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Phylogenetics of Chloridoideae (Gramineae): a Preliminary Study Based on Nuclear Ribosomal Internal Transcribed Spacer and Chloroplast trnL–F Sequences

Authors

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PHYLOGENETICS OF CHLORIDOIDEAE (GRAMINEAE): A PRELIMINARY STUDY BASED ON NUCLEAR RIBOSOMAL INTERNAL TRANSCRIBED SPACER AND CHLOROPLAST *trn*L–F SEQUENCES

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ABSTRACT

The phylogeny of Chloridoideae (Gramineae) was inferred from parsimony analyses of DNA sequences from two genomes-the chloroplast trnL intron, trnL 3' exon, and trnL-F intergenic spacer, and the nuclear ribosomal internal transcribed spacer region (ITS1 + 5.8S + ITS2). Eighty species representing 66 chloridoid genera were sampled, including all but four of the native New World genera. Analyses of the individual and combined data sets were performed. The phylogenies were found to be highly congruent. Of the four tribes and seven subtribes of Chloridoideae sensu Clayton and Renvoize (1986) whose phylogenetic status could be tested with our taxon sample, only Orcuttieae and Uniolinae were monophyletic. The phylogenies suggested significant homoplasy in morphological traits, including inflorescence type, number of florets per spikelet, and number of lemma nerves. We propose a new classification based on the three main clades in the phylogenies-tribes Cynodonteae, Eragrostideae, and Zoysieae. The Eragrostideae clade is well resolved and supported and is further divided into three subtribes, Cotteinae, Eragrostidinae, and Uniolinae. Cynodonteae include most of the genera in our study, but the clade is poorly resolved. However, a clade formed of Muhlenbergia and nine other genera is present in both phylogenies and is well resolved and supported. A number of interesting, well-supported relationships are evident in the phylogenies, including Pappophorum-Tridens flavus, Tragus-Willkommia, and Gouinia-Tridens muticus-Triplasis-Vaseyochloa. Except for Bouteloua, no genus represented by multiple species proved to be monophyletic in the phylogenies. Key words: Chloridoideae, classification, Gramineae, homoplasy, ITS, phylogeny, Poaceae, trnL-trnF.

INTRODUCTION

The grass subfamily Chloridoideae is remarkable in its variation. Inflorescences range from diffuse and rebranched to a solitary spicate branch. Spikelets vary greatly in the number of florets (1–100+), lemma nerves (1–15), and awns (0–19), and in fertility (hermaphrodite, unisexual, or sterile florets) and disarticulation. Two types of C₄ photosynthesis (NAD-ME and PCK) are known, and one species of *Eragrostis* Wolf is C₃ (Ellis 1984; Hattersley and Watson 1992). Distributed worldwide, mostly in the tropics and subtropics, Chloridoideae are also diverse in numbers, with as many as 166 genera and some 1500 species (Van den Borre and Watson 1997).

Chloridoideae are monophyletic in virtually all phylogenetic analyses in spite of elusive non-molecular synapomorphies (Grass Phylogeny Working Group [GPWG] 2001 and refs. therein). They are one of the subfamilies in the PAC-CAD clade, along with Panicoideae, Aristidoideae, Centothecoideae, Arundinoideae, and Danthonioideae. Classification within the subfamily, however, has been controversial (see Jacobs 1987; Van den Borre and Watson 1997). The central issue has been whether to recognize the traditional tribes Cynodonteae (Chlorideae) and Eragrostideae as distinct. The much smaller tribes Orcuttieae and Pappophoreae have been widely accepted. In recent classifications in Clayton and Renvoize (1986) and Watson and Dallwitz (1994), Orcuttieae and Pappophoreae were recognized, but the latter authors merged Cynodonteae and Eragrostideae. Tests of these circumscriptions came with important contributions by Van den Borre and Watson (1997), who analyzed a large morphological and anatomical data set, and Hilu and Alice (2001), who analyzed sequences from the chloroplast gene *mat*K. Both of these studies rejected the traditional circumscriptions of Cynodonteae and Eragrostideae and revealed new groups that may better reflect evolutionary history.

In this study, we provide additional estimates of the phylogeny of Chloridoideae by analyzing sequences from two genomes—the chloroplast *trnL* intron, *trnL* 3' exon, and *trnL–trnF* intergenic spacer (hereafter referred to as *trnL–* F), and the nuclear ribosomal internal transcribed spacer region (ITS1 + 5.8S + ITS2; hereafter ITS). We compare these phylogenies to one another and to previous studies and classifications, in particular the detailed and widely followed classification in Clayton and Renvoize (1986). We also assess levels of homoplasy in morphological traits, seek characters supporting relationships in the molecular phylogenies, and propose changes to the classification.

MATERIALS AND METHODS

Taxa and Collections

We sampled 80 species representing 66 genera of Chloridoideae, including multiple species for some of the larger genera (Table 1). The sample emphasizes the New World and includes 36 and 60 endemic genera and species, respectively. *Lepturidium* Hitchc. & Ekman, *Rheochloa* Filg., P. M. Peterson & Y. Herrera, *Saugetia* Hitchc. & Chase, and *Steir*- Table 1. Taxa and collections sampled, and GenBank accession numbers for trnL-F and ITS sequences. Collection/voucher numbers are those of the lead author unless indicated otherwise. Most determinations were made or verified by the lead author. Vouchers are deposited at RSA unless indicated otherwise.

| TaonCollection/voucherSource $mL-F$ TISAegopogon conchrolides Humb. & Bongl. ex. Willd.4380Venerucla: MéridaFF15001FF15021Beall and Molesy is Subarks. & H. F. Decker3666Mexico: ChihuahuaFF150671FF15021Beall mexicana Seribn.3632Mexico: ChihuahuaFF150671FF15021Beall mexicana Seribn.3632Mexico: ChihuahuaFF150673FF15024Biopharidechter Kapit (S. Watson) Hack.3632Mexico: ChihuahuaFF150673FF15026Biopharides Vatti (Columbus (syn. Duchlod duchloide 2229Mexico: Son LuisFF150675FF15026Calumoilla Inglifilie (Hock.) Hack. ex Scribn. & Southw.2126USA: ParasFF150677FF150205Vas. InglifilieColumbus (syn. Duchlod duchloide 2029)USA: TexasFF150677FF150207Calumoilla Inglifilie (Hock.) Hack. ex Scribn. & Southw.2917USA: TexasFF150677FF150202Calumoilla Inglifilie (Hock.) Hack. ex Scribn. & Southw.2917USA: TexasFF150677FF150302C. elata Desv. (syn. C. dandyana C. D. Adams)3068Argentina: CorinenesFF150680FF153031C. elata Desv. (syn. C. dandyana C. D. Adams)3183Argentina: SaltaFF156682FF153037Contea quepophonides Kunth3183Argentina: SaltaFF156682FF153037Contea quepophonides Kunth3184USA: CaliforniaFF156684FF153037Contea quepophonides (La Unit) Mole.2873Mexico: TamaulipasFF156684FF153047<

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 | Taxon | Collection/voucher | Source | trnL-F | ITS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Aegopogon cenchroides Humb. & Bonpl. ex Willd. | 4380 | Venezuela: Mérida | EF156669 | EF153020 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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Distchils spicata (L.) Greene 2707
Mexico: Sonora EF15600 EF15304
Distchils spicata (L.) Greene 2707
Mexico: Sonora EF15609 EF15304
Distchils spicata (L.) Greene 2707
Mexico: Sonora EF15609 EF153

 | Allolepis texana (Vasey) Soderstr. & H. F. Decker | Bell 240 | USA: Texas | EF156670 | EF153021 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Bealia mexicana Scribn. | 3666 | Mexico: Chihuahua | EF156671 | EF153022 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Blepharoneuron tricholepis (Torr.) Nash | 3652 | Mexico: Chihuahua | EF156673 | EF153024 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Bouteloua aristidoides (Kunth) Griseb. var. aristidoides | 2444 | USA: Arizona | EF156674 | EF153025 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | B. dactyloides (Nutt.) Columbus (syn. Buchloë dactyloides (Nutt.) Engelm.) | 2329 | Mexico: San Luis
Potosí | EF156675 | EF153026 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| $ \begin{array}{c} Calamerilly long(bla (Hook.) Hack. es Scrihn. & Southw. 3017 USA: Kansas EF156677 EF15302 var. long(bla (Hook.) Hack. es Scrihn. & Southw. 3017 USA: Kansas EF156677 EF15302 (Cabios acculated Bisch. Cabios acculated Bisch. Cabios acculated Bisch. Cabios acculated Bisch. 2003 USA: Texas EF156679 EF15303 (Cabios acculated Bisch. 2003 USA: Texas EF156681 EF15303 (Cabios acculated Bisch. 2003 USA: California EF156681 EF15303 (Cabios California USA: California EF156684 EF15303 (Cabios California USA: California EF156685 EF153036 (Cabios Cabios Cab$

 | <i>B. trifida</i> Thurb. | 2126 | USA: Texas | EF156676 | EF153027 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chabaisseine documbers (Swallen) Reeder & C. Reeder 363 Mexico: Chinuanua FE156678 FF153030 C. elato Desv. (syn. C. dandyana C. D. Adams) 2003 USA: Texus FF156708 FF153030 C. elato Desv. (syn. C. dandyana C. D. Adams) 2008 Argentina: California FF156608 FF153032 Cortea pappophoroides Kunth 3183 Argentina: Salta EF156681 EF155035 Cortea pappophoroides Kunth 3183 Argentina: Salta EF156688 EF155035 Cortea pappophoroides Kunth 3184 USA: California EF156685 EF153037 Cardia caromacizan (Walter) Alph. Wood 3348 USA: California EF156685 EF153037 Dacytocthinum (L.) Willd. 2777 Mexico: Tamaulipas EF156688 EF153047 Dasychloa pulchella (Kunth) Willd. ex Rydb. (syn. Erioneu- (23 Aug 2004) USA: California EF156688 EF153042 Dinstroritis spicata (L.) Greene Bell 231 Aust: California EF156689 EF153042 Districhis spicata (L.) Greene Bell 231 Augentina: San Juan EF156690 EF153042 Enversiona (Acuusti P

 | <i>Calamovilfa longifolia</i> (Hook.) Hack. ex Scribn. & Southw. var. <i>longifolia</i> | 3917 | USA: Kansas | EF156677 | EF153028 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chloris cucullata Bisch. 2003 USA: Texas FF156679 FF153031
C. trancara R. Br. 3203 USA: Texas FF156808 FF153031
C. trancara R. Br. 3203 USA: California FF156818 FF153031
Create approphoroide (Kunth 3183 Argentina: Salta FF15688 FF153031
Create approphoroide (Kunth 210) Will C. S. 2010 USA: California FF15688 FF153034
Crondon dacryotin (L.) Pers. 2691 USA: California FF15688 FF153035
Dactyloctenium acgyptium (L.) Will C. S. 2691 USA: California EF15688 FF153035
Dactyloctenium acgyptium (L.) Will C. S. 2691 USA: California EF15688 FF153036
Dactyloctenium acgyptium (L.) Will C. S. 2691 USA: California EF15688 FF153036
Dactyloctenium acgyptium (L.) Will C. S. 277 Mexico: Tamaulipas FF15688 FF153036
Dactyloctenium acgyptium (L.) Will C. S. 2010 USA: California EF15688 FF153039
Dactyloctenium acgyptium (L.) Will C. S. 2010 USA: California EF15689 FF153048
EF153049 USA: California EF15689 FF153048
EF153049 USA: California EF15689 FF153049
Ectrosia leporina R, Br. var. leporina Bell 231 USA: California EF15689 EF153041
Territory EF15691 EF153041
Enteropogon desvauxit P. Beaux. 3133 Argentina: Sonthern EF156699 EF153042
Enteropogon divolucit J. PresD Clayton 2939 Mexico: Sonora EF15692 EF153042
Enteropogon divolucit J. PresD Clayton 3438 Vern: Lambageue EF156094 EF153049
Enteropogon divolucit J. PresD Clayton 3438 Vern: Lambageue EF15609 EF153049
Enteropogon divolucit J. PresD Clayton 3438 Vern: Lambageue EF15609 EF153049
Enteropogon divolucit J. PresD Clayton 3438 Vern: Lambageue EF15609 EF153049
Enteropogon divolucit J. PresD Clayton 3438 Vern: Lambageue EF15609 EF153049
Entoreuron executed Michx1) Nateoka var. avenaceum 2553 Mexico: Sonora EF15609 EF153049
Ef153049 (Backkey) Nash) Tateoka var. avenaceum 2573 Mexico: Mexico Senora EF15609 EF153049
Ef153049 (Backkey) Nash) Tateoka var. avenaceum 2573 Mexico: Caxaea EF15609 EF15305
Ef153049 (Suchky) Mish) Nees (syn. Diplachae dubia 3568 Peru: Cusco EF156707 EF15305
Ef153050 FF15305 FF15305
Ef153050 FF153050 FF153050 FF15305 FF15305
Ef153050 FF15305 FF15305 FF15305 FF153

 | Chaboissaea decumbens (Swallen) Reeder & C. Reeder | 3653 | Mexico: Chihuahua | EF156678 | EF153029 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| C. elata Desv. (syn. C. dandyana C. D. Adams) 3068 Argentina: Corrientes $EF15608$ $EF155081$ C. truncata R. Bt. 3203 USA: California $EF156081$ $EF155082$ Cottes pappophoroides Kunth 3183 Argentina: Scalifornia $EF156081$ $EF155082$ Conta argonanticum (Walter) Alph. Wood 3348 USA: Louisiana $EF156085$ $EF153032$ Conta argonian (L.) Willd. 2873 Mexico: Tamanilpas $EF156085$ $EF153036$ Dacyloterinium (Kunth) Tateoka) 2777 Mexico: Queretaro $EF156085$ $EF153097$ Dischilds splicata (L.) Greene $Bell 231$ USA: California $EF156088$ $EF155045$ Elevsine indica (L.) Greene $Bell 231$ USA: California $EF156089$ $EF153041$ Elevsine indica (L.) Greene $Bell 171$ Australia: Northern $EF156092$ $EF153042$ Elevsine indica (L.) Greene $Bell 231$ USA: California $EF156092$ $EF153042$ Eneropogon chorideux (I. Pres) Clayton 2939 Mexico: Tamalipas $EF156092$ $EF153042$ Eneropogon chorideux (I. Pres) Clayton 3438 Pert: Lambayeque $EF156092$ $EF153045$ Er gestiniscia dus backle (ysn. Acomptoclados sessilispicus 3328 USA: Texas $EF156092$ $EF153045$ Er metrosi a mabilis (L.) Wight & Arn. ex Nees 317 Venezuela: Distribus $EF156092$ $EF153045$ Er metrosi argonantific (L.) Wight & Arn. ex Nees 3328 USA: Texas $EF156095$ $EF153045$ Erindeuron argonargonantific (L.) Wight & Arn

 | Chloris cucullata Bisch. | 2903 | USA: Texas | EF156679 | EF153030 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| C. trancata R. Br. 3203 USA: California EF156681 EF153032 Cottea pappophoroides Kunth 318.3 Argentina: Salta EF156682 EF153034 Creation aromaticum (Walter) Alph. Wood 3348 USA: Louisiana EF156684 EF153035 Crondon dacyton (L.) Pers. 2691 USA: California EF156685 EF153034 Dactyloctenium acgyptium (L.) Wild. 2873 Mexico: Queretaro EF156685 EF153037 Distichtis spicata (L.) Greene 277 Mexico: Queretaro EF156685 EF15304 Clarke s.n. USA: California EF156688 EF153037 Distichtis spicata (L.) Greene Bell 231 USA: California EF156689 EF153044 Ectrosia leporina R. Br. var. tetroflexa Clarke s.n. USA: California EF156689 EF153044 Ectrosia leporina R. Br. var. leporina Bell 231 USA: California EF156689 EF153044 Ectrosia leporina R. Br. var. leporina Bell 231 Eleusine indica (L.) Gaertn. 2875 Mexico: Tamaulipas EF156690 EF153044 Erneagoosti acyton 19 Beaux. 3133 Argentina: Salta BF156692 EF153044 Erneagoost desvauxif P Beaux. 3133 Argentina: Salta BF156692 EF153044 Ernagrosti anabilis (L.) Wight & Arn. ex Nees 4317 Venezuela: Distrito EF156695 EF153044 Ernogoost choradeus (J. Presl) Clayton 3948 Peru: Lambacque EF156694 EF153045 Ernagrosti anabilis (L.) Wight & Arn. ex Nees 4317 Venezuela: Distrito EF156695 EF153046 Esteropogon desvauxif P Beaux. 3133 Argentina: Salta BF156695 EF153045 Endergoora desvauxif P Beaux. 3133 Argentina: Er156695 EF153045 Ernagrosti anabilis (L.) Wight & Arn. ex Nees 4317 Venezuela: Distrito EF156695 EF153045 Esteropogon desvauxif P Beaux. 3138 Peru: Lambacque EF156695 EF153045 Esteropogon desvauxif P Beaux. 3138 Peru: Lambacque EF156695 EF153045 Esteropogon desvauxif P Beaux. 3183 Peru: Lambacque EF156695 EF153045 Esteropogon desvauxif P Beaux. 3138 Peru: Lambacque EF156695 EF153045 Esteropogon desvauxif P Beaux. 3138 Peru: Lambacque EF156695 EF153045 Esteropogon desvauxif P Beaux. 3138 Peru: Lambacque EF156695 EF153045 Esteropogon desvauxif P Beaux. 3138 Peru: Lambacque EF156695 EF153045 Esteropogon desvauxif P Beaux. 3138 Peru: Lambacque EF156695 EF153045 Esteropogon desvauxif P Beaux. 7270 Mexic

 | C. elata Desv. (syn. C. dandyana C. D. Adams) | 3068 | Argentina: Corrientes | EF156680 | EF153031 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Cottea pappophoroides Kunth3183Argentina: SaltaEF156682EF153033Crypsis vaginflora (Forssk.) Opiz381USA: CaliforniaEF156684EF153035Crondon dacylon (L.) Pers.2691USA: CaliforniaEF156685EF153035Dactylocethum acgyntium (L.) Wild.2873Mexico: TamaulipasEF156685EF153035Dacylocethum (Kunth) Tateoka)2873Mexico: QueretaroEF156685EF153039Dinbera retroflexa (Vahl) Panz. var. retroflexaClarke s.n.USA: CaliforniaEF156689EF153049Distichils spicata (L.) GreeneBell 231USA: CaliforniaEF156689EF153041Eneropson chlorideus (J.) GaerneBell 171Australia: NorthermEF156691EF153042Eneropson chlorideus (J. Pres)Clayon2939Mexico: SonoraEF156692EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156698EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees3328USA: CaliforniaEF156698EF153045Erastacy distribution of the service activation of the serv

 | C. truncata R. Br. | 3203 | USA: California | EF156681 | EF153032 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Crypsis vaginiflora (Forssk.) Opiz3831USA: CaliforniaEF156683EF153034Crenium aromaticum (Walter) Alph. Wood3348USA: LouisianaEF156685EF153037Condon dacylon (L.) Pers.2601USA: CaliforniaEF156685EF153037Dasyochica pulchellan (Kunth) Wild, ex Rybb. (syn. Erioneu-
Dasyochica pulchellan (Kunth) Wild, ex Rybb. (syn. Erioneu-
(23 Aug 2004)USA: CaliforniaEF156688EF153037Distichli s spicata (L.) GreeneBell 231USA: CaliforniaEF156689EF153041Eleusine indica (L.) Gaertn.2875Mexico: TarnaulipasEF156690EF153042Eleusine indica (L.) Gaertn.2875Mexico: TarnaulipasEF156691EF153042Enteropogon desvauxii P. Beauv.3133Argentini: San JuanEF156691EF153043Enteropogon choirdieus (J., Pens) Clayton2939Mexico: SonoraEF156691EF153045Enteropogon choirdieus (J., Pens) Clayton3438Peru: LambayequeEF156694EF153045Enteropogon Acamptot Lados essellispicus3328USA: TexasEF156698EF153045Ergorsits amabilis (I.) Wight & Arn. ex Nees3704Mexico: SonoraEF156698EF153049E sessilispicus Buckley (syn. Acamptot clados sessilispicus3328USA: TexasEF156698EF153049E trianeuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MaxicoEF156700EF153053E trianeuron avenaceum (Kunth) Stecka var. avenaceum2553Mexico: SonoraEF156700EF153053E trianeuron avenace

 | Cottea pappophoroides Kunth | 3183 | Argentina: Salta | EF156682 | EF153033 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Clenium aromaticum (Walter) Alph. Wood3348USA: CuliforniaEF15084EF153036Cynodon dacyloctenium aegyptium (L.) Wild.2873Mexico: TamaulipasEF156685EF153036Dacsyochloa pulchella (Kunth) Willd. ex Rydb. (syn. Erioneu-
ron pulchellan (Kunth) Tateoka)2577Mexico: TamaulipasEF156687EF153037Dinebra retroflexa (Vahl) Panz. var. retroflexaClarke s.n.
(23 Aug 2004)USA: CaliforniaEF156688EF153039Distichlis spicata (L.) GreeneBell 231USA: CaliforniaEF156690EF153041Eleusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156690EF153042Eneapogon desvauxit P. Beauv.3133Argentina: San JuanEF156692EF153042Eneapogon chiorideus (J. Presl) Clayton2348Peru: LambayequeEF156694EF153045Ergrostis amabilis (L.) Wight & Arn. ex Nees317Venezuela: Distrito
CapitalEF156694EF153045Ergrostis amabilis (L.) Wight & Arn. ex Nees3090Argentina: CarlodesEF150695EF153047E sessilispica Buckley (syn. Acamptoclados sessilispicus3228USA: TexasEF15609EF153047E sessilispica Buckley (syn. Acamptoclados sessilispicus3528Mexico: CarlodasEF155006EF153051Fingerhuthia africana Nees ex Lehm.7207 (MO)Regentina: CórdobaEF155001EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3558Peru: CuscoEF156700EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3558Peru: CuscoEF

 | Crypsis vaginiflora (Forssk.) Opiz | 3831 | USA: California | EF156683 | EF153034 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Cynodon dacrylon (L.) Pers.2691USA: CaliforniaEF15085EF153037Dacylocteinum aegyntium (L.) Wild.2873Mexico: TamaulipasEF156686EF153037Dacylocha pulchella (Kunth) Wild. ex Rydb. (syn. Erioneu-
ron pulchellum (Kunth) Tateoka)2577Mexico: QuerétaroEF156687EF153039Dinebra retroflexa (Vall) Parz. var. retroflexaClarke s.n.
(23 Aug 2004)USA: CaliforniaEF156689EF153040Distichlis spicata (L.) GreeneBell 231USA: CaliforniaEF156690EF153041Eleusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156091EF153042Enteropogon desvarati P. Beauv.3133Argentina: San JuanEF156093EF153044Enteropogon choridus (J.) Fresh) Clayton2939Mexico: SonoraEF156093EF153045Erasti samabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156095EF153046E pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156098EF153049E inderica (Lu) Wight & Arn. ex Nees328USA: TexasEF156098EF153045E sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF15609EF153050Eristoneur7207Mexico: MéxicoEF15609EF153050EristostoSares3000Argentina: CórdobaEF155070EF153051EristostoSares war. pectinacea3568Peri: CuscoEF153047EF153051EristostoMexico: Jarenna: CamarcaEF156708EF153057EF153

 | Ctenium aromaticum (Walter) Alph. Wood | 3348 | USA: Louisiana | EF156684 | EF153035 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Dactyloctenium aegyptium (L.) Willd.2873Mexico: TamaulipasEF150686EF15037Dasyochloa pulchella (Kunth) Willd. ex Rydb. (syn. Erioneu-
ron pulchellum (Kunth) Tateoka)2577Mexico: QuerétaroEF156687EF150387Dinebra retroflexa (Valh) Panz. var. retroflexaClarke s.n.
(23 Aug 2004)USA: CaliforniaEF156688EF153039Distichlis spicata (L.) GreeneBell 231USA: CaliforniaEF156690EF153041Etrosia leporinaBell 171Australia: NorthernEF156690EF153041Enerapogo desvauxii P Beauv.3133Argentina: San June FF156692EF153043Enerapogo devauxii P Beauv.3133Argentina: San June FF156692EF153045Enerapogo chlorideus (J. Presl) Clayton2348Peru: LambayequeEF156694EF153045Engrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156696EF153047E. sectinacea (Michx.) Nees var. pectinacea2704Mexico: MéxicoEF156698EF153049Einoeuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153050EristostoS727 (MO)S72USA: TexasEF156703EF153054Gouinia latifolia (Griseb.) Vasey var. Latifolia3758Mexico: MéxicoEF156704EF153054Gouinia latifolia (Griseb.) Vasey var. Latifolia375Argentina: CatabasEF153054GrissosJ. Parisos, Michx.) Briton, Sterns & Poggenb.3352USA: TexasEF156704EF153054Isingerhuhla dirica (Griseb.) Vasey var. Latifo

 | Cynodon dactylon (L.) Pers. | 2691 | USA: California | EF156685 | EF153036 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Dasyochioa pulchella (Kunth) Willd. ex Rydb. (syn. Erioneu-
ron pulchellum (Kunth) Tateoka)2577Mexico: QuerétaroEF156687EF153038Dinebra retroflexa (Vahl) Panz. var. retroflexa
(23 Aug 2004)Clarke s.n.
(23 Aug 2004)USA: CaliforniaEF156688EF153039Distichlis spicata (L.) Greene
Bell 231Bell 171Australia: Northern
TerritoryEF156699EF153040Eteusine indica (L.) Gaertn.2875Mexico: Tamaulipas
and partice thereorgen devauxii P. Beauv.3133
Argentina: San Juan
EF156693EF153043Enteropogon devauxii P. Beauv.3133
Argentina: San JuanEF156693EF153044E molits (Necs) Clayton2939Mexico: SonoraEF156694EF153044E notlis (Necs) Clayton3438
Curica anabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153046E pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E sessilispica Buckley (syn. Acamptoclador sessilispicus
Bingerhuhtia africana Nees ex Lehm.2553Mexico: MéxicoEF15609EF153050Gouina latifolia (Griseb.) Vasey var. latifolia
(Gunchx) Britton, Sterns & Poggenh.3558Peru: CuscoEF156703EF153057L fusca (L.) Kunth Subp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne dubia
(Linex), Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Seribn.L fusca (L.) Kunth subp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156708EF153059

 | Dactyloctenium aegyptium (L.) Willd. | 2873 | Mexico: Tamaulipas | EF156686 | EF153037 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Dinebra retroflexa (Vahl) Panz. var. retroflexaClarke s.n.
(23 Aug 2004)USA: CaliforniaEF156688EF153039
(23 Aug 2004)Distichilis spicata (L.) GreeneBell 231USA: CaliforniaEF156689EF153040Ectrosia leporina R. Br. var. leporinaBell 171Australia: NorthernEF156690EF153041Eleusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156691EF153042Eneropogon desvauxii P. Beauv.313Argentina: San JuanEF156693EF153042Enteropogon cholorideus (L.) Greyton2939Mexico: SonoraEF156693EF153044E. molis (Nees) Clayton3438Peru: LambayequeEF156695EF153044E. motilis (Nees) Clayton3438Peru: LambayequeEF156695EF153047E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156698EF153049(Buckley) Nash)Er1osaues3328USA: TexasEF15609EF153050Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Fingerhuthia africana Nees ex Lehm.7207 (MO)Namibia: ErongoEF156702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156704EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3155Argentina: ChameraEF156706EF153057Javea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156708EF153057Leptodrium rigidam Kunth3129Peru: FluraEF156710EF1

 | Dasyochloa pulchella (Kunth) Willd. ex Rydb. (syn. Erioneu-
ron pulchellum (Kunth) Tateoka) | 2577 | Mexico: Querétaro | EF156687 | EF153038 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Distichlis spicata (L.) GreeneBell 231USA: CaliforniaEF156689EF153040Ectrosia leporina R, Br. var. leporinaBell 171Austrilia: NorthernEF156690EF153041TerritoryEleusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156691EF153042Eneapogon chlorideus (J. Presl) Clayton2939Mexico: SonoraEF156692EF153043Enteropogon chlorideus (J. Presl) Clayton3438Peru: LambayequeEF156695EF153045Ergarostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153047E. sessilipica Buckley (syn. Acamptoclados sessilispicus3228USA: TexasEF156696EF153047Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156099EF153051Eringerin avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156701EF153051Sonw & BurgoryneArgentina: CórdobaEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153054Javat pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156707EF153057Leptochla dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153057Leptorhun rigidum Kunth3429Peru: PiuraEF156708EF153061Leptorhun rigidum Kunth3429Peru: PiuraEF156711EF153063Mercoi: Nayarita Erpison3286USA: New MexicoEF156711EF153063 <tr <="" td=""><td>Dinebra retroflexa (Vahl) Panz. var. retroflexa</td><td>Clarke s.n.
(23 Aug 2004)</td><td>USA: California</td><td>EF156688</td><td>EF153039</td></tr> <tr><td>Ectrosia leporinaBell 171Australia: NorthernEF156690EF15041Lelusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156691EF15042Enerapogon desvauxii P. Beauv.3133Argentina: San JuanEF156692EF15043Enteropogon chorideus (J. Presl) Clayton2939Mexico: SonoraEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153045E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3228USA: TexasEF156698EF153049Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Engerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153051Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3582USA: TexasEF156704EF153054Javea pilosa (L. Presl) Scribn.Bell 247Mexico: OancaaEF156704EF153055Javea pilosa (L.) Presl) Parodi)111Argentina: CatamareaEF156704EF153059L fusca (L.) Kunth Subp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156706EF153059L fusca (L.) Ohwi subp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156704EF153059L fusca (L.) Ohwi subp. brachiata (Steud.) N. W.<</td><td>Distichlis spicata (L.) Greene</td><td>Bell 231</td><td>USA: California</td><td>EF156689</td><td>EF153040</td></tr> <tr><td>Eleusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156091EF153042Enneropogon desvauxii P. Beauv.3133Argentina: San JuanEF156092EF153044Enneropogon chlorideus (I. Prest) Clayton2399Mexico: SonoraEF156094EF153044Er mollis (Nees) Clayton3438Peru: LambayequeEF156094EF153045Er gectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156096EF153047E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156096EF153049(Buckley) Nash)S328USA: TexasEF16609EF153050Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF15609EF153050Enstachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156701EF153051Engerhuhia africana Nees ex Lehm.Snaw & Burgoyne
7207 (MO)Namibia: ErongoEF15702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156704EF153054Jouwea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Jourea pilosa (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: CharnacraEF156708EF153056Leptothorium rigidum Kunth3429Peru: PiuraEF156708EF153056EF153066Snow2799Mexico: SonoraEF156710EF153061Lycurtus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156713EF153066<td>Ectrosia leporina R. Br. var. leporina</td><td>Bell 171</td><td>Australia: Northern
Territory</td><td>EF156690</td><td>EF153041</td></td></tr> <tr><td>Enneapogon desvauxii P, Beauv.3133Argentina: San JuanEF156692EF153043Enteropogon chlorideus (J. Presl) Clayton2339Mexico: SonoraEF156693EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153047E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156698EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.352USA: TexasEF156704EF153057Allaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153057L fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: CatamarcaEF156701EF153064L fusca (L.) Kunth subsp. brachiata (Steud.) N. W.326USA: New MexicoEF156710EF153065Leptothrium rigidum Kunth3429Peru: PiraEF156710EF153065Leptothrium rigidum Kunth3429Peru: PiruraEF156710EF153065Lept</td><td>Eleusine indica (L.) Gaertn.</td><td>2875</td><td>Mexico: Tamaulipas</td><td>EF156691</td><td>EF153042</td></tr> <tr><td>Enteropogon chlorideus (J. Presl) Clayton2939Mexico: SonoraEF156693EF153044E. mollis (Nees) Clayton3438Peru: LambayequeEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153046CapitalCapitalEF156695EF153047E. pectinacea (Mickx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153051Entenuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Fingerhuithia africana Nees ex Lehm.7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Jouvea pilosa (I. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153050(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153061(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156710EF153050(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156710EF153061(syn. Diplachne uninervia (J. Presl) Parodi)2700M</td><td>Enneapogon desvauxii P. Beauv.</td><td>3133</td><td>Argentina: San Juan</td><td>EF156692</td><td>EF153043</td></tr> <tr><td>E. mollis (Nees) Clayton3438Peru: LambayequeEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: Distrito
CapitalEF156695EF153046E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153050Einstachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.5753Mexico: MexicoEF156701EF153052Gourina latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153054Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3758Mexico: OaxacaEF156704EF153054Julara enchroides Kunth3758Mexico: JaliscoEF156706EF153054Leptochola dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153059L panicea (Retz.) Ohwi subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3266USA: New MexicoEF156711EF153061Lycurus setosus (Nutt.) C. Reeder3266USA: New MexicoEF156712EF153064Melanocenchris abyssinica (</td><td>Enteropogon chlorideus (J. Presl) Clayton</td><td>2939</td><td>Mexico: Sonora</td><td>EF156693</td><td>EF153044</td></tr> <tr><td>Eragrostis anabilis (L.) Wight & Arn. ex Nees4317Venezuela: Distrito
CapitalEF156695EF153046E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Eringerhuthia africana Nees ex Lehm.Snow & BurgoyneNamibia: ErongoEF156700EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3558Peru: CuscoEF156702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3558Peru: CuscoEF156703EF153054Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: AaxacaEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153059L fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153059Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153061<t< td=""><td>E. mollis (Nees) Clayton</td><td>3438</td><td>Peru: Lambayeque</td><td>EF156694</td><td>EF153045</td></t<></td></tr> <tr><td>E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153050Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)TexasEF156702EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156703EF153053Gouinia latifolia (Griseb.) Vasey var.
latifolia3568Mexico: OaxacaEF156704EF153057Jouwea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153061Morandhochloë littoralis Engelm.Bell 236USA: New MexicoEF156713EF153064Menarchulo chidica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714</td><td>Eragrostis amabilis (L.) Wight & Arn. ex Nees</td><td>4317</td><td>Venezuela: Distrito
Capital</td><td>EF156695</td><td>EF153046</td></tr> <tr><td>E. sessilispica Buckley (syn. Acamptoclados sessilispicus
(Buckley) Nash)3328USA: TexasEF156698EF153049Erioneuron avenaceum (Kunth) Tateoka var. avenaceum
Eustachys distichophylla (Lag.) Nees2553Mexico: MéxicoEF156699EF153050Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153051Gouinia latifolia (Griseb.) Vasey var. latifolia
Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.
Jourea pilosa (J. Presl) Scribn.3568Peru: CuscoEF156702EF153053Jourea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Syn. Diplachne uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) N. W. Snow
Snow3111Argentina: CatamarcaEF156708EF153061L pracicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Murloa (Kunth) Stellen.Bell 236USA: TexasEF156714EF153053Mexico: NayaritEF156713EF153063EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Murloa (Kunth) KuthBell 236USA: New MexicoEF156714E</td><td>E. pectinacea (Michx.) Nees var. pectinacea</td><td>2704</td><td>Mexico: Sonora</td><td>EF156696</td><td>EF153047</td></tr> <tr><td>Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153050Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Jaivea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(kunth) Scribn.)3155Argentina: CatamarcaEF156707EF153058L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)3111Argentina: MendozaEF156709EF153060L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153064Microchloa indica (L. f.) P Beauv.2979Mexico: NayaritEF156713EF153064Microchloe indica indica (L. f.) P Beauv.2979Mexico: NayaritEF156714EF153066Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156716EF153066Muhlenbergia (Nutt.) Hitchc.3375USA: New MexicoEF156716EF153066Muroa squarrosa (Nutt.) Hitchc.3616Mexico: SonoraEF156716<td< td=""><td>E. sessilispica Buckley (syn. Acamptoclados sessilispicus
(Buckley) Nash)</td><td>3328</td><td>USA: Texas</td><td>EF156698</td><td>EF153049</td></td<></td></tr> <tr><td>Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156704EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156706EF153057Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156707EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153059(Kunth) Scribn.)Ljusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156709EF153069L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: New MexicoEF156715EF153065Muhenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066Muhenbergia (Nutt.) Hitchc.3375USA: New MexicoEF156715EF153066Murnoa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Erioneuron avenaceum (Kunth) Tateoka var. avenaceum</td><td>2553</td><td>Mexico: México</td><td>EF156699</td><td>EF153050</td></tr> <tr><td>Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Jilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156713EF153063Meinrochloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156714EF153055Muhenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153064Munhanhochloë littoralis Engelm.Bell 236USA: New MexicoEF156715EF153065Muhenbergia (Nutt.) Hitchc.3775USA: ArizonaEF156716EF153067M. ramulosa (Kunth)</td><td>Eustachys distichophylla (Lag.) Nees</td><td>3090</td><td>Argentina: Córdoba</td><td>EF156700</td><td>EF153051</td></tr> <tr><td>Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)Ljugachue uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153065Muhlenbergia (Kunth) Swallen3616Mexico: SonoraEF156717EF153067Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Fingerhuthia africana Nees ex Lehm.</td><td>Snow & Burgoyne
7207 (MO)</td><td>Namibia: Erongo</td><td>EF156701</td><td>EF153052</td></tr> <tr><td>Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)Lfusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153064Monanthochloe littoralis Engelm.Bell 236USA: TexasEF156714EF153064Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153065M. montana (Nutt.) Hitchc.3375USA: New MexicoEF156716EF153066M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Gouinia latifolia (Griseb.) Vasey var. latifolia</td><td>3568</td><td>Peru: Cusco</td><td>EF156702</td><td>EF153053</td></tr> <tr><td>Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156709EF153060L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156712EF153064Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.</td><td>3352</td><td>USA: Texas</td><td>EF156703</td><td>EF153054</td></tr> <tr><td>Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Kunth) Scribn.)3155Argentina: CatamarcaEF156707EF153058L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)3111Argentina:
MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Leptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153054Munthalenbergia emersleyi Vasey3275USA: New MexicoEF156714EF153065Munroa squarrosa (Nutt.) Torr.3616Mexico: SonoraEF156717EF153068</td><td>Hilaria cenchroides Kunth</td><td>3758</td><td>Mexico: Oaxaca</td><td>EF156704</td><td>EF153055</td></tr> <tr><td>Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156709EF153060SnowLeptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156715EF153066Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153067M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Jouvea pilosa (J. Presl) Scribn.</td><td>Bell 247</td><td>Mexico: Jalisco</td><td>EF156706</td><td>EF153057</td></tr> <tr><td>L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156709EF153060Leptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Kunth) Scribn.)</td><td>3155</td><td>Argentina: Catamarca</td><td>EF156707</td><td>EF153058</td></tr> <tr><td>L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W. 2700 Mexico: Sonora EF156709 EF153060
Snow Leptothrium rigidum Kunth 3429 Peru: Piura EF156710 EF153061
Lycurus setosus (Nutt.) C. Reeder 3286 USA: New Mexico EF156711 EF153062
Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst. 4304.5 India: Maharashtra EF156712 EF153063
Microchloa indica (L. f.) P. Beauv. 2979 Mexico: Nayarit EF156713 EF153064
Monanthochloë littoralis Engelm. Bell 236 USA: Texas EF156714 EF153065
Muhlenbergia emersleyi Vasey 3275 USA: New Mexico EF156715 EF153066
M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156716 EF153067
M. ramulosa (Kunth) Swallen 3616 Mexico: Sonora EF156717 EF153068
Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069</td><td>L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)</td><td>3111</td><td>Argentina: Mendoza</td><td>EF156708</td><td>EF153059</td></tr> <tr><td>Leptothrium rigidum Kunth 3429 Peru: Piura EF156710 EF153061 Leptothrium rigidum Kunth 3286 USA: New Mexico EF156711 EF153062 Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst. 4304.5 India: Maharashtra EF156712 EF153063 Microchloa indica (L. f.) P. Beauv. 2979 Mexico: Nayarit EF156713 EF153064 Monanthochloë littoralis Engelm. Bell 236 USA: Texas EF156715 EF153065 Muhlenbergia emersleyi Vasey 3275 USA: New Mexico EF156715 EF153066 M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156717 EF153068 Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069</td><td><i>L. panicea</i> (Retz.) Ohwi subsp. <i>brachiata</i> (Steud.) N. W.</td><td>2700</td><td>Mexico: Sonora</td><td>EF156709</td><td>EF153060</td></tr> <tr><td>Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF150710EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: New MexicoEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Leptothrium rigidum Kunth</td><td>3120</td><td>Deru: Diura</td><td>FF156710</td><td>FF153061</td></tr> <tr><td>Dytarias scious (rutic) C. Recur32600584. Rew MexicoEF150711EF15002Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Lucrus setosus (Nutt.) C. Reeder</td><td>3286</td><td>USA: New Mexico</td><td>FF156711</td><td>EF153062</td></tr> <tr><td>Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF150712EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Melanocenchris abyssinica (R Br ex Fresen) Hochst</td><td>4304 5</td><td>India: Maharashtra</td><td>EF156712</td><td>EF153063</td></tr> <tr><td>Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td>Microchloa indica (L. f.) P Resuv</td><td>2979</td><td>Mexico: Navarit</td><td>EF156713</td><td>EF153064</td></tr> <tr><td>Mullenbergia emersleyi Vasey 3275 USA: New Mexico EF150714 EF153066 M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156716 EF153067 M. ramulosa (Kunth) Swallen 3616 Mexico: Sonora EF156717 EF153068 Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069</td><td>Monanthochloë littoralis Engelm</td><td>Bell 236</td><td>USA: Texas</td><td>EF156714</td><td>EF153065</td></tr> <tr><td>M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156716 EF153067 M. ramulosa (Kunth) Swallen 3616 Mexico: Sonora EF156717 EF153068 Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069</td><td>Muhlenhergia emerslevi Vasey</td><td>3275</td><td>USA: New Mexico</td><td>EF156715</td><td>EF153066</td></tr> <tr><td>M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td><i>M. montana</i> (Nutt.) Hitchc.</td><td>3375</td><td>USA: Arizona</td><td>EF156716</td><td>EF153067</td></tr> <tr><td>Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069</td><td><i>M. ramulosa</i> (Kunth) Swallen</td><td>3616</td><td>Mexico: Sonora</td><td>EF156717</td><td>EF153068</td></tr> <tr><td></td><td>Munroa squarrosa (Nutt.) Torr.</td><td>3894</td><td>USA: New Mexico</td><td>EF156718</td><td>EF153069</td></tr> | Dinebra retroflexa (Vahl) Panz. var. retroflexa | Clarke s.n.
(23 Aug 2004) | USA: California | EF156688 | EF153039 | Ectrosia leporinaBell 171Australia: NorthernEF156690EF15041Lelusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156691EF15042Enerapogon desvauxii P. Beauv.3133Argentina: San JuanEF156692EF15043Enteropogon chorideus (J. Presl) Clayton2939Mexico: SonoraEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153045E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3228USA: TexasEF156698EF153049Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Engerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153051Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3582USA: TexasEF156704EF153054Javea pilosa (L. Presl) Scribn.Bell 247Mexico: OancaaEF156704EF153055Javea pilosa (L.) Presl) Parodi)111Argentina: CatamareaEF156704EF153059L fusca (L.) Kunth Subp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156706EF153059L fusca (L.) Ohwi subp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156704EF153059L fusca (L.) Ohwi subp. brachiata (Steud.) N. W.< | Distichlis spicata (L.) Greene | Bell 231 | USA: California | EF156689 | EF153040 | Eleusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156091EF153042Enneropogon desvauxii P. Beauv.3133Argentina: San JuanEF156092EF153044Enneropogon chlorideus (I. Prest)
Clayton2399Mexico: SonoraEF156094EF153044Er mollis (Nees) Clayton3438Peru: LambayequeEF156094EF153045Er gectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156096EF153047E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156096EF153049(Buckley) Nash)S328USA: TexasEF16609EF153050Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF15609EF153050Enstachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156701EF153051Engerhuhia africana Nees ex Lehm.Snaw & Burgoyne
7207 (MO)Namibia: ErongoEF15702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156704EF153054Jouwea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Jourea pilosa (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: CharnacraEF156708EF153056Leptothorium rigidum Kunth3429Peru: PiuraEF156708EF153056EF153066Snow2799Mexico: SonoraEF156710EF153061Lycurtus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156713EF153066 <td>Ectrosia leporina R. Br. var. leporina</td> <td>Bell 171</td> <td>Australia: Northern
Territory</td> <td>EF156690</td> <td>EF153041</td> | Ectrosia leporina R. Br. var. leporina | Bell 171 | Australia: Northern
Territory | EF156690 | EF153041 | Enneapogon desvauxii P, Beauv. 3133 Argentina: San JuanEF156692EF153043Enteropogon chlorideus (J. Presl) Clayton 2339 Mexico: SonoraEF156693EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees 4317 Venezuela: DistritoEF156695EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees 4317 Venezuela: DistritoEF156695EF153047E. pectinacea (Michx.) Nees var. pectinacea 2704 Mexico: SonoraEF156698EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus 3328 USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum 2553 Mexico: MéxicoEF156700EF153051Erioneuron avenaceum (Kunth) Tateoka var. avenaceum 2553 Mexico: MéxicoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia 3568 Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb. 352 USA: TexasEF156704EF153057Allaria cenchroides Kunth 3758 Mexico: OaxacaEF156704EF153057L fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow 3111 Argentina: CatamarcaEF156701EF153064L fusca (L.) Kunth subsp. brachiata (Steud.) N. W. 326 USA: New MexicoEF156710EF153065Leptothrium rigidum Kunth 3429 Peru: PiraEF156710EF153065Leptothrium rigidum Kunth 3429 Peru: PiruraEF156710EF153065Lept | Eleusine indica (L.) Gaertn. | 2875 | Mexico: Tamaulipas | EF156691 | EF153042 | Enteropogon chlorideus (J. Presl) Clayton2939Mexico: SonoraEF156693EF153044E. mollis (Nees) Clayton3438Peru: LambayequeEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153046CapitalCapitalEF156695EF153047E. pectinacea (Mickx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153051Entenuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Fingerhuithia africana Nees ex Lehm.7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Jouvea pilosa (I. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153050(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153061(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156710EF153050(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156710EF153061(syn. Diplachne uninervia (J. Presl) Parodi)2700M | Enneapogon desvauxii P. Beauv. | 3133 | Argentina: San Juan | EF156692 | EF153043 | E. mollis (Nees) Clayton3438Peru: LambayequeEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: Distrito
CapitalEF156695EF153046E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153050Einstachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.5753Mexico: MexicoEF156701EF153052Gourina latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153054Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3758Mexico: OaxacaEF156704EF153054Julara enchroides Kunth3758Mexico: JaliscoEF156706EF153054Leptochola dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153059L panicea (Retz.) Ohwi subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3266USA: New MexicoEF156711EF153061Lycurus setosus (Nutt.) C. Reeder3266USA: New MexicoEF156712EF153064Melanocenchris abyssinica (| Enteropogon chlorideus (J. Presl) Clayton | 2939 | Mexico: Sonora | EF156693 | EF153044 | Eragrostis anabilis (L.) Wight & Arn. ex Nees4317Venezuela: Distrito
CapitalEF156695EF153046E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Eringerhuthia africana Nees ex Lehm.Snow & BurgoyneNamibia: ErongoEF156700EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3558Peru: CuscoEF156702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3558Peru: CuscoEF156703EF153054Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: AaxacaEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153059L fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153059Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153061 <t< td=""><td>E. mollis (Nees) Clayton</td><td>3438</td><td>Peru: Lambayeque</td><td>EF156694</td><td>EF153045</td></t<> | E. mollis (Nees) Clayton | 3438 | Peru: Lambayeque | EF156694 | EF153045 | E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153050Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)TexasEF156702EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156703EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3568Mexico: OaxacaEF156704EF153057Jouwea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153061Morandhochloë littoralis Engelm.Bell 236USA: New MexicoEF156713EF153064Menarchulo chidica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714 | Eragrostis amabilis (L.) Wight & Arn. ex Nees | 4317 | Venezuela: Distrito
Capital | EF156695 | EF153046 | E. sessilispica Buckley (syn. Acamptoclados sessilispicus
(Buckley) Nash)3328USA: TexasEF156698EF153049Erioneuron avenaceum (Kunth) Tateoka var. avenaceum
Eustachys distichophylla (Lag.) Nees2553Mexico: MéxicoEF156699EF153050Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153051Gouinia latifolia (Griseb.) Vasey var. latifolia
Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.
Jourea pilosa (J. Presl) Scribn.3568Peru: CuscoEF156702EF153053Jourea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Syn. Diplachne uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) N. W. Snow
Snow3111Argentina: CatamarcaEF156708EF153061L pracicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Murloa (Kunth) Stellen.Bell 236USA: TexasEF156714EF153053Mexico: NayaritEF156713EF153063EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Murloa (Kunth) KuthBell 236USA: New MexicoEF156714E | E. pectinacea (Michx.) Nees var. pectinacea | 2704 | Mexico: Sonora | EF156696 | EF153047 | Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153050Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Jaivea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(kunth) Scribn.)3155Argentina: CatamarcaEF156707EF153058L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J.
Presl) Parodi)3111Argentina: MendozaEF156709EF153060L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153064Microchloa indica (L. f.) P Beauv.2979Mexico: NayaritEF156713EF153064Microchloe indica indica (L. f.) P Beauv.2979Mexico: NayaritEF156714EF153066Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156716EF153066Muhlenbergia (Nutt.) Hitchc.3375USA: New MexicoEF156716EF153066Muroa squarrosa (Nutt.) Hitchc.3616Mexico: SonoraEF156716 <td< td=""><td>E. sessilispica Buckley (syn. Acamptoclados sessilispicus
(Buckley) Nash)</td><td>3328</td><td>USA: Texas</td><td>EF156698</td><td>EF153049</td></td<> | E. sessilispica Buckley (syn. Acamptoclados sessilispicus
(Buckley) Nash) | 3328 | USA: Texas | EF156698 | EF153049 | Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156704EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156706EF153057Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156707EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153059(Kunth) Scribn.)Ljusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156709EF153069L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: New MexicoEF156715EF153065Muhenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066Muhenbergia (Nutt.) Hitchc.3375USA: New MexicoEF156715EF153066Murnoa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Erioneuron avenaceum (Kunth) Tateoka var. avenaceum | 2553 | Mexico: México | EF156699 | EF153050 | Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Jilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156713EF153063Meinrochloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156714EF153055Muhenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153064Munhanhochloë littoralis Engelm.Bell 236USA: New MexicoEF156715EF153065Muhenbergia (Nutt.) Hitchc.3775USA: ArizonaEF156716EF153067M. ramulosa (Kunth) | Eustachys distichophylla (Lag.) Nees | 3090 | Argentina: Córdoba | EF156700 | EF153051 | Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)Ljugachue uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153065Muhlenbergia (Kunth) Swallen3616Mexico: SonoraEF156717EF153067Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Fingerhuthia africana Nees ex Lehm. | Snow & Burgoyne
7207 (MO) | Namibia: Erongo | EF156701 | EF153052 | Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)Lfusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153064Monanthochloe littoralis Engelm.Bell 236USA: TexasEF156714EF153064Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153065M. montana (Nutt.) Hitchc.3375USA: New MexicoEF156716EF153066M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Gouinia latifolia (Griseb.) Vasey var. latifolia | 3568 | Peru: Cusco | EF156702 | EF153053 | Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156709EF153060L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156712EF153064Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb. | 3352 | USA: Texas | EF156703 | EF153054 | Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Kunth) Scribn.)3155Argentina: CatamarcaEF156707EF153058L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Leptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153054Munthalenbergia emersleyi Vasey3275USA: New MexicoEF156714EF153065Munroa squarrosa (Nutt.) Torr.3616Mexico: SonoraEF156717EF153068 | Hilaria cenchroides Kunth | 3758 | Mexico: Oaxaca | EF156704 | EF153055 | Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156709EF153060SnowLeptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156715EF153066Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153067M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Jouvea pilosa (J. Presl) Scribn. | Bell 247 | Mexico: Jalisco | EF156706 | EF153057 | L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156709EF153060Leptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Kunth) Scribn.) | 3155 | Argentina: Catamarca | EF156707 | EF153058 | L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W. 2700 Mexico: Sonora EF156709 EF153060
Snow Leptothrium rigidum Kunth 3429 Peru: Piura EF156710 EF153061
Lycurus setosus (Nutt.) C. Reeder 3286 USA: New Mexico EF156711 EF153062
Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst. 4304.5 India: Maharashtra EF156712 EF153063
Microchloa indica (L. f.) P. Beauv. 2979 Mexico: Nayarit EF156713 EF153064
Monanthochloë littoralis Engelm. Bell 236 USA: Texas EF156714 EF153065
Muhlenbergia emersleyi Vasey 3275 USA: New Mexico EF156715 EF153066
M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156716 EF153067
M. ramulosa (Kunth) Swallen 3616 Mexico: Sonora EF156717 EF153068
Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069 | L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J.
Presl) Parodi) | 3111 | Argentina: Mendoza | EF156708 | EF153059 | Leptothrium rigidum Kunth 3429 Peru: Piura EF156710 EF153061 Leptothrium rigidum Kunth 3286 USA: New Mexico EF156711 EF153062 Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst. 4304.5 India: Maharashtra EF156712 EF153063 Microchloa indica (L. f.) P. Beauv. 2979 Mexico: Nayarit EF156713 EF153064 Monanthochloë littoralis Engelm. Bell 236 USA: Texas EF156715 EF153065 Muhlenbergia emersleyi Vasey 3275 USA: New Mexico EF156715 EF153066 M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156717 EF153068 Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069 | <i>L. panicea</i> (Retz.) Ohwi subsp. <i>brachiata</i> (Steud.) N. W. | 2700 | Mexico: Sonora | EF156709 | EF153060 | Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF150710EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: New MexicoEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Leptothrium rigidum Kunth | 3120 | Deru: Diura | FF156710 | FF153061 | Dytarias scious (rutic) C. Recur32600584. Rew MexicoEF150711EF15002Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Lucrus setosus (Nutt.) C. Reeder | 3286 | USA: New Mexico | FF156711 | EF153062 | Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF150712EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Melanocenchris abyssinica (R Br ex Fresen) Hochst | 4304 5 | India: Maharashtra | EF156712 | EF153063 | Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | Microchloa indica (L. f.) P Resuv | 2979 | Mexico: Navarit | EF156713 | EF153064 | Mullenbergia emersleyi Vasey 3275 USA: New Mexico EF150714 EF153066 M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156716 EF153067 M. ramulosa (Kunth) Swallen 3616 Mexico: Sonora EF156717 EF153068 Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069 | Monanthochloë littoralis Engelm | Bell 236 | USA: Texas | EF156714 | EF153065 | M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156716 EF153067 M. ramulosa (Kunth) Swallen 3616 Mexico: Sonora EF156717 EF153068 Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069 | Muhlenhergia emerslevi Vasey | 3275 | USA: New Mexico | EF156715 | EF153066 | M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | <i>M. montana</i> (Nutt.) Hitchc. | 3375 | USA: Arizona | EF156716 | EF153067 | Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069 | <i>M. ramulosa</i> (Kunth) Swallen | 3616 | Mexico: Sonora | EF156717 | EF153068 | | Munroa squarrosa (Nutt.) Torr. | 3894 | USA: New Mexico | EF156718 | EF153069 |
| Dinebra retroflexa (Vahl) Panz. var. retroflexa

 | Clarke s.n.
(23 Aug 2004) | USA: California | EF156688 | EF153039 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Ectrosia leporinaBell 171Australia: NorthernEF156690EF15041Lelusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156691EF15042Enerapogon desvauxii P. Beauv.3133Argentina: San JuanEF156692EF15043Enteropogon chorideus (J. Presl) Clayton2939Mexico: SonoraEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153045E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3228USA: TexasEF156698EF153049Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Engerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153051Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3582USA: TexasEF156704EF153054Javea pilosa (L. Presl) Scribn.Bell 247Mexico: OancaaEF156704EF153055Javea pilosa (L.) Presl) Parodi)111Argentina: CatamareaEF156704EF153059L fusca (L.) Kunth Subp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156706EF153059L fusca (L.) Ohwi subp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156704EF153059L fusca (L.) Ohwi subp. brachiata (Steud.) N. W.<

 | Distichlis spicata (L.) Greene | Bell 231 | USA: California | EF156689 | EF153040 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Eleusine indica (L.) Gaertn.2875Mexico: TamaulipasEF156091EF153042Enneropogon desvauxii P. Beauv.3133Argentina: San JuanEF156092EF153044Enneropogon chlorideus (I. Prest) Clayton2399Mexico: SonoraEF156094EF153044Er mollis (Nees) Clayton3438Peru: LambayequeEF156094EF153045Er gectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156096EF153047E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156096EF153049(Buckley) Nash)S328USA: TexasEF16609EF153050Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF15609EF153050Enstachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156701EF153051Engerhuhia africana Nees ex Lehm.Snaw & Burgoyne
7207 (MO)Namibia: ErongoEF15702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156704EF153054Jouwea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Jourea pilosa (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: CharnacraEF156708EF153056Leptothorium rigidum Kunth3429Peru: PiuraEF156708EF153056EF153066Snow2799Mexico: SonoraEF156710EF153061Lycurtus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156713EF153066 <td>Ectrosia leporina R. Br. var. leporina</td> <td>Bell 171</td> <td>Australia: Northern
Territory</td> <td>EF156690</td> <td>EF153041</td>

 | Ectrosia leporina R. Br. var. leporina | Bell 171 | Australia: Northern
Territory | EF156690 | EF153041 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Enneapogon desvauxii P, Beauv. 3133 Argentina: San JuanEF156692EF153043Enteropogon chlorideus (J. Presl) Clayton 2339 Mexico: SonoraEF156693EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees 4317 Venezuela: DistritoEF156695EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees 4317 Venezuela: DistritoEF156695EF153047E. pectinacea (Michx.) Nees var. pectinacea 2704 Mexico: SonoraEF156698EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus 3328 USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum 2553 Mexico: MéxicoEF156700EF153051Erioneuron avenaceum (Kunth) Tateoka var. avenaceum 2553 Mexico: MéxicoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia 3568 Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb. 352 USA: TexasEF156704EF153057Allaria cenchroides Kunth 3758 Mexico: OaxacaEF156704EF153057L fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow 3111 Argentina: CatamarcaEF156701EF153064L fusca (L.) Kunth subsp. brachiata (Steud.) N. W. 326 USA: New MexicoEF156710EF153065Leptothrium rigidum Kunth 3429 Peru: PiraEF156710EF153065Leptothrium rigidum Kunth 3429 Peru: PiruraEF156710EF153065Lept

 | Eleusine indica (L.) Gaertn. | 2875 | Mexico: Tamaulipas | EF156691 | EF153042 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Enteropogon chlorideus (J. Presl) Clayton2939Mexico: SonoraEF156693EF153044E. mollis (Nees) Clayton3438Peru: LambayequeEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: DistritoEF156695EF153046CapitalCapitalEF156695EF153047E. pectinacea (Mickx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153051Entenuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Fingerhuithia africana Nees ex Lehm.7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Jouvea pilosa (I. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153050(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153061(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156710EF153050(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156710EF153061(syn. Diplachne uninervia (J. Presl) Parodi)2700M

 | Enneapogon desvauxii P. Beauv. | 3133 | Argentina: San Juan | EF156692 | EF153043 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| E. mollis (Nees) Clayton3438Peru: LambayequeEF156694EF153045Eragrostis amabilis (L.) Wight & Arn. ex Nees4317Venezuela: Distrito
CapitalEF156695EF153046E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153050Einstachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.5753Mexico: MexicoEF156701EF153052Gourina latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153054Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3758Mexico: OaxacaEF156704EF153054Julara enchroides Kunth3758Mexico: JaliscoEF156706EF153054Leptochola dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153059L panicea (Retz.) Ohwi subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3266USA: New MexicoEF156711EF153061Lycurus setosus (Nutt.) C. Reeder3266USA: New MexicoEF156712EF153064Melanocenchris abyssinica (

 | Enteropogon chlorideus (J. Presl) Clayton | 2939 | Mexico: Sonora | EF156693 | EF153044 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Eragrostis anabilis (L.) Wight & Arn. ex Nees4317Venezuela: Distrito
CapitalEF156695EF153046E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156700EF153051Eringerhuthia africana Nees ex Lehm.Snow & BurgoyneNamibia: ErongoEF156700EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3558Peru: CuscoEF156702EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3558Peru: CuscoEF156703EF153054Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: AaxacaEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153059L fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156710EF153059Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153061 <t< td=""><td>E. mollis (Nees) Clayton</td><td>3438</td><td>Peru: Lambayeque</td><td>EF156694</td><td>EF153045</td></t<>

 | E. mollis (Nees) Clayton | 3438 | Peru: Lambayeque | EF156694 | EF153045 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| E. pectinacea (Michx.) Nees var. pectinacea2704Mexico: SonoraEF156696EF153047E. sessilispica Buckley (syn. Acamptoclados sessilispicus3328USA: TexasEF156698EF153049(Buckley) Nash)Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153050Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)TexasEF156702EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156703EF153053Gouinia latifolia (Griseb.) Vasey var. latifolia3568Mexico: OaxacaEF156704EF153057Jouwea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(syn. Diplachne uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153061Morandhochloë littoralis Engelm.Bell 236USA: New MexicoEF156713EF153064Menarchulo chidica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714

 | Eragrostis amabilis (L.) Wight & Arn. ex Nees | 4317 | Venezuela: Distrito
Capital | EF156695 | EF153046 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| E. sessilispica Buckley (syn. Acamptoclados sessilispicus
(Buckley) Nash)3328USA: TexasEF156698EF153049Erioneuron avenaceum (Kunth) Tateoka var. avenaceum
Eustachys distichophylla (Lag.) Nees2553Mexico: MéxicoEF156699EF153050Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153051Gouinia latifolia (Griseb.) Vasey var. latifolia
Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.
Jourea pilosa (J. Presl) Scribn.3568Peru: CuscoEF156702EF153053Jourea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156704EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Syn. Diplachne uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) N. W. Snow
Snow3111Argentina: CatamarcaEF156708EF153061L pracicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Murloa (Kunth) Stellen.Bell 236USA: TexasEF156714EF153053Mexico: NayaritEF156713EF153063EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153063Murloa (Kunth) KuthBell 236USA: New MexicoEF156714E

 | E. pectinacea (Michx.) Nees var. pectinacea | 2704 | Mexico: Sonora | EF156696 | EF153047 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Erioneuron avenaceum (Kunth) Tateoka var. avenaceum2553Mexico: MéxicoEF156699EF153050Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Jaivea pilosa (J. Presl) Scribn.Bell 247Mexico: OaxacaEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(kunth) Scribn.)3155Argentina: CatamarcaEF156707EF153058L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)3111Argentina: MendozaEF156709EF153060L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153064Microchloa indica (L. f.) P Beauv.2979Mexico: NayaritEF156713EF153064Microchloe indica indica (L. f.) P Beauv.2979Mexico: NayaritEF156714EF153066Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156716EF153066Muhlenbergia (Nutt.) Hitchc.3375USA: New MexicoEF156716EF153066Muroa squarrosa (Nutt.) Hitchc.3616Mexico: SonoraEF156716 <td< td=""><td>E. sessilispica Buckley (syn. Acamptoclados sessilispicus
(Buckley) Nash)</td><td>3328</td><td>USA: Texas</td><td>EF156698</td><td>EF153049</td></td<>

 | E. sessilispica Buckley (syn. Acamptoclados sessilispicus
(Buckley) Nash) | 3328 | USA: Texas | EF156698 | EF153049 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Eustachys distichophylla (Lag.) Nees3090Argentina: CórdobaEF156700EF153051Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156704EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156706EF153057Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156707EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156708EF153059(Kunth) Scribn.)Ljusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156709EF153069L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: New MexicoEF156715EF153065Muhenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066Muhenbergia (Nutt.) Hitchc.3375USA: New MexicoEF156715EF153066Murnoa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069

 | Erioneuron avenaceum (Kunth) Tateoka var. avenaceum | 2553 | Mexico: México | EF156699 | EF153050 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Fingerhuthia africana Nees ex Lehm.Snow & Burgoyne
7207 (MO)Namibia: ErongoEF156701EF153052Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Jilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)L panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156713EF153063Meinrochloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156714EF153055Muhenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153064Munhanhochloë littoralis Engelm.Bell 236USA: New MexicoEF156715EF153065Muhenbergia (Nutt.) Hitchc.3775USA: ArizonaEF156716EF153067M. ramulosa (Kunth)

 | Eustachys distichophylla (Lag.) Nees | 3090 | Argentina: Córdoba | EF156700 | EF153051 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Gouinia latifolia (Griseb.) Vasey var. latifolia3568Peru: CuscoEF156702EF153053Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)Ljugachue uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153065Muhlenbergia (Kunth) Swallen3616Mexico: SonoraEF156717EF153067Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069

 | Fingerhuthia africana Nees ex Lehm. | Snow & Burgoyne
7207 (MO) | Namibia: Erongo | EF156701 | EF153052 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb.3352USA: TexasEF156703EF153054Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)Lfusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153064Monanthochloe littoralis Engelm.Bell 236USA: TexasEF156714EF153064Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153065M. montana (Nutt.) Hitchc.3375USA: New MexicoEF156716EF153066M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069

 | Gouinia latifolia (Griseb.) Vasey var. latifolia | 3568 | Peru: Cusco | EF156702 | EF153053 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Hilaria cenchroides Kunth3758Mexico: OaxacaEF156704EF153055Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)2700Mexico: SonoraEF156709EF153060L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156712EF153064Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069

 | Gymnopogon ambiguus (Michx.) Britton, Sterns & Poggenb. | 3352 | USA: Texas | EF156703 | EF153054 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Jouvea pilosa (J. Presl) Scribn.Bell 247Mexico: JaliscoEF156706EF153057Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Kunth) Scribn.)3155Argentina: CatamarcaEF156707EF153058L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156710EF153061Leptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153054Munthalenbergia emersleyi Vasey3275USA: New MexicoEF156714EF153065Munroa squarrosa (Nutt.) Torr.3616Mexico: SonoraEF156717EF153068

 | Hilaria cenchroides Kunth | 3758 | Mexico: Oaxaca | EF156704 | EF153055 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia3155Argentina: CatamarcaEF156707EF153058(Kunth) Scribn.)L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow3111Argentina: MendozaEF156708EF153059(syn. Diplachne uninervia (J. Presl) Parodi)L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.2700Mexico: SonoraEF156709EF153060SnowLeptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156715EF153066Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153067M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069

 | Jouvea pilosa (J. Presl) Scribn. | Bell 247 | Mexico: Jalisco | EF156706 | EF153057 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi)3111Argentina: MendozaEF156708EF153059L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W.
Snow2700Mexico: SonoraEF156709EF153060Leptothrium rigidum Kunth3429Peru: PiuraEF156710EF153061Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF156711EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: TexasEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069

 | Leptochloa dubia (Kunth) Nees (syn. Diplachne dubia
(Kunth) Scribn.) | 3155 | Argentina: Catamarca | EF156707 | EF153058 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| L. panicea (Retz.) Ohwi subsp. brachiata (Steud.) N. W. 2700 Mexico: Sonora EF156709 EF153060
Snow Leptothrium rigidum Kunth 3429 Peru: Piura EF156710 EF153061
Lycurus setosus (Nutt.) C. Reeder 3286 USA: New Mexico EF156711 EF153062
Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst. 4304.5 India: Maharashtra EF156712 EF153063
Microchloa indica (L. f.) P. Beauv. 2979 Mexico: Nayarit EF156713 EF153064
Monanthochloë littoralis Engelm. Bell 236 USA: Texas EF156714 EF153065
Muhlenbergia emersleyi Vasey 3275 USA: New Mexico EF156715 EF153066
M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156716 EF153067
M. ramulosa (Kunth) Swallen 3616 Mexico: Sonora EF156717 EF153068
Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069

 | L. fusca (L.) Kunth subsp. uninervia (J. Presl) N. W. Snow
(syn. Diplachne uninervia (J. Presl) Parodi) | 3111 | Argentina: Mendoza | EF156708 | EF153059 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Leptothrium rigidum Kunth 3429 Peru: Piura EF156710 EF153061 Leptothrium rigidum Kunth 3286 USA: New Mexico EF156711 EF153062 Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst. 4304.5 India: Maharashtra EF156712 EF153063 Microchloa indica (L. f.) P. Beauv. 2979 Mexico: Nayarit EF156713 EF153064 Monanthochloë littoralis Engelm. Bell 236 USA: Texas EF156715 EF153065 Muhlenbergia emersleyi Vasey 3275 USA: New Mexico EF156715 EF153066 M. montana (Nutt.) Hitchc. 3375 USA: Arizona EF156717 EF153068 Munroa squarrosa (Nutt.) Torr. 3894 USA: New Mexico EF156718 EF153069

 | <i>L. panicea</i> (Retz.) Ohwi subsp. <i>brachiata</i> (Steud.) N. W. | 2700 | Mexico: Sonora | EF156709 | EF153060 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Lycurus setosus (Nutt.) C. Reeder3286USA: New MexicoEF150710EF153062Melanocenchris abyssinica (R. Br. ex Fresen.) Hochst.4304.5India: MaharashtraEF156712EF153063Microchloa indica (L. f.) P. Beauv.2979Mexico: NayaritEF156713EF153064Monanthochloë littoralis Engelm.Bell 236USA: New MexicoEF156714EF153065Muhlenbergia emersleyi Vasey3275USA: New MexicoEF156715EF153066M. montana (Nutt.) Hitchc.3375USA: ArizonaEF156716EF153067M. ramulosa (Kunth) Swallen3616Mexico: SonoraEF156717EF153068Munroa squarrosa (Nutt.) Torr.3894USA: New MexicoEF156718EF153069

 | Leptothrium rigidum Kunth | 3120 | Deru: Diura | FF156710 | FF153061 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Lucrus setosus (Nutt.) C. Reeder | 3286 | USA: New Mexico | FF156711 | EF153062 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Melanocenchris abyssinica (R Br ex Fresen) Hochst | 4304 5 | India: Maharashtra | EF156712 | EF153063 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Microchloa indica (L. f.) P Resuv | 2979 | Mexico: Navarit | EF156713 | EF153064 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Monanthochloë littoralis Engelm | Bell 236 | USA: Texas | EF156714 | EF153065 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Muhlenhergia emerslevi Vasey | 3275 | USA: New Mexico | EF156715 | EF153066 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | <i>M. montana</i> (Nutt.) Hitchc. | 3375 | USA: Arizona | EF156716 | EF153067 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | <i>M. ramulosa</i> (Kunth) Swallen | 3616 | Mexico: Sonora | EF156717 | EF153068 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | Munroa squarrosa (Nutt.) Torr. | 3894 | USA: New Mexico | EF156718 | EF153069 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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			GenBank accession	
Taxon	Collection/voucher	Source	<i>trn</i> L–F	ITS
Neeragrostis reptans (Michx.) Nicora (= Eragrostis reptans (Michx.) Nees)	Hill 22450	USA: Texas	EF156697	EF153048
Neobouteloua lophostachya (Griseb.) Gould	3144	Argentina: La Rioja	EF156719	EF153070
Neostapfia colusana (Burtt Davy) Burtt Davy	Reeder & Reeder 6198	USA: California	EF156720	EF153071
Orcuttia californica Vasey	2687	USA: California	EF156721	EF153072
Pappophorum vaginatum Buckley	2540	USA: Arizona	EF156722	EF153073
Pereilema crinitum J. Presl	3621	Mexico: Sonora	EF156723	EF153074
Pleuraphis jamesii Torr. (= Hilaria jamesii (Torr.) Benth.)	3221	USA: Wyoming	EF156705	EF153056
Pogonarthria squarrosa (Roem. & Schult.) Pilg.	Snow et al. 7023 (MO)	South Africa: Mpu- malanga	EF156724	EF153075
Redfieldia flexuosa (Thurb. ex A. Gray) Vasey	3910	USA: Colorado	EF156725	EF153076
Reederochloa eludens Soderstr. & H. F. Decker	Bell 250	Mexico: San Luis Potosí	EF156726	EF153077
Schaffnerella gracilis (Benth.) Nash	4040	Mexico: San Luis Potosí	EF156727	EF153078
Schedonnardus paniculatus (Nutt.) Branner & Coville	Reeder & Reeder 9431	USA: Arizona	EF156728	EF153079
Scleropogon brevifolius Phil.	4129	Mexico: San Luis Potosí	EF156729	EF153080
Sohnsia filifolia (E. Fourn.) Airy Shaw	4038	Mexico: San Luis Potosí	EF156730	EF153081
Spartina pectinata Link	3210	USA: Missouri	EF156731	EF153082
Sporobolus indicus (L.) R. Br.	2737	Mexico: Sonora	EF156732	EF153083
S. pyramidatus (Lam.) Hitchc.	4264	USA: Florida	EF156733	EF153084
S. wrightii Munro ex Scribn.	2507	USA: Arizona	EF156734	EF153085
Swallenia alexandrae (Swallen) Soderstr. & H. F. Decker	Bell 228	USA: California	EF156735	EF153086
Tragus racemosus (L.) All.	2228	USA: Arizona	EF156736	EF153087
Trichloris crinita (Lag.) Parodi	3109	Argentina: Mendoza	EF156737	EF153088
Trichoneura elegans Swallen	4299	USA: Texas	EF156738	EF153089
Tridens flavus (L.) Hitchc. var. flavus	3212	USA: Missouri	EF156739	EF153090
T. muticus (Torr.) Nash var. muticus	3254	USA: Arizona	EF156740	EF153091
Triodia desertorum (C. E. Hubb.) Lazarides	Bell 114	Australia: Western Australia	EF156741	EF153092
Triplasis americana P. Beauv.	4251	USA: Florida	EF156742	EF153093
Tripogon spicatus (Nees) Ekman	3108	Argentina: San Luis	EF156743	EF153094
Tuctoria mucronata (Crampton) Reeder	4682.5	USA: California	EF156744	EF153095
Uniola paniculata L.	4206	USA: North Carolina	EF156745	EF153096
Vaseyochloa multinervosa (Vasey) Hitchc.	4300	USA: Texas	EF156746	EF153097
Willkommia texana Hitchc. var. texana	4143	USA: Texas	EF156747	EF153098
Zoysia matrella (L.) Merr. s.l.	3985	USA: Hawaii	EF156748	EF153099
	Outgroup			
Aristida adscensionis L.	2991	Mexico: Jalisco	DQ172196	DQ171972
Arundo donax L.	3201	USA: California	DQ172302	DQ172077
Chasmanthium latifolium (Michx.) H. O. Yates	3211	USA: Missouri	DQ172304	DQ172079
Hackelochloa granularis (L.) Kuntze	2624	Mexico: Michoacán	DQ172306	DQ172081
Panicum hirticaule J. Presl var. hirticaule	2536	USA: Arizona	DQ172307	DQ172082

achne Ekman, each with one or two species, are the only genera endemic to the New World that were not sampled. Despite the New World emphasis, of Clayton and Renvoize's (1986) five chloridoid tribes and nine subtribes, only Leptureae and Pommereullinae are not represented. Also unavailable at the time of the study was DNA of *Centropodia* Rchb. and *Merxmuellera rangei* (Pilg.) Conert, recently positioned in Chloridoideae (GPWG 2001). Five species representing four of the other PACCAD subfamilies were employed as the outgroup (Table 1).

Collection/voucher information is provided in Table 1. Most samples were from live, field-collected plants or plants grown from caryopses or transplants at Rancho Santa Ana Botanic Garden. One gram or more of healthy, living leaf material was removed from an individual plant and placed directly in liquid nitrogen, silica gel (Liston et al. 1990; Chase and Hills 1991), or a -80° C freezer for later DNA extraction, or the sample was processed immediately. In a few cases 20 mg samples were removed from dried herbarium specimens.

Table 2. DNA amplification and sequencing primers designed for this study. See Fig. 1 for locations of primers.

Name	5' Sequence 3'	Comments
trnL5' BR	GATATGGCGAAATCGGTAGA	Complement of Taberlet et al. (1991) primer "b"
trnL INT1F	CTCAATGGAAGCTGTTCTAACG	
trnL INT1R	CGTTAGAACAGCTTCCATTGAG	
trnL INT2R	GCTATGTCAGTATCTATACGTG	
trnL INT3F	GAGAGAGTCCCATTCTACATGTC	
trnL3' D2	TGGGGATAGAGGGACTTGAACCC	Modification of Taberlet et al. (1991) primer "d"
trnF F2	CAGTCCTCTGCTCTACCAAC	

DNA Sequences

ITS sequences of *Bouteloua aristidoides*, *Cynodon dactylon*, and *Tragus racemosus* are from Columbus et al. (1998).

Three procedures were used to extract total cellular DNA: the CTAB protocol of Doyle and Doyle (1987) as modified in Columbus et al. (1998), the Cullings (1992) CTAB protocol, or the DNeasy Plant Mini Kit (QIAGEN, Valencia, California, USA).

For amplification of trnL-F and ITS, Taq polymerase from Invitrogen (Carlsbad, California, USA) or Promega (Madison, Wisconsin, USA) was used, as well as PCR Master Mix (Promega) and PuReTaq Ready-To-Go PCR Beads (Amersham Biosciences, Piscataway, New Jersey, USA). Employing annealing temperatures of 52–55°C, primers "c" and "f" (Taberlet et al. 1991) were used to amplify trnL-F or, more frequently, primer "trnL5' BR" (Table 2) was used instead of "c" (Fig. 1). Reactions sometimes included 5 or 10% dimethyl sulfoxide (DMSO) to facilitate amplification (Winship 1989; Varadaraj and Skinner 1994). Amplification of ITS generally followed Columbus et al. (1998), with an annealing temperature of 48°C, except that primer "ITS-5m" (Sang et al. 1995) was sometimes used in place of "ITS5" (White et al. 1990), and the reactions sometimes included 10% DMSO. PCR products were purified using the Morgan and Soltis (1993) PEG protocol or the QIAquick PCR Purification Kit (QIAGEN).

Cycle sequencing was carried out with the Applied Biosystems (ABI; Foster City, California, USA) DyeDeoxy or BigDye (vers. 3.1) Terminator Cycle Sequencing Kit, and sequencing products were visualized on an ABI PRISM 373A DNA Sequencer or 3100 Genetic Analyzer, respectively. For *trn*L–F, primers "c", "d", "e", and "f" (Taberlet et al. 1991) were most often employed for sequencing, but "*trn*L INT3F" (Table 2) was commonly used in place of "e" to enable reliable sequence determination of the *trn*L 3' exon and flanking regions (Fig. 1). New primers were designed (Table 2; Fig. 1) primarily to improve sequence quality downstream from poly-n strings (predominately adenine and thymine). For ITS, primers "ITS5" and "ITS4" were usually used for sequencing, but "ITS-5m", "ITS5i", "ITS4i", "ITS2", and "ITS3" were sometimes employed (White et al. 1990; Sang et al. 1995; Porter 1997). Sequence fragments were assembled, edited, and a consensus sequence constructed using Sequencher vers. 3 or 4 (Gene Codes Corporation, Ann Arbor, Michigan, USA). The bounds of the *trnL* exons and intron and *trnL-trnF* intergenic spacer were determined by comparison with the annotated sequence of *Zea mays* L. (GenBank accession X86563). The bounds of ITS1, 5.8S, and ITS2 follow Columbus et al. (1998).

Analyses

Sequences were aligned manually using Se-Al vers. 2.0 (Rambaut 2001). Unambiguous nucleotide insertions or deletions (indels) shared by two or more species were scored as presence/absence characters at the end of the data matrix following the simple indel coding method of Simmons and Ochoterena (2000).

Parsimony analyses of the trnL–F, ITS, and combined trnL–F/ITS data sets were performed using PAUP* vers. 4.0b10 (Swofford 2002). Characters (nucleotide sites and coded indels) were treated as unordered and weighted equally, and were optimized via accelerated transformation. For a given ITS sequence, a site possessing multiple nucleotides was treated as a polymorphism. Gaps were treated as missing data. For each heuristic search, 1000 random stepwise-addition replicates were executed, holding one tree per step, using tree bisection-reconnection branch swapping, collapsing branches with a maximum length of zero, and saving all shortest trees (MulTrees). Because exploratory analyses of the trnL–F matrix yielded many thousands of trees and could not be run to completion, for the final analysis of this data set we limited each replicate to one million rearrangements.

To determine statistical support for clades, bootstrap analyses (Felsenstein 1985) were performed in PAUP*. The same settings as above were employed except for the exclusion of uninformative characters and random stepwise-addition replicates was set to one. One thousand bootstrap replicates were performed on each data set. In addition, Bremer values (decay indices; Bremer 1988; Donoghue et al. 1992)



Fig. 1.—Locations of amplification and sequencing primers used in this study.

Table 3. Summary information for the data sets and results of the analyses.

	trnL-F	ITS	<i>trn</i> L–F + ITS
Average guanine/cytosine content (%) ^a	<i>trn</i> L intron: 33.0	ITS1: 56.3	_
	trnL 3' exon: 46.0	5.8S: 54.4	
	trnL-trnF spacer: 27.9	ITS2: 57.6	_
Sequence length (base pairs) ^a	860-1025	565-612	
Aligned sequence length	1712	812	2524
Insertions/deletions coded	38	0	38
Total characters	1750	812	2562
Parsimony informative characters	243 (13.9%)	382 (47.0%)	626 (24.4%)
Most parsimonious trees	360,636	17	114
Tree length	906	3664	4602
Consistency index ^b	0.51	0.27	0.30
Retention index	0.69	0.50	0.53

^a Ingroup only. ^b Excluding parsimony uninformative characters.

Table 4. Nucleotide insertions and deletions (indels) in trnL-F scored as presence/absence characters for the analyses (characters 1713–1750 in the trnL-F data matrix). Indels 1–19 are in the trnL intron and 20–38 are in the trnL-trnF intergenic spacer. Indels 9, 26, and 30 involve a subset of the outgroup and cannot be readily classed as insertions or deletions based on this data set.

Number	Kind	Length (base pairs)	Position in trnL–F data matrix
1	Insertion	2	219-220
2	Insertion	5	246-250
3	Insertion	23	269-291
4	Insertion	5	309-313
5	Insertion	8	324-342
6	Insertion	1	346
7	Insertion	5	360-364
8	Insertion	5	473-477
9	?	1	493
10	Insertion	2	494-495
11	Insertion	4	539-542
12	Insertion	12	568-579
13	Insertion	8	639-646
14	Insertion	1	675
15	Insertion	6	693-698
16	Deletion	1	784
17	Insertion	5	801-805
18	Deletion	5	808-822
19	Insertion	5	810-814
20	Insertion	6	987-992
21	Deletion	29	1013-1061
22	Insertion	5	1032-1036
23	Insertion	1	1068
24	Insertion	5	1078-1082
25	Insertion	23	1111-1133
26	?	3	1258-1260
27	Insertion	5	1267-1271
28	Insertion	6	1310-1315
29	Insertion	29	1329-1357
30	?	5	1359-1363
31	Deletion	9	1368-1377
32	Deletion	2	1369-1370
33	Deletion	6	1370-1376
34	Insertion	10	1402-1411
35	Insertion	6	1527-1532
36	Insertion	12	1557-1568
37	Insertion	5	1578-1582
38	Insertion	1	1705

were calculated using MacClade vers. 4.05 (Maddison and Maddison 2002) and PAUP*.

We relied heavily on the descriptions in Clayton and Renvoize (1986) and Watson and Dallwitz (1994) in making comparisons among taxa.

RESULTS

For each sample, complete sequences were obtained of the *trnL* intron, *trnL* 3' exon, *trnL–trn*F intergenic spacer, ITS1, 5.8S, and ITS2. Sequences are available from Gen-Bank with accession numbers as in Table 1. Summary information for the data sets and results of the analyses are given in Table 3. The data matrices along with the strict consensus tree from each analysis are available from TreeBASE (study accession S189, matrix accessions M3471–M3473).

Aligning the trnL–F sequences required the creation of many gaps equivalent to one or more base pairs. We found that most of the nucleotide insertions are duplications. Thirty-eight indels were coded for analysis (Table 4). Length variation associated with strings of the same nucleotide (mostly adenine and thymine) usually were not coded due to uncertainties about homology. Based on the phylogenetic trees presented below, several of the coded indels proved to be homoplastic. Of the 1750 total characters in the trnL–F data set, 243 (13.9%) are parsimony informative. The analysis yielded over 360,000 most parsimonious trees 906 steps long and with a consistency index of 0.51. Figure 2 is one of the shortest trees, showing branches (dotted) not present in the strict consensus tree.

In contrast to *trnL*–F, aligning the shorter but more divergent ITS sequences was challenging and not confidently achieved for ITS1 and ITS2. However, exploratory parsimony analyses based on different alignments always yielded the same strongly supported clades. Due to uncertainties about homology, we elected not to code gaps. Although the ITS data set has fewer total characters (812) than the *trnL*–F data set, a greater number of the ITS characters (382, 47.0%) are parsimony informative. The ITS data also yielded fewer trees (17) of far greater length (3664 steps) and with more homoplasy (consistency index = 0.27). Figure 3 is one of the shortest trees, showing branches (dotted) not present in the strict consensus tree.



Fig. 2.—One of 360,636 most parsimonious trees, arbitrarily selected and drawn as a phylogram, resulting from analysis of *trnL*–F sequences. Dotted branches are not present in the strict consensus tree. Numbers above and below branches are bootstrap percentages (\geq 50%) and Bremer values (\geq 2), respectively. Bullets denote clades having the same composition of taxa in all most parsimonious trees from separate and combined analyses of *trnL*–F and ITS.

Aristida adscensionis

Arundo donax



Fig. 3.—One of 17 most parsimonious trees, arbitrarily selected and drawn as a phylogram, resulting from analysis of ITS sequences. Dotted branches are not present in the strict consensus tree. Numbers above and below branches are bootstrap percentages (\geq 50%) and Bremer values (\geq 2), respectively. Bullets denote clades having the same composition of taxa in all most parsimonious trees from separate and combined analyses of *trnL*–F and ITS.

Analysis of the combined *trn*L–F/ITS data set resulted in 114 most parsimonious trees. Figure 4 is the strict consensus tree.

Thirty-seven clades are common to all trees resulting from the three analyses (bulleted nodes in Fig. 2-4). One of these clades corresponds to Chloridoideae and four are early diverging clades within the subfamily (A, B, C, and B + C inFig. 2–4; clade designations follow Hilu and Alice 2001). Relationships within clade A are completely resolved in the ITS phylogeny (Fig. 3) and trnL-F + ITS trees (Fig. 4) and are congruent with the trnL-F phylogeny (Fig. 2), which has one polytomy. Likewise, relationships within clade B are completely resolved and congruent in the ITS and trnL-F + ITS trees; however, relationships are virtually unresolved in the trnL-F phylogeny. Clade C contains most of the genera and species sampled in the study. Unfortunately, as a whole, relationships are poorly resolved in clade C. However, common to all trees from all analyses is a clade comprising Muhlenbergia Schreb. and nine other genera (the Muhlen*bergia* clade), and common to the ITS and trnL-F + ITStrees, but not the trnL-F trees, is a clade containing Chloris Sw., five other genera, and two of the three sampled species of Leptochloa P. Beauv. (the Chloris clade). The only supported topological conflict between the trnL-F and ITS phylogenies involves Chloris and relatives: Eustachys Desv. forms a clade with Cynodon Rich. and Chloris elata (bootstrap [BS] 89%, Bremer value [BV] 4) in the trnL-F phylogeny yet forms a clade with Microchloa R. Br. (BS 91%, BV 5) in the ITS phylogeny.

DISCUSSION

Comparison with Previous Molecular Phylogenetic Studies

Although taxon sampling differs between our study and Hilu and Alice's (2001) phylogenetic study of 56 genera of Chloridoideae based on chloroplast matK sequences, in common are 37 genera, so comparisons can be made with some confidence. The results of the two studies are in fact quite similar, including the presence of clades A, B, and C in the matK, trnL-F (Fig. 2), ITS (Fig. 3), and trnL-F + ITS (Fig. 4) trees, and the level of resolution within each clade. The only apparent inconsistency involves Pappophorum Schreb., which is situated among Eragrostis species in clade A of Hilu and Alice (2000, 2001), but is in clade C in our study. Ingram and Doyle (2004, 2007) explained that the matK sequence of Pappophorum appears to be a sequence from a species of Eragrostis, and trnL-F and ITS sequences from additional species of Pappophorum confirm the position of the genus in clade C (J. T. Columbus and R. Cerros unpubl. data). If the Pappophorum sequence indeed represents a species of Eragrostis in Hilu and Alice (2001), then the matK phylogeny is congruent with the trnL-F and ITS phylogenies. It also should be pointed out that we did not sample the two species of *Eragrostis* that resolved in clade B of the matK phylogeny apart from the other species in clade A, nor did we sample other species of Eragrostis morphologically close to Sporobolus R. Br. (Clayton and Renvoize 1986). The similarity among the three phylogenies extends to the level of resolution: high in clade A and low in clade C. With respect to clade B, the chloroplast matK and trnL-F phylogenies are similar in their low resolution, whereas relationships within the clade are completely resolved in the ITS phylogeny, although a couple of the clades are not well supported.

Although the *mat*K phylogeny is congruent with the *trn*L-F and ITS phylogenies, the relationships among clades A, B, and C were not resolved by parsimony analysis of equally weighted characters in Hilu and Alice (2001). The three clades, each well supported, form a polytomy along with Triraphis R. Br., which we did not sample. In our study, clades B and C are sister, and A is sister to B + C. These clades and relationships are well supported in all analyses except with respect to clade B in the ITS phylogeny (BS 50%, BV 2) and clade C in separate analyses of the trnL-F (BS 74%, BV 1) and ITS (BS <50%, BV 2) data sets (Fig. 2, 3). The combined trnL-F/ITS data yielded better support for clade C (BS 78%, BV 8; Fig. 4). In their analyses of the matK data set, Hilu and Alice (2001) also performed parsimony analyses using differential character weighting and a neighbor-joining analysis. These analyses yielded the same relationships among clades A, B, and C, although without support, as we obtained from parsimony analyses of our data. As well, Triraphis resolved as sister to the remaining Chloridoideae (BS 72-74%). A year earlier, Hilu and Alice (2000) published the results of a parsimony analysis of matK sequences representing a smaller number (26) of chloridoid genera. In addition to the unlikely position of Pappophorum among species of Eragrostis (discussed above), Muhlenbergia is in a clade with Sporobolus, which is in conflict with our study and Hilu and Alice (2001), who indicated that the Muhlenbergia sample was actually a species of Sporobolus. These errors notwithstanding, clades A, B, and C are resolved in Hilu and Alice (2000), though clade C is not well supported, and the sequence of divergence of these clades is the same as in our study and in the Hilu and Alice (2001) analyses described above.

Two other phylogenetic studies based at least in part on molecular data do not agree well with our results. Hilu and Esen (1993) examined relationships within Chloridoideae based on the size and immunological similarities of prolamins, a class of seed storage proteins. Trees resulting from analyses of these data for 11 genera bear little resemblance to the matK, trnL-F, and ITS phylogenies, the only exception being the consistent grouping of Chloris with Cynodon. Many chloridoid genera were sampled in Hodkinson et al.'s (2007) supertree analysis of the grass family that included over 400 genera and combined 62 source trees based on molecular and non-molecular data. With respect to Chloridoideae, the matK, trnL-F, and ITS phylogenies are not congruent with the supertree, wherein members of clades A, B, and C are intermixed, and Microchloa, along with Austrochloa Lazarides and Kengia Packer, fall outside the subfamily in a clade labeled as incertae sedis.

Other molecular phylogenetic studies of grasses have not focused on Chloridoideae as a whole. In most cases a limited number of chloridoids have been included in family-wide studies, or studies have focused on groups within the subfamily. In a study focused on *Eragrostis* based on chloroplast *rps*16 and nuclear *waxy* (granule-bound starch synthase I; GBSSI) sequences, Ingram and Doyle (2004, 2007) sampled 21 chloridoid genera. Rooted with the chloridoid genus *Coelachyrum* Hochst. & Nees, which was not sampled in VOLUME 23



Fig. 4.—Strict consensus of 114 most parsimonious trees resulting from analysis of combined *trn*L–F and ITS sequences. Numbers above and below branches are bootstrap percentages (\geq 50%) and Bremer values (\geq 2), respectively. Bullets denote clades having the same composition of taxa in all most parsimonious trees from separate and combined analyses of *trn*L–F and ITS. Abbreviations of tribes and subtribes recognized in Clayton and Renvoize (1986) are as follows: CYN = Cynodonteae, ERA = Eragrostideae, ORC = Orcuttieae, PAP = Pappophoreae, Bou = Boutelouinae, Chl = Chloridinae, Ele = Eleusininae, Mon = Monanthochloinae, Spo = Sporobolinae, Tri = Triodiinae, Uni = Uniolinae, Zoy = Zoysiinae.

our study but is a member of clade C in Hilu and Alice (2000, 2001), clades corresponding to our clades A and B are present and well supported in the rps16 and waxy trees, although not all of the genera that we sampled were sampled by Ingram and Doyle (2004, 2007) and vice versa. Within clade A, Acamptoclados Nash (as Eragrostis sessilispica in our study), Neeragrostis Bush, and Pogonarthria Stapf are part of a well-supported clade (the *Eragrostis* clade) along with other species of *Eragrostis*, which is consistent with our trees (Fig. 2-4). Clades consistent with our Cottea Kunth-Enneapogon Desv. ex P. Beauv. clade and Fingerhuthia Nees ex Lehm.-Uniola L. clade are present in the rps16 phylogeny, but not in the waxy phylogeny, which is not well resolved with respect to the genera in question. Relationships among these two clades and the Eragrostis clade are not resolved in the rps16 phylogeny, in contrast to the matK (Hilu and Alice 2001), trnL-F (Fig. 2), and ITS (Fig. 3) phylogenies, wherein the Fingerhuthia-Uniola clade is sister to the Eragrostis clade, and sister to this clade is the Cottea-Enneapogon clade. Within clade B, a well-supported sister relationship between *Calamovilfa* (A. Gray) Hack. ex Scribn. & Southw. and Spartina Schreb. is common to the rps16, waxy, ITS, and trnL-F + ITS trees. As well, consistent between Hilu and Alice (2000, 2001) and Ingram and Doyle (2004, 2007) is the presence of Eragrostis advena (Stapf) S. M. Phillips (as Thellungia advena Stapf in Ingram and Doyle 2004, 2007), not sampled in our study, in clade B. Ingram and Doyle (2004, 2007) also sampled two species of Pappophorum, which form a well-supported clade apart from clades A and B.

Based on chloroplast restriction site variation, Duvall et al. (1994) conducted a phylogenetic study of 17 genera in Eragrostideae. *Aegopogon* Humb. & Bonpl. ex Willd., *Schaffnerella* Nash, and *Schedonnardus* Steud. (all Cynodonteae; Clayton and Renvoize 1986) were not sampled in their study, but *Muhlenbergia* and six other genera form a clade (BS 90%) consistent in composition with our *Muhlenbergia* clade (Fig. 2–4), including a sister relationship between *Bealia* Scribn. and *Blepharoneuron* Nash (BS 81%), and the non-monophyly of *Muhlenbergia*. Intergeneric relationships outside the *Muhlenbergia* clade are less certain. However, a clade comprising *Dasyochloa* Willd. ex Rydb., *Erioneuron* Nash, and *Munroa* Torr., which is well supported in our trees, is also present in the Duvall et al. (1994) trees from one of their analyses.

Ortiz-Diaz and Culham (2000) studied the phylogeny of *Sporobolus* and relatives using ITS sequences. Three chloridoid species were employed as the outgroup, including one species of *Eragrostis*. *Spartina* and *Zoysia* Willd. were not sampled. Their analyses yielded a well-supported clade (jackknife 100%) consistent with clade B (Fig. 2–4; Hilu and Alice 2001; Ingram and Doyle 2004, 2007). As in our study, *Sporobolus* is not monophyletic in the analyses of Ortiz-Diaz and Culham (2000), wherein *Calamovilfa*, *Crypsis* Aiton, and two species of *Eragrostis*, including *E. advena*, are nested within *Sporobolus* with support.

Although sampling of Chloridoideae has been limited in family-wide molecular phylogenetic studies of grasses, several provide support for relationships in our study. Hilu et al.'s (1999) *mat*K phylogeny of grasses (13 chloridoid genera sampled) is consistent with our study, including support for the relationships of clades A, B, and C, except Pappophorum resolved in clade A, not C (discussed above). The phylogenies in Soreng and Davis (1998) and GPWG (2001) based on chloroplast restriction site variation are fully resolved with respect to Chloridoideae (Distