAAAGTGTTTCCTCAC-C-
Themedatriandra6383                 TTG-GTGG-TC-GAAAGA-GTAAGT--GAGGATGAGCAGTCTCACGC-
Themedatriandra6555                 TTG-GTGG-TC-GAAAGA-GTAAGT--GAGGATGAGCAGTCTCACGC-
Themedatriandra6525                 TAA-GTGA-TC-GAAAGA-GTAAGT--GAGGATGAGCTGTCTCACGC-
Andropogonschirensis6581            TAG-GTGA-TC-GAAATGAGTAAGATGAGAAATGAGTTTCCTCACGC-
Imperatacylindrica5114a             TAA-GTG-ATC-GAATCA-GTAAG-ATGAGAAAGTGTCTCCTCACGC-
Bothriochloainsculpta5681           TAA-GTG-ATC-GAATCA-GTAAG-ATGAGATAGTGTCTCCTCACGC-
Bothriochloa7489                    TAATGTA-ATCTNAAANAC-TAATCATGCATCGGTCTTTCCTCCCCCC
Heteropogoncontortus6628            TT-TGTT-TTC-GAAAGA-GTAAG-ATGAGAAAGTGTTTCCTCGCGC-
Hyparrheniapilgeriana4603           TA-AGTA-ATC-GAAAGA-GTAAG-ATGAGAAAGTGTTTCCTCACGC-
Hemarthriaaltissima5698             TA--AGA-ATC-GATAGC-GTAAG-ATGAGAACGTGTTTCCCCGCGC-
Andropogonamethestinus6679          TGA-GTG-ATC-GAAAGA-GTAAG-AGGAGAAAGTGTTTCCTCACGC-
Andropogonamethestinus6685          TAA-GTG-ATC-GAAAGAC-TAAG-AGGAGAAAGTGTTTCCTCACGC-
Andropogondistachyos6684            TAATGTG-ATC-GAAAGACGTAAG-ATGAGAAAGTGTTTCCTCACGC-
Hyparrheniatamba6585                TAA-GTT-ATCGAA-AGC-GTAAG-ATGAGATTGCGTTCCCTCACGC-
Hyparrheniarudis6576                TTA-GCG-ATCGAGGAGA-GTAAG-ATGAGAAAGCGTTTCCTCACGC-
Hyparrheniatamba6537a               TAA-GTG-ATCGAA-AGA-GTAAG-ATGAGAAAG-GTTTCCTCACGC-
Cymbopogonexcavatus6577             TTT-GTG-ATC-TAAAGA-GTAAG-ATGAGTTAGCGTTTTCTCACGC-
Cymbopogonsp5800                    TGA-GTG-AGC-GAAAGA-GTAAG-ATGAGAGAGTGTTCCCTCACGC-
Andropogonappendiculatus6677        TAA-GTG-ATC-GAAAGCA-TAAG-ATGAGAAAGTGTTTCCTCACGC-
Heteropogoncontortus6942            TAATGTG-ATC-GAAAGAA-TAAG-ATGAGAATGTGTTTCCTCGCGC-
Andropogoneucomus6587               TGGTGTGGAGC-GAAAGAA-TAAG-ATGAGAATGTGTTTCTTCGCGC-
Cymbopogondieterlenii6642           TGA-GTG-ATC-GAAAGA-GTAAG-ATGAGAAAGTGTTTCCTCACGC-
Cymbopogonprolixus6682              TCA-GTG-ATC-GAAAGA-GTAAG-ATGAGAGAGTGTTCCCTCACGC-
Imperatacylindrica6632a             NAA-GGNA--T-CAAANA-GNAAG-GG-AGAAANAGTTTCCTCCC-C-
Trachypogonspicatus6580             TGA-GTAAATT-GAAGGA-GTAAC-AACAGCAGCGGTGTCCACAAGC-
Cymbopogonplurinodus6406            TGA-GTG-ATC-GAAA-ACGTAAG-ATGAGAAAGAGTTTCCTCACCT-
Hyparrheniahirta6618                TGA-GTG-ATC-GAAAGA-GTAAG-ATGAGAAAGTGTTTCCTCACGC-
Hemarthria9319                      TAA-GTA-ATC-GATAAAGTACTA-A-GAGAAAGTGTTACCTCACGC-
Sorghumbicolour6588                 TAA-GGG-ATC-GAAAGATGTAAG-G-GAGAAAGTGTTTCCTCACGC-
Miscanthuscapensis6655              TCA-TTG-ATC-GAAATA-GTAAG-AGGAGACCGAGTTTCCTCACGC-
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Miscanthuscapensis6584          TCA-GTGGATC-GAAATAGATAGG-CGCAGACCGAGTTTCCTCACCC-
Heteropogoncontortus6538        TAA-GTG-ATC-GAAAGAGGTAT---TGAGAAAGTGTCTCCTCGCGC-
Hyparrheniaanamesa4807          TAAGGACAATAGGAGTTATTTTTC---GGGAAATATATTCCTAGGTCT
Pdilatum6617                    AAAGCCCATTATAAATGGGCTTAA--GAGTCACTAGCTTTATCATTCT
Zea                             TTG-ATTT-TT-TAGTCC-CTTTAA--TTGAAT-AG-------ATGC-
Icylindrical                    TTT-TCT-TTT-ATCAAT-GGG--TTT----AAGA--TTC-ACTAGC-
Sacharumofficinarum             TTT-TCT-TTT-ATCAAT-GGG--TTT----AAGA--TTC-ACTAGC-
Sorghumhalepnese                TTT-----TTT-ATCAAT-GGG--TTT----AAGA--TTC-ACTAGC-
Ttriandra                       TTT-TCT-TTT-ATCAAT-GGG--TTT----AAGA--TTC-ACTAGC-
Pschinzii                       ??????????????????????????????????????????????

Diheteropogonfillifolius5872    ---CATCAATA-GGAA-AATAGTTACCCAAATTCTAAG-TAA---TCGAA
Hyparrheniadissoluta5145a       ---CATCAATA-GGAA-AATAGTTACCCAAATTCTAAG-TAA---TCCAA
Hyparrheniafillipendula5144     TAGCTACAAAA-AAAATAATACTAACCCAAGTTCC-CT-AAG---CCTAA
Sorghumhalepense9318            TCCAAAAAATA-AAAAAAATACCTACCCAAATTCTACT-TCT---TCGAA
Hyparrheniapilgeriana4738       AAGGTGATAGA-AAGAATA-AGATGCCAAAGTGTTAGCCTTG---GCTAG
Trachypogonspicatus4846         AGGA--AAAAA-AAGAATATAGTTACCCAAATTCTAAG-TAG---TCGAG
Phacelurusfranksae4705          TAGG--AAAAA-AAGAAAATAGTTACCCAAAGTCTAAG-TAA---TCGAA
Hyparrheniaquarrei6586          TAGGAAAAAGAGAAGAACATAGTTTCCCAGATTCTACG-TAG---TCGAA
Andropogonappendiculatus6692    GGGGTGTGGGAGAAAATAAGGGATTGGTATCAACTTTCGGAA---AC-AA
Elionurusmuticus6559            GGGGTTGGGGAGAAAATAAGGGATTGGTATCACCAATAGGAA---ACGAA
Elionurusmuticus6539            CGGGTTTGGGAGGAAATAAGGGATAGGTATCAACTTTCGTAA---ACGAA
Elionurusmuticus6954            GGGGTTGGGGAGAAAATAAGGGATTGGTATCACCTATCGGAA---ACTAA
Hyparrheniahirta6656f           -TGTTCGTGACGTTGCTGA-AGATAC-GATAAAGTAAATTAT-CT-AGTA
Themedatriandra6383             -AGTTC-TGA-GTTACTTA-GAGTAC-GATAA-GTAATTTAT-TTGAGCT
Themedatriandra6555             -AGTTC-TGA-GTTACTTA-GAGTAC-GATAA-GTAATTTAT-TTGAGCT
Themedatriandra6525             -TGTTC-TGA-GTTACTTA-GACTAC-GATAA-GTAATTTAT-TTGAGCT
Andropogonschirensis6581        -TGTTC-TGGAGTTACTTA-GAGTAC-GATAA-GTAATTTAT-CTGCTAA
Imperatacylindrica5114a         -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTACTAC
Bothriochloainsculpta5681       -TGTTCT-TGAGTTACCGA-GAATAC-GATGA-GTGAGTTAT-CTACGAA
Bothriochloa7489                -TTCTCACGGCGTTACT-A-GAATCCCGATAACGTAATTTCTTCTTCTAA
Heteropogoncontortus6628        -TTCTCT-GGCGTTACTTA-CGAATCCGATAA-GTAATTTAT-CTTCTAA
Hyparrheniapilgeriana4603       -TTCTCT-TGAGTTACCTA-GAAT-------A-GGATCTTAT----ATAA
Hemarthriaaltissima5698         -GGCTCT-GGGGTTACTTA-GAATAC-GATGA-GTAATTTAT-CTACTAA
Andropogonamethestinus6679      -TGTTCG-TGAGTTACTCA-GAATAC-GATCA-GTAATTTAT-CTACTAA
Andropogonamethestinus6685      -TGTTCT-TGAGTTACTCA-GAATAC-GATAA-GTAGTTTAT-CTACTAA
Andropogondistachyos6684        -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTTCTAA
Hyparrheniatamba6585            -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAATTTTT-CTACTAA
Hyparrheniarudis6576            -TGTTCT-TGAGTTACTTA-GAATAC-GATAG-GTAATTTT--CTGCTAG
Hyparrheniatamba6537a           -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAATTTAT-CTACTAA
Cymbopogonexcavatus6577         -TGTTCTTGA-GTTTCTTA-GA-TAC-TATC--CTAAGTTTT-CTTCTAG
Cymbopogonsp5800                -TGTTCTTGA-GTTACTTA-GAATAC-TATG--CGTAGTCTTGCTACTAG
Andropogonappendiculatus6677    -TGTTCTATA-GTTCTCTA-GACTGC-GCTC--CGTAGTTTT-CTACTAA
Heteropogoncontortus6942        -TGTTCTATA-AACTTTAC-CACTGG-ACTC--CTGAGTTAT-CG-CTGA
Andropogoneucomus6587           -TGTTCAGAATGATACTGA-GAATAC-GATCG-CCAAGGTAT-GTACGAA
Cymbopogondieterlenii6642       -TGTTCTTGA-GTTACTTA-GAATAC-GATCA-GTAATTTAT-CTACTAA
Cymbopogonprolixus6682          -TGTTCTTGA-GTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTACTAA
Imperatacylindrica6632a         -TGNNCT-TCAGTTTCCTA-GAATCC-GATCA-GTTATTTAT-CTACTAA
Trachypogonspicatus6580         -CGTTCC-CGAGTTTCTTC-GTATCC-CCTCA-GTCATATAA-TTTCNAA
Cymbopogonplurinodus6406        -GTT-CT-TGAGTTTCTGATGGATAC-GATAA-GTTGTTTAT-CTACTAA
Hyparrheniahirta6618            -TGT-CT-TGAGTTGCTGA-GAATAC-GATAA-GTAATTTAT-CTACTAA
Hemarthria9319                  -CCT-CT-GCGGTTTTTTA-GAATAC-GACAA-CTAATTTAT-CTACTAG
Sorghumbicolour6588             -CGTTCT-TGGGTTTCTTA-GAATAC-GATAA-GTAATTTAT-CTACTAG
Miscanthuscapensis6655          -TGTCCT-TGCGTTACTTA-GAATACGA-TAG---TATTTTACCTAGTCA
Miscanthuscapensis6584          -CGTTCG-TGCGTTACTAA-TCATACGACTAA---GGTCTGACCGCGTCG
Heteropogoncontortus6538        -AGTTCT-CGCGTTGCTTA-GAATAC-GATAA-GGACTTTATCGTCCAAG
Hyparrheniaanamesa4807          AGGGTTGGAAATAAGAAGA-TAATACCGAGTTTGCTCTCGGTGCT-CGAG
Pdilatum6617                    CTAT----GGAGCAAAGGA-GAGTGACGAGAACTCAATGTATCTTATGCT
Zea                             -AAATA---CATTTACTAA-GAGATG-CACAA-GAAAGGG---TCAGGAT
Icylindrical                    --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Sacharumofficinarum             --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Sorghumhalepnese                --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Ttriandra                       --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Pscinzi                         ??????????????????????????????????????????????

Diheteropogonfillifolius5872    AG--------------------AGTAAGATG------AGAAAGTGTTTCC
Hyparrheniadissoluta5145a       AG--------------------AGTAAAATG------AGAAAGTGTTTCC
Hyparrheniafillipendula5144     AT--------------------AAAAAAACCTA--GAATAAAGTAATTCC
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Sorghumhalepense9318                AG--------------------AGCCAGATGAG--CAATAAATCGTTTCC
Hyparrheniapilgeriana4738           AA--------------------TGAAGAAACCT--AGAATAGGGTAACTA
Trachypogonspicatus4846             AG--------------------AGTAAAATCCG--AGAGTAAGGGAAGCC
Phacelurusfranksae4705              AG--------------------AGTAAGA------AGAGAAAGGGTATCC
Hyparrheniaquarrei6586              AG--------------------AGTATGTTG------AGACAGGGTTTCC
Andropogonappendiculatus6692        GA--------------------AACAATAT-----AATCCCATCTCTTAG
Elionurusmuticus6559                GA--------------------AAAAATAT-----AATCTCATCACTTAG
Elionurusmuticus6539                GA--------------------AACAATAT-----AATCTCATCTCATAG
Elionurusmuticus6954                GA--------------------AACAATAT-----AATCCCATCACTTAG
Hyparrheniahirta6656f               AGCCTAGGCT-------CGAGAGAAGAAATCTA-GAATCTCGTCTCTA--
Themedatriandra6383                 ACTCAAGGCC-------CGATTGAGGAAACCTA-GAATCTCGTCTCTA--
Themedatriandra6555                 ACTCAAGGCC-------CGATTGAGGAAACCTA-GAATCTCGTCTCGA--
Themedatriandra6525                 ACTCAAGACC-------CGATTGAG-AAACCTA-GAATCTCGTCTCAG--
Andropogonschirensis6581            AGCCAAGGTC-------TGGATGAAGAAATCTA-TAATCTCGTCTCAA--
Imperatacylindrica5114a             AGG----------------AATGATGAAGCCTA-TAATCTCATCTCAT--
Bothriochloainsculpta5681           TGT----------------AATGATAAAGATTA-TAATCTCATCTCAA--
Bothriochloa7489                    AA--------------------AACCAATT-----AATCTCAT-------
Heteropogoncontortus6628            AG--------------------AACAAAG------AATCTCAT-------
Hyparrheniapilgeriana4603           AG--------------------AAAAAAT------AATCTCATAGCC---
Hemarthriaaltissima5698             AG--------------------AAGAAATAATC-TAACCACATAGC----
Andropogonamethestinus6679          AGTTAAACT--------AAAGAAAAAAAAATCAA-TAATCTCATCTCAT--
Andropogonamethestinus6685          AGATATTCT--------ACAGAAAAAAAAATCTA-TAATCTCATCTCAT--
Andropogondistachyos6684            AGCTTATCT--------ACAGAAAAAAAATCTA-TAATCTCATCTCAT--
Hyparrheniatamba6585                AGT-------------------AAAAAAATAAA-TAATCTCGTCTCAT--
Hyparrheniarudis6576                AGT-------------------GAAGAAATAAA-TAATCGCGTCTCA---
Hyparrheniatamba6537a               AGA-------------------AAAAAAATAAA-TAATCTCATCTCAT--
Cymbopogonexcavatus6577             AT--------------------ACCTTAATCTA-TAGTCTCAA-------
Cymbopogonsp5800                    AG--------------------ACAT-AGTATA-TAGTCTCAAA------
Andropogonappendiculatus6677        AC--------------------AGACAAGACCA-TAGTCTCATA------
Heteropogoncontortus6942            AC--------------------AGGCGAGCACA--AGCTTCGTA------
Andropogoneucomus6587               GG--------------------AATCTAGCATA--AGGCTCATA------
Cymbopogondieterlenii6642           AG--------------------ACAT-AATATA-TAGTCTCATA------
Cymbopogonprolixus6682              AG--------------------ACTT-AATCTA-TAGTCTCATA------
Imperatacylindrica6632a             ATAAA---------GCATGAAGGAAAAAACCTA-CTATATAGTCTCAT--
Trachypogonspicatus6580             AGGAATTATCCACGGCTTTAATAAAAAAATCAAGCAATCTCATCTCAA--
Cymbopogonplurinodus6406            ACTAAGGCT--------CGAGAGAAGAAACTCA-CAATCTCGTCTCTG--
Hyparrheniahirta6618                GGTTAAGCT--------CTAGAGAAGAAACTAA-GAATCTCGTCTCTA--
Hemarthria9319                      AGAGCTTATA----G-ACGAAAGAAAAAACAAA-TAATCTCGTGTCAA--
Sorghumbicolour6588                 AGAGCCTATA----G-AGGAAAGAAAAAATCAA-TAATCTCGTGTCTT--
Miscanthuscapensis6655              ACCTAAGATC--------TAGTGAAGAAATCCA-GAATCTCATCTCCT--
Miscanthuscapensis6584              ACCTACCACT--------TATTGAAGAAATCCA-GCATCTCATGTCCT--
Heteropogoncontortus6538            AAGCACTCAAGAA-ACATAAATGATAAAGTCGCTAAAACATGTAGGATGA
Hyparrheniaanamesa4807              GGTTACAGACGATACGATGTGTGCCTTAGCTTGCATAAAAAAACCTAGCA
Pdilatum6617                        AC--------------------ACACGGAAT------AGATGGTATTTT--
Zea                                 ACTCATGGTA-------GAGCAGAGGAC-TGAA-AATCCTCGTGTCAC--
Icylindrical                        A-TGAATCTTATGCTATTCATTAAATA-----GATGATTTCTTTTTTA--
Sacharumofficinarum                 A-TGAATCTTATGCTATTCATTAAATA-----GATGATTTCTTTTTTA--
Sorghumhalepnese                    A-TGAATCTTATGCTATTCATTAAATA-----GATGATTTCTTTTTTA--
Ttriandra                           A-TGAATCTTATGCTATTCATTAAATAAAATAGATGATTTCTTTTTTA--
Pschinzii                           ??????????????????????????????????????????????????
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Diheteropogonfillifolius5872        TTACGCTGCTTTTGAGTTACTTAGAA-TACGATAAGTAAT-TTAT
Hyparrheniadissoluta5145a           TCACCCTTCTCTTGAGTTTCTTAAAA-TACGATAAGTAAT-TTAT
Hyparrheniafillipendula5144         TCTAACTTCTCTAATATCACTTAC-A-TTCATTAGGGATAATTAT
Sorghumhalepense9318                TCACGCTGCTCTTTTTTTCCTTAGTA-TACGATAAGCATT-TTAT
Hyparrheniapilgeriana4738           TGTTTACTCGTATAATATCATATCCG-TTCATTAGGCATA-ATCT
Trachypogonspicatus4846             TCTCGCCGCGCATGAGTTCCTAACCG-TTCAATAGGTATT-TTAT
Phacelurusfranksae4705              TCACGCCGCGCATGAGATACTTAGCA-TACGATAAGTAAT-ATAT
Hyparrheniaquarrei6586              TCACACTGCTCTCGTGTTGCTTAGAA-ATCGATACGTTAT-TTGC
Andropogonappendiculatus6692        CCGTTCCTTAGAGATAATAATTAAGC-TAATAAAATTCATAATAC
Elionurusmuticus6559                CCGTTCCTTAGAGATACTAATTAAGC-TACTAAAACTCATAATAA
Elionurusmuticus6539                CCGTTCCTTAGAGATAATAATTTAGC-TAATATAATTCATCCTAA
Elionurusmuticus6954                CCGTTCCTTAGAAATAATAATTAAGC-TACTAAAATTCATAATAA
Hyparrheniahirta6656f               AGCCTTCCCGTATAG-CTACTTATCC-GTCCATTAAGATTCATAA
Themedatriandra6383                 AGCCTTCCCGTAGAG-CTACTTATCC-GTTCATTAGGGATCATAA
Themedatriandra6555                 AGCCTTCCCGTAGAG-CTACTTATCC-GTTCATTAGGGATCATAA
Themedatriandra6525                 AGCCTTCCCTTAGAG-CTACTAATTCAGTT-ATTAAGAATCATAA
Andropogonschirensis6581            AGCCTTTCCGTAGAG-CTACTAATCC-GGCTATTAACATTCATAA
Imperatacylindrica5114a             AGCCTTCCCTTAGAG-CTACTTATTC-ATCCATTAAGATTCATAA
Bothriochloainsculpta5681           AGCCTTTCCGTAGAG-CTAATTATCA-GACTATTAACATTCATAA
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Bothriochloa7489                    ---CTTTATGTAGAC-CTGTAAATCA-ATTTATTANTCTTCATAA
Heteropogoncontortus6628            ---CACTTAGCCGCT-CCTTAGAGCT-AATAATTCTTCTATAAAT
Hyparrheniapilgeriana4603           ---CTTTCTTAGGGT-CAATAAGTGAGATAAAATAGTCATAATAA
Hemarthriaaltissima5698             ---CGTTCCTAAGAT-CTAATAATTAAGCTCATAATTCATAATAA
Andropogonamethestinus6679          AGCCTTTCCTTAGAG-CTACTAATTC-ATCCATTAAAATTCATAA
Andropogonamethestinus6685          AGCCTTTCCTTAGAG-CTACTAATTC-ATCTATTAAAATTCATAA
Andropogondistachyos6684            AGCCTTTCCTTAGAG-CTAATAATTC-ATCCAAAAAAATTCATAA
Hyparrheniatamba6585                AGCCTTTTCTTAGAG-CTACT-ATTA-ATCTATTAACCTTCATAA
Hyparrheniarudis6576                AGCCTTTTCGTAGAG-CAACTTATTT-GTTTATTAGCATTCATAA
Hyparrheniatamba6537a               AGCCTTTCCTTAGAG-CTAATTATTA-ATCTATTAAACTTCATAA
Cymbopogonexcavatus6577             -GCTTTACCTTAGACTCTACTAATTT-ATCTATTTACATTCATAA
Cymbopogonsp5800                    -GCCTTCCCTTAGAG-CTACTAATTC-GTCTATTAACATTCATAA
Andropogonappendiculatus6677        -GCCTTTCCTTAAGCTCTAACAATTT-AGCTCTTTACCGTCATAA
Heteropogoncontortus6942            -GTCTTCCCTGAAAC-CTCACAAATC-TGCTCTAATCCGTGATAA
Andropogoneucomus6587               --TCTTTCCTTAGAG-CTAACATTTC-CGCTCATTAGGGTCATAA
Cymbopogondieterlenii6642           -GCCTTTCCTTAGAG-CTAATAATTA-AGCTATTAACATTCATAA
Cymbopogonprolixus6682              -GCCTTTCCGTAGAG-CTACTAATCC-AGCTATTAACATTCATAA
Imperatacylindrica6632a             AGCCGTCCCTTAGAG-CTACTTATCA-ATCTATAAACATTCATAA
Trachypogonspicatus6580             AGCCGTCCCTTATAC-CTACTTATCC-ATCTATTAACATTCATAA
Cymbopogonplurinodus6406            AGTCTTCCCTTAGAG-CTACTTATCC-GTCTATTAGCATTCATAA
Hyparrheniahirta6618                AGCCTTCCCTTAGAG-CTACTTATCA-GTCTATTAACATTCATAA
Hemarthria9319                      AGTCGTTCCTTAGAG-CTACTAATTA-AGCCAATAAAATTCATAA
Sorghumbicolour6588                 AGCCGTTCCTTAGAG-CTACTAATTA-AGCCAATAAGATTCATAA
Miscanthuscapensis6655              AGCCGTTTCTTAGAG-CTACTCATTA-GTCTATAAGGTTTCATAA
Miscanthuscapensis6584              AGCCGCTCCCTAGAG-CTACTAATTA-GGCTAGAAGGTTTAATAA
Heteropogoncontortus6538            AGACTACAAATGGTCGCGCTCATAGCCTTCCTTAGCGCTTGATGC
Hyparrheniaanamesa4807              CGGCGCAAGTACGTTCCTAGTACAACAGTCTTTCCGTTCTCGGAT
Pdilatum6617                        ----TTTGGATAGAGACGCGT--TTA-GGC---AAGGGATCATGA
Zea                                 CAGTTCAAA-TCTGG-TTCCTCAGA-----AAAAAAGGATCATAC
Icylindrical                        TTTCTTTTTTTTTTTTTATTT-ATTAGAGT--ATCGGCAA--GGAA
Sacharumofficinarum                 TTTCTTTTTTTATTTATTAGAGTAGAGT--ATCGGCAA--GGAA
Sorghumhalepnese                    TCTCTTTTTTTTATTTATTAGAGTACAGT--ATCGGCAA--GGAA
Ttriandra                           TTTCTTTTTTT---T-ATTAGAGTAGAGT--ATCGGAAA--GGAA
Pschinzii                           ??????????????????????????????????????????????

Diheteropogonfillifolius5872        CTACTA-AAGAAAAAA-------TAACTATCCTGATGGGGACGG
Hyparrheniadissoluta5145a           CTACTA-AAAAAAAAA-----GAAAACTATCCTTATGGGGGGAG
Hyparrheniafillipendula5144         TCACTC-AGTAACGTGTT------ACGTATACCAATAG-GACTG
Sorghumhalepense9318                CTGCTA-AAGGAAGCTT------AATCCATCCGAGTGA-AACCG
Hyparrheniapilgeriana4738           TTCATTC-AGTAAGTGTT------AGGTATAGTAATAG-GACGG
Trachypogonspicatus4846             CTCCTAC-AGTAAGAGTT------AGCTATCCTGATAG-GACGG
Phacelurusfranksae4705              CTACTAC-AGAAAATGTT------AACTATCCTAATGA-GGCGG
Hyparrheniaquarrei6586              CTACTA-TAGAAA----------TAAGTACTCTCATCG---CCG
Andropogonappendiculatus6692        TTCATTC-GGTAGGTGTT------ACGTATCCTGATGC-GAGGG
Elionurusmuticus6559                TTCATGC-GGTAGGTGTT------ACCTATCCTGATGC-GAGGG
Elionurusmuticus6539                TTCATTC-CGTAGCTGTT------ACCTATCCTGATGC-GAGGA
Elionurusmuticus6954                CTCATTC-GGTAGGTGTT------ACCTATCCTGATGC-GAGGA
Hyparrheniahirta6656f               TTCTTTCT-GCGGGAGTT---GGTTCGTGTCCTCAGGCGGAGGG
Themedatriandra6383                 TTCATTCA-GCAATTGTT---GTTTCGTGTCCTCAGGCGGAGGG
Themedatriandra6555                 TTCATTCA-GCAATTGTT---GTTTCGTGTCCTCAGGCGGAGGG
Themedatriandra6525                 TT-ATTCA-GCAATTGTT---GTTTCGTATCCTCAGGCGGAGGG
Andropogonschirensis6581            TTATTCAT-GCAATAGGT---GTTTCGTATCCTGAGGGGGAGCG
Imperatacylindrica5114a             TTCATCAA-TCAATAGGT---GTTTCGTATCCTAAGGCGGAGGG
Bothriochloainsculpta5681           TTAATCAT-TCAATAGGT---GTTTCGTATACTGAGGGGGAGGG
Bothriochloa7489                    CACTTTACTTCCATGGGT---TTTCCGTCCTGGGCTAATACCTA
Heteropogoncontortus6628            GACTAATAATTCATCC-T---TTAGGGTACTATCCTAAAGGGGG
Hyparrheniapilgeriana4603           TTCTTTCGGTACATGTGTAGGTATCTTGATGGGGGGGTTAAAAG
Hemarthriaaltissima5698             CTCATTCTGTTGAGTTGACG-CATCGTGAACGTGGGGGTACAGG
Andropogonamethestinus6679          TAAATCAT-GCATGAGGT---GTTCCGTATCCTGAAGGGGAGGC
Andropogonamethestinus6685          TAATTCATTGCAAACGGT---GTTCCGTATCCTGAAGGGGAGGC
Andropogondistachyos6684            TACATCAT-GCGTACGGT---GTTACGTATCCTGAGGGGGAGGC
Hyparrheniatamba6585                TTCTTTAA-TCAATCGTT---GTTTCGTATCCTCAAGCGGAGCG
Hyparrheniarudis6576                TTAATTAG-GCCATCGTT---GGTTCGTTTACTCAAGCGGAGGG
Hyparrheniatamba6537a               TAAATCAA-TCAATAGTT---GTTTCGTATACTGAAGCGGAGCG
Cymbopogonexcavatus6577             TTAATGCAACCTATC-GT---GTTTCATTTACTCAAGCCCATCC
Cymbopogonsp5800                    TTCTTTAAGCGGTAG-TT---GTTTCGTATACTCAGGCGGATCG
Andropogonappendiculatus6677        TAACAT-ATCTAGTCGGT---GTTGCATACTCTGAGGAGAAGCT
Heteropogoncontortus6942            TAACAA-ACGGGGTGCGT---GTTGCGTACTCTTAGGCTGATCC
Andropogoneucomus6587               TTACTTTACCCTATCGGT---GTTTCATACACTGAGGACGAGCC
Cymbopogondieterlenii6642           TAATTC-AGGCGGTAGGT---GTTTCGTATCCTGAGGGGGATGG
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Cymbopogonprolixus6682              TTATTC-ATGCAGTAGGT---GTTTCGTATACTGAGGCGGACGG
Imperatacylindrica6632a             T-TATTCAATCTATCGTT---GTTTCGTATACTCAAGCCGAGCG
Trachypogonspicatus6580             T-TAATTCACC-ATCGTT---GGTTCGTATCCTCAAGCGGAGCG
Cymbopogonplurinodus6406            TTAAAGTAACCAGTCGTT---GTTTCGTATACTCAAGCCGAGGG
Hyparrheniahirta6618                T-TATTTATTCATGAGTT---GTTTCGTATACTCAGGGGGAGGG
Hemarthria9319                      T-AATTCACTCAATTGTT---GTTTCCTATCCTGAGGCGGAGCA
Sorghumbicolour6588                 T-ACTTCATTCGGTAGGT---GTTTCGTATCCTGATGGGGAGGG
Miscanthuscapensis6655              T-AATTTAAGCAGTAGTT---GTTTGGTATCCTCAAGCGGAG-C
Miscanthuscapensis6584              T-ATTCGAGGCGGGAGTG---CTTTCCCATCCTGCCGCTGCGAC
Heteropogoncontortus6538            TGGATATATCTATTCGTGAGTCTGTAGTAGTACGTAGCCCATGG
Hyparrheniaanamesa4807              AATATTCACTCAGTAAGT---GTCATGTCCAGTAAGGG-GAAGG
Pdilatum6617                        TTAAGATAGGAAA--------GTAATGTATAATAAAGA-GAGAG
Zea                                 TGAATAGA-TCAATTGAT---TACAAATATTTTGAGATGGAGGG
Icylindrical                        T--CTCGATTATTAATTCGATTTTAAGTATTATTAA-GTAAGCC
Sacharumofficinarum                 T--CTCGATTATTAATTCGATTTTAAGTATTATTAA-GTAAGCC
Sorghumhalepnese                    T--CTCGATTATTAATTCGATTTTAAGTATTATTAA-GTAAGCC
Ttriandra                           T--CTCGATTATTAATTCTATTTTAAGTATTATTAA-GTAAGCC
Pschinzii                           ??????????????????????????????????????????

Diheteropogonfillifolius5872        -GTAAATG-GTTTAAA--CCTTA-----TGA-AAT-AACTAAAA--AATT
Hyparrheniadissoluta5145a           GGTAAAGG-GTTTAAA--CCTTACCTTATGA-AAT-AACTAAAAT-AATC
Hyparrheniafillipendula5144         --TATAAG-ATTCAGA--CCTTACCCTTATA-AAT-AAATAAAA--AATC
Sorghumhalepense9318                ---ATACA-GTTCAAA--CCCTACCTTTAGA-AAT-AACTAAAA--AATC
Hyparrheniapilgeriana4738           --TGTATG-CTTCAGG--CCATACCTTTAGG-AAT-AACTAAAA--AATC
Trachypogonspicatus4846             --TGTAAG-GTTCACG--TCTTACCTTTTGG-AAT-AATTAAAA--AATC
Phacelurusfranksae4705              --GTAAAG-GTTCAAA--TCTTACCTT-AGA-AAT-AACTAAAA--AATC
Hyparrheniaquarrei6586              -----TTC-CTTAGAG--CCTTT----TATT-AAT-G-CTAAAA--CTTC
Andropogonappendiculatus6692        -GTAAAGG-ATTAAAA--CTTTTCTTACCGA-AAT-AACTAAAA--AATC
Elionurusmuticus6559                -GTATAGG-AGTAAAA--CTTATCTTAC-GA-AAT-AACTAAAA--AATC
Elionurusmuticus6539                -GTAAAGT-ATTAAAA--CTTATCTTAC-GA-AAT-AACTAAAA--AATC
Elionurusmuticus6954                -GTATAGG-ATTAAAA--CTTTTCTTAC-GA-AAT-AACTAAAA--AATC
Hyparrheniahirta6656f               -GTAAACA-ATTAAAA---CTTATCTTATGA-AAT-AACTAATCAG--TC
Themedatriandra6383                 -GTAAACA-AGTAAAC---CTCATCTTATGA-AAT-AACTAATCAG--TC
Themedatriandra6555                 -GTAAACA-AGTAAAC---CTCATCTTATGA-AAT-AACTAATCAG--TC
Themedatriandra6525                 -GTAAACA-AGTAAAC---CTCATCTTATGA-AAT-AACTAATCAG--TC
Andropogonschirensis6581            -GTAAACA-ATTAAAA---CTTATCTTACGA-ACT-AACTAAACAA--TC
Imperatacylindrica5114a             -GTAAACA-ATTAAAA---CTTACCTTATGA-AAT-AACTAATCAA--GC
Bothriochloainsculpta5681           -GGAAAGG-ATTAAAA---CTCACCTTATGA-AAT-AACTAAAAAA--GC
Bothriochloa7489                    -CTCAATT-ATTCATC---TT---CTTTCCCTTTT-ACCTAAACAA--T-
Heteropogoncontortus6628            -GGTAAAG-ATTTAAC-GGCTTACCCTCTGT-AAT-AAATAAAAAA--TC
Hyparrheniapilgeriana4603           -GTTAAAT-CTTAAAC-TTTATGAAATAAAT---T-AACTAAAAAA--TC
Hemarthriaaltissima5698             -TTTAAAA-CTTACGCGTTAAATTTCTAACG-TAT-AAATAAAAAA--TC
Andropogonamethestinus6679          -GTAAAAG-A-TTAAA--ACTTACCTTATGA--AT-AACTAAACAA--TC
Andropogonamethestinus6685          -GTAAAAG-A-TTACA--TCTTACCTTATCA-CAT-TACTAAACAA--TC
Andropogondistachyos6684            -GTAAAGG-AATTAAA--ACTTACCTTATGA-AAT-AAATAAACAA--TC
Hyparrheniatamba6585                -GTACAGA-ATTCAAA---CTTATCTTATGA-AAT-AACTAACAAT--GC
Hyparrheniarudis6576                -GGAAACA-ATTAAAA---CTTATCTTACGA-AGT-AACTAAACAT-AGC
Hyparrheniatamba6537a               -GTAAAGGGATTAAAA---CTTATCTTACGA-AAT-AACTAAAAAA--GC
Cymbopogonexcavatus6577             -TTAAACCAATTCAAA---CTCATCTTACGC-AATTAACTAAACAT-AGC
Cymbopogonsp5800                    -GTAAAC-AATTAAAA---CTTATCTTANGC-ANT-AACTAANCCN-AGC
Andropogonappendiculatus6677        -GTAAAA--ATATAAC---CTTATCTTATGC-CAT-ACCTCAACA--AGG
Heteropogoncontortus6942            -TTACTC-TATCTCGC---CTTATCTTCCGA-ATT-GTCTAAACA--AGG
Andropogoneucomus6587               -GTAAAG-CATCTTAA---CTTATCTTGTGA-AAT-TCCTAATCA--GGC
Cymbopogondieterlenii6642           -GTAAAG-GATTAAAA---CTTACCTTACGA-AAT-AACTAAACA--ATC
Cymbopogonprolixus6682              -GGAAAC-AATTAAAA---CTCACCTTACGA-AAT-AACTAAACA--ATC
Imperatacylindrica6632a             -GTAAACA-ATTCAAC---CTCATCTTACGA-AAT-AACTAAACA--ATC
Trachypogonspicatus6580             -GGAAACA-ATTAAAA---CTCATCTTACGA-AAT-AACTAAACA--ATC
Cymbopogonplurinodus6406            -GTAAACA-ATTAAAA---CTTATCTTACGC-AAT-AACTCAAAATAGCA
Hyparrheniahirta6618                -GTAAAGA-ATTAAAA---CTTATCTTATGA-AAT-AACTAATCA--ATC
Hemarthria9319                      -GTATACG-ATTAAAA---CTTATCTTATGA-AAT-AACTAAACA--ATC
Sorghumbicolour6588                 -GTAAAGG-ATTAAAA---CTTACCTTATGA-AAT-AACTAAACA--ATC
Miscanthuscapensis6655              -TTATACA-ATTCAAA---CTCATCTTAACGCTAT-CACTACACAA--GC
Miscanthuscapensis6584              -TTATAGA-AGTTAAC---CTCTTCTTCACT-TAT-AACGACTAAG--TC
Heteropogoncontortus6538            -GTAGGGCTAATCGAT---CTCTTCTGACGA-AAT-CACTAATCAG--GC
Hyparrheniaanamesa4807              --TAAAGG-ATTCAGG---CTTAACTCTTATGTAT-AAATAAAAA--ATC
Pdilatum6617                        -TTATTCAAAGTATAG-TCATTCCCTTAC----ATTTCCTAAGTTCGAAT
Zea                                 -GTAAATA-TTTAAAA---ATCTACTTAGTC-TTT-AGTCTAGAGT--AA
Icylindrical                        -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTGGAAT
Sacharumofficinarum                 -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTTGAAT
Sorghumhalepnese                    -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTTGAAT
Ttriandra                           -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTGGAAT
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Pschinzii                          ??????????????????????????????????????????????????

Diheteropogonfillifolius5872       AGGGA-TGTTTAACGGTCT--CTTCGTCT-ACGATTGGCAC-CTTTTGCG
Hyparrheniadissoluta5145a          ACCCA-AATTTCACGGTCT--TTATTCCC-ACCGTTTGCCA-CTTTTGTA
Hyparrheniafillipendula5144        AGCGA-AATTGACCTAT----CTTTTCCC-ACCATGTGCCA-CTTTTGTC
Sorghumhalepense9318               AGGCA-AATGTAACTATATT-CTTTGCCC-ATAAAGAGGAC-CCTACTAC
Hyparrheniapilgeriana4738          CGGGA-AATT-AACTGTAT--CTACGTTC-ATGAGATGATC-CTACTG-C
Trachypogonspicatus4846            AGGGA-AATT-AACGGTTT--CTTCGTTC-ATGAGATGATC-CTACTG-C
Phacelurusfranksae4705             AGGGA-AATT-AGCGGTAT--CTACGTTC-ATGAGAGGACC-CTACTG-C
Hyparrheniaquarrei6586             AGGGA-AATT-AACTGTAT--CTACGTTT-ATGAGATGATC-CTACTA-C
Andropogonappendiculatus6692       AGGGA-AATT-GACTGTAT--GTTCGTTT-ACGAAAGGATACCTACTG-C
Elionurusmuticus6559               AGGGA-AATT-TACTGTAT--GTTCGTTT-CCGAGATGACAACTACTA-C
Elionurusmuticus6539               AGGGC-AATT-ATCTGTAT--GTTCGTTT-ACCAAAGGATAACTACTA-C
Elionurusmuticus6954               AGGGA-AACT-GACTGTAT--GTACGTTT-ATGAGATGATC-CTACTA-C
Hyparrheniahirta6656f              AGGGA-AACTGTCT-CTAT--CTTCGTTCACCGAGATGATC-CTACTA-C
Themedatriandra6383                AGGGA-A-CTGTCT-GTAT--CTTCGTTCAT-GAGATGATC-CTACTA-C
Themedatriandra6555                AGGGA-A-CTGTCT-GTAT--CTTCGTTCAT-GAGATGATC-CTACTA-C
Themedatriandra6525                AGGGA-A-CTGTCT-GTAT--CTTCGTTCAT-GAGATGATC-CTACTA-C
Andropogonschirensis6581           AGGGA-AACTAACT-GTAT--CTTCGTTTAC-CAGATGATA-CTACTA-C
Imperatacylindrica5114a            AGGGA-AATTAACGC-TAT--CTTCGTCCACG-ATAGGACA-CTACTG-C
Bothriochloainsculpta5681          AGGGA-GATTGACTG-TAT--CTTCGTTCAAG-AGATGATA-CTACTA-C
Bothriochloa7489                   AGAGG-AGGTAATTA-TAT--CTTTATACTTGT--ATGATT-CTATTA-T
Heteropogoncontortus6628           AGGGA-AATTAACTG-TAT--CTACGTTCATGATGAGGATC-CTACTA-C
Hyparrheniapilgeriana4603          AGGGA-AATTAACGGGTAT--CTAGGTTTATGA-GAGGACA-CTTTTA-C
Hemarthriaaltissima5698            AGGGA-AATTAAACTGTAT--CTCTGTATCACGAGAGGACAACTACTT-C
Andropogonamethestinus6679         AGGGA-AATTAACTG-TAT--CTTCGTTACCG-AGATGATT-CTACTA-C
Andropogonamethestinus6685         AGGGA-AATTAGCTC-TAT--CTTCGTTCACC-AATGGACA-CTATTA-C
Andropogondistachyos6684           AGGGA-AATTAACTG-TAT--CTTCGTTCACCGAGATGATA-CTACTA-C
Hyparrheniatamba6585               ATGGA-AACTAACTG-TAT--CTTCGTTAC-CGATATGATA-CTCTTA-C
Hyparrheniarudis6576               AGGGA-AACTGTCTG-TAT--CTTCGTTCA-CCAAATGATA-CTACTA-C
Hyparrheniatamba6537a              AGGGA-AATTGACGCATAT--CTTCGTACCACCAGTGGCCA-CTTTTA-C
Cymbopogonexcavatus6577            ACTTGAAATTATCT-CTATT-CTTCGTTC-ACCAAATG-ATCCTACTA-C
Cymbopogonsp5800                   -CNNGGAATTNACT-CTAT--CTTCNTT----------------------
Andropogonappendiculatus6677       AGCGGGCAGTAGCTTATAT--CTTTGTCC-AC-CGCGG-ACACGTCTA-T
Heteropogoncontortus6942           AGCGA-CTGTCGCT-ATA---CCTTGTCT-TCGCGCGG-ATTCNTCTN-N
Andropogoneucomus6587              AGGGA-AACTGTCT-GTAT--CTTCGTTC-ATGAGATG-ATTCTACTA-C
Cymbopogondieterlenii6642          AGGGAG-ATTAACT-GTAT--CTACGTTTACCGAGATGGATACTACTA-C
Cymbopogonprolixus6682             AGGGAGGATTGACT-GTAT--CTACGTTT-CCGAGATG-ATACTACTA-C
Imperatacylindrica6632a            AGGGA-AATTGA-CTGTAT--CTTCGTTC--CCAAATGATAACTACTA-C
Trachypogonspicatus6580            AGGGA-AATTGA-CTCTAT--CTTCGTTC-ACCAGATGATC-CTACTA-C
Cymbopogonplurinodus6406           CGGGG-CCTTGG-GCGCATATCTTCTTAG-ACCAATGGACA-CTTTTA-C
Hyparrheniahirta6618               AGGGA-AACTGA-CTGTAT---CTTCGTT-ACCAGATGATT-CTACTA-C
Hemarthria9319                     AGGGA-AATTGGACTGTAT--CTTCGTT--ACCAAAGGATA-CTACTA-C
Sorghumbicolour6588                AGGGA-AATTAG-CTGTAT--CTACGTTT-ATGAGAGGATT-CTACTA-C
Miscanthuscapensis6655             AGTTG-GACCTGCC-CTAT--CTTCGTTCATC-TATTGTCC-CTACTA-C
Miscanthuscapensis6584             AGGGG-AACTAAGT-CTAT--ATACGTTACTG-AGTTGCTC-CTACTA-C
Heteropogoncontortus6538           AGGGT-GGCTATCT-GTAT--CTCCGTTTAT-GACATGATC-CTACTA-C
Hyparrheniaanamesa4807             AGGGA-AATTAACT-GTAT--CTACGTTC-ATGAGATGATA-CTACTA-C
Pdilatum6617                       AGAGA--ATGCATATTTATTTTTAGTCCCTTTAATTGACA--TAGAAGC
Zea                                GTAGA-AAATCTCT-AGAG-TAAGGATAAATC----TCTAC-ACACTT-C
Icylindrical                       -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Sacharumofficinarum                -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Sorghumhalepnese                   -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Ttriandra                          -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Pschinzii                          ??????????????????????????????????????????????????

Diheteropogonfillifolius5872        GCG-CCTTGGTCA
Hyparrheniadissoluta5145a          GCA-CCTTTGTCA
Hyparrheniafillipendula5144        GTAACCTATGTCC
Sorghumhalepense9318               GGGTCCTTTCTCC
Hyparrheniapilgeriana4738          GTGTTCTTTGCCA
Trachypogonspicatus4846            GTGTCCTTGGCCA
Phacelurusfranksae4705             GTGTCCTTGGCCA
Hyparrheniaquarrei6586             GTGTTCTTTCCCA
Andropogonappendiculatus6692       GTGTTCTTTGCCA
Elionurusmuticus6559               GCGTTCTTTGCCA
Elionurusmuticus6539               GCGATCTTTGTCA
Elionurusmuticus6954               GTGTTCTTTGCCC
Hyparrheniahirta6656f              GTGTTCTTTGCCA
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Themedatriandra6383                GTGTTCTTTCCCA
Themedatriandra6555                GTGTTCTTTGCCA
Themedatriandra6525                GCGTTCTTTGCCA
Andropogonschirensis6581           GTGTTCTTTCCCA
Imperatacylindrica5114a            GCGTCCTTTGCCA
Bothriochloainsculpta5681          GCGTTCTTTGTCA
Bothriochloa7489                   ATGATCTTTGTCA
Heteropogoncontortus6628           GCGTTCTTTGCCA
Hyparrheniapilgeriana4603          GCGTTCTTTGCCN
Hemarthriaaltissima5698            GTGACTTTTGTCA
Andropogonamethestinus6679         GCGTCCTTTTCCA
Andropogonamethestinus6685         GCGACCTTTGTCA
Andropogondistachyos6684           GTGTCCTTTGCCA
Hyparrheniatamba6585               GTGTTCTTTGTCA
Hyparrheniarudis6576               GTGTCCTTTGTCA
Hyparrheniatamba6537a              GCGATCTTTGTCA
Cymbopogonexcavatus6577            GCGTTCTTTCCCA
Cymbopogonsp5800                   -------------
Andropogonappendiculatus6677       GTGTCCTTTTTCA
Heteropogoncontortus6942           GTGTTCTTTCCCC
Andropogoneucomus6587              GTGTTCTTTCCCA
Cymbopogondieterlenii6642          GCGTTCTTTCCCA
Cymbopogonprolixus6682             G-GTTCTTTCCCA
Imperatacylindrica6632a            GCGACCTTTGTCA
Trachypogonspicatus6580            GGGACCTTTTTCA
Cymbopogonplurinodus6406           CGGACCTTGGTCA
Hyparrheniahirta6618               GTGACCTTTCTCA
Hemarthria9319                     GTGTTCTTTCTCA
Sorghumbicolour6588                GTGTTCTTTCCCA
Miscanthuscapensis6655             G-GTTCTTTCCCC
Miscanthuscapensis6584             G-TGTCTTTCCCA
Heteropogoncontortus6538           GGGTTCTTTGCCA
Hyparrheniaanamesa4807             GTGTCCTTGCCCA
Pdilatum6617                       AGTACTCTACTAA
Zea                                TTTTTCTTTTAAA
Icylindrical                       AAATACTTTCTAA
Sacharumofficinarum                AAATACTTTCTAA
Sorghumhalepnese                   AAATACTTTCTAA
Ttriandra                          AAATACTTTCTAA
P.schinzii                         ????????????
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Appendix D: CLUSTAL W (1.74) multiple sequence alignment data of the Andropogoneae specimens for *tnrL-F* region.

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Aadscen6713                 GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Aameth6679                  ???????????????????????????????????????????????
Aameth6685                  ???????????????????????????????????????????????
Aappen6543                  ----TCGG-TATA-GGTTTTGTGG-------------TTTGGGGG-----
Aappen6677                  GAA-TCGG-TAG--CGCTACGTT-GTATTCCCG--CCTTCCCAGGA-ACC
Aappen6946                  GAA-TGGA-AACCTTGCTAGGTTCTAACTCCCN---AAATCCAGAGCCCC
Adist6684                   ???????????????????????????????????????????????
Aeuco5869                   ???????????????????????????????????????????????
Aschiren6581                ???????????????????????????????????????????????
Bbladh                      GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Binsc5681                   ???????????????????????????????????????????????
Brachiaria                  GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Bserra5074                  GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Bserra6654                  GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Bserra6954                  GAA-TCGGATAGA-CGATACGGT-AATG--GGT--ATATCCCAGCCTGAA
Cdieter6642                 ???????????????????????????????????????????????
Cexc5877                    GAAATCGG-TACA-CGCTACGTT-CAAGTCCCT--CTATCCCCACCGAAA
Cexc6577                    -------------------------------------------------
Cmarg4397                   GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Cplur6406                   ???????????????????????????????????????????????
Cplur6406                   GAA-TCGG-ACC---GCTACGTTGGAAGTCCCA---ATTCAGAGAAACCC
Dfilli5872                  GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Hanam4841                   GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Hcon6942                    ???????????????????????????????????????????????
Hdiss5145                   GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Sbicolour9319               ???????????????????????????????????????????????
Hemarthriaaltissima5698     GAA-TGGA-AACCTTGCTAAGTG-TAACTTCCC---AATTCCGGAACCCT
Hfilli5144                  ???????????????????????????????????????????????
Hhirt6550                   GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCACCAAACC
Hhirt6656                   ???????????????????????????????????????????????
Hlongi6560                  GAA-TCGG-TAGA-CGCTACGTT-AAGT--CCC--TCCTCCCAGCCGAAA
Hpilg4603                   GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Hpilg4738                   GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Hquar5088                   ???????????????????????????????????????????????
Hrud6576                    ???????????????????????????????????????????????
Htamb6585                   ???????????????????????????????????????????????
Icylin5114                  GAAATCGG-TAGA-CGCTACGTT-CAATTCCCT--CCTTCCCAGCCGAAA
Icylin6632                  GAA-TCGG-TAGA-CGCTACGGT--TATTGCCT--CCTTCCCAGAAGAAC
Mcape6655                   GTA-TGGG-AAC--TGCTAAGTG-TAACTCCCA---ATTCCCAGAACC--
Pdilatum6617                GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCC--CCTTCCCAGCCGAAA
Pfrank4705                  GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Pschinz6652                 GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Sbic6589                    GAA-T-GG-T-GA-CGCTACGTT---ACTCCCT--CCTTCCCAGCCGAAA
Shalep9318                  GAA-TCGG-AACC-CGCTACGTT-AAGT--CCC---ATTC--AGC-GAAA
Snigros6567                 GAAATCGG-TAGA-CGCTACGTT-TAATTCCCC--CATTCCCAGCCGAAA
Tspic4846                   GAAATCGG-TAGA-CGCTACGTT-CAATTCCCT--CCTTCCCAGCCGAAA
Tspic6580                   GAA-TGG--AAC--TGCTACGTT-CAAGTGCCC-----TCCTAGGGGAAA
Ttria6383 b                 ???????????????????????????????????????????????
Ttria6555                   GAAAT-GG-TAG--CGGTAGCGTTCAAGTCCCCGACATAAGCTGCCACCT
Zea                         TTTCT-AT-CTA--AGTGGAACTTCCAATTT-AGAACTAGT-TAATAACT
Elionurusmuticus6954        GAA-TCGGATAGA-CGATACGGT-AATG--GGT--ATATCCCAGCCTGAA
Icylindrical                ----------------------------TTCCA--AATTCAGAGAA-ACC
Sacharumofficinarum         ----------------------------TTCCA--AATTCAGAGAA-ACC
Sorghumhalepnese            ----------------------------TTCCA--AATTCAGAGAA-ACC
Ttriandra                   ----------------------------TTCCA--AATTCAGAGAA-ACC
Pschinzii                   ATG-GAAA-CCT--GCTAAGTGG-TAACTTCCA--AATTCAGAGAA-ACC

Aadscen6713             -TGGGT-GGATGCAATGGGCAA-TCCTGAGCCAAATCC-CTCTTTTGAAA
Aameth6679              ???????????????????????????????????????????????
Aameth6685              ???????????????????????????????????????????????
Aappen6543              ---GGT---GTGTGTTGGGCAA-TGTTGAGATA-TTCCCTTTTTTTTGAA
Aappen6677              --TGGAATGATA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Aappen6946              --TGGAATGAAA-G-TGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Adist6684               ???????????????????????????????????????????????
Aeuco5869               ???????????????????????????????????????????????
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Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  -TGGGAAAGATGCAATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Binsc5681               ??????????????????????????????????????????????????
Brachiaria              -TCGGAATGACG-CATGGGCAA-TCCTGAGCCAAATCC-CTTTTT-GAAA
Bserra5074              -TCGGTG-GATG-AATGGGCAA-T----------CCCA-CCGTCCCCTTG
Bserra6654              -TGGGAATGACGCAATGGGCAA-TCCTGAGCCAAATCC-CTCTTTTGAAA
Bserra6954              ATCGGTA-GACG-AATGGGCAA-TCCTGAACCAAATCC-CTTTATTGAAA
Cdieter6642             ??????????????????????????????????????????????????
Cexc5877                -TCGGTA-GATT-CTACGGCAA-TGCCCCGCGGGCTCC-CTTTATTTAAA
Cexc6577                --------------------------------------------------
Cmarg4397               -TCGGTA-GATT-AATGGGCAA-TCCTGAGCCAACTCC-CTTTATTTGAA
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             --TGGAATGAAA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Dfilli5872              -TCGGAA-GACG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Hanam4841               -TCGGTA-GACG-CATGGGCAA-TCCTGA-CCATCTCC-CTTT-TTT--A
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               -TCGGAT-GAGA-AATGGGCAA-TCCTGA-CCAAATCC-CTTTTTTGAAA
Sbicolour9319           ??????????????????????????????????????????????????
Hemarthriaaltissima5698 --CGGAATGAAA-A-TGGGCAA-TCCTGAGCCAAATCC-CTTTTT-GAAA
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               -TGGAAT-GACA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              -TTGG----ATG-AATGGGCAA-TCCTGAGCCAAATCC-GTGTTTTCTGA
Hpilg4603               -TCGGTA-GACG-CTAGGGCAA-TCCTGAGCCATATCC-CTTGATTTGAA
Hpilg4738               -TCGGTA-GATG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              -TCGGTT-GACG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Icylin6632              --TGGAATGATA-AATGGGCAA-TCCTGAGCCAAATCCACTTTTTTGAAA
Mcape6655               --TGGAATGAAA-AATGGGCAA-TCCTGAGCCTTTGGG-GGT----GAAA
Pdilatum6617            -TGGGA-TGATG-CATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Pfrank4705              -TCGGAT-GAGG-AATGGGCAA-TCCTGA-CCAAATCC-CTTTTTTGAAA
Pschinz6652             -TCGGA-TGACG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Sbic6589                --TGGAATGATA-AATGGGCAA-TCCTGAGCCAAATCCACTTTTTTCAAA
Shalep9318              -TCGG--TGATG-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Snigros6567             -TGGAA-TGATA-CATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Tspic4846               -TCGGTG-GATT-AAAGGGCAA-TGGTGAGC---CTCA-CCTTTTTTTTT
Tspic6580               --TCGGATGATA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Ttria6383 b             ??????????????????????????????????????????????????
Ttria6555               TGGCCTCTAATGTCGTAGCTAACCACGCAGCGCAATAT-ATGATCTG--A
Zea                     AAGATTAATAATTAAGATCTGACTTTACAGCCCTATAT-ATAATTTT--T
Elionurusmuticus6954    ATCGGTA-GACG-AATGGGCAA-TCCTGAACCAAATCC-CTTTATTGAAA
Icylindrical            -TGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCCACTTTTTTGAAA
Sacharumofficinarum     CTGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCCCCTTTTTTGAAA
Sorghumhalepnese        CTGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCCACTTTTTTCAAA
Ttriandra               CTGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA
Pschinzii               CTGGAA-TGAAA-AATGGGCAA-TCCTGAGCCAAATCC-CTTTTTTGAAA

Aadscen6713             AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              AAAGAAAGCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Aappen6677              AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Aappen6946              AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAA-GGATAGGTGC
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Binsc5681               ??????????????????????????????????????????????????
Brachiaria              AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Bserra5074              AAACTT-GCGG-TCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Bserra6654              AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Bserra6954              AAACAA-GTGGTTCG--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Cdieter6642             ??????????????????????????????????????????????????
Cexc5877                AAACTT-CCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Cexc6577                --------------------------------------------------
Cmarg4397               AAACTT-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             AAACAA-GC-GGTTT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Dfilli5872              AAACTA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
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Hanam4841               --ACCA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Sbicolour9319           ??????????????????????????????????????????????????
Hemarthriaaltissima5698 AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               AAACAA-GCG-------CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              AAACAACGAGGTTCT--CGAACTAGAA-TACAAAGGAAAAGGATAGGTGC
Hpilg4603               AAACCA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAAATGC
Hpilg4738               AAACTA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Icylin6632              AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Mcape6655               TGACTA-CATGGTCTACCTAATGATGA-TCCAAAGGTAATGGATAGGTGC
Pdilatum6617            AA-CAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Pfrank4705              AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Pschinz6652             AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Sbic6589                AAA----GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Shalep9318              AA-CAA-GTGGTT-T--CCAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Snigros6567             AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Tspic4846               AAACTA-GTGGGTCT--CAAACTAGAAACCCAAAGGAAAAGGATAGGTGC
Tspic6580               AAACAA-GTGGTTCT--CTAAGTAGAA-TCCAAAGGAAAAGGATAGGTGC
Ttria6383 b             ??????????????????????????????????????????????????
Ttria6555               GGACAAAGA---TC---CATATTGGTC-------GGTCCCGTAGCG-TCT
Zea                     TGTTACATT---TC---TGTTATGTAA-------GCCCACTTAG---CTC
Elionurusmuticus6954    AAACAA-GTGGTTCG--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Icylindrical            AAACAA-GTG-------CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Sacharumofficinarum     AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Sorghumhalepnese        AAA----GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Ttriandra               AAACAA-GCGGTTCT--CAAACTAGAA-CCAAAAGGAAAAGGATAGGTGC
Pschinzii               AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC


Aadscen6713             AGAGACTCAATGGAAGCTATTCTA--ACGAATCGAAGTAATTACGTTGTG
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Aappen6677              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Aappen6946              AGAGACTCTATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Binsc5681               ??????????????????????????????????????????????????
Brachiaria              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Bserra5074              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Bserra6654              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Bserra6954              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Cdieter6642             ??????????????????????????????????????????????????
Cexc5877                AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Cexc6577                --------------------------------------------------
Cmarg4397               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Dfilli5872              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hanam4841               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Sbicolour9319           ??????????????????????????????????????????????????
Hemarthriaaltissima5698 AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTGCGTTGTG
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAGTTAATTACGTTGTG
Hpilg4603               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hpilg4738               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
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Htamb6585               ??????????????????????????????????????????????????
Icylin5114              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Icylin6632              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Mcape6655               AGAGACTCCCATG--GCTGTTCTAGAATGGATCTGAGCGAT---------
Pdilatum6617            AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTGCGTTGTG
Pfrank4705              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Pschinz6652             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Sbic6589                AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Shalep9318              AGAGACTCAATGGA-GCTGTTCTA--ACGAATCGAAGTAAT-ACGTTGTG
Snigros6567             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Tspic4846               AGAGACTCAATGGAAGCTTTTCTA--ACGAATCGAAGTAAT---------
Tspic6580               AGAGAATCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Ttria6383 b             ??????????????????????????????????????????????????
Ttria6555               ACCGATTTTCGCGAAGCTGTCCTA--CCGGTTCGAAGTTATT--------
Zea                     AGAGGTTAGAGCATCGCATTTGTA-ACGAATCGGTTCAAAT---------
Elionurusmuticus6954    AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Icylindrical            AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Sacharumofficinarum     AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Sorghumhalepnese        AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Ttriandra               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Pschinzii               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG


Aadscen6713             TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATA-----
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              --------------------------------------------------
Aappen6677              --------------------------------------------------
Aappen6946              --------------------------------------------------
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  --------------------------------------------------
Binsc5681               ??????????????????????????????????????????????????
Brachiaria              TTGGTAGGGGAACTGCCTCAAAATACTAGAAAGAAGGGCTTTATATTATA
Bserra5074              --------------------------------------------------
Bserra6654              TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATTT-ATA
Bserra6954              --------------------------------------------------
Cdieter6642             ??????????????????????????????????????????????????
Cexc5877                --------------------------------------------------
Cexc6577                --------------------------------------------------
Cmarg4397               --------------------------------------------------
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             --------------------------------------------------
Dfilli5872              --------------------------------------------------
Hanam4841               --------------------------------------------------
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               --------------------------------------------------
Sbicolour9319           ??????????????????????????????????????????????????
Hemarthriaaltissima5698 TTGGTAGTGGAACT-CTTCGAAATTAGAGAAAGAAGGGCTTTATA-----
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               --------------------------------------------------
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              TTGTTAGTGGAATTCCTTCTAAATTTGAGAAAGAAGGGCTTTATA-----
Hpilg4603               --------------------------------------------------
Hpilg4738               --------------------------------------------------
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              --------------------------------------------------
Icylin6632              --------------------------------------------------
Mcape6655               --------------------------------------------------
Pdilatum6617            TTGGTAGTGGAACCTCTTCGAAATTAGAGAAAGAAGGGCTTTATA-----
Pfrank4705              --------------------------------------------------
Pschinz6652             TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATA-----
Sbic6589                --------------------------------------------------
Shalep9318              TTGGTAGTGGAACTCCCTCGAAATACTAGAAAGAAGGGCTTTATA-----
Snigros6567             TTGGTAGTGGAACTCCCTCGAAATACTAGAAAGAAGGGCTTTATA-----
Tspic4846               --------------------------------------------------
Tspic6580               --------------------------------------------------
Ttria6383 b             ??????????????????????????????????????????????????
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Ttria6555               ------------------------------------------------
Zea                     ------------------------------------------------
Elionurusmuticus6954    ------------------------------------------------
Icylindrical            ------------------------------------------------
Sacharumofficinarum     ------------------------------------------------
Sorghumhalepnese        ------------------------------------------------
Ttriandra               ------------------------------------------------
Pschinzii               TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATA-----

Aadscen6713             CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              ----------------------------------AACGATTAATCACA--
Aappen6677              ----------------------------------AACGATTAATCACA--
Aappen6946              ----------------------------------AACGATCAATCACA--
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  ----------------------------------AACGATTAATCACA--
Binsc5681               ??????????????????????????????????????????????????
Brachiaria              CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACG--
Bserra5074              ----------------------------------AACGATTAATCACA--
Bserra6654              CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Bserra6954              ----------------------------------AACGATTAATCACA--
Cdieter6642             ??????????????????????????????????????????????????
Cexc5877                ----------------------------------AACGATTAATCACAAA
Cexc6577                ------------------------------------------------
Cmarg4397               ----------------------------------AACGATTAATCACAAA
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             ----------------------------------AACGATTAATCACA--
Dfilli5872              ----------------------------------AACGATTAATCACA--
Hanam4841               ----------------------------------AACGATTAATCACA--
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               ----------------------------------AACGATTAATCACA--
Sbicolour9319           ??????????????????????????????????????????????????
Hemarthriaaltissima5698 CATCTTATATACACGCATATATACTGACATAGCAAACGATTAATCACG--
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               ----------------------------------AACGATTAATCACA--
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              CACCTAATAAACACGTATAGATACTGGCATAGCAAACGATTAATCACG--
Hpilg4603               ----------------------------------AACGATTAATCACA--
Hpilg4738               ----------------------------------AACGATTAATCACA--
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              ----------------------------------AACGATTAATCACA--
Icylin6632              ----------------------------------AACGATTATTCACA--
Mcape6655               ----------------------------------GCAGCTTAATCACA--
Pdilatum6617            CATCTAATATACACGCATATATACTGACATAGCAAACGATTAATCACG--
Pfrank4705              ----------------------------------AACGATTAATCACA--
Pschinz6652             CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCATA--
Sbic6589                ----------------------------------AACGATTAATCACA--
Shalep9318              CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Snigros6567             CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Tspic4846               ----------------------------------TACGATTAATCACA--
Tspic6580               ----------------------------------AACGATTAATCACA--
Ttria6383 b             ??????????????????????????????????????????????????
Ttria6555               ----------------------------------ACGAGT-TTCAGG--
Zea                     ----------------------------------CCGATT-TTTTTT--
Elionurusmuticus6954    ----------------------------------AACGATTAATCACA--
Icylindrical            ----------------------------------AACGATTAATCACA--
Sacharumofficinarum     ----------------------------------AACGATTAATCACA--
Sorghumhalepnese        ----------------------------------AACGATTAATCACA--
Ttriandra               ----------------------------------AACGATTAATCACA--
Pschinzii               CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCATA--

Aadscen6713             GAACCCATATCATAATATAGGTTCTTTATTTTATAT-------TTTTTTT
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
Aappen6677              GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
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Aappen6946              GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Binsc5681               ??????????????????????????????????????????????????
Brachiaria              GAACCCCTATCATAATAGGGGTTCTTTATTTTATAT-----TTTTTTCT-
Bserra5074              GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Bserra6654              GAACCCATATCATAATATAGGTTCTTTATTTTATATATATATTTTTTTTT
Bserra6954              GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Cdieter6642             ??????????????????????????????????????????????????
Cexc5877                GAACCCATATTATAATATAGGTTCTTTATTTT-----------------T
Cexc6577                -------CATNNGGCTACGTGTTGCGCAGTCG-------------------
Cmarg4397               GAACCCATATTATAATATAGGTTCTTTATTTT-----------------T
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Dfilli5872              GAACCTATATTATAATATAGGTTCTTTTTTTTATTT------------TT
Hanam4841               GAACCTATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Sbicolour9319           ??????????????????????????????????????????????????
Hemarthriaaltissima5698 GAACCCATATCATAATATAGGTTCCTTATTTTATTT------------TT
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              GAACCCATATTATAATATAGGTTCTTTATTCTTTTT-------TAGAATG
Hpilg4603               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hpilg4738               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Icylin6632              GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Mcape6655               GAACCCATATTCTAATATAGGTTCTTTATTACATTT------------TT
Pdilatum6617            GAACCCATATCATAATATAGGTTCCTTATTTTATTT--------TTT---
Pfrank4705              GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Pschinz6652             GAACCCATATCATAATATAGGTTCTTTATTTTATTT--------TTT---
Sbic6589                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TG
Shalep9318              GAACCCCTATCATAATATAGGTTCTTTATTTTATAT-----TTTTTTTTT
Snigros6567             GAACCCCTATCATAATATAGGTTCTTTATTTTATAT-----TTTTTTTT-
Tspic4846               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Tspic6580               GAACCCATATTATAATATAGGTTGTTTATTTTATTG------------TT
Ttria6383 b             ??????????????????????????????????????????????????
Ttria6555               TAAGCCTTATGATAATCGTAGTCGTCTACGTCGC---------------G
Zea                     CTATCGATGTTCTATGAACAAGAATTTCTCTTTT---------------C
Elionurusmuticus6954    GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Icylindrical            GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Sacharumofficinarum     GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Sorghumhalepnese        GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TG
Ttriandra               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Pschinzii               GAACCCATATCATAATATAGGTTCTTTATTTTATTT-----------TTT

Aadscen6713             AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCTG---A
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGAAAATTCAT---A
Aappen6677              AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGAAAATTCAT---A
Aappen6946              AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGTCGATTGAT---A
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Binsc5681               ??????????????????????????????????????????????????
Brachiaria              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCTT---A
Bserra5074              AGAATGAAATT-TGG-AAGGATTATGAAGAGGTATAGAAAATTCAT---A
Bserra6654              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTATG---A
Bserra6954              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Cdieter6642             ??????????????????????????????????????????????????
Cexc5877                AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Cexc6577                ---CTGAAACGCTCCCAAGAACTCTCGCTATCGCCAGATAATTCGGTGGA
Cmarg4397               AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
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Cplur6406                ??????????????????????????????????????????????????
Cprolix6682              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Dfilli5872               AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGAAAATTCAT---A
Hanam4841                AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGAAAATTCAT---A
Hcon6942                 ??????????????????????????????????????????????????
Hdiss5145                AGAATGAAATT-TGG-AAGGATTATGAAGAGGTATAGAAAATTCAT---A
Sbicolour9319            ??????????????????????????????????????????????????
Hemarthriaaltissima5698  TGAATGAAATT-AGG-AATGATTATGAA-----ATATAAAATTCTG---A
Hfilli5144               ??????????????????????????????????????????????????
Hhirt6550                AGAATGAAATT-TGG-AAGGATTATGAAGAGGTATAGAAAATTCAT---A
Hhirt6656                ??????????????????????????????????????????????????
Hlongi6560               AAATTTGAAAT-AGA-AATGATTATGAA-----ATAATAAATTCTG---A
Hpilg4603                AGAATGAAATT-TGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Hpilg4738                AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Hquar5088                ??????????????????????????????????????????????????
Hrud6576                 ??????????????????????????????????????????????????
Htamb6585                ??????????????????????????????????????????????????
Icylin5114               AGAATGAAATT-AG--AATGATTATGAA-----ATAGAAAATTCAT---A
Icylin6632               AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Mcape6655                TGAATGAAATT-CGG-AATGATTATGAA-----ATACAACAACAGC---A
Pdilatum6617             -GAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCTG---A
Pfrank4705               AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Pschinz6652              AGAATGAAATT-AGG-AATGATTATGAA-----ATATAAAATTCTG---A
Sbic6589                 AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Shalep9318               AGAATGAAATT-AGG-AATGATTAGGAA-----ATAGAAAATTCTG---A
Snigros6567              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCTG---A
Tspic4846                AGAATGAAATT-TGG-AAGGATTATGAA-----ATACAAAATTCAT---A
Tspic6580                AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAA-ATTCAT---A
Ttria6383 b              ??????????????????????????????????????????????????
Ttria6555                AAATTGAAATT-AGG-AATGATTATGAA-----ATAAAA-ATTCAT---A
Zea                      CGAATAAAATG-GGG-AATCAGGGTCTA-----TTAGTC-GTTCAA---G
Elionurusmuticus6954     AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Icylindrical             AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCCT---A
Sacharumofficinarum      AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Sorghumhalepnese         AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Ttriandra                AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Pschinzii                AGAATGAAATT-AGG-AATGATTATGAA-----ATATAAAATTCTG---A

Aadscen6713              ATTTTTT-GAGAATTA----TTGT-GAATCCATTCCAATCGA-ATATT
Aameth6679               ??????????????????????????????????????????????????
Aameth6685               ??????????????????????????????????????????????????
Aappen6543               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Aappen6677               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Aappen6946               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Adist6684                ??????????????????????????????????????????????????
Aeuco5869                ??????????????????????????????????????????????????
Aschiren6581             ??????????????????????????????????????????????????
Bbladh                   ATTTTTT-GAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Binsc5681                ??????????????????????????????????????????????????
Brachiaria               ATTTTTT-TAGAATTA----TTGT-GAATCCATTCCAATCGA-ATATT
Bserra5074               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Bserra6654               ATTTTTT-CATAATTA----TTGT-GAATC-ATTCCAATCGA-ATATT
Bserra6954               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Cdieter6642              ??????????????????????????????????????????????????
Cexc5877                 ATTTTTT-GAGAATTAATTATTGT-GAATCTATTCCAATCGA-ATATT
Cexc6577                 CTATGATCGTCGACTA-TTTTCGCGCTGTCTACGCCAACAGAGTCATT
Cmarg4397                ATTTTTT-GAGAATTAATTATTGT-GAATCTATTCCAATCGA-ATATT
Cplur6406                ??????????????????????????????????????????????????
Cprolix6682              ATTTTTT-GAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Dfilli5872               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Hanam4841                ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Hcon6942                 ??????????????????????????????????????????????????
Hdiss5145                ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Sbicolour9319            ??????????????????????????????????????????????????
Hemarthriaaltissima5698  ATTTTTT-TAGAATTA----TTGT-GAATCCATTCCAATCGA-ATATT
Hfilli5144               ??????????????????????????????????????????????????
Hhirt6550                ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Hhirt6656                ??????????????????????????????????????????????????
Hlongi6560               ATTTTTTGTAGAATTA----TT---GAATC-ATTCCAATTGA-ATATT
Hpilg4603                ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Hpilg4738                ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
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Hquar5088                ??????????????????????????????????????????????????
Hrud6576                 ??????????????????????????????????????????????????
Htamb6585                ??????????????????????????????????????????????????
Icylin5114               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Icylin6632               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Mcape6655                TTAAATG-AAGAATTC----ATGT-GAAGCTATTGCTTGCAATATATT
Pdilatum6617             ATTTTTT-TAGAATTA----TTGT-GAATCCATTCCAATCGA-ATATT
Pfrank4705               ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Pschinz6652              ATTTTTTTTAGAATTA----TTGT-GAATCCATTCCAATCGA-ATATT
Sbic6589                 ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Shalep9318               ATTTTTT-TAGAATTA----TTGT-GGATCCATTCCAATCGA-ATATT
Snigros6567              ATTTTTT-TAGAATTA----TTGT-GAATCCATTCCAATCTA-ATATT
Tspic4846                ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Tspic6580                ATTTTTT-TAGAATTA----TTGT-GAATCTATTGCAATGGA-ATATT
Ttria6383 b              ??????????????????????????????????????????????????
Ttria6555                ATTTTTT-GAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Zea                      ACTCCAT-TTGTCATA----TATT-CCATATATCACATTCGA-AGATA
Elionurusmuticus6954     ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Icylindrical             ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Sacharumofficinarum      ATTTTTT-TAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Sorghumhalepnese         ATTTTTT-TAGAATTA-----TGT-GAATCTATTCCAATCGA-ATATT
Ttriandra                ATTTTTT-GAGAATTA----TTGT-GAATCTATTCCAATCGA-ATATT
Pschinzii                ATTTTTTTTAGAATTA----TTGT-GAATCCATTCCAATCGA-ATATT

Aadscen6713              -TCATAATCA-AATCCTT--CAATTCATTGTTTTG------AGATCTTTA
Aameth6679               ??????????????????????????????????????????????????
Aameth6685               ??????????????????????????????????????????????????
Aappen6543               -GAGTAATCA-AATCCTT--CAA-TCATTGTTTTCG-----AGATCTTTT
Aappen6677               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Aappen6946               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTC-----GAGATCTTTT
Adist6684                ??????????????????????????????????????????????????
Aeuco5869                ??????????????????????????????????????????????????
Aschiren6581             ??????????????????????????????????????????????????
Bbladh                   -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Binsc5681                ??????????????????????????????????????????????????
Brachiaria               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTG------AGATC----
Bserra5074               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Bserra6654               -GAGTAATCA-AATCCTT--CAACTCATT---TTG------AGATCTTTA
Bserra6954               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Cdieter6642              ??????????????????????????????????????????????????
Cexc5877                 -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCCTTT
Cexc6577                 AGGGGGAGACGGATCACGCACATATATATTATTTCA-----ATATC-TAT
Cmarg4397                -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATC-TTT
Cplur6406                ??????????????????????????????????????????????????
Cprolix6682              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTC-----GAGATCTTTT
Dfilli5872               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hanam4841                -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hcon6942                 ??????????????????????????????????????????????????
Hdiss5145                -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Sbicolour9319            ??????????????????????????????????????????????????
Hemarthriaaltissima5698  -GAGTAATCA-AATCCTT--CAATTCATTATTTTGTTGG-CAGATCTTTT
Hfilli5144               ??????????????????????????????????????????????????
Hhirt6550                -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hhirt6656                ??????????????????????????????????????????????????
Hlongi6560               -TAGTAATCA-AATCCTT--CAATTCAGT---TTG------GAGTCTTTA
Hpilg4603                -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hpilg4738                -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hquar5088                ??????????????????????????????????????????????????
Hrud6576                 ??????????????????????????????????????????????????
Htamb6585                ??????????????????????????????????????????????????
Icylin5114               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Icylin6632               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Mcape6655                -GACTAATCACAATGGAC--TAATACATTGTGTT------GAGATCATTT
Pdilatum6617             -GAGTAATCA-AATCCTT--CAATTCATTATTTTGTTTTCGAGATCTTAA
Pfrank4705               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Pschinz6652              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTG------AGATCTTCA
Sbic6589                 -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Shalep9318               -GAGTAATCG-AATCCTT--CAATTCATTGTTTTG------CGATC----
Snigros6567              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTG------AGATC----
Tspic4846                -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Tspic6580                -GAGTAAT-AGAATGGTT--CAATTGATTATTTTTC----GAGATGTTTT
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Ttria6383 b             ??????????????????????????????????????????????????
Ttria6555               -GAGTTATCA-AATCCTT--CAATTCATTGGTTTCG-----AGATCTTTT
Zea                     -TCATATTCA-TGGAATA--CGATTCACT---TTCA-----AGATGCCTT
Elionurusmuticus6954    -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Icylindrical            -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Sacharumofficinarum     -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Sorghumhalepnese        -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Ttriandra               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Pschinzii               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTG------AGATCTTCA


Aadscen6713             AAAAGTGG-ATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Aappen6677              AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Aappen6946              CCTCAGTGGATTAATC--GGACGAGGATA--AAGAGA--GACTAACA
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Binsc5681               ??????????????????????????????????????????????????
Brachiaria              AAAAGTGG-ATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Bserra5074              AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Bserra6654              AAAAGTGGGATTAATC---GACGAGGATA--AAGAGA--GAGTCCCA
Bserra6954              TAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Cdieter6642             ??????????????????????????????????????????????????
Cexc5877                TAAAAGCGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Cexc6577                ATAAGATGTGATAGTC--GAAAGTATACTGGAAAAGAATGACGTACC
Cmarg4397               TAAAAGCGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Dfilli5872              AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Hanam4841               AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145                AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Sbicolour9319          ??????????????????????????????????????????????????
Hemarthriaaltissima5698 AAAAAGTGGATTAAGC--GGACGAGGATA--AAGAGA--GAGTCCCA
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              AAACAGGTGATTAATCCGGGACGAGGACA--AAGAGA--GAGTCCCA
Hpilg4603               AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Hpilg4738               AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Icylin6632              AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Mcape6655               AAAAAGTGGATAAATC--GGCGGAGGATT--AAGCGT--GGTTCATA
Pdilatum6617            AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Pfrank4705              AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Pschinz6652             AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Sbic6589                AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Shalep9318              GAAAGTGG-TATACTC---GAATCGGACG--AGGATAA-GAGTCCCA
Snigros6567             AAAAGTGG-ATTAATC---GACGAGGATA--AAGAGA--GAGTCCCA
Tspic4846               AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Tspic6580               AAAAAGTGGATTAATC--GGATGAGGATA--AAGAGA--GAGTAGAA
Ttria6383 b             ??????????????????????????????????????????????????
Ttria6555               AAAAAGTGGATTAATCC-GGACGAAGATT--AAGAGA--GATTCCCA
Zea                     GA----TGGTGAAAT---GGTAGAC------ACGCGA--GACTCAAA
Elionurusmuticus6954    TAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Icylindrical            AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Sacharumofficinarum     AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Sorghumhalepnese        AAAAAGTGGATTAATC--GGACGAGGATA---AGAGA--GAGTCCCA
Ttriandra               AAAAAGTGGATTAATC--GGACGAGGATA--AAGAGA--GAGTCCCA
Pschinzii               AAAAAGTGGATTAATC--GAACGAGGATA--AAGAGA--GAGTCCCA

Aadscen6713             TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
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Aappen6543              TTCTA--CATGTCAAT--ACTGA-CAACATT--AATTTCTAGTAAAA
Aappen6677              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Aappen6946              TTTTG--AATCCCAAC--GGAAT-CGGG--ACACATAACTTTCAAAT
Adist6684               ??????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????
Bbladh                  TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Binsc5681               ??????????????????????????????????????????????
Brachiaria              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Bserra5074              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Bserra6654              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Bserra6954              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Cdieter6642             ??????????????????????????????????????????????
Cexc5877                TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Cexc6577                GTCAACGANTTTCNGG----NNN-TATAGTTCTTTATTATTTTNANA
Cmarg4397               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Cplur6406               ??????????????????????????????????????????????
Cprolix6682             TTCTA--CATGTCAAT--ACTGA-CGGC--AGATGGATTTGAATCCC
Dfilli5872              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hanam4841               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hcon6942                ??????????????????????????????????????????????
Hdiss5145               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Sbicolour9319           ??????????????????????????????????????????????
Hemarthriaaltissima5698 TGCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hfilli5144              ??????????????????????????????????????????????
Hhirt6550               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hhirt6656               ??????????????????????????????????????????????
Hlongi6560              TTCTA--CATGTCAAT--ACTG---AACAATGAAATTTCTAGTAAAA
Hpilg4603               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hpilg4738               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hquar5088               ??????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????
Icylin5114              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Icylin6632              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Mcape6655               TTCGG--TATGTCAAT--GCGAT-CGTC--TGACTTTACTTTCTAAC
Pdilatum6617            TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Pfrank4705              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Pschinz6652             TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Sbic6589                TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Shalep9318              TTCTA--CATGTCAAT--ACTGA-CAACAATGAA-TTTCTAGTAAAA
Snigros6567             TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Tspic4846               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Tspic6580               TTATA--CATGTCNATCTGACAA-CAAGAATATAGGAGGTTTATGAT
Ttria6383 b             ??????????????????????????????????????????????
Ttria6555               TCCTA--CATGTCAAT--ACTGGACAACAATGAAATTTCTAGTTAAA
Zea                     ATCT---CGTG-CTAA--AGAGCGTGGAGGTTCGAGTCCT-CTTCAA
Elionurusmuticus6954    TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Icylindrical            TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Sacharumofficinarum     TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Sorghumhalepnese        TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Ttriandra               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Pschinzii               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA


Aadscen6713             GGA
Aameth6679              ???
Aameth6685              ???
Aappen6543              GGA
Aappen6677              GGG
Aappen6946              TCC
Adist6684               ???
Aeuco5869               ???
Aschiren6581            ???
Bbladh                  GGA
Binsc5681               ???
Brachiaria              GGA
Bserra5074              GGA
Bserra6654              GGA
Bserra6954              GGA
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Cdieter6642	???
Cexc5877	GGA
Cexc6577	ATG
Cmarg4397	GGA
Cplur6406	???
Cprolix6682	TCC
Dfilli5872	GGA
Hanam4841	GGA
Hcon6942	???
Hdiss5145	GGA
Sbicolour9319	???
Hemarthriaaltissima5698	GGA
Hfilli5144	???
Hhirt6550	GGA
Hhirt6656	???
Hlongi6560	GGA
Hpilg4603	GGA
Hpilg4738	GGA
Hquar5088	???
Hrud6576	???
Htamb6585	???
Icylin5114	GGA
Icylin6632	GGG
Mcape6655	ACC
Pdilatum6617	GGA
Pfrank4705	GGA
Pschinz6652	GGA
Sbic6589	GG-
Shalep9318	GGA
Snigros6567	GGA
Tspic4846	GGA
Tspic6580	TGG
Ttria6383 b	???
Ttria6555	GGG
Zea	GGC
Elionurusmuticus6954	GGA
Icylindrical	GGA
Sacharumofficinarum	GGA
Sorghumhalepnese	GGA
Ttriandra	GGA
Pschinzii	GGA

Aadscen6713	?????
Aameth6679	GACCC
Aameth6685	GACCC
Aappen6543	?????
Aappen6677	GACCA
Aappen6946	GATCC
Adist6684	GACCC
Aeuco5869	GACCC
Aschiren6581	GACCC
Bbladh	GACCC
Binsc5681	GACCC
Brachiaria	?????
Bserra5074	GACTC
Bserra6654	?????
Bserra6954	GACTC
Cdieter6642	GACCC
Cexc5877	?????
Cexc6577	GACCC
Cmarg4397	?????
Cplur6406	GACCC
Cprolix6682	GACCC
Dfilli5872	CCTCC
Hanam4807	GACCC
Hcon6942	GACCA
Hdiss5145a	ACCCC
Sbicolour9319	GACCC
Hemarthriaaltissima5698	GACCA
Hfilli5144	GCCCC

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Hhirt6650                ?????
Hhirt6656f               GAACC
Hlongi6560               ?????
Hpilg4603                GACCC
Hpilg4738                GACCC
Hquar5088                GACCA
Hrud6576                 GACCA
Htamb6585                GACCC
Icylin5114a              GACCC
Icylin6632a              GACCA
Mcape6655                GACCC
Pdilatum6617             GACCC
Pfrank4705               GACCA
Pschinz6652              ?????
Sbic6588                 GACCA
Shalep9318               GACCC
Snigros6567              ?????
Tspic4846                GACCA
Tspic6580                GACCC
Ttria6383 b              GACCC
Ttria6555                GACCC
Zea                      ATAAT
Elionurusmuticus6954     GACTC
Icylindrical             AAATC
Sacharumofficinarum      AAATC
Sorghumhalepnese         AAATC
Ttriandra                AAATC
Pschinzii                AAATC

Aadscen6713              ??????????????????????????????????????????????
Aameth6679               AGTT-CAGGGAGATCGGGGGT-TGGGAGAAACTAAGGG-TTGGTA
Aameth6685               AGTT-C-GTGAGATAGGGGGT-TGGGAGAAAATAAGGGATTGGTA
Aappen6543               ??????????????????????????????????????????????
Aappen6677               AGGTTCAGGGAGATAGGGGTT-TGGGAGAAAATAACGGATTGGTA
Aappen6946               ATATTTTGGGACCAAATTCCG---GGAGA---TAGGGG---ATAT
Adist6684                CGTTACAGGGAAGACGGGGTT-TGGGAGAAAATAAGGGCTTGGTA
Aeuco5869                CGGT--CGGGAGATCGGGGTT-GGGGAGAAANAATGGGGTTGGTA
Aschiren6581             A-GTTCAGGGAGATAGGGGGTGTGGGAGAAAATAAGGGATTGGTN
Bbladh                   AAACTNGNCGAGATACCTTTGTTGGGAGAAAACATCGGGTAGAAT
Binsc5681                AAAATNG-GGAGAGACGGG--TTGGGAGAAAATAAGGCATTGGTA
Brachiaria               ??????????????????????????????????????????????
Bserra5074               CGATTGTCGGACCAAAGTTCA---GGAGA---TAGGGG---AAAA
Bserra6654               ??????????????????????????????????????????????
Bserra6954               CGTTTGTCGGACCAAGTTCAG---GGAGA---TAGGGGN-TATTT
Cdieter6642              AAGTTCAGGGAGATAGGGGTT-TGGGAGAAAATAAGGGATTGGTA
Cexc5877                 ??????????????????????????????????????????????
Cexc6577                 AAGT-CAGGGGGATACGGGTT-TGGGAGCAAATAACGGGTCGGTA
Cmarg4397                ??????????????????????????????????????????????
Cplur6406                C---TCGGGAAAATAGGGGTGTGCGGAGGAAATACGGGTTTGGGA
Cprolix6682              CAGT--CGGGAGATAGGGGTT-TGGGAGAAAATAAGGGATTGGTA
Dfilli5872               CNTTTTTAGGACCAAGTTCAG---GGAGA---TAGGGGTTTGGAA
Hanam4807                ACCTTCCGCAAA-TAGGCCTCCCCCCCGCCCCTTCGGCACACCCA
Hcon6942                 AGGTTCAGGGAGATAGGGGTT-TGGGGGCAAATAACGGATAGGTA
Hdiss5145a               TTATAGTCCTACACACGTCCC--TGCACA---AAAGGCACTCCTT
Sbicolour9319            G---TCCGGGAATTAGGGGGT-CCGGAGAACATCAAGGGTTGGGA
Hemarthriaaltissima5698  AGGTTCGGGAGATA-GGTATGGTGGAAAAAA-CAAGGGATTGGTA
Hfilli5144               TCTTAGCCCGACCCAAGTTTC--GGCACA---TAGGGCCCTATTT
Hhirt6650                ??????????????????????????????????????????????
Hhirt6656f               A-GTTTCGGGAATAGGGTG--GTGGGAGAACATAAGGGATTGGTA
Hlongi6560               ??????????????????????????????????????????????
Hpilg4603                AANTTTAGGGAGATAGGGGTT-TGGGAGGAAATAAGGGATTGAAA
Hpilg4738                TCTTACCGGACCC-AAATTTC--GGGAGA---TAGGGGTTATTTT
Hquar5088                AGTTCAGGAGATAGGGGGGTG--TGGTTT---TAAGGGTCAGGTA
Hrud6576                 AAGTTCAGGG-GATAGCGGGGTCGGGAGAAAAGAACCGGATTGAT
Htamb6585                AAGTTCAGGG-GATAGCGGGTTTGGGAGAAAATACCGAATTCGTA
Icylin5114a              AANTTTCAGGAGATAGGGGGTTTGGGAGAAAATAAGGGTTCGGTA
Icylin6632a              --GTTCAGGGAAATACGGGGGT--GGGGGAAATAAGGGATTGGTA
Mcape6655                ACGTTCAGGGAAATAAGGGGGTTGGGAGAAAATAAGGGATTGGTA
Pdilatum6617             AGCTTCCGGGAATTAGGGGCCCCTGGGGCCAACATTTTAGCCCAA
Pfrank4705               AAGTTTTGAGCACCAAGTGCG--GGGAGA---TAGGGGTCATTGA
Pschinz6652              ??????????????????????????????????????????????
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Sbic6588                 G---TTCGGGAATTAGGGGGT-TGGGGGAAAATAAGGGATTGGGA
Shalep9318               TCTTACCGGACCCCCATATA---CCGATT---TCCCGGTTATTTT
Snigros6567              ??????????????????????????????????????????????
Tspic4846                TCGTTGTCCCANAAAAGTTTC---GCANA---TAGGGGTTATTTT
Tspic6580                CG-TTCAGGGAAATCCGGGATTCCCGGCAAAATACGGGCTGGGTA
Ttria6383 b              AAGTTCAGCAGATAGGGTT--GTGGGAGAAAATAAGGGATTGGTA
Ttria6555                AAGTTCAGCAGATAGGGGT--GTGGGAGAAAATAAGGGATTGGTA
Zea                      C-GGAGAATGCTCATTGAT--GAGCATTCCCGTAGAAGTATTC--
Elionurusmuticus6954     CGTTTGTCGGACCAAGTTCAG---GGAGA---TAGGGGN-TATTT
Icylindrical             CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Sacharumofficinarum      CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Sorghumhalepnese         CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Ttriandra                CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Pschinzii                CGTCGACTTTATA-AGTCGT-GAG??????????????????????

Aadscen6713              ??????????????????????????????????????????????
Aameth6679               TCC--CTTTAGGAAACAAGAATA---TAGTTACCCA-CACTC
Aameth6685               TCC--CTTTAGGAAACAAGAAAA---TAGTTACCCA-CACTC
Aappen6543               ??????????????????????????????????????????????
Aappen6677               TCA-ACATTAGTAAACAAAGAAAC--TAGTTACCCA-CATTC
Aappen6946               TCTTCGC----ACACA-AGG------CA-ATAAAC---CTTG
Adist6684                TCC--CATTAGGAAACAAGAATA---TAGTTACCCA-CATTC
Aeuco5869                TCN-GTTATTGTTCAAGTAGAAAC--TAGTTACCCATCATCC
Aschiren6581             TCA-ACNTTG-GAGATAGGGGA----TAGTTACCC-GGATTC
Bbladh                   CA---CATCA-TCTTACCGAAAGACATAGTTACCCA-TACTC
Binsc5681                TCAAATA-TAGGAAA---CAAAGA--TAATAGTTACCAATTC
Brachiaria               ??????????????????????????????????????????????
Bserra5074               ACTGGCG----ACACG-GGC------CA-ATAAAC---CTTG
Bserra6654               ??????????????????????????????????????????????
Bserra6954               TTTCGGG----TAAAG-AGA------AA-ATAAAC---CTTC
Cdieter6642              TCA-GCTATCGGAAACGTAGAAAA--TAGTTACCCA-AATTC
Cexc5877                 ??????????????????????????????????????????????
Cexc6577                 CCA-TCATTCTGAAACATAGAAAA--TAGTAACCCA-ACTTC
Cmarg4397                ??????????????????????????????????????????????
Cplur6406                TCAA-CTTTAGGAAAA-AAGGAA--ATAGGTTTCCC-GATTC
Cprolix6682              TCA-GCTATNGGAAAAATAGAAAA--TAGTTACCCC-AATTC
Dfilli5872               G----------AAAATAAGG------GA----------TTGG
Hanam4807                GAT-AAAAATCTAGACTCGGA-AAGGTCTAGNCCCA-CAGTT
Hcon6942                 TCA-NCTATAGGAAAAATAGAAAA--TAGTTACCCA-CATTC
Hdiss5145a               TTCTCCC----ATCTTTTGG------CACC-AAA----ATTC
Sbicolour9319            GTCA-ACTTAGGAACA-AAGG----ATAGGTTCCCC-A-TTC
Hemarthriaaltissima5698  TCCCTCATCGGAAGAAAAGAAATAAATATTTACCCA--ATTC
Hfilli5144               TTTCGGA----CACCATTG-------CAGATAA-----ATAA
Hhirt6650                ??????????????????????????????????????????????
Hhirt6656f               CCA-ACNTTAGGAGAAAAGAAGTA--TAGTTACCCAGTATTC
Hlongi6560               ??????????????????????????????????????????????
Hpilg4603                TA--TCATAAATAGGAGAAAAGAAAATAGTTACCCA-AATTC
Hpilg4738                TCGGGTC----AATTGCAGG------GATAA-------ATAG
Hquar5088                CATGGGT----TTCCGGACC------AAGGTTCAG---GGAG
Hrud6576                 GCA-ACATT-GTAAATCTAG-AAA-GTAGTTAGCCG--ATTC
Htamb6585                GCA-CCATTCGTAAACATAG-AAA-CTAGTTACCCC-CATTC
Icylin5114a              TCATAGAGTATGCAAAAAAAGAGTAATAGTTACCCA-AATTC
Icylin6632a              TCTG-CTATGGGAAAAAAAGAAA--ATAGTTACCCA-AATTC
Mcape6655                TCAA-CTTTAAGAAAAAGAGAC----AAGTTTCGGG-ACTTC
Pdilatum6617             GCCTTGCTCAGTTATTCTGGTAACAGTAGATATCCCCAATTA
Pfrank4705               TCGGGTC----AATAGGACC------ANGTTTCAG---GGAG
Pschinz6652              ??????????????????????????????????????????????
Sbic6588                 TCAA-CTTTAGGAAAA-AAGG----NTTGTTACCCC-AATTC
Shalep9318               TTTGTAA----GACCAAAGT------CAGATAA-----CATG
Snigros6567              ??????????????????????????????????????????????
Tspic4846                TCGGACC----AAGTGCAGG------GAG---------ATAG
Tspic6580                TCT--CTAACCAAAAACAAGAAG--ATAGTTGTCCC-CATTC
Ttria6383 b              TCC--CATTCGCAAATAAAGAAA---TAGTTACCA--AATTC
Ttria6555                TCC--CATTCGCAAACAAAGAAA---TAGTTACCA--AATTC
Zea                      AAT--CTGGCGCTCTCCTCTATC---TAATGAATA--CTTTA
Elionurusmuticus6954     TTTCGGG----TAAAG-AGA------AA-ATAAAC---CTTC
Icylindrical             AAA-CCCTCTTTTATTCCCTAACC-ATAGTTGTTAT-CCTTT
Sacharumofficinarum      AAA-CCCTCTTTTATTCCCTAACC-ATAGTTGTTAT-CCTTT
Sorghumhalepnese         AAA-CCCTCTTTTATTCGCTAACC-ATAGTTGTTAT-CCTTT
Ttriandra                AAA-CCCTCTTTTATTCCCTAACC-ATAGTTGTTAT-CCTTT
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Pschinzii                ??????????????????????????????????????????????

Aadscen6713              ????????????????????????????????????????????????????
Aameth6679               TGA-GTG-ATC-GAAAGAG-TAAG-AGGAGAAAG-TGTTTCCTCACGC-
Aameth6685               TAA-GTG-ATC-GAAAGAC-TAAG-AGGAGAAAG-TGTTTCCTCACGC-
Aappen6543               ????????????????????????????????????????????????????
Aappen6677               TAA-GTG-ATC-GAAAGCA-TAAG-ATGAGAA-AGTGTTTCCTCACGC-
Aappen6946               ACCCCGGT--G-CTCCTAAATATC----GGACC--ACGTTCAGGGAGAT
Adist6684                TAATGTG-ATC-GAAAGACGTAAG-ATGAGAAAG-TGTTTCCTCACGC-
Aeuco5869                TGGTGTGGAGC-GAAAGAA-TAAG-ATGAGAAGTGTGTTTCTTCGCGC-
Aschiren6581             TAG-GTGA-TC-GAAATGAGTAAGATGAGAAATG-AGTTTCCTCACGC-
Bbladh                   TAATGTA-ATCTNAAANAC-TAATCATGCCATCGGTCTTTCCTCCCCCC
Binsc5681                TAA-GTG-ATC-GAATCAG-TAAG-ATGAGATAG-TGTCTCCTCACGC-
Brachiaria               ????????????????????????????????????????????????????
Bserra5074               --CACTGT--G-CTCA-AAATATC----GGACC--ACGTTCAGGGAGAT
Bserra6654               ????????????????????????????????????????????????????
Bserra6954               A-CNCNGT--G-CTCATAAAAATC----AGACC--ACGTTCAGGGAGAT
Cdieter6642              TGA-GTG-ATC-GAAAGAG-TAAG-ATGAGAA-AGTGTTTCCTCACGC-
Cexc5877                 ????????????????????????????????????????????????????
Cexc6577                 TTT-GTG-ATC-TAAAGAG-TAAG-ATGAGTT-AGCGTTTTCTCACGC-
Cmarg4397                ????????????????????????????????????????????????????
Cplur6406                TGA-GTG-ATC-GAAA-ACGTAAG-ATGAGAAA-GAGTTTCCTCACCT-
Cprolix6682              TCA-GTG-ATC-GAAAGAG-TAAG-ATGAGAG-AGTGTTCCCTCACGC-
Dfilli5872               TATAAAATAAGGGATTGGTATGGA----TTG----GTATT-------AT
Hanam4807                TAAGGACAATAGGAGTTATTTTTC---GGGAAATATATATCCTAGGTCT
Hcon6942                 TAATGTG-ATC-GAAAGAA-TAAG-ATGAGAA-TGTGTTTCCTCGCGC-
Hdiss5145a               AAGGAAATAGGGGTTTGGGACAAA----ATAAC--GGATTGGT----AT
Sbicolour9319            TAA-GTA-ATC-GATAAAGTACTA-A-GAGAAA-GTGTTACCTCACGC-
Hemarthriaaltissima5698  TA--AGA-ATC-GATAGCG-TAAG-ATGAGAACG-TGTTTCCCCGCGC-
Hfilli5144               CAGTGTGT--GAGATAGAAATAAT----TACCA--AGTTTCAT---CTA
Hhirt6650                ????????????????????????????????????????????????????
Hhirt6656f               TGA-GTGGATC-GAAAGACGTAAGATGGAGAAAG-TGTTTCCTCAC-C-
Hlongi6560               ????????????????????????????????????????????????????
Hpilg4603                TA-AGTA-ATC-GAAAGAG-TAAG-ATGAGAAAG-TGTTTCCTCACGC-
Hpilg4738                CATGGGTTGGAGGATAAAAATTAA----GTACC--AAGTTTGT---CCT
Hquar5088                CGTAGGTGTTGGGAGAGAACTAAG----GGATA--GGTATCAT---CAT
Hrud6576                 TTA-GCG-ATCGAGGAGAG-TAAG-ATGAGAAAG-CGTTTCCTCACGC-
Htamb6585                TAA-GTT-ATCGAA-AGCG-TAAG-ATGAGATTG-CGTTCCCTCACGC-
Icylin5114a              TAA-GTG-ATC-GAATCAG-TAAG-ATGAGAAAG-TGTCTCCTCACGC-
Icylin6632a              NAA-GGNA--T-CAAANA-GNAAG-GG-AGNAAANAGTTTCCTCCC-C-
Mcape6655                TCA-TTG-ATC-GAAATAG-TAAG-AGGAGACCG-AGTTTCCTCACGC-
Pdilatum6617             AAAGCCCATTATAAATGGGCTTAA---GAGTCACTAGCTTTATCATTCT
Pfrank4705               ATAGGGGTTTGGGAGAAAA-TAAG----GGATT--GGTACCAT---CAA
Pschinz6652              ????????????????????????????????????????????????????
Sbic6588                 TAA-GGG-ATC-GAAAGATGTAAG-G-GAGAAA-GTGTTTCCTCACGC-
Shalep9318               GTGGGCGTT-GGGAAAGAAATAAC----AGGTT--TGTCTCAC---CT-
Snigros6567              ????????????????????????????????????????????????????
Tspic4846                CGGGGGGGGAGGGAGAAAA--TAG----GTACC--GGTATCGT---CAT
Tspic6580                TGA-GTAAATT-GAAGGA-GTAAC-AACAGCAGTCGGTGTCCACAAGC-
Ttria6383 b              TTG-GTGG-TC-GAAAGA-GTAAGT--GAGGATG-AGCAGTCTCACGC-
Ttria6555                TTG-GTGG-TC-GAAAGA-GTAAGT--GAGGATG-AGCAGTCTCACGC-
Zea                      TTG-ATTT-TT-TAGTCC-CTTTAA--TTGAAT--AG-------ATGC-
Elionurusmuticus6954     A-CNCNGT--G-CTCATAAAAATC----AGACC--ACGTTCAGGGAGAT
Icylindrical             TTT-TCT-TTT-ATCAAT-GGG--TTT----AAGA--TTC-A-CTAGC-
Sacharumofficinarum      TTT-TCT-TTT-ATCAAT-GGG--TTT----AAGA--TTC-A-CTAGC-
Sorghumhalepnese         TTT-----TTT-ATCAAT-GGG--TTT----AAGA--TTC-A-CTAGC-
Ttriandra                TTT-TCT-TTT-ATCAAT-GGG--TTT----AAGA--TTC-A-CTAGC-
Pschinzii                ????????????????????????????????????????????????????

Aadscen6713              ????????????????????????????????????????????????????
Aameth6679               -TGTTCG-TGAGTTACTCA-GAATAC-GATCA-GTAATTTAT-CTACTAA
Aameth6685               -TGTTCT-TGAGTTACTCA-GAATAC-GATAA-GTAGTTTAT-CTACTAA
Aappen6543               ????????????????????????????????????????????????????
Aappen6677               -TGTTCTATA-GTTCTCTA-GACTGC-GCTC--CGTAGTTTT-CTACTAA
Aappen6946               GGGGTGTGGGAGAAAATAAGGGATTGGTATCAACTTTCGGAA---AC-AA
Adist6684                -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTTCTAA
Aeuco5869                -TGTTCAGAATGATACTGA-GAATAC-GATCG-CCAAGGTAT-GTACGAA
Aschiren6581             -TGTTC-TGGAGTTACTTA-GAGTAC-GATAA-GTAATTTAT-CTGCTAA
Bbladh                   -TTCTCACGGCGTTACT-A-GAATCCCGATAACGTAATTTCTTCTTCTAA
Binsc5681                -TGTTCT-TGAGTTACCGA-GAATAC-GATGA-GTGAGTTAT-CTACGAA
Brachiaria               ????????????????????????????????????????????????????
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Bserra5074                GGGGTTGGGGAGAAAATAAGGGATTGGTATCACCAATAGGAA---ACGAA
Bserra6654                ??????????????????????????????????????????????????
Bserra6954                GGGGTTGGGGAGAAAATAAGGGATTGGTATCACCTATCGGAA---ACTAA
Cdieter6642               -TGTTCTTGA-GTTACTTA-GAATAC-GATCA-GTAATTTAT-CTACTAA
Cexc5877                  ??????????????????????????????????????????????????
Cexc6577                  -TGTTCTTGA-GTTTCTTA-GA-TAC-TATC--CTAAGTTTT-CTTCTAG
Cmarg4397                 ??????????????????????????????????????????????????
Cplur6406                 -GTT-CT-TGAGTTTCTGATGGATAC-GATAA-GTTGTTTAT-CTACTAA
Cprolix6682               -TGTTCTTGA-GTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTACTAA
Dfilli5872                ---CATCAATA-GGAA-AATAGTTACCCAAATTCTAAG-TAA---TCGAA
Hanam4807                 AGGGTTGGAAATAAGAAGA-TAATACCGAGTTTGCTCTCGGTGCT-CGAG
Hcon6942                  -TGTTCTATA-AACTTTAC-CACTGG-ACTC--CTGAGTTAT-CG-CTGA
Hdiss5145a                ---CATCAATA-GGAA-AATAGTTACCCAAATTCTAAG-TAA---TCCAA
Sbicolour9319             -CCT-CT-GCGGTTTTTTA-GAATAC-GACAA-CTAATTTAT-CTACTAG
Hemarthriaaltissima5698   -GGCTCT-GGGGTTACTTA-GAATAC-GATGA-GTAATTTAT-CTACTAA
Hfilli5144                TAGCTACAAAA-AAAATAATACTAACCCAAGTTCC-CT-AAG---CCTAA
Hhirt6650                 ??????????????????????????????????????????????????
Hhirt6656f                -TGTTCGTGACGTTGCTGA-AGATAC-GATAAAGTAAATTAT-CT-AGTA
Hlongi6560                ??????????????????????????????????????????????????
Hpilg4603                 -TTCTCT-TGAGTTACCTA-GAAT-------A-GGATCTTAT----ATAA
Hpilg4738                 AAGGTGATAGA-AAGAATA-AGATGCCAAAGTGTTAGCCTTG---GCTAG
Hquar5088                 TAGGAAAAAGAGAAGAACATAGTTTCCCAGATTCTACG-TAG---TCGAA
Hrud6576                  -TGTTCT-TGAGTTACTTA-GAATAC-GATAG-GTAATTTT--CTGCTAG
Htamb6585                 -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAATTTTT-CTACTAA
Icylin5114a               -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTACTAC
Icylin6632a               -TGNNCT-TCAGTTTCCTA-GAATCC-GATCA-GTTATTTAT-CTACTAA
Mcape6655                 -TGTCCT-TGCGTTACTTA-GAATACGA-TAG---TATTTTACCTAGTCA
Pdilatum6617              CTAT----GGAGCAAAGGA-GAGTGACGAGAACTCAATGTATCTTATGCT
Pfrank4705                TAGG--AAAAA-AAGAAAATAGTTACCCAAAGTCTAAG-TAA---TCGAA
Pschinz6652               ??????????????????????????????????????????????????
Sbic6588                  -CGTTCT-TGGGTTTCTTA-GAATAC-GATAA-GTAATTTAT-CTACTAG
Shalep9318                TCCAAAAAATA-AAAAAAATACCTACCCAAATTCTACT-TCT---TCGAA
Snigros6567               ??????????????????????????????????????????????????
Tspic4846                 AGGA--AAAAA-AAGAATATAGTTACCCAAATTCTAAG-TAG---TCGAG
Tspic6580                 -CGTTCC-CGAGTTTCTTC-GTATCC-CCTCA-GTCATATAA-TTTCNAA
Ttria6383 b               -AGTTC-TGA-GTTACTTA-GAGTAC-GATAA-GTAATTTAT-TTGAGCT
Ttria6555                 -AGTTC-TGA-GTTACTTA-GAGTAC-GATAA-GTAATTTAT-TTGAGCT
Zea                       -AAATA---CATTTACTAA-GAGATG-CACAA-GAAAGGG---TCAGGAT
Elionurusmuticus6954      GGGGTTGGGGAGAAAATAAGGGATTGGTATCACCTATCGGAA---ACTAA
Icylindrical              --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Sacharumofficinarum       --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Sorghumhalepnese          --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Ttriandra                 --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Pscinzi                   ??????????????????????????????????????????????????

Aadscen6713               ??????????????????????????????????????????????????
Aameth6679                AGTTAAACT--------AAAGAAAAAAAAATCAA-TAATCTCATCTCAT--
Aameth6685                AGATATTCT--------ACAGAAAAAAAATCTA-TAATCTCATCTCAT--
Aappen6543                ??????????????????????????????????????????????????
Aappen6677                AC--------------------AGACAAGACCA-TAGTCTCATA------
Aappen6946                GA--------------------AACAATAT-----AATCCCATCTCTTAG
Adist6684                 AGCTTATCT--------ACAGAAAAAAAATCTA-TAATCTCATCTCAT--
Aeuco5869                 GG--------------------AATCTAGCATA--AGGCTCATA------
Aschiren6581              AGCCAAGGTC-------TGGATGAAGAAATCTA-TAATCTCGTCTCAA--
Bbladh                    AA--------------------AACCAATT-----AATCTCAT-------
Binsc5681                 TGT----------------AATGATAAAGATTA-TAATCTCATCTCAA--
Brachiaria                ??????????????????????????????????????????????????
Bserra5074                GA--------------------AAAAATAT-----AATCTCATCACTTAG
Bserra6654                ??????????????????????????????????????????????????
Bserra6954                GA--------------------AACAATAT-----AATCCCATCACTTAG
Cdieter6642               AG--------------------ACAT-AATATA-TAGTCTCATA------
Cexc5877                  ??????????????????????????????????????????????????
Cexc6577                  AT--------------------ACCTTAATCTA-TAGTCTCAA-------
Cmarg4397                 ??????????????????????????????????????????????????
Cplur6406                 ACTAAGGCT--------CGAGAGAAGAAACTCA-CAATCTCGTCTCTG--
Cprolix6682               AG--------------------ACTT-AATCTA-TAGTCTCATA------
Dfilli5872                AG--------------------AGTAAGATG------AGAAAGTGTTTCC
Hanam4807                 GGTTACAGACGATACGATGTGTGCCTTAGCTTGCATAAAAAAACCTAGCA
Hcon6942                  AC--------------------AGGCGAGCACA--AGCTTCGTA------
Hdiss5145a                AG--------------------AGTAAAATG------AGAAAGTGTTTCC
Sbicolour9319             AGAGCTTATA----G-ACGAAAGAAAAAACAAA-TAATCTCGTGTCAA--
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Hemarthriaaltissima5698 AG--------------------AAGAAATAATC-TAACCACATAGC----
Hfilli5144              AT--------------------AAAAAAACCTA--GAATAAAGTAATTCC
Hhirt6650               ??????????????????????????????????????????????????
Hhirt6656f              AGCCTAGGCT-------CGAGAGAAGAAATCTA-GAATCTCGTCTCTA--
Hlongi6560              ??????????????????????????????????????????????????
Hpilg4603               AG--------------------AAAAAAT------AATCTCATAGCC---
Hpilg4738               AA--------------------TGAAGAAACCT--AGAATAGGGTAACTA
Hquar5088               AG--------------------AGTATGTTG------AGACAGGGTTTCC
Hrud6576                AGT-------------------GAAGAAATAAA-TAATCGCGTCTCA---
Htamb6585               AGT-------------------AAAAAAATAAA-TAATCTCGTCTCAT--
Icylin5114a             AGG----------------AATGATGAAGCCTA-TAATCTCATCTCAT--
Icylin6632a             ATAAA---------GCATGAAGGAAAAAACCTA-CTATATAGTCTCAT--
Mcape6655               ACCTAAGATC--------TAGTGAAGAAATCCA-GAATCTCATCTCCT--
Pdilatum6617            AC-------------------ACACGGAAT------AGATGGTATTTT--
Pfrank4705              AG--------------------AGTAAGA------AGAGAAAGGGTATCC
Pschinz6652             ??????????????????????????????????????????????????
Sbic6588                AGAGCCTATA----G-AGGAAAGAAAAAATCAA-TAATCTCGTGTCTT--
Shalep9318              AG--------------------AGCCAGATGAG--CAATAAATCGTTTCC
Snigros6567             ??????????????????????????????????????????????????
Tspic4846               AG--------------------AGTAAAATCCG--AGAGTAAGGGAAGCC
Tspic6580               AGGAATTATCCACGGCTTTAATAAAAAAATCAAGCAATCTCATCTCAA--
Ttria6383 b             ACTCAAGGCC-------CGATTGAGGAAACCTA-GAATCTCGTCTCTA--
Ttria6555               ACTCAAGGCC-------CGATTGAGGAAACCTA-GAATCTCGTCTCGA--
Zea                     ACTCATGGTA-------GAGCAGAGGAC-TGAA-AATCCTCGTGTCAC--
Elionurusmuticus6954    GA--------------------AACAATAT-----AATCCCATCACTTAG
Icylindrical            A-TGAATCTTATGCTATTCATTAAATA-----GATGATTTCTTTTTTA--
Sacharumofficinarum     A-TGAATCTTATGCTATTCATTAAATA-----GATGATTTCTTTTTTA--
Sorghumhalepnese        A-TGAATCTTATGCTATTCATTAAATA-----GATGATTTCTTTTTTA--
Ttriandra               A-TGAATCTTATGCTATTCATTAAATAAAATAGATGATTTCTTTTTTA--
Pschinzii               ??????????????????????????????????????????????????

Aadscen6713             ??????????????????????????????????????????????????
Aameth6679              AGCCTTTCCTTAGAG-CTACTAATTC-ATCCATTAAAATTCATAA
Aameth6685              AGCCTTTCCTTAGAG-CTACTAATTC-ATCTATTAAAATTCATAA
Aappen6543              ??????????????????????????????????????????????????
Aappen6677              -GCCTTTCCTTAAGCTCTAACAATTT-AGCTCTTTACCGTCATAA
Aappen6946              CCGTTCCTTAGAGATAATAATTAAGC-TAATAAAATTCATAATAC
Adist6684               AGCCTTTCCTTAGAG-CTAATAATTC-ATCCAAAAAAATTCATAA
Aeuco5869               --TCTTTCCTTAGAG-CTAACATTTC-CGCTCATTAGGGTCATAA
Aschiren6581            AGCCTTTCCGTAGAG-CTACTAATCC-GGCTATTAACATTCATAA
Bbladh                  ---CTTTATGTAGAC-CTGTAAATCA-ATTTATTANTCTTCATAA
Binsc5681               AGCCTTTCCGTAGAG-CTAATTATCA-GACTATTAACATTCATAA
Brachiaria              ??????????????????????????????????????????????????
Bserra5074              CCGTTCCTTAGAGATACTAATTAAGC-TACTAAAACTCATAATAA
Bserra6654              ??????????????????????????????????????????????????
Bserra6954              CCGTTCCTTAGAAATAATAATTAAGC-TACTAAAATTCATAATAA
Cdieter6642             -GCCTTTCCTTAGAG-CTAATAATTA-AGCTATTAACATTCATAA
Cexc5877                ??????????????????????????????????????????????????
Cexc6577                -GCTTTACCTTAGACTCTACTAATTT-ATCTATTTACATTCATAA
Cmarg4397               ??????????????????????????????????????????????????
Cplur6406               AGTCTTCCCTTAGAG-CTACTTATCC-GTCTATTAGCATTCATAA
Cprolix6682             -GCCTTTCCGTAGAG-CTACTAATCC-AGCTATTAACATTCATAA
Dfilli5872              TTACGCTGCTTTTGAGTTACTTAGAA-TACGATAAGTAAT-TTAT
Hanam4807               CGGCGCAAGTACGTTCCTAGTACAACAGTCTTTCCGTTCTCGGAT
Hcon6942                -GTCTTCCCTGAAAC-CTCACAAATC-TGCTCTAATCCGTGATAA
Hdiss5145a              TCACCCTTCTCTTGAGTTTCTTAAAA-TACGATAAGTAAT-TTAT
Sbicolour9319           AGTCGTTCCTTAGAG-CTACTAATTA-AGCCAATAAAATTCATAA
Hemarthriaaltissima5698 ---CGTTCCTAAGAT-CTAATAATTAAGCTCATAATTCATAATAA
Hfilli5144              TCTAACTTCTCTAATATCACTTAC-A-TTCATTAGGGATAATTAT
Hhirt6650               ??????????????????????????????????????????????????
Hhirt6656f              AGCCTTCCCGTATAG-CTACTTATCC-GTCCATTAAGATTCATAA
Hlongi6560              ??????????????????????????????????????????????????
Hpilg4603               ---CTTTCTTAGGGT-CAATAAGTGAGATAAAATAGTCATAATAA
Hpilg4738               TGTTTACTCGTATAATATCATATCCG-TTCATTAGGCATA-ATCT
Hquar5088               TCACACTGCTCTCGTGTTGCTTAGAA-ATCGATACGTTAT-TTGC
Hrud6576                AGCCTTTTCGTAGAG-CAACTTATTT-GTTTATTAGCATTCATAA
Htamb6585               AGCCTTTTCTTAGAG-CTACT-ATTA-ATCTATTAACCTTCATAA
Icylin5114a             AGCCTTCCCTTAGAG-CTACTTATTC-ATCCATTAAGATTCATAA
Icylin6632a             AGCCGTCCCTTAGAG-CTACTTATCA-ATCTATAAACATTCATAA
Mcape6655               AGCCGTTTCTTAGAG-CTACTCATTA-GTCTATAAGGTTTCATAA
Pdilatum6617            ----TTTGGATAGAGACGCGT--TTA-GGC---AAGGGATCATGA
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Pfrank4705              TCACGCCGCGCATGAGATACTTAGCA-TACGATAAGTAAT-ATAT
Pschinz6652             ??????????????????????????????????????????????
Sbic6588                AGCCGTTCCTTAGAG-CTACTAATTA-AGCCAATAAGATTCATAA
Shalep9318              TCACGCTGCTCTTTTTTTCCTTAGTA-TACGATAAGCATT-TTAT
Snigros6567             ??????????????????????????????????????????????
Tspic4846               TCTCGCCGCGCATGAGTTCCTAACCG-TTCAATAGGTATT-TTAT
Tspic6580               AGCCGTCCCTTATAC-CTACTTATCC-ATCTATTAACATTCATAA
Ttria6383 b             AGCCTTCCCGTAGAG-CTACTTATCC-GTTCATTAGGGATCATAA
Ttria6555               AGCCTTCCCGTAGAG-CTACTTATCC-GTTCATTAGGGATCATAA
Zea                     CAGTTCAAA-TCTGG-TTCCTCAGA-----AAAAAAGGATCATAC
Elionurusmuticus6954    CCGTTCCTTAGAAATAATAATTAAGC-TACTAAAATTCATAATAA
Icylindrical            TTTCTTTTTTTTTTTTTATTT-ATTAGAGT--ATCGGCAA--GGAA
Sacharumofficinarum     TTTCTTTTTTTTATTTATTAGAGTAGAGT--ATCGGCAA--GGAA
Sorghumhalepnese        TCTCTTTTTTTTATTTATTAGAGTACAGT--ATCGGCAA--GGAA
Ttriandra               TTTCTTTTTTT---T-ATTAGAGTAGAGT--ATCGGAAA--GGAA
Pschinzii               ??????????????????????????????????????????????

Aadscen6713             ??????????????????????????????????????????????
Aameth6679              TAAATCAT-GCATGAGGT---GTTCCGTATCCTGAAGGGGAGGC
Aameth6685              TAATTCATTGCAAACGGT---GTTCCGTATCCTGAAGGGGAGGC
Aappen6543              ??????????????????????????????????????????????
Aappen6677              TAACAT-ATCTAGTCGGT---GTTGCATACTCTGAGGAGAAGCT
Aappen6946              TTCATTC-GGTAGGTGTT------ACGTATCCTGATGC-GAGGG
Adist6684               TACATCAT-GCGTACGGT---GTTACGTATCCTGAGGGGGAGGC
Aeuco5869               TTACTTTACCCTATCGGT---GTTTCATACACTGAGGACGAGCC
Aschiren6581            TTATTCAT-GCAATAGGT---GTTTCGTATCCTGAGGGGGAGCG
Bbladh                  CACTTTACTTCCATGGGT---TTTCCGTCCTGGGCTAATACCTA
Binsc5681               TTAATCAT-TCAATAGGT---GTTTCGTATACTGAGGGGGAGGG
Brachiaria              ??????????????????????????????????????????????
Bserra5074              TTCATGC-GGTAGGTGTT------ACCTATCCTGATGC-GAGGG
Bserra6654              ??????????????????????????????????????????????
Bserra6954              CTCATTC-GGTAGGTGTT------ACCTATCCTGATGC-GAGGA
Cdieter6642             TAATTC-AGGCGGTAGGT---GTTTCGTATCCTGAGGGGGATGG
Cexc5877                ??????????????????????????????????????????????
Cexc6577                TTAATGCAACCTATC-GT---GTTTCATTTACTCAAGCCCATCC
Cmarg4397               ??????????????????????????????????????????????
Cplur6406               TTAAAGTAACCAGTCGTT---GTTTCGTATACTCAAGCCGAGGG
Cprolix6682             TTATTC-ATGCAGTAGGT---GTTTCGTATACTGAGGCGGACGG
Dfilli5872              CTACTA-AAGAAAAAA-------TAACTATCCTGATGGGGACGG
Hanam4807               AATATTCACTCAGTAAGT---GTCATGTCCAGTAAGGG-GAAGG
Hcon6942                TAACAA-ACGGGGTGCGT---GTTGCGTACTCTTAGGCTGATCC
Hdiss5145a              CTACTA-AAAAAAAAA-----GAAAACTATCCTTATGGGGGGAG
Sbicolour9319           T-AATTCACTCAATTGTT---GTTTCCTATCCTGAGGCGGAGCA
Hemarthriaaltissima5698 CTCATTCTGTTGAGTTGACG-CATCGTGAACGTGGGGGTACAGG
Hfilli5144              TCACTC-AGTAACGTGTT------ACGTATACCAATAG-GACTG
Hhirt6650               ??????????????????????????????????????????????
Hhirt6656f              TTCTTTCT-GCGGGAGTT---GGTTCGTGTCCTCAGGCGGAGGG
Hlongi6560              ??????????????????????????????????????????????
Hpilg4603               TTCTTTCGGTACATGTGTAGGTATCTTGATGGGGGGGTTAAAAG
Hpilg4738               TTCATTC-AGTAAGTGTT------AGGTATAGTAATAG-GACGG
Hquar5088               CTACTA-TAGAAA----------TAAGTACTCTCATCG---CCG
Hrud6576                TTAATTAG-GCCATCGTT---GGTTCGTTTACTCAAGCGGAGGG
Htamb6585               TTCTTTAA-TCAATCGTT---GTTTCGTATCCTCAAGCGGAGCG
Icylin5114a             TTCATCAA-TCAATAGGT---GTTTCGTATCCTAAGGCGGAGGG
Icylin6632a             T-TATTCAATCTATCGTT---GTTTCGTATACTCAAGCCGAGCG
Mcape6655               T-AATTTAAGCAGTAGTT---GTTTGGTATCCTCAAGCGGAG-C
Pdilatum6617            TTAAGATAGGAAA--------GTAATGTATAATAAAGA-GAGAG
Pfrank4705              CTACTAC-AGAAAATGTT------AACTATCCTAATGA-GGCGG
Pschinz6652             ??????????????????????????????????????????????
Sbic6588                T-ACTTCATTCGGTAGGT---GTTTCGTATCCTGATGGGGAGGG
Shalep9318              CTGCTA-AAGGAAGCTT------AATCCATCCGAGTGA-AACCG
Snigros6567             ??????????????????????????????????????????????
Tspic4846               CTCCTAC-AGTAAGAGTT------AGCTATCCTGATAG-GACGG
Tspic6580               T-TAATTCACC-ATCGTT---GGTTCGTATCCTCAAGCGGAGCG
Ttria6383 b             TTCATTCA-GCAATTGTT---GTTTCGTGTCCTCAGGCGGAGGG
Ttria6555               TTCATTCA-GCAATTGTT---GTTTCGTGTCCTCAGGCGGAGGG
Zea                     TGAATAGA-TCAATTGAT---TACAAATATTTTGAGATGGAGGG
Elionurusmuticus6954    CTCATTC-GGTAGGTGTT------ACCTATCCTGATGC-GAGGA
Icylindrical            T--CTCGATTATTAATTCGATTTTAAGTATTATTAA-GTAAGCC
Sacharumofficinarum     T--CTCGATTATTAATTCGATTTTAAGTATTATTAA-GTAAGCC
Sorghumhalepnese        T--CTCGATTATTAATTCGATTTTAAGTATTATTAA-GTAAGCC
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Ttriandra               T--CTCGATTATTAATTCTATTTTAAGTATTATTAA-GTAAGCC
Pschinzii               ??????????????????????????????????????????

Aadscen6713             ????????????????????????????????????????????????
Aameth6679              -GTAAAAG-A-TTAAA--ACTTACCTTATGA--AT-AACTAAACAA--TC
Aameth6685              -GTAAAAG-A-TTACA--TCTTACCTTATCA-CAT-TACTAAACAA--TC
Aappen6543              ????????????????????????????????????????????????
Aappen6677              -GTAAAA--ATATAAC---CTTATCTTATGC-CAT-ACCTCAACA--AGG
Aappen6946              -GTAAAGG-ATTAAAA--CTTTTCTTACCGA-AAT-AACTAAAA--AATC
Adist6684               -GTAAAGG-AATTAAA--ACTTACCTTATGA-AAT-AAATAAACAA--TC
Aeuco5869               -GTAAAG-CATCTTAA---CTTATCTTGTGA-AAT-TCCTAATCA--GGC
Aschiren6581            -GTAAACA-ATTAAAA---CTTATCTTACGA-ACT-AACTAAACAA--TC
Bbladh                  -CTCAATT-ATTCATC---TT---CTTTCCCTTTT-ACCTAAACAA--T-
Binsc5681               -GGAAAGG-ATTAAAA---CTCACCTTATGA-AAT-AACTAAAAAA--GC
Brachiaria              ????????????????????????????????????????????????
Bserra5074              -GTATAGG-AGTAAAA--CTTATCTTAC-GA-AAT-AACTAAAA--AATC
Bserra6654              ????????????????????????????????????????????????
Bserra6954              -GTATAGG-ATTAAAA--CTTTTCTTAC-GA-AAT-AACTAAAA--AATC
Cdieter6642             -GTAAAG-GATTAAAA---CTTACCTTACGA-AAT-AACTAAACA--ATC
Cexc5877                ????????????????????????????????????????????????
Cexc6577                -TTAAACCAATTCAAA---CTCATCTTACGC-AATTAACTAAACAT-AGC
Cmarg4397               ????????????????????????????????????????????????
Cplur6406               -GTAAACA-ATTAAAA---CTTATCTTACGC-AAT-AACTCAAAATAGCA
Cprolix6682             -GGAAAC-AATTAAAA---CTCACCTTACGA-AAT-AACTAAACA--ATC
Dfilli5872              -GTAAATG-GTTTAAA--CCTTA-----TGA-AAT-AACTAAAA--AATT
Hanam4807               --TAAAGG-ATTCAGG---CTTAACTCTTATGTAT-AAATAAAAA--ATC
Hcon6942                -TTACTC-TATCTCGC---CTTATCTTCCGA-ATT-GTCTAAACA--AGG
Hdiss5145a              GGTAAAGG-GTTTAAA--CCTTACCTTATGA-AAT-AACTAAAAT-AATC
Sbicolour9319           -GTATACG-ATTAAAA---CTTATCTTATGA-AAT-AACTAAACA--ATC
Hemarthriaaltissima5698 -TTTAAAA-CTTACGCGTTAAATTTCTAACG-TAT-AAATAAAAAA--TC
Hfilli5144              --TATAAG-ATTCAGA--CCTTACCCTTATA-AAT-AAATAAAA--AATC
Hhirt6650               ????????????????????????????????????????????????
Hhirt6656f              -GTAAACA-ATTAAAA---CTTATCTTATGA-AAT-AACTAATCAG--TC
Hlongi6560              ????????????????????????????????????????????????
Hpilg4603               -GTTAAAT-CTTAAAC-TTTATGAAATAAAT---T-AACTAAAAAA--TC
Hpilg4738               --TGTATG-CTTCAGG--CCATACCTTTAGG-AAT-AACTAAAA--AATC
Hquar5088               -----TTC-CTTAGAG--CCTTT----TATT-AAT-G-CTAAAA--CTTC
Hrud6576                -GGAAACA-ATTAAAA---CTTATCTTACGA-AGT-AACTAAACAT-AGC
Htamb6585               -GTACAGA-ATTCAAA---CTTATCTTATGA-AAT-AACTAACAAT--GC
Icylin5114a             -GTAAACA-ATTAAAA---CTTACCTTATGA-AAT-AACTAATCAA--GC
Icylin6632a             -GTAAACA-ATTCAAC---CTCATCTTACGA-AAT-AACTAAACA--ATC
Mcape6655               -TTATACA-ATTCAAA---CTCATCTTAACGCTAT-CACTACACAA--GC
Pdilatum6617            -TTATTCAAAGTATAG-TCATTCCCTTAC----ATTTCCTAAGTTCGAAT
Pfrank4705              --GTAAAG-GTTCAAA--TCTTACCTT-AGA-AAT-AACTAAAA--AATC
Pschinz6652             ????????????????????????????????????????????????
Sbic6588                -GTAAAGG-ATTAAAA---CTTACCTTATGA-AAT-AACTAAACA--ATC
Shalep9318              ---ATACA-GTTCAAA--CCCTACCTTTAGA-AAT-AACTAAAA--AATC
Snigros6567             ????????????????????????????????????????????????
Tspic4846               --TGTAAG-GTTCACG--TCTTACCTTTTGG-AAT-AATTAAAA--AATC
Tspic6580               -GGAAACA-ATTAAAA---CTCATCTTACGA-AAT-AACTAAACA--ATC
Ttria6383 b             -GTAAACA-AGTAAAC---CTCATCTTATGA-AAT-AACTAATCAG--TC
Ttria6555               -GTAAACA-AGTAAAC---CTCATCTTATGA-AAT-AACTAATCAG--TC
Zea                     -GTAAATA-TTTAAAA---ATCTACTTAGTC-TTT-AGTCTAGAGT--AA
Elionurusmuticus6954    -GTATAGG-ATTAAAA--CTTTTCTTAC-GA-AAT-AACTAAAA--AATC
Icylindrical            -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTGGAAT
Sacharumofficinarum     -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTTGAAT
Sorghumhalepnese        -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTTGAAT
Ttriandra               -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTGGAAT
Pschinzii               ????????????????????????????????????????????????

Aadscen6713             ????????????????????????????????????????????????
Aameth6679              AGGGA-AATTAACTG-TAT--CTTCGTTACCG-AGATGATT-CTACTA-C
Aameth6685              AGGGA-AATTAGCTC-TAT--CTTCGTTCACC-AATGGACA-CTATTA-C
Aappen6543              ????????????????????????????????????????????????
Aappen6677              AGCGGGCAGTAGCTTATAT--CTTTGTCC-AC-CGCGG-ACACGTCTA-T
Aappen6946              AGGGA-AATT-GACTGTAT--GTTCGTTT-ACGAAAGGATACCTACTG-C
Adist6684               AGGGA-AATTAACTG-TAT--CTTCGTTCACCGAGATGATA-CTACTA-C
Aeuco5869               AGGGA-AACTGTCT-GTAT--CTTCGTTC-ATGAGATG-ATTCTACTA-C
Aschiren6581            AGGGA-AACTAACT-GTAT--CTTCGTTTAC-CAGATGATA-CTACTA-C
Bbladh                  AGAGG-AGGTAATTA-TAT--CTTTATACTTGT--ATGATT-CTATTA-T
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Binsc5681                AGGGA-GATTGACTG-TAT--CTTCGTTCAAG-AGATGATA-CTACTA-C
Brachiaria               ??????????????????????????????????????????????????
Bserra5074               AGGGA-AATT-TACTGTAT--GTTCGTTT-CCGAGATGACAACTACTA-C
Bserra6654               ??????????????????????????????????????????????????
Bserra6954               AGGGA-AACT-GACTGTAT--GTACGTTT-ATGAGATGATC-CTACTA-C
Cdieter6642              AGGGAG-ATTAACT-GTAT--CTACGTTTACCGAGATGGATACTACTA-C
Cexc5877                 ??????????????????????????????????????????????????
Cexc6577                 ACTTGAAATTATCT-CTATT-CTTCGTTC-ACCAAATG-ATCCTACTA-C
Cmarg4397                ??????????????????????????????????????????????????
Cplur6406                CGGGG-CCTTGG-GCGCATATCTTCTTAG-ACCAATGGACA-CTTTTA-C
Cprolix6682              AGGGAGGATTGACT-GTAT--CTACGTTT-CCGAGATG-ATACTACTA-C
Dfilli5872               AGGGA-TGTTTAACGGTCT--CTTCGTCT-ACGATTGGCAC-CTTTTGCG
Hanam4807                AGGGA-AATTAACT-GTAT--CTACGTTC-ATGAGATGATA-CTACTA-C
Hcon6942                 AGCGA-CTGTCGCT-ATA---CCTTGTCT-TCGCGCGG-ATTCNTCTN-N
Hdiss5145a               ACCCA-AATTTCACGGTCT--TTATTCCC-ACCGTTTGCCA-CTTTTGTA
Sbicolour9319            AGGGA-AATTGGACTGTAT--CTTCGTT--ACCAAAGGATA-CTACTA-C
Hemarthriaaltissima5698  AGGGA-AATTAAACTGTAT--CTCTGTATCACGAGAGGACAACTACTT-C
Hfilli5144               AGCGA-AATTGACCTAT----CTTTTCCC-ACCATGTGCCA-CTTTTGTC
Hhirt6650                ??????????????????????????????????????????????????
Hhirt6656f               AGGGA-AACTGTCT-CTAT--CTTCGTTCACCGAGATGATC-CTACTA-C
Hlongi6560               ??????????????????????????????????????????????????
Hpilg4603                AGGGA-AATTAACGGGTAT--CTAGGTTTATGA-GAGGACA-CTTTTA-C
Hpilg4738                CGGGA-AATT-AACTGTAT--CTACGTTC-ATGAGATGATC-CTACTG-C
Hquar5088                AGGGA-AATT-AACTGTAT--CTACGTTT-ATGAGATGATC-CTACTA-C
Hrud6576                 AGGGA-AACTGTCTG-TAT--CTTCGTTCA-CCAAATGATA-CTACTA-C
Htamb6585                ATGGA-AACTAACTG-TAT--CTTCGTTAC-CGATATGATA-CTCTTA-C
Icylin5114a              AGGGA-AATTAACGC-TAT--CTTCGTCCACG-ATAGGACA-CTACTG-C
Icylin6632a              AGGGA-AATTGA-CTGTAT--CTTCGTTC--CCAAATGATAACTACTA-C
Mcape6655                AGTTG-GACCTGCC-CTAT--CTTCGTTCATC-TATTGTCC-CTACTA-C
Pdilatum6617             AGAGA--ATGCATATTTATTTTTTAGTCCCTTTAATTGACA--TAGAAGC
Pfrank4705               AGGGA-AATT-AGCGGTAT--CTACGTTC-ATGAGAGGACC-CTACTG-C
Pschinz6652              ??????????????????????????????????????????????????
Sbic6588                 AGGGA-AATTAG-CTGTAT--CTACGTTT-ATGAGAGGATT-CTACTA-C
Shalep9318               AGGCA-AATGTAACTATATT-CTTTGCCC-ATAAAGAGGAC-CCTACTAC
Snigros6567              ??????????????????????????????????????????????????
Tspic4846                AGGGA-AATT-AACGGTTT--CTTCGTTC-ATGAGATGATC-CTACTG-C
Tspic6580                AGGGA-AATTGA-CTCTAT--CTTCGTTC-ACCAGATGATC-CTACTA-C
Ttria6383 b              AGGGA-A-CTGTCT-GTAT--CTTCGTTCAT-GAGATGATC-CTACTA-C
Ttria6555                AGGGA-A-CTGTCT-GTAT--CTTCGTTCAT-GAGATGATC-CTACTA-C
Zea                      GTAGA-AAATCTCT-AGAG-TAAGGATAAATC----TCTAC-ACACTT-C
Elionurusmuticus6954     AGGGA-AACT-GACTGTAT--GTACGTTT-ATGAGATGATC-CTACTA-C
Icylindrical             -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Sacharumofficinarum      -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Sorghumhalepnese         -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Ttriandra                -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Pschinzii                ??????????????????????????????????????????????????

Aadscen6713              ?????????????
Aameth6679               GCGTCCTTTTCCA
Aameth6685               GCGACCTTTGTCA
Aappen6543               ?????????????
Aappen6677               GTGTCCTTTTTCA
Aappen6946               GTGTTCTTTGCCA
Adist6684                GTGTCCTTTGCCA
Aeuco5869                GTGTTCTTTCCCA
Aschiren6581             GTGTTCTTTCCCA
Bbladh                   ATGATCTTTGTCA
Binsc5681                GCGTTCTTTGTCA
Brachiaria               ?????????????
Bserra5074               GCGTTCTTTGCCA
Bserra6654               ?????????????
Bserra6954               GTGTTCTTTGCCC
Cdieter6642              GCGTTCTTTCCCA
Cexc5877                 ?????????????
Cexc6577                 GCGTTCTTTCCCA
Cmarg4397                ?????????????
Cplur6406                CGGACCTTGGTCA
Cprolix6682              G-GTTCTTTCCCA
Dfilli5872               GCG-CCTTGGTCA
Hanam4807                GTGTCCTTGCCCA
Hcon6942                 GTGTTCTTTCCCC
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Hdiss5145a              GCA-CCTTTGTCA
Sbicolour9319           GTGTTCTTTCTCA
Hemarthriaaltissima5698 GTGACTTTTGTCA
Hfilli5144              GTAACCTATGTCC
Hhirt6650               ?????????????
Hhirt6656f              GTGTTCTTTGCCA
Hlongi6560              ?????????????
Hpilg4603               GCGTTCTTTGCCN
Hpilg4738               GTGTTCTTTGCCA
Hquar5088               GTGTTCTTTCCCA
Hrud6576                GTGTCCTTTGTCA
Htamb6585               GTGTTCTTTGTCA
Icylin5114a             GCGTCCTTTGCCA
Icylin6632a             GCGACCTTTGTCA
Mcape6655               G-GTTCTTTCCCC
Pdilatum6617            AGTACTCTACTAA
Pfrank4705              GTGTCCTTGGCCA
Pschinz6652             ?????????????
Sbic6588                GTGTTCTTTCCCA
Shalep9318              GGGTCCTTTCTCC
Snigros6567             ?????????????
Tspic4846               GTGTCCTTGGCCA
Tspic6580               GGGACCTTTTTCA
Ttria6383 b             GTGTTCTTTCCCA
Ttria6555               GTGTTCTTTGCCA
Zea                     TTTTTCTTTTAAA
Elionurusmuticus6954    GTGTTCTTTGCCC
Icylindrical            AAATACTTTCTAA
Sacharumofficinarum     AAATACTTTCTAA
Sorghumhalepnese        AAATACTTTCTAA
Ttriandra               AAATACTTTCTAA
P.schinzii              ?????????????
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Appendix E: CLUSTAL W (1.74) multiple sequence alignment data of the Andropogoneae specimens for *ITS1* region.

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Aameth6685                      TCGTGACC-GCGTCGATGACCG-T--AACAAAGT-TTCCCTCAGTT--G
Aameth6679                      TCGTGACCCGCGTGAAAATATG-AC-AACAAAGGCTTCCCTCAGTT--G
Dfili5874                       TCGTGACCCG-TGAAAAAAACG-CA-AACAAGAGCTTCCCTCAGTT--C
Ttria6555                       TCGTGACC-GT-GAAGGTAACG-CC-AACAAGAGTTTCCCTCAGTT--G
Ttria6525                       TCGTGACC-CAG-GAAGGAATT-CG-TAACAAAGCTTCCCTCAGTT--G
Tspic5205                       TCGTGACA------ATAAACGA-AT-AACAAACGTTTCCCTCTCTT--C
Tspic6579                       TCGTGACA--CGG-AGGAATTC-GT-AACAAA-GTTTCCCTCAGTT--G
Tspic6580                       TCG--ACG----AAAGGTTATC-GT-AACAAA-GTTTCCCTCAGTT--G
Tspic5873                       TCGTGACC--CGGAGGAAATTC-GT-AACAAA-GCTTCCCTCTGTT--G
Adist6684                       TCGTGACA---CGAAAGAAA-C-GT-AACAAACGCTTCCCTCAGTT--C
Mcape6584                       TCGTGAG----CGATCGTAC-C-GT-AACAAA-GCTTCCCTCNGTT--C
Aappen6543                      TCGTGAC-----GAAGGAATTC-GT-AACAAA-GTTTCCCTCAGTT--N
Mcape6655                       TCGTGAGG---CGAAGGATT-C-GT-AACAAG-GTTTCCCTCAGTT--G
Aappen6946                      TCGTGACC-----GAGGAATTC-GT-AACAAA-GTTTCCCTCAGTG--C
Sbic6589                        TCGTGACC--CAGGAGGAATTC-GT-AACACA-GTTTCCCTCAGTT--C
Cplur6406                       TCGTGACC--ATGTAGATATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Icylin6632                      TCGTGACC--G-GAAGA-ATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Hpilg4738                       TCCTGACC--CGGAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Icylin5090                      TCGTGAGC--CGGAAGG-ATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Emuti6715                       TCGTGAGC-----GAGGAATTC-GT-AACAAA-GCTTCCCTCAGT---G
Emuti6559                       TCGTGAGG-----GAGGAATTC-GT-AACAAA-GCTTCCCTCCGT---G
Emuti5074                       TCGTGAAC----GGAGGAATTC-GT-AACAAA-GTTTCCCTCAGT---G
Emuti6539                       TCGTGAACA--CGGAGGAATTG-CT-AACAAA-GTTTCCCTCAGT---G
Pfrank4705                      TCGTGAC------GAGGAATTC-GT-AACAAA-GTTTCCCTCAGTT--G
Icylin5114                      TCGTGACCT---GAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Aeuco5869                       TCGTGACCCA--GAAA-AATCC-GT-AACAAG-GCTTCCCTCATGCATG
Dfili5872                       TCGTGACGGA--GGA---ATTC-GT-AACAAG--CTTCCCTCAGTT--G
Aeuco6587                       TCGTGACCCTT-GGAAGGATTC-GT-AACAAA-GCTTCCCTCACT---G
Bradi4784                       TCGTGAACCT--GAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Binsc5681                       TCGTGAGC----GGAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT---
Tspic4846                       TCGTGAT-----GGAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Cprolix6682                     TCGTGACCGG--TTAAACCG---GT-AACAAA-GCTTCCCTCCCTT--G
Csp5800                         TCATGACCCG----CGGGAATT-GT-AACAA--GCTTCCCTCAGTT---
Cprolix5101                     TCGTGACCCG----AGGAAATC-GT-AACAAA-GCTTCCCTCACTT--G
Cdieter6642                     TCGTGACCCCG--ACGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Cmarg4397                       TCGTGACAATTCGAAGGAATCG-GT-AACAAGAGCTTCCCTCAGTTC--
Hpilg4603                       TCGTGAGCGG----AGGAATTC-GT-AACAAA-GTTTCCCTCCGTT--G
Htamb6585                       TCGTGACC---CGGAGGAAATCCGT-AACAAAG-CTTCCCTCTGAT--G
Hdiss5145                       TCGGTACT---TGGAGGAATTC-GT-AACAAAG-CTTCCCTCTGAT--G
Htamb6537                       TCG--------NGAAAGAAATTCGT-AACAAAG-CTTCCCTCTGTT--G
Hanam4807                       TCGTGAGC---CGGAGGAATTC-GT-AACAAAG-TTTCCCTCTCAT--G
Hfilli5144                      TCGTGATAG--CGGAGGAATTC-GT-AACAAAG-CTTCCTCCTCAT--G
Hanam4841                       TCGTGACC----CGAGGAAATC-GT-AACAAAG-CTTCCCTCTCAT--G
Hhirt6656                       TCGTGACG----AGGAAAATTC-GT-AACAAAG-CTTCCCTCAGTT--G
Hhirt6618                       TCGTGACC---CGGAGGAATTC-GT-AACAAANGCTTCCCTCAGTT--G
Shalep9318                      TCGTGACA---CGAAGGAAATC-GT-AACAAAG-CTTCCCTACGTT--C
Hcon4741                        TCGTGACCC--TGAAAGAAATC-GA-AACAAA-GCTTCCCTCTGTT--G
Evill5085                       TCGTGACCC--TGAAACAAATC-GT-AACAAA-GCTTCCCTCTTTG--T
Bbladh5173                      TCGTGACCC--TGAAGGAAATCAG--ACCGAAAGCTTCCCTCTAAT--G
Hquar5088                       TCGTACCC---TGGAAGAAAACAGA-AACAAA-GCGTCCCTCTCAT--G
Sbic6588                        TCGTGACC---TTAAACAAAACAGACCGTGAACATGTCTCTCATGT---
Sbicolour9319                   TCGTGACCC--TTAAACAAAACAGACCGTGAACATGTCTCTCATGT---
Hrud6576                        TCGTGACCC--TTAAACAAAACAGACCGCGAACGCGTCTCTCATGT---
Andropogondistachyos            TCGTGACCC--TTAAACAAAACAGACCGTGAACGCGTCCCTCATGT---
Cleistachnesorghoides           TCGTGACCC--TTAAACAAAACAGACCGCGAACGCGTCTCTCGTG----
CoixBuckler                     TCGTGACCC--TTAAACAGAGCAGACCGCGAACCCGTCTCTCGTG----
Arundinellanepalensis           TCGTGACCC-TTAAAACAAAACAGACCGCGAACATGTTTCCCATGT---
Pennisetumsetaceum              TCGTGACCC--TTAAACAAAACAGACCGTGAACATGTCATCCATG---C
Panicumbisulcatum               TCGTGACCC--TTAACCAAAACAGACCGTGAACATGTCATCCATG---C
Danthoniacalifornica            TCGTGACCC--GAAACCAAAACCGACCGAGAACGCGTCACCCTGT---C
PentaschistisaristifoliaSpies6  TCGTGACC---GAAACCAATGCAGACCGTGAACAAGTCACATTGT---C
Eragrostisdielsii               TCGTGACCC--TGA-CCAAAATAGACCGCGAACATGTCATCCATG---C
Aristidaharvardii               TCGTGACCC--TGA-CCAAAACAGACCGCGAACGTGTCACCGTG----C
Zeadiplo                        CTGTGACCC--TTAAACGAAACAGACCGCGAACGAGTCACCCGTG---C
ZmaysGfl                        CCGTGACCC--TTAAACAAAACAGACCGCGAACGAGTCACCCGTG---C
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Evillosa                    -------------------------CCGTGAACACGTCTCTCGTGT--C
Saccharumofficinarum        TCGTGACC---TTAAACAAACCAGACCGCGAACGCGTCCCTCGTG--CC
Imperatacylindrical         TCGTGACCC--TTAAACAAAACAGACCGCGAACGAGTCTCTCGTG--CC
Bothriochloainsculpta       TCGTGACCC--TTAAACAAAACAGACCGCGAACGTGTCTCTCATGT--C
Dichanthiumannulatum        TCGTGACCC--TTAAACAAAACAGACCGCGAACGTGTCTCTCGTGT--C
Cplurnodus                  TCGTGACCC--TTAAACAAAGCAGACCGTGATCGTGTGTCTCGTGT--C
Cexcavatus                  TCGTCACCC--TTAAACAAAACAGACCGNGAGCGTGTCTCTCATGT--C
Hyparrhnietamba             TCGTGACCC--TTAAACAAAACAGACCGNGAACGCGTCTCTCATGT--C
Hanamesa                    TCGTGACCC--TTAAACAAAGCAGACCGTGAACGCGTCTCTCATGT--C
Heteropogoncontortus        TCGTGACCC--TTAAACAAAACAGACCGCGAACGCGTCTCTCATGT--C

Aameth6685                  CCCCCGGGCTTC---------------GGCTCGGC-CAAGGCACCCTAT
Aameth6679                  TCCC-GGGCTTC---------------GGCTCGGC-CAAGGCACCCGAG
Dfili5874                   CCACCGGGCTCG---------------GGCCCGGC-AAAGGCTCCCGAG
Ttria6555                   CCCCCGGGCCTC---------------GGCCCGGC-CACGGCCCCCGAG
Ttria6525                   CCCCCGGGCCTC---------------GGCCCGGC-CACGGCCCCCGAG
Tspic5205                   CCGCCGGGCTCC---------------GGCCCGGCACAAGGCCCCCGAG
Tspic6579                   CCCCCGGGCTCC---------------GGCCCGGCTCAAGGCCCCCGAG
Tspic6580                   CCCCCGGGCTCC---------------GGCC-GGCACGGGGCCCCCTAT
Tspic5873                   CCGCCGGGCTCC---------------GGCCCGGCACAAGGCCCCCGAG
Adist6684                   CCCCCGGCCCTT---------------GGTTCCACCTTGGGCCCCCTTT
Mcape6584                   CACCCGGGCTTC---------------CGCTCCGAGCTCGGTCCCCCAG
Aappen6543                  CNCCCNGGCTAC---------------GGTTCGGCCTCTGGCTCCCNAG
Mcape6655                   CCCCCGGGCTAC---------------GGCTCGGCACAGG--CCCCTAG
Aappen6946                  ACCGCGGGCTAG---------------GGCCCCGCACTCGGCCCCCTAG
Sbic6589                    ACCNCGGGCTGG---------------GGCTCGGCCTTAGCCCCCCTTG
Cplur6406                   CTCCCNGGCTAG---------------GG--CCGG-CTTGGCCCCCTAT
Icylin6632                  CCCCCGGGCCAG---------------GGTTCGGC-CCCGGCCCCCTAT
Hpilg4738                   CCCCCGGGCAAG---------------GGCCCCGCACAAGGCCCCGGAG
Icylin5090                  CCGCCGGGCTCG---------------GGCCCGGC-CAAGGCCCCCGAG
Emuti6715                   CCACCGGGCCTC---------------GGCCCGGA-CAAGGCCCCCCAG
Emuti6559                   CCACCGGGCCTC---------------GGCCCGGA-CAAGGCCCCCCAG
Emuti5074                   CCACCGGGCCTC---------------GGCCCGGA-CAAGGCCCCCCAG
Emuti6539                   CCACCGGGCCTC---------------GGCCCGGA-CAAGGCCCCCCAG
Pfrank4705                  CCGCCTGGCTTC---------------GGCCTGGT-CAAGGCCCCTGAG
Icylin5114                  CCGCCGGGCTCC---------------GGCCCGGC-CAAGGCCCCCGAG
Aeuco5869                   CCACCGGGCTCC---------------GGCCCGGC-AAAGGCTCCCGAG
Emuti6539                   CCACCGGGCTCC---------------GGCCCGGC-AAAGGCTCCCGAG
Aeuco6587                   CCGCCGGGCTCC---------------GGCCCGGCCAAAGGCTCCCGAG
Bradi4784                   CCGCCGGGCTCC---------------GGCCCGGCCAAAGGCTCCCGAG
Binsc5681                   CCACCGGGCCTC---------------GGCC-GGC-ACAGGCCCCCGAG
Tspic4846                   CCACCGGGCTTC---------------GGCCCGGC-AAAGGCTCCCGAG
Cprolix6682                 CCGCCGGGCTTC---------------GGTCCGGC-CAAGGCCCCCGAG
Csp5800                     CCGCCGGGCTTC---------------GGTCCGGC-CAAGGCCCCCGAG
Cprolix5101                 CCGCCGGGCTTC---------------GGTCCGGC-CAAGGCCTCCGAG
Cdieter6642                 CCCCCGGGCTTC---------------GGTCCGGC-CAAGGCCCTCTAG
Cmarg4397                   CCGCCGGGCTTC---------------GGCCCGGC-CAAGGCCCCCGAG
Hpilg4603                   CCGCCGGGCTTC---------------GGCCCGGC-CAAGGCCCCCGAG
Htamb6585                   TCGCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCGAG
Hdiss5145                   TCGCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCGAG
Htamb6537                   TCCCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCGAG
Hanam4807                   TCGCCGGGCTCC---------------GGCCCGGC-CAAGGTTCCCGAG
Hfilli5144                  TCGCCGGGCTCC---------------GGCCCGGCCAAAGGCTCCCGAG
Hanam4841                   TCGCTGGGCTTC---------------GGCCCGGC-CAAGGCTCCCGAG
Hhirt6656                   ACCCTGGGCTTC---------------GGCCCGGC-CAAGGCTCCCGAG
Hhirt6618                   TCCCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCCAT
Shalep9318                  CTCCTGGGCTCC---------------TGCCCGTG-CAAGGCCCTCGAC
Hcon4741                    TCGTCGAGCCTC---------------GGCTCGGC--AAGGCCCCCGAG
Evill5085                   CTGCCGGGCTCC---------------GGCTCGGCCTGAGGTCCCCGAG
Bbladh5173                  CCGCCGGGCTCC---------------GGCCCGGC-CTAGGCCCCCGAG
Hquar5088                   TCGCCGGGCTCC---------------GGCCCGGC-CAAGGGTCCCCAA
Sbic6588                    -CGTCGAGCTTC---------------GGCTCGGCACAAGGTCCCCTTG
Sbicolour9319               -CGTCGAGCTTT---------------GGCTCGGCACAAGGTCCCCTTG
Hrud6576                    -CGCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCGAG
Andropogondistachyos        -CGCCGGGCTCC---------------GGC-CGGC-CAAGGGTCCCCAG
Cleistachnesorghoides       CCGCCGGGCCTC---------------GGCNCGGCANNNGGNCCCCGAG
CoixBuckler                 CCATCGGGCTTC---------------GGCCCGGCCGAAGGCCCCCGAG
Arundinellanepalensis       -CGCCGGACTTC---------------GGTCCGGT-TTAGGCCCCCGAG
Pennisetumsetaceum          CGCACGGGCTTG---------------TGCTCGTG-CCAGGCCCCGACC
Panicumbisulcatum           CGT-CGGGCTAT---------------GGCCCGAC-AAAGGCACCCACC
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Danthoniacalifornica              CGGCCACGCGACGGGACTCGTCCCCGCCGCGCGGCCCTAGGCCGCCGAC
PentaschistisaristifoliaSpies6    CGGCCACACGA--------GCTCACGCCGTGTGGC-CTAGGCCGCCGAC
Eragrostisdielsii                 CGTCGG-GTGATGGGGCTTG-CCTCGCCTCCCGAC-TTAGGCCCCAGAC
Aristidaharvardii                 CGTCGG-GCGTC-------TCCCACGACGCCCGGC-CAAGGCCCCCGAC
Zeadiplo                          CGCCGG-GCTCC---------------GGCCCGGCACGCTGCCCCCCC-
ZmaysGfl                          CGCCGG-GCTCC---------------GGCCCGGCACGCTGCCCCCCCC
Evillosa                          -GCCGG-GCTTC---------------GGCTCGGC-CAAGGCACCYGAG
Saccharumofficinarum              -GCCGG-GCTTC---------------GGCCCGGCACGAGGTCCCCGAG
Imperatacylindrical               -GCCGG-GCTCC---------------GGCCCGGC-CAAGGCCCCCGAG
Bothriochloainsculpta             -GACGG-GCTCC---------------GGATCGGA-CAAGGCGCCCGAG
Dichanthiumannulatum              -GCCGG-GCTTC---------------GGCTCGGA-CAAGGCGTCCGAG
Cplurnodus                        -GCCGG-GCTTC---------------GGCTCGGA-CAAGGCTCCCGAA
Cexcavatus                        -GCCGG-GCCTC---------------GGGCCTGAGCAAGGCTCCCGAA
Hyparrhnietamba                   -GCCGG-GCTCC---------------GGCTCGGC-CAAGGCTCCCGAA
Hanamesa                          -GTCGG-GCTCC---------------GGTCCGGC-CAAGGCTCCCGAA
Heteropogoncontortus              -GTCGA-GCCTC---------------GGCTCGGC--AAGGCCCCCGAT


Aameth6685                        -CCTCGTCCC-------GGGGCGGAGGTGCCGC-AAAAGAACCCACGGC
Aameth6679                        -CCCCGTCCC-------GGGGCGGAGGTGCCGC-AAAAGAACCCACGGC
Dfili5874                         -CCCCGTCCC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Ttria6555                         -CTCCGTTCC-------GGGGCGGAGGGGCCAC-AAAAGAACCCACGGC
Ttria6525                         -CTCCGTTCC-------GGGGCGGAGGGGCCAC-AAAAGAACCCACGGC
Tspic5205                         -CTCCGTCCC-------GGGGCGGAGGGGCCAC-AAAAGAACCCACGGC
Tspic6579                         -CTCCGTCCC-------GGGGCGGAGGGGCCAC-AAAAGAACCCACGGC
Tspic6580                         -CTCCGTCCC-------GGGGCGGAGGGGCCAC-AAAAGAACCCACGGC
Tspic5873                         -CTCCGTCCC-------GGGGCGGAGGGGCCAC-AAAAGAACCCACGGC
Adist6684                         -TCCCCTCCC-------TGGGTAATCGCCCGAA-AA-ACAACCCACGGC
Mcape6584                         -CCCCGTCGT-------GGGGCGGACGGGCCAC-AACACAACCCACGGT
Aappen6543                        -CCCCGTCCA-------GGGGCGGAAGGGCCGC-AAAACAACCCACGGC
Mcape6655                         -CCCCGTCTT-------GGGGCGGAGGGGCCAC-AACAGAACCCACGGC
Aappen6946                        GCCCCGTCCC-------GGGGCGGAGGGGCCGC-AAAACAACCCACGGT
Sbic6589                          -CTCCCTCCT-------GGGGCAGAGGGGCCAC-AAAAGAACCCACGGC
Cplur6406                         -CCCCNTCTT-------GGGGTGGAGGGGCCGC-AAAATAACCCACGGC
Icylin6632                        -CTCCGTCCC-------GGGGCGGAGGGGCCGC-AACAGAACCCACGGC
Hpilg4738                         -CCCCGTCAC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Icylin5090                        -CTCCGTCCC-------GGGGCGGAGGGGCCGC-AACAGAACCCACGGC
Emuti6715                         -CTCCGGCA--------------GAGGGGCCGC-AACAGAACCCACGGC
Emuti6559                         -CTCCGGCA--------------GAGGGGCCGC-AACAGAACCCACGGC
Emuti5074                         -CTCCGGCA--------------GAGGGGCCGC-AACAGAACCCACGGC
Emuti6539                         -CTCCGGCA--------------CAAGGGCCGC-AACAGAACCCACGGC
Pfrank4705                        -CACCGTCAA-------GGGGC-GAGGGGCCGC-AACAGAACCCACGGC
Icylin5114                        -CTCCGTCCC-------GGGGCGGAGGGGCCGC-AACAGAACCCACGGC
Aeuco5869                         -CCCCGTCCC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Dfili5872                         -CCCCGTCCC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Aeuco6587                         -CCCCGTCCA-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Bradi4784                         -CCCCGTCCA-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Binsc5681                         -CTCCGTCCT-------GGGGCGGAGGGGCCGC-AAAAGAACCCACCGC
Tspic4846                         -CCCCGTCCC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Cprolix6682                       -CCCTGTCAC-------GGGGCGGAGGGGCCGC-AAAACAACCCACGGC
Csp5800                           -CCCTGTCAC-------GGGGCGCGAGGGCCGC-AAAAGAACCCACAGC
Cprolix5101                       -CCCTGTCAC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Cdieter6642                       -CCCCTGTCAC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Cmarg4397                         -CCCTGTCAC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Hpilg4603                         -CCCTGTCAC-------GGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Htamb6585                         -CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Hdiss5145                         -CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
Htamb6537                         -CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC-GAAAGAACCCACGGC
Hanam4807                         -CCCCGTCCC-------GGGGCGGAGGTGCCGC-AAAAGAACCCACGGC
Hfilli5144                        -CCCCGTCCC-------GGGGCGGAGGTGCCGC-AAAAGAACCCACGGC
Hanam4841                         -CCCCGTCCG-------GGGGCGGAGGTGCCGC-AAAAGAACCC-CGGC
Hhirt6656                         -CCCCGTCCG-------GGGGCGGAGGTGCCGC-AAAAGAACCC-CGGC
Hhirt6618                         -CCCCGTCCC-------GGGGGCGGGGGCCCAC-AAAACAACCCAGG-C
Shalep9318                        -CTTC-TCAT-------GGAGGAGAGGGGCCAC-AAAAGAACCCAGGGC
Hcon4741                          -CTTC--------------GGCAGAGGGGCCGC-CACAGAACCCACGGC
Evill5085                         -CCCCGTCCT-------GGGGCGGAGGGGCCGC-AAAAGATCCCACGGC
Bbladh5173                        -CCCCTTCCC-------GGGGCGGAGGAGCCGC-CAAAGAACCCACGGC
Hquar5088                         CCCCCGTCCC-------GGGGCGGAGGTGCAGCCAAAAGAACCCAAAGC
Sbic6588                          -CTCCAAC-CT------GGGGCAGAGGGGCCAC-AAAAGAACCCACGGC
Sbicolour9319                     -CTCCAAC-CT------GGGGCAGAGGGGCCAC-AAAAGAACCCACGGC
Hrud6576                          -CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC-AAAAGAACCCACGGC
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Andropogondistachyos                -CCCCGTC-CC------GGGGNGGAGGTGCCGCCAAAAGAACCCACGGC
Cleistachnesorghoides               -CCCNGTCNT-------GGGGCGGAGGGGCCAC-AAAAGAACCCACGGC
CoixBuckler                         -CTCCGTCCC-------GGGGCGGAGGGGCCGC-AACAGAACCCACGGC
Arundinellanepalensis               -CTCCGTCCC-------GGGGCAGAGGGGCCTT-AACAGAACCCACGGC
Pennisetumsetaceum                  -TTCTTTAT-------GAGGGGGA--GGGCCGC-AAAAGAACCCACGGC
Panicumbisulcatum                   -CACCT-AT-------TAGGAGGATGGGGCCGC-AAAAGAACCCACGGC
Danthoniacalifornica                -CTCCCTCCTCC----GGGAGGGGAGCGGCCGT-AAAAGAACCCACGGC
PentaschistisaristifoliaSpies6      -CTCCGCAA-------GGACGGGGAGCGGCCGC-AAAAGAACCCACGGC
Eragrostisdielsii                   -TTTCTTAC--------GGAGGGCTGGGGCCGC-AACAGAATCCACGGC
Aristidaharvardii                   -CTCCCTGT--------GGAGGGGAGGGGCCGC-AACAGAACCCACGGC
Zeadiplo                            -GAACCTCCCGC----GGGGAAGGGGGGCCGCGAAAAAGAACCCACGGC
ZmaysGfl                            -GAACCTCCCGC----GGGGAAGGGGGGGCCGCGAAAAGAACCCACGGC
Evillosa                            TCCAGTCCC-------GGGCGCGAGGGTGCGCGCAAAAGAACCCAYGGC
Saccharumofficinarum                CTCCGTCCC-------GGAGCGGAGGGGCCAC--AACAGAACCCACGGC
Imperatacylindrical                 CTCCGTCCC-------GGGGCGGAGGGGCCGC--AACAGAACCCACGGC
Bothriochloainsculpta               CTCCGTCT--------GGGGGGGGGGGA-GTCGCAAAAGAACCCACGGC
Dichanthiumannulatum                CCCTGTCCC-------GGGGGGGGGGGGCCCC--AAAAGAACCCACGGC
Cplurnodus                          CCC-TTCCC-------GGGGGGGAGGGCNCCCC-AAAAGAACCCACGTC
Cexcavatus                          CCCCTTCCC-------GGGGGGGAGG-TTCCCC-AAAAGAACCCACGGC
Hyparrheniatamba                    CCCCCTCCC-------GGGGGGGAGG-TTCCCCCAAAAGAACCCACGCC
Hanamesa                            CCCCCTCCC-------GGGGGGGAGG-TTCCCCCAAAGNAACC-ACGGC
Heteropogoncontortus                CTTCGA-CA-------GAGGGG--------CCACCACAGAACCCACGGC


Aameth6685                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Aameth6679                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Dfili5874                           GCCTT---AGGCGTCAAGGAACACATG-TATTGCCTT--GC
Ttria6555                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Ttria6525                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Tspic5205                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCAT--GC
Tspic6579                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCAT--GC
Tspic6580                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCAT--GC
Tspic5873                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCAT--GC
Adist6684                           GCCTTCGTAAACATTCAGGAACACTTA-TATTGCCTT--GC
Mcape6584                           GCCTT---ATGCGTCAAGGAACACTTA-TATTGCCTT--GC
Aappen6543                          GCCTT---AAGCGTCAAGGAACACTTA-TATTGCCTT--GC
Mcape6655                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
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Sbic6589                            GCCTT---AGGCGTCAAGGAACACTCA-TGTTGCCTT--GC
Cplur6406                           GCCTT---AGGCGTCATGGAACACTTA-TATTGCCTT--GC
Icylin6632                          GCCTA---AGGCGTCAAGGAACACTTC-TATTGCCTT--GC
Hpilg4738                           GCCTT---AGGCGTCAAGGAACACCTA-TATTGCCTC--GC
Icylin5090                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Emuti6715                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCTC---GC
Emuti6559                           GCCTT---AGGCGTCAAGGAACACTTA-TATCGGCTC--GC
Emuti5074                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGGCTC--GC
Emuti6539                           GCCTT---AGGCGTCAAGGAACACTTA-TATCGGCTC--GC
Pfrank4705                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Icylin5114                          GCCTA---AGGCGTCAAGGAACACTTC-TATTGCCTT--GC
Aeuco5869                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Dfili5872                           GCCTT---AGGCGTCAAGGAACACTTG-TATTGCCTT--GC
Aeuco6587                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Bradi4784                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Binsc5681                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Tspic4846                           GCCTT---AGGCGTCAAGGAACACATG-TATTGCCTT--GC
Cprolix6682                         GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Csp5800                             GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Cprolix5101                         GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Cdieter6642                         GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Cmarg4397                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Hpilg4603                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Htamb6585                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Hdiss5145                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Htamb6537                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Hanam4807                           GCCTT---AGGCGTCAAGGAACACTTAATATTGCCTT--GC
Hfilli5144                          GCCTT---AGCC-TCA-GGAACACTTA-TATTGCCTT--GC
Hanam4841                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Hhirt6656                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Hhirt6618                           GCCTT---AGGCGTCTAGGCGAACTGT-TATTGCCTT--GC
Shalep9318                          GCCGA---AGGCGTCAAGGAACACTGA-TATTGCTTT--GC
Hcon4741                            GCCTT---AGGCGTCAAGGAACACTTG-TATTG-CTT--GC
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Evill5085                       GCCTT---ACGAGTCAAGGAA-ACTTG-TATTGCCTT--GC
Bbladh5173                      GCCTT---AGGCGTCAAGGAACACTAC-TATTGCCTT--GC
Hquar5088                       GCCTT---AGGCGTCAAGGAACACTCAATATTGCCTT--GC
Sbic6588                        GC-TT---AGGCGTCAAGGAACACTCA-TATTGCCTT--GC
Sbicolour9319                   GCCTT---AGGCNTCNNNGAACACTCA-TGTTGCCTT--GC
Hrud6576                        GCCTT---AGGCNCCCAGGAACANTTA-TATTNCCTT--GC
Andropogondistachyos            GCCTT---AGGCGTCAAGGAACACTTA-TATTNCCTT--GC
Cleistachnesorghoides           GCCTA---AGGCGTCAAGGAACACTTA-TATTGCCTN--GC
CoixBuckler                     GCCTT---AGGCGTCAAGGAACACTAA-TGCTGCCTT--GC
Arundinellanepalensis           GCCAT---AGGCGTCAAGGAACACTCA-TATTGCCTT--GC
Pennisetumsetaceum              GCCGA---AGGCGTCAAGGAACACTGA-TATTGCCTT--GC
Panicumbisulcatum               GCCAA---AGGCGTCAAGGAACACATA-TATTGCCTT--GC
Danthoniacalifornica            GCCGAC--CGGCGCCAAGGAACACTGTTTATTGCCT----C
PentaschistisaristifoliaSpies6  GCCGTA--CGGCGTCAAGGAAAACTGT-TATTGCCTT--GC
Eragrostisdielsii               GCCGA---CGGCGTCAAGGAACACTAA-TATTGCCTT--GC
Aristidaharvardii               GCCGAA--CGGCGTCAAGGAACACTGTCTATTGCCTG--GC
Zeadiplo                        GCCTC---GGGCGCCAAGGAACACCAG-TACTACCTCCTGC
ZmaysGfl                        GCCCC---GGGCGCCAAGGAACACCAG-TACTACCTCCTGC
Evillosa                        GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTTGCTC
Saccharumofficinarum            GCCTT---AGGCGTCAAGGAACACCTA-TATTGCCTTGCGC
Imperatacylindrical             GCCT----AGGGGTCAAGGAACACTTC-TATTGCCTTGCTC
Bothriochloainsculpta           GCCTT---AGGCGTCAAGGAACACTTA-TATTTCCTTGCTC
Dichanthiumannulatum            GCCTT---AGGCGTCAAGGAACACTTA-TATTTCCTTGCCC
Cplurnodus                      NCCTT---AGGCGTCAAGGAACACTTA-TATTNCCTTGCTC
Cexcavatus                      GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTTGCCC
Hyparrhnietamba                 CCCTT---AGGCGCCAAGGAACACTTA-TATTTCCTTGCAC
Hanamesa                        GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTTGCCC
Heteropogoncontortus            GCCTT---AGGCGTCAAGGAACACTTG-TATTGC-TTGCTT

Aameth6685                      ACGGCGGGGCGGCTGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATCAT
Aameth6679                      ACGGCGGGGCGGCTGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATCAT
Dfili5874                       CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Ttria6555                       TCGGCGGAGCGGTCGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATGAC
Ttria6525                       TCGGCGGAGCGGTCGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATGAC
Tspic5205                       TCTGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Tspic6579                       TCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Tspic6580                       TCTGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Tspic5873                       TCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Adist6684                       ACTTCCGAGCCGCTGGC-TTGCCTTCCCCTCCCCGCGCAAC---GATCAT
Mcape6584                       TCGGCCG-GACGCCTGC-CTGCCTTCCGCTCCCCGCGCAGC--ATATGAT
Aappen6543                      TCGGCGAGCCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Mcape6655                       TCGGCGG-ACGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Aappen6946                      TCG-CGG-GCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Sbic6589                        ACA-CGGAGTGGTCGGC-CTGCCTTCCGCTCCCTGAGCAGC---GATGAT
Cplur6406                       CCGGTGGA-CGGTC--C-CTGCCTTCCACTCCCCCCGCA-C---GATGAT
Icylin6632                      TCGGCGGAGCGGCCG-C-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Hpilg4738                       CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Icylin5090                      CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Emuti6715                       TCGGCGGAGCGGACGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGTT
Emuti6559                       TCGGCGGAGCGGACGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGTT
Emuti5074                       TCGGCGGAGCGGACGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGTT
Emuti6539                       TCGCGGGGACGGACAGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGTT
Pfrank4705                      TCGACGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Icylin5114                      TCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Aeuco5869                       TCGGTGGAGCGGTCGGC-ATGCCTTCTGCTCCCCGCGCAGC---GATGAT
Dfili5872                       TCGGTGGAGCGGTCGGC-ATGCCTTCTGCTCCCCGCGCAGC---GATGAT
Aeuco6587                       TCGGCGGGGCGGTCGGC-CTGCCTTCCGCTCCCCGGGCAGC---GATGAT
Bradi4784                       TCGGCGGGGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Binsc5681                       CCGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCA-C---GATGAT
Tspic4846                       CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cprolix6682                     GCCGTGGAGCGCTCAACTCTTCCCTCC-CTCCCCGCGCAC----GATGAT
Csp5800                         CCGGTGGAGCCCTCGGC-CTGCCTTCCGCTCCCCCCACATT---GATGAT
Cprolix5101                     CCGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cdieter6642                     CCGGTGGAGCGGTCGGC-CTGCCCTCCGCTCCCCGCGCAGC---GATGAT
Cmarg4397                       CCGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Hpilg4603                       CCGGTGGAGCGGTCGCC--TGCCTTCCGCTCCCCGCGCAGC---GATGAT
Htamb6585                       AAGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hdiss5145                       AAGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Htamb6537                       CAGGTGGAGCGGACGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hanam4807                       CCGTGGGAGCGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
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Hfilli5144                      CCGTGGA--CGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
Hanam4841                       CCGGTGGAGCGGTCAGC-TTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hhirt6656                       CCGGTGGAGCGGTCTGC-TTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hhirt6618                       CAGGTGTACTCCTCGGC-CTGCCTTCCGCTCCCCGTGCAAC---GATGAT
Shalep9318                      TCGGGGCTTTGGTTGGC-TTGCCGATCATGCCTCGTGCAGC---GATGCT
Hcon4741                        TCGGTGGAGCGGTCGGC-CTGCCTTCTGCTCCCCGCGCGGC---GATGAT
Evill5085                       TCGGTGGAGCGGTCGGC-GTGCCTTCCGCTCCCCGTGCAGC---GATAAT
Bbladh5173                      CCGGCGGAGCGGTCNNC-CTGCCTTCCGCTCCCCG-GCAGC---GATGAT
Hquar5088                       CCGGTGGAGCGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
Sbic6588                        GCAGTGGAG-GCTCGGC-CTCCGTTGGTGCCGCGATGAAGAACGCAAGAT
Sbicolour9319                   ACAGTGGAGTGGTCGGC-NTGCGTTGGGGTCCCGATGAAGAACAAAAGAT
Hrud6576                        AAGGTTGGAACCAAGGC-TTCCGTGGGGGCACCGATGAAGA-CGGATGAT
Andropogondistachyos            CCGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Cleistachnesorghoides           NCGGCGGAGCGGTCGGC-NTGCCTTCCGCTCCCCGCGCAGC---GATGAT
CoixBuckler                     TCGACGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Arundinellanepalensis           ACGGTGGAGCGGTTGGC-CTGCCTTCTGCTCCCTGCGCAGC---GATGCT
Pennisetumsetaceum              GCGGGGCTGTGGTTGGC-CTGCCGATCGCACCTCGTGCAGC---GATACT
Panicumbisulcatum               TCGGGGTTGTGGTTGGC-TTGCCGGCCACGCCTCGTGCAGC---GATGCT
Danthoniacalifornica            GCGGCGCGGCGGCCAGC-CTGCCGGTCGTCACACGCGTA-----------
PentaschistisaristifoliaSpies6  GCGTGGCCGTGGCTGGC-CTGCCAGCCGCGCCGCGCGCAGC---GATTCT
Eragrostisdielsii               CCAATGACTCGACCGGC-CTGCCGGGCGCGTCTTGAGCAGC---GATACC
Aristidaharvardii               GCGGGGCTGCGGCCGGC-CTGCCGGACGCGCCCCAGCCAGC---GATGCT
Zeadiplo                        CCCGCGGAGCGGTCGGC-CCGCCTTCCGCTCCCCGGGCAGC---GGTTA-
ZmaysGfl                        CCCGCGGAGCGGTCGGC-CCGCCTTCCGTTCCCAGGGCAGC---GGTTA-
Evillosa                        --GGCGGAGCGGCTGGC-TTGCCTTCCGCTCCCCACGCGGT---GATCAT
Saccharumofficinarum            --GGTGGAGCGGTCGGC-CCGCCTTCCGCTCCCCGCGCAGC---GATGAT
Imperatacylindrical             --GGCGGA-CGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGA----GTGCT
Bothriochloainsculpta           --GGCGGAGCGGCTGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Dichanthiumannulatum            --GGTGGAGCGGCTGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cplurnodus                      --GGTGGAGNGGCTGGC-CTGCCTTCCGCTCACCGCGCAGC---GATGAT
Cexcavatus                      --GGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hyparrhnietamba                 --GGTGGAGCGGTTGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hanamesa                        --GGTGGAGCGGTTGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Heteropogoncontortus            --GGTGGAGCGGTTGGC-CTGCCTTCTGCTCCCCGCGCGGC---GATGAT

Aameth6685                      ATAC-TAATC
Aameth6679                      ATAC-TAATC
Dfili5874                       ATCT-TAATC
Ttria6555                       TTAT-TAATC
Ttria6525                       TTAT-TAATC
Tspic5205                       ATCA-TAATC
Tspic6579                       ATCA-TAATC
Tspic6580                       ATCT-TAATC
Tspic5873                       ATCA-TAATC
Adist6684                       ATCTCTAATC
Mcape6584                       ATCT-TAAAC
Aappen6543                      ATCT-TAATC
Mcape6655                       ACCT-TAAAC
Aappen6946                      ATCT-TAATC
Sbic6589                        ATCT-TAATC
Cplur6406                       ATCT-TAATC
Icylin6632                      ATCT-TAATC
Hpilg4738                       ATCT-TAATC
Icylin5090                      ATCT-TAATC
Emuti6715                       ATCT-TAATC
Emuti6559                       ATCT-TAATC
Emuti5074                       ATCT-TAATC
Emuti6539                       ATCT-TAATC
Pfrank4705                      ATCT-TAATC
Icylin5114                      ATCT-TAATC
Aeuco5869                       ATCT-TAATC
Dfili5872                       ATCT-TAATC
Aeuco6587                       ATCT-TAATC
Bradi4784                       ATCT-TAATC
Binsc5681                       ATCT-TAATC
Tspic4846                       ATCT-TAATC
Cprolix6682                     ATCT-TAATC
Csp5800                         ATCT-TAATC
Cprolix5101                     ATCT-TAATC
Cdieter6642                     ATCT-TAATC
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Cmarg4397	ATCT-TAATC
Hpilg4603	ATCT-TAATC
Htamb6585	ATCTTTAATC
Hdiss5145	ATCT-TAATC
Htamb6537	ATCT-TAATC
Hanam4807	ATCT-TAATC
Hfilli5144	ATCT-TAATC
Hanam4841	ATCT-TAATC
Hhirt6656	ATCT-TAATC
Hhirt6618	ATCT-TAATC
Shalep9318	ATCT-TAATC
Hcon4741	ATCT-TAATC
Evill5085	ATCT-TAATC
Bbladh5173	ATCTTTAATC
Hquar5088	ATCT-TAATC
Sbic6588	ATCT-TAATC
Sbicolour9319	ATCA-TCC--
Hrud6576	ATCT-TAATC
Andropogondistachyos	ATCT-TAATC
Cleistachnesorghoides	ATCT-TAATC
CoixBuckler	ATCT-TAATA
Arundinellanepalensis	ATGT--AAC-
Pennisetumsetaceum	ATCT-TAATC
Panicumbisulcatum	ATCT-TAATC
Danthoniacalifornica	----------
PentaschistisaristifoliaSpies6	ATAC-TAATC
Eragrostisdielsii	TTTTGTAATC
Aristidaharvardii	ATCA-TAAC-
Zeadiplo	----------
ZmaysGfl	----------
Evillosa	ATAC-TAATC
Saccharumofficinarum	ATCT-TAATC
Imperatacylindrical	ATCT-TAATC
Bothriochloainsculpta	ATAC-TAATC
Dichanthiumannulatum	ATAC-TAATC
Cplurnodus	ATCC-TAACC
Cexcavatus	ATCT-TAATC
Hyparrhnietamba	ATCC-TAATC
Hanamesa	ATCT-TAATC
Heteropogoncontortus	ATCT-TAATC

Appendix F: CLUSTAL W (1.74) multiple sequence alignment data of the Andropogoneae specimens for *ITS2* region.

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B. radicans 4831            TGCG-ATACCTGGTGT-GAATTGC
H quarrei 6586               TGCG-ATACCTGGCGT-TAATTGC
H. dissoluta 5154            TACGGATACCTAGCGCTCAATTGC
H. rudis 6576                TACG-ATACCTGGTTGTGACTTGC
H. anamesa 4841              TGCT-ATACCTCGAGT-GAACTGC
E. muticus 6954              TACGGATACCTGGTG-GGAATTGC
CoixBuckler                  TGCG-ATACCTGGTGT-GAATTGC
Arundinellanepalensis        TGCG-ATACCTGGTGT-GAATTGC
Pennisetumsetaceum           TGCG-ATACCTGGTGT-GAATTGC
Panicumbisulcatum            TGCG-ATACCTGGTGT-GAATTGC
Chimonobambusabrevinoda      TGCG-ATACCTGGTGT-GAATTGC
Danthoniacalifornica         TGCG-ATACCTGGTGT-GAATTGC
Eragrostisdielsii            TGCG-ATACCTGGTGT-GAATTGC
Aristidaharvardii            TGCG-ATACCTGGTGT-GAATTGC
Zeadiplo                     TGCG-ATACCTGGTGT-GAATTGC
ZmaysGfl                     TGCG-ATACCTGGTGT-GAATTGC
Cleistachnesorghoides        TGCG-ATACCTGGTGT-GAATTGC
I. cylindrica 6632           TGCGGATACCTGGTGCTGAATTGC
D. filliformis 5874          TGCGGATACCTGGGCT-AAATTGC
T. spicatus 4846             TGCG-ATACCTGGTGT-GAATTGC
P. franksae 4705             -------------------------
C. plurinoides 6404          -------------------------
A. eucomus5869               TGCG-ATACCTGGTGT-GAATTGC
D.filliformis 5872           TGCG-ATACCTGGTGT-GAATTGC
H. contortus 4271            TGCGGATACCTGGTGT-GAATTGC
H. contortus 4741            TGCGGATACCTGGTGT-GAATTGC
B. radicans 4831             TCG--ATACCTGGTGT-GAATTGC
A. appenduculatus 6638       TGCG-ATACCTGGTGT-GAATTGC
A. appenduculatus 6677       TGCGGATACCTGGTGT-GAATTGC
A. appendicilatus 6543       TGCGGATACGTGGCGT-GAATTGC
H. hirta 6656                TGCGGATACCTGGTGT-GAATTGC
H. hirta 6550                TGCGGATACCTGGTGT-GAATTGC
H. quarrei 5088              TGCGGATACCTGGTGT-GAATTGC
B. insculpta 5681            TGCGGATACCTGGTGT-GAATTGC
T. triandra 6555             ---GGATACTTGGTGCTGAATTGC
Spies 6620                   TGCGGATACCTGGTGT-GAATTGC
H. pilgeriana 4738           TGCGNATACCTGGTGT-GAATTGC
A. appendiculatus 6625       TA--GATACCTGGTGT-GAATTGC
Bothriochloa 7489            TGCGGATACCTGGTGT-GAATTGC
H. longofollium 6560         TGCCGATACCTGGTGT-GAATTGC
H. longofollium              TGCGGATACCTGGTGT-GAATTGC
Pannicum schinzii 6652       TGCG-ATACCTGGTGT-GAATTGC
B. serata                    TGCGGATACCTGGTGT-GAATTGC
S. halepense 9318            TGCG-ATACCTGGTGT-GACTTGC
Papalum dilatum 6617         TCG--ATACCTGGTGT-GAATTGC
Paspalum                     TGCGGATACCTGGTGT-GAATTGC
Brachiaria                   TGCG-ATACCTGGTGT-GAATTGC
Aristida adscencianis 6713   TGCG-ATACCTGGTGT-GAATTGC
H. contortus 6628            TGCGGATACCTGGTGT-GAATTGC
T. leucothrix 6627           TGCG-ATACCTGGTGT-GAATTGC
S. halepense 9319            TGCG-ATACCTGGTGT-GAATTGC
S. bicolour 6588             TGCG-ATACCTGGTGT-GAATTGC
S. bicolour 6589             TGCGGATACCTGGTGT-GAATTGC
E. muticus 5074              TACGGATACCTGGTGT-GAATGCC
E. muticus 6715              TGCCGATACCTGGTGT-GAATTGC
M. capensis 6655             TGCGGATACCTGGTGT-GAATTGC
C. prolixus 6682             TGCGGATACCTGGTGT-GAATTGC
C. excavatus 5877            TAG-GANACCTAGCGT-CAATTCC
C. plurinodus 6406           TGCCGATACCTAGCGGTGAATTCC
H. anamesa 4807              TGCGGATACCTGGTGT-GAATTGC
A. amethestinus 6685         TGCG-ATACCTAGTGT-GAATTGC
I. cylindrica 5114           TGCGGATACCTAGTGT-GAATTGC
I. cylindrica 6582           TACT-ATACCTAGAAT-TAATTGC
Monocymbium                  T-CG-ATACCTAGTGT-CAATTGC
A. distachyos 6684           TNCCGATACCTAGCGGCGAATTCG
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B. bladhii 5173              TGCCGT--CCTAGCGT-NATTCCC
S. nigrostis 6567            TTCCACGTCGACCTATGACACTGC
H. fillipendula 5144         TGGCCCCACATGCCTATAC---GC
H.tamba 6585                 TCCCGATACCTAGCGGCTA-TTGC
A. schirensis 6581           ATGCGATACCTAGCGT-CAATTCC
E. villosa 5085              ATNCGATACCTAGTNT-GAATTGC
C. excavatus 6577            GTGCCATACCTAGTGT-CAA-TTC
C. marginatus 4397           -ATCGATACCTAGTGT-GAA-TTC
Evillosa                     TGCG-ATACCTGGTGT-GAATTGC
Saccharumofficinarum         TGCG-ATACCTGGTGT-GAATTGC
Imperatacylindrical          TGCG-ATACCTGGTGT-GAATTGC
Bothriochloainsculpta        TGCG-ATACCTGGTGT-GAATTGC
Dichanthiumannulatum         TGCG-ATACCTGGTGT-GAATTGC
Cybopogonprolixus            TGCG-ATACCTGGTGT-GAATTGC
Cplurnodus                   TGCG-ATACCTGGTGT-GAATTGC
Cmarginatus                  TGCG-ATACCTGGTGT-GAATTGC
Cexcavatus                   TGCG-ATACCTGGTGT-GAATTGC
Hyparrhnietamba              T-CG-ATACCTGGTGT-GAATTGC
Hanamesa                     TGCG-ATACCTGGTGT-GAATTGC
Heteropogoncontortus         TGCG-ATACCTGGTGT-GAATTGC


B. radicans 4831             ATTAATCCCG--CGAAACCATCG--AGTTTTTTAA-CGCAACTTGCCCCC
H quarrei 6586               AT-AATCCCG--CTAATC-ATCG--AGTTGTTGAA-CTCAAGTTGCCCCC
H. dissoluta 5154            ATTAATCCCC--GTCAACCATCGC-ATTTTTTGCAACTCAACTTGCCCCC
H. rudis 6576                ATAAATCCCT--C-CAACCATCGA-AGTTTTTG-AACGCAACTTGCCCCC
H. anamesa 4841              AGAAATCCCG--ACGAACCATCGA-GATTCTTC-AACGCAAGCTGCGCCC
E. muticus 6954              CTGAATCCCN--C-CAACGGTCGC-AGTTGTTG-AACGCAAGTTGCTCCC
CoixBuckler                  AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Arundinellanepalensis        AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Pennisetumsetaceum           AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Panicumbisulcatum            AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCT
Chimonobambusabrevinoda      AG-AATCCCG--C-GAACCATCG--AGTCTTTGAA-CGCAAGTTGCGCCC
Danthoniacalifornica         AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Eragrostisdielsii            AG-AATCCCG--T-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Aristidaharvardii            AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Zeadiplo                     AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
ZmaysGfl                     AG-AATCCCG--T-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Cleistachnesorghoides        AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
I. cylindrica 6632           AT-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
D. filliformis 5874          ATTAATCCCG--C-CAACGATCC--AGCTTTTTAA-CGCAAGTTGCGCCC
T. spicatus 4846             AT-AATCCCG--CGCAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
P. franksae 4705             --------------------------------------------------
C. plurinoides 6404          --------------------------------------------------
A. eucomus5869               A--AATCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
D.filliformis 5872           ATAAATCCCN--CCAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCCCCC
H. contortus 4271            ATAAATCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
H. contortus 4741            ATAAATCCCG--CGAA-CCATCGC-AGTTTTTGAA-CGCAAGTTGCGCCC
B. radicans 4831             ATAA-TCCCG--CGAAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
A. appenduculatus 6638       ATAA-TCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
A. appenduculatus 6677       ATAA-TCCCG--CGAA-CCATCGC-AGTTTTTGAA-CGCAAGTTGCGCCC
A. appendicilatus 6543       ATAAATCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
H. hirta 6656                ATAA-TCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
H. hirta 6550                ATAA-TCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
H. quarrei 5088              ATAAATCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
B. insculpta 5681            ATAAATCCCG--CGGAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
T. triandra 6555             AGAA-TCCCG--CGCAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Spies 6620                   AGAA-TCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
H. pilgeriana 4738           ATAA-TCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
A. appendiculatus 6625       ATAA-TCCCG--CG-AACCATCG--AGTTTTTGAA-CGCATGTTGCGCCC
Bothriochloa 7489            ATAAATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
H. longofollium 6560         AG-AATCCCG--CGGAACCATCG--AGGCTTTGAA-CGCGAGTTGCGCCC
H. longofollium              AGCAATCCCG--CGGAACCATCG--AGTCTTTGAA-CGCAAGTTGCGCCC
Pannicum schinzii 6652       ATAA-TCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
B. serata                    ATAA-TCCCG--CGTAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
S. halepense 9318            ATAA-TCCCG--CGAA-CCATCG--AGTTTGTGAA-CGCAAGTTGCGCCT
Papalum dilatum 6617         ATAA-TCCCG--CGAA-CCATCC--AATTTTTGAA-CGCAAGTTGCTCCC
Paspalum                     AGAA-TCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Brachiaria                   ATAAATCCCG--CGAAACCATCGT-AGTGTTTGAA-CGCAAGTTGCGCCC
Aristida adscencianis 6713   ATAAATCCCG--TGTAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
H. contortus 6628            AGCAATCCCG--CGGAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
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T. leucothrix 6627          AGAAATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
S. halepense 9319           ATAA-TCCCG--CA-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
S. bicolour 6588            ATAA-TCCCG--CG-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
S. bicolour 6589            ATAA-TCCCG--CG-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
E. muticus 5074             ATAA-TCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
E. muticus 6715             ATAA-TCCCG--C-AAACCATCGC-AGTTTTTGAA-CGCAAGTTGCGCCC
M. capensis 6655            ATAA-TCCCG--CGCAACCATCN--AGTTTTTGAA-CTCAAGTTGCCCCC
C. prolixus 6682            ATAA-TCCCG--C--AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
C. excavatus 5877           ATTAATCCCC--T-CAATCATCC--ATTTGTTNAAACACAGGTTGCCCCC
C. plurinodus 6406          AT-AATCCCG--C-NAATCATCN--ATTTTTTGAA-CGCAAGTTGCGCCC
H. anamesa 4807             ATAA-TCCCG--C--AACCATCG--AGTTTTTGAA-CGCAAGTTGCCCCC
A. amethestinus 6685        ATACATCCCG--CTGAACCATCT--AGGTTTTTAAACGCAAGTTGCGCCC
I. cylindrica 5114          ATAA-TCCCG--C-CAATCATCC--ATTTTTTGAA-CGCAAGTTGCCCCC
I. cylindrica 6582          ATAA-TCTCG--C-CAACCATCC--ATTTTTTGAA-CGCAACTTGCCCCC
Monocymbium                 ATAA--TCTG--GTCAATGGTCC--ATTTTTTCAA-CTCAACTTGCCCCC
A. distachyos 6684          ATTCATGTGCCTCGAATGGATTCCATTATTTCCGACTGCAACTTGCCGCC
B. bladhii 5173             --TAATGTGC-TC-AATGGGTCC--TTATGGCCGAATACACCG-GCCGCG
S. nigrostis 6567           --TAATTCG--TC-AATGGATTGC---ATTTGTCAATAAACCA-GCTACA
H. fillipendula 5144        --TACTGTGC-TC-CATAGTTCC----TTATGTCCACGAATCTAGCCCCC
H.tamba 6585                --TAATCCGC-TC-AATCGATTCC---TTTTTTGAACTCAACTTGCCCCC
A. schirensis 6581          ATAAATCCGC-TCGAATGCATCCC--ATTTTTTCAACTCAACTTGCCCCC
E. villosa 5085             ATGAATCCCC-TCCAATC-ATCGCAGTTTTTGCAACTGCAACTTACGCCC
C. excavatus 6577           A-TAATCCCC-TC--AACGATCCC--ATTTGTTCAAACCAACTTGCCCCC
C. marginatus 4397          CATAATCCCG--CGAACC-ATCGA---GTTTTTGAACGCAAGTTGCCCCC
Evillosa                    AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Saccharumofficinarum        AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Imperatacylindrical         AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Bothriochloainsculpta       AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Dichanthiumannulatum        AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Cybopogonprolixus           AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCACATTGCGCCC
Cplurnodus                  AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCACATTGCGCCC
Cmarginatus                 AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCACATTGCGCCC
Cexcavatus                  AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCACATTGCGCCC
Hyparrhnietamba             AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Hanamesa                    AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Heteropogoncontortus        AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC


B. radicans 4831            T-ATGCC-TTCTGNTCAA-GGGCACCTCTGCCTGGGCG--TCACGCCG--
H quarrei 6586              G-AGGCC-TTCTGGTCAA-GGGCACCTCTGCCTGGGCGC-TCACGCCA--
H. dissoluta 5154           TGACGCC-TTCTGTTCAA-CGACACATCTGATTGGGCA--TCACAGCC--
H. rudis 6576               GGA-GCC-TTCTGGTCAA-CGGCACGTCTGCCTGGGCG--TCAC-GCC--
H. anamesa 4841             C-ACGTC-TTCTGGTCGA-CGGCACCTCTGCCTGAGCG--TCAA-TCT--
E. muticus 6954             GGA-GCC-TTCTGGTCAA-CGGCACCTCTGCCTGGGCG--TCCC---C--
CoixBuckler                 G-AGGCC-TTCTGGCCAA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Arundinellanepalensis       G-AAGCC-TCCAGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Pennisetumsetaceum          G-AGGCC-TTCTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Panicumbisulcatum           G-AGGCC-TTCTGGTCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Chimonobambusabrevinoda     G-AGGCC-CTCGGGCCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Danthoniacalifornica        G-AGGCC-TTCTGGCCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Eragrostisdielsii           G-AGGCC-TTCTGGCTGA-GGGCACGTCTGCCTGGGCG--TCACGCG---
Aristidaharvardii           G-AGGCC-TTCTGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Zeadiplo                    G-AAGCC-TTCTGGCGGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
ZmaysGfl                    G-AAGCC-TTCTGGCGGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Cleistachnesorghoides       G-AGGCC-TTCTGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
I. cylindrica 6632          GTAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
D. filliformis 5874         GA-GGCC-TTTTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCCG--
T. spicatus 4846            GAAGGCC-TTTTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
P. franksae 4705            ----------------------------------------------------
C. plurinoides 6404         ----------------------------------------------------
A. eucomus5869              G-AAGCC-TTTTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
D.filliformis 5872          G-AAGCC-TTTTGGTCGA-GGGCAC-TCTGCCTGGGCG--TCACGCC---
H. contortus 4271           G-ATGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
H. contortus 4741           G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
B. radicans 4831            G-AGGCC-TTCTGGTCAA-GGGCACGTCTGCCTGGGCG--TCACGCC---
A. appenduculatus 6638      G-AG-CC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
A. appenduculatus 6677      G-GAGCC-TTCTGGTCGA-GGGCACCTCTGCCTGGGCG--TCACGCC---
A. appendicilatus 6543      G-AGGCC-TTCTGGTCGA-GGGCACCTCTGCCTGGGCG--TCACGCCG--
H. hirta 6656               G-A-GCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
H. hirta 6550               G-A-GCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
H. quarrei 5088             G-ATGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
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B. insculpta 5681            G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
T. triandra 6555             G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Spies 6620                   G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
H. pilgeriana 4738           G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
A. appendiculatus 6625       G-ATGCC-TTCTGGTCTA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Bothriochloa 7489            G-AGGCC-TTCTGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
H. longofollium 6560         G-AAGCC-TTTTGGCCTAAGGGCACGCCTGCCTGGGCG--TCACGCC---
H. longofollium              G-AAGCC-TTTTGGTCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Pannicum schinzii 6652       GGAGGCC-TTTTGGTTGA-GGGCACGTCTGCCTGGGCG--TCACGCCG--
B. serata                    G-AGGCC-TTCTGGTCCA-GGGCACGCCTGCCTGGGCG--TCACGCC---
S. halepense 9318            G-ACGCC-TTCTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Papalum dilatum 6617         G-AGGCC-TTCTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Paspalum                     G-AGGCC-TTTTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Brachiaria                   C-ACGCC-TTCTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Aristida adscencianis 6713   G-AAGCC-TTCTGGTCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
H. contortus 6628            G-AGGCC-TTCTGGCCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
T. leucothrix 6627           G-AGGCC-TTCTGGCCTA-GGGCACGCCTGCCTGGGCG--TCACGCC---
S. halepense 9319            G-AGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCA--
S. bicolour 6588             G-AG-CC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCG--
S. bicolour 6589             G-AGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCA--
E. muticus 5074              G-AAGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
E. muticus 6715              G-ACGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
M. capensis 6655             G-AAGCC-TTCTGGCCGA-AGGCACNTCTGCCTGGGCG--TCACGCC---
C. prolixus 6682             G--AGCC-TTCTGGTC-A-GGGCACCTCTGCCTGGGCG--TCACGCCA--
C. excavatus 5877            T-ATGCC-TTCTTTTCAA-CGACACCTCTGCCTGGGCG--TCACGCC---
C. plurinodus 6406           G-ACGGC-TTCTTGTCCA-GGGCACATCTGCCTGGGCG--TAACACC---
H. anamesa 4807              A--CGCC-TTCTGGTCAA-GGGCACCTCTGCCTGGGCG--TCACGCC---
A. amethestinus 6685         C-AGGGC-TTCTGGTCGA-GGACACCTCTTCCTGGCCGC-TCACGCC---
I. cylindrica 5114           C-ACGCC-TTCTGGTCAA-GGGCACCTCTGCCTGGGCG--TCACGCCA--
I. cylindrica 6582           C-ACGCC-TTCTGGTCAA-CGGCACCTCTGCCTGGGCG--TCACGCCA--
Monocymbium                  T-ACGCC-TTCTGTCCAA-CGACACCTATGCCTGGCCG--TCACGACA--
A. distachyos 6684           TGACCCCGTTCTCTTCACACGACACCAATTGCATGTCGCGTCACGCTGAT
B. bladhii 5173              T-ACCGCGGTCTCTTCAC-CGACAACAATGGGA-GTCGCC-CACCACG-T
S. nigrostis 6567            TGACGCCTTCTTACTGAG--GGCAACACCTACCATGTGCCCCACCACG-T
H. fillipendula 5144         C-ACGAC-TTCTGTTCGC-ACACACCACTTC---TTCTCGCCCCCAAGTT
H.tamba 6585                 T-ACGAC-TTCTCTGCAA-CGACACAACTGC----TTGCGCCCCACACCT
A. schirensis 6581           C-ACGCCTTTTCTTTGAC--GACACAACTGCTTGCGCGTCACACCAAA--
E. villosa 5085              G-ACGGCTTTTTTGCTGCAAGGCACGTCTGCCTGTCGCG-TCACGCCA--
C. excavatus 6577            T-ACGCC-TTCTCTGCAA-CGACACCTATTGCATGGCCG-TCACCCCA--
C. marginatus 4397           GGACGCC-TTCTGTTCAA-CGACACCTCTGCCTGGGCG--TCACGCCA--
Evillosa                     -GAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Saccharumofficinarum         -GAGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Imperatacylindrical          -GAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Bothriochloainsculpta        -GAGGC--TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Dichanthiumannulatum         -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--TCACGCC---
Cybopogonprolixus            -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--NCACGNC---
Cplurnodus                   -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--NCACGAC---
Cmarginatus                  -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--NCACGAC---
Cexcavatus                   -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGNG--TCACGAC---
Hyparrhnietamba              -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGTG--TCACGCC---
Hanamesa                     -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGTG--TCACGCC---
Heteropogoncontortus         -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGTG--TCACGCC---


B. radicans 4831             AAAATAC-ACTCCCAACCC-AT---ACTCGGGGG--AGGG-ATGTTGTG
H quarrei 6586               AAATGAC-ACTCCCAAGGGGAA---AATCGGGAG--ACGGCATACTTTG
H. dissoluta 5154            TAATAAC-ACTCAC-AACATACAATC--GCGGC----A-GCACCTTCT-
H. rudis 6576                AAAATAC-ACTCCC-AACACACCATC--G-GGG----A-GGACCTGGT-
H. anamesa 4841              TATCTAC-AAGTCG-ACGTAACCNTN--GGGGA----C-NNACCTNGT-
E. muticus 6954              AAAACAC-ACTCCC-AACCCATAATCCTGGAGGG---C-ACAAGTTGT-
CoixBuckler                  AAAAGAC-ACTCCC-AACCCACCC-CCGGGG------AGGGACGTGGT-
Arundinellanepalensis        AAAAGAC-ACTCCC-AACCCAACC-CAGGGG------AGGGATGTGGC-
Pennisetumsetaceum           AAAAGAC-ACTCCC-AACCCATCC-ATTGGGAA-----AGGATGTGGT-
Panicumbisulcatum            AAAAGAC-ACTCCC-AACCCATCC-AT-GGGGT-----GGGACGTGGT-
Chimonobambusabrevinoda      AAAAGAC-GCTCCC-CACCCCCCC-TCGGCGGGGC-GGAGGACGCGGT-
Danthoniacalifornica         AAAAGAC-GCTCCC--ACCCAACC-CCGGTG-------AGGACGCGGC-
Eragrostisdielsii            AAAAGAC-ACTCCT-CACCCATC--TTGGTG-------TGGACGTGGC-
Aristidaharvardii            AAAAGAC-ACTCCC-CACCCACCC-AGGTTG-------GGGACGTGGC-
Zeadiplo                     AAAAGAC-ACTCCC-AACACCCCC-CCTGCGGGGC-GAGGGACGTGGC-
ZmaysGfl                     AAAAGAC-ACTCCC-AACACCCCC-CC-GCGGGGC-GAGGGACGTGGC-
Cleistachnesorghoides        AAAAGAC-ACTCCC-AACCCACCC-AAAGGGGAG--GAGGGACGTGGT-
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I. cylindrica 6632          AAAAGAC-ACTCCC-AACCCACCC-TCGGGG------AGGGACATGGT-
D. filliformis 5874         AAAACAC-ACTCCC-AAACCGAAA-TCCGGG------AGGGACGTGGT-
T. spicatus 4846            AAAAGAC-ACTCCC-AACCCACCC-TCGGGGG-----AGGGACGTGGT-
P. franksae 4705            --GTACC-CGCTCAGATACTAG---CAGCAAA----ATAGGACTTCCT-
C. plurinoides 6404         ----------------------------TCGGG----GTAGTA-TTGGC-
A. eucomus5869              AAAAGAC-ACGTCCCAAGCCAC---AATCAAG----GAGGTA-CTGGC-
D.filliformis 5872          AAAAGAC-A-CTCCCAAGCCAC---CCTCGGG----GAGGGACTTGGC-
H. contortus 4271           AAAAGAC-A-CTCCCAACCCAT---CCTCGGGG---CGGGGACTTGGC-
H. contortus 4741           AAAACAC-A-CTCCCAACCCAA---AATCGGG----CGGGGATGTGGT-
B. radicans 4831            AAAAGAC-ACTCCC-AACCCAA---CCTCGGGG---AGGG-ATGTGGT-
A. appenduculatus 6638      AAAAGAC-ACTCCC-AACCCAA---CCTCGGGG---AGGG-ATGTGGT-
A. appenduculatus 6677      AAAAGAC-ACTCCCCAACCCAA---CCTCGGGG---AGGG-ATGTGGT-
A. appendicilatus 6543      AAAACAC-ACTCCC-AACCCAA---AATCGGGGG--AGGGCATGTG-T-
H. hirta 6656               AAAA-AC-ACTCCC-AACCCAC---CCTCGGGG---ACGG-CACTGGT-
H. hirta 6550               AAAAGAC-ACTCCC-AACCCAC---CATCGGGG---ACGG-ACGTGGT-
H. quarrei 5088             AAAAGAC-AGTCCC-AACCCAC---CATCGGGG---ACGG-ACGTGGT-
B. insculpta 5681           AAAAGAC-ACTCCCAACCCAC----CCTCGGGG---AGGGCACGTGGT-
T. triandra 6555            AAAAGAC-ACTCCCAAACCAC----CCTAGGGG---AGGG-ACGTGGT-
Spies 6620                  AAAACAC-TCTCCAAACCCGC----AA-CGGAG---AGGG-ACCTGGT-
H. pilgeriana 4738          AAAAGAC-ACTCCCAACCCGT----ACTCGGGT---AGGG-ACGTGGT-
A. appendiculatus 6625      AAAATAC-TCTCCCAACCCGG----AATCGGGT---ACGG-ACGTGGT-
Bothriochloa 7489           AAAATAC-ACTCCCAACCCGGG---ACAAGGGG---AGGG-ACATGGT-
H. longofollium 6560        -AAACAC-GCTCCCGACCCCACTAACCTGTGAT---CTGC-ATGCCAC-
H. longofollium             -AAACAC-GCTCCC-ACCCCACTAACCTGTGGT---GGG--ATGCGGC-
Pannicum schinzii 6652      AAAAGAC-ACTCCT-ACCCCAT-ACTATGGGGT---ACGG-ATGTGGT-
B. serata                   AAAAGAC-ACTCCC-AACCCA--ACCCTGGGG----ACGG-ACGTGGT-
S. halepense 9318           AAAAGAC-ACTCCC-AACCCA--TCCCTGGGT----AGGG-ACCTGGT-
Papalum dilatum 6617        AAAAGAC-ACTCCC-AACCCA--TCATAGGGT----GGGG-ACGATTTA
Paspalum                    AAAAGAC-ACTCCC-AACCCA--TCACTGGGG----AAGG-ACGTGGC-
Brachiaria                  AAAAGAC-ACTCCC-AATCCA--TCAGTGGGG----AAGG-ACTTGGT-
Aristida adscencianis 6713  AAAAGAC-ACTCCC-AACCCA--TCCATGGGG----ACGG-ACGTGGT-
H. contortus 6628           AAAAGAC-GCTCCC-AACCCA--ACCAAGGGG----AGGG-ACGCGGT-
T. leucothrix 6627          AAAAGAC-GCTCCC-AACCCA--ACCAAGGGG----AGGG-ACGCTGT-
S. halepense 9319           ACATTAC-ACTCCG-AACCCA---CCCTCGGGG---AGGG-ATGTGGT-
S. bicolour 6588            ACAGTAC-ACTCCC-AACCCA---GCCTCGGGG---AGGG-ATGTGGT-
S. bicolour 6589            ACAG-AC-ACTCCC-AACCCA---GGCTCGGGG---AGGG-ATGTGGT-
E. muticus 5074             AAAANAC-ACTCCC-AAACCAC---AATCGTGG----AGGGAC-TGGT-
E. muticus 6715             AAAACACTACTCCC-AACCCAC---NCTCGTGG----AGGGACATGTT-
M. capensis 6655            AAAACAC-ACTCCCAAACCCAC---ACAAGG-----AAAGGACATTTT-
C. prolixus 6682            AAATGAC-ACTCCC-AACCCAT---CCTCGGGT----ACGGACATGGT-
C. excavatus 5877           AAAATAC-ACTCCCAACCCCAA---CCCTCGGGG--AGG--ACCTTGC-
C. plurinodus 6406          AAAAGAC-ACTCCCAACAGCA-CCCTCGAGCGGCATAATGGACCTGAC-
H. anamesa 4807             AAAATAC-ACTCCC-AACCCAT---CCTCGGGT-----AGGACATGGT-
A. amethestinus 6685        ATAGCAC-ACTCACCAAGATGAC--CCTCGGCCT---ACAGATTTGGT-
I. cylindrica 5114          AAATGAT-ACTCGCCAACGCGCAT-CCTCGGGG----AGGGACATT-TC
I. cylindrica 6582          AAATGAC-ACTCCC-AACCGAT---CCTCGGGG----ACGGACATTTT-
Monocymbium                 TAATGAT-ACTCCG-AACCCTTCG-CAAGGCGG----ACGGACATTTT-
A. distachyos 6684          GAATGAG-ACGTCGACACGATTCTTCGGCAGACGG---CACACTTTGG-
B. bladhii 5173             GC-TGTG-CC--CGGCACGGCTATCCGGCAACC-----CAAACTTCGG-
S. nigrostis 6567           GC--GGC-GCTCGAACAAGTTTTGCTGGCAGCC-----CAAACTTCG--
H. fillipendula 5144        TC-TGTG-CC---CAATCCACTTGTTGCCAGGC-----CCCACTTTTG-
H.tamba 6585                GCTGTAC-ACTGCCACAAC-CACTATGGCAGTAG----CTACCTTCTG-
A. schirensis 6581          -T--GAC-ACT--CACAAAACACCCTTGCAGAC-----CCACCTTCTG-
E. villosa 5085             -AAAGAC-ACTCCCAGTCCCTACCCTTGACAGGGCA--TCTACTTCTT-
C. excavatus 6577           AAATATG-ACTCGGAGACCATTCCCTCGCAGCA-----CGCACCTTCG-
C. marginatus 4397          -AAATAC-ACT--CCCAACCAATCCTCGGCAGAAG---GACGCTTTGG-
Evillosa                    AAAAGAC-ACTCCCAACCCGA----CCTCGGGG---AGGG-ACGTGGT-
Saccharumofficinarum        AAAAGAC-ACTCCCAACCCAC----CCGAGGGGG--AGGG-ACGTGGT-
Imperatacylindrical         AAAAGAC-ACTCCCAACCCAC----CCTCGGGG---AGGG-ACGTGGT-
Bothriochloainsculpta       AAAAGAC-ACTCCCATCCCAA----CCTCGGGGGGGGGG--ACGTGGT-
Dichanthiumannulatum        AAAAGAC-ACTCCCAACCCAA----CCTCGGGGGGG-----ACGTTGT-
Cybopogonprolixus           AAAAGAC-ACTCCCATCCCAA----TCTCGGGGGGGG----ATGTGGT-
Cplurnodus                  AAAAGAC-ACTCCCATCCCAG----TCGCGGGGGGGG----ATGTGGT-
Cmarginatus                 AAAAGAC-ACTCCCATCCCAG----TCTCGGAGAGGG----ACGTGGT-
Cexcavatus                  AAAAGAC-ACTCCCATCCCAC----CCTCGGGGAGGG----ACGTGGT-
Hyparrhnietamba             AAAAGAC-ACTCCCAACCCAC----CCTCGGGGGGGG----AGNTGGN-
Hanamesa                    AAAAGAC-ACTCCCATCCCAN----CCTCGGGGGGG----ACGTGGT-
Heteropogoncontortus        AAAANAA-NCTCCCAACCCAN----CTTGGGACGGG-----ACGTGGT-


B. radicans 4831            -TTTCGCCTCCCCCTTCC-GGCAAGGGCGAGGCTGAACACAACTTC
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H quarrei 6586              GTTTGGCCGTCCCCCTGC-GGCAAGGGCGAGGCTTGACACAACTTG
H. dissoluta 5154           CTTTGCCC--CCCCGTAC-CATACGACGGGGGTGAACACAAACTT-
H. rudis 6576               GTTTGGCC--CCCCCTGC-CATACGGCGGGCC-GGACACGAAATT-
H. anamesa 4841             NTT-------------------------------------------
E. muticus 6954             TTGGACCC--CTCCCCCC-NNGAGGGCAGGGGTGGGAA-NAAGTT-
CoixBuckler                 ATCTGGCC--CCCCGCGC-CGCAAGGCGCGG-TGGGCCG-AAGTT-
Arundinellanepalensis       GTATGGCC--CCCCGTGC-CGCATGGCGCGG-TGGGCCG-AAGTT-
Pennisetumsetaceum          GTTTGGCT--CCTCGTGC-TGCAAAGCGCGG-TGGGCCG-AAGTT-
Panicumbisulcatum           GTTTGGCT--CCCCGTGC-CTCACGGTGCGG-TGGGCCG-AAGTT-
Chimonobambusabrevinoda     GTTTGGCC--CCCCGCGC-CGCACGGCGCGG-TGGGCCG-AAGTT-
Danthoniacalifornica        GTTTGGCT--CCCCGTGC-CGCAGGGCGCGG-TGGGCCG-AAGTT-
Eragrostisdielsii           ATTTGGCT--CCCCGTGC-AACACGACACGG-TGGGCCG-AAGTT-
Aristidaharvardii           GTATGGCC--CCCCGTGC-CGCGAGGCGCGG-TGGGCCG-AAGTT-
Zeadiplo                    GTCTGGCC--CCCCACGC-CGCAGGGCGAGG-CGGGCCG-AAGCA-
ZmaysGfl                    GTCTGGCC--CCACGCGC-CGCAGGGCGAGG-TGGGCCG-AAGCA-
Cleistachnesorghoides       GTTTGGCC--TCCCGTGC-CTCACGGCGCGG-TGGGCCG-AAGTT-
I. cylindrica 6632          GTTTGGAC--CCCCGCTC-CGCAGGGCGCGG-TGGGCCA-AACTT-
D. filliformis 5874         GTTTGGCC--CCCCGTGC-CGCAGGGCGCGA-TGGGCCTGAAGTT-
T. spicatus 4846            GTTTGGCC--CCCCGTGC-CGCAGGGCGCGG-TGGGCCT-AATTT-
P. franksae 4705            GTTTGGAT--CCCCGTGC-CGCATGGGCACAGTCGGGCCGAAAGTT
C. plurinoides 6404         GTCTGCC---CCCCTCGC-CTCATGACGCGGATGGTCG--AATAT-
A. eucomus5869              GTATGGCC--CCCCGTGC-CGCACGGCGCGG-TGGGCCG-AAATT-
D.filliformis 5872          GTATGGCC--CCCCGTGC-CGCACGGGGGCGGTGGGCC--AAATT-
H. contortus 4271           GTTTGGCC--CCCCGTGC-CGCAGGGCGCGG-TGGGCCA-AATAA-
H. contortus 4741           GTTTGGCC--TCCCGTGC-CGCAAGGCGCGG-TAGGCCG-AAGTT-
B. radicans 4831            GTTTGGCC--TCCCGTGC-CGCAGGGCGCGG-TGGGCCG-AAGTT-
A. appenduculatus 6638      GTTTGGCC--TCCCGTGC-CGCAGGGCGCGG-TGGGCCG-AACTT-
A. appenduculatus 6677      GTTTGGCC--TCCCGTGC-CGCAGGGCGCGG-TGGGCCC-AACTT-
A. appendicilatus 6543      GTTTGGCC--TCCCGTGC-CGCAGGGCGCG--TGGGCCG-AACTT-
H. hirta 6656               GTTTGGCC--CCCCATGC-CGTATGGCGCGG-TGGGCCC-AACTT-
H. hirta 6550               GTTTGGCC--CCCCATGC-CGTATGGCGCGG-TGGGCCG-AAGTT-
H. quarrei 5088             GTTTGGCC--CCCCGTGC-CGTACGGCGCGG-TGGGCCG-AAGTT-
B. insculpta 5681           GTTTGGCT--CCCCGTGC-CGCAGGGCGCAG-TGGGCCG-AAGTT-
T. triandra 6555            GTTTGGCT--CCCCGTGC-CGCAGGGCGCGG-AGGGCCA-AAATT-
Spies 6620                  GTTTGGCT--CCCCGTGC-CGCAGGGCGCGG-TGGGCCG-AAGTT-
H. pilgeriana 4738          GTTTGGCC--CCCCGTGC-CGCAGGGCGCGG-TGGGCCG-AAGTT-
A. appendiculatus 6625      GTTTGGCC--CCCCGTGC-CGCAGGGCGCGG-TGGGCCA-AACTT-
Bothriochloa 7489           GTTTGGCC--CCCCGTGC-CGCAGGGCGCGG-TGGGCCG-AAGTT-
H. longofollium 6560        ATGTGGCT--CCCCGTACTCGCAAGCGGCGTGTGCGGCTCAAGAT-
H. longofollium             ATGTGGCT--CCCCGT-CTCGCAAGGGGCGG-TGGGCCTCAAGAT-
Pannicum schinzii 6652      GTTTGGCT--CCCCTTGC-CTTGCGGNATGG-TGGGCTA-AAGTT-
B. serata                   GTTTGGCT--CCCCCTAC-CGCAAGGGGCGG-TGGGCCG-AAATT-
S. halepense 9318           GTTTGGCT--CCCTGTGC-TGCAAAGCGCGG-GGGGCTG-AAATT-
Papalum dilatum 6617        GTTTGGCC--TCTCGTGC-CGTTGTGCACAGGTGGGCCT-AAATC-
Paspalum                    GTTTGGCT--CCTCGTAC-TGCATGGTGCGG-TGGGCCG-AAGTT-
Brachiaria                  GTTTGGCT--CCCCGTGC-CGCAAGGAGCCG-TGGGCCA-AAGTT-
Aristida adscencianis 6713  GTTTGGCT--CCTCGTGC-CGTAAGGTGCGG-TGGGCCG-AAGTT-
H. contortus 6628           GTTTGGCT--CCCCGTGC-CGCAAGGCGCGG-TGGGCCG-AAGAT-
T. leucothrix 6627          GTTTGGCT--CCCCGTGC-CGCAAGGCGCGG-TGGGCCG-AAGAT-
S. halepense 9319           TTTTGGCT--CCCCGATGCCGCATGGCGTGG-TGGGCCC-AAGTT-
S. bicolour 6588            TTTTGGCT--CCCCGATGCCGCATGGCGCGG-TGGGCCC-AAGTT-
S. bicolour 6589            TTTTGGCT--CCCCGA-GCCGCATGGCGCGG--GGGCCG-AAGTT-
E. muticus 5074             GTTTGGCC--CCTCGCGCCTCAGG--CGCGG-TGGGCC-AAATTT-
E. muticus 6715             GTTTGGCC--CCTC-CGCCTCANGG-CACGG-GGGGCC-AAAATT-
M. capensis 6655            GTTTCGTC--CCCCCTTCCGCAAGG-CGCGA-TGGGCCA-AAATT-
C. prolixus 6682            GTCTGGCC--CCCCGTGCCGCAAGG-CGGGG-TGGGCCACAAGTT-
C. excavatus 5877           GTCTGGCC--CCCCGTGCCGCACGG-GGGGG-TGGACCCCAAGTT-
C. plurinodus 6406          GTCTGGCC--CCCCGCCCGGCAGGG-CGAAG-TGGGCCCCAATAT-
H. anamesa 4807             GTTTGGCC--CCCCGTGCCGCAAGGCGGGG-TCGACCACAACTT--
A. amethestinus 6685        GTTTCGCC--CCTCGTGGCACGAGGGGCCGAGC-ACCACAAGTT--
I. cylindrica 5114          GTTTGGAC-CCCCCCTGCCGGCAGGGGGGCGGTGGGACACAAGTTG
I. cylindrica 6582          GTTTCGAC-CCCCCCTGCCGGCAGGG-GGGTTCAGACACAAATTG-
Monocymbium                 GTTTGACC--CCCCGTTGCGGAAGG-GGGGGTCAGACAC-AACTG-
A. distachyos 6684          -TTTCACC-CCTCCTTGCGGCAAGGAGGGGCCGAACAC-AACGTG-
B. bladhii 5173             -CT-CACC-TCGCCCTGCGGCA-GGGGGAGCCAAACACC-AC-TG-
S. nigrostis 6567           -TTCCACC-CCACCATCTAGCT-CGAGCAGCCAAACACC-ACGTG-
H. fillipendula 5144        -GCCAACC-CCACCTTATTGAACGTTG--GGCAAACACC-CCCTT-
H.tamba 6585                -CTCTACC-ACCCCGTGCCGCACGACGG-GGCATACACC-AACAT-
A. schirensis 6581          -TT-TACC-GCCCCCTGCCGCACGGGGG-GCCGAACACC-AAGTC-
E. villosa 5085             -TCCTTCC-TCCCCTGCCAGGACGA-GGAACCAAACACC-ATGAT-
C. excavatus 6577           -GTCTAGC-GCCCCCTGCCGCACGG-GGGGCCAGACCCC-AACTT-
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C. marginatus 4397          -TT-GACC-GCGCCCTGCGGCAAGGGGGGGCCAGACACACACTG--
Evillosa                    GTTTGGCC-CCTCGTGC-CGCAAGG-CGCGG-TGGGCCG-AAGTT-
Saccharumofficinarum        GTTTGGTC-CCCCGTGC-CGCAGGG-CGCGG-TGGGCCG-AAGTT-
Imperatacylindrical         GTTTGGAC-CCCCCCGC-CGCAGGG-CGCGG-TGGGCCG-AAGTT-
Bothriochloainsculpta       GTTTGGCC-CCTCGTNC-CTCAAGG-CACGG-TGGGCCG-AAGTT-
Dichanthiumannulatum        GTTTGGCCCCCCCNNTC-CCNAAGG-GGGNGGGGGCCC--AAGTT-
Cybopogonprolixus           GTTTGGCCCCCCTTCCC-CAAGGGG--GAGG-TGGCCCGC-AGTT-
Cplurnodus                  GTTGGNCCCCCNNTGCC-CAAGGGG--GAGG-TGGCCCC-AAGTA-
Cmarginatus                 GTTTGGCCCCCCTTTCTACAANAN--NACGG-TGGGCCG-AAGTT-
Cexcavatus                  GTTTGGCCCCCCATGCC-GAATGGG-GAGG--TGGTACCNAAGTT-
Hyparrhnietamba             -TTTGGCCCCTCCGTCC-AAAGGGG-GGGGG--GGCCC--AAGNT-
Hanamesa                    TTTTGGCCCCCCCCTTCC-CCATTGG-CGCGG-TGGGGCGGGAATT-
Heteropogoncontortus        GTTTGNCCCCCCGTNCC--GCAGGG-CGCGG-TAGGCCG-AAGTT-


B. radicans 4831            CGGTCTGCCCGAGCGTAATCTTGCCGAGGTCACA-TTACG-TGGTTGACG
H quarrei 6586              CCGTCT-CCCGAG-GTAATCTTGCCGAGGTGACA-TTTGG-TGGTGAGCC
H. dissoluta 5154           CGGGCTTCCAGCA-TTATCTATCTTA-GTGAATTTTT---TCGGTATGAC
H. rudis 6576               GCCTCTCCCATGC-CTATCTGTGGCACGTGCACTTTTAGCTAGTACGGCN
H. anamesa 4841             --------------------------------------------------
E. muticus 6954             GGGGCTGCCGGAA-CGATCGGCTTTCGGACACATTTT-----TGGTGGAC
CoixBuckler                 GGGGCTGCCGT---CGAATCGTG-TCGGG-CACA-GCACG-TGGTGGGCG
Arundinellanepalensis       GGGGCTGCCGG---CAAACCGTG-TCGGG-CACA-GCATG-TGGTGGGCG
Pennisetumsetaceum          GGGGCTGCCGG---CATAACATG-CCGGG-CACC-GCACG-TGGTGGGCG
Panicumbisulcatum           TGGGCTGCTGG---CATACCGTG-CCGGG-CACC-GCACG-TGGTGGGCG
Chimonobambusabrevinoda     CGGGCTGCCGG---CGCAGCACG-CCGGG-CACA-GCACA-AGGTGGGCG
Danthoniacalifornica        GGGGCTGCCGG---CGTACCGTG-CCGGG-CGCA-GCACA-AGGTGGGCG
Eragrostisdielsii           GGGGCTGCCGG---CTTACGGTA-CCGGT-CACA-GCACA-AGGTGGGTG
Aristidaharvardii           GGGGCTGCCGG---CGTATCGCG-TCGGG-CACA-GCACG-TGGTGGGCG
Zeadiplo                    GGTGCTGCCGG---CGAACCGCG-CCGGG-CGCA-GCACG-TGGTGGGCG
ZmaysGfl                    GGGGCTGCCGG---CGAACCGCG-CCGGG-CGCA-GCACG-TGGTGGGCG
Cleistachnesorghoides       GGGGCTGCCGG---CGAATCGTG-TCGGG-CACA-GCACG-TGGTGGGCG
I. cylindrica 6632          GGGGCTGCCGG---CGAA-CGTG-TCGGG-CACA-TGACG-TGGTGGGCG
D. filliformis 5874         GGGGCTGCCATC--TGAATCATA-CCGGTACACA-TCACG-CGGTGGGCG
T. spicatus 4846            GGGGCTGCCAG---TGAATCACAGCCGGTACACA-TCACG-TGGTGGGCG
P. franksae 4705            GGGGCTTCCGGC--ATAACCG-TGTCGGG-CACA-GCATT-CTGTGGGC-
C. plurinoides 6404         GGGGCTGCCGGC--G-AATCG-CGCCGGG-TACT-GGACG-TGGTGGACC
A. eucomus5869              GGGGCTGCCGGC--T-AATCC-TGCCAGG-CACA-GCACC-TGGTGGGC-
D.filliformis 5872          GGGGCTGCCAGC--A-AATCT-TGCCAGG-CACA-TCACG-TGGTGGGC-
H. contortus 4271           GGGGCTGCCGGC--A-AATCT-TGCCGGG-CACA-CCACT-TGGTGGGC-
H. contortus 4741           GGGGCTGCCGGC--G-AATCG-TGTCGGG-CACA-GCACG-TGGTGGGC-
B. radicans 4831            GGGGCTGCCG-G--CGAATCG-TGCCGGG-CACA-GCACG-TGGTGGGCG
A. appenduculatus 6638      GGGGCTGCCG-G--CGAATCA-TGCCGGG-CACA-TCACG-TGGTGGGCG
A. appenduculatus 6677      GGGGCTGCCGAG--CTAATCN-TGCCGGG-CACA-TCACG-TGGTGGGCC
A. appendicilatus 6543      GGGGCTGCCG-G--CTAATCG-TGCCGGG-CACA-TCACG-TGGTGGGCG
H. hirta 6656               GGGGCTGTCG-A--CGAATCG-TGTCGGG-CACA-TCACG-TGGTGGGCG
H. hirta 6550               GGGGCTGTCG-A--CGAATCG-TGTCGGG-CACA-GCACG-TGGTGGGCG
H. quarrei 5088             GGGGCTGCCA-A--CGAATCG-TGTCAGG-CACA-GCACG-TGGTGGGCG
B. insculpta 5681           GGGGCTGCCGGC--G-AATCG-TGTCGAG-CACA-GCACG-TGGTGGGCG
T. triandra 6555            GGGGCTGCCCGC--G-AATCG-TGTCG-G-CACA--CAC--TGGTGGGCG
Spies 6620                  GGGGCTGCCGGC--G-AACCG-TGTCGGG-CACA-GCACG-TGGTGGGCG
H. pilgeriana 4738          GGGGCTGCCGGC--GGAATCG-CGCCGGG-CACA-GCACG-TGGTGGGCG
A. appendiculatus 6625      GGGGCTGCCGAC--GGAATCGTCGCCGAG-CACA-TTACG-TGGTGGGCG
Bothriochloa 7489           GGGGCTGCCGGC--GGAATCG-TGCCGGG-CACA-GCACG-TGGTGGGCC
H. longofollium 6560        CCAGGTGCCGGT---GTATCGT-ACCGGA-CACA-GCGCG-TGGCACGCG
H. longofollium             CCGGCTGCCGGT---GTATCGTGACCGGA-CACA-GCGCG-TGGTACGCG
Pannicum schinzii 6652      GTGGCTGCCGGC---ATACCGN-GTCGGG-CACCTGCATG-TGGNGGGCC
B. serata                   GGAGCTGCCGGC---GTACCTT-GCCGGG-CACC-GCACG-TGGTGGGCG
S. halepense 9318           GGGGCTGCCGGCA-TATACATT-GCCGGG-CACC-GCATG-TGGTGGGCG
Papalum dilatum 6617        TTGGCTGCCGG---TGTATCTT-GCTGGG-CACC-TCATA-TGGTGGGCG
Paspalum                    GGGGCTGCCGGC---ATAACTT-GCCGAG-CACC-GCACG-TGGTGGGCG
Brachiaria                  GGGGCTGCCGGC---ATAACTT-GACTGG-CACC-TCACG-TGGTGGGCA
Aristida adscencianis 6713  GGGGCTGCCGGC---ATATCTT-GCCGGG-CACC-GCACG-TGGTGGGCG
H. contortus 6628           GGGGCTGCCGGC--GGGACCGT-GCCGGG-CACC-GCACG-TGGTGGGCG
T. leucothrix 6627          GGGGCTGCCGGC--GGGACCGT-GCCGGG-CACC-GCACG-TGGTGGGCG
S. halepense 9319           GGGGCTGCCGGC---GATTCGT-GTCGGG-CACA-TCACG-TGGTGGGCG
S. bicolour 6588            GGGGCTGCCGGC---GATTCGT-GTCGGG-CACC-TCACG-TGGTGGGCG
S. bicolour 6589            GGGGCTGCCGGC---GATTCGT-GTCGGG-CACA-TCACG-TGGTGGGCG
E. muticus 5074             GGGGCTGCCGG---CATATCG-CGTCGGG-CACA-TCACG-TGGTGGGCG
E. muticus 6715             GGGGCTGCCGGA--CAGATCG-CGTCGGA-CACA-TCTT--TGGTGGGCG
M. capensis 6655            GGGGCTGCCTCG---GAATCGT-GTCAGA-CACA-TTATG-TGGTGGACC
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C. prolixus 6682            GGGGCTGCCGGC--GGAATCGTCGCCGGGGCACA-TCACG-TGGTGGGCC
C. excavatus 5877           CCCTCTCCCAGCG--TAATCT-CGCCGAG-CACA-TTACG-TGGTGAGCC
C. plurinodus 6406          GGGGCTGCCAGC---TAATCT-CGCCAGG-CACA-TTACC-TGGTCGGCC
H. anamesa 4807             GCGGCTCCCGAC--GGAATCGTTGCCGAGTGACA-TTACG-TGGTGAGCC
A. amethestinus 6685        CTAGCTGACGGGTGATACTCGT-GACTGT-CTTTTGGACG-TGACTGGCC
I. cylindrica 5114          GGGTCTGCCGAG---GGAGCCTTGGCGAGTGACTTTT--GGTGGTTGACG
I. cylindrica 6582          GGGTCTGCCGAG---GGAGCCGTGGCGAGTGACA-TTTCG-TGGT-GACG
Monocymbium                 -GGGTTGCCTTG--GGAGTCGTTGGCGAGTGACTTTT--GGTGGT-GACG
A. distachyos 6684          CCCTCTCCCGAG--GTAG-TCGTTGTCGAGTG-ACTTTTGATGGT-GAGC
B. bladhii 5173             CCCTC-CCCTTG--GGAG-GCTTGG--GAGTG-ACTTTTGGCGGT-GACG
S. nigrostis 6567           CT-TC-GCCATG--GATG-CGTTGG--GAGTG-TCTTTAGTCG-T-GACG
H. fillipendula 5144        CCTTC-CCCAAG--GTAC-CCTTGG--AATTT-ACTTTTGTCATT-AACC
H.tamba 6585                CTCTCTGCCATG--CATGGCCGTGTCCAGGTGCACTTTTAGCT-T-AACG
A. schirensis 6581          CC-TCCTGCAAG--GCTAATCTGGG---AGTG-TATTTTAGCG-T-GACG
E. villosa 5085             CCCTC---CCGG--GGAGTGCTGGC---AGTG-TCTTTTCGCG-T-GACG
C. excavatus 6577           CCCTCTCCCAGG--GTAG-TGTTGC--GAGTG-TCTTTTGGCGTT-GAGC
C. marginatus 4397          CCCTT-GCCGAG--GGAG-TGTTGCG-GAGTG-ACTTTTCGCGTG-GACG
Evillosa                    GGGGCTGCCGGC---ATACCG-TGTCGGG-CACA-GCACG-TGGTGGGCG
Saccharumofficinarum        GGGGCTGCCGGC---GAATCG-TGTCGGG-CACA-GCACG-TGGTGGGCG
Imperatacylindrica          GGGGCTGCCGGC---GAACCGC-GCCGGG-CACA-GCACG-TGGTGGGCG
Bothriochloainsculpta       GGGGCTGCTTCCGGCGAATCG-TGTCGGG-CACA-GCACA-TGGTGGGCG
Dichanthiumannulatum        GGGGCTGCTTCCGGCGAATCG-TGTCGGG-CGCA-GCACA-TGGTGGGCG
Cybopogonprolixus           GGGGCTGCNGGC---GANTCG-TGTTGGG-CACA-GCACA-TGGTGGGCG
Cplurnodus                  GGGGCTGCTGGC---GATTCG--TTTCGG-TAGCAAAAGA-TGGTGGGCG
Cmarginatus                 GGGGCTGCCGGC---GAATCG-TGTTGGG-CACA-GCACG-TGGTGGGCG
Cexcavatus                  GGGGCTGCCGGC---GATTCG--TTTCGG-TAACAGAACG-TGGTGGGCG
Hyparrhnietamba             GGGTCT-CTNCCGGCGAATCG-TTTCGGG-TACA-ACACA-TGGTGGGCG
Hanamesa                    GGGGCTTCCGNC---GAATCG-TATCGGG-CACA-AAAAA-TGGTGGGCG
Heteropogoncontortus        GGGNCTGCCGNC---GAATCG-TGTCGGG-CACA-GCACG-TGGTGGGCG


B. radicans 4831            CCACATC---AGATGTT---CTC---TCTGACATACA-CTCCTCAC---G
H quarrei 6586              CAAAATC---AGATGTT---CTC---TCTGACACATAACTCCTCAC---A
H. dissoluta 5154           C-ACAACA--TTTGTTTCCTCGSCGATAAAA-ATCCCTCCCGCCGCT---
H. rudis 6576               C-ACGTCA--AACTTCTCNTCGCAGAGACTCCATCATGGCTGCCAGT-TA
H. anamesa 4841             --------------------------------------------------
E. muticus 6954             G-ACATGA--AGTTGTTC-TCGGTGACAAGACTCGTCACGCAACCAG-TC
CoixBuckler                 --ACACCT--AGTTGTT---CTC---GGTG-CAG-CGCCCCAGCAC---G
Arundinellanepalensis       --ACAACT--AGTTGTT---CTC---GATG-CAG-TGGCTCGACAC---G
Pennisetumsetaceum          --ACATTT--AGTTGTT---CTC---GGTG-CAG-CGTCTCGGCTA---G
Panicumbisulcatum           --ACTTAC--AGTTGTT---CTC---GGTG-CAG-CGTCCCGGTAC---G
Chimonobambusabrevinoda     --ATCTCGCACTCTCTT---A-C---G-TG-CAG-TGCCCCGGCGT---G
Danthoniacalifornica        --ACCA---ACGTTGTC---A-C---GGTG-CTG-CGCCCCGGCCC---G
Eragrostisdielsii           --ACAC---ACGGTGTT---CTC---GCTG-CTG-CGAACTGGTCCA-AG
Aristidaharvardii           --ACCT----AGTTGTC---ATC---GGTG-CCG-TGACCCGACGC---G
Zeadiplo                    --ACATC--AAGTTGTT---CTC---GGTG-CAG-CGTCCCGGCGC---G
ZmaysGfl                    --ACATC--AAGTTGTTGTTCTC---GGTG-CAG-CGTCCCGGCGC---G
Cleistachnesorghoides       --ACACCT--AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
I. cylindrica 6632          --ACATC---AGTTTTT---CTC---GGTG-CA---CACCCGGCGC---G
D. filliformis 5874         --ACATC---AATT-TC---T-C---GGNG-CAA-TGCCNCNGNAA---G
T. spicatus 4846            --ACATC---AGTTGTC---T-C---GGTGACAC-TGCCCCGGCAC---G
P. franksae 4705            G-AGATCT--ACTTGTT---GCC---GGTG-CAG-CGCCCCGGCAC---G
C. plurinoides 6404         G-ATATC---AGTTGTT---CTC---GGTG-CAT-TGCCCCGGCGC---G
A. eucomus5869              G-ACATC---AGTTGT----CTC---CGTG-CAG-TGACCCGTCAA---A
D.filliformis 5872          --ACATC---AATTGT----CTC---GGTG-CAA-TACCCTCAAAA---G
H. contortus 4271           A-ACGCA---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
H. contortus 4741           G-ACATT---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
B. radicans 4831            --ACATC---AGTTGTT---CTC---TGTG-CAA-TGCCTCGGCAC---G
A. appenduculatus 6638      --ACATC---AGTTGTT---CTC---TGTG-CAA-TGCCTCCGCAC---G
A. appenduculatus 6677      --ACATC---AGATGTT---CTC---TGTG-CAA-TGCCTCCGCAC---G
A. appendicilatus 6543      --ACATC---AGTTGTT---CTC---GGTG-CAT-GACCTCGGCAC---G
H. hirta 6656               --ACATT---AGTTGTT---CTC---GGTG-CAT-TGCCTCGGCGC---G
H. hirta 6550               --ACATT---AGTTGTT---CTC---GGTG-CAT-TGCCTCGGCGC---G
H. quarrei 5088             C-ACATT---AGTTGTT---CTC---GGTG-CAT-TGCTTCGGAGC---C
B. insculpta 5681           C-ACATCC--G-TTGTT---CTC---GGTG-CAG-CGCCCCGGCAT---G
T. triandra 6555            --ACATCT--AATTGTT---CTC---GGTG-CA--CGCCCCGGCAC---G
Spies 6620                  --ACATCT--AGTTGTT---CTC---GGTG-CAA-CGCCCCGGCAC---G
H. pilgeriana 4738          --ACATCA--G-TTGTT---CTC---GGTG-CAG-TGCCCCGGCAC---G
A. appendiculatus 6625      C-ACATCA--A-TTGTT---CTC---GGTG-CAG-TGCCCCGGCAC---G
Bothriochloa 7489           --ACTCCC--G-TTGTT---CTC---GGTG-CAG-CGACCCGGCAC---G
H. longofollium 6560        --ATCT----CGCTATA---CTA---AACA-CAAATGCATCCGGGG---C
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H. longofollium              --ATCT----CGCTATA---CTA---AACG-CAA-TGCATCCGGGG---C
Pannicum schinzii 6652       --ACAT-T--AGTTGTT---CTC---GGTG-CAA-TGTCCTGACAC---G
B. serata                    --ACAC-T-CAGGTGTT---CTC---TGTG-TAA-TGCCTTGGCAA---G
S. halepense 9318            --ACATCG-TAGGTGTT---CTC---TGTG-CAA-TATCGCCACAT---G
Papalum dilatum 6617         --ACAT-G-AAGTTGTT---CTC---ACTG-CAA-CATCGCATCAT---G
Paspalum                     --ACGT-T-TAGTTGTT---CTC---GGTG-CAG-TGTCTCGGCTT---G
Brachiaria                   --ACAT-C-T-GTTGTT---CTC---AGTG-TAA-TGTCTCCGCAA---G
Aristida adscencianis 6713   --ACAT---TAGTTGTT---CTC---GGTG-CAA-CATCCCGGTAT---A
H. contortus 6628            --ACTC-A-AAGTTGTT---CTCGTTAGTG-CAG--GCCTCGGCAC---G
T. leucothrix 6627           --ACTC-A-AAGTTGTT---CTCGTTAGTG-CAG--GCCTCGGCAC---G
S. halepense 9319            --ACAC-T-TAATTGTT---CTC---TGTG-CAA-CACCCC-ACAC---G
S. bicolour 6588             --ACAC-T-TAAATGTT---CTC---TGTG-CAG-CGCCCC-ACAC---G
S. bicolour 6589             --ACAC-T-TAATTGTT---CTC---TGTG-CAG-CGCCCCGACAC---G
E. muticus 5074              --ACATCA--AGTTGTT---CTC---GGTG-CAN-CGCCTCNGCAC---G
E. muticus 6715              C-ACATCA--AGTTGTT---CTC---TGTG-CAN-CGACTCGGCAC---G
M. capensis 6655             --ACACTC---ATTGTT---CTC----NTG-CAG-CGCCCCGGCAC---G
C. prolixus 6682             --ACATC---AGATGTT---CTC---TGTG-CAATGCCCCCGTCAC---G
C. excavatus 5877            --ACATC---AGTTGTT---CTC----GGTGCA--TGCCCCGGTCAC-GG
C. plurinodus 6406           C-ACATC---AATTGTT---CTCT--CGTACCA--TACCCCNTNCGC-G-
H. anamesa 4807              C-ACATC---AGATGTT---CTC---TGTGACAC-TGACCCCTCAC--GG
A. amethestinus 6685         AGGCATCA--CGTTGTT---CTCG--ACTGACAAAGCCCCGGGGAC---G
I. cylindrica 5114           CCACATCA--AGATGTT---CTC---TGTGACAGACGACGCGCGTCGCGG
I. cylindrica 6582           CCACATC---AGTTGTT---CTC---TCTGACAACGAACGCGGTCGC--G
Monocymbium                  CCA-ATGC--AGATGTT---CTC---GGTG-CACACGAACGCGGTCA-GG
A. distachyos 6684           CCA-AGG--CAG-ACGTTCTCTC---TGACACACGAACGCC-TCA---GG
B. bladhii 5173              CCA-ATG--AAG-ATGTTCTCTC---TG-CACAAAAGGCGG-TCAT--GG
S. nigrostis 6567            CCACAGG--CAG-GCGTTCCCTC---AG---CCAGAACGCC-TCG---TG
H. fillipendula 5144         CCA-AGA--AAA-ACTTCCCTTC---AA---CAAAAAGCCT-TCG---GG
H.tamba 6585                 CCCACGT--CAA-AC-TTCTCTC---GG---CGACATTGCC-TCT---GC
A. schirensis 6581           CCC-ACG--TAA-ACTTTCTCTC---AA---CAAAAACTCC-TCG---TG
E. villosa 5085              CCACAG---CAG-ACTTTTCTTA---AT---CCAAAAACCC-TCG---GC
C. excavatus 6577            CCA-AGT--CAG-ATGTTCTCTC---TG---CACAGAAGCC-TCAC--GG
C. marginatus 4397           CCA-AGG--CAGTACGTTCTCTT---TGACACATGAAGGCNGTCAC--GG
Evillosa                     --ACATC---AGTTGTT---CTC---GGTG-CAG-TGCCCCGGCACA--G
Saccharumofficinarum         --ACACTC--AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Imperatacylindrical          --ACATC---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCGC---G
Bothriochloainsculpta        --ACATC---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Dichanthiumannulatum         --ACATC---AGTTGTT---CTC---GGTG-CAG-CACCCCGGCACAC-G
Cybopogonprolixus            --ACAACTG-ATGTTTTT--------GGTG-CAG-CACCCCGGCAC-GCG
Cplurnodus                   --ACAAN---AGTTGTTNTT------GGTN-NNT-TACTCCGGCGG-GCG
Cmarginatus                  --ACATC---AGTTGTTTTT------GGTG-CAG-TACCCCGGCACA-CG
Cexcavatus                   --ACA----AAAATTTTTTTC-----GGTT-CAN-TTCCCCGGCAC-GCG
Hyparrhnietamba              --AAATC---AATTTTT---CTC---GGTN-CAG-NGCCCCGGCAC-GCG
Hanamesa                     --ACATC---AATTGTTTTC------GGTT-CAA-TTCCCCGGCAC-GCG
Heteropogoncontortus         --ACATT---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC-NC-


B. radicans 4831             CGCCTAT--TGTATTCAACCTTACG-ATCCATTACGAAACT---CAGCAC
H quarrei 6586               CGGCTAT--TGTATTGGA-------------------------------
H. dissoluta 5154            ------------------------------------------------
H. rudis 6576                ANTTCNAANNTAATGGACCCATCNAGCACATTAAGCGCATCACC------
H. anamesa 4841              ------------------------------------------------
E. muticus 6954              TTATCTGCCCTAATGACCCATTGTGCGACCTTCAGCCCATTGCCCCTNGG
CoixBuckler                  CAGCCAG--CACATCGGCCC-TAAGGATCCATCGG-GCACC--GCAGCGC
Arundinellanepalensis        CGGCCAG--CGTCTTGGCCC-TAAGGACCCATGGA-GCACC--GCAGCGC
Pennisetumsetaceum           CAGCTGG--CTTATTGCCC--TAAGGACCCATGAC-G-ACC--GAAGCGC
Panicumbisulcatum            TAGCTAG--CTTGTTGGCCCTTAAGGACCCAGGA----ACC--GTAGCGC
Chimonobambusabrevinoda      TAGCCGG--CGCAGCGGCCCAG--GGACCCATCG----ACC--GGAGCGC
Danthoniacalifornica         CAGCCGG--CGAGACGGCCCTCA-GGACCCTTCGC-ATACC--GCAGCGC
Eragrostisdielsii            TATCAGGTACGGAATGGCCCTCA-TGACCCATGA----ACC--GAAGCGC
Aristidaharvardii            CAGCCGG--CGAGAGGGCCCTGTACGACCCATCG----ACC--GCAGCGC
Zeadiplo                     TGGCCGG--CCATTCGGCCC-TACGGACCCATCG----AGC--G-ACCGA
ZmaysGfl                     CGGCCGG--CCATTCGGCCC-TAAGGACCCATCG----AGC--G-ACCGA
Cleistachnesorghoides        CGGCCGG--CGCATCGGCCC-TAAGGACCCATGGA-GCACC--GCAGCGC
I. cylindrica 6632           C-GCCAG--TGCGTTGGCC--TAA-----------------------------
D. filliformis 5874          CGNCCAGGTTGCGTANGCCC-------------------------------
T. spicatus 4846             CGGCCGGC--GCGTAGGCCC-TAAGGACCCATCGA-GCACC--GAAGCGC
P. franksae 4705             CTGCCGA-AGCGATTGACCCTAAGGGACCCATCTA-CCACC--GCAGCGC
C. plurinoides 6404          CTTCCG---GCGCTCCGCCCTAATG-ACCCATCTA-GCACC--TAAGCGC
A. eucomus5869               AGGCCG---GCGCATCGCCCTAAGG-ACCCATCGA-GCACC--GGAGCGC
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D.filliformis 5872          CCGCGC------ATCTGCCCTAAGG-ACCCATCGA-GCACC--TGAGCGC
H. contortus 4271           CGGACGG-CGA-ATCGGCCCTCAGG-ACCCATCGA-GCACC--GCAGCGC
H. contortus 4741           CGGACGG-CAA-ATCGGCCCTTAGG-ACCCATCGA-GCACC--GCAGCGC
B. radicans 4831            CGGCTAG-CGT-ATTGGCCCTTACG-ACCCATTGA-GCACC--GAAGCGC
A. appenduculatus 6638      CGGCTAT-CGT-ATTGGCCCTTA-G-ACCCATTGA-GCACC--TAAGCGC
A. appenduculatus 6677      CGGCTAT-CGT-ATTGGCCCTTACG-ACCCATTGA-GCACC--TAAGCGC
A. appendicilatus 6543      CG-CTAT-CGT-ATTGGCCCTTACG-ACCCATTGA-GCACACGTAAGC-C
H. hirta 6656               TGGTCGG-TGT-GTCTGCCCTAAGG-ACCCATCGA-GCACC--TAAGCGC
H. hirta 6550               TGGTCGG-CTT-GTCGGCCCTAAGG-ACCCATCAA-GCACC--NAAGCNC
H. quarrei 5088             CGCTCGG--GT-ATTNGCCCTAAG--ACCCATCGA-GCACC--TAAGCGC
B. insculpta 5681           CGGCCGG-CGT-ATCGGCCCTGAGG-ACCCATCAA-GCACC--TAAGCGC
T. triandra 6555            CGGCCGG-CGT-ATNTGCCCTTATG-ANCCATCTA-GCACC--GNAGCGC
Spies 6620                  CGGCCGG-CGC-ATTGGCCCTAAGG-ACCCATCTA-CCACC--GCAGCGC
H. pilgeriana 4738          CGGCCGG-CGC-GACGGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
A. appendiculatus 6625      CGGCCGG-CGC-GACGGCCCTAAGG-ACCCATCGA-GCACC--TAAGCGC
Bothriochloa 7489           CGGCCGG-CGT-ATCTGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
H. longofollium 6560        GTATTCC-ACTCAATGCCTTCATTG-GACCCT--A-GAACC--G-AGCGC
H. longofollium             GTATCCG-ACGCAATGCCTTCAATG-GACCCT--A-TTACC--G-AGCGC
Pannicum schinzii 6652      CAGCTAT-CTCCATAACCTCAAGGG-ACCCATTTA-CGACC--GTAGCGC
B. serata                   TACCTGG-CTTG-TCCGCTCTAACG-ACCCATAAA-GGACC--GTAGCCA
S. halepense 9318           TACCTA--TCTTATTGGCCTTAAG--ACCCATATG-TGAAC--TAAGCGT
Papalum dilatum 6617        TACCTGG-TACTATGGCCTTTACG--ACCGATCAT-CGACC--TCAGCGC
Paspalum                    CAGCTG--GCTTATTGGCCTTAATG-ACCCATAGA-CGACC--GAAGCGC
Brachiaria                  GAACTG--GCTTGTTGGCCTTAAA--ACCCAT-GA-CGACC--TTAGCAC
Aristida adscencianis 6713  -AGCTA--TCTTGTTGGCCCTAAGG-ACCCATACT-TGACC--GCAGCGC
H. contortus 6628           CANCCG--GCGCAGCGGCCCTAAGG-ACCCACACG-CGACC--GCAGCGC
T. leucothrix 6627          CAGCCG--GCGCAGCGGCCCTAAGG-ACCCACACG-CGACC--GCAGCGC
S. halepense 9319           TGGCCG--GTGCATCTGCCCTAAAG-ACCCTTCNG-GCACT--GCAGCCC
S. bicolour 6588            TGGCCG--GTGCATCTGCCCTAAAG-ACCCTTCGG-GCA-T--GC-GCCC
S. bicolour 6589            TGGCCG--GTGCATCTGCCCTAACG-ACCCTTCGG-GCACT--GC--GCA
E. muticus 5074             CAACCGG--CTTATCGGCCCTAAGG-ACCCATTNT-GCACA--CCANCNC
E. muticus 6715             CAACCNG--CTTATCTGCCCTAACG-ACCCATTGT-GCACA--TCAGCGC
M. capensis 6655            CGGCNGT--TGCATCTGCCCTAAGG-ATCCATGGAAGCACN--TCTTCAC
C. prolixus 6682            C-GCCGG--TCCGACTGCCCTAACG-ACCCATCGA-GCAAT--TAAGCAC
C. excavatus 5877           CGGCCGTG---CGTCTGCCCTAA-G-ACCCATCGA-GCACCT--AAGCAC
C. plurinodus 6406          CGGCCTT----CGCTTGACCTAAAG-ATCCATCGA-GCACNT-TAAGCCC
H. anamesa 4807             CAGCCCG-TTGCGACTGCCNTAACG-ATCCATCA--GCAAT--TAAGCAA
A. amethestinus 6685        CAACTTGGCGTTATCGAAACCTAATGACTCATCGAATTA-----T-GCAC
I. cylindrica 5114          CGGCCGGTTGCGTTTCGCCCTATCGGATCCATCGA-GCAAT--TCAGCGC
I. cylindrica 6582          CGGCCAGTTGCGTCTGAACCTATCG-ATCCATCGA-GCAAT--TCAGCAC
Monocymbium                 CGCAAGGTTGTATTTGAAAATAATGGATGGATCGA-GCACAT-TAAGCGC
A. distachyos 6684          CG-CAACTTGCAT-TCAAA-ATCTCGATCCATCGAGCG---ATTCTGCGC
B. bladhii 5173             CG-CAACTTGTATCTGAAA-CTATGAATCCATCGAGCA---ATTATGCAC
S. nigrostis 6567           CG-CAACTTTCGT-TCAAA-AACTCGATGGTTTGCGGG---ATTCTGCAA
H. fillipendula 5144        CC-CAGTTT-------------------------------------------
H.tamba 6585                TG-CAGCTTGCTTTTCTGCGCAATCGATGGATCTAGAGC--ATTATGCAC
A. schirensis 6581          CG-CAACTTGCAT-TCAANNN-----------------------------
E. villosa 5085             AC-CTACTTACGT-TCNNA-AACTCGATGGTTCGCGGN---ATTCAGCAA
C. excavatus 6577           CG-CAACTTGCGT-TCAAC-CTCTCGATCGATCGAGCAC--ATTCAGCAC
C. marginatus 4397          CGGCAACTTGCGANTGAAA-------------------------------
Evillosa                    CATACGGCGAC-ATCGG---------------------------------
Saccharumofficinarum        CGGCCGGCG-C-ATCGG---------------------------------
Imperatacylindrical         CGGCCGGCG-TG-TCGGCCCTAAGG-ACCCATCGA-GCACC--GCAGCGC
Bothriochloainsculpta       CGGCCGGCG--CATCGGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
Dichanthiumannulatum        --ACCGGCG--CATCGGCCCTAAGG-ACCCATCGA-GCACC--GAAGC--
Cybopogonprolixus           --ACAGGCG--TATTGTCGCTAAGG-AGGCCATGGAGCGAAC-GAAGCGC
Cplurnodus                  -AACCGAGC--ACCTGTCGTCCAGG-AGGGATCGA-GCAGC--GAAGGGC
Cmarginatus                 --ACCGGCG--CATTGTCGCTAAGG-AGGCCATCGAGCACC--GAAGCGC
Cexcavatus                  --GCCGGCG--TATTGTCTCTAAGG-AGGCCATCGAGCACC--GAAGCGC
Hyparrhnietamba             --GCCGGCG--CATCGGCCCTA-GG-ACCCATCGA-GCACC--GAAGCGC
Hanamesa                    --GCCGGCG--TATTGGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
Heteropogoncontortus        -AGACGGCA--AATTGGCCCTTAGG-ACCCATTGA-GCACC--GNAGCGC



B. radicans 4831            ATCACC-CCTCGGAT--CGCAACCCCCT--NCCNTNTTCG-ACTACCCGA
H quarrei 6586              ---------------------------------------------------
H. dissoluta 5154           ---------------------------------------------------
H. rudis 6576               ---------------------------------------------------
H. anamesa 4841             ---------------------------------------------------
E. muticus 6954             ACCCCAATCCCCGACA----------------------------------
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CoixBuckler                 ACCGTC-GCTC-GGA-CCGCGA----------------------------
Arundinellanepalensis       ATCGCC-GCTC-GGA-CC--------------------------------
Pennisetumsetaceum          TTTGTC-GCTC-GGA-CC--------------------------------
Panicumbisulcatum           TTCGTC-GCTC-GGA-CC--------------------------------
Chimonobambusabrevinoda     A-CGTC-GCTC-GGA-CC--------------------------------
Danthoniacalifornica        T-CGTC-GCTC-GG-----------------------------------
Eragrostisdielsii           A-TCTC-GCTC-GGA-CC--------------------------------
Aristidaharvardii           A-AGCC-GCTC-GGA-CC--------------------------------
Zeadiplo                    GCTTGT-CCTC-GGA-CCGCGA----------------------------
ZmaysGfl                    GCTTGC-CCTC-GGA-CCGCGA----------------------------
Cleistachnesorghoides       ACCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACT------
I. cylindrica 6632          --------------------------------------------------
D. filliformis 5874         --------------------------------------------------
T. spicatus 4846            ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
P. franksae 4705            ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
C. plurinoides 6404         ATCGCC-GCTC-GAA-CCCCCATCCCAT--GTCAGTCCGG-ACTACCCGC
A. eucomus5869              ATCCCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
D.filliformis 5872          ATCACC-CCTC-GGA-CCGC-ACCCCA---GTCATTCTGG-ACTACCCGC
H. contortus 4271           ACCGCC-GCTC-GGA-CCGCAACCCCAG--GTCATTCGGG-ACTACCCGC
H. contortus 4741           ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
B. radicans 4831            ATCGCC-GCTC-GGATCGGCGACCCCAT--GTCAGTCGGG-ACTACCCGC
A. appenduculatus 6638      ATCGCC-GCTC-GGA-CCGCGACCCCAT--GTCATTCTGG-ACTACCCGC
A. appenduculatus 6677      ATCGCC-GCTC-GGA-TCGCAACTTCAT--GTCATTCTGG-ACTACCCGC
A. appendicilatus 6543      ATCGCC-GCTC-GGA-TCGCGACCCCAT--GTCATTCTCC-ACTACCCGC
H. hirta 6656               ATCCC--GCTC-GGA-CCACGACCCCAG--GTCAGTCTGG-ACTACCCGC
H. hirta 6550               TTCCCC-NCTN-GNA-CCACAACCCCAG--GNCATNCGGA-ACTACCCNC
H. quarrei 5088             ATCCC--GCTC-GGA-CCGCGACCCCAG--GTCATTCTGG-ACTACCCGC
B. insculpta 5681           CTCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCTGG-ACTACCCGC
T. triandra 6555            TTTTCC-GCTTTGGA-ACGCGACCC-AN--GTCA-TCTGG-ACTACCCGC
Spies 6620                  ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
H. pilgeriana 4738          ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
A. appendiculatus 6625      ATCGCC-GCTC-GGA-CCGCGACCCCAT--GTCAGTCTGG-ACTACCCGC
Bothriochloa 7489           TTGGCC-GCTC-GGA-CCGCGACCCCAG--GTCATTCTGG-ACTACCCGC
H. longofollium 6560        ACAAC--CCTT-GTA-TCGCGACTCCCT--GTCATGCTGG-ACTACCCGC
H. longofollium             ACA----CCTT-CTA-CCGC-ACCCCAT--GTCA-GCTGG-ACTACCCGC
Pannicum schinzii 6652      CTTGG-TGCTC-GGA-CCGCGACCCCAA--GTCATGCGGG-ACTACCCGC
B. serata                   CTTAACTGCTC-GGA-CCGCGACCCCAT--GTCATGCTGG-ACTACCCGC
S. halepense 9318           TTCCT-CGCTC-GGA-CCGC-ACCCCAT--GTCATACTGG-ACTACCCGC
Papalum dilatum 6617        TTGTA-CACTC-GGA-CCGC-ACCCCAT--GTCATGCTGG-ATTACCCGC
Paspalum                    CTTGT-CGCTC-GGA-CCGCGACCCCAG--GTCAGACGGG-ACTACCCGC
Brachiaria                  TTTGT-TGCTC-GGA-CCGCGACCCCAT--GTCATACTGG-ACTACCCGC
Aristida adscencianis 6713  TTTGC-CGCTC-GGA-CCGCGACCCCAT--GTCAG-CTGG-ACTACCCGC
H. contortus 6628           CAGCC--GCTC-GGA-CCGCGACCCCAG--GTCAAACGGG-ACTACCCGC
T. leucothrix 6627          CAGCC--GCTC-GGA-CCGCGACCCCAG--GTCAGACGGG-ACTACCCGC
S. halepense 9319           CATCCATGCTC-GGA-CCGCGACCCCAN--GTCAGTCNGG-ACCACCCGC
S. bicolour 6588            ANTCCATGCTC-GGA-CCGCGACCCCAN--GTCANNCNGG-ACCACCCGC
S. bicolour 6589            CATCGATGCTC-GGA-CCGCGACCCCAG--GTCAGTCTGG-ACCACCCGC
E. muticus 5074             ATTGCC-NCTC-GGA-CCNCNACCCCAG--GNNAGCCC-------------
E. muticus 6715             ATTTCC-CCTC-GGA-TCGCGATCCCCT--GTGATTTTGG-ACTATACGC
M. capensis 6655            ATCACC-GCTC-GGATCCGA---CCCAT--GTCATTCTGG-ACTACCCGC
C. prolixus 6682            ATCGCC-CCTC-GGA-CCGCAACCCCAT--GCCATTCTGGTACTACCCGC
C. excavatus 5877           ATCACC-GCTC-GGA-CCGC-ACCCCAT--GTCATTCTGG-ACTACCCGC
C. plurinodus 6406          ATCNCC-NCTC-GNA-TCNCCACCNCAT--GTCAATCTGG-ACTACC-GN
H. anamesa 4807             NATCNCCCCTC-GGA--CGCAANCCCCT--GNCATNTTGN-ACTANNCGN
A. amethestinus 6685        TTCATC-CCTC-GGA-TCGCAAT--------------------------
I. cylindrica 5114          ATCGCC-GCTC-GGA-TCACGATCCCAT--GTCATCCTGG-ACTATCCGC
I. cylindrica 6582          ATCNCC-GCTC-GTNATCACAATCTCAT--GTCATTCTGG-ACTACCCGC
Monocymbium                 TTCGCC-GCTC-GGA-TCGCAATTTCAT--GTCATTTTGGTACTATCCGC
A. distachyos 6684          TTCACACC-TC-GTA-TCGCAATTCGCT--GCCATCTTCAT-CTATCCGA
B. bladhii 5173             TTCNCCCCCTC-GGA-TCGCAATTTCAT--GACATTTTGGA-CTATCCGA
S. nigrostis 6567           TTCACACCAT--GTA-TCGCATTTTGCT--ACGTTCTTCAT-ACATGCCA
H. fillipendula 5144        --------------------------------------------------
H.tamba 6585                TTCACCGCTCG-GTA-TCGCATCTTCCT--GCTATCTTCGT-CGACCCGA
A. schirensis 6581          --------------------------------------------------
E. villosa 5085             TTCACTGCAGG-GGA-TCGCATTTTCCATANCGTTCTTCATACTATNCCA
C. excavatus 6577           TTCACCCC-TC-GTA-TCGCAATTGCCT--GCCATCTTCAA-CTATGCGA
C. marginatus 4397          --------------------------------------------------
Evillosa                    --------------------------------------------------
Saccharumofficinarum        --------------------------------------------------
Imperatacylindrical         ATCGCC-GCTC-GGA-CC--------------------------------
Bothriochloainsculpta       TTACGCCGCTC-GGA-CCGCGA----------------------------
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Dichanthiumannulatum ATCACC-GCTC-GGA-CCGCGA----------
Cybopogonprolixus ATCCCC-GCTC-GGA-CCGCGA----------
Cplurnodus ATCCCC-GCTC-GGA-CCGCGA----------
Cmarginatus ATCCCC-CCTC-GGA-CCGCGA----------
Cexcavatus ATCGCC-GCTC-GGA-CCGCGA----------
Hyparrhnietamba ATCNCC-NCTC-GGA-CCGCGA----------
Hanamesa ATCGCC-GCTC-GGA-CCGCGA----------
Heteropogoncontortus ACAGCC-GCTC-GGA-CCGCGA----------

Appendix G: CLUSTAL W (1.74) multiple sequence alignment data of the Andropogoneae specimens for *ITS1 + 5.8S gene + ITS2* region.

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Aameth6685                      TCGTGACC-GCGTCGATGACC--GT-AACAAA-GTTTCCCTCAGTT--G
Aappen6543                      TCGTGAC-----GAAGGAATTC-GT-AACAAA-GTTTCCCTCAGTT--C
Aappen6946                      TCGTGACC-----GAGGAATTC-GT-AACAAA-GTTTCCCTCAGTG--C
Adist6684                       TCGTGACAC---GAAAGAAA-C-GT-AACAAACGCTTCCCTCAGTT--C
Aeuco5869                       TCGTGACCCA--GAAA-AATCC-GT-AACAAG-GCTTCCCTCATGCATG
Aristidaharvardii               TCGTGACCC---TGACCAAAACAGACCGCGAACGTGTCACCGTG----C
Arundinellanepalensis           TCGTGACCC-TTAAAACAAAACAGACCGCGAACATGTTTCCCATGT---
Aschiren6581                    ????????????????????????????????????????????????
Bbladh5173                      TCGTGACCC--TGAAGGAAATCAG--ACCGAAAGCTTCCCTCTAAT--G
Binsc5681                       TCGTGAGC----GGAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT---
Bradi4784                       TCGTGAACCT--GAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Cdieter6642                     TCGTGACCCCG--ACGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Cleistachnesorghoides           TCGTGACC--CTTAAACAAAACAGACCGCGAACGCGTCTCTC-GT---G
Cmarg4397                       TCGTGACAATTCGAAGGAATCG-GT-AACAAGAGCTTCCCTCAGTT--C
Cplur6406                       TCGTGACC--ATGTAGATATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Cprolix6682                     TCGTGACC----GGTTAAACCG-GT-AACAAA-GCTTCCCTCCCTT--G
Danthoniacalifornica            TCGTGACCC--GAAACCAAAACCGACCGAGAACGCGTCACCCTGT---C
Dfili5872                       TCGTGACGGA--GGA---ATTC-GT-AACAA--GCTTCCCTCAGTT--G
Dfili5874                       TCGTGACCCG-TGAAAAAAACG-CA-AACAAGAGCTTCCCTCAGTT--C
Emuti5074                       TCGTGAAC----GGAGGAATTC-GT-AACAAA-GTTTCCCTCAGT---G
Emuti6715                       TCGTGAGC-----GAGGAATTC-GT-AACAAA-GCTTCCCTCAGT---G
Eragrostisdielsii               TCGTGACCC---TGACCAAAATAGACCGCGAACATGTCATCCATG---C
Evill5085                       TCGTGACCC--TGAAACAAATC-GT-AACAAA-GCTTCCCTCTTTG--T
Hanam4807                       TCGTGAGCC---GGAGGAATTC-GT-AACAAA-GTTTCCCTCTCAT--G
Hanam4841                       TCGTGACCC----GAGGAAATC-GT-AACAAA-GCTTCCCTCTCAT--G
Hcon4741                        TCGTGACCC--TGAAAGAAATC-GA-AACAAA-GCTTCCCTCTGTT--G
Hdiss5145                       TCGGTACT---TGGAGGAATTC-GT-AACAAA-GCTTCCCTCTGAT--G
Sbicolour9319                   TCGTGACCC--TTAAACAAAACAGACCGTGAACATGTCTCTCA-----G
Hfilli5144                      TCGTGATAGC--GGAGGAATTC-GT-AACAAA-GCTTCCTCCTCAT--G
Hhirt6656                       TCGTGACG----AGGAAAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Hlongi6560                      ????????????????????????????????????????????????
Hpilg4603                       TCGTGAGC----GGAGGAATTC-GT-AACAAA-GTTTCCCTCCGTT--G
Hpilg4738                       TCCTGACCC--GGAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Hquar5088                       TCGTACCC---TGGAAGAAAACAGA-AACAAA-GCGTCCCTCTCAT--G
Hrud6576                        TCGTGACCC--TTAAACAAAACAGACCGCGAACGCGTCTCTCATGT---
Htamb6585                       TCGTGACCC---GGAGGAAATCCGT-AACAAA-GCTTCCCTCTGAT--G
Icylin5114                      TCGTGACC---TGAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Icylin6632                      TCGTGACC---GGAAGA-ATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Mcape6655                       TCGTGAGGC---GAAGGATT-C-GT-AACAAG-GTTTCCCTCAGTT--G
Panicumbisulcatum               TCGTGACCC--TTAACCAAAACAGACCGTGAACATGTCATCCATG---C
PentaschistisaristifoliaSpies6  TCGTGACC---GAAACCAATGCAGACCGTGAACAAGTCACATTGT---C
Pfrank4705                      TCGTGAC------GAGGAATTC-GT-AACAAA-GTTTCCCTCAGTT--G
Sbic6588                        TCGTGACC---TTAAACAAAACAGACCGTGAACATGTCTCTCATGT---
Sbic6589                        TCGTGACCC--AGGAGGAATTC-GT-AACACA-GTTTCCCTCAGTT--C
Shalep9318                      TCGTGACAC---GAAGGAAATC-GT-AACAAA-GCTTCCCTACGTT--C
Tspic4846                       TCGTGAT-----GGAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Ttria6555                       TCGTGACC--GTGAAGGTAACG-CC-AACAAGAGTTTCCCTCAGTT--G
Zeadiplo                        CTGTGACCC--TTAAACGAAACAGACCGCGAACGAGTCACCCGTG---C
ZmaysGfl                        CCGTGACCC--TTAAACAAAACAGACCGCGAACGAGTCACCCGTG---C
Evillosa                        -------------------------CCGTGAACACGTCTCTCGTGT--C
Saccharumofficinarum            TCGTGACC---TTAAACAAACCAGACCGCGAACGCGTCCCTCGTG--CC
Imperatacylindrical             TCGTGACCC--TTAAACAAAACAGACCGCGAACGAGTCTCTCGTG--CC
Bothriochloainsculpta           TCGTGACCC--TTAAACAAAACAGACCGCGAACGTGTCTCTCATGT--C
Dichanthiumannulatum            TCGTGACCC--TTAAACAAAACAGACCGCGAACGTGTCTCTCGTGT--C
Cybopogonprolixus               TCGTGACCC--TTAAACAAAGCAGACCGTGATCGTGTGTCTCGTGT--C
Cplurnodus                      TCGTGACCC--TTAAACAAAGCAGACCGTGATCGTGTGTCTCGTGT--C
Cmarginatus                     TCGTGACCC--TTAAACAAAACAGACCGTGAGCGTGTCTCTCGTGT--C
Cexcavatus                      TCGTCACCC--TTAAACAAAACAGACCGNGAGCGTGTCTCTCATGT--C
Hyparrhnietamba                 TCGTGACCC--TTAAACAAAACAGACCGNGAACGCGTCTCTCATGT--C
Hanamesa                        TCGTGACCC--TTAAACAAAGCAGACCGTGAACGCGTCTCTCATGT--C
Heteropogoncontortus            TCGTGACCC--TTAAACAAAACAGACCGCGAACGCGTCTCTCATGT--C


Aameth6685                      CCCCCGGGCTTC---------------GGCTCGGC-CAAGGCACCCTAT
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Aappen6543                      CNCCCNGGCTAC---------------GGTTCGGC-CCTGGCTCCCNAG
Aappen6946                      ACCGCGGGCTAG---------------GGCCCCGCACTCGGCCCCCTAG
Adist6684                       CCCCCGGCCCTT---------------GGTTCCAC-CTTGGCCCCCTTT
Aeuco5869                       CCACCGGGCTCC---------------GGCCCGGC-AAAGGCTCCCGAG
Aristidaharvardii               CGTCGG-GCGTC-------TCCCACGACGCCCGGC-CAAGGCCCCCGAC
Arundinellanepalensis           -CGCCGGACTTC---------------GGTCCGGT-TTAGGCCCCCGAG
Aschiren6581                    ??????????????????????????????????????????????????
Bbladh5173                      CCGCCGGGCTCC---------------GGCCCGGC-CTAGGCCCCCGAG
Binsc5681                       CCACCGGGCCTC---------------GGCC-GGC-ACAGGCCCCCGAG
Bradi4784                       CCGCCGGGCTCC---------------GGCCCGGCCAAAGGCTCCCGAG
Cdieter6642                     CCCCCGGGCTTC---------------GGTCCGGC-CAAGGCCCTCTAG
Cleistachnesorghoides           CCGCCGGGCCTC---------------GGCNCGGCANNNGGNCCCCGAG
Cmarg4397                       CCGCCGGGCTTC---------------GGCCCGGC-CAAGGCCCCCGAG
Cplur6406                       CTCCCNGGCTAG---------------GG--CCGG-CTTGGCCCCCTAT
Cprolix6682                     CCGCCGGGCTTC---------------GGTCCGGC-CAAGGCCCCCGAG
Danthoniacalifornica            CGGCCACGCGACGGGACTCGTCCCCGCCGCGCGGCCCTAGGCCGCCGAC
Dfili5872                       CCACCGGGCTCC---------------GGCCCGGC-AAAGGCTCCCGAG
Dfili5874                       CCACCGGGCTCG---------------GGCCCGGC-AAAGGCTCCCGAG
Emuti5074                       CCACCGGGCCTC---------------GGCCCGGA-CAAGGCCCCCCAG
Emuti6715                       CCACCGGGCCTC---------------GGCCCGGA-CAAGGCCCCCCAG
Eragrostisdielsii               CGTCGG-GTGATGGGGCTTG-CCTCGCCTCCCGAC-TTAGGCCCCAGAC
Evill5085                       CTGCCGGGCTCC---------------GGCTCGGC-CGAGGTCCCCGAG
Hanam4807                       TCGCCGGGCTCC---------------GGCCCGGC-CAAGGTTCCCGAG
Hanam4841                       TCGCTGGGCTTC---------------GGCCCGGC-CAAGGCTCCCGAG
Hcon4741                        TCGTCGAGCCTC---------------GGCTCGGC--AAGGCCCCCGAG
Hdiss5145                       TCGCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCGAG
Sbicolour9319                   TCGTCGAGCTTT---------------GGCTCGGCACAAGGTCCCCTTG
Hfilli5144                      TCGCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCGAG
Hhirt6656                       ACCCTGGGCTTC---------------GGCCCGGC-CAAGGCTCCCGAG
Hlongi6560                      ??????????????????????????????????????????????????
Hpilg4603                       CCGCCGGGCTTC---------------GGCCCGGC-CAAGGCCCCCGAG
Hpilg4738                       CCCCCGGGCAAG---------------GGCCCCGCACAAGGCCCCGGAG
Hquar5088                       TCGCCGGGCTCC---------------GGCCCGGC-CAAGGGTCCCCAA
Hrud6576                        -CGCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCGAG
Htamb6585                       TCGCCGGGCTCC---------------GGCCCGGC-CAAGGCTCCCGAG
Icylin5114                      CCGCCGGGCTCC---------------GGCCCGGC-CAAGGCCCCCGAG
Icylin6632                      CCCCCGGGCCAG---------------GGTTCGGC-CCCGGCCCCCTAT
Mcape6655                       CCCCCGGGCTAC---------------GGCTCGGCACAGG--CCCCTAG
Panicumbisulcatum               CGT-CGGGCTAT---------------GGCCCGAC-AAAGGCACCCACC
PentaschistisaristifoliaSpies6  CGGCCACACGA--------GCTCACGCCGTGTGGC-CTAGGCCGCCGAC
Pfrank4705                      CCGCCTGGCTTC---------------GGCCTGGT-CAAGGCCCCTGAG
Sbic6588                        -CGTCGAGCTTC---------------GGCTCGGCACAAGGTCCCCTTG
Sbic6589                        ACCNCGGGCTGG---------------GGCTCGGC-CTAGCCCCCCTTG
Shalep9318                      CTCCTGGGCTCC---------------TGCCCGTG-CAAGGCCCTCGAC
Tspic4846                       CCACCGGGCTTC---------------GGCCCGGC-AAAGGCTCCCGAG
Ttria6555                       CCCCCGGGCCTC---------------GGCCCGGC-CACGGCCCCCGAG
Zeadiplo                        CGCCGG-GCTCC---------------GGCCCGGCACGCTGCCCCCCC-
ZmaysGfl                        CGCCGG-GCTCC---------------GGCCCGGCACGCTGCCCCCCCC
Evillosa                        -GCCGG-GCTTC---------------GGCTCGGC-CAAGGCACCYGAG
Saccharumofficinarum            -GCCGG-GCTTC---------------GGCCCGGCACGAGGTCCCCGAG
Imperatacylindrical             -GCCGG-GCTCC---------------GGCCCGGC-CAAGGCCCCCGAG
Bothriochloainsculpta           -GACGG-GCTCC---------------GGATCGGA-CAAGGCGCCCGAG
Dichanthiumannulatum            -GCCGG-GCTTC---------------GGCTCGGA-CAAGGCGTCCGAG
Cybopogonprolixus               -GCCGG-GCTTC---------------GGCTCGGN-CAAGGCTCCCGAA
Cplurnodus                      -GCCGG-GCTTC---------------GGCTCGGA-CAAGGCTCCCGAA
Cmarginatus                     -GCCGG-GCTTC---------------GGCTCGGC-CAAGGCTCCCGAA
Cexcavatus                      -GCCGG-GCCTC---------------GGGCCTGAGCAAGGCTCCCGAA
Hyparrhnietamba                 -GCCGG-GCTCC---------------GGCTCGGC-CAAGGCTCCCGAA
Hanamesa                        -GTCGG-GCTCC---------------GGTCCGGC-CAAGGCTCCCGAA
Heteropogoncontortus            -GTCGA-GCCTC---------------GGCTCGGC--AAGGCCCCCGAT


Aameth6685                      CCTCGTCCC-------GGGGCGGAGGTGCCGC--AAAAGAACCCACGGC
Aappen6543                      CCCCGTCCA-------GGGGCGGAAGGGCCGC--AAAACAACCCACGGC
Aappen6946                      CCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAACAACCCACGGT
Adist6684                       TCCCCTCCC-------TGGGTAATCGCCCGAA--AA-ACAACCCACGGC
Aeuco5869                       CCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Aristidaharvardii               CTCCCTGT--------GGAGGGGAGGGGCCGC--AACAGAACCCACGGC
Arundinellanepalensis           CTCCGTCCC-------GGGGCAGAGGGGCCTT--AACAGAACCCACGGC
Aschiren6581                    ??????????????????????????????????????????????????
Bbladh5173                      CCCCTTCCC-------GGGGCGGAGGAGCCGC--CAAAGAACCCACGGC
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Binsc5681                       CTCCGTCCT-------GGGGCGGAGGGGCCGC--AAAAGAACCCACCGC
Bradi4784                       CCCCGTCCA-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Cdieter6642                     CCCTGTCAC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Cleistachnesorghoides           CCCNGTCNT-------GGGGCGGAGGGGCCAC--AAAAGAACCCACGGC
Cmarg4397                       CCCTGTCAC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Cplur6406                       CCCCNTCTT-------GGGGTGGAGGGGCCGC--AAAATAACCCACGGC
Cprolix6682                     CCCTGTCAC-------GGGGCGGAGGGGCCGC--AAAACAACCCACGGC
Danthoniacalifornica            CTCCCTCCTCC----GGGAGGGGAGCGGCCGT--AAAAGAACCCACGGC
Dfili5872                       CCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Dfili5874                       CCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Emuti5074                       CTCCGGCA--------------GAGGGGCCGC--AACAGAACCCACGGC
Emuti6715                       CTCCGGCA--------------GAGGGGCCGC--AACAGAACCCACGGC
Eragrostisdielsii               TTTCTTAC--------GGAGGGCTGGGGCCGC--AACAGAATCCACGGC
Evill5085                       CCCCGTCCT-------GGGGCGGAGGGGCCGC--AAAAGATCCCACGGC
Hanam4807                       CCCCGTCCC-------GGGGCGGAGGTGCCGC--AAAAGAACCCACGGC
Hanam4841                       CCCCGTCCG-------GGGGCGGAGGTGCCGC--AAAAGAACCC-CGGC
Hcon4741                        CTTC--------------GGCAGAGGGGCCGC--CACAGAACCCACGGC
Hdiss5145                       CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Sbicolour9319                   CTCCAACCT-------GGGGCAGAGGGGCCAC--AAAAGAACCCACGGC
Hfilli5144                      CCCCGTCCC-------GGGGCGGAGGTGCCGC--AAAAGAACCCACGGC
Hhirt6656                       CCCCGTCCG-------GGGGCGGAGGTGCCGC--AAAAGAACCC-CGGC
Hlongi6560                      ??????????????????????????????????????????????????
Hpilg4603                       CCCTGTCAC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Hpilg4738                       CCCCGTCAC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Hquar5088                       CCCGTCCC-------GGGGCGGAGGTGCAGCC--AAAAGAACCCAAAGC
Hrud6576                        CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Htamb6585                       CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Icylin5114                      CTCCGTCCC-------GGGGCGGAGGGGCCGC--AACAGAACCCACGGC
Icylin6632                      CTCCGTCCC-------GGGGCGGAGGGGCCGC--AACAGAACCCACGGC
Mcape6655                       CCCCGTCTT-------GGGGCGGAGGGGCCAC--AACAGAACCCACGGC
Panicumbisulcatum               CACC-TATT-------AGGAGGATGGGGCCGC--AAAAGAACCCACGGC
PentaschistisaristifoliaSpies6  CTCCGCAA-------GGACGGGGAGCGGCCGC--AAAAGAACCCACGGC
Pfrank4705                      CACCGTCAA-------GGGGC-GAGGGGCCGC--AACAGAACCCACGGC
Sbic6588                        CTCCAACCT-------GGGGCAGAGGGGCCAC--AAAAGAACCCACGGC
Sbic6589                        CTCCCTCCT-------GGGGCAGAGGGGCCAC--AAAAGAACCCACGGC
Shalep9318                      CTTC-TCAT-------GGAGGAGAGGGGCCAC--AAAAGAACCCAGGGC
Tspic4846                       CCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Ttria6555                       CTCCGTTCC-------GGGGCGGAGGGGCCAC--AAAAGAACCCACGGC
Zeadiplo                        GAACCTCCCGC-----GGGGAAGGGGGGCCGCGAAAAAGAACCCACGGC
ZmaysGfl                        GAACCTCCCGC-----GGGGAAGGGGGGCCGCGAAAAAGAACCCACGGC
Evillosa                        TCCAGTCCC-------GGGCGCGAGGGTGCGCGCAAAAGAACCCAYGGC
Saccharumofficinarum            CTCCGTCCC-------GGAGCGGAGGGGCCAC--AACAGAACCCACGGC
Imperatacylindrical             CTCCGTCCC-------GGGGCGGAGGGGCCGC--AACAGAACCCACGGC
Bothriochloainsculpta           CTCCGTCT--------GGGGGGGGGGGA-GTCGCAAAAGAACCCACGGC
Dichanthiumannulatum            CCCTGTCCC-------GGGGGGGGGGGGCCCC--AAAAGAACCCACGGC
Cybopogonprolixus               CCCCTTCCC-------GGGGGGGAGGGCTCCCC-AAAAGAACCCNCGTC
Cplurnodus                      CCC-TTCCC-------GGGGGGGAGGGCNCCCC-AAAAGAACCCACGTC
Cmarginatus                     CCCCTTCCC-------GGGGGGGAGGGCTCCCC-AAAAGAACCCACGTC
Cexcavatus                      CCCCTTCCC-------GGGGGGGAGG-TTCCCC-AAAAGAACCCACGGC
Hyparrhnietamba                 CCCCCTCCC-------GGGGGGGAGG-TTCCCCCAAAAGAACCCACGCC
Hanamesa                        CCCCCTCCC-------GGGGGGGAGG-TTCCCCCAAAGNAACC-ACGGC
Heteropogoncontortus            CTTCGA-CA-------GAGGGG--------CCACCACAGAACCCACGGC


Aameth6685                      GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Aappen6543                      GCCTT---AAGCGTCAAGGAACACTTA-TATG-CCTT--GC
Aappen6946                      GCCTT---AGGCGTCAAGGAACACTTA-TATG-CCTT--GC
Adist6684                       GCCTTCGTAAACATTCAGGAACACTTA-TATTGCCTT--GC
Aeuco5869                       GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Aristidaharvardii               GCCGAA--CGGCGTCAAGGAACACTGTCTATTGCCTG--GC
Arundinellanepalensis           GCCAT---AGGCGTCAAGGAACACTCA-TATTGCCTT--GC
Aschiren6581                    ??????????????????????????????????????????
Bbladh5173                      GCCTT---AGGCGTCAAGGAACACTAC-TATTGCCTT--GC
Binsc5681                       GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Bradi4784                       GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Cdieter6642                     GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Cleistachnesorghoides           GCCTA---AGGCGTCAAGGAACACTTA-TATTGCCTN--GC
Cmarg4397                       GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Cplur6406                       GCCTT---AGGCGTCATGGAACACTTA-TATTGCCTT--GC
Cprolix6682                     GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Danthoniacalifornica            GCCGAC--CGGCGCCAAGGAACACTGTTTATTGCCT----C
```

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Dfili5872                          GCCTT---AGGCGTCAAGGAACACTTG-TATTGCCTT--GC
Dfili5874                          GCCTT---AGGCGTCAAGGAACACATG-TATTGCCTT--GC
Emuti5074                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGGCTC--GC
Emuti6715                          GCCTT---AGGCGTCAAGGAACACTTA-TATTG-CTC--GC
Eragrostisdielsii                  GCCGA---CGGCGTCAAGGAACACTAA-TATTGCCTT--GC
Evill5085                          GCCTT---ACGAGTCAAGGAA-ACTTG-TATTGCCTT--GC
Hanam4807                          GCCTT---AGGCGTCAAGGAACACTTAATATTGCCTT--GC
Hanam4841                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Hcon4741                           GCCTT---AGGCGTCAAGGAACACTTG-TATTG-CTT--GC
Hdiss5145                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Sbicolour9319                      GCCTT---AGGCNTCNNNGAACACTCA-TGTTGCCTT--GC
Hfilli5144                         GCCTT---AGCC-TCA-GGAACACTTA-TATTGCCTT--GC
Hhirt6656                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Hlongi6560                         ??????????????????????????????????????????
Hpilg4603                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Hpilg4738                          GCCTT---AGGCGTCAAGGAACACCTA-TATTGCCTC--GC
Hquar5088                          GCCTT---AGGCGTCAAGGAACACTCAATATTGCCTT--GC
Hrud6576                           GCCTT---AGGCGCCCAGGAACACTTA-TATTGCCTT--GC
Htamb6585                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Icylin5114                         GCCTA---AGGCGTCAAGGAACACTTC-TATTGCCTT--GC
Icylin6632                         GCCTA---AGGCGTCAAGGAACACTTC-TATTGCCTT--GC
Mcape6655                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Panicumbisulcatum                  GCCAA---AGGCGTCAAGGAACACATA-TATTGCCTT--GC
PentaschistisaristifoliaSpies6     GCCGTA--CGGCGTCAAGGAAAACTGT-TATTGCCTT--GC
Pfrank4705                         GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Sbic6588                           GC-TT---AGGCGTCAAGGAACACTCA-TATTGCCTT--GC
Sbic6589                           GCCTT---AGGCGTCAAGGAACACTCA-TGTTGCCTT--GC
Shalep9318                         GCCGA---AGGCGTCAAGGAACACTGA-TATTGCTTT--GC
Tspic4846                          GCCTT---AGGCGTCAAGGAACACATG-TATTGCCTT--GC
Ttria6555                          GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTT--GC
Zeadiplo                           GCCTC---GGGCGCCAAGGAACACCAG-TACTACCTCCTGC
ZmaysGfl                           GCCCC---GGGCGCCAAGGAACACCAG-TACTACCTCCTGC
Evillosa                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTTGCTC
Saccharumofficinarum               GCCTT---AGGCGTCAAGGAACACCTA-TATTGCCTTGCGC
Imperatacylindrical                GCCT----AGGGGTCAAGGAACACTTC-TATTGCCTTGCTC
Bothriochloainsculpta              GCCTT---AGGCGTCAAGGAACACTTA-TATTTCCTTGCTC
Dichanthiumannulatum               GCCTT---AGGCGTCAAGGAACACTTA-TATTTCCTTGCCC
Cybopogonprolixus                  ACCTT---AGGCNTCAAGGAACACTTA-TATTTCCTTGCTC
Cplurnodus                         NCCTT---AGGCGTCAAGGAACACTTA-TATTNCCTTGCTC
Cmarginatus                        GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTTGCTC
Cexcavatus                         GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTTGCCC
Hyparrhnietamba                    CCCTT---AGGCGCCAAGGAACACTTA-TATTTCCTTGCAC
Hanamesa                           GCCTT---AGGCGTCAAGGAACACTTA-TATTGCCTTGCCC
Heteropogoncontortus               GCCTT---AGGCGTCAAGGAACACTTG-TATTGC-TTGCTT


Aameth6685                         ACGGCGGGGCGGCTGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATCAT
Aappen6543                         TCGGCGAGCCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Aappen6946                         TCG-CGG-GCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Adist6684                          ACTTCCGAGCCGCTGGC-TTGCCTTCCCCTCCCCGCGCAAC---GATCAT
Aeuco5869                          TCGGTGGAGCGGTCGGC-ATGCCTTCTGCTCCCCGCGCAGC---GATGAT
Aristidaharvardii                  GCGGGGCTGCGGCCGGC-CTGCCGGACGCGCCCCAGCCAGC---GATGCT
Arundinellanepalensis              ACGGTGGAGCGGTTGGC-CTGCCTTCTGCTCCCTGCGCAGC---GATGCT
Aschiren6581                       ??????????????????????????????????????????????????
Bbladh5173                         CCGGCGGAGCGGTCNNC-CTGCCTTCCGCTCCCCG-GCAGC---GATGAT
Binsc5681                          CCGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCA-C---GATGAT
Bradi4784                          TCGGCGGGGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cdieter6642                        CCGGTGGAGCGGTCGGC-CTGCCCTCCGCTCCCCGCGCAGC---GATGAT
Cleistachnesorghoides              NCGGCGGAGCGGTCGGC-NTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cmarg4397                          CCGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cplur6406                          CCGGTGGA-CGGTC--C-CTGCCTTCCACTCCCCCCGCA-C---GATGAT
Cprolix6682                        GCCGTGGAGCGCTCAACTCTTCCCTCC-CTCCCCGCGCAC----GATGAT
Danthoniacalifornica               GCGGCGCGGCGGCCAGC-CTGCCGGTCGTCACACGCGTA-----------
Dfili5872                          TCGGTGGAGCGGTCGGC-ATGCCTTCTGCTCCCCGCGCAGC---GATGAT
Dfili5874                          CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Emuti5074                          TCGGCGGAGCGGACGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGTT
Emuti6715                          TCGGCGGAGCGGACGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGTT
Eragrostisdielsii                  CCAATGACTCGACCGGC-CTGCCGGGCGCGTCTTGAGCAGC---GATACC
Evill5085                          TCGGTGGAGCGGTCGGC-GTGCCTTCCGCTCCCCGTGCAGC---GATAAT
Hanam4807                          CCGTGGGAGCGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
Hanam4841                          CCGGTGGAGCGGTCAGC-TTGCCTTCCGCTCCCCGTGCAGC---GATGAT
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Hcon4741                          TCGGTGGAGCGGTCGGC-CTGCCTTCTGCTCCCCGCGCGGC---GATGAT
Hdiss5145                         AAGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Sbicolour9319                     ACAGTGGAGTGGTCGGC-NTGCGTTGGGGTCCCGATGAAGAACAAAAGAT
Hfilli5144                        CCGTGGA--CGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
Hhirt6656                         CCGGTGGAGCGGTCTGC-TTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hlongi6560                        ??????????????????????????????????????????????????
Hpilg4603                         CCGGTGGAGCGGTCGCC--TGCCTTCCGCTCCCCGCGCAGC---GATGAT
Hpilg4738                         CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Hquar5088                         CCGGTGGAGCGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
Hrud6576                          AAGGTTGGAACCAAGGC-TTCCGTGGGGGCACCGATGAAGA-CGGATGAT
Htamb6585                         AAGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Icylin5114                        TCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Icylin6632                        TCGGCGGAGCGGCCG-C-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Mcape6655                         TCGGCGG-ACGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Panicumbisulcatum                 TCGGGGTTGTGGTTGGC-TTGCCGGCCACGCCTCGTGCAGC---GATGCT
PentaschistisaristifoliaSpies6    GCGTGGCCGTGGCTGGC-CTGCCAGCCGCGCCGCGCGCAGC---GATTCT
Pfrank4705                        TCGACGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Sbic6588                          GCAGTGGAG-GCTCGGC-CTCCGTTGGTGCCGCGATGAAGAACGCAAGAT
Sbic6589                          ACA-CGGAGTGGTCGGC-CTGCCTTCCGCTCCCTGAGCAGC---GATGAT
Shalep9318                        TCGGGGCTTTGGTTGGC-TTGCCGATCATGCCTCGTGCAGC---GATGCT
Tspic4846                         CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Ttria6555                         TCGGCGGAGCGGTCGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATGAC
Zeadiplo                          CCCGCGGAGCGGTCGGC-CCGCCTTCCGCTCCCCGGGCAGC---GGTTA-
ZmaysGfl                          CCCGCGGAGCGGTCGGC-CCGCCTTCCGTTCCCAGGGCAGC---GGTTA-
Evillosa                          --GGCGGAGCGGCTGGC-TTGCCTTCCGCTCCCCACGCGGT---GATCAT
Saccharumofficinarum              --GGTGGAGCGGTCGGC-CCGCCTTCCGCTCCCCGCGCAGC---GATGAT
Imperatacylindrical               --GGCGGA-CGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGA----GTGCT
Bothriochloainsculpta             --GGCGGAGCGGCTGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Dichanthiumannulatum              --GGTGGAGCGGCTGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cybopogonprolixus                 --GGTGGAGCGGCTGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cplurnodus                        --GGTGGAGNGGCTGGC-CTGCCTTCCGCTCACCGCGCAGC---GATGAT
Cmarginatus                       --GGTGGAGCGGCTGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cexcavatus                        --GGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hyparrhnietamba                   --GGTGGAGCGGTTGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hanamesa                          --GGTGGAGCGGTTGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Heteropogoncontortus              --GGTGGAGCGGTTGGC-CTGCCTTCTGCTCCCCGCGCGGC---GATGAT

Aameth6685                        ATAC-TAATC
Aappen6543                        ATC-TTAATC
Aappen6946                        ATC-TTAATC
Adist6684                         ATCTCTAATC
Aeuco5869                         ATC-TTAATC
Aristidaharvardii                 ATCA-TAAC-
Arundinellanepalensis             ATG--TAAC-
Aschiren6581                      ??????????
Bbladh5173                        ATCTTTAATC
Binsc5681                         ATC-TTAATC
Bradi4784                         ATC-TTAATC
Cdieter6642                       ATC-TTAATC
Cleistachnesorghoides             ATC-TTAATC
Cmarg4397                         ATC-TTAATC
Cplur6406                         ATC-TTAATC
Cprolix6682                       ATC-TTAATC
Danthoniacalifornica              ??????????
Dfili5872                         ATC-TTAATC
Dfili5874                         ATC-TTAATC
Emuti5074                         ATC-TTAATC
Emuti6715                         ATC-TTAATC
Eragrostisdielsii                 TTTTGTAATC
Evill5085                         ATC-TTAATC
Hanam4807                         ATC-TTAATC
Hanam4841                         ATC-TTAATC
Hcon4741                          ATC-TTAATC
Hdiss5145                         ATC-TTAATC
Sbicolour9319                     ATCA-TCC--
Hfilli5144                        ATC-TTAATC
Hhirt6656                         ATC-TTAATC
Hlongi6560                        ??????????
Hpilg4603                         ATC-TTAATC
Hpilg4738                         ATC-TTAATC
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Hquar5088                       ATC-TTAATC
Hrud6576                        ATC-TTAATC
Htamb6585                       ATCTTTAATC
Icylin5114                      ATC-TTAATC
Icylin6632                      ATC-TTAATC
Mcape6655                       ACC-TTAAAC
Panicumbisulcatum               ATC-TTAATC
PentaschistisaristifoliaSpies6  ATAC-TAATC
Pfrank4705                      ATC-TTAATC
Sbic6588                        ATC-TTAATC
Sbic6589                        ATC-TTAATC
Shalep9318                      ATC-TTAATC
Tspic4846                       ATC-TTAATC
Ttria6555                       TTA-TTAATC
Zeadiplo                        CACCTTAGTC
ZmaysGfl                        CACCTTAATC
Evillosa                        ATAC-TAATC
Saccharumofficinarum            ATCT-TAATC
Imperatacylindrical             ATC-TTAATC
Bothriochloainsculpta           ATAC-TAATC
Dichanthiumannulatum            ATAC-TAATC
Cybopogonprolixus               ATCC-TAATC
Cplurnodus                      ATCC-TAACC
Cmarginatus                     ATCC-TAACC
Cexcavatus                      ATC-TTAATC
Hyparrhnietamba                 ATCC-TAATC
Hanamesa                        ATC-TTAATC
Heteropogoncontortus            ATC-TTAATC

Ameth6685                       AACACG-ACTCTCGG-CAACGGATATCT
Aappen6543                      CACACG-ACTCTCGG-CAACGGATATCT
Aappen6946                      CACACG-ACTCTCGG-CAACGGATATCT
Adist6684                       CACACG-ACTCTCGGTCAACGGATATCT
Aeuco5869                       CACACG-ACTCTCGG-CAACGGATATCT
Aristidaharvardii               AACACG-ACTCTCGG-CAACGGATATCT
Arundinellanepalensis           AACACG-ACTCTCGG-CAACGGATATCT
Aschiren6581                    ??????????????????????????????
Bbladh5173                      CACACGAACTCT-GG-GAAGGTATATCT
Binsc5681                       CACAC--ACTCTCG--CAACGGATATCT
Bradi4784                       CACACG-ACTCTCGG-CAACGGATATCT
Cdieter6642                     CACACG-ACTCTCGG-CAACGGATATCT
Cleistachnesorghoides           CACACG-ACTCTCGG-CAACGGATATCT
Cmarg4397                       CACACG-ACTCTCGG-CAACGGATATCT
Cplur6406                       CACACG-ACTCTCGG-CAACGGATATCT
Cprolix6682                     CACACG-ACTCTCGG-CAACGGATATCT
Danthoniacalifornica            CACACG-ACTCTCGG-CAACGGATATCT
Dfili5872                       CACACG-ACTCTCGG-CAACGGATATCT
Dfili5874                       CACACG-ACTCTCGG-CAACGGATATCT
Emuti5074                       CACACG-ACTCTCGG-CAACGGATATCT
Emuti6715                       CACACG-ACTCTCGG-CAACGGATATCT
Eragrostisdielsii               CACACG-ACTCTCGG-CAACGGATATCT
Evill5085                       TACATG-ACTATCCG-CAACGGATATCT
Hanam4807                       CACACG-ACTCTCGG-CAACGGATATCT
Hanam4841                       CACGCG-ACTCTCGG-CAACGGATATCT
Hcon4741                        CACACG-ACTCTCGG-CAACGGATATCT
Hdiss5145                       CACACG-ACTCTCGG-CAACGGATATCT
Sbicolour9319                   ----------------------------
Hfilli5144                      CACACG-ACTCTCGG-CAACGGATATCT
Hhirt6656                       CACACG-ACTCTCGG-CAACGGATATCT
Hlongi6560                      ??????????????????????????????
Hpilg4603                       CACACG-ACTCTCGG-CAACGGATATCT
Hpilg4738                       CACACG-ACTCTCGG-CAACGGATATCT
Hquar5088                       CACACC-ACTCTCAG-TAACGGATATCT
Hrud6576                        CACACG-ACTCTCGG-CAACGGATATCT
Htamb6585                       CACACG-ACTCTCGG-CAACGGATATCT
Icylin5114                      CACACG-ACTCTCGG-CAACGGATATCT
Icylin6632                      CACACG-ACTCTCGG-CAACGGATATCT
Mcape6655                       CACACG-ACTCTCGG-CAACGGATATCT
Panicumbisulcatum               CACACG-ACTCTCGG-CAACGGATATCT
PentaschistisaristifoliaSpies6  ??????????????????????????????
Pfrank4705                      GACACG-ACTCTCGG-CAACGGATATCT
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Sbic6588                          ??????????????????????????????
Sbic6589                          CACACG-ACTCTCGG-CAACGGATATCT
Shalep9318                        CACACG-ACTCTCGG-CAACGGATATCT
Tspic4846                         CACACG-ACTCTCGG-CAACGGATATCT
Ttria6555                         CACACG-ACTCTCGG-CAACGGATATCT
Zeadiplo                          GACACG-ACTCTCGG-CAACGGATATCT
ZmaysGf1                          GACACG-ACTCTCGG-CAACGGATATCT
Evillosa                          CACACG-ACTCTCGG-CAACGGATATCT
Saccharumofficinarum              GACACG-ACTCTCGG-CAACGGATATCT
Imperatacylindrical               CACACG-ACTCTCGG-CAACGGATATCT
Bothriochloainsculpta             CACACG-ACTCTCGG-CAACGGATATCN
Dichanthiumannulatum              CACACG-ACTCTCGG-CAACGGATATCN
Cybopogonprolixus                 CACACG-ACTCTCGG-CAACGGATATCN
Cplurnodus                        CACACG-ACTCTCGG-CAACGGATATCN
Cmarginatus                       CACACG-ACTCTCGG-CAACGGATATCN
Cexcavatus                        CACACG-ACTCTCGG-CAACGGATATCN
Hyparrhnietamba                   CACACG-ACTCTCGG-CAACGGATATCN
Hanamesa                          CACACG-ACTCTCGG-CAACGGATATCN
Heteropogoncontortus              CACACG-ACTCTCGG-CAACGGATATCN


Ameth6685                         CGGCTCTCGCATCGATGAAGAA----------
Aappen6543                        CGGCTCTCGCATCGATGAAGAA----------
Aappen6946                        CGGCTCTCGCATCGATGAAGAA----------
Adist6684                         CGGCTCTCGCATCGATGAAGAA----------
Aeuco5869                         CGGCTCTC-------------------------
Aristidaharvardii                 CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
Arundinellanepalensis             CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
Aschiren6581                      ????????????????????????????????
Bbladh5173                        GGGCTCTCGCATCGAAGAA-------------
Binsc5681                         CGGCTCTCGCATCGATGAAGAA----------
Bradi4784                         CGGCTCTCGCATCGATGAAGAA----------
Cdieter6642                       CGGCTCTCGCATCGATGAAGAA----------
Cleistachnesorghoides             CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
Cmarg4397                         CGGCTCTCGCATCGATGAAGAA----------
Cplur6406                         CGGCTCTCGCATCGATGAAGAA----------
Cprolix6682                       CGGATCTCGCATCGATGAAGAA----------
Danthoniacalifornica              CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
Dfili5872                         CGGCTCTCGCATCGATGAAGAA----------
Dfili5874                         CGGCTCTCGCATCGATGAAGAA----------
Emuti5074                         CGGCTCTCGCATCGATGAAGAA----------
Emuti6715                         CGGCTCTCGCATCGATGAAGAA----------
Eragrostisdielsii                 CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
Evill5085                         CCGCTCTTGTATCGATGAAGAA----------
Hanam4807                         CGGCTCTCGCATCGATGAAGAA----------
Hanam4841                         CGGCTCTCGCATCGATGAAGAA----------
Hcon4741                          CGGCTCTCGCATCGATGAAGAA----------
Hdiss5145                         CGGCTCTCGCATCGATGAAGAA----------
Sbicolour9319                     ????????????????????????????????
Hfilli5144                        CGGCTCTCGCATCGATGAAGAA----------
Hhirt6656                         CGGCTCTCGCATCGATGAAGAA----------
Hlongi6560                        ????????????????????????????????
Hpilg4603                         CGGCTCTCGCATCGATGAAGAA----------
Hpilg4738                         CGGCTCTCGCATCGATGAAGAA----------
Hquar5088                         CGGTTCTCGCATCGATGAAGAA----------
Hrud6576                          CGGC????????????????????????????
Htamb6585                         CGGCTCTCCATTCGATGAAGAA----------
Icylin5114                        CGGCTCTCGCATCGATGAAGAA----------
Icylin6632                        CGGCTCTCGCATCGATGAAGAA----------
Mcape6655                         CGGCTCTCGCATCGATGAAGAA----------
Panicumbisulcatum                 CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
PentaschistisaristifoliaSpies6    ????????????????????????????????
Pfrank4705                        CGGCTCTCGCATCGATGAAGAA----------
Sbic6588                          ????????????????????????????????
Sbic6589                          CGGCTCTCGCATCGATGAAGAA----------
Shalep9318                        CGGCTCTCGCATCGATGAAGAA----------
Tspic4846                         CGGCTCTCGCATCGATGAAGAA----------
Ttria6555                         CGGCTCTCGCATCGATGAAGAA----------
Zeadiplo                          CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
ZmaysGf1                          CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
Evillosa                          CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
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Saccharumofficinarum                CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
Imperatacylindrical                 CGGCTCTCGCATCGATGAAGAACGTAGCAAAA
Bothriochloainsculpta               NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAA
Dichanthiumannulatum                NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAA
Cybopogonprolixus                   NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAA
Cplurnodus                          NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAA
Cmarginatus                         NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAA
Cexcavatus                          NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAA
Hyparrhnietamba                     NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAAG
Hanamesa                            NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAAG
Heteropogoncontortus                NNNNNNNNNNNNNNNNNNNNNNNNNNNNAAAAG


Aameth6685                          TGCG-ATACCTAGTGT-GAATTGC
Aappen6543                          TGCGGATACGTGGCGT-GAATTGC
Aappen6946                          ????????????????????????
Adist6684                           TNCCGATACCTAGCGGCGAATTGC
Aeuco5869                           TGCG-ATACCTGGTGT-GAATTGC
Aristidaharvardii                   TGCG-ATACCTGGTGT-GAATTGC
Arundinellanepalensis               TGCG-ATACCTGGTGT-GAATTGC
Aschiren6581                        ATGCGATACCTAGCGT-CAATTCC
Bbladh5173                          TGCCGT-CCTAGCGTT--NATTCC
Binsc5681                           TGCGGATACCTGGTGT-GAATTGC
Bradi4784                           TGCG-ATACCTGGTGT-GAATTGC
Cdieter6642                         ????????????????????????
Cleistachnesorghoides               TGCG-ATACCTGGTGT-GAATTGC
Cmarg4397                           -ATCGATACCTAGTGT-GAATT-C
Cplur6406                           TGCCGATACCTAGCGT-GAATTCC
Cprolix6682                         TGCGGATACCTGGTGT-GAATTGC
Danthoniacalifornica                TGCG-ATACCTGGTGT-GAATTGC
Dfili5872                           TGCG-ATACCTGGTGT-GAATTGC
Dfili5874                           TGCGGATACCTGGGCT-AAATTGC
Emuti5074                           TACGGATACCTGGTGT-GAATGCC
Emuti6715                           TGCCGATACCTGGTGT-GAATTGC
Eragrostisdielsii                   TGCG-ATACCTGGTGT-GAATTGC
Evill5085                           ATNCGATACCTAGTNT-GAATTGC
Hanam4807                           TGCGGATACCTGGTGT-GAATTGC
Hanam4841                           TGCT-ATACCTCGAGT-GAACTGC
Hcon4741                            TGCGGATACCTGGTGT-GAATTGC
Hdiss5145                           TACGGATACCTAGGCT-CAATTGC
Sbicolour9319                       TGCG-ATACCTGGTGT-GAATTGC
Hfilli5144                          TGGCCCCACATGCCTA-TAC--GC
Hhirt6656                           TGCGGATACCTGGTGT-GAATTGC
Hlongi6560                          TGCGGATACCTGGTGT-GAATTGC
Hpilg4603                           TGCGNATACCTGGTGT-GAATTGC
Hplig4738                           ????????????????????????
Hquar5088                           TGCGGATACCTGGTGT-GAATTGC
Hrud6576                            TACG-ATACCTGGTGTGTACTTGC
Htamb6585                           TCCCGATACCTAGCGG-CTATTGC
Icylin5114                          TGCGGATACCTAGTGT-GAATTGC
Icylin6632                          TGCGGATACCTGGTGT-GAATTGC
Mcape6655                           TGCGGATACCTGGTGT-GAATTGC
Panicumbisulcatum                   TGCG-ATACCTGGTGT-GAATTGC
PentaschistisaristifoliaSpies6      ????????????????????????
Pfrank4705                          ????????????????????????
Sbic6588                            TGCG-ATACCTGGTGT-GAATTGC
Sbic6589                            TGCGGATACCTGGTGT-GAATTGC
Shalep9318                          TGCG-ATACCTGGTGT-GACTTGC
Tspic4846                           TGCG-ATACCTGGTGT-GAATTGC
Ttria6555                           ---GGATACTTGGTGT-GAATTGC
Zeadiplo                            TGCG-ATACCTGGTGT-GAATTGC
ZmaysGfl                            TGCG-ATACCTGGTGT-GAATTGC
Evillosa                            TGCG-ATACCTGGTGT-GAATTGC
Saccharumofficinarum                TGCG-ATACCTGGTGT-GAATTGC
Imperatacylindrical                 TGCG-ATACCTGGTGT-GAATTGC
Bothriochloainsculpta               TGCG-ATACCTGGTGT-GAATTGC
Dichanthiumannulatum                TGCG-ATACCTGGTGT-GAATTGC
Cybopogonprolixus                   TGCG-ATACCTGGTGT-GAATTGC
Cplurnodus                          TGCG-ATACCTGGTGT-GAATTGC
Cmarginatus                         TGCG-ATACCTGGTGT-GAATTGC
Cexcavatus                          TGCG-ATACCTGGTGT-GAATTGC
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Hyparrhnietamba                 T-CG-ATACCTGGTGT-GAATTGC
Hanamesa                        TGCG-ATACCTGGTGT-GAATTGC
Heteropogoncontortus            TGCG-ATACCTGGTGT-GAATTGC


Aameth6685                       ATACATCCCG--CTGAACCATCT--AGGTTTTTAAACGCAAGTTGCGCCC
Aappen6543                       ATAAATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Aappen6946                       ??????????????????????????????????????????????????
Adist6684                        ATTCATGTGCCTCGAATGGATTCCATTATTTCCGACTGCAACTTGCCGCC
Aeuco5869                        --AAATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Aristidaharvardii                AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Arundinellanepalensis            AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Aschiren6581                     ATAAATCCGC-TCGAATGCATCCC-ATTTTTTCAA-CTCAACTTGCCCCC
Bbladh5173                       --TAATGTGC-TC-AATGGGTCC-TTATGGCCGAA-TACACCG-GCCGCG
Binsc5681                        ATAAATCCCG--CGGAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Bradi4784                        ATTAATCCCG--CGAAACCATCG--AGTTTTTTAA-CGCAACTTGCCCCC
Cdieter6642                      ??????????????????????????????????????????????????
Cleistachnesorghoides            AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Cmarg4397                        CATAATCCCG--CG-AACCATCGA--GTTTTTGAA-CGCAAGTTGCCCCC
Cplur6406                        AT-AATCCCG--CN-AATCATCN--ATTTTTTGAA-CGCAAGTTGCGCCC
Cprolix6682                      AT-AATCCCG--C--AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
Danthoniacalifornica             AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Dfili5872                        ATAAATCCCN--CC-AACCATCG--AGTTTTTGAA-CGCAAGTTGCCCCC
Dfili5874                        ATTAATCCCG--CC-AACGATCC--AGCTTTTTAA-CGCAAGTTGCGCCC
Emuti5074                        AT-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Emuti6715                        AT-AATCCCG--CA-AACCATCGC-AGTTTTTGAA-CGCAAGTTGCGCCC
Eragrostisdielsii                AG-AATCCCG--TG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Evill5085                        ATGAATCCCC-TCCAATC-ATCGCAGTTTTTGCAACTGCAACTTACGCCC
Hanam4807                        AT-AATCCCG--C--AACCATCG--AGTTTTTGAA-CGCAAGTTGCCCCC
Hanam4841                        AGAAATCCCG--ACGAACCATCGA-GATTCTTCAA-CGCAAGCTGCGCCC
Hcon4741                         ATAAATCCCG--CG-AACCATCGC-AGTTTTTGAA-CGCAAGTTGCGCCC
Hdiss5145                        ATTAATCCCC--GTCAACCATCGC-ATTTTTTGCAACTCAACTTGCCCCC
Sbicolour9319                    AT-AATCCCG--CA-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
Hfilli5144                       --TACTGTGC-TC-CATAGTTCC---TTATGTCCA-CGAATCTAGCCCCC
Hhirt6656                        AT-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Hlongi6560                       AGCAATCCCG--CGGAACCATCG--AGTCTTTGAA-CGCAAGTTGCGCCC
Hpilg4603                        AT-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Hplig4738                        ??????????????????????????????????????????????????
Hquar5088                        ATAAATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Hrud6576                         ATAAATCCCT--CC-AACCATCGA-AGTTTTTGAA-CGCAACTTGCCCCC
Htamb6585                        --TAATCCGC-TC--AATCGATTCC-TTTTTTGAA-CTCAACTTGCCCCC
Icylin5114                       AT-AATCCCG--CC-AATCATCC--ATTTTTTGAA-CGCAAGTTGCCCCC
Icylin6632                       AT-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Mcape6655                        AT-AATCCCG--CGCAACCATCN--AGTTTTTGAA-CTCAAGTTGCCCCC
Panicumbisulcatum                AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCT
PentaschistisaristifoliaSpies6   ??????????????????????????????????????????????????
Pfrank4705                       ??????????????????????????????????????????????????
Sbic6588                         AT-AATCCCG--CG-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
Sbic6589                         AT-AATCCCG--CG-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
Shalep9318                       AT-AATCCCG--CG-AACCATCG--AGTTTGTGAA-CGCAAGTTGCGCCT
Tspic4846                        AT-AATCCCG--CGCAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Ttria6555                        AG-AATCCCG--CGCAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Zeadiplo                         AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
ZmaysGfl                         AG-AATCCCG--TG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Evillosa                         AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Saccharumofficinarum             AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Imperatacylindrical              AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Bothriochloainsculpta            AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Dichanthiumannulatum             AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Cybopogonprolixus                AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCACATTGCGCCC
Cplurnodus                       AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCACATTGCGCCC
Cmarginatus                      AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCACATTGCGCCC
Cexcavatus                       AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCACATTGCGCCC
Hyparrhnietamba                  AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Hanamesa                         AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Heteropogoncontortus             AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC


Aameth6685                       C-AGGGC-TTCTGGTCGA-GGACACCTCTTCCTGGCCGC-TCACGCC---
Aappen6543                       -GAGGCC-TTCTGGTCGA-GGGCACCTCTGCCTGGGCG--TCACGCCG--
Aappen6946                       ??????????????????????????????????????????????????
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Adist6684                       TGACCCCGTTCTCTTCACACGACACCAATTGCATGTCGCGTCACGCTGAT
Aeuco5869                       -GAAGCC-TTTTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Aristidaharvardii               -GAGGCC-TTCTGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Arundinellanepalensis           -GAAGCC-TCCAGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Aschiren6581                    C-ACGCCTTTTCTTTGAC--GACACAACTGCTTGCGCGTCACACCAAA--
Bbladh5173                      T-ACCGCGGTCTCTTCAC-CGACAACAATGGGA-GTCGCC-CACCACG-T
Binsc5681                       -GAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Bradi4784                       T-ATGCC-TTCTGNTCAA-GGGCACCTCTGCCTGGGCG--TCACGCCG--
Cdieter6642                     ??????????????????????????????????????????????????
Cleistachnesorghoides           -GAGGCC-TTCTGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Cmarg4397                       GGACGCC-TTCTGTTCAA-CGACACCTCTGCCTGGGCG--TCACGCCA--
Cplur6406                       -GACGGC-TTCTTGTCCA-GGGCACATCTGCCTGGGCG--TAACACC---
Cprolix6682                     G--AGCC-TTCTGGTC-A-GGGCACCTCTGCCTGGGCG--TCACGCCA--
Danthoniacalifornica            -GAGGCC-TTCTGGCCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Dfili5872                       -GAAGCC-TTTTGGTCGA-GGGCAC-TCTGCCTGGGCG--TCACGCC---
Dfili5874                       -GAGGCC-TTTTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCCG--
Emuti5074                       -GAAGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Emuti6715                       -GACGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Eragrostisdielsii               -GAGGCC-TTCTGGCTGA-GGGCACGTCTGCCTGGGCG--TCACGCG---
Evill5085                       -GACGGCTTTTTTGCTGCAAGGCACGTCTGCCT-GTCGCGTCACGCCA--
Hanam4807                       --ACGCC-TTCTGGTCAA-GGGCACCTCTGCCTGGGCG--TCACGCC---
Hanam4841                       C-ACGTC-TTCTGGTCGA-CGGCACCTCTGCCTGAGCG--TCAA-TCT--
Hcon4741                        -GAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Hdiss5145                       TGACGCC-TTCTGTTCAA-CGACACATCTGATTGGGCA--TCACAGCC--
Sbicolour9319                   -GAGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCA--
Hfilli5144                      C-ACGAC-TTCTGTTCGC-ACACACCACTTCTTCTCGC--CCCCAAGTT-
Hhirt6656                       -GA-GCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Hlongi6560                      -GAAGCC-TTTTGGTCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Hpilg4603                       -GAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Hplig4738                       ??????????????????????????????????????????????????
Hquar5088                       -GATGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Hrud6576                        GGA-GCC-TTCTGGTCAA-CGGCACGTCTGCCTGGGCG--TCAC-GCC--
Htamb6585                       T-ACGAC-TTCTCTGCAA-CGACACAACTGCTTGCGCC--CCACACCT--
Icylin5114                      C-ACGCC-TTCTGGTCAA-GGGCACCTCTGCCTGGGCG--TCACGCCA--
Icylin6632                      GTAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Mcape6655                       -GAAGCC-TTCTGGCCGA-AGGCACNTCTGCCTGGGCG--TCACGCC---
Panicumbisulcatum               -GAGGCC-TTCTGGTCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
PentaschistisaristifoliaSpies6  ??????????????????????????????????????????????????
Pfrank4705                      ??????????????????????????????????????????????????
Sbic6588                        -GAG-CC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCG--
Sbic6589                        -GAGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCA--
Shalep9318                      -GACGCC-TTCTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Tspic4846                       GAAGGCC-TTTTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Ttria6555                       -GAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Zeadiplo                        -GAAGCC-TTCTGGCGGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
ZmaysGfl                        -GAAGCC-TTCTGGCGGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Evillosa                        -GAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Saccharumofficinarum            -GAGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Imperatacylindrical             -GAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Bothriochloainsculpta           -GAGGC--TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Dichanthiumannulatum            -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--TCACGCC---
Cybopogonprolixus               -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--NCACGNC---
Cplurnodus                      -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--NCACGAC---
Cmarginatus                     -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--NCACGAC---
Cexcavatus                      -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGNG--TCACGAC---
Hyparrhnietamba                 -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGTG--TCACGCC---
Hanamesa                        -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGTG--TCACGCC---
Heteropogoncontortus            -GAGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGTG--TCACGCC---


Aameth6685                      ATAGCAC-ACTCACCAAGATGAC--CCTCGGCCT--A-CAGATTTGGT-
Aappen6543                      AAAACAC-ACTCCCAACCCAA----AATCGGGGG--AGGGCATGTG-T-
Aappen6946                      ??????????????????????????????????????????????????
Adist6684                       GAATGAG-ACGTCGACACGATTCTTC-GGCAGACGG--CACACTTTGG-
Aeuco5869                       AAAAGAC-ACGTCCCAAGCCAC---AATCAAG-----GAGGTACTGGC-
Aristidaharvardii               AAAAGAC-ACTCCCCACCCACCC--AGGTTG------GGG-ACGTGGC-
Arundinellanepalensis           AAAAGAC-ACTCCCAACCCAACC--CAGGGG-----AGGG-ATGTGGC-
Aschiren6581                    -T--GAC-ACTCACAAAACACCC-T-TGCAGAC-----CCACCTTCTG-
Bbladh5173                      GC-TGTG-CCCGGCACGGCTATCC--GGCAACC-----CAAACTTCGG-
Binsc5681                       AAAAGAC-ACTCCCAACCCAC----CCTCGGGG---AGGGCACGTGGT-
Bradi4784                       AAAATAC-ACTCCCAACCC-AT---ACTCGGGGG--AGGG-ATGTTGTG
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Cdieter6642                    ??????????????????????????????????????????????????
Cleistachnesorghoides          AAAAGAC-ACTCCCAACCCACCC--AAAGGGGAG-GAGGG-ACGTGGT-
Cmarg4397                      -AAATAC-ACTCCCAACC-AATCCTCGGCAGAAG----GACGCTTTGG-
Cplur6406                      AAAAGAC-ACTCCCAACAGCACCCTCGAGCGGCATAATGG-ACCTGAC-
Cprolix6682                    AAATGAC-ACTCCCAACCCAT----CCTCGGGT---ACGG-ACATGGT-
Danthoniacalifornica           AAAAGAC-GCTCCC-ACCCAACC--CCGGTG-----AGG--ACGCGGC-
Dfili5872                      AAAAGAC-ACTCCCAAGCCAC----CCTCGGG---GAGGG-ACTTGGC-
Dfili5874                      AAAACAC-ACTCCCAAACCGAAA----TCCGGG---AGGG-ACGTGGT-
Emuti5074                      AAAANAC-ACTCCCAAACCAC----AATCGTGG---AGGG-AC-TGGT-
Emuti6715                      AAAACACTACTCCCAACCCAC----NCTCGTGG---AGGG-ACATGTT-
Eragrostisdielsii              AAAAGAC-ACTCCTCACCCATC---TTGGTG------TGG-ACGTGGC-
Evill5085                      -AAAGAC-ACTCCCAGTCCCTACCCTTGACAGGGC-ATCT-ACTTCTT-
Hanam4807                      AAAATAC-ACTCCCAACCCAT----CCTCGGGT---AGG--ACATGGT-
Hanam4841                      TATCTAC-AAGTCG-ACGTAACCGTC--GGGGA----CGG-ACCTGGT-
Hcon4741                       AAAACAC-A-CTCCCAACCCAA---AATCGGG---CGGGG-ATGTGGT-
Hdiss5145                      TAATAAC-ACTCACAACATAC----AATCGCGGC--AGC--ACCTTCT-
Sbicolour9319                  ACATTAC-ACTCCGAACCCA----CCCTCGGGG---AGGG-ATGTGGT-
Hfilli5144                     TC-TGTG----CCCAATCCACTTGTT-GCCAGGC---CCC-ACTTTTG-
Hhirt6656                      AAAA-AC-ACTCCCAA-CCCAC---CCTCGGGG---ACGG-CACTGGT-
Hlongi6560                     -AAACAC-GCTCCCACCCCACTAACCCTGTGGT----GGG-ATGCGGC-
Hpilg4603                      AAAAGAC-ACTCCCAACCCGT----ACTCGGGT---AGGG-ACGTGGT-
Hplig4738                      ??????????????????????????????????????????????????
Hquar5088                      AAAAGAC-AGTCCCAACCCAC----CATCGGGG---ACGG-ACGTGGT-
Hrud6576                       AAAATAC-ACTCC-AACACACCATC----GGGG---AGG--ACCTGGT-
Htamb6585                      GCTGTAC-ACTGCCACAAC-CACTAT-GGCAGTAG--CT--ACCTTCTG
Icylin5114                     AAATGAT-ACTCGCCAACGCGCAT-CCTCGGGG---AGGG-ACATT-TC
Icylin6632                     AAAAGAC-ACTCCCAACCCACCC----TCGGGG---AGGG-ACATGGT-
Mcape6655                      AAAACAC-ACTCCCAAACCCAC----ACAAGG---AAAGG-ACATTTT-
Panicumbisulcatum              AAAAGAC-ACTCCCAACCCATCC---ATGGGGT----GGG-ACGTGGT-
PentaschistisaristifoliaSpies6 ??????????????????????????????????????????????????
Pfrank4705                     --GTACC-CGCTCAGATACTAG---CAGCAAA---ATAGG-ACTTCCT-
Sbic6588                       ACAGTAC-ACTCCCAACCCA----GCCTCGGGG---AGGG-ATGTGGT-
Sbic6589                       ACAG-AC-ACTCCCAACCCA----GGCTCGGGG---AGGG-ATGTGGT-
Shalep9318                     AAAAGAC-ACTCCCAACCCA---TCCCTGGGT----AGGG-ACCTGGT-
Tspic4846                      AAAAGAC-ACTCCCAACCCACCC----TCGGGGG--AGGG-ACGTGGT-
Ttria6555                      AAAAGAC-ACTCCCAAACCAC----CCTAGGGG---AGGG-ACGTGGT-
Zeadiplo                       AAAAGAC-ACTCCCAACACCCCC--CCTGCGGGGCGAGGG-ACGTGGC-
ZmaysGfl                       AAAAGAC-ACTCCCAACACCCCC--CC-GCGGGGCGAGGG-ACGTGGC-
Evillosa                       AAAAGAC-ACTCCCAACCCGA----CCTCGGGG---AGGG-ACGTGGT-
Saccharumofficinarum           AAAAGAC-ACTCCCAACCCAC----CCGAGGGGG--AGGG-ACGTGGT-
Imperatacylindrical            AAAAGAC-ACTCCCAACCCAC----CCTCGGGG---AGGG-ACGTGGT-
Bothriochloainsculpta          AAAAGAC-ACTCCCATCCCAA----CCTCGGGGGGGGGG--ACGTGGT-
Dichanthiumannulatum           AAAAGAC-ACTCCCAACCCAA----CCTCGGGGGGG-----ACGTTGT-
Cybopogonprolixus              AAAAGAC-ACTCCCATCCCAA----TCTCGGGGGGGG----ATGTGGT-
Cplurnodus                     AAAAGAC-ACTCCCATCCCAG----TCGCGGGGGGGG----ATGTGGT-
Cmarginatus                    AAAAGAC-ACTCCCATCCCAG----TCTCGGAGAGGG----ACGTGGT-
Cexcavatus                     AAAAGAC-ACTCCCATCCCAC----CCTCGGGGAGGG----ACGTGGT-
Hyparrhnietamba                AAAAGAC-ACTCCCAACCCAC----CCTCGGGGGGGG----AGNTGGN-
Hanamesa                       AAAAGAC-ACTCCCATCCCAN----CCTCGGGGGGGG----ACGTGGT-
Heteropogoncontortus           AAAANAA-NCTCCCAACCCAN----CTTGGGACGGG-----ACGTGGT-


Aameth6685                     GTTTCGCC-CCTCGTGG-CACGAGGGGCCGAGC--ACCACAAGTT-
Aappen6543                     GTTTGGCC-TCCCGTGC-CGCAGGG-CGCG--TGGGCCG-AACTT-
Aappen6946                     ??????????????????????????????????????????????????
Adist6684                      -TTTCACCCCTCCTTGC-GGCAAGGA-GGGGCCGAACACAACGTG-
Aeuco5869                      GTATGGCC-CCCCGTGC-CGCACGG-CGCGG-TGGGCCG-AAATT-
Aristidaharvardii              GTATGGCC-CCCCGTGC-CGCGAGG-CGCGG-TGGGCCG-AAGTT-
Arundinellanepalensis          GTATGGCC-CCCCGTGC-CGCATGG-CGCGG-TGGGCCG-AAGTT-
Aschiren6581                   -TT-TACCGCCCCCTGC-CGCACGGG-GG-GCCGAACACCAAGTC-
Bbladh5173                     -CTCACCT-CGCCCTGC-GGCA-GGG-GGAGCCAAACACCAC-TG-
Binsc5681                      GTTTGGCT-CCCCGTGC-CGCAGGG-CGCAG-TGGGCCG-AAGTT-
Bradi4784                      -TTTCGCTCCCCCTTCC-GGCAAGGGCGAGGCTGAAACACAACTTC
Cdieter6642                    ??????????????????????????????????????????????????
Cleistachnesorghoides          GTTTGGCC-TCCCGTGC-CTCACGG-CGCGG-TGGGCCG-AAGTT-
Cmarg4397                      -TT-GACCGCGCCCTGC-GGCAAGGG-GGGGCCAGACACACACTG-
Cplur6406                      GTCTGGCC-CCCCGCCCCGGCAGGG-CGAAG-TGGGCCCCAATAT-
Cprolix6682                    GTCTGGCC-CCCCGTGC-CGCAAGG-CGGGG-TGGGCCACAAGTT-
Danthoniacalifornica           GTTTGGCT-CCCCGTGC-CGCAGGG-CGCGG-TGGGCCG-AAGTT-
Dfili5872                      GTATGGCC-CCCCGTGC-CGCACGGGGGCGG-TGGGCC--AAATT-
Dfili5874                      GTTTGGCC-CCCCGTGC-CGCAGGG-CGCGA-TGGGCCTGAAGTT-
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Emuti5074                       GTTTGGCC-CCTCGCGC-CTCAGG--CGCGG-TGGGCC--AAATTT
Emuti6715                       GTTTGGCC-CCTC-CGC-CTCANGG-CACGG-GGGGCC--AAAATT
Eragrostisdielsii               ATTTGGCT-CCCCGTGC-AACACGA-CACGG-TGGGCCG-AAGTT-
Evill5085                       -TCCTTCCTCCCCTGCC-AGGA-CGA-GGAACCAAACACCATGAT-
Hanam4807                       GTTTGGCC-CCCCGTGC-CGCAAGG-CGGGG-TCGACCACAACTT-
Hanam4841                       NTT-------------------------------------------
Hcon4741                        GTTTGGCC-TCCCGTGC-CGCAAGG-CGCGG-TAGGCCG-AAGTT-
Hdiss5145                       CTTTGCCC-CCCCGTAC-CATACGA-CGGGGGTGAACACAAACTT-
Sbicolour9319                   TTTTGGCT-CCCCGATGCCGCATGGC-GTGG-TGGGCCC-AAGTT-
Hfilli5144                      -GCCAACCCCACCTTAT-TGAACGTT--GGG-CAAACACCCCCTT-
Hhirt6656                       GTTTGGCC-CCCCATGC-CGTATGG-CGCGG-TGGGCCC-AACTT-
Hlongi6560                      ATGTGGCT-CCCCGT-CTCGCAAGGGGCGGTG-GGCCTC-AAGAT-
Hpilg4603                       GTTTGGCC-CCCCGTGC-CGCAGGG-CGCGG-TGGGCCG-AAGTT-
Hplig4738                       ??????????????????????????????????????????????
Hquar5088                       GTTTGGCC-CCCCGTGC-CGTACGG-CGCGG-TGGGCCG-AAGTT-
Hrud6576                        GTTTGGCC-CCCCCTGC-CATACGG-CGGGCC-GGACACGAAATT-
Htamb6585                       -CTCTACCACCCCGTGC-CGCACGA-CGGGG-CATACACCAACAT-
Icylin5114                      GTTTGGACCCCCCCTGCCGGCAGGG-GGGCGGTGGGACACAAGTTG
Icylin6632                      GTTTGGAC-CCCCGCTC-CGCAGGG-CGCGG-TGGGCCA-AACTT-
Mcape6655                       GTTTCGTC-CCCCCTTC-CGCAAGG-CGCGA-TGGGCCA-AAATT-
Panicumbisulcatum               GTTTGGCT-CCCCGTGC-CTCACGG-TGCGG-TGGGCCG-AAGTT-
PentaschistisaristifoliaSpies6  ??????????????????????????????????????????????
Pfrank4705                      GTTTGGAT-CCCCGTGC-CGCATGGGCACAGGTGGGCCGAAAGTT-
Sbic6588                        TTTTGGCT-CCCCGATGCCGCATGG-CGCGG-TGGGCCC-AAGTT-
Sbic6589                        TTTTGGCT-CCCCGA-GCCGCATGG-CGCGG-TGGGCCG-AAGTT-
Shalep9318                      GTTTGGCT-CCCTGTGC-TGCAAAG-CGCGG-GGGGCTG-AAATT-
Tspic4846                       GTTTGGCC-CCCCGTGC-CGCAGGG-CGCGG-TGGGCCT-AATTT-
Ttria6555                       GTTTGGCT-CCCCGTGC-CGCAGGG-CGCGG-AGGGCCA-AAATT-
Zeadiplo                        GTCTGGCC-CCCCACGC-CGCAGGG-CGAGG-CGGGCCG-AAGCA-
ZmaysGfl                        GTCTGGCC-CCACGCGC-CGCAGGG-CGAGG-TGGGCCG-AAGCA-
Evillosa                        GTTTGGCC-CCTCGTGC-CGCAAGG-CGCGG-TGGGCCG-AAGTT-
Saccharumofficinarum            GTTTGGTC-CCCCGTGC-CGCAGGG-CGCGG-TGGGCCG-AAGTT-
Imperatacylindrical             GTTTGGAC-CCCCCCGC-CGCAGGG-CGCGG-TGGGCCG-AAGTT-
Bothriochloainsculpta           GTTTGGCC-CCTCGTNC-CTCAAGG-CACGG-TGGGCCG-AAGTT-
Dichanthiumannulatum            GTTTGGCCCCCCCNNTC-CCNAAGG-GGGNGGGGGCCC--AAGTT-
Cybopogonprolixus               GTTTGGCCCCCCTTCCC-CAAGGGG--GAGG-TGGCCCGC-AGTT-
Cplurnodus                      GTTGGNCCCCCNNTGCC-CAAGGGG--GAGG-TGGCCCC-AAGTA-
Cmarginatus                     GTTTGGCCCCCCTTTCTACAANAN--NACGG-TGGGCCG-AAGTT-
Cexcavatus                      GTTTGGCCCCCCATGCC-GAATGGG-GAGG--TGGTACCNAAGTT-
Hyparrhnietamba                 -TTTGGCCCCTCCGTCC-AAAGGGG-GGGGG--GGCCC--AAGNT-
Hanamesa                        TTTTGGCCCCCCCTTCC-CCATTGG-CGCGG-TGGGGCGGGAATT-
Heteropogoncontortus            GTTTGNCCCCCCGTNCC--GCAGGG-CGCGG-TAGGCCG-AAGTT-

Aameth6685                      CTAGCTGACGGGTGATACTCGT-GACTGT-CTTTTGGACG-TGACTGGCC
Aappen6543                      GGGGCTGCCGG---CTAATCG-TGCCGGG-CACA-TCACG-TGGTGGGCG
Aappen6946                      ??????????????????????????????????????????????
Adist6684                       CCCTCTCCCGAG--GTAG-TCGTTGTCGAGTG-ACTTTTGATGGT-GAGC
Aeuco5869                       GGGGCTGCCGGC--T-AATCC-TGCCAGG-CACA-GCACC-TGGTGGGC-
Aristidaharvardii               GGGGCTGCCGG---CGTATCGCG-TCGGG-CACA-GCACG-TGGTGGGCG
Arundinellanepalensis           GGGGCTGCCGG---CAAACCGTG-TCGGG-CACA-GCATG-TGGTGGGCG
Aschiren6581                    CC-TCCTGCAAG--GCTAATCTGGG---AGTG-TATTTTAGCG-T-GACG
Bbladh5173                      CCCTC-CCCTTG--GGAG-GCTTGG--GAGTG-ACTTTTGGCGGT-GACG
Binsc5681                       GGGGCTGCCGGC---GAATCG-TGTCGAG-CACA-GCACG-TGGTGGGCG
Bradi4784                       CGGTCTGCCCGAGCGTAATCTTGCCGAGGTCACA-TTACG-TGGTTGACG
Cdieter6642                     ??????????????????????????????????????????????
Cleistachnesorghoides           GGGGCTGCCGG---CGAATCGTG-TCGGG-CACA-GCACG-TGGTGGGCG
Cmarg4397                       CCCTT-GCCGAG--GGAG-TGTTGCG-GAGTG-ACTTTTCGCGTG-GACG
Cplur6406                       GGGGCTGCCAGC---TAATCT-CGCCAGG-CACA-TTACC-TGGTCGGCC
Cprolix6682                     GGGGCTGCCGGC--GGAATCGTCGCCGGGGCACA-TCACG-TGGTGGGCC
Danthoniacalifornica            GGGGCTGCCGG---CGTACCG--TGCCGGGCGCA-GCACA-AGGTGGGCG
Dfili5872                       GGGGCTGCCAGC---AAATCT-TGCCAGG-CACA-TCACG-TGGTGGGC-
Dfili5874                       GGGGCTGCCATC--TGAATCATA-CCGGTACACA-TCACG-CGGTGGGCG
Emuti5074                       GGGGCTGCCGG---CATATCG-CGTCGGG-CACA-TCACG-TGGTGGGCG
Emuti6715                       GGGGCTGCCGGA--CAGATCG-CGTCGGA-CACA-TCTT--TGGTGGGCG
Eragrostisdielsii               GGGGCTGCCGG---CTTACGGTA-CCGGT-CACA-GCACA-AGGTGGGTG
Evill5085                       CCCTC---CCGG--GGAGTGC--TGGC-AGTG-TCTTTTCGCG-T-GACG
Hanam4807                       GCGGCTCCCGAC--GGAATCGTTGCCGAGTGACA-TTACG-TGGTGAGCC
Hanam4841                       ??????????????????????????????????????????????
Hcon4741                        GGGGCTGCCGGC---GAATCG-TGTCGGG-CACA-GCACG-TGGTGGGC-
Hdiss5145                       CGGGCTTCCAGCA-TTATCTATCTTA-GTGAATTTTTT---CGGTATGAC
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Sbicolour9319                    GGGGCTGCCGGC---GATTCGT-GTCGGG-CACA-TCACG-TGGTGGGCG
Hfilli5144                       CCTTC-CCCAAG--GTACCCT-TGG--AATTT-ACTTTTG-TCATTAACC
Hhirt6656                        GGGGCTGTCG-A--CGAATCG-TGTCGGG-CACA-TCACG-TGGTGGGCG
Hlongi6560                       CCGGCTGCCGGT---GTATCGTGACCGGA-CACA-GCGCG-TGGTACGCG
Hpilg4603                        GGGGCTGCCGGC--GGAATCG-CGCCGGG-CACA-GCACG-TGGTGGGCG
Hplig4738                        ??????????????????????????????????????????????????
Hquar5088                        GGGGCTGCCA-A--CGAATCG-TGTCAGG-CACA-GCACG-TGGTGGGCG
Hrud6576                         GCCTCTCCCATGC-CTATCTGTGGCACGTGCACTTTTAGCTAGTACGGCN
Htamb6585                        CTCTCTGCCATG--CATGGCCGTGTCCAGGTGCACTTTTAGCT-T-AACG
Icylin5114                       GGGTCTGCCGAG---GGAGCCTTGGCGAGTGA--CTTTTGGTGGTTGACG
Icylin6632                       GGGGCTGCCGG---CGAA-CG-TGTCGGG-CACA-TGACG-TGGTGGGCG
Mcape6655                        GGGGCTGCCTCG---GAATCG-TGTCAGA-CACA-TTATG-TGGTGGACC
Panicumbisulcatum                TGGGCTGCTGG---CATACCG-TGCCGGG-CACC-GCACG-TGGTGGGCG
PentaschistisaristifoliaSpies6   ??????????????????????????????????????????????????
Pfrank4705                       GGGGCTTCCGGC--ATAACCG-TGTCGGG-CACA-GCATT-CTGTGGGC-
Sbic6588                         GGGGCTGCCGGC---GATTCG-TGTCGGG-CACC-TCACG-TGGTGGGCG
Sbic6589                         GGGGCTGCCGGC---GATTCG-TGTCGGG-CACA-TCACG-TGGTGGGCG
Shalep9318                       GGGGCTGCCGGCA-TATACAT-TGCCGGG-CACC-GCATG-TGGTGGGCG
Tspic4846                        GGGGCTGCCAG---TGAATCACAGCCGGTACACA-TCACG-TGGTGGGCG
Ttria6555                        GGGGCTGCCCGC---GAATCG-TGTCGG--CACA--CAC--TGGTGGGCG
Zeadiplo                         GGTGCTGCCGGC---GAACCGC-GCCGGG-CGCA-GCACG-TGGTGGGCG
ZmaysGfl                         GGGGCTGCCGGC---GAACCGC-GCCGGG-CGCA-GCACG-TGGTGGGCG
Evillosa                         GGGGCTGCCGGC---ATACCG-TGTCGGG-CACA-GCACG-TGGTGGGCG
Saccharumofficinarum             GGGGCTGCCGGC---GAATCG-TGTCGGG-CACA-GCACG-TGGTGGGCG
Imperatacylindrical              GGGGCTGCCGGC---GAACCGC-GCCGGG-CACA-GCACG-TGGTGGGCG
Bothriochloainsculpta            GGGGCTGCTTCCGGCGAATCG-TGTCGGG-CACA-GCACA-TGGTGGGCG
Dichanthiumannulatum             GGGGCTGCTTCCGGCGAATCG-TGTCGGG-CGCA-GCACA-TGGTGGGCG
Cybopogonprolixus                GGGGCTGCNGGC---GANTCG-TGTTGGG-CACA-GCACA-TGGTGGGCG
Cplurnodus                       GGGGCTGCTGGC---GATTCG--TTTCGG-TAGCAAAAGA-TGGTGGGCG
Cmarginatus                      GGGGCTGCCGGC---GAATCG-TGTTGGG-CACA-GCACG-TGGTGGGCG
Cexcavatus                       GGGGCTGCCGGC---GATTCG--TTTCGG-TAACAGAACG-TGGTGGGCG
Hyparrhnietamba                  GGGTCT-CTNCCGGCGAATCG-TTTCGGG-TACA-ACACA-TGGTGGGCG
Hanamesa                         GGGGCTTCCGNC---GAATCG-TATCGGG-CACA-AAAAA-TGGTGGGCG
Heteropogoncontortus             GGGNCTGCCGNC---GAATCG-TGTCGGG-CACA-GCACG-TGGTGGGCG

Aameth6685                       AGGCATCA--CGTTGTT---CTCG--ACTGACAAAGCCCCGGGGAC---G
Aappen6543                       --ACATC---AGTTGTT---CTC---GGTG-CAT-GACCTCGGCAC---G
Aappen6946                       ??????????????????????????????????????????????????
Adist6684                        CCA-AGG--CAG-ACGTTCTCTC---TGACACACGAACGCC-TCA---GG
Aeuco5869                        G-ACATC---AGTTGT----CTC---CGTG-CAG-TGACCCGTCAA---A
Aristidaharvardii                --ACCT----AGTTGTC---ATC---GGTG-CCG-TGACCCGACGC---G
Arundinellanepalensis            --ACAACT--AGTTGTT---CTC---GATG-CAG-TGGCTCGACAC---G
Aschiren6581                     CCC-ACG---TAAACTTTCTCTC---AA---CAAAAACTCC-TCG---TG
Bbladh5173                       CCA-ATG---AAGATGTTCTCTC---TG-CACAAAAGGCGG-TCAT--GG
Binsc5681                        C-ACATCC---GTTGTT---CTC---GGTG-CAG-CGCCCCGGCAT---G
Bradi4784                        CCACATC---AGATGTT---CTC---TCTGACATACA-CTCCTCAC---G
Cdieter6642                      ??????????????????????????????????????????????????
Cleistachnesorghoides            --ACACCT--AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Cmarg4397                        CCA-AGG--CAGTACGTTCTCTT---TGACACATGAAGGCNGTCAC--GG
Cplur6406                        C-ACATC---AATTGTT---CTCT--CGTA-CCA-TACCCCNTNCG--CG
Cprolix6682                      --ACATC---AGATGTT---CTC---TGTG-CAATGCCCCCGTCAC---G
Danthoniacalifornica             --ACCA---ACGTTGT----CAC---GGTG-CTG-CGCCCCGGCCC---G
Dfili5872                        --ACATC---AATTGT----CTC---GGTG-CAA-TACCCTCAAAA---G
Dfili5874                        --ACATC---AATT-T----CTC---GGTG-CAA-TGCCCCGGAAA---G
Emuti5074                        --ACATC--AAGTTGTT---CTC---GGTG-CAG-CGCCTCGGCAC---G
Emuti6715                        C-ACATC--AAGTTGTT---CTC---TGTG-CAG-CGACTCGGCAC---G
Eragrostisdielsii                --ACAC---ACGGTGTT---CTC---GCTG-CTG-CGAACTGGTCCA-AG
Evill5085                        CCACAG---CAG-ACTTTT-CTT---AAT--CCAAAAACCC-TCG---GC
Hanam4807                        C-ACATC---AGATGTT---CTC---TGTGACAC-TGACCCCTCAC--GG
Hanam4841                        ??????????????????????????????????????????????????
Hcon4741                         G-ACATT---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Hdiss5145                        C-ACAACA--TTTGTTTCCTCGSCGATAAAA-ATCCCTCCCGCCGCT---
Sbicolour9319                    --ACACT--TAATTGTT---CTC---TGTG-CAA-CACCCC-ACAC---G
Hfilli5144                       CCA-AGA--AAA-ACTTCCCTTC---AA---CAAAAAGCCT-TCG---GG
Hhirt6656                        --ACATT---AGTTGTT---CTC---GGTG-CAT-TGCCTCGGCGC---G
Hlongi6560                       --ATCT----CGCTATA---CTA---AACG-CAA-TGCATCCGGGG---C
Hpilg4603                        --ACATCA--G-TTGTT---CTC---GGTG-CAG-TGCCCCGGCAC---G
Hplig4738                        ??????????????????????????????????????????????????
Hquar5088                        C-ACATT---AGTTGTT---CTC---GGTG-CAT-TGCTTCGGAGC---C
Hrud6576                         C-ACGTCA--AACTTCTCNTCGCAGAGACTCCATCATGGCTGCCAGT-TA
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Htamb6585                       CCCACGT--CAA-AC-TTCTCTC---GG---CGACATTGCC-TCT---GC
Icylin5114                      CCACATCA--AGATGTT---CTC---TGTGACAGACGACGCGCGTCGCGG
Icylin6632                      --ACATC---AGTTTTT---CTC---GGTG-CA---CACCCGGCGC---G
Mcape6655                       --ACACTC---ATTGTT---CTC----GTG-CAG-CGCCCCGGCAC---G
Panicumbisulcatum               --ACTTAC--AGTTGTT---CTC---GGTG-CAG-CGTCCCGGTAC---G
PentaschistisaristifoliaSpies6  ??????????????????????????????????????????????????
Pfrank4705                      G-AGATCT--ACTTGTT---GCC---GGTG-CAG-CGCCCCGGCAC---G
Sbic6588                        --ACAC-T-TAAATGTT---CTC---TGTG-CAG-CGCCCC-ACAC---G
Sbic6589                        --ACAC-T-TAATTGTT---CTC---TGTG-CAG-CGCCCCGACAC---G
Shalep9318                      --ACATCG-TAGGTGTT---CTC---TGTG-CAA-TATCGCCACAT---G
Tspic4846                       --ACATC---AGTTGT----CTC---GGTGACAC-TGCCCCGGCAC---G
Ttria6555                       --ACATCT--AATTGTT---CTC---GGTG-CA--CGCCCCGGCAC---G
Zeadiplo                        --ACATC--AAGTTGTT---CTC---GGTG-CAG-CGTCCCGGCGC---G
ZmaysGfl                        --ACATC--AAGTTGTTGTTCTC---GGTG-CAG-CGTCCCGGCGC---G
Evillosa                        --ACATC---AGTTGTT---CTC---GGTG-CAG-TGCCCCGGCACA--G
Saccharumofficinarum            --ACACTC--AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Imperatacylindrical             --ACATC---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCGC---G
Bothriochloainsculpta           --ACATC---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Dichanthiumannulatum            --ACATC---AGTTGTT---CTC---GGTG-CAG-CACCCCGGCACAC-G
Cybopogonprolixus               --ACAACTG-ATGTTTTT--------GGTG-CAG-CACCCCGGCAC-GCG
Cplurnodus                      --ACAAN---AGTTGTTNTT------GGTN-NNT-TACTCCGGCGG-GCG
Cmarginatus                     --ACATC---AGTTGTTTTT------GGTG-CAG-TACCCCGGCACA-CG
Cexcavatus                      --ACA----AAAATTTTTTC-----GGTT-CAN-TTCCCCGGCAC-GCG
Hyparrhnietamba                 --AAATC---AATTTTT---CTC---GGTN-CAG-NGCCCCGGCAC-GCG
Hanamesa                        --ACATC---AATTGTTTTC------GGTT-CAA-TTCCCCGGCAC-GCG
Heteropogoncontortus            --ACATT---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC-NC-

Aameth6685                      CAACTTGGCGTTATCGAAACCTAATGACTCATCGAATTA-----T-GCAC
Aappen6543                      CG-CTAT-CGT-ATTGGCCCTTACG-ACCCATTGA-GCACACGTAAGC-C
Aappen6946                      ??????????????????????????????????????????????????
Adist6684                       CG-CAACTTGCAT-TCAAA-ATCTCGATCCATCGAGCG---ATTCTGCGC
Aeuco5869                       AGGCCG---GCGCATCGCCCTAAGG-ACCCATCGA-GCACC--GGAGCGC
Aristidaharvardii               CAGCCGG--CGAGAGGGCCCTGTACGACCCATCG----ACC--GCAGCGC
Arundinellanepalensis           CGGCCAG-CGTCTTGGCCC--TAAGGACCCATGGA-GCACC--GCAGCGC
Aschiren6581                    CG-CAACTTGCAT-TCAANNN----------------------------
Bbladh5173                      CG-CAACTTGTATCTGAAA-CTATGAATCCATCGAGCA---ATTATGCAC
Binsc5681                       CGGCCGG-CGT-ATCGGCCCTGAGG-ACCCATCAA-GCACC--TAAGCGC
Bradi4784                       CGCCTAT--TGTATTCAACCTTACG-ATCCATTACGAAACT---CAGCAC
Cexc6577                        CG-CAACTTGCGT-TCAAC-CTCTCGATCGATCGAGCAC--ATTCAGCAC
Cleistachnesorghoides           CGGCCGG--CGCATCGGCCCTAA-GGACCCATGGA-GCACC--GCAGCGC
Cmarg4397                       CGGCAACTTGCGANTGAAA----------------------------
Cplur6406                       CGGCCTT----CGCTTGACCTAAAG-ATCCATCGA-GCACNT-TAAGCCC
Cprolix6682                     C-GCCGG--TCCGACTGCCCTAACG-ACCCATCGA-GCAAT--TAAGCAC
Danthoniacalifornica            CAGCCGG--CGAGACGGCCCTCA-GGACCCTTCGC-ATACC--GCAGCGC
Dfili5872                       CCGCGC------ATCTGCCCTAAGG-ACCCATCGA-GCACC--TGAGCGC
Dfili5874                       CGNCCAGGTTGCGTANGCCC----------------------------
Emuti5074                       CAACCGG--CTTATCGGCCCTAAGG-ACCCATTNT-GCACA--CCANCNC
Emuti6715                       CAACCNG--CTTATCTGCCCTAACG-ACCCATTGT-GCACA--TCAGCGC
Eragrostisdielsii               TATCAGGTACGGAATGGCCCTCA-TGACCCATGA----ACC--GAAGCGC
Evill5085                       AC-CTACTTACGT-TCNNA-AACTCGATGGTTCGCGGN---ATTCAGCAA
Hanam4807                       CAGCCCG-TTGCGACTGCCNTAACG-ATCCATCA--GCAAT--TAAGCAA
Hanam4841                       ??????????????????????????????????????????????????
Hcon4741                        CGGACGG-CAA-ATCGGCCCTTAGG-ACCCATCGA-GCACC--GCAGCGC
Hdiss5145                       ??????????????????????????????????????????????????
Sbicolour9319                   TGGCCG--GTGCATCTGCCCTAAAG-ACCCTTCNG-GCACT--GCAGCCC
Hfilli5144                      CC-CAGTTT----------------------------------------
Hhirt6656                       TGGTCGG-TGT-GTCTGCCCTAAGG-ACCCATCGA-GCACC--TAAGCGC
Hlongi6560                      GTATCCG-ACGCAATGCCTTCAATG-GACCCT--A-TTACC--G-AGCGC
Hpilg4603                       CGGCCGG-CGC-GACGGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
Hplig4738                       ??????????????????????????????????????????????????
Hquar5088                       CGCTCGG--GT-ATTNGCCCTAAG--ACCCATCGA-GCACC--TAAGCGC
Hrud6576                        ANTTCNAANNTAATGGACCCATCNAGCACATTAAGCGCATCACC------
Htamb6585                       TG-CAGCTTGCTTTTCTGCGCAATCGATGGATCTAGAGC--ATTATGCAC
Icylin5114                      CGGCCGGTTGCGTTTCGCCCTATCGGATCCATCGA-GCAAT--TCAGCGC
Icylin6632                      C-GCCAG--TGCGTTGGCC--TAA-------------------------
Mcape6655                       CGGCNGT--TGCATCTGCCCTAAGG-ATCCATGGAAGCACN--TCTTCAC
Panicumbisulcatum               TAGCTAG--CTTGTTGGCCCTTAAGGACCCAGGA----ACC--GTAGCGC
PentaschistisaristifoliaSpies6  ??????????????????????????????????????????????????
Pfrank4705                      CTGCCGA-AGCGATTGACCCTAAGGGACCCATCTA-CCACC--GCAGCGC
Sbic6588                        TGGCCG--GTGCATCTGCCCTAAAG-ACCCTTCGG-GCA-T--GC-GCCC
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Sbic6589                        TGGCCG--GTGCATCTGCCCTAACG-ACCCTTCGG-GCACT--GC--GCA
Shalep9318                      TACCTA--TCTTATTGGCCTTAAG--ACCCATATG-TGAAC--TAAGCGT
Tspic4846                       CGGCCGGC--GCGTAGGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
Ttria6555                       CGGCCGGCGT-ATNTGCCCTTATG--ANCCATCTA-GCACC--GAAGCGC
Zeadiplo                        TGGCCGG--CCATTCGGCCCTACGG-ACCCATCGAGCGACC--GA-GC--
ZmaysGfl                        CGGCCGG--CCATTCGGCCCTAAGG-ACCCATCGAGCGACC--GA-GC--
Evillosa                        CATACGGCGAC-ATCGG----------------------------------
Saccharumofficinarum            CGGCCGGCG-C-ATCGG----------------------------------
Imperatacylindrical             CGGCCGGCG-TG-TCGGCCCTAAGG-ACCCATCGA-GCACC--GCAGCGC
Bothriochloainsculpta           CGGCCGGCG--CATCGGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
Dichanthiumannulatum            --ACCGGCG--CATCGGCCCTAAGG-ACCCATCGA-GCACC--GAAGC--
Cybopogonprolixus               --ACAGGCG--TATTGTCGCTAAGG-AGGCCATGGAGCGAAC-GAAGCGC
Cplurnodus                      -AACCGAGC--ACCTGTCGTCCAGG-AGGGATCGA-GCAGC--GAAGGGC
Cmarginatus                     --ACCGGCG--CATTGTCGCTAAGG-AGGCCATCGAGCACC--GAAGCGC
Cexcavatus                      --GCCGGCG--TATTGTCTCTAAGG-AGGCCATCGAGCACC--GAAGCGC
Hyparrhnietamba                 --GCCGGCG--CATCGGCCCTA-GG-ACCCATCGA-GCACC--GAAGCGC
Hanamesa                        --GCCGGCG--TATTGGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
Heteropogoncontortus            -AGACGGCA--AATTGGCCCTTAGG-ACCCATTGA-GCACC--GNAGCGC


Aameth6685                      TTCATC-CCTC-GGA-TCGCAAT----------------------------
Aappen6543                      ATCGCC-GCTC-GGA-TCGCGACCCCAT--GTCATTCTCC-ACTACCCGC
Aappen6946                      ----------------------------------------------------
Adist6684                       TTCACACC-TC-GTA-TCGCAATTCGCT--GCCATCTTCAT-CTATCCGA
Aeuco5869                       ATCCCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Aristidaharvardii               A-AGCC-GCTC-GGA-CC---------------------------------
Arundinellanepalensis           ATCGCC-GCTC-GGA-CC---------------------------------
Aschiren6581                    ????????????????????????????????????????????????
Bbladh5173                      TTCNCCCCCTC-GGA-TCGCAATTTCAT--GACATTTTGGA-CTATCCGA
Binsc5681                       CTCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCTGG-ACTACCCGC
Bradi4784                       ATCACC-CCTCGGAT--CGCAACCCCCT--NCCNTNTTCG-ACTACCCGA
Cdieter6642                     ????????????????????????????????????????????????
Cleistachnesorghoides           ACCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACT------
Cmarg4397                       ????????????????????????????????????????????????
Cplur6406                       ATCNCC-NCTC-GNA-TCNCCACCNCAT--GTCAATCTGG-ACTACC-GN
Cprolix6682                     ATCGCC-CCTC-GGA-CCGCAACCCCAT--GCCATTCTGGTACTACCCGC
Danthoniacalifornica            T-CGTC-GCTC-GG-------------------------------------
Dfili5872                       ATCACC-CCTC-GGA-CCGC-ACCCCA---GTCATTCTGG-ACTACCCGC
Dfili5874                       ????????????????????????????????????????????????
Emuti5074                       ATTGCC-NCTC-GGA-CCNCNACCCCAG--GNNAGCCC------------
Emuti6715                       ATTTCC-CCTC-GGA-TCGCGATCCCCT--GTGATTTTGG-ACTATACGC
Eragrostisdielsii               A-TCTC-GCTC-GGA-CC---------------------------------
Evill5085                       TTCACTGCAGG-GGA-TCGCATTTTCCATANCGTTCTTCATACTATNCCA
Hanam4807                       NATCNCCCCTC-GGA--CGCAANCCCCT--GNCATNTTGN-ACTANNCGN
Hanam4841                       ????????????????????????????????????????????????
Hcon4741                        ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Hdiss5145                       ????????????????????????????????????????????????
Sbicolour9319                   CATCCATGCTC-GGA-CCGCGACCCCAN--GTCAGTCNGG-ACCACCCGC
Hfilli5144                      ????????????????????????????????????????????????
Hhirt6656                       ATCCC--GCTC-GGA-CCACGACCCCAG--GTCAGTCTGG-ACTACCCGC
Hlongi6560                      ACA----CCTT-CTA-CCGC-ACCCCAT--GTCA-GCTGG-ACTACCCGC
Hpilg4603                       ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Hplig4738                       ????????????????????????????????????????????????
Hquar5088                       ATCCC--GCTC-GGA-CCGCGACCCCAG--GTCATTCTGG-ACTACCCGC
Hrud6576                        ????????????????????????????????????????????????
Htamb6585                       TTCACCGCTCG-GTA-TCGCATCTTCCT--GCTATCTTCGT-CGACCCGA
Icylin5114                      ATCGCC-GCTC-GGA-TCACGATCCCAT--GTCATCCTGG-ACTATCCGC
Icylin6632                      ????????????????????????????????????????????????
Mcape6655                       ATCACC-GCTC-GGATCCGA---CCCAT--GTCATTCTGG-ACTACCCGC
Panicumbisulcatum               TTCGTC-GCTC-GGA-CC---------------------------------
PentaschistisaristifoliaSpies6  ????????????????????????????????????????????????
Pfrank4705                      ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Sbic6588                        ANTCCATGCTC-GGA-CCGCGACCCCAN--GTCANNCNGG-ACCACCCGC
Sbic6589                        CATCGATGCTC-GGA-CCGCGACCCCAG--GTCAGTCTGG-ACCACCCGC
Shalep9318                      TTCCTC-GCTC-GGA-CCGC-ACCCCAT--GTCATACTGG-ACTACCCGC
Tspic4846                       ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Ttria6555                       TTTTCC-GCTTTGGA-ACGCGACCC-AN--GTCA-TCTGG-ACTACCCGC
Zeadiplo                        TTGTCC---TC-GGA-CCGCGA----------------------------
ZmaysGfl                        TTGCCC---TC-GGA-CCGCGA----------------------------
Evillosa                        ----------------------------------------------------
Saccharumofficinarum            ----------------------------------------------------
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Imperatacylindrical             ATCGCC-GCTC-GGA-CC------------------------------
Bothriochloainsculpta           TTACGCCGCTC-GGA-CCGCGA---------------------------
Dichanthiumannulatum            ATCACC-GCTC-GGA-CCGCGA---------------------------
Cybopogonprolixus               ATCCCC-GCTC-GGA-CCGCGA---------------------------
Cplurnodus                      ATCCCC-GCTC-GGA-CCGCGA---------------------------
Cmarginatus                     ATCCCC-CCTC-GGA-CCGCGA---------------------------
Cexcavatus                      ATCGCC-GCTC-GGA-CCGCGA---------------------------
Hyparrhnietamba                 ATCNCC-NCTC-GGA-CCGCGA---------------------------
Hanamesa                        ATCGCC-GCTC-GGA-CCGCGA---------------------------
Heteropogoncontortus            ACAGCC-GCTC-GGA-CCGCGA---------------------------
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Appendix H: CLUSTAL W (1.74) multiple sequence alignment data of the Andropogoneae specimens for trnL-F + *ITS* region.

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Aadscen6713                 ??????????????????????????????????????????????????
Aameth6679                  TCGTGACCCGCGTGAAAATATG-AC-AACAAAGGCTTCCCTCAGTT--G
Aameth6685                  TCGTGACC-GCGTCGATGACCG--T-AACAAAGT-TTCCCTCAGTT--G
Aappen6543                  TCGTGAC-----GAAGGAATTC-GT-AACAAA-GTTTCCCTCAGTT--C
Aappen6946                  TCGTGACC-----GAGGAATTC-GT-AACAAA-GTTTCCCTCAGTG--C
Adist6684                   TCGTGACA---CGAAAGAAA-C-GT-AACAAACGCTTCCCTCAGTT--C
Aeuco5869                   TCGTGACCCA--GAAA-AATCC-GT-AACAAG-GCTTCCCTCATGCATG
Arundinellanepalensis       TCGTGACCC-TTAAAACAAAACAGACCGCGAACATGTTTCCCATGT---
Aschiren6581                ??????????????????????????????????????????????????
Bbladh5173                  TCGTGACC--CTGAAGGAAATCAG--ACCGAAAGCTTCCCTCTAAT--G
Binsc5681                   TCGTGAGC----GGAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT---
BBrachiaria                 ??????????????????????????????????????????????????
Bradi4784                   TCGTGAACCT--GAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Bserra6554                  ??????????????????????????????????????????????????
Cexc6577                    ??????????????????????????????????????????????????
Cdieter6642                 TCGTGACCCCG--ACGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Cleistachnesorghoides       TCGTGACC--CTTAAACAAAACAGACCGCGAACGCGTCTCTCGTG----
Cmarg4397                   TCGTGACAATTCGAAGGAATCG-GT-AACAAGAGCTTCCCTCAGTTC--
Cplur6406                   TCGTGACC--ATGTAGATATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Cprolix6682                 TCGTGACCGG----TTAAACCG-GT-AACAAA-GCTTCCCTCCCTT--G
Danthoniacalifornica        TCGTGACCC--GAAACCAAAACCGACCGAGAACGCGTCACCCTGT---C
Dfili5872                   TCGTGACGGA--GGA---ATTC-GT-AACAAG--CTTCCCTCAGTT--G
Emuti5074                   TCGTGAAC----GGAGGAATTC-GT-AACAAA-GTTTCCCTCAGT---G
Emuti6715                   TCGTGAGC-----GAGGAATTC-GT-AACAAA-GCTTCCCTCAGT---G
Eragrostisdielsii           TCGTGACC---CTGACCAAAATAGACCGCGAACATGTCATCCATG---C
Evill5085                   TCGTGACC--CTGAAACAAATC-GT-AACAAA-GCTTCCCTCTTTG--T
Hanam4807                   TCGTGAGC---CGGAGGAATTC-GT-AACAAAG-TTTCCCTCTCAT--G
Hanam4841                   TCGTGACC----CGAGGAAATC-GT-AACAAAG-CTTCCCTCTCAT--G
Hcon4741                    TCGTGACC--CTGAAAGAAATC-GA-AACAAA-GCTTCCCTCTGTT--G
Hdiss5145                   TCGGTACT---TGGAGGAATTC-GT-AACAAAG-CTTCCCTCTGAT--G
Sbicolour9319               TCGTGACCC--TTAAACAAAACAGACCGTGAACATGTCTCTCATGT---
Hfilli5144                  TCGTGATAG--CGGAGGAATTC-GT-AACAAAG-CTTCCTCCTCAT--G
Hhirt6656                   TCGTGACG----AGGAAAATTC-GT-AACAAAG-CTTCCCTCAGTT--G
Hlongi6560                  ??????????????????????????????????????????????????
Hpilg4603                   TCGTGAGCGG----AGGAATTC-GT-AACAAA-GTTTCCCTCCGTT--G
Hpilg4738                   TCCTGACC--CGGAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Hquar5088                   TCGTACCC---TGGAAGAAAACAGA-AACAAA-GCGTCCCTCTCAT--G
Hrud6576                    TCGTGACCC--TTAAACAAAACAGACCGCGAACGCGTCTCTCATGT---
Htamb6585                   TCGTGACC---CGGAGGAAATCCGT-AACAAAG-CTTCCCTCTGAT--G
Icylin5114                  TCGTGACCT---GAAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Icylin6632                  TCGTGACC--G-GAAGA-ATTC-GT-AACAAA-GCTTCCCTCAGTT--C
Mcape6655                   TCGTGAGG---CGAAGGATT-C-GT-AACAAG-GTTTCCCTCAGTT--G
Monocymbium                 ??????????????????????????????????????????????????
Pdilatum6617                ??????????????????????????????????????????????????
PentaschistisaristifoliaSpies6  TCGTGACC---GAAACCAATGCAGACCGTGAACAAGTCACATTGT---C
Pfrank4705                  TCGTGAC------GAGGAATTC-GT-AACAAA-GTTTCCCTCAGTT--G
Pschinz6652                 ??????????????????????????????????????????????????
Sbic6588                    TCGTGACC---TTAAACAAAACAGACCGTGAACATGTCTCTCATGT---
Sbic6589                    TCGTGACC--CAGGAGGAATTC-GT-AACACA-GTTTCCCTCAGTT--C
Shalep9318                  TCGTGACA---CGAAGGAAATC-GT-AACAAAG-CTTCCCTACGTT--C
Snigros6567                 ??????????????????????????????????????????????????
Tleuc6627                   ??????????????????????????????????????????????????
Tspic4846                   TCGTGAT-----GGAGGAATTC-GT-AACAAA-GCTTCCCTCAGTT--G
Ttria6555                   TCGTGACC-GT-GAAGGTAACG-CC-AACAAGAGTTTCCCTCAGTT--G
Zeadiplo                    CTGTGACCC--TTAAACGAAACAGACCGCGAACGAGTCACCCGTG---C
ZmaysGfl                    CCGTGACCC--TTAAACAAAACAGACCGCGAACGAGTCACCCGTG---C
Saccharumofficinarum        TCGTGACC---TTAAACAAACCAGACCGCGAACGCGTCCCTCGTG--CC
Imperatacylindrica          TCGTGACCC--TTAAACAAAACAGACCGCGAACGAGTCTCTCGTG--CC
Dichanthiumannulatum         TCGTGACCC--TTAAACAAAACAGACCGCGAACGTGTCTCTCGTGT--C


Aadscen6713                 ??????????????????????????????????????????????????
Aameth6679                  TCCC-GGGCTTC---------------GGCTCGGC--CAAGGCACCCGAG
Aameth6685                  CCCCCGGGCTTC---------------GGCTCGGC--CAAGGCACCCTAT
Aappen6543                  CNCCCNGGCTAC---------------GGTTCGGC-CTCTGGCTCCCNAG
Aappen6946                  ACCGCGGGCTAG---------------GGCCCCGCACTCCGGCCCCCTAG
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Adist6684                       CCCCCGGCCCTT---------------GGTTCCAC-CTTGGGCCCCCTTT
Aeuco5869                       CCACCGGGCTCC---------------GGCCCGGC--AAAGGCTCCCGAG
Arundinellanepalensis           -CGCCGGACTTC---------------GGTCCGGT--TTAGGCCCCCGAG
Aschiren6581                    ??????????????????????????????????????????????????
Bbladh5173                      CCGCCGGGCTCC---------------GGCCCGGC--CTAGGCCCCCGAG
Binsc5681                       CCACCGGGCCTC---------------GGCC-GGC--ACAGGCCCCCGAG
BBrachiaria                     ??????????????????????????????????????????????????
Bradi4784                       CCGCCGGGCTCC---------------GGCCCGGCC-AAAGGCTCCCGAG
Bserra6554                      ??????????????????????????????????????????????????
Cexc6577                        ??????????????????????????????????????????????????
Cdieter6642                     CCCCCGGGCTTC---------------GGTCCGGC--CAAGGCCCTCTAG
Cleistachnesorghoides           CCGCCGGGCCTC---------------GGCNCGGC-ANNNGGNCCCCGAG
Cmarg4397                       CCGCCGGGCTTC---------------GGCCCGGC--CAAGGCCCCCGAG
Cplur6406                       CTCCCNGGCTAG---------------GG--CCGG--CTTGGCCCCCTAT
Cprolix6682                     CCGCCGGGCTTC---------------GGTCCGGC--CAAGGCCCCCGAG
Danthoniacalifornica            CGGCCACGCGACGGGACTCGTCCCCGCCGCGCGGCCCCTAGGCCGCCGAC
Dfili5872                       CCACCGGGCTCC---------------GGCCCGGC--AAAGGCTCCCGAG
Emuti5074                       CCACCGGGCCTC---------------GGCCCGGA--CAAGGCCCCCCAG
Emuti6715                       CCACCGGGCCTC---------------GGCCCGGA--CAAGGCCCCCCAG
Eragrostisdielsii               CGTCGG-GTGATGGGGCTTG-CCTCGCCTCCCGAC--TTAGGCCCCAGAC
Evill5085                       CTGCCGGGCTCC---------------GGCTCGGC-CTGAGGTCCCCGAG
Hanam4807                       TCGCCGGGCTCC---------------GGCCCGGC--CAAGGTTCCCGAG
Hanam4841                       TCGCTGGGCTTC---------------GGCCCGGC--CAAGGCTCCCGAG
Hcon4741                        TCGTCGAGCCTC---------------GGCTCGGC---AAGGCCCCCGAG
Hdiss5145                       TCGCCGGGCTCC---------------GGCCCGGC--CAAGGCTCCCGAG
Sbicolour9319                   -CGTCGAGCTTT---------------GGCTCGGCA-CAAGGTCCCCTTG
Hfilli5144                      TCGCCGGGCTCC---------------GGCCCGGC-CAAAGGCTCCCGAG
Hhirt6656                       ACCCTGGGCTTC---------------GGCCCGGC--CAAGGCTCCCGAG
Hlongi6560                      ??????????????????????????????????????????????????
Hpilg4603                       CCGCCGGGCTTC---------------GGCCCGGC--CAAGGCCCCCGAG
Hpilg4738                       CCCCCGGGCAAG---------------GGCCCCGC-ACAAGGCCCCGGAG
Hquar5088                       TCGCCGGGCTCC---------------GGCCCGGC--CAAGGGTCCCCAA
Hrud6576                        -CGCCGGGCTCC---------------GGCCCGGC--CAAGGCTCCCGAG
Htamb6585                       TCGCCGGGCTCC---------------GGCCCGGC--CAAGGCTCCCGAG
Icylin5114                      CCGCCGGGCTCC---------------GGCCCGGC--CAAGGCCCCCGAG
Icylin6632                      CCCCCGGGCCAG---------------GGTTCGGC--CCCGGCCCCCTAT
Mcape6655                       CCCCCGGGCTAC---------------GGCTCGGC-ACAGG--CCCCTAG
Monocymbium                     ??????????????????????????????????????????????????
Pdilatum6617                    ??????????????????????????????????????????????????
PentaschistisaristifoliaSpies6  CGGCCACACGA--------GCTCACGCCGTGTGGC--CTAGGCCGCCGAC
Pfrank4705                      CCGCCTGGCTTC---------------GGCCTGGT--CAAGGCCCCTGAG
Pschinz6652                     ??????????????????????????????????????????????????
Sbic6588                        -CGTCGAGCTTC---------------GGCTCGGCA-CAAGGTCCCCTTG
Sbic6589                        ACCNCGGGCTGG---------------GGCTCGGC-CTTAGCCCCCCTTG
Shalep9318                      CTCCTGGGCTCC---------------TGCCCGTG--CAAGGCCCTCGAC
Snigros6567                     ??????????????????????????????????????????????????
Tleuc6627                       ??????????????????????????????????????????????????
Tspic4846                       CCACCGGGCTTC---------------GGCCCGGC--AAAGGCTCCCGAG
Ttria6555                       CCCCCGGGCCTC---------------GGCCCGGC--CACGGCCCCCGAG
Zeadiplo                        CGCCGG-GCTCC---------------GGCCCGGCACGCTGCCCCCCC--
ZmaysGfl                        CGCCGG-GCTCC---------------GGCCCGGCACGCTGCCCCCCCCC
Saccharumofficinarum            -GCCGG-GCTTC---------------GGCCCGGCA-CGAGGTCCCCGAG
Imperatacylindrica              -GCCGG-GCTCC---------------GGCCCGGC--CAAGGCCCCCGAG
Dichanthiumannulatum            -GCCGG-GCTTC---------------GGCTCGGA--CAAGGCGTCCGAG


Aadscen6713                     ??????????????????????????????????????????????????
Aameth6679                      -CCCCGTCCC-------GGGGCGGAGGTGCCGC--AAAAGAACCCACGGC
Aameth6685                      -CCTCGTCCC-------GGGGCGGAGGTGCCGC--AAAAGAACCCACGGC
Aappen6543                      -CCCCGTCCA-------GGGGCGGAAGGGCCGC--AAAACAACCCACGGC
Aappen6946                      GCCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAACAACCCACGGT
Adist6684                       -TCCCCTCCC-------TGGGTAATCGCCCGAA--AA-ACAACCCACGGC
Aeuco5869                       -CCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Arundinellanepalensis           -CTCCGTCCC-------GGGGCAGAGGGGCCTT--AACAGAACCCACGGC
Aschiren6581                    ??????????????????????????????????????????????????
Bbladh5173                      -CCCCTTCCC-------GGGGCGGAGGAGCCGC--CAAAGAACCCACGGC
Binsc5681                       -CTCCGTCCT-------GGGGCGGAGGGGCCGC--AAAAGAACCCACCGC
BBrachiaria                     ??????????????????????????????????????????????????
Bradi4784                       -CCCCGTCCA-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Bserra6554                      ??????????????????????????????????????????????????
Cexc6577                        ??????????????????????????????????????????????????
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Cdieter6642                     -CCCTGTCAC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Cleistachnesorghoides           -CCCNGTCNT-------GGGGCGGAGGGGCCAC--AAAAGAACCCACGGC
Cmarg4397                       -CCCTGTCAC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Cplur6406                       -CCCCNTCTT-------GGGGTGGAGGGGCCGC--AAAATAACCCACGGC
Cprolix6682                     -CCCTGTCAC-------GGGGCGGAGGGGCCGC--AAAACAACCCACGGC
Danthoniacalifornica            -CTCCCTCCTCC----GGGAGGGGAGCGGCCGT--AAAAGAACCCACGGC
Dfili5872                       -CCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Emuti5074                       -CTCCGGCA--------------GAGGGGCCGC--AACAGAACCCACGGC
Emuti6715                       -CTCCGGCA--------------GAGGGGCCGC--AACAGAACCCACGGC
Eragrostisdielsii               -TTTCTTAC--------GGAGGGCTGGGGCCGC--AACAGAATCCACGGC
Evill5085                       -CCCCGTCCT-------GGGGCGGAGGGGCCGC--AAAAGATCCCACGGC
Hanam4807                       -CCCCGTCCC-------GGGGCGGAGGTGCCGC--AAAAGAACCCACGGC
Hanam4841                       -CCCCGTCCG-------GGGGCGGAGGTGCCGC--AAAAGAACCC-CGGC
Hcon4741                        -CTTC--------------GGCAGAGGGGCCGC--CACAGAACCCACGGC
Hdiss5145                       -CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Sbicolour9319                   -CTCCAAC-CT------GGGGCAGAGGGGCCAC--AAAAGAACCCACGGC
Hfilli5144                      -CCCCGTCCC-------GGGGCGGAGGTGCCGC--AAAAGAACCCACGGC
Hhirt6656                       -CCCCGTCCG-------GGGGCGGAGGTGCCGC--AAAAGAACCC-CGGC
Hlongi6560                      ??????????????????????????????????????????????????
Hpilg4603                       -CCCTGTCAC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Hpilg4738                       -CCCCGTCAC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Hquar5088                       CCCCCGTCCC-------GGGGCGGAGGTGCAGCC-AAAAGAACCCAAAGC
Hrud6576                        -CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Htamb6585                       -CCCCGTCTCTCATGTCGGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Icylin5114                      -CTCCGTCCC-------GGGGCGGAGGGGCCGC--AACAGAACCCACGGC
Icylin6632                      -CTCCGTCCC-------GGGGCGGAGGGGCCGC--AACAGAACCCACGGC
Mcape6655                       -CCCCGTCTT-------GGGGCGGAGGGGCCAC--AACAGAACCCACGGC
Monocymbium                     ??????????????????????????????????????????????????
Pdilatum6617                    ??????????????????????????????????????????????????
PentaschistisaristifoliaSpies6  -CTCCGCAA-------GGACGGGGAGCGGCCGC--AAAAGAACCCACGGC
Pfrank4705                      -CACCGTCAA-------GGGGC-GAGGGGCCGC--AACAGAACCCACGGC
Pschinz6652                     ??????????????????????????????????????????????????
Sbic6588                        -CTCCAAC-CT------GGGGCAGAGGGGCCAC--AAAAGAACCCACGGC
Sbic6589                        -CTCCCTCCT-------GGGGCAGAGGGGCCAC--AAAAGAACCCACGGC
Shalep9318                      -CTTC-TCAT-------GGAGGAGAGGGGCCAC--AAAAGAACCCAGGGC
Snigros6567                     ??????????????????????????????????????????????????
Tleuc6627                       ??????????????????????????????????????????????????
Tspic4846                       -CCCCGTCCC-------GGGGCGGAGGGGCCGC--AAAAGAACCCACGGC
Ttria6555                       -CTCCGTTCC-------GGGGCGGAGGGGCCAC--AAAAGAACCCACGGC
Zeadiplo                        -GAACCTCCCGC----GGGGAAGGGGGG-CCGCGAAAAAGAACCCACGGC
ZmaysGfl                        -GAACCTCCCGC----GGGGAAGGGGGGGCCGCGAAAAAGAACCCACGGC
Saccharumofficinarum            CTCCGTCCC--------GGAGCGGAGGGGCCAC--AACAGAACCCACGGC
Imperatacylindrica              CTCCGTCCC--------GGGGCGGAGGGGCCGC--AACAGAACCCACGGC
Dichanthiumannulatum            CCCTGTCCC--------GGGGGGGGGGGGCCCC--AAAAGAACCCACGGC

Aadscen6713                     ??????????????????????????????????????????????????
Aameth6679                      GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Aameth6685                      GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Aappen6543                      GCCTT---AAGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Aappen6946                      GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Adist6684                       GCCTTCGTAAACATTCAGGAACACTTA-TA------TTG---CCTT--GC
Aeuco5869                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Arundinellanepalensis           GCCAT---AGGCGTCAAGGAACACTCA-TA------TTG---CCTT--GC
Aschiren6581                    ??????????????????????????????????????????????????
Bbladh5173                      GCCTT---AGGCGTCAAGGAACACTAC-TA------TTG---CCTT--GC
Binsc5681                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
BBrachiaria                     ??????????????????????????????????????????????????
Bradi4784                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Bserra6554                      ??????????????????????????????????????????????????
Cexc6577                        ??????????????????????????????????????????????????
Cdieter6642                     GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Cleistachnesorghoides           GCCTA---AGGCGTCAAGGAACACTTA-TA------TTG---CCTN--GC
Cmarg4397                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Cplur6406                       GCCTT---AGGCGTCATGGAACACTTA-TA------TTG---CCTT--GC
Cprolix6682                     GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Danthoniacalifornica            GCCGAC--CGGCGCCAAGGAACACTGTTTA------TTG---CCT----C
Dfili5872                       GCCTT---AGGCGTCAAGGAACACTTG-TA------TTG---CCTT--GC
Emuti5074                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---GCTC--GC
Emuti6715                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG----CTC--GC
Eragrostisdielsii               GCCGA---CGGCGTCAAGGAACACTAA-TA------TTG---CCTT--GC
Evill5085                       GCCTT---ACGAGTCAAGGAA-ACTTG-TA------TTG---CCTT--GC
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Hanam4807                       GCCTT---AGGCGTCAAGGAACACTTAATA------TTG---CCTT--GC
Hanam4841                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Hcon4741                        GCCTT---AGGCGTCAAGGAACACTTG-TA------TTG----CTT--GC
Hdiss5145                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Sbicolour9319                   GCCTT---AGGCNTCNNNGAACACTCA-TG------TTG---CCTT--GC
Hfilli5144                      GCCTT---AGCC-TCA-GGAACACTTA-TA------TTG---CCTT--GC
Hhirt6656                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Hlongi6560                      ??????????????????????????????????????????????????
Hpilg4603                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Hpilg4738                       GCCTT---AGGCGTCAAGGAACACCTA-TA------TTG---CCTC--GC
Hquar5088                       GCCTT---AGGCGTCAAGGAACACTCAATA------TTG---CCTT--GC
Hrud6576                        GCCTT---AGGCGCCCAGGAACACTTA-TA------TTG---CCTT--GC
Htamb6585                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Icylin5114                      GCCTA---AGGCGTCAAGGAACACTTC-TA------TTG---CCTT--GC
Icylin6632                      GCCTA---AGGCGTCAAGGAACACTTC-TA------TTG---CCTT--GC
Mcape6655                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Monocymbium                     ??????????????????????????????????????????????????
Pdilatum6617                    ??????????????????????????????????????????????????
PentaschistisaristifoliaSpies6  GCCGTA--CGGCGTCAAGGAAAACTGT-TA------TTG---CCTT--GC
Pfrank4705                      GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Pschinz6652                     ??????????????????????????????????????????????????
Sbic6588                        GC-TT---AGGCGTCAAGGAACACTCA-TA------TTG---CCTT--GC
Sbic6589                        GCCTT---AGGCGTCAAGGAACACTCA-TG------TTG---CCTT--GC
Shalep9318                      GCCGA---AGGCGTCAAGGAACACTGA-TA------TTG---CTTT--GC
Snigros6567                     ??????????????????????????????????????????????????
Tleuc6627                       ??????????????????????????????????????????????????
Tspic4846                       GCCTT---AGGCGTCAAGGAACACATG-TA------TTG---CCTT--GC
Ttria6555                       GCCTT---AGGCGTCAAGGAACACTTA-TA------TTG---CCTT--GC
Zeadiplo                        GCCTC---GGGCGCCAAGGAACACCAG-TA------CTA---CCTCCTGC
ZmaysGfl                        GCCCC---GGGCGCCAAGGAACACCAG-TA------CTA---CCTCCTGC
Saccharumofficinarum            GCCTT---AGGCGTCAAGGAACACCTA-TA------TTG---CCTTGCGC
Imperatacylindrica              GCCT----AGGGGTCAAGGAACACTTC-TA------TTG---CCTTGCTC
Dichanthiumannulatum            GCCTT---AGGCGTCAAGGAACACTTA-TA------TTT---CCTTGCCC

Aadscen6713                     ??????????????????????????????????????????????????
Aameth6679                      ACGGCGGGGCGGCTGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATCAT
Aameth6685                      ACGGCGGGGCGGCTGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATCAT
Aappen6543                      TCGGCGAGCCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Aappen6946                      TCG-CGG-GCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Adist6684                       ACTTCCGAGCCGCTGGC-TTGCCTTCCCCTCCCCGCGCAAC---GATCAT
Aeuco5869                       TCGGTGGAGCGGTCGGC-ATGCCTTCTGCTCCCCGCGCAGC---GATGAT
Arundinellanepalensis           ACGGTGGAGCGGTTGGC-CTGCCTTCTGCTCCCTGCGCAGC---GATGCT
Aschiren6581                    ??????????????????????????????????????????????????
Bbladh5173                      CCGGCGGAGCGGTCNNC-CTGCCTTCCGCTCCCCG-GCAGC---GATGAT
Binsc5681                       CCGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCA-C---GATGAT
BBrachiaria                     ??????????????????????????????????????????????????
Bradi4784                       TCGGCGGGGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Bserra6554                      ??????????????????????????????????????????????????
Cexc6577                        ??????????????????????????????????????????????????
Cdieter6642                     CCGGTGGAGCGGTCGGC-CTGCCCTCCGCTCCCCGCGCAGC---GATGAT
Cleistachnesorghoides           NCGGCGGAGCGGTCGGC-NTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cmarg4397                       CCGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Cplur6406                       CCGGTGGA-CGGTC--C-CTGCCTTCCACTCCCCCCGCA-C---GATGAT
Cprolix6682                     GCCGTGGAGCGCTCAACTCTTCCCTCC-CTCCCCGCGCAC----GATGAT
Danthoniacalifornica            GCGGCGCGGCGGCCAGC-CTGCCGGTCGTCACACGCGTA-----------
Dfili5872                       TCGGTGGAGCGGTCGGC-ATGCCTTCTGCTCCCCGCGCAGC---GATGAT
Emuti5074                       TCGGCGGAGCGGACGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGTT
Emuti6715                       TCGGCGGAGCGGACGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGTT
Eragrostisdielsii               CCAATGACTCGACCGGC-CTGCCGGGCGCGTCTTGAGCAGC---GATACC
Evill5085                       TCGGTGGAGCGGTCGGC-GTGCCTTCCGCTCCCCGTGCAGC---GATAAT
Hanam4807                       CCGTGGGAGCGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
Hanam4841                       CCGGTGGAGCGGTCAGC-TTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hcon4741                        TCGGTGGAGCGGTCGGC-CTGCCTTCTGCTCCCCGCGCGGC---GATGAT
Hdiss5145                       AAGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Sbicolour9319                   ACAGTGGAGTGGTCGGC-NTGCGTTGGGGTCCCGATGAAGAACAAAAGAT
Hfilli5144                      CCGTGGA--CGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
Hhirt6656                       CCGGTGGAGCGGTCTGC-TTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Hlongi6560                      ??????????????????????????????????????????????????
Hpilg4603                       CCGGTGGAGCGGTCGCC--TGCCTTCCGCTCCCCGCGCAGC---GATGAT
Hpilg4738                       CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Hquar5088                       CCGGTGGAGCGGTCGGC-CTGCCTTTCGCTCCCCGTGCAGC---GATGAT
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Hrud6576                          AAGGTTGGAACCAAGGC-TTCCGTGGGGGCACCGATGAAGA-CGGATGAT
Htamb6585                         AAGGTGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Icylin5114                        TCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Icylin6632                        TCGGCGGAGCGGCCG-C-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Mcape6655                         TCGGCGG-ACGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Monocymbium                       ??????????????????????????????????????????????????
Pdilatum6617                      ??????????????????????????????????????????????????
PentaschistisaristifoliaSpies6    GCGTGGCCGTGGCTGGC-CTGCCAGCCGCGCCGCGCGCAGC---GATTCT
Pfrank4705                        TCGACGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGTGCAGC---GATGAT
Pschinz6652                       ??????????????????????????????????????????????????
Sbic6588                          GCAGTGGAG-GCTCGGC-CTCCGTTGGTGCCGCGATGAAGAACGCAAGAT
Sbic6589                          ACA-CGGAGTGGTCGGC-CTGCCTTCCGCTCCCTGAGCAGC---GATGAT
Shalep9318                        TCGGGGCTTTGGTTGGC-TTGCCGATCATGCCTCGTGCAGC---GATGCT
Snigros6567                       ??????????????????????????????????????????????????
Tleuc6627                         ??????????????????????????????????????????????????
Tspic4846                         CCGGCGGAGCGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT
Ttria6555                         TCGGCGGAGCGGTCGGC-TTGCCTTCCGCTCCCCGCGCAGC---GATGAC
Zeadiplo                          CCCGCGGAGCGGTCGGC-CCGCCTTCCGCTCCCCGGGCAGC---GGTTA-
ZmaysGfl                          CCCGCGGAGCGGTCGGC-CCGCCTTCCGTTCCCAGGGCAGC---GGTTA-
Saccharumofficinarum              --GGTGGAGCGGTCGGC-CCGCCTTCCGCTCCCCGCGCAGC---GATGAT
Imperatacylindrica                --GGCGGA-CGGTCGGC-CTGCCTTCCGCTCCCCGCGCAGA----GTGCT
Dichanthiumannulatum              --GGTGGAGCGGCTGGC-CTGCCTTCCGCTCCCCGCGCAGC---GATGAT


Aadscen6713                       ??????????
Aameth6679                        ATAC-TAATC
Aameth6685                        ATAC-TAATC
Aappen6543                        ATCT-TAATC
Aappen6946                        ATCT-TAATC
Adist6684                         ATCTCTAATC
Aeuco5869                         ATCT-TAATC
Arundinellanepalensis             ATGT--AAC-
Aschiren6581                      ??????????
Bbladh5173                        ATCTTTAATC
Binsc5681                         ATCT-TAATC
BBrachiaria                       ??????????
Bradi4784                         ATCT-TAATC
Bserra6554                        ??????????
Cdieter6642                       ATCT-TAATC
Cexc6577                          ??????????
Cleistachnesorghoides             ATCT-TAATC
Cmarg4397                         ATCT-TAATC
Cplur6406                         ATCT-TAATC
Cprolix6682                       ATCT-TAATC
Danthoniacalifornica              ??????????
Dfili5872                         ATCT-TAATC
Emuti5074                         ATCT-TAATC
Emuti6715                         ATCT-TAATC
Eragrostisdielsii                 TTTTGTAATC
Evill5085                         ATCT-TAATC
Hanam4807                         ATCTT-AATC
Hanam4841                         ATCTT-AATC
Hcon4741                          ATCT-TAATC
Hdiss5145                         ATCTT-AATC
Sbicolour9319                     ATCA-TCC--
Hfilli5144                        ATCTT-AATC
Hhirt6656                         ATCTT-AATC
Hlongi6560                        ??????????
Hpilg4603                         ATCT-TAATC
Hpilg4738                         ATCT-TAATC
Hquar5088                         ATCT-TAATC
Hrud6576                          ATCT-TAATC
Htamb6585                         ATCTTTAATC
Icylin5114                        ATCT-TAATC
Icylin6632                        ATCT-TAATC
Mcape6655                         ACCT-TAAAC
Monocymbium                       ??????????
Pdilatum6617                      ??????????
PentaschistisaristifoliaSpies6    ATAC-TAATC
Pfrank4705                        ATCT-TAATC
Pschinz6652                       ??????????
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Sbic6588                          ATCT-TAATC
Sbic6589                          ATCT-TAATC
Shalep9318                        ATCTT-AATC
Snigros6567                       ??????????
Tleuc6627                         ??????????
Tspic4846                         ATCT-TAATC
Ttria6555                         TTAT-TAATC
Zeadiplo                          CACCTTAGTC
ZmaysGfl                          CACCTTAATC
Saccharumofficinarum              ATCT-TAATC
Imperatacylindrica                ATC-TTAATC
Dichanthiumannulatum              ATAC-TAATC

Aadscen6713                       ??????????????????????????????????????
Ameth6679                         --AA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Ameth6685                         --AA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Aappen6543                        --CAACACG-ACTCT--CGG-CAACGG-ATATCT-
Aappen6946                        --CA-CACG-ACTCT--CGG-CAACGG-ATATCT-
Adist6684                         --CA-CACG-ACTCT--CGGTCAACGG-ATATCT-
Aeuco5869                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Arundinellanepalensis             --AA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Aschiren6581                      ??????????????????????????????????????
Bbladh5173                        --CA-CACGAACTCT---GG-GAACGGTATATCT-
Binsc5681                         --CA-CA-C-ACTCT--CG--CAA-CGGATATCT-
BBrachiaria                       ??????????????????????????????????????
Bradi4784                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Bserra6554                        ??????????????????????????????????????
Cdieter6642                       --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Cexc6577                          ??????????????????????????????????????
Cleistachnesorghoides             --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Cmarg4397                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Cplur6406                         --CA-CACG-ACTCT--CGG-CAACGG-ATATCT-
Cprolix6682                       CACA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Danthoniacalifornica              --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Dfili5872                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Emuti5074                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Emuti6715                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Eragrostisdielsii                 --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Evill5085                         --TA-CATG-ACTAT--CCG-CAA-CGGATATCT-
Hanam4807                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Hanam4841                         --CA-CGCG-ACTCT--CGG-CAA-CGGATATCT-
Hcon4741                          --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Hdiss5145                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Sbicolour9319                     C----------------------------------
Hfilli5144                        --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Hhirt6656                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Hlongi6560                        ??????????????????????????????????????
Hpilg4603                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Hpilg4738                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Hquar5088                         --CA-CACC-ACTCT--CAG-TAA-CGGATATCT-
Hrud6576                          CACACGACTCTCGGCAACGGATATCTCGGC-----
Htamb6585                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Icylin5114                        --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Icylin6632                        --CA-CACG-ACTCT--CGG-CAACGG-ATATCT-
Mcape6655                         --CA-CACG-ACTCT--CGG-CAACGG-ATATCT-
Monocymbium                       ??????????????????????????????????????
Pdilatum6617                      ??????????????????????????????????????
PentaschistisaristifoliaSpies6    ??????????????????????????????????????
Pfrank4705                        --GA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Pschinz6652                       ??????????????????????????????????????
Sbic6588                          AA----------------------------------
Sbic6589                          --CA-CACG-ACTCT--CGG-CAACGG-ATATCT-
Shalep9318                        --CA-CACG-ACTCT--CGG-CAACGG-ATATCT-
Snigros6567                       ??????????????????????????????????????
Tleuc6627                         ??????????????????????????????????????
Tspic4846                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Ttria6555                         --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Zeadiplo                          --GA-CACG-ACTCT--CGG-CAA-CGGATATCT-
ZmaysGf1                          --GA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Saccharumofficinarum              --GA-CACG-ACTCT--CGG-CAA-CGGATATCT-
Imperatacylindrica                --CA-CACG-ACTCT--CGG-CAA-CGGATATCT-
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Dichanthiumannulatum              --CA-CACG-ACTCT--CGG-CAA-CGGATATCN-


Aadscen6713                       ????????????????????????????????????
Ameth6679                         -CGGCTC-TCGCATCGATGAAGAA----------
Ameth6685                         -CGGCTC-TCGCATCGATGAAGAA----------
Aappen6543                        -CGGCTC-TCGCATCGATGAAGAA----------
Aappen6946                        -CGGCTC-TCGCATCGATGAAGAA----------
Adist6684                         -CGGCTC-TCGCATCGATGAAGAA----------
Aeuco5869                         -CGGCTC-TC------------------------
Arundinellanepalensis             -CGGCTC-TCGCATCGATGAAGAACGTAGCAAAA
Aschiren6581                      ????????????????????????????????????
Bbladh5173                        -GGGCTC-TCGCATCGAAGAA-------------
Binsc5681                         -CGGCTC-TCGCATCGATGAAGAA----------
BBrachiaria                       ????????????????????????????????????
Bradi4784                         -CGGCTC-TCGCATCGATGAAGAA----------
Bserra6554                        ????????????????????????????????????
Cdieter6642                       -CGGCTC-TCGCATCGATGAAGAA----------
Cexc6577                          ????????????????????????????????????
Cleistachnesorghoides             -CGGCTC-TCGCATCGATGAAGAACGTAGCAAAA
Cmarg4397                         -CGGCTC-TCGCATCGATGAAGAA----------
Cplur6406                         -CGGCTC-TCGCATCGATGAAGAA----------
Cprolix6682                       -CGGATC-TCGCATCGATGAAGAA----------
Danthoniacalifornica              -CGGCTC-TCGCATCGATGAAGAACGTAGCAAAA
Dfili5872                         -CGGCTC-TCGCATCGATGAAGAA----------
Emuti5074                         -CGGCTC-TCGCATCGATGAAGAA----------
Emuti6715                         -CGGCTC-TCGCATCGATGAAGAA----------
Eragrostisdielsii                 -CGGCTC-TCGCATCGATGAAGAACGTAGCAAAA
Evill5085                         -CCGCTC-TTGTATCGATGAAGAA----------
Hanam4807                         -CGGCTC-TCGCATCGATGAAGAA----------
Hanam4841                         -CGGCTC-TCGCATCGATGAAGAA----------
Hcon4741                          -CGGCTC-TCGCATCGATGAAGAA----------
Hdiss5145                         -CGGCTC-TCGCATCGATGAAGAA----------
Sbicolour9319                     ????????????????????????????????????
Hfilli5144                        -CGGCTC-TCGCATCGATGAAGAA----------
Hhirt6656                         -CGGCTC-TCGCATCGATGAAGAA----------
Hlongi6560                        ????????????????????????????????????
Hpilg4603                         -CGGCTC-TCGCATCGATGAAGAA----------
Hpilg4738                         -CGGCTC-TCGCATCGATGAAGAA----------
Hquar5088                         -CGGTTC-TCGCATCGATGAAGAA----------
Hrud6576                          ????????????????????????????????????
Htamb6585                         -CGGCTC-TCCATTCGATGAAGAA----------
Icylin5114                        -CGGCTC-TCGCATCGATGAAGAA----------
Icylin6632                        -CGGCTC-TCGCATCGATGAAGAA----------
Mcape6655                         -CGGCTC-TCGCATCGATGAAGAA----------
Monocymbium                       -----------------------------------
Pdilatum6617                      ????????????????????????????????????
PentaschistisaristifoliaSpies6    ????????????????????????????????????
Pfrank4705                        -CGGCTC-TCGCATCGATGAAGAA----------
Pschinz6652                       ????????????????????????????????????
Sbic6588                          ????????????????????????????????????
Sbic6589                          -CGGCTC-TCGCATCGATGAAGAA----------
Shalep9318                        -CGGCTC-TCGCATCGATGAAGAA----------
Snigros6567                       ????????????????????????????????????
Tleuc6627                         ????????????????????????????????????
Tspic4846                         -CGGCTC-TCGCATCGATGAAGAA----------
Ttria6555                         -CGGCTC-TCGCATCGATGAAGAA----------
Zeadiplo                          -CGGCTC-TCGCATCGATGAAGAACGTAGCAAAA
ZmaysGf1                          -CGGCTC-TCGCATCGATGAAGAACGTAGCAAAA
Saccharumofficinarum              -CGGCTC-TCGCATCGATGAAGAACGTAGCAAAA
Imperatacylindrica                -CGGCTC-TCGCATCGATGAAGAACGTAGCAAAA
Dichanthiumannulatum              -NNNNNN-NNNNNNNNNNNNNNNNNNNNAAAA


Aadscen6713                       TGCG-ATACCTGGTGT-GAA-TTGC
Aameth6679                        ????????????????????????
Aameth6685                        TGCG-ATACCTAGTGT-GAA-TTGC
Aappen6543                        TGCGGATACGTGGCGTGCAA-TTGC
Aappen6946                        ????????????????????????
Adist6684                         TNCCGATACCTAGCGGCGAATTCGC
Aeuco5869                         TGCG-ATACCTGGTGT-GAA-TTGC
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Arundinellanepalensis              TGCG-ATACCTGGTGT-GAA-TTGC
Aschiren6581                       ATGCGATACCTAGCGT-CAA-TTCC
Bbladh5173                         TGCCGT--CCTAGCGTTNA-TTCCC
Binsc5681                          TGCGGATACCTGGTGT-GAA-TTGC
BBrachiaria                        TGCG-ATACCTGGTGT-GAAATTGC
Bradi4784                          TGCG-ATACCTGGTGT-GAA-TTGC
Bserra6554                         TGCGGATACCTGGTGT-GTAATTGC
Cdieter6642                        ????????????????????????
Cexc6577                           GTGCCATACCTAGTGT-CAA--TTC
Cleistachnesorghoides              TGCG-ATACCTGGTGT-GAA-TTGC
Cmarg4397                          -ATCGATACCTAGTGT-GAA--TTC
Cplur6406                          TGCCGATACCTAGCGGTGAA-TTCC
Cprolix6682                        TGCGGATACCTGGTGT-GAA-TTGC
Danthoniacalifornica               TGCG-ATACCTGGTGT-GAA-TTGC
Dfili5872                          TGCG-ATACCTGGTGT-GAA-TTGC
Emuti5074                          TACGGATACCTGGTGT-GAA-TGCC
Emuti6715                          TGCCGATACCTGGTGT-GAA-TTGC
Eragrostisdielsii                  TGCG-ATACCTGGTGT-GAA-TTGC
Evill5085                          ATNCGATACCTAGTNT-GAA-TTGC
Hanam4807                          TGCGGATACCTGGTGT-GAA-TTGC
Hanam4841                          TGCT-ATACCTCGAGT-GAA-CTGC
Hcon4741                           TGCGGATACCTGGTGT-GAA-TTGC
Hdiss5145                          TACGGATACCTAGCGCTCAA-TTGC
Sbicolour9319                      TGCG-ATACCTGGTGT-GAA-TTGC
Hfilli5144                         TGGCCCCACATGCCTATAC----GC
Hhirt6656                          TGCGGATACCTGGTGT-GAA-TTGC
Hlongi6560                         TGCGGATACCTGGTGT-GAA-TTGC
Hpilg4603                          TGCGNATACCTGGTGT-GAA-TTGC
Hplig4738                          ????????????????????????
Hquar5088                          TGCGGATACCTGGTGT-GAA-TTGC
Hrud6576                           TACG-ATACCTGGTTGTGTACTTGC
Htamb6585                          TCCCGATACCTAGCGGCTA--TTGC
Icylin5114                         TGCGGATACCTAGTGT-GAA-TTGC
Icylin6632                         TGCGGATACCTGGTGCTGAA-TTGC
Mcape6655                          TGCGGATACCTGGTGT-GAA-TTGC
Monocymbium                        T-CG-ATACCTAGTGT-CAA-TTGC
Pdilatum6617                       TCG--ATACCTGGTGT-GAA-TTGC
PentaschistisaristifoliaSpies6     ????????????????????????
Pfrank4705                         ????????????????????????
Pschinz6652                        TGCG-ATACCTGGTGT-GAA-TTGC
Sbic6588                           TGCG-ATACCTGGTGT-GAA-TTGC
Sbic6589                           TGCGGATACCTGGTGT-GAA-TTGC
Shalep9318                         TGCG-ATACCTGGTGT-GAC-TTGC
Snigros6567                        TTCCACGTCGACCCTATGACACTGC
Tleuc6627                          TGCG-ATACCTGGTGT-GAA-TTGC
Tspic4846                          TGCG-ATACCTGGTGT-GAA-TTGC
Ttria6555                          ---GGATACTTGGTGCTGAA-TTGC
Zeadiplo                           TGCG-ATACCTGGTGT-GAA-TTGC
ZmaysGfl                           TGCG-ATACCTGGTGT-GAA-TTGC
Saccharumofficinarum               TGCG-ATACCTGGTGT-GAA-TTGC
Imperatacylindrica                 TGCG-ATACCTGGTGT-GAA-TTGC
Dichanthiumannulatum               TGCG-ATACCTGGTGT-GAA-TTGC


Aadscen6713                         ATAAATCCCG--TGTAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Aameth6679                          ????????????????????????????????????????????????
Aameth6685                          ATACATCCCG--CTGAACCATCT--AGGTTTTTAAACGCAAGTTGCGCCC
Aappen6543                          ATAAATCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Aappen6946                          ????????????????????????????????????????????????
Adist6684                           ATTCATGTGCCTCGAATGGATTCCATTATTTCCGACTGCAACTTGCCGCC
Aeuco5869                           A--AATCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Arundinellanepalensis               AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Aschiren6581                        ATAAATCCGC-TCGAATGCATCCC--ATTTTTTCAACTCAACTTGCCCCC
Bbladh5173                          --TAATGTGC-TC-AATGGGTCC--TTATGGCCGAATACACCG-GCCGCG
Binsc5681                           ATAAATCCCG--CGGAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
BBrachiaria                         ATAAATCCCG--CGAAACCATCGT-AGTGTTTGAA-CGCAAGTTGCGCCC
Bradi4784                           ATTAATCCCG--CGAAACCATCG--AGTTTTTTAA-CGCAACTTGCCCCC
Bserra6554                          ATAA-TCCCG--CGTAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Cdieter6642                         ????????????????????????????????????????????????
Cexc6577                            A-TAATCCCC-TC--AACGATCCC--ATTTGTTCAAACCAACTTGCCCCC
Cleistachnesorghoides               AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
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Cmarg4397                       CATAATCCCG--CGAACC-ATCGA---GTTTTTGAACGCAAGTTGCCCCC
Cplur6406                       AT-AATCCCG--C-NAATCATCN--ATTTTTTGAA-CGCAAGTTGCGCCC
Cprolix6682                     ATAA-TCCCG--C--AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
Danthoniacalifornica            AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Dfili5872                       ATAAATCCCN--CCAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCCCCC
Emuti5074                       ATAA-TCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Emuti6715                       ATAA-TCCCG--C-AAACCATCGC-AGTTTTTGAA-CGCAAGTTGCGCCC
Eragrostisdielsii               AG-AATCCCG--T-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Evill5085                       ATGAATCCCC-TCCAATC-ATCGCAGTTTTTGCAACTGCAACTTACGCCC
Hanam4807                       ATAA-TCCCG--C--AACCATCG--AGTTTTTGAA-CGCAAGTTGCCCCC
Hanam4841                       AGAAATCCCG--ACGAACCATCGA-GATTCTTC-AACGCAAGCTGCGCCC
Hcon4741                        ATAAATCCCG--CGAA-CCATCGC-AGTTTTTGAA-CGCAAGTTGCGCCC
Hdiss5145                       ATTAATCCCC--GTCAACCATCGC-ATTTTTTGCAACTCAACTTGCCCCC
Sbicolour9319                   ATAA-TCCCG--CA-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
Hfilli5144                      --TACTGTGC-TC-CATAGTTCC----TTATGTCCACGAATCTAGCCCCC
Hhirt6656                       ATAA-TCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Hlongi6560                      AGCAATCCCG--CGGAACCATCG--AGTCTTTGAA-CGCAAGTTGCGCCC
Hpilg4603                       ATAA-TCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Hplig4738                       ??????????????????????????????????????????????????
Hquar5088                       ATAAATCCCG--CGAA-CCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Hrud6576                        ATAAATCCCT--C-CAACCATCGA-AGTTTTTG-AACGCAACTTGCCCCC
Htamb6585                       --TAATCCGC-TC-AATCGATTCC---TTTTTTGAACTCAACTTGCCCCC
Icylin5114                      ATAA-TCCCG--C-CAATCATCC--ATTTTTTGAA-CGCAAGTTGCCCCC
Icylin6632                      AT-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Mcape6655                       ATAA-TCCCG--CGCAACCATCN--AGTTTTTGAA-CTCAAGTTGCCCCC
Monocymbium                     ATAA--TCTG--GTCAATGGTCC--ATTTTTTCAA-CTCAACTTGCCCCC
Pdilatum6617                    ATAA-TCCCG--CGAA-CCATCC--AATTTTTGAA-CGCAAGTTGCTCCC
PentaschistisaristifoliaSpies6  ??????????????????????????????????????????????????
Pfrank4705                      ??????????????????????????????????????????????????
Pschinz6652                     ATAA-TCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Sbic6588                        ATAA-TCCCG--CG-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
Sbic6589                        ATAA-TCCCG--CG-AACCATCGG-AGTTTTTGAA-CGCAAGTTGCGCCC
Shalep9318                      ATAA-TCCCG--CGAA-CCATCG--AGTTTGTGAA-CGCAAGTTGCGCCT
Snigros6567                     --TAATTCG--TC-AATGGATTGC---ATTTGTCAATAAACCA-GCTACA
Tleuc6627                       AGAAATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Tspic4846                       AT-AATCCCG--CGCAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Ttria6555                       AGAA-TCCCG--CGCAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Zeadiplo                        AG-AATCCCG--C-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
ZmaysGfl                        AG-AATCCCG--T-GAACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Saccharumofficinarum            AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Imperatacylindrica              AG-AATCCCG--CG-AACCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC
Dichanthiumannulatum            AG-AATCCCG--CG-AATCATCG--AGTTTTTGAA-CGCAAGTTGCGCCC


Aadscen6713                     G-AAGCC-TTCTGGTCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Aameth6679                      ??????????????????????????????????????????????????
Aameth6685                      C-AGGGC-TTCTGGTCGA-GGACACCTCTTCCTGGCCGC-TCACGCC---
Aappen6543                      G-AGGCC-TTCTGGTCGA-GGGCACCTCTGCCTGGGCG--TCACGCCG--
Aappen6946                      ??????????????????????????????????????????????????
Adist6684                       TGACCCCGTTCTCTTCACACGACACCAATTGCATGTCGCGTCACGCTGAT
Aeuco5869                       G-AAGCC-TTTTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Arundinellanepalensis           G-AAGCC-TCCAGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Aschiren6581                    C-ACGCCTTTTCTTTGAC--GACACAACTGCTTGCGCGTCACACCAAA--
Bbladh5173                      T-ACCGCGGTCTCTTCAC-CGACAACAATGGGA-GTCGCC-CACCACG-T
Binsc5681                       G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
BBrachiaria                     C-ACGCC-TTCTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Bradi4784                       T-ATGCC-TTCTGNTCAA-GGGCACCTCTGCCTGGGCG--TCACGCCG--
Bserra6554                      G-AGGCC-TTCTGGTCCA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Cdieter6642                     ??????????????????????????????????????????????????
Cexc6577                        T-ACGCC-TTCTCTGCAA-CGACACCTATTGCA-TGGCCGTCACCCCA--
Cleistachnesorghoides           G-AGGCC-TTCTGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Cmarg4397                       GGACGCC-TTCTGTTCAA-CGACACCTCTGCC--TGGGCGTCACGCCA--
Cplur6406                       G-ACGGC-TTCTTGTCCA-GGGCACATCTGCCTGGGCG--TAACACC---
Cprolix6682                     G--AGCC-TTCTGGTC-A-GGGCACCTCTGCCTGGGCG--TCACGCCA--
Danthoniacalifornica            G-AGGCC-TTCTGGCCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Dfili5872                       G-AAGCC-TTTTGGTCGA-GGGCAC-TCTGCCTGGGCG--TCACGCC---
Emuti5074                       G-AAGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Emuti6715                       G-ACGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Eragrostisdielsii               G-AGGCC-TTCTGGCTGA-GGGCACGTCTGCCTGGGCG--TCACGCG---
Evill5085                       G-ACGGCTTTTTTGCTGCAAGGCACGTCTGCCT-GTCGCGTCACGCCA--
Hanam4807                       A--CGCC-TTCTGGTCAA-GGGCACCTCTGCCTGGGCG--TCACGCC---
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Hanam4841                          C-ACGTC-TTCTGGTCGA-CGGCACCTCTGCCTGAGCG--TCAA-TCT--
Hcon4741                           G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Hdiss5145                          TGACGCC-TTCTGTTCAA-CGACACATCTGATTGGGCA--TCACAGCC--
Sbicolour9319                      G-AGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCA--
Hfilli5144                         C-ACGAC-TTCTGTTCGC-ACACACCACTTC---TTCTCGCCCCCAAGTT
Hhirt6656                          G-A-GCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Hlongi6560                         G-AAGCC-TTTTGGTCGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Hpilg4603                          G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Hplig4738                          ??????????????????????????????????????????????????
Hquar5088                          G-ATGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Hrud6576                           GGA-GCC-TTCTGGTCAA-CGGCACGTCTGCCTGGGCG--TCAC-GCC--
Htamb6585                          T-ACGAC-TTCTCTGCAA-CGACACAACTGC----TTGCGCCCCACACCT
Icylin5114                         C-ACGCC-TTCTGGTCAA-GGGCACCTCTGCCTGGGCG--TCACGCCA--
Icylin6632                         GTAGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Mcape6655                          G-AAGCC-TTCTGGCCGA-AGGCACNTCTGCCTGGGCG--TCACGCC---
Monocymbium                        T-ACGCC-TTCTGTCCAA-CGACACCTATGCCTGGCCG--TCACGACA--
Pdilatum6617                       G-AGGCC-TTCTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
PentaschistisaristifoliaSpies6     ??????????????????????????????????????????????????
Pfrank4705                         ??????????????????????????????????????????????????
Pschinz6652                        GGAGGCC-TTTTGGTTGA-GGGCACGTCTGCCTGGGCG--TCACGCCG--
Sbic6588                           G-AG-CC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCG--
Sbic6589                           G-AGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCCA--
Shalep9318                         G-ACGCC-TTCTGGCTGA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Snigros6567                        TGACGCCTTCTTACTGAG--GGCAACACCTACCATGTGCCCCACCACG-T
Tleuc6627                          G-AGGCC-TTCTGGCCTA-GGGCACGCCTGCCTGGGCG--TCACGCC---
Tspic4846                          GAAGGCC-TTTTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Ttria6555                          G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Zeadiplo                           G-AAGCC-TTCTGGCGGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
ZmaysGfl                           G-AAGCC-TTCTGGCGGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Saccharumofficinarum               G-AGGCC-TTCCGGCCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Imperatacylindrica                 G-AGGCC-TTCTGGTCGA-GGGCACGTCTGCCTGGGCG--TCACGCC---
Dichanthiumannulatum               G-AGGCC-TTCTGGTCGA-GGGTACGTCTGCCTGGGCG--TCACGCC---


Aadscen6713                        AAAAGAC-ACTCCC-AACCCA---TCCATGGGG----ACGG-ACGTGGT-
Aameth6679                         ??????????????????????????????????????????????????
Aameth6685                         ATAGCAC-ACTCACCAAGATGAC---CCTCGGCCT---ACAGATTTGGT-
Aappen6543                         AAAACAC-ACTCCC-AACCCAA----AATCGGGGG--AGGGCATGTG-T-
Aappen6946                         ??????????????????????????????????????????????????
Adist6684                          GAATGAG-ACGTCGACACGATTCTTC-GGCAGACGG---CACACTTTGG-
Aeuco5869                          AAAAGAC-ACGTCCCAAGCCAC----AATCAAG----GAGGTA-CTGGC-
Arundinellanepalensis              AAAAGAC-ACTCCC-AACCCAACC--CAGGGG------AGGGATGTGGC-
Aschiren6581                       -T--GAC-ACT--CACAAAACACCCT-TGCAGAC-----CCACCTTCTG-
Bbladh5173                         GC-TGTG-CC--CGGCACGGCTATCC-GGCAACC-----CAAACTTCGG-
Binsc5681                          AAAAGAC-ACTCCCAACCCAC-----CCTCGGGG---AGGGCACGTGGT-
BBrachiaria                        AAAAGAC-ACTCCC-AATCCA---TCAGTGGGG----AAGG-ACTTGGT-
Bradi4784                          AAAATAC-ACTCCCAACCC-AT----ACTCGGGGG--AGGG-ATGTTGTG
Bserra6554                         AAAAGAC-ACTCCC-AACCCA---ACCCTGGGG----ACGG-ACGTGGT-
Cdieter6642                        ??????????????????????????????????????????????????
Cexc6577                           AAATATG-ACTCGGAGACCATTCCCT-CGCAGCA-----CGCACCTTCG-
Cleistachnesorghoides              AAAAGAC-ACTCCC-AACCCACCC--AAAGGGGAG--GAGGGACGTGGT-
Cmarg4397                          -AAATAC-ACT--CCCAACCAATCCTCGGCAGAAG----GACGCTTTGG-
Cplur6406                          AAAAGAC-ACTCCCAACAGCA-CCCTCGNAGCGGCATAATGGACCTGAC-
Cprolix6682                        AAATGAC-ACTCCC-AACCCAT----CCTCGGGT----ACGGACATGGT-
Danthoniacalifornica               AAAAGAC-GCTCCC--ACCCAACC--CCGGTG-------AGGACGCGGC-
Dfili5872                          AAAAGAC-A-CTCCCAAGCCAC----CCTCGGG----GAGGGACTTGGC-
Emuti5074                          AAAANAC-ACTCCC-AAACCAC----AATCGTGG----AGGGAC-TGGT-
Emuti6715                          AAAACACTACTCCC-AACCCAC----NCTCGTGG----AGGGACATGTT-
Eragrostisdielsii                  AAAAGAC-ACTCCT-CACCCATC---TTGGTG-------TGGACGTGGC-
Evill5085                          -AAAGAC-ACTCCCAGTCCCTACCCTTGACAGGGCA---TCTACTTCTT-
Hanam4807                          AAAATAC-ACTCCC-AACCCAT----CCTCGGGT-----AGGACATGGT-
Hanam4841                          TATCTAC-AAGTCG-ACGTAACCGTC---GGGGA-----CGGACCTGGT-
Hcon4741                           AAAACAC-A-CTCCCAACCCAA----AATCGGG----CGGGGATGTGGT-
Hdiss5145                          TAATAAC-ACTCAC-AACATACAATC---GCGGC-----AGCACCTTCT-
Sbicolour9319                      ACATTAC-ACTCCG-AACCCA----CCCTCGGGG----AGGGATGTGGT-
Hfilli5144                         TC-TGTG-CC---CAATCCACTTGTT-GCCAGGC-----CCCACTTTTG-
Hhirt6656                          AAAA-AC-ACTCCC-AACCCAC----CCTCGGGG----ACGGCACTGGT-
Hlongi6560                         -AAACAC-GCTCCC-ACCCCACTAACCCTGTGGT-----GGGATGCGGC-
Hpilg4603                          AAAAGAC-ACTCCCAACCCGT-----ACTCGGGT----AGGGACGTGGT-
Hplig4738                          ??????????????????????????????????????????????????
Hquar5088                          AAAAGAC-AGTCCC-AACCCAC----CATCGGGG----ACGGACGTGGT-
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Hrud6576                          AAAATAC-ACTCCC-AACACACCATC----GGGG-----AGGACCTGGT-
Htamb6585                         GCTGTAC-ACTGCCACAAC-CACTAT-GGCAGTAG----CTACCTTCTG-
Icylin5114                        AAATGAT-ACTCGCCAACGCGCAT--CCTCGGGG----AGGGACATT-TC
Icylin6632                        AAAAGAC-ACTCCC-AACCCACCC----TCGGGG----AGGGACATGGT-
Mcape6655                         AAAACAC-ACTCCCAAACCCAC----ACAAGG-----AAAGGACATTTT-
Monocymbium                       TAATGAT-ACTCCG-AACCCTTCG--CAAGGCGG----ACGGACATTTT-
Pdilatum6617                      AAAAGAC-ACTCCC-AACCCA---TCATAGGGT-----GGGGACGATTTA
PentaschistisaristifoliaSpies6    ??????????????????????????????????????????????????
Pfrank4705                        --GTACC-CGCTCAGATACTAG----CAGCAAA----ATAGGACTTCCT-
Pschinz6652                       AAAAGAC-ACTCCT-ACCCCAT--ACTATGGGGT---ACGG-ATGTGGT-
Sbic6588                          ACAGTAC-ACTCCC-AACCCA----GCCTCGGGG---AGGG-ATGTGGT-
Sbic6589                          ACAG-AC-ACTCCC-AACCCA----GGCTCGGGG---AGGG-ATGTGGT-
Shalep9318                        AAAAGAC-ACTCCC-AACCCA---TCCCTGGGT----AGGG-ACCTGGT-
Snigros6567                       GC--GGC-GCTCGAACAAGTTTTGCT-GGCAGCC-----CAAACTTCG--
Tleuc6627                         AAAAGAC-GCTCCC-AACCCA---ACCAAGGGG----AGGG-ACGCTGT-
Tspic4846                         AAAAGAC-ACTCCC-AACCCACCC----TCGGGGG---AGGGACGTGGT-
Ttria6555                         AAAAGAC-ACTCCCAAACCAC-----CCTAGGGG---AGGG-ACGTGGT-
Zeadiplo                          AAAAGAC-ACTCCC-AACACCCCC--CCTGCGGGGC-GAGGGACGTGGC-
ZmaysGfl                          AAAAGAC-ACTCCC-AACACCCCC--CC-GCGGGGC-GAGGGACGTGGC-
Saccharumofficinarum              AAAAGAC-ACTCCCAACCCAC----CCGAGGGGG---AGGG-ACGTGGT-
Imperatacylindrica                AAAAGAC-ACTCCCAACCCAC----CCTCGGGG----AGGG-ACGTGGT-
Dichanthiumannulatum              AAAAGAC-ACTCCCAACCCAA----CCTCGGGGGGG------ACGTTGT-


Aadscen6713                       GTTTGGCT--CCTCGTGC-CGTAAGGT---GCG-GTGGGCCG-AAGTT--
Aameth6679                        ??????????????????????????????????????????????????
Aameth6685                        GTTTCGCC--CCTCGTGG-CACGAGGGGCCGAGC----ACCACAAGTT--
Aappen6543                        GTTTGGCC--TCCCGTGC-CGCAGGG---CGCG--TGGGCCG-AACTT--
Aappen6946                        ??????????????????????????????????????????????????
Adist6684                         -TTTCACC-CCTCCTTGC-GGCAAGGA---GGGGCCGAACACAACGTG--
Aeuco5869                         GTATGGCC--CCCCGTGC-CGCACGG---CGCGG-TGGGCCG-AAATT--
Arundinellanepalensis             GTATGGCC--CCCCGTGC-CGCATGG---CGCGG-TGGGCCG-AAGTT--
Aschiren6581                      -TT-TACC-GCCCCCTGC-CGCACGGG---GG-GCCGAACACCAAGTC--
Bbladh5173                        -CT-CACC-TCGCCCTGC-GGCA-GGG---GGAGCCAAACACCAC-TG--
Binsc5681                         GTTTGGCT--CCCCGTGC-CGCAGGG---CGCAG-TGGGCCG-AAGTT--
BBrachiaria                       GTTTGGCT--CCCCGTGC-CGCAAGGA--GCCGT--GGGCCA-AAGTT--
Bradi4784                         -TTTCGCCTCCCCCTTCC-GGCAAGGG--CGAGGCTGAAACACAACTTC-
Bserra6554                        GTTTGGCT--CCCCCTAC-CGCAAGGG--GCGGT--GGGCCG-AAATT--
Cdieter6642                       ??????????????????????????????????????????????????
Cexc6577                          -GTCTAGC-GCCCCCTGC-CGCACGGG---GG-GCCAGACCCCAACTT--
Cleistachnesorghoides             GTTTGGCC--TCCCGTGC-CTCACGG---CGCGG-TGGGCCG-AAGTT--
Cmarg4397                         -TT-GACC-GCGCCCTGC-GGCAAGGG---GGGGCCAGACACACACTG--
Cplur6406                         GTCTGGCC--CCCCGCCCCGGCAGGG---CGAAG-TGGGCCCCAATAT--
Cprolix6682                       GTCTGGCC--CCCCGTGC-CGCAAGG---CGGGG-TGGGCCACAAGTT--
Danthoniacalifornica              GTTTGGCT--CCCCGTGC-CGCAGGG---CGCGG-TGGGCCG-AAGTT--
Dfili5872                         GTATGGCC--CCCCGTGC-CGCACGGG--GGCGG-TGGGCC--AAATT--
Emuti5074                         GTTTGGCC--CCTCGCGC-CTCAGG----CGCGG-TGGGCC--AAATTT-
Emuti6715                         GTTTGGCC--CCTC-CGC-CTCANGG---CACGG-GGGGCC--AAAATT-
Eragrostisdielsii                 ATTTGGCT--CCCCGTGC-AACACGA---CACGG-TGGGCCG-AAGTT--
Evill5085                         -TCCTTCC-TCCCCTGCC-AGGA-CGA---GGAACCAAACACCATGAT--
Hanam4807                         GTTTGGCC--CCCCGTGC-CGCAAGG---CGGGG-TCGACCACAACTT--
Hanam4841                         NTT-----------------------------------------------
Hcon4741                          GTTTGGCC--TCCCGTGC-CGCAAGG---CGCGG-TAGGCCG-AAGTT--
Hdiss5145                         CTTTGCCC--CCCCGTAC-CATACGA---CGGGGGTGAACACAAACTT--
Sbicolour9319                     TTTTGGCT--CCCCGATGCCGCATGGC----GTGGTGGGCCC-AAGTT--
Hfilli5144                        -GCCAACC-CCACCTTAT-TGAACGTT-----GGGCAAACACCCCCTT--
Hhirt6656                         GTTTGGCC--CCCCATGC-CGTATGG---CGCGG-TGGGCCC-AACTT--
Hlongi6560                        ATGTGGCT--CCCCGT-CTCGCAAGGG--GCGGTG-GGCCTC-AAGAT--
Hpilg4603                         GTTTGGCC--CCCCGTGC-CGCAGGG---CGCGG-TGGGCCG-AAGTT--
Hplig4738                         ??????????????????????????????????????????????????
Hquar5088                         GTTTGGCC--CCCCGTGC-CGTACGG---CGCGG-TGGGCCG-AAGTT--
Hrud6576                          GTTTGGCC--CCCCCTGC-CATACGG---CGGGCC-GGACACGAAATT--
Htamb6585                         -CTCTACC-ACCCCGTGC-CGCACGA---CGG-GGCATACACCAACAT--
Icylin5114                        GTTTGGAC-CCCCCCTGCCGGCAGGG---GGGCGGTGGGACACAAGTTG-
Icylin6632                        GTTTGGAC--CCCCGCTC-CGCAGGG---CGCGG-TGGGCCA-AACTT--
Mcape6655                         GTTTCGTC--CCCCCTTC-CGCAAGG---CGCGA-TGGGCCA-AAATT--
Monocymbium                       GTTTGACC--CCCCGTTG-CGGAAGG----GGGGGTCAGACACAACTG--
Pdilatum6617                      GTTTGGCC--TCTCGTGC-CGTTGTGC--ACAGG-TGGGCCT-AAATC--
PentaschistisaristifoliaSpies6    ??????????????????????????????????????????????????
Pfrank4705                        GTTTGGAT--CCCCGTGC-CGCATGGGCACAGGT-CGGGCCG-AAAGTT-
Pschinz6652                       GTTTGGCT--CCCCTTGC-CTTGCGG---CATG-GTGGGCTA-AAGTT--
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Sbic6588                        TTTTGGCT--CCCCGATGCCGCATGG---CGCG-GTGGGCCC-AAGTT--
Sbic6589                        TTTTGGCT--CCCCGA-GCCGCATGG---CGCG-GTGGGCCG-AAGTT--
Shalep9318                      GTTTGGCT--CCCTGTGC-TGCAAAG---CGCG-GGGGGCTG-AAATT--
Snigros6567                     -TTCCACC-CCACCATCT-AGCT-CG---AGCAGCCAAACACCACGTG--
Tleuc6627                       GTTTGGCT--CCCCGTGC-CGCAAGG---CGCG-GTGGGCCG-AAGAT--
Tspic4846                       GTTTGGCC--CCCCGTGC-CGCAGGG---CGCGG-TGGGCCT-AATTT--
Ttria6555                       GTTTGGCT--CCCCGTGC-CGCAGGG---CGCGG-AGGGCCA-AAATT--
Zeadiplo                        GTCTGGCC--CCCCACGC-CGCAGGG---CGAGG-CGGGCCG-AAGCA--
ZmaysGfl                        GTCTGGCC--CCACGCGC-CGCAGGG---CGAGG-TGGGCCG-AAGCA--
Saccharumofficinarum            GTTTGGTC--CCCCGTGC-CGCAGGG---CGCGG-TGGGCCG-AAGTT--
Imperatacylindrica              GTTTGGAC--CCCCCCGC-CGCAGGG---CGCGG-TGGGCCG-AAGTT--
Dichanthiumannulatum            GTTTGGCC-CCCCCNNTC-CCNAAGG---GGGNG-GGGGCCC-AAGTT--


Aadscen6713                     GGGGCTGCCGGC---ATATCTT-GCCGGG-CACC-GCACG-TGGTGGGCG
Aameth6679                      ??????????????????????????????????????????????????
Aameth6685                      CTAGCTGACGGGTGATACTCGT-GACTGT-CTTTTGGACG-TGACTGGCC
Aappen6543                      GGGGCTGCCG-G--CTAATCG-TGCCGGG-CACA-TCACG-TGGTGGGCG
Aappen6946                      ??????????????????????????????????????????????????
Adist6684                       CCCTCTCCCGAG--GTAG-TCGTTGTCGAGTG-ACTTTTGATGGT-GAGC
Aeuco5869                       GGGGCTGCCGGC--T-AATCC-TGCCAGG-CACA-GCACC-TGGTGGGC-
Arundinellanepalensis           GGGGCTGCCGG---CAAACCGTG-TCGGG-CACA-GCATG-TGGTGGGCG
Aschiren6581                    CC-TCCTGCAAG--GCTAATCTGGG---AGTG-TATTTTAGCG-T-GACG
Bbladh5173                      CCCTC-CCCTTG--GGAG-GCTTGG--GAGTG-ACTTTTGGCGGT-GACG
Binsc5681                       GGGGCTGCCGGC--G-AATCG-TGTCGAG-CACA-GCACG-TGGTGGGCG
BBrachiaria                     GGGGCTGCCGGC---ATAACTT-GACTGG-CACC-TCACG-TGGTGGGCA
Bradi4784                       CGGTCTGCCCGAGCGTAATCTTGCCGAGGTCACA-TTACG-TGGTTGACG
Bserra6554                      GGAGCTGCCGGC---GTACCTT-GCCGGG-CACC-GCACG-TGGTGGGCG
Cdieter6642                     ??????????????????????????????????????????????????
Cexc6577                        CCCTCTCCCAGG--GTAG-TGTTGC--GAGTG-TCTTTTGGCGTT-GAGC
Cleistachnesorghoides           GGGGCTGCCGG---CGAATCGTG-TCGGG-CACA-GCACG-TGGTGGGCG
Cmarg4397                       CCCTT-GCCGAG--GGAG-TGTTGCG-GAGTG-ACTTTTCGCGTG-GACG
Cplur6406                       GGGGCTGCCAGC---TAATCT-CGCCAGG-CACA-TTACC-TGGTCGGCC
Cprolix6682                     GGGGCTGCCGGC--GGAATCGTCGCCGGGGCACA-TCACG-TGGTGGGCC
Danthoniacalifornica            GGGGCTGCCGG---CGTACCGTG-CCGGG-CGCA-GCACA-AGGTGGGCG
Dfili5872                       GGGGCTGCCAGC--A-AATCT-TGCCAGG-CACA-TCACG-TGGTGGGC-
Emuti5074                       GGGGCTGCCGG---CATATCG-CGTCGGG-CACA-TCACG-TGGTGGGCG
Emuti6715                       GGGGCTGCCGGA--CAGATCG-CGTCGGA-CACA-TCTT--TGGTGGGCG
Eragrostisdielsii               GGGGCTGCCGG---CTTACGGTA-CCGGT-CACA-GCACA-AGGTGGGTG
Evill5085                       CCCTC---CCGG--GGAGTGCTGGC---AGTG-TCTTTTCGCG-T-GACG
Hanam4807                       GCGGCTCCCGAC--GGAATCGTTGCCGAGTGACA-TTACG-TGGTGAGCC
Hanam4841                       ??????????????????????????????????????????????????
Hcon4741                        GGGGCTGCCGGC--G-AATCG-TGTCGGG-CACA-GCACG-TGGTGGGC-
Hdiss5145                       CGGGCTTCCAGCA-TTATCTATCTTA-GTGAATTTTT---TCGGTATGAC
Sbicolour9319                   GGGGCTGCCGGC---GATTCGT-GTCGGG-CACA-TCACG-TGGTGGGCG
Hfilli5144                      CCTTC-CCCAAG--GTAC-CCTTGG--AATTT-ACTTTTGTCATT-AACC
Hhirt6656                       GGGGCTGTCG-A--CGAATCG-TGTCGGG-CACA-TCACG-TGGTGGGCG
Hlongi6560                      CCGGCTGCCGGT---GTATCGTGACCGGA-CACA-GCGCG-TGGTACGCG
Hpilg4603                       GGGGCTGCCGGC--GGAATCG-CGCCGGG-CACA-GCACG-TGGTGGGCG
Hplig4738                       ??????????????????????????????????????????????????
Hquar5088                       GGGGCTGCCA-A--CGAATCG-TGTCAGG-CACA-GCACG-TGGTGGGCG
Hrud6576                        GCCTCTCCCATGC-CTATCTGTGGCACGTGCACTTTTAGCTAGTACGGCN
Htamb6585                       CTCTCTGCCATG--CATGGCCGTGTCCAGGTGCACTTTTAGCT-T-AACG
Icylin5114                      GGGTCTGCCGAG---GGAGCCTTGGCGAGTGA--CTTTTGGTGGTTGACG
Icylin6632                      GGGGCTGCCGG---CGAA-CGTG-TCGGG-CACA-TGACG-TGGTGGGCG
Mcape6655                       GGGGCTGCCTCG---GAATCGT-GTCAGA-CACA-TTATG-TGGTGGACC
Monocymbium                     -GGGTTGCCTTG--GGAGTCGTTGGCGAGTGACTTTT--GGTGGT-GACG
Pdilatum6617                    TTGGCTGCCGG---TGTATCTT-GCTGGG-CACC-TCATA-TGGTGGGCG
PentaschistisaristifoliaSpies6  ??????????????????????????????????????????????????
Pfrank4705                      GGGGCTTCCGGC--ATAACCG-TGTCGGG-CACA-GCATT-CTGTGGGC-
Pschinz6652                     GTGGCTGCCGGC---ATACCGN-GTCGGG-CACCTGCATG-TGGNGGGCC
Sbic6588                        GGGGCTGCCGGC---GATTCGT-GTCGGG-CACC-TCACG-TGGTGGGCG
Sbic6589                        GGGGCTGCCGGC---GATTCGT-GTCGGG-CACA-TCACG-TGGTGGGCG
Shalep9318                      GGGGCTGCCGGCA-TATACATT-GCCGGG-CACC-GCATG-TGGTGGGCG
Snigros6567                     CT-TC-GCCATG--GATG-CGTTGG--GAGTG-TCTTTAGTCG-T-GACG
Tleuc6627                       GGGGCTGCCGGC--GGGACCGT-GCCGGG-CACC-GCACG-TGGTGGGCG
Tspic4846                       GGGGCTGCCAG---TGAATCACAGCCGGTACACA-TCACG-TGGTGGGCG
Ttria6555                       GGGGCTGCCCGC---GAATCGT-GTCG-G-CACA--CAC--TGGTGGGCG
Zeadiplo                        GGTGCTGCCGG---CGAACCGCG-CCGGG-CGCA-GCACG-TGGTGGGCG
ZmaysGfl                        GGGGCTGCCGG---CGAACCGCG-CCGGG-CGCA-GCACG-TGGTGGGCG
Saccharumofficinarum            GGGGCTGCCGGC---GAATCG-TGTCGGG-CACA-GCACG-TGGTGGGCG
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Imperatacylindrica                GGGGCTGCCGGC---GAACCGC-GCCGGG-CACA-GCACG-TGGTGGGCG
Dichanthiumannulatum              GGGGCTGCTTCCGGCGAATCG-TGTCGGG-CGCA-GCACA-TGGTGGGCG


Aadscen6713                       --ACAT---TAGTTGTT---CTC---GGTG-CAA-CATCCCGGTAT---A
Aameth6679                        ??????????????????????????????????????????????????
Aameth6685                        AGGCATCA--CGTTGTT---CTCG--ACTGACAAAGCCCCGGGGAC---G
Aappen6543                        --ACATC---AGTTGTT---CTC---GGTG-CAT-GACCTCGGCAC---G
Aappen6946                        ??????????????????????????????????????????????????
Adist6684                         CCA-AGG--CAG-ACGTTCTCTC---TGACACACGAACGCC-TCA---GG
Aeuco5869                         G-ACATC---AGTTGT----CTC---CGTG-CAG-TGACCCGTCAA---A
Arundinellanepalensis             --ACAACT--AGTTGTT---CTC---GATG-CAG-TGGCTCGACAC---G
Aschiren6581                      CCC-ACG---TAAACTTTCTCTC---AA---CAAAAACTCC-TCG---TG
Bbladh5173                        CCA-ATG---AAGATGTTCTCTC---TG-CACAAAAGGCGG-TCAT--GG
Binsc5681                         C-ACATCC---GTTGTT---CTC---GGTG-CAG-CGCCCCGGCAT---G
BBrachiaria                       --ACATCT---GTTGTT---CTC---AGTG-TAA-TGTCTCCGCAA---G
Bradi4784                         CCACATC---AGATGTT---CTC---TCTGACATACA-CTCCTCAC---G
Bserra6554                        --ACACT--CAGGTGTT---CTC---TGTG-TAA-TGCCTTGGCAA---G
Cdieter6642                       ??????????????????????????????????????????????????
Cexc6577                          CCA-AGT--CAG-ATGTTCTCTC---TG---CACAGAAGCC-TCAC--GG
Cleistachnesorghoides             --ACACCT--AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Cmarg4397                         CCA-AGG--CAGTACGTTCTCTT---TGACACATGAAGGCNGTCAC--GG
Cplur6406                         C-ACATC---AATTGTT---CTCT--CGTACCA--TACCCCNTNCGC-G-
Cprolix6682                       --ACATC---AGATGTT---CTC---TGTG-CAATGCCCCCGTCAC---G
Danthoniacalifornica              --ACCA---ACGTTGT----CAC---GGTG-CTG-CGCCCCGGCCC---G
Dfili5872                         --ACATC---AATTGT----CTC---GGTG-CAA-TACCCTCAAAA---G
Emuti5074                         --ACATC--AAGTTGTT---CTC---GGTG-CAG-CGCCTCGGCAC---G
Emuti6715                         C-ACATC--AAGTTGTT---CTC---TGTG-CAG-CGACTCGGCAC---G
Eragrostisdielsii                 --ACAC---ACGGTGTT---CTC---GCTG-CTG-CGAACTGGTCCA-AG
Evill5085                         CCACAG---CAG-ACTTTT-CTT---AAT--CCAAAAACCC-TCG---GC
Hanam4807                         C-ACATC---AGATGTT---CTC---TGTGACAC-TGACCCCTCAC--GG
Hanam4841                         ??????????????????????????????????????????????????
Hcon4741                          G-ACATT---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Hdiss5145                         C-ACAACA--TTTGTTTCCTCGSCGATAAAA-ATCCCTCCCGCCGCT---
Sbicolour9319                     --ACAC-T-TAATTGTT---CTC---TGTG-CAA-CACCCC-ACAC---G
Hfilli5144                        CCA-AGA--AAA-ACTTCCCTTC---AA---CAAAAAGCCT-TCG---GG
Hhirt6656                         --ACATT---AGTTGTT---CTC---GGTG-CAT-TGCCTCGGCGC---G
Hlongi6560                        --ATCT----CGCTATA---CTA---AACG-CAA-TGCATCCGGGG---C
Hpilg4603                         --ACATCA--G-TTGTT---CTC---GGTG-CAG-TGCCCCGGCAC---G
Hplig4738                         ??????????????????????????????????????????????????
Hquar5088                         C-ACATT---AGTTGTT---CTC---GGTG-CAT-TGCTTCGGAGC---C
Hrud6576                          C-ACGTCA--AACTTCTCNTCGCAGAGACTCCATCATGGCTGCCAGT-TA
Htamb6585                         CCCACGT--CAA-AC-TTCTCTC---GG---CGACATTGCC-TCT---GC
Icylin5114                        CCACATCA--AGATGTT---CTC---TGTGACAGACGACGCGCGTCGCGG
Icylin6632                        --ACATC---AGTTTTT---CTC---GGTG-CA---CACCCGGCGC---G
Mcape6655                         --ACACTC---ATTGTT---CTC----GTG-CAG-CGCCCCGGCAC---G
Monocymbium                       CCA-ATGC--AGATGTT---CTC---GGTG-CACACGAACGCGGTCA-GG
Pdilatum6617                      --ACAT-G-AAGTTGTT---CTC---ACTG-CAA-CATCGCATCAT---G
PentaschistisaristifoliaSpies6    ??????????????????????????????????????????????????
Pfrank4705                        G-AGATCT--ACTTGTT---GCC---GGTG-CAG-CGCCCCGGCAC---G
Pschinz6652                       --ACAT-T--AGTTGTT---CTC---GGTG-CAA-TGTCCTGACAC---G
Sbic6588                          --ACAC-T-TAAATGTT---CTC---TGTG-CAG-CGCCCC-ACAC---G
Sbic6589                          --ACAC-T-TAATTGTT---CTC---TGTG-CAG-CGCCCCGACAC---G
Shalep9318                        --ACATCG-TAGGTGTT---CTC---TGTG-CAA-TATCGCCACAT---G
Snigros6567                       CCACAGG--CAG-GCGTTCCCTC---AG---CCAGAACGCC-TCGT---G
Tleuc6627                         --ACTC--AAAGTTGTT---CTCGTTAGTG-CAG--GCCTCGGCAC---G
Tspic4846                         --ACATC---AGTTGT----CTC---GGTGACAC-TGCCCCGGCAC---G
Ttria6555                         --ACATCT--AATTGTT---CTC---GGTG-CA--CGCCCCGGCAC---G
Zeadiplo                          --ACATC--AAGTTGTT---CTC---GGTG-CAG-CGTCCCGGCGC---G
ZmaysGfl                          --ACATC--AAGTTGTTGTTCTC---GGTG-CAG-CGTCCCGGCGC---G
Saccharumofficinarum              --ACACTC--AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCAC---G
Imperatacylindrica                --ACATC---AGTTGTT---CTC---GGTG-CAG-CGCCCCGGCGC---G
Dichanthiumannulatum              --ACATC---AGTTGTT---CTC---GGTG-CAG-CACCCCGGCACAC-G


Aadscen6713                       -AGCTA--TCTTGTTGGCCCTAAGG-ACCCATACT-TGACC--GCAGCGC
Aameth6679                        ??????????????????????????????????????????????????
Aameth6685                        CAACTTGGCGTTATCGAAACCTAATGACTCATCGAATTA-----T-GCAC
Aappen6543                        CG-CTAT-CGT-ATTGGCCCTTACG-ACCCATTGA-GCACACGTAAGC-C
Aappen6946                        ??????????????????????????????????????????????????
Adist6684                         CG-CAACTTGCAT-TCAAA-ATCTCGATCCATCGAGCG---ATTCTGCGC
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Aeuco5869                          AGGCCG---GCGCATCGCCCTAAGG-ACCCATCGA-GCACC--GGAGCGC
Arundinellanepalensis              CGGCCAG--CGTCTTGGCCC-TAAGGACCCATGGA-GCACC--GCAGCGC
Aschiren6581                       CG-CAACTTGCAT-TCAANNN----------------------------
Bbladh5173                         CG-CAACTTGTATCTGAAA-CTATGAATCCATCGAGCA---ATTATGCAC
Binsc5681                          CGGCCGG-CGT-ATCGGCCCTGAGG-ACCCATCAA-GCACC--TAAGCGC
BBrachiaria                        GAACTG--GCTTGTTGGCCTTAAA--ACCCAT-GA-CGACC--TTAGCAC
Bradi4784                          CGCCTAT--TGTATTCAACCTTACG-ATCCATTACGAAACT---CAGCAC
Bserra6554                         TACCTGG-CTTG-TCCGCTCTAACG-ACCCATAAA-GGACC--GTAGCCA
Cdieter6642                        ??????????????????????????????????????????????????
Cexc6577                           CG-CAACTTGCGT-TCAAC-CTCTCGATCGATCGAGCAC--ATTCAGCAC
Cleistachnesorghoides              CGGCCGG--CGCATCGGCCC-TAAGGACCCATGGA-GCACC--GCAGCGC
Cmarg4397                          CGGCAACTTGCGANTGAAA----------------------------
Cplur6406                          CGGCCTT----CGCTTGACCTAAAG-ATCCATCGA-GCACNT-TAAGCCC
Cprolix6682                        C-GCCGG--TCCGACTGCCCTAACG-ACCCATCGA-GCAAT--TAAGCAC
Danthoniacalifornica               CAGCCGG--CGAGACGGCCCTCA-GGACCCTTCGC-ATACC--GCAGCGC
Dfili5872                          CCGCGC------ATCTGCCCTAAGG-ACCCATCGA-GCACC--TGAGCGC
Emuti5074                          CAACCGG--CTTATCGGCCCTAAGG-ACCCATTNT-GCACA--CCANCNC
Emuti6715                          CAACCNG--CTTATCTGCCCTAACG-ACCCATTGT-GCACA--TCAGCGC
Eragrostisdielsii                  TATCAGGTACGGAATGGCCCTCA-TGACCCATGA----ACC--GAAGCGC
Evill5085                          AC-CTACTTACGT-TCNNA-AACTCGATGGTTCGCGGN---ATTCAGCAA
Hanam4807                          CAGCCCG-TTGCGACTGCCNTAACG-ATCCATCA--GCAAT--TAAGCAA
Hanam4841                          ??????????????????????????????????????????????????
Hcon4741                           CGGACGG-CAA-ATCGGCCCTTAGG-ACCCATCGA-GCACC--GCAGCGC
Hdiss5145                          ??????????????????????????????????????????????????
Sbicolour9319                      TGGCCG--GTGCATCTGCCCTAAAG-ACCCTTCNG-GCACT--GCAGCCC
Hfilli5144                         CC-CAGTTT---------------------------------------
Hhirt6656                          TGGTCGG-TGT-GTCTGCCCTAAGG-ACCCATCGA-GCACC--TAAGCGC
Hlongi6560                         GTATCCG-ACGCAATGCCTTCAATG-GACCCT--A-TTACC--G-AGCGC
Hpilg4603                          CGGCCGG-CGC-GACGGCCCTAAGG-ACCCATCGA-GCACC--GAAGCGC
Hplig4738                          ??????????????????????????????????????????????????
Hquar5088                          CGCTCGG--GT-ATTNGCCCTAAG--ACCCATCGA-GCACC--TAAGCGC
Hrud6576                           ANTTCNAANNTAATGGACCCATCNAGCACATTAAGCGCATCACC------
Htamb6585                          TG-CAGCTTGCTTTTCTGCGCAATCGATGGATCTAGAGC--ATTATGCAC
Icylin5114                         CGGCCGGTTGCGTTTCGCCCTATCGGATCCATCGA-GCAAT--TCAGCGC
Icylin6632                         C-GCCAG--TGCGTTGGCC--TAA-----------------------
Mcape6655                          CGGCNGT--TGCATCTGCCCTAAGG-ATCCATGGAAGCACN--TCTTCAC
Monocymbium                        CGCAAGGTTGTATTTGAAAATAATGGATGGATCGA-GCACAT-TAAGCGC
Pdilatum6617                       TACCTGG-TACTATGGCCTTTACG--ACCGATCAT-CGACC--TCAGCGC
PentaschistisaristifoliaSpies6     ??????????????????????????????????????????????????
Pfrank4705                         CTGCCGA-AGCGATTGACCCTAAGGGACCCATCTA-CCACC--GCAGCGC
Pschinz6652                        CAGCTAT-CTCCATAACCTCAAGGG-ACCCATTTA-CGACC--GTAGCGC
Sbic6588                           TGGCCG--GTGCATCTGCCCTAAAG-ACCCTTCGG-GCA-T--GC-GCCC
Sbic6589                           TGGCCG--GTGCATCTGCCCTAACG-ACCCTTCGG-GCACT--GC--GCA
Shalep9318                         TACCTA--TCTTATTGGCCTTAAG--ACCCATATG-TGAAC--TAAGCGT
Snigros6567                        CG-CAACTTTCGT-TCAAA-AACTCGATGGTTTGCGGG---ATTCTGCAA
Tleuc6627                          CAGCCG--GCGCAGCGGCCCTAAGG-ACCCACACG-CGACC--GCAGCGC
Tspic4846                          CGGCCGGC--GCGTAGGCCC-TAAGGACCCATCGA-GCACC--GAAGCGC
Ttria6555                          CGGCCGG-CGT-ATNTGCCCTTATG-ANCCATCTA-GCACC--GAAGCGC
Zeadiplo                           TGGCCGG--CCATTCGGCCC-TACGGACCCATCG----AGC--G-ACCGA
ZmaysGfl                           CGGCCGG--CCATTCGGCCC-TAAGGACCCATCG----AGC--G-ACCGA
Saccharumofficinarum               CGGCCGGCG-C-ATCGG-------------------------------
Imperatacylindrica                 CGGCCGGCG-TG-TCGGCCCTAAGG-ACCCATCGA-GCACC--GCAGCGC
Dichanthiumannulatum               --ACCGGCG--CATCGGCCCTAAGG-ACCCATCGA-GCACC--GAAGC--


Aadscen6713                        TTTGC-CGCTC-GGA-CCGCGACCCCAT--GTCAG-CTGG-ACTACCCGC
Aameth6679                         ??????????????????????????????????????????????????
Aameth6685                         TTCATC-CCTC-GGA-TCGCAAT-----------------------------
Aappen6543                         ATCGCC-GCTC-GGA-TCGCGACCCCAT--GTCATTCTCC-ACTACCCGC
Aappen6946                         ---------------------------------------------------
Adist6684                          TTCACACC-TC-GTA-TCGCAATTCGCT--GCCATCTTCAT-CTATCCGA
Aeuco5869                          ATCCCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Arundinellanepalensis              ATCGCC-GCTC-GGA-CC-----------------------------------
Aschiren6581                       ??????????????????????????????????????????????????
Bbladh5173                         TTCNCCCCCTC-GGA-TCGCAATTTCAT--GACATTTTGGA-CTATCCGA
Binsc5681                          CTCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCTGG-ACTACCCGC
BBrachiaria                        TTTGT-TGCTC-GGA-CCGCGACCCCAT--GTCATACTGG-ACTACCCGC
Bradi4784                          ATCACC-CCTCGGAT--CGCAACCCCCT--NCCNTNTTCG-ACTACCCGA
Bserra6554                         CTTAACTGCTC-GGA-CCGCGACCCCAT--GTCATGCTGG-ACTACCCGC
Cdieter6642                        ??????????????????????????????????????????????????
Cexc6577                           TTCACCCC-TC-GTA-TCGCAATTGCCT--GCCATCTTCAA-CTATGCGA
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Cleistachnesorghoides             ACCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACT------
Cmarg4397                         ??????????????????????????????????????????????????
Cplur6406                         ATCNCC-NCTC-GNA-TCNCCACCNCAT--GTCAATCTGG-ACTACC-GN
Cprolix6682                       ATCGCC-CCTC-GGA-CCGCAACCCCAT--GCCATTCTGGTACTACCCGC
Danthoniacalifornica              T-CGTC-GCTC-GG-------------------------------------
Dfili5872                         ATCACC-CCTC-GGA-CCGC-ACCCCA---GTCATTCTGG-ACTACCCGC
Emuti5074                         ATTGCC-NCTC-GGA-CCNCNACCCCAG--GNNAGCCC------------
Emuti6715                         ATTTCC-CCTC-GGA-TCGCGATCCCCT--GTGATTTTGG-ACTATACGC
Eragrostisdielsii                 A-TCTC-GCTC-GGA-CC--------------------------------
Evill5085                         TTCACTGCAGG-GGA-TCGCATTTTCCATANCGTTCTTCATACTATNCCA
Hanam4807                         NATCNCCCCTC-GGA--CGCAANCCCCT--GNCATNTTGN-ACTANNCGN
Hanam4841                         ??????????????????????????????????????????????????
Hcon4741                          ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Hdiss5145                         ??????????????????????????????????????????????????
Sbicolour9319                     CATCCATGCTC-GGA-CCGCGACCCCAN--GTCAGTCNGG-ACCACCCGC
Hfilli5144                        ??????????????????????????????????????????????????
Hhirt6656                         ATCCC--GCTC-GGA-CCACGACCCCAG--GTCAGTCTGG-ACTACCCGC
Hlongi6560                        ACA----CCTT-CTA-CCGC-ACCCCAT--GTCA-GCTGG-ACTACCCGC
Hpilg4603                         ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Hplig4738                         ??????????????????????????????????????????????????
Hquar5088                         ATCCC--GCTC-GGA-CCGCGACCCCAG--GTCATTCTGG-ACTACCCGC
Hrud6576                          ??????????????????????????????????????????????????
Htamb6585                         TTCACCGCTCG-GTA-TCGCATCTTCCT--GCTATCTTCGT-CGACCCGA
Icylin5114                        ATCGCC-GCTC-GGA-TCACGATCCCAT--GTCATCCTGG-ACTATCCGC
Icylin6632                        ??????????????????????????????????????????????????
Mcape6655                         ATCACC-GCTC-GGATCCGA---CCCAT--GTCATTCTGG-ACTACCCGC
Monocymbium                       TTCGCC-GCTC-GGA-TCGCAATTTCAT--GTCATTTTGGTACTATCCGC
Pdilatum6617                      TTGTA-CACTC-GGA-CCGC-ACCCCAT--GTCATGCTGG-ATTACCCGC
PentaschistisaristifoliaSpies6    ??????????????????????????????????????????????????
Pfrank4705                        ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Pschinz6652                       CTTGG-TGCTC-GGA-CCGCGACCCCAA--GTCATGCGGG-ACTACCCGC
Sbic6588                          ANTCCATGCTC-GGA-CCGCGACCCCAN--GTCANNCNGG-ACCACCCGC
Sbic6589                          CATCGATGCTC-GGA-CCGCGACCCCAG--GTCAGTCTGG-ACCACCCGC
Shalep9318                        TTCCT-CGCTC-GGA-CCGC-ACCCCAT--GTCATACTGG-ACTACCCGC
Snigros6567                       TTCACACCAT--GTA-TCGCATTTTGCT--ACGTTCTTCAT-ACATGCCA
Tleuc6627                         CAGCC--GCTC-GGA-CCGCGACCCCAG--GTCAGACGGG-ACTACCCGC
Tspic4846                         ATCGCC-GCTC-GGA-CCGCGACCCCAG--GTCAGTCGGG-ACTACCCGC
Ttria6555                         TTTTCC-GCTTTGGA-ACGCGACCC-AN--GTCA-TCTGG-ACTACCCGC
Zeadiplo                          GCTTGT-CCTC-GGA-CCGCGA----------------------------
ZmaysGfl                          GCTTGC-CCTC-GGA-CCGCGA----------------------------
Saccharumofficinarum              --------------------------------------------------
Imperatacylindrica                ATCGCC-GCTC-GGA-CC--------------------------------
Dichanthiumannulatum              ATCACC-GCTC-GGA-CCGCGA----------------------------

Aadscen6713                     GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Aameth6679                      ??????????????????????????????????????????????????
Aameth6685                      ??????????????????????????????????????????????????
Aappen6543                      ----TCGG-TATA-GGTTTTGTGG-------------TTTGGGGG-----
Aappen6946                      GAA-TGGA-AACCTTGCTAGGTTCTAACTCCCN---AAATCCAGAGCCCC
Adist6684                       ??????????????????????????????????????????????????
Aeuco5869                       ??????????????????????????????????????????????????
Arundinellanepalensis           ??????????????????????????????????????????????????
Aschiren6581                    ??????????????????????????????????????????????????
Bbladh                          GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Binsc5681                       ??????????????????????????????????????????????????
BBrachiaria                     GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Bradi4784                       ??????????????????????????????????????????????????
Bserra5074                      GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Bserra6654                      GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Bserra6954                      GAA-TCGGATAGA-CGATACGGT-AATG--GGT--ATATCCCAGCCTGAA
Cdieter6642                     ??????????????????????????????????????????????????
Cexc6577                        --------------------------------------------------
Cleistachnesorghoides           ??????????????????????????????????????????????????
Cmarg4397                       GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Cplur6406                       ??????????????????????????????????????????????????
Cprolix6682                     GAA-TCGG-ACC---GCTACGTTGGAAGTCCCA---ATTCAGAGAAACCC
Danthoniacalifornica            ??????????????????????????????????????????????????
Dfilli5872                      GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Eragrostisdielsii               ??????????????????????????????????????????????????
Evill5085                       ??????????????????????????????????????????????????
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Hanam4841                    GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Hcon6942                     ???????????????????????????????????????????????
Hdiss5145                    GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Hemarthria9319               ???????????????????????????????????????????????
Hfilli5144                   ???????????????????????????????????????????????
Hhirt6550                    GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCACCAAACC
Hhirt6656                    ???????????????????????????????????????????????
Hlongi6560                   GAA-TCGG-TAGA-CGCTACGTT-AAGT--CCC--TCCTCCCAGCCGAAA
Hpilg4603                    GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Hpilg4738                    GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Hquar5088                    ???????????????????????????????????????????????
Hrud6576                     ???????????????????????????????????????????????
Htamb6585                    ???????????????????????????????????????????????
Icylin5114                   GAAATCGG-TAGA-CGCTACGTT-CAATTCCCT--CCTTCCCAGCCGAAA
Icylin6632                   GAA-TCGG-TAGA-CGCTACGGT--TATTGCCT--CCTTCCCAGAAGAAC
Mcape6655                    GTA-TGGG-AAC--TGCTAAGTG-TAACTCCCA---ATTCCCAGAACC--
Monocymbium                  ???????????????????????????????????????????????
Pdilatum6617                 GAA-TCGG-TAGA-CGCTACGTT-CAAGTCCCC--CCTTCCCAGCCGAAA
Pentaschistisaristifol       ???????????????????????????????????????????????
Pfrank4705                   GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Pschinz6652                  GAAATCGG-TAGA-CGCTACGTT-CAAGTCCCT--CCTTCCCAGCCGAAA
Sbic6588                     ???????????????????????????????????????????????
Sbic6589                     GAA-T-GG-T-GA-CGCTACGTT---ACTCCCT--CCTTCCCAGCCGAAA
Shalep9318                   GAA-TCGG-AACC-CGCTACGTT-AAGT--CCC---ATTC--AGC-GAAA
Snigros6567                  GAAATCGG-TAGA-CGCTACGTT-TAATTCCCC--CATTCCCAGCCGAAA
Tleuco6627                   ???????????????????????????????????????????????
Tspic4846                    GAAATCGG-TAGA-CGCTACGTT-CAATTCCCT--CCTTCCCAGCCGAAA
Ttria6555                    GAAAT-GG-TAG--CGGTAGCGTTCAAGTCCCCGACATAAGCTGCCACCT
Zeadiplo                     ???????????????????????????????????????????????
Zea                          TTTCT-AT-CTA--AGTGGAACTTCCAATTT-AGAACTAGT-TAATAACT
Sacharumofficinarum          ----------------------------TTCCA--AATTCAGAGAA-ACC
Icylindrical                 ----------------------------TTCCA--AATTCAGAGAA-ACC
Dichanthiumannulatum         ???????????????????????????????????????????????

Aadscen6713             AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Aameth6679              ???????????????????????????????????????????????
Aameth6685              ???????????????????????????????????????????????
Aappen6543              AAAGAAAGCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Aappen6946              AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAA-GGATAGGTGC
Adist6684               ???????????????????????????????????????????????
Aeuco5869               ???????????????????????????????????????????????
Arundinellanepalensis   ???????????????????????????????????????????????
Aschiren6581            ???????????????????????????????????????????????
Bbladh                  AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Binsc5681               ???????????????????????????????????????????????
BBrachiaria              AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Bradi4784               ???????????????????????????????????????????????
Bserra5074              AAACTT-GCGG-TCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Bserra6654              AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Bserra6954              AAACAA-GTGGTTCG--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Cdieter6642             ???????????????????????????????????????????????
Cexc6577                ------------------------------------------------
Cleistachnesorghoides   ???????????????????????????????????????????????
Cmarg4397               AAACTT-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Cplur6406               ???????????????????????????????????????????????
Cprolix6682             AAACAA-GC-GGTTT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Danthoniacalifornica    ???????????????????????????????????????????????
Dfilli5872              AAACTA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Eragrostisdielsii       ???????????????????????????????????????????????
Evill5085               ???????????????????????????????????????????????
Hanam4841               --ACCA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Hcon6942                ???????????????????????????????????????????????
Hdiss5145               AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Hemarthria9319          ???????????????????????????????????????????????
Hfilli5144              ???????????????????????????????????????????????
Hhirt6550               AAACAA-GCG-------CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Hhirt6656               ???????????????????????????????????????????????
Hlongi6560              AAACAACGAGGTTCT--CGAACTAGAA-TACAAAGGAAAAGGATAGGTGC
Hpilg4603               AAACCA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAAATGC
Hpilg4738               AAACTA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
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Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Icylin6632              AAACAA-GCGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Mcape6655               TGACTA-CATGGTCTACCTAATGATGA-TCCAAAGGTAATGGATAGGTGC
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            AA-CAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Pschinz6652             AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                AAA----GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Shalep9318              AA-CAA-GTGGTT-T--CCAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Snigros6567             AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               AAACTA-GTGGGTCT--CAAACTAGAAACCCAAAGGAAAAGGATAGGTGC
Ttria6555               GGACAAAGA---TC---CATATTGGTC-------GGTCCCGTAGCG-TCT
Zeadiplo                ??????????????????????????????????????????????????
Zea                     TGTTACATT---TC---TGTTATGTAA-------GCCCACTTAG---CTC
Sacharumofficinarum     AAACAA-GTGGTTCT--CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Icylindrical            AAACAA-GTG-------CAAACTAGAA-CCCAAAGGAAAAGGATAGGTGC
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             AGAGACTCAATGGAAGCTATTCTA--ACGAATCGAAGTAATTACGTTGTG
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Aappen6946              AGAGACTCTATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Binsc5681               ??????????????????????????????????????????????????
BBrachiaria              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Bserra6654              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Bserra6954              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Cdieter6642             ??????????????????????????????????????????????????
Cexc6577                --------------------------------------------------
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4841               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hemarthria9319          ??????????????????????????????????????????????????
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAGTTAATTACGTTGTG
Hpilg4603               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hpilg4738               AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Icylin6632              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Mcape6655               AGAGACTCCCATG--GCTGTTCTAGAATGGATCTGAGCGAT---------
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTGCGTTGTG
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
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Pschinz6652             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Shalep9318              AGAGACTCAATGGA-GCTGTTCTA--ACGAATCGAAGTAAT-ACGTTGTG
Snigros6567             AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAATTACGTTGTG
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               AGAGACTCAATGGAAGCTTTTCTA--ACGAATCGAAGTAAT---------
Ttria6555               ACCGATTTTCGCGAAGCTGTCCTA--CCGGTTCGAAGTTATT--------
Zeadiplo                ??????????????????????????????????????????????????
Zea                     AGAGGTTAGAGCATCGCATTTGTA-ACGAATCGGTTCAAAT---------
Sacharumofficinarum     AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Icylindrical            AGAGACTCAATGGAAGCTGTTCTA--ACGAATCGAAGTAAT---------
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATA-----
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              --------------------------------------------------
Aappen6946              --------------------------------------------------
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  --------------------------------------------------
Binsc5681               ??????????????????????????????????????????????????
BBrachiaria              TTGGTAGGGGAACTGCCTCAAAATACTAGAAAGAAGGGCTTTATATTATA
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              --------------------------------------------------
Bserra6654              TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATTT-ATA
Bserra6954              --------------------------------------------------
Cdieter6642             ??????????????????????????????????????????????????
Cexc6577                --------------------------------------------------
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               --------------------------------------------------
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             --------------------------------------------------
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              --------------------------------------------------
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4841               --------------------------------------------------
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               --------------------------------------------------
Hemarthria9319          ??????????????????????????????????????????????????
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               --------------------------------------------------
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              TTGTTAGTGGAATTCCTTCTAAATTTGAGAAAGAAGGGCTTTATA-----
Hpilg4603               --------------------------------------------------
Hpilg4738               --------------------------------------------------
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              --------------------------------------------------
Icylin6632              --------------------------------------------------
Mcape6655               --------------------------------------------------
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            TTGGTAGTGGAACCTCTTCGAAATTAGAGAAAGAAGGGCTTTATA-----
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              --------------------------------------------------
Pschinz6652             TTGGTAGTGGAACTCCCTCGAAATTATAGAAAGAAGGGCTTTATA-----
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                --------------------------------------------------
Shalep9318              TTGGTAGTGGAACTCCCTCGAAATACTAGAAAGAAGGGCTTTATA-----
Snigros6567             TTGGTAGTGGAACTCCCTCGAAATACTAGAAAGAAGGGCTTTATA-----
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               --------------------------------------------------
Ttria6555               --------------------------------------------------
Zeadiplo                ??????????????????????????????????????????????????
Zea                     --------------------------------------------------
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Sacharumofficinarum     ------------------------------------------------
Icylindrical            ------------------------------------------------
Dichanthiumannulatum      ??????????????????????????????????????????????


Aadscen6713             CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              ----------------------------------AACGATTAATCACA--
Aappen6946              ----------------------------------AACGATCAATCACA--
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  ----------------------------------AACGATTAATCACA--
Binsc5681               ??????????????????????????????????????????????????
BBrachiaria              CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACG--
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              ----------------------------------AACGATTAATCACA--
Bserra6654              CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Bserra6954              ----------------------------------AACGATTAATCACA--
Cdieter6642             ??????????????????????????????????????????????????
Cexc6577                ------------------------------------------------
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               ----------------------------------AACGATTAATCACAAA
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             ----------------------------------AACGATTAATCACA--
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              ----------------------------------AACGATTAATCACA--
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4841               ----------------------------------AACGATTAATCACA--
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               ----------------------------------AACGATTAATCACA--
Hemarthria9319          ??????????????????????????????????????????????????
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               ----------------------------------AACGATTAATCACA--
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              CACCTAATAAACACGTATAGATACTGGCATAGCAAACGATTAATCACG--
Hpilg4603               ----------------------------------AACGATTAATCACA--
Hpilg4738               ----------------------------------AACGATTAATCACA--
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              ----------------------------------AACGATTAATCACA--
Icylin6632              ----------------------------------AACGATTATTCACA--
Mcape6655               ----------------------------------GCAGCTTAATCACA--
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            CATCTAATATACACGCATATATACTGACATAGCAAACGATTAATCACG--
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              ----------------------------------AACGATTAATCACA--
Pschinz6652             CATCTAATACACACGTATAGATACTGACATAGCAAACGATTAATCATA--
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                ----------------------------------AACGATTAATCACA--
Shalep9318              CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Snigros6567             CATTTAATACACACGTATAGATACTGACATAGCAAACGATTAATCACA--
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               ----------------------------------TACGATTAATCACA--
Ttria6555               ----------------------------------ACGAGT-TTCAGG--
Zeadiplo                ??????????????????????????????????????????????????
Zea                     ----------------------------------CCGATT-TTTTTT--
Sacharumofficinarum     ----------------------------------AACGATTAATCACA--
Icylindrical            ----------------------------------AACGATTAATCACA--
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             GAACCCATATCATAATATAGGTTCTTTATTTTATAT-------TTTTTTT
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
Aappen6946              GAACCCATATTATAATATAGGTTCTTTATTTGATTT------------TT
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Adist6684                ??????????????????????????????????????????????????
Aeuco5869                ??????????????????????????????????????????????????
Arundinellanepalensis    ??????????????????????????????????????????????????
Aschiren6581             ??????????????????????????????????????????????????
Bbladh                   GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Binsc5681                ??????????????????????????????????????????????????
BBrachiaria               GAACCCCTATCATAATAGGGGTTCTTTATTTTATAT-----TTTTTTCT-
Bradi4784                ??????????????????????????????????????????????????
Bserra5074               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Bserra6654               GAACCCATATCATAATATAGGTTCTTTATTTTATATATATATTTTTTTTT
Bserra6954               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Cdieter6642              ??????????????????????????????????????????????????
Cexc6577                 -------CATNNGGCTACGTGTTGCGCAGTCG-------------------
Cleistachnesorghoides    ??????????????????????????????????????????????????
Cmarg4397                GAACCCATATTATAATATAGGTTCTTTATTTT-----------------T
Cplur6406                ??????????????????????????????????????????????????
Cprolix6682              GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Danthoniacalifornica     ??????????????????????????????????????????????????
Dfilli5872               GAACCTATATTATAATATAGGTTCTTTTTTTTATTT------------TT
Eragrostisdielsii        ??????????????????????????????????????????????????
Evill5085                ??????????????????????????????????????????????????
Hanam4841                GAACCTATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hcon6942                 ??????????????????????????????????????????????????
Hdiss5145                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hemarthria9319           ??????????????????????????????????????????????????
Hfilli5144               ??????????????????????????????????????????????????
Hhirt6550                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hhirt6656                ??????????????????????????????????????????????????
Hlongi6560               GAACCCATATTATAATATAGGTTCTTTATTCTTTTT-------TAGAATG
Hpilg4603                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hpilg4738                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Hquar5088                ??????????????????????????????????????????????????
Hrud6576                 ??????????????????????????????????????????????????
Htamb6585                ??????????????????????????????????????????????????
Icylin5114               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Icylin6632               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Mcape6655                GAACCCATATTCTAATATAGGTTCTTTATTACATTT------------TT
Monocymbium              ??????????????????????????????????????????????????
Pdilatum6617             GAACCCATATCATAATATAGGTTCCTTATTTTATTT--------TTT---
Pentaschistisaristifol   ??????????????????????????????????????????????????
Pfrank4705               GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Pschinz6652              GAACCCATATCATAATATAGGTTCTTTATTTTATTT--------TTT---
Sbic6588                 ??????????????????????????????????????????????????
Sbic6589                 GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TG
Shalep9318               GAACCCCTATCATAATATAGGTTCTTTATTTTATAT-----TTTTTTTTT
Snigros6567              GAACCCCTATCATAATATAGGTTCTTTATTTTATAT-----TTTTTTTT-
Tleuco6627               ??????????????????????????????????????????????????
Tspic4846                GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Ttria6555                TAAGCCTTATGATAATCGTAGTCGTCTACGTCGC---------------G
Zeadiplo                 ??????????????????????????????????????????????????
Zea                      CTATCGATGTTCTATGAACAAGAATTTCTCTTTT---------------C
Sacharumofficinarum      GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Icylindrical             GAACCCATATTATAATATAGGTTCTTTATTTTATTT------------TT
Dichanthiumannulatum     ??????????????????????????????????????????????????


Aadscen6713              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCTG---A
Aameth6679               ??????????????????????????????????????????????????
Aameth6685               ??????????????????????????????????????????????????
Aappen6543               AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGAAAATTCAT---A
Aappen6946               AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGTCGATTGAT---A
Adist6684                ??????????????????????????????????????????????????
Aeuco5869                ??????????????????????????????????????????????????
Arundinellanepalensis    ??????????????????????????????????????????????????
Aschiren6581             ??????????????????????????????????????????????????
Bbladh                   AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Binsc5681                ??????????????????????????????????????????????????
BBrachiaria               AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCTT---A
Bradi4784                ??????????????????????????????????????????????????
Bserra5074               AGAATGAAATT-TGG-AAGGATTATGAAGAGGTATAGAAAATTCAT---A
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Bserra6654              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTATG---A
Bserra6954              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Cdieter6642             ??????????????????????????????????????????????????
Cexc6577                ---CTGAAACGCTCCCAAGAACTCTCGCTATCGCCAGATAATTCGGTGGA
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGAAAATTCAT---A
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4841               AGAATGAAATT-TGG-AAGGATTATGAA-----ATAGAAAATTCAT---A
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               AGAATGAAATT-TGG-AAGGATTATGAAGAGGTATAGAAAATTCAT---A
Hemarthria9319          ??????????????????????????????????????????????????
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               AGAATGAAATT-TGG-AAGGATTATGAAGAGGTATAGAAAATTCAT---A
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              AAATTTGAAAT-AGA-AATGATTATGAA-----ATAATAAATTCTG---A
Hpilg4603               AGAATGAAATT-TGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Hpilg4738               AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              AGAATGAAATT-AG--AATGATTATGAA-----ATAGAAAATTCAT---A
Icylin6632              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Mcape6655               TGAATGAAATT-CGG-AATGATTATGAA-----ATACAACAACAGC---A
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            -GAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCTG---A
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Pschinz6652             AGAATGAAATT-AGG-AATGATTATGAA-----ATATAAAATTCTG---A
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Shalep9318              AGAATGAAATT-AGG-AATGATTAGGAA-----ATAGAAAATTCTG---A
Snigros6567             AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCTG---A
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               AGAATGAAATT-TGG-AAGGATTATGAA-----ATACAAAATTCAT---A
Ttria6555               AAATTGAAATT-AGG-AATGATTATGAA-----ATAAAA-ATTCAT---A
Zeadiplo                ??????????????????????????????????????????????????
Zea                     CGAATAAAATG-GGG-AATCAGGGTCTA-----TTAGTC-GTTCAA---G
Sacharumofficinarum     AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCAT---A
Icylindrical            AGAATGAAATT-AGG-AATGATTATGAA-----ATAGAAAATTCCT---A
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             ATTTTTT-GAGAATTA----TTGT-GAATCC-ATTCCAA-TCGA-ATATT
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Aappen6946              ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  ATTTTTT-GAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Binsc5681               ??????????????????????????????????????????????????
BBrachiaria              ATTTTTT-TAGAATTA----TTGT-GAATCC-ATTCCAA-TCGA-ATATT
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Bserra6654              ATTTTTT-CATAATTA----TTGT-GAATC--ATTCCAA-TCGA-ATATT
Bserra6954              ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Cdieter6642             ??????????????????????????????????????????????????
Cexc6577                CTATGATCGTCGACTA-TTTTCGCGCTGTCT-ACGCCAA-CAGAGTCATT
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               ATTTTTT-GAGAATTAATTATTGT-GAATCT-ATTCCAA-TCGA-ATATT
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             ATTTTTT-GAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
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Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4841               ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Hemarthria9319          ??????????????????????????????????????????????????
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              ATTTTTTGTAGAATTA----TT---GAATC--ATTCCAA-TTGA-ATATT
Hpilg4603               ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Hpilg4738               ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Icylin6632              ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Mcape6655               TTAAATG-AAGAATTC----ATGT-GAAGCT-ATTGCTT-GCAATATATT
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            ATTTTTT-TAGAATTA----TTGT-GAATCC-ATTCCAA-TCGA-ATATT
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Pschinz6652             ATTTTTTTTAGAATTA----TTGT-GAATCC-ATTCCAA-TCGA-ATATT
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Shalep9318              ATTTTTT-TAGAATTA----TTGT-GGATCC-ATTCCAA-TCGA-ATATT
Snigros6567             ATTTTTT-TAGAATTA----TTGT-GAATCC-ATTCCAA-TCTA-ATATT
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Ttria6555               ATTTTTT-GAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Zeadiplo                ??????????????????????????????????????????????????
Zea                     ACTCCAT-TTGTCATA----TATT-CCATAT-ATCACAT-TCGA-AGATA
Sacharumofficinarum     ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Icylindrical            ATTTTTT-TAGAATTA----TTGT-GAATCT-ATTCCAA-TCGA-ATATT
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             -TCATAATCA-AATCCTT--CAATTCATTGTTTTG------AGATCTTTA
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              -GAGTAATCA-AATCCTT--CAA-TCATTGTTTTCG-----AGATCTTTT
Aappen6946              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTC-----GAGATCTTTT
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Binsc5681               ??????????????????????????????????????????????????
BBrachiaria              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTG------AGATC----
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Bserra6654              -GAGTAATCA-AATCCTT--CAACTCATT---TTG------AGATCTTTA
Bserra6954              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Cdieter6642             ??????????????????????????????????????????????????
Cexc6577                AGGGGGAGACGGATCACGCACATATATATTATTTCA-----ATATC-TAT
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATC-TTT
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             -GAGTAATCA-AATCCTT--CAATTCATTGTTTTC-----GAGATCTTTT
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4841               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hemarthria9319          ??????????????????????????????????????????????????
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              -TAGTAATCA-AATCCTT--CAATTCAGT---TTG------GAGTCTTTA
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Hpilg4603               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hpilg4738               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Icylin6632              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Mcape6655               -GACTAATCACAATGGAC--TAATACATTGTGTT------GAGATCATTT
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            -GAGTAATCA-AATCCTT--CAATTCATTATTTTGTTTTCGAGATCTTAA
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Pschinz6652             -GAGTAATCA-AATCCTT--CAATTCATTGTTTTG------AGATCTTCA
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Shalep9318              -GAGTAATCG-AATCCTT--CAATTCATTGTTTTG------CGATC----
Snigros6567             -GAGTAATCA-AATCCTT--CAATTCATTGTTTTG------AGATC----
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Ttria6555               -GAGTTATCA-AATCCTT--CAATTCATTGGTTTCG-----AGATCTTTT
Zeadiplo                ??????????????????????????????????????????????????
Zea                     -TCATATTCA-TGGAATA--CGATTCACT---TTCA-----AGATGCCTT
Sacharumofficinarum     -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Icylindrical            -GAGTAATCA-AATCCTT--CAATTCATTGTTTTCG-----AGATCTTTT
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             AAAAGTGG-ATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Aappen6946              CCTCAGTGGATTAATC--GGACGAGGATA---AAGAGA--GACTAACA
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Binsc5681               ??????????????????????????????????????????????????
BBrachiaria              AAAAGTGG-ATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Bserra6654              AAAAGTGGGATTAATC---GACGAGGATA---AAGAGA--GAGTCCCA
Bserra6954              TAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Cdieter6642             ??????????????????????????????????????????????????
Cexc6577                ATAAGATGTGATAGTC--GAAAGTATACTGG-AAAAGAATGACGTACC
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               TAAAAGCGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4841               AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Hemarthria9319          ??????????????????????????????????????????????????
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              AAACAGGTGATTAATCCGGGACGAGGACA---AAGAGA--GAGTCCCA
Hpilg4603               AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Hpilg4738               AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Icylin6632              AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Mcape6655               AAAAAGTGGATAAATC--GGCGGAGGATT---AAGCGT--GGTTCATA
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
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Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Pschinz6652             AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Shalep9318              GAAAGTGG-TATACTC---GAATCGGACG---AGGATAA-GAGTCCCA
Snigros6567             AAAAGTGG-ATTAATC---GACGAGGATA---AAGAGA--GAGTCCCA
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Ttria6555               AAAAAGTGGATTAATCC-GGACGAAGATT---AAGAGA--GATTCCCA
Zeadiplo                ??????????????????????????????????????????????????
Zea                     GA----TGGTGAAAT---GGTAGAC-------ACGCGA--GACTCAAA
Sacharumofficinarum     AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Icylindrical            AAAAAGTGGATTAATC--GGACGAGGATA---AAGAGA--GAGTCCCA
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Aameth6679              ??????????????????????????????????????????????????
Aameth6685              ??????????????????????????????????????????????????
Aappen6543              TTCTA--CATGTCAAT--ACTGA-CAACATT--AATTTCTAGTAAAA
Aappen6946              TTTTG--AATCCCAAC--GGAAT-CGGG--ACACATAACTTTCAAAT
Adist6684               ??????????????????????????????????????????????????
Aeuco5869               ??????????????????????????????????????????????????
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            ??????????????????????????????????????????????????
Bbladh                  TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Binsc5681               ??????????????????????????????????????????????????
BBrachiaria              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Bserra6654              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Bserra6954              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Cdieter6642             ??????????????????????????????????????????????????
Cexc6577                GTCAACGANTTTCNGG----NNN-TATAGTTCTTTATTATTTTNANA
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Cplur6406               ??????????????????????????????????????????????????
Cprolix6682             TTCTA--CATGTCAAT--ACTGA-CGGC--AGATGGATTTGAATCCC
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4841               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hcon6942                ??????????????????????????????????????????????????
Hdiss5145               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hemarthria9319          ??????????????????????????????????????????????????
Hfilli5144              ??????????????????????????????????????????????????
Hhirt6550               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hhirt6656               ??????????????????????????????????????????????????
Hlongi6560              TTCTA--CATGTCAAT--ACTG---AACAATGAAATTTCTAGTAAAA
Hpilg4603               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hpilg4738               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Hquar5088               ??????????????????????????????????????????????????
Hrud6576                ??????????????????????????????????????????????????
Htamb6585               ??????????????????????????????????????????????????
Icylin5114              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Icylin6632              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Mcape6655               TTCGG--TATGTCAAT--GCGAT-CGTC--TGACTTTACTTTCTAAC
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Pschinz6652             TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Sbic6588                ??????????????????????????????????????????????????
Sbic6589                TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Shalep9318              TTCTA--CATGTCAAT--ACTGA-CAACAATGAA-TTTCTAGTAAAA
Snigros6567             TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Ttria6555               TCCTA--CATGTCAAT--ACTGGACAACAATGAAATTTCTAGTTAAA
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Zeadiplo                ??????????????????????????????????????????????????
Zea                     ATCT---CGTG-CTAA--AGAGCGTGGAGGTTCGAGTCCT-CTTCAA
Sacharumofficinarum     TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Icylindrical            TTCTA--CATGTCAAT--ACTGA-CAACAATGAAATTTCTAGTAAAA
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             GGA
Aameth6679              ???
Aameth6685              ???
Aappen6543              GGA
Aappen6946              TCC
Adist6684               ???
Aeuco5869               ???
Arundinellanepalensis   ???
Aschiren6581            ???
Bbladh                  GGA
Binsc5681               ???
BBrachiaria              GGA
Bradi4784               ???
Bserra5074              GGA
Bserra6654              GGA
Bserra6954              GGA
Cdieter6642             ???
Cexc6577                ATG
Cleistachnesorghoides   ???
Cmarg4397               GGA
Cplur6406               ???
Cprolix6682             TCC
Danthoniacalifornica    ???
Dfilli5872              GGA
Eragrostisdielsii       ???
Evill5085               ???
Hanam4841               GGA
Hcon6942                ???
Hdiss5145               GGA
Hemarthria9319          ???
Hfilli5144              ???
Hhirt6550               GGA
Hhirt6656               ???
Hlongi6560              GGA
Hpilg4603               GGA
Hpilg4738               GGA
Hquar5088               ???
Hrud6576                ???
Htamb6585               ???
Icylin5114              GGA
Icylin6632              GGG
Mcape6655               ACC
Monocymbium             ???
Pdilatum6617            GGA
Pentaschistisaristifol  ???
Pfrank4705              GGA
Pschinz6652             GGA
Sbic6588                ???
Sbic6589                GG-
Shalep9318              GGA
Snigros6567             GGA
Tleuco6627              ???
Tspic4846               GGA
Ttria6555               GGG
Zeadiplo                ???
Zea                     GGC
Sacharumofficinarum     GGA
Icylindrical            GGA
Dichanthiumannulatum    ???


Aadscen6713             ?????
Aameth6679              GACCC
Aameth6685              GACCC
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Aappen6543              ?????
Aappen6946              GATCC
Adist6684               GACCC
Aeuco5869               GACCC
Arundinellanepalensis   ?????
Aschiren6581            GACCC
Bbladh                  GACCC
Binsc5681               GACCC
BBrachiaria              ?????
Bradi4784               ?????
Bserra5074              GACTC
Bserra6654              ?????
Bserra6954              GACTC
Cdieter6642             GACCC
Cexc6577                GACCC
Cleistachnesorghoides   ?????
Cmarg4397               ?????
Cplur6406               GACCC
Cprolix6682             GACCC
Danthoniacalifornica    ?????
Dfilli5872              CCTCC
Eragrostisdielsii       ?????
Evill5085               ?????
Hanam4807               GACCC
Hcon6942                GACCA
Hdiss5145a              ACCCC
Hemarthria9319          GACCC
Hfilli5144              GCCCC
Hhirt6650               ?????
Hhirt6656f              GAACC
Hlongi6560              ?????
Hpilg4603               GACCC
Hpilg4738               GACCC
Hquar5088               GACCA
Hrud6576                GACCA
Htamb6585               GACCC
Icylin5114a             GACCC
Icylin6632a             GACCA
Mcape6655               GACCC
Monocymbium             ?????
Pdilatum6617            GACCC
Pentaschistisaristifol  ?????
Pfrank4705              GACCA
Pschinz6652             ?????
Sbic6588                ?????
Sbic6588                GACCA
Shalep9318              GACCC
Snigros6567             ?????
Tleuco6627              ?????
Tspic4846               GACCA
Ttria6555               GACCC
Zeadiplo                ?????
Zea                     ATAAT
Sacharumofficinarum     AAATC
Icylindrical            AAATC
Dichanthiumannulatum    ?????


Aadscen6713             ??????????????????????????????????????????????
Aameth6679              AGTT-CAGGGAGATCGGGGGT-TGGGAGAAACTAAGGG-TTGGTA
Aameth6685              AGTT-C-GTGAGATAGGGGGT-TGGGAGAAAATAAGGGATTGGTA
Aappen6543              ??????????????????????????????????????????????
Aappen6946              ATATTTTGGGACCAAATTCCG---GGAGA---TAGGGG---ATAT
Adist6684               CGTTACAGGGAAGACGGGGTT-TGGGAGAAAATAAGGGCTTGGTA
Aeuco5869               CGGT--CGGGAGATCGGGGTT-GGGGAGAAANAATGGGGTTGGTA
Arundinellanepalensis   ??????????????????????????????????????????????
Aschiren6581            A-GTTCAGGGAGATAGGGGGTGTGGGAGAAAATAAGGGATTGGTN
Bbladh                  AAACTNGNCGAGATACCTTTGTTGGGAGAAAACATCGGGTAGAAT
Binsc5681               AAAATNG-GGAGAGACGGG--TTGGGAGAAAATAAGGCATTGGTA
BBrachiaria              ??????????????????????????????????????????????
Bradi4784               ??????????????????????????????????????????????
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Bserra5074              CGATTGTCGGACCAAAGTTCA---GGAGA---TAGGGG---AAAA
Bserra6654              ??????????????????????????????????????????????
Bserra6954              CGTTTGTCGGACCAAGTTCAG---GGAGA---TAGGGGN-TATTT
Cdieter6642             AAGTTCAGGGAGATAGGGGTT-TGGGAGAAAATAAGGGATTGGTA
Cexc6577                AAGT-CAGGGGGATACGGGTT-TGGGAGCAAATAACGGGTCGGTA
Cleistachnesorghoides   ??????????????????????????????????????????????
Cmarg4397               ??????????????????????????????????????????????
Cplur6406               C---TCGGGAAAATAGGGGTGTGCGGAGGAAATACGGGTTTGGGA
Cprolix6682             CAGT--CGGGAGATAGGGGTT-TGGGAGAAAATAAGGGATTGGTA
Danthoniacalifornica    ??????????????????????????????????????????????
Dfilli5872              CNTTTTTAGGACCAAGTTCAG---GGAGA---TAGGGGTTTGGAA
Eragrostisdielsii       ??????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????
Hanam4807               ACCTTCCGCAAA-TAGGCCTCCCCCCCGCCCCTTCGGCACACCCA
Hcon6942                AGGTTCAGGGAGATAGGGGTT-TGGGGGCAAATAACGGATAGGTA
Hdiss5145a              TTATAGTCCTACACACGTCCC--TGCACA---AAAGGCACTCCTT
Hemarthria9319          G---TCCGGGAATTAGGGGGT-CCGGAGAACATCAAGGGTTGGGA
Hfilli5144              TCTTAGCCCGACCCAAGTTTC--GGCACA---TAGGGCCCTATTT
Hhirt6650               ??????????????????????????????????????????????
Hhirt6656f              A-GTTTCGGGAATAGGGTG--GTGGGAGAACATAAGGGATTGGTA
Hlongi6560              ??????????????????????????????????????????????
Hpilg4603               AANTTTAGGGAGATAGGGGTT-TGGGAGGAAATAAGGGATTGAAA
Hpilg4738               TCTTACCGGACCC-AAATTTC--GGGAGA---TAGGGGTTATTTT
Hquar5088               AGTTCAGGAGATAGGGGGGTG--TGGTTT---TAAGGGTCAGGTA
Hrud6576                AAGTTCAGGG-GATAGCGGGGTCGGGAGAAAAGAACCGGATTGAT
Htamb6585               AAGTTCAGGG-GATAGCGGGTTTGGGAGAAAATACCGAATTCGTA
Icylin5114a             AANTTTCAGGAGATAGGGGGTTTGGGAGAAAATAAGGGTTCGGTA
Icylin6632a             --GTTCAGGGAAATACGGGGGT--GGGGGAAATAAGGGATTGGTA
Mcape6655               ACGTTCAGGGAAATAAGGGGGTTGGGAGAAAATAAGGGATTGGTA
Monocymbium             ??????????????????????????????????????????????
Pdilatum6617            AGCTTCCGGGAATTAGGGGCCCCTGGGGCCAACATTTTAGCCCAA
Pentaschistisaristifol  ??????????????????????????????????????????????
Pfrank4705              AAGTTTTGAGCACCAAGTGCG--GGGAGA---TAGGGGTCATTGA
Pschinz6652             ??????????????????????????????????????????????
Sbic6588                ??????????????????????????????????????????????
Sbic6588                G---TTCGGGAATTAGGGGGT-TGGGGGAAAATAAGGGATTGGGA
Shalep9318              TCTTACCGGACCCCCATATA---CCGATT---TCCCGGTTATTTT
Snigros6567             ??????????????????????????????????????????????
Tleuco6627              ??????????????????????????????????????????????
Tspic4846               TCGTTGTCCCANAAAAGTTTC---GCANA---TAGGGGTTATTTT
Ttria6555               AAGTTCAGCAGATAGGGGT--GTGGGAGAAAATAAGGGATTGGTA
Zeadiplo                ??????????????????????????????????????????????
Zea                     C-GGAGAATGCTCATTGAT--GAGCATTCCCGTAGAAGTATTC--
Sacharumofficinarum     CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Icylindrical            CGTCGACTTTATA-AGTCGT-GAGGGTTCAAGTCCCTCTATCCCC
Dichanthiumannulatum    ??????????????????????????????????????????????


Aadscen6713             ??????????????????????????????????????????????
Aameth6679              TCC--CTTTAGGAAACAAGAATA---TAGTTACCCA-CACTC
Aameth6685              TCC--CTTTAGGAAACAAGAAAA---TAGTTACCCA-CACTC
Aappen6543              ??????????????????????????????????????????????
Aappen6946              TCTTCGC----ACACA-AGG------CA-ATAAAC---CTTG
Adist6684               TCC--CATTAGGAAACAAGAATA---TAGTTACCCA-CATTC
Aeuco5869               TCN-GTTATTGTTCAAGTAGAAAC--TAGTTACCCATCATCC
Arundinellanepalensis   ??????????????????????????????????????????????
Aschiren6581            TCA-ACNTTG-GAGATAGGGGA----TAGTTACCC-GGATTC
Bbladh                  CA---CATCA-TCTTACCGAAAGACATAGTTACCCA-TACTC
Binsc5681               TCAAATA-TAGGAAA---CAAAGA--TAATAGTTACCAATTC
BBrachiaria              ??????????????????????????????????????????????
Bradi4784               ??????????????????????????????????????????????
Bserra5074              ACTGGCG----ACACG-GGC------CA-ATAAAC---CTTG
Bserra6654              ??????????????????????????????????????????????
Bserra6954              TTTCGGG----TAAAG-AGA------AA-ATAAAC---CTTC
Cdieter6642             TCA-GCTATCGGAAACGTAGAAAA--TAGTTACCCA-AATTC
Cexc6577                CCA-TCATTCTGAAACATAGAAAA--TAGTAACCCA-ACTTC
Cleistachnesorghoides   ??????????????????????????????????????????????
Cmarg4397               ??????????????????????????????????????????????
Cplur6406               TCAA-CTTTAGGAAAA-AAGGAA--ATAGGTTTCCC-GATTC
Cprolix6682             TCA-GCTATNGGAAAAATAGAAAA--TAGTTACCCC-AATTC
Danthoniacalifornica    ??????????????????????????????????????????????
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Dfilli5872              G----------AAAATAAGG------GA----------TTGG
Eragrostisdielsii       ??????????????????????????????????????????
Evill5085               ??????????????????????????????????????????
Hanam4807               GAT-AAAAATCTAGACTCGGA-AAGGTCTAGNCCCA-CAGTT
Hcon6942                TCA-NCTATAGGAAAAATAGAAAA--TAGTTACCCA-CATTC
Hdiss5145a              TTCTCCC----ATCTTTTGG------CACC-AAA----ATTC
Hemarthria9319          GTCA-ACTTAGGAACA-AAGG----ATAGGTTCCCC-A-TTC
Hfilli5144              TTTCGGA----CACCATTG-------CAGATAA-----ATAA
Hhirt6650               ??????????????????????????????????????????
Hhirt6656f              CCA-ACNTTAGGAGAAAAGAAGTA--TAGTTACCCAGTATTC
Hlongi6560              ??????????????????????????????????????????
Hpilg4603               TA--TCATAAATAGGAGAAAAGAAAATAGTTACCCA-AATTC
Hpilg4738               TCGGGTC----AATTGCAGG------GATAA-------ATAG
Hquar5088               CATGGGT----TTCCGGACC------AAGGTTCAG---GGAG
Hrud6576                GCA-ACATT-GTAAATCTAG-AAA-GTAGTTAGCCG--ATTC
Htamb6585               GCA-CCATTCGTAAACATAG-AAA-CTAGTTACCCC-CATTC
Icylin5114a             TCATAGAGTATGCAAAAAAAGAGTAATAGTTACCCA-AATTC
Icylin6632a             TCTG-CTATGGGAAAAAAAGAAA--ATAGTTACCCA-AATTC
Mcape6655               TCAA-CTTTAAGAAAAAGAGAC----AAGTTTCGGG-ACTTC
Monocymbium             ??????????????????????????????????????????
Pdilatum6617            GCCTTGCTCAGTTATTCTGGTAACAGTAGATATCCCCAATTA
Pentaschistisaristifol  ??????????????????????????????????????????
Pfrank4705              TCGGGTC----AATAGGACC------ANGTTTCAG---GGAG
Pschinz6652             ??????????????????????????????????????????
Sbic6588                ??????????????????????????????????????????
Sbic6588                TCAA-CTTTAGGAAAA-AAGG----NTTGTTACCCC-AATTC
Shalep9318              TTTGTAA----GACCAAAGT------CAGATAA-----CATG
Snigros6567             ??????????????????????????????????????????
Tleuco6627              ??????????????????????????????????????????
Tspic4846               TCGGACC----AAGTGCAGG------GAG---------ATAG
Ttria6555               TCC--CATTCGCAAACAAAGAAA---TAGTTACCA--AATTC
Zeadiplo                ??????????????????????????????????????????
Zea                     AAT--CTGGCGCTCTCCTCTATC---TAATGAATA--CTTTA
Sacharumofficinarum     AAA-CCCTCTTTTATTCCCTAACC-ATAGTTGTTAT-CCTTT
Icylindrical            AAA-CCCTCTTTTATTCCCTAACC-ATAGTTGTTAT-CCTTT
Dichanthiumannulatum    ??????????????????????????????????????????


Aadscen6713             ??????????????????????????????????????????????????
Aameth6679              TGA-GTG-ATC-GAAAGAG-TAAG-AGGAGAAAG-TGTTTCCTCACGC-
Aameth6685              TAA-GTG-ATC-GAAAGAC-TAAG-AGGAGAAAG-TGTTTCCTCACGC-
Aappen6543              ??????????????????????????????????????????????????
Aappen6946              ACCCCGGT--G-CTCCTAAATATC----GGACC--ACGTTCAGGGAGAT
Adist6684               TAATGTG-ATC-GAAAGACGTAAG-ATGAGAAAG-TGTTTCCTCACGC-
Aeuco5869               TGGTGTGGAGC-GAAAGAA-TAAG-ATGAGAAGTGTGTTTCTTCGCGC-
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            TAG-GTGA-TC-GAAATGAGTAAGATGAGAAATG-AGTTTCCTCACGC-
Bbladh                  TAATGTA-ATCTNAAANAC-TAATCATGCCATCGGTCTTTCCTCCCCCC
Binsc5681               TAA-GTG-ATC-GAATCAG-TAAG-ATGAGATAG-TGTCTCCTCACGC-
BBrachiaria              ??????????????????????????????????????????????????
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              --CACTGT--G-CTCA-AAATATC----GGACC--ACGTTCAGGGAGAT
Bserra6654              ??????????????????????????????????????????????????
Bserra6954              A-CNCNGT--G-CTCATAAAAATC----AGACC--ACGTTCAGGGAGAT
Cdieter6642             TGA-GTG-ATC-GAAAGAG-TAAG-ATGAGAA-AGTGTTTCCTCACGC-
Cexc6577                TTT-GTG-ATC-TAAAGAG-TAAG-ATGAGTT-AGCGTTTTCTCACGC-
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               ??????????????????????????????????????????????????
Cplur6406               TGA-GTG-ATC-GAAA-ACGTAAG-ATGAGAAA-GAGTTTCCTCACCT-
Cprolix6682             TCA-GTG-ATC-GAAAGAG-TAAG-ATGAGAG-AGTGTTCCCTCACGC-
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              TATAAAATAAGGGATTGGTATGGA----TTG----GTATT-------AT
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4807               TAAGGACAATAGGAGTTATTTTTC---GGGAAATATATATCCTAGGTCT
Hcon6942                TAATGTG-ATC-GAAAGAA-TAAG-ATGAGAA-TGTGTTTCCTCGCGC-
Hdiss5145a              AAGGAAATAGGGGTTTGGGACAAA----ATAAC--GGATTGGT----AT
Hemarthria9319          TAA-GTA-ATC-GATAAAGTACTA-A-GAGAAA-GTGTTACCTCACGC-
Hfilli5144              CAGTGTGT--GAGATAGAAATAAT----TACCA--AGTTTCAT---CTA
Hhirt6650               ??????????????????????????????????????????????????
Hhirt6656f              TGA-GTGGATC-GAAAGACGTAAGATGGAGAAAG-TGTTTCCTCAC-C-
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Hlongi6560              ??????????????????????????????????????????????????
Hpilg4603               TA-AGTA-ATC-GAAAGAG-TAAG-ATGAGAAAG-TGTTTCCTCACGC-
Hpilg4738               CATGGGTTGGAGGATAAAAATTAA----GTACC--AAGTTTGT---CCT
Hquar5088               CGTAGGTGTTGGGAGAGAACTAAG----GGATA--GGTATCAT---CAT
Hrud6576                TTA-GCG-ATCGAGGAGAG-TAAG-ATGAGAAAG-CGTTTCCTCACGC-
Htamb6585               TAA-GTT-ATCGAA-AGCG-TAAG-ATGAGATTG-CGTTCCCTCACGC-
Icylin5114a             TAA-GTG-ATC-GAATCAG-TAAG-ATGAGAAAG-TGTCTCCTCACGC-
Icylin6632a             NAA-GGNA--T-CAAANA-GNAAG-GG-AGNAAANAGTTTCCTCCC-C-
Mcape6655               TCA-TTG-ATC-GAAATAG-TAAG-AGGAGACCG-AGTTTCCTCACGC-
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            AAAGCCCATTATAAATGGGCTTAA---GAGTCACTAGCTTTATCATTCT
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              ATAGGGGTTTGGGAGAAAA-TAAG----GGATT--GGTACCAT---CAA
Pschinz6652             ??????????????????????????????????????????????????
Sbic6588                ??????????????????????????????????????????????????
Sbic6588                TAA-GGG-ATC-GAAAGATGTAAG-G-GAGAAA-GTGTTTCCTCACGC-
Shalep9318              GTGGGCGTT-GGGAAAGAAATAAC----AGGTT--TGTCTCAC---CT-
Snigros6567             ??????????????????????????????????????????????????
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               CGGGGGGGGAGGGAGAAAA--TAG----GTACC--GGTATCGT---CAT
Ttria6555               TTG-GTGG-TC-GAAAGA-GTAAGT--GAGGATG-AGCAGTCTCACGC-
Zeadiplo                ??????????????????????????????????????????????????
Zea                     TTG-ATTT-TT-TAGTCC-CTTTAA--TTGAAT--AG-------ATGC-
Sacharumofficinarum     TTT-TCT-TTT-ATCAAT-GGG--TTT----AAGA--TTC-A-CTAGC-
Icylindrical            TTT-TCT-TTT-ATCAAT-GGG--TTT----AAGA--TTC-A-CTAGC-
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             ??????????????????????????????????????????????????
Aameth6679              -TGTTCG-TGAGTTACTCA-GAATAC-GATCA-GTAATTTAT-CTACTAA
Aameth6685              -TGTTCT-TGAGTTACTCA-GAATAC-GATAA-GTAGTTTAT-CTACTAA
Aappen6543              ??????????????????????????????????????????????????
Aappen6946              GGGGTGTGGGAGAAAATAAGGGATTGGTATCAACTTTCGGAA---AC-AA
Adist6684               -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTTCTAA
Aeuco5869               -TGTTCAGAATGATACTGA-GAATAC-GATCG-CCAAGGTAT-GTACGAA
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            -TGTTC-TGGAGTTACTTA-GAGTAC-GATAA-GTAATTTAT-CTGCTAA
Bbladh                  -TTCTCACGGCGTTACT-A-GAATCCCGATAACGTAATTTCTTCTTCTAA
Binsc5681               -TGTTCT-TGAGTTACCGA-GAATAC-GATGA-GTGAGTTAT-CTACGAA
BBrachiaria              ??????????????????????????????????????????????????
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              GGGGTTGGGGAGAAAATAAGGGATTGGTATCACCAATAGGAA---ACGAA
Bserra6654              ??????????????????????????????????????????????????
Bserra6954              GGGGTTGGGGAGAAAATAAGGGATTGGTATCACCTATCGGAA---ACTAA
Cdieter6642             -TGTTCTTGA-GTTACTTA-GAATAC-GATCA-GTAATTTAT-CTACTAA
Cexc6577                -TGTTCTTGA-GTTTCTTA-GA-TAC-TATC--CTAAGTTTT-CTTCTAG
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               ??????????????????????????????????????????????????
Cplur6406               -GTT-CT-TGAGTTTCTGATGGATAC-GATAA-GTTGTTTAT-CTACTAA
Cprolix6682             -TGTTCTTGA-GTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTACTAA
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              ---CATCAATA-GGAA-AATAGTTACCCAAATTCTAAG-TAA---TCGAA
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4807               AGGGTTGGAAATAAGAAGA-TAATACCGAGTTTGCTCTCGGTGCT-CGAG
Hcon6942                -TGTTCTATA-AACTTTAC-CACTGG-ACTC--CTGAGTTAT-CG-CTGA
Hdiss5145a              ---CATCAATA-GGAA-AATAGTTACCCAAATTCTAAG-TAA---TCCAA
Hemarthria9319          -CCT-CT-GCGGTTTTTTA-GAATAC-GACAA-CTAATTTAT-CTACTAG
Hfilli5144              TAGCTACAAAA-AAAATAATACTAACCCAAGTTCC-CT-AAG---CCTAA
Hhirt6650               ??????????????????????????????????????????????????
Hhirt6656f              -TGTTCGTGACGTTGCTGA-AGATAC-GATAAAGTAAATTAT-CT-AGTA
Hlongi6560              ??????????????????????????????????????????????????
Hpilg4603               -TTCTCT-TGAGTTACCTA-GAAT-------A-GGATCTTAT----ATAA
Hpilg4738               AAGGTGATAGA-AAGAATA-AGATGCCAAAGTGTTAGCCTTG---GCTAG
Hquar5088               TAGGAAAAAGAGAAGAACATAGTTTCCCAGATTCTACG-TAG---TCGAA
Hrud6576                -TGTTCT-TGAGTTACTTA-GAATAC-GATAG-GTAATTTT--CTGCTAG
Htamb6585               -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAATTTTT-CTACTAA
Icylin5114a             -TGTTCT-TGAGTTACTTA-GAATAC-GATAA-GTAAGTTAT-CTACTAC
Icylin6632a             -TGNNCT-TCAGTTTCCTA-GAATCC-GATCA-GTTATTTAT-CTACTAA
Mcape6655               -TGTCCT-TGCGTTACTTA-GAATACGA-TAG---TATTTTACCTAGTCA
Monocymbium             ??????????????????????????????????????????????????
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Pdilatum6617            CTAT----GGAGCAAAGGA-GAGTGACGAGAACTCAATGTATCTTATGCT
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              TAGG--AAAAA-AAGAAAATAGTTACCCAAAGTCTAAG-TAA---TCGAA
Pschinz6652             ??????????????????????????????????????????????????
Sbic6588                ??????????????????????????????????????????????????
Sbic6588                -CGTTCT-TGGGTTTCTTA-GAATAC-GATAA-GTAATTTAT-CTACTAG
Shalep9318              TCCAAAAAATA-AAAAAAATACCTACCCAAATTCTACT-TCT---TCGAA
Snigros6567             ??????????????????????????????????????????????????
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               AGGA--AAAAA-AAGAATATAGTTACCCAAATTCTAAG-TAG---TCGAG
Ttria6555               -AGTTC-TGA-GTTACTTA-GAGTAC-GATAA-GTAATTTAT-TTGAGCT
Zeadiplo                ??????????????????????????????????????????????????
Zea                     -AAATA---CATTTACTAA-GAGATG-CACAA-GAAAGGG---TCAGGAT
Sacharumofficinarum     --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Icylindrical            --TTTC-TCA--TT-CT-AC-TCTTT-CACAAAGGAGTGCGACAAGAACT
Dichanthiumannulatum    ??????????????????????????????????????????????????


Aadscen6713             ??????????????????????????????????????????????????
Aameth6679              AGTTAAACT--------AAAGAAAAAAAAATCAA-TAATCTCATCTCAT--
Aameth6685              AGATATTCT--------ACAGAAAAAAAAATCTA-TAATCTCATCTCAT--
Aappen6543              ??????????????????????????????????????????????????
Aappen6946              GA-------------------AACAATAT-----AATCCCATCTCTTAG
Adist6684               AGCTTATCT--------ACAGAAAAAAAATCTA-TAATCTCATCTCAT--
Aeuco5869               GG-------------------AATCTAGCATA--AGGCTCATA------
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            AGCCAAGGTC-------TGGATGAAGAAATCTA-TAATCTCGTCTCAA--
Bbladh                  AA-------------------AACCAATT-----AATCTCAT-------
Binsc5681               TGT----------------AATGATAAAGATTA-TAATCTCATCTCAA--
BBrachiaria              ??????????????????????????????????????????????????
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              GA-------------------AAAAATAT-----AATCTCATCACTTAG
Bserra6654              ??????????????????????????????????????????????????
Bserra6954              GA-------------------AACAATAT-----AATCCCATCACTTAG
Cdieter6642             AG-------------------ACAT-AATATA-TAGTCTCATA------
Cexc6577                AT-------------------ACCTTAATCTA-TAGTCTCAA-------
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               ??????????????????????????????????????????????????
Cplur6406               ACTAAGGCT--------CGAGAGAAGAAACTCA-CAATCTCGTCTCTG--
Cprolix6682             AG-------------------ACTT-AATCTA-TAGTCTCATA------
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              AG-------------------AGTAAGATG------AGAAAGTGTTTCC
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4807               GGTTACAGACGATACGATGTGTGCCTTAGCTTGCATAAAAAAACCTAGCA
Hcon6942                AC-------------------AGGCGAGCACA--AGCTTCGTA------
Hdiss5145a              AG-------------------AGTAAAATG------AGAAAGTGTTTCC
Hemarthria9319          AGAGCTTATA----G-ACGAAAGAAAAAACAAA-TAATCTCGTGTCAA--
Hfilli5144              AT-------------------AAAAAAACCTA--GAATAAAGTAATTCC
Hhirt6650               ??????????????????????????????????????????????????
Hhirt6656f              AGCCTAGGCT-------CGAGAGAAGAAATCTA-GAATCTCGTCTCTA--
Hlongi6560              ??????????????????????????????????????????????????
Hpilg4603               AG-------------------AAAAAAT------AATCTCATAGCC---
Hpilg4738               AA-------------------TGAAGAAACCT--AGAATAGGGTAACTA
Hquar5088               AG-------------------AGTATGTTG------AGACAGGGTTTCC
Hrud6576                AGT------------------GAAGAAATAAA-TAATCGCGTCTCA---
Htamb6585               AGT------------------AAAAAAATAAA-TAATCTCGTCTCAT--
Icylin5114a             AGG----------------AATGATGAAGCCTA-TAATCTCATCTCAT--
Icylin6632a             ATAAA---------GCATGAAGGAAAAAACCTA-CTATATAGTCTCAT--
Mcape6655               ACCTAAGATC--------TAGTGAAGAAATCCA-GAATCTCATCTCCT--
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            AC-------------------ACACGGAAT------AGATGGTATTTT--
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              AG-------------------AGTAAGA------AGAGAAAGGGTATCC
Pschinz6652             ??????????????????????????????????????????????????
Sbic6588                ??????????????????????????????????????????????????
Sbic6588                AGAGCCTATA----G-AGGAAAGAAAAAATCAA-TAATCTCGTGTCTT--
Shalep9318              AG-------------------AGCCAGATGAG--CAATAAATCGTTTCC
Snigros6567             ??????????????????????????????????????????????????
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               AG-------------------AGTAAAATCCG--AGAGTAAGGGAAGCC
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Ttria6555               ACTCAAGGCC--------CGATTGAGGAAACCTA-GAATCTCGTCTCGA--
Zeadiplo                ??????????????????????????????????????????????????
Zea                     ACTCATGGTA-------GAGCAGAGGAC-TGAA-AATCCTCGTGTCAC--
Sacharumofficinarum     A-TGAATCTTATGCTATTCATTAAATA-----GATGATTTCTTTTTTA--
Icylindrical            A-TGAATCTTATGCTATTCATTAAATA-----GATGATTTCTTTTTTA--
Dichanthiumannulatum    ??????????????????????????????????????????????????

Aadscen6713             ??????????????????????????????????????????????????
Aameth6679              AGCCTTTCCTTAGAG-CTACTAATTC-ATCCATTAAAATTCATAA
Aameth6685              AGCCTTTCCTTAGAG-CTACTAATTC-ATCTATTAAAATTCATAA
Aappen6543              ??????????????????????????????????????????????????
Aappen6946              CCGTTCCTTAGAGATAATAATTAAGC-TAATAAAATTCATAATAC
Adist6684               AGCCTTTCCTTAGAG-CTAATAATTC-ATCCAAAAAAATTCATAA
Aeuco5869               --TCTTTCCTTAGAG-CTAACATTTC-CGCTCATTAGGGTCATAA
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            AGCCTTTCCGTAGAG-CTACTAATCC-GGCTATTAACATTCATAA
Bbladh                  ---CTTTATGTAGAC-CTGTAAATCA-ATTTATTANTCTTCATAA
Binsc5681               AGCCTTTCCGTAGAG-CTAATTATCA-GACTATTAACATTCATAA
BBrachiaria              ??????????????????????????????????????????????????
Bradi4784               ??????????????????????????????????????????????????
Bserra5074              CCGTTCCTTAGAGATACTAATTAAGC-TACTAAAACTCATAATAA
Bserra6654              ??????????????????????????????????????????????????
Bserra6954              CCGTTCCTTAGAAATAATAATTAAGC-TACTAAAATTCATAATAA
Cdieter6642             -GCCTTTCCTTAGAG-CTAATAATTA-AGCTATTAACATTCATAA
Cexc6577                -GCTTTACCTTAGACTCTACTAATTT-ATCTATTTACATTCATAA
Cleistachnesorghoides   ??????????????????????????????????????????????????
Cmarg4397               ??????????????????????????????????????????????????
Cplur6406               AGTCTTCCCTTAGAG-CTACTTATCC-GTCTATTAGCATTCATAA
Cprolix6682             -GCCTTTCCGTAGAG-CTACTAATCC-AGCTATTAACATTCATAA
Danthoniacalifornica    ??????????????????????????????????????????????????
Dfilli5872              TTACGCTGCTTTTGAGTTACTTAGAA-TACGATAAGTAAT-TTAT
Eragrostisdielsii       ??????????????????????????????????????????????????
Evill5085               ??????????????????????????????????????????????????
Hanam4807               CGGCGCAAGTACGTTCCTAGTACAACAGTCTTTCCGTTCTCGGAT
Hcon6942                -GTCTTCCCTGAAAC-CTCACAAATC-TGCTCTAATCCGTGATAA
Hdiss5145a              TCACCCTTCTCTTGAGTTTCTTAAAA-TACGATAAGTAAT-TTAT
Hemarthria9319          AGTCGTTCCTTAGAG-CTACTAATTA-AGCCAATAAAATTCATAA
Hfilli5144              TCTAACTTCTCTAATATCACTTAC-A-TTCATTAGGGATAATTAT
Hhirt6650               ??????????????????????????????????????????????????
Hhirt6656f              AGCCTTCCCGTATAG-CTACTTATCC-GTCCATTAAGATTCATAA
Hlongi6560              ??????????????????????????????????????????????????
Hpilg4603               ---CTTTCTTAGGGT-CAATAAGTGAGATAAAATAGTCATAATAA
Hpilg4738               TGTTTACTCGTATAATATCATATCCG-TTCATTAGGCATA-ATCT
Hquar5088               TCACACTGCTCTCGTGTTGCTTAGAA-ATCGATACGTTAT-TTGC
Hrud6576                AGCCTTTTCGTAGAG-CAACTTATTT-GTTTATTAGCATTCATAA
Htamb6585               AGCCTTTTCTTAGAG-CTACT-ATTA-ATCTATTAACCTTCATAA
Icylin5114a             AGCCTTCCCTTAGAG-CTACTTATTC-ATCCATTAAGATTCATAA
Icylin6632a             AGCCGTCCCTTAGAG-CTACTTATCA-ATCTATAAACATTCATAA
Mcape6655               AGCCGTTTCTTAGAG-CTACTCATTA-GTCTATAAGGTTTCATAA
Monocymbium             ??????????????????????????????????????????????????
Pdilatum6617            ----TTTGGATAGAGACGCGT--TTA-GGC---AAGGGATCATGA
Pentaschistisaristifol  ??????????????????????????????????????????????????
Pfrank4705              TCACGCCGCGCATGAGATACTTAGCA-TACGATAAGTAAT-ATAT
Pschinz6652             ??????????????????????????????????????????????????
Sbic6588                ??????????????????????????????????????????????????
Sbic6588                AGCCGTTCCTTAGAG-CTACTAATTA-AGCCAATAAGATTCATAA
Shalep9318              TCACGCTGCTCTTTTTTTCCTTAGTA-TACGATAAGCATT-TTAT
Snigros6567             ??????????????????????????????????????????????????
Tleuco6627              ??????????????????????????????????????????????????
Tspic4846               TCTCGCCGCGCATGAGTTCCTAACCG-TTCAATAGGTATT-TTAT
Ttria6555               AGCCTTCCCGTAGAG-CTACTTATCC-GTTCATTAGGGATCATAA
Zeadiplo                ??????????????????????????????????????????????????
Zea                     CAGTTCAAA-TCTGG-TTCCTCAGA-----AAAAAAGGATCATAC
Sacharumofficinarum     TTTCTTTTTTTTATTTATTAGAGTAGAGT--ATCGGCAA--GGAA
Icylindrical            TTTCTTTTTTTTTTTTATTT-ATTAGAGT--ATCGGCAA--GGAA
Dichanthiumannulatum    ??????????????????????????????????????????????????

Aadscen6713             ??????????????????????????????????????????????????
Aameth6679              TAAATCAT-GCATGAGGT---GTTCCGTATCCTGAAGGGGAGGC
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Aameth6685              TAATTCATTGCAAACGGT---GTTCCGTATCCTGAAGGGGAGGC
Aappen6543              ??????????????????????????????????????????
Aappen6946              TTCATTC-GGTAGGTGTT------ACGTATCCTGATGC-GAGGG
Adist6684               TACATCAT-GCGTACGGT---GTTACGTATCCTGAGGGGGAGGC
Aeuco5869               TTACTTTACCCTATCGGT---GTTTCATACACTGAGGACGAGCC
Arundinellanepalensis   ??????????????????????????????????????????
Aschiren6581            TTATTCAT-GCAATAGGT---GTTTCGTATCCTGAGGGGGAGCG
Bbladh                  CACTTTACTTCCATGGGT---TTTCCGTCCTGGGCTAATACCTA
Binsc5681               TTAATCAT-TCAATAGGT---GTTTCGTATACTGAGGGGGAGGG
BBrachiaria              ??????????????????????????????????????????
Bradi4784               ??????????????????????????????????????????
Bserra5074              TTCATGC-GGTAGGTGTT------ACCTATCCTGATGC-GAGGG
Bserra6654              ??????????????????????????????????????????
Bserra6954              CTCATTC-GGTAGGTGTT------ACCTATCCTGATGC-GAGGA
Cdieter6642             TAATTC-AGGCGGTAGGT---GTTTCGTATCCTGAGGGGGATGG
Cexc6577                TTAATGCAACCTATC-GT---GTTTCATTTACTCAAGCCCATCC
Cleistachnesorghoides   ??????????????????????????????????????????
Cmarg4397               ??????????????????????????????????????????
Cplur6406               TTAAAGTAACCAGTCGTT---GTTTCGTATACTCAAGCCGAGGG
Cprolix6682             TTATTC-ATGCAGTAGGT---GTTTCGTATACTGAGGCGGACGG
Danthoniacalifornica    ??????????????????????????????????????????
Dfilli5872              CTACTA-AAGAAAAAA-------TAACTATCCTGATGGGGACGG
Eragrostisdielsii       ??????????????????????????????????????????
Evill5085               ??????????????????????????????????????????
Hanam4807               AATATTCACTCAGTAAGT---GTCATGTCCAGTAAGGG-GAAGG
Hcon6942                TAACAA-ACGGGGTGCGT---GTTGCGTACTCTTAGGCTGATCC
Hdiss5145a              CTACTA-AAAAAAAAA-----GAAAACTATCCTTATGGGGGGAG
Hemarthria9319          T-AATTCACTCAATTGTT---GTTTCCTATCCTGAGGCGGAGCA
Hfilli5144              TCACTC-AGTAACGTGTT------ACGTATACCAATAG-GACTG
Hhirt6650               ??????????????????????????????????????????
Hhirt6656f              TTCTTTCT-GCGGGAGTT---GGTTCGTGTCCTCAGGCGGAGGG
Hlongi6560              ??????????????????????????????????????????
Hpilg4603               TTCTTTCGGTACATGTGTAGGTATCTTGATGGGGGGGTTAAAAG
Hpilg4738               TTCATTC-AGTAAGTGTT------AGGTATAGTAATAG-GACGG
Hquar5088               CTACTA-TAGAAA----------TAAGTACTCTCATCG---CCG
Hrud6576                TTAATTAG-GCCATCGTT---GGTTCGTTTACTCAAGCGGAGGG
Htamb6585               TTCTTTAA-TCAATCGTT---GTTTCGTATCCTCAAGCGGAGCG
Icylin5114a             TTCATCAA-TCAATAGGT---GTTTCGTATCCTAAGGCGGAGGG
Icylin6632a             T-TATTCAATCTATCGTT---GTTTCGTATACTCAAGCCGAGCG
Mcape6655               T-AATTTAAGCAGTAGTT---GTTTGGTATCCTCAAGCGGAG-C
Monocymbium             ??????????????????????????????????????????
Pdilatum6617            TTAAGATAGGAAA--------GTAATGTATAATAAAGA-GAGAG
Pentaschistisaristifol  ??????????????????????????????????????????
Pfrank4705              CTACTAC-AGAAAATGTT------AACTATCCTAATGA-GGCGG
Pschinz6652             ??????????????????????????????????????????
Sbic6588                ??????????????????????????????????????????
Sbic6588                T-ACTTCATTCGGTAGGT---GTTTCGTATCCTGATGGGGAGGG
Shalep9318              CTGCTA-AAGGAAGCTT------AATCCATCCGAGTGA-AACCG
Snigros6567             ??????????????????????????????????????????
Tleuco6627              ??????????????????????????????????????????
Tspic4846               CTCCTAC-AGTAAGAGTT------AGCTATCCTGATAG-GACGG
Ttria6555               TTCATTCA-GCAATTGTT---GTTTCGTGTCCTCAGGCGGAGGG
Zeadiplo                ??????????????????????????????????????????
Zea                     TGAATAGA-TCAATTGAT---TACAAATATTTTGAGATGGAGGG
Sacharumofficinarum     T--CTCGATTATTAATTCGATTTTAAGTATTATTAA-GTAAGCC
Icylindrical            T--CTCGATTATTAATTCGATTTTAAGTATTATTAA-GTAAGCC
Dichanthiumannulatum    ??????????????????????????????????????????


Aadscen6713             ??????????????????????????????????????????????????
Aameth6679              -GTAAAAG-A-TTAAA--ACTTACCTTATGA--AT-AACTAAACAA--TC
Aameth6685              -GTAAAAG-A-TTACA--TCTTACCTTATCA-CAT-TACTAAACAA--TC
Aappen6543              ??????????????????????????????????????????????????
Aappen6946              -GTAAAGG-ATTAAAA--CTTTTCTTACCGA-AAT-AACTAAAA--AATC
Adist6684               -GTAAAGG-AATTAAA--ACTTACCTTATGA-AAT-AAATAAACAA--TC
Aeuco5869               -GTAAAG-CATCTTAA---CTTATCTTGTGA-AAT-TCCTAATCA--GGC
Arundinellanepalensis   ??????????????????????????????????????????????????
Aschiren6581            -GTAAACA-ATTAAAA---CTTATCTTACGA-ACT-AACTAAACAA--TC
Bbladh                  -CTCAATT-ATTCATC---TT---CTTTCCCTTTT-ACCTAAACAA--T-
Binsc5681               -GGAAAGG-ATTAAAA---CTCACCTTATGA-AAT-AACTAAAAAA--GC
BBrachiaria              ??????????????????????????????????????????????????
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Bradi4784               ????????????????????????????????????????????????????
Bserra5074              -GTATAGG-AGTAAAA--CTTATCTTAC-GA-AAT-AACTAAAA--AATC
Bserra6654              ????????????????????????????????????????????????????
Bserra6954              -GTATAGG-ATTAAAA--CTTTTCTTAC-GA-AAT-AACTAAAA--AATC
Cdieter6642             -GTAAAG-GATTAAAA---CTTACCTTACGA-AAT-AACTAAACA--ATC
Cexc6577                -TTAAACCAATTCAAA---CTCATCTTACGC-AATTAACTAAACAT-AGC
Cleistachnesorghoides   ????????????????????????????????????????????????????
Cmarg4397               ????????????????????????????????????????????????????
Cplur6406               -GTAAACA-ATTAAAA---CTTATCTTACGC-AAT-AACTCAAAATAGCA
Cprolix6682             -GGAAAC-AATTAAAA---CTCACCTTACGA-AAT-AACTAAACA--ATC
Danthoniacalifornica    ????????????????????????????????????????????????????
Dfilli5872              -GTAAATG-GTTTAAA--CCTTA-----TGA-AAT-AACTAAAA--AATT
Eragrostisdielsii       ????????????????????????????????????????????????????
Evill5085               ????????????????????????????????????????????????????
Hanam4807               --TAAAGG-ATTCAGG---CTTAACTCTTATGTAT-AAATAAAAA--ATC
Hcon6942                -TTACTC-TATCTCGC---CTTATCTTCCGA-ATT-GTCTAAACA--AGG
Hdiss5145a              GGTAAAGG-GTTTAAA--CCTTACCTTATGA-AAT-AACTAAAAT-AATC
Hemarthria9319          -GTATACG-ATTAAAA---CTTATCTTATGA-AAT-AACTAAACA--ATC
Hfilli5144              --TATAAG-ATTCAGA--CCTTACCCTTATA-AAT-AAATAAAA--AATC
Hhirt6650               ????????????????????????????????????????????????????
Hhirt6656f              -GTAAACA-ATTAAAA---CTTATCTTATGA-AAT-AACTAATCAG--TC
Hlongi6560              ????????????????????????????????????????????????????
Hpilg4603               -GTTAAAT-CTTAAAC-TTTATGAAATAAAT---T-AACTAAAAAA--TC
Hpilg4738               --TGTATG-CTTCAGG--CCATACCTTTAGG-AAT-AACTAAAA--AATC
Hquar5088               -----TTC-CTTAGAG--CCTTT----TATT-AAT-G-CTAAAA--CTTC
Hrud6576                -GGAAACA-ATTAAAA---CTTATCTTACGA-AGT-AACTAAACAT-AGC
Htamb6585               -GTACAGA-ATTCAAA---CTTATCTTATGA-AAT-AACTAACAAT--GC
Icylin5114a             -GTAAACA-ATTAAAA---CTTACCTTATGA-AAT-AACTAATCAA--GC
Icylin6632a             -GTAAACA-ATTCAAC---CTCATCTTACGA-AAT-AACTAAACA--ATC
Mcape6655               -TTATACA-ATTCAAA---CTCATCTTAACGCTAT-CACTACACAA--GC
Monocymbium             ????????????????????????????????????????????????????
Pdilatum6617            -TTATTCAAAGTATAG-TCATTCCCTTAC----ATTTCCTAAGTTCGAAT
Pentaschistisaristifol  ????????????????????????????????????????????????????
Pfrank4705              --GTAAAG-GTTCAAA--TCTTACCTT-AGA-AAT-AACTAAAA--AATC
Pschinz6652             ????????????????????????????????????????????????????
Sbic6588                ????????????????????????????????????????????????????
Sbic6588                -GTAAAGG-ATTAAAA---CTTACCTTATGA-AAT-AACTAAACA--ATC
Shalep9318              ---ATACA-GTTCAAA--CCCTACCTTTAGA-AAT-AACTAAAA--AATC
Snigros6567             ????????????????????????????????????????????????????
Tleuco6627              ????????????????????????????????????????????????????
Tspic4846               --TGTAAG-GTTCACG--TCTTACCTTTTGG-AAT-AATTAAAA--AATC
Ttria6555               -GTAAACA-AGTAAAC---CTCATCTTATGA-AAT-AACTAATCAG--TC
Zeadiplo                ????????????????????????????????????????????????????
Zea                     -GTAAATA-TTTAAAA---ATCTACTTAGTC-TTT-AGTCTAGAGT--AA
Sacharumofficinarum     -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTTGAAT
Icylindrical            -ATCCACA-ATGCATAGGACT-ACCCC-TCCCCATTTCCTAATTTGGAAT
Dichanthiumannulatum    ????????????????????????????????????????????????????


Aadscen6713             ????????????????????????????????????????????????????
Aameth6679              AGGGA-AATTAACTG-TAT--CTTCGTTACCG-AGATGATT-CTACTA-C
Aameth6685              AGGGA-AATTAGCTC-TAT--CTTCGTTCACC-AATGGACA-CTATTA-C
Aappen6543              ????????????????????????????????????????????????????
Aappen6946              AGGGA-AATT-GACTGTAT--GTTCGTTT-ACGAAAGGATACCTACTG-C
Adist6684               AGGGA-AATTAACTG-TAT--CTTCGTTCACCGAGATGATA-CTACTA-C
Aeuco5869               AGGGA-AACTGTCT-GTAT--CTTCGTTC-ATGAGATG-ATTCTACTA-C
Arundinellanepalensis   ????????????????????????????????????????????????????
Aschiren6581            AGGGA-AACTAACT-GTAT--CTTCGTTTAC-CAGATGATA-CTACTA-C
Bbladh                  AGAGG-AGGTAATTA-TAT--CTTTATACTTGT--ATGATT-CTATTA-T
Binsc5681               AGGGA-GATTGACTG-TAT--CTTCGTTCAAG-AGATGATA-CTACTA-C
BBrachiaria              ????????????????????????????????????????????????????
Bradi4784               ????????????????????????????????????????????????????
Bserra5074              AGGGA-AATT-TACTGTAT--GTTCGTTT-CCGAGATGACAACTACTA-C
Bserra6654              ????????????????????????????????????????????????????
Bserra6954              AGGGA-AACT-GACTGTAT--GTACGTTT-ATGAGATGATC-CTACTA-C
Cdieter6642             AGGGAG-ATTAACT-GTAT--CTACGTTTACCGAGATGGATACTACTA-C
Cexc6577                ACTTGAAATTATCT-CTATT-CTTCGTTC-ACCAAATG-ATCCTACTA-C
Cleistachnesorghoides   ????????????????????????????????????????????????????
Cmarg4397               ????????????????????????????????????????????????????
Cplur6406               CGGGG-CCTTGG-GCGCATATCTTCTTAG-ACCAATGGACA-CTTTTA-C
Cprolix6682             AGGGAGGATTGACT-GTAT--CTACGTTT-CCGAGATG-ATACTACTA-C
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Danthoniacalifornica    ????????????????????????????????????????????????????
Dfilli5872              AGGGA-TGTTTAACGGTCT--CTTCGTCT-ACGATTGGCAC-CTTTTGCG
Eragrostisdielsii       ????????????????????????????????????????????????????
Evill5085               ????????????????????????????????????????????????????
Hanam4807               AGGGA-AATTAACT-GTAT--CTACGTTC-ATGAGATGATA-CTACTA-C
Hcon6942                AGCGA-CTGTCGCT-ATA---CCTTGTCT-TCGCGCGG-ATTCNTCTN-N
Hdiss5145a              ACCCA-AATTTCACGGTCT--TTATTCCC-ACCGTTTGCCA-CTTTTGTA
Hemarthria9319          AGGGA-AATTGGACTGTAT--CTTCGTT--ACCAAAGGATA-CTACTA-C
Hfilli5144              AGCGA-AATTGACCTAT----CTTTTCCC-ACCATGTGCCA-CTTTTGTC
Hhirt6650               ????????????????????????????????????????????????????
Hhirt6656f              AGGGA-AACTGTCT-CTAT--CTTCGTTCACCGAGATGATC-CTACTA-C
Hlongi6560              ????????????????????????????????????????????????????
Hpilg4603               AGGGA-AATTAACGGGTAT--CTAGGTTTATGA-GAGGACA-CTTTTA-C
Hpilg4738               CGGGA-AATT-AACTGTAT--CTACGTTC-ATGAGATGATC-CTACTG-C
Hquar5088               AGGGA-AATT-AACTGTAT--CTACGTTT-ATGAGATGATC-CTACTA-C
Hrud6576                AGGGA-AACTGTCTG-TAT--CTTCGTTCA-CCAAATGATA-CTACTA-C
Htamb6585               ATGGA-AACTAACTG-TAT--CTTCGTTAC-CGATATGATA-CTCTTA-C
Icylin5114a             AGGGA-AATTAACGC-TAT--CTTCGTCCACG-ATAGGACA-CTACTG-C
Icylin6632a             AGGGA-AATTGA-CTGTAT--CTTCGTTC--CCAAATGATAACTACTA-C
Mcape6655               AGTTG-GACCTGCC-CTAT--CTTCGTTCATC-TATTGTCC-CTACTA-C
Monocymbium             ????????????????????????????????????????????????????
Pdilatum6617            AGAGA--ATGCATATTTATTTTTTAGTCCCTTTAATTGACA--TAGAAGC
Pentaschistisaristifol  ????????????????????????????????????????????????????
Pfrank4705              AGGGA-AATT-AGCGGTAT--CTACGTTC-ATGAGAGGACC-CTACTG-C
Pschinz6652             ????????????????????????????????????????????????????
Sbic6588                ????????????????????????????????????????????????????
Sbic6588                AGGGA-AATTAG-CTGTAT--CTACGTTT-ATGAGAGGATT-CTACTA-C
Shalep9318              AGGCA-AATGTAACTATATT-CTTTGCCC-ATAAAGAGGAC-CCTACTAC
Snigros6567             ????????????????????????????????????????????????????
Tleuco6627              ????????????????????????????????????????????????????
Tspic4846               AGGGA-AATT-AACGGTTT--CTTCGTTC-ATGAGATGATC-CTACTG-C
Ttria6555               AGGGA-A-CTGTCT-GTAT--CTTCGTTCAT-GAGATGATC-CTACTA-C
Zeadiplo                ????????????????????????????????????????????????????
Zea                     GTAGA-AAATCTCT-AGAG-TAAGGATAAATC----TCTAC-ACACTT-C
Sacharumofficinarum     -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Icylindrical            -GG-AATACTTTATTG-ATTTTTTAGTCCCTTTAATTGACA--TAGATGC
Dichanthiumannulatum    ????????????????????????????????????????????????????


Aadscen6713             ?????????????
Aameth6679              GCGTCCTTTTCCA
Aameth6685              GCGACCTTTGTCA
Aappen6543              ?????????????
Aappen6946              GTGTTCTTTGCCA
Adist6684               GTGTCCTTTGCCA
Aeuco5869               GTGTTCTTTCCCA
Arundinellanepalensis   ?????????????
Aschiren6581            GTGTTCTTTCCCA
Bbladh                  ATGATCTTTGTCA
Binsc5681               GCGTTCTTTGTCA
BBrachiaria              ?????????????
Bradi4784               ?????????????
Bserra5074              GCGTTCTTTGCCA
Bserra6654              ?????????????
Bserra6954              GTGTTCTTTGCCC
Cdieter6642             GCGTTCTTTCCCA
Cexc6577                GCGTTCTTTCCCA
Cleistachnesorghoides   ?????????????
Cmarg4397               ?????????????
Cplur6406               CGGACCTTGGTCA
Cprolix6682             G-GTTCTTTCCCA
Danthoniacalifornica    ?????????????
Dfilli5872              GCG-CCTTGGTCA
Eragrostisdielsii       ?????????????
Evill5085               ?????????????
Hanam4807               GTGTCCTTGCCCA
Hcon6942                GTGTTCTTTCCCC
Hdiss5145a              GCA-CCTTTGTCA
Hemarthria9319          GTGTTCTTTCTCA
Hfilli5144              GTAACCTATGTCC
Hhirt6650               ?????????????
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Hhirt6656f              GTGTTCTTTGCCA
Hlongi6560              ?????????????
Hpilg4603               GCGTTCTTTGCCN
Hpilg4738               GTGTTCTTTGCCA
Hquar5088               GTGTTCTTTCCCA
Hrud6576                GTGTCCTTTGTCA
Htamb6585               GTGTTCTTTGTCA
Icylin5114a             GCGTCCTTTGCCA
Icylin6632a             GCGACCTTTGTCA
Mcape6655               G-GTTCTTTCCCC
Monocymbium             ?????????????
Pdilatum6617            AGTACTCTACTAA
Pentaschistisaristifol  ?????????????
Pfrank4705              GTGTCCTTGGCCA
Pschinz6652             ?????????????
Sbic6588                ?????????????
Sbic6588                GTGTTCTTTCCCA
Shalep9318              GGGTCCTTTCTCC
Snigros6567             ?????????????
Tleuco6627              ?????????????
Tspic4846               GTGTCCTTGGCCA
Ttria6555               GTGTTCTTTGCCA
Zeadiplo                ?????????????
Zea                     TTTTTCTTTTAAA
Sacharumofficinarum     AAATACTTTCTAA
Icylindrical            AAATACTTTCTAA
Dichanthiumannulatum    ?????????????
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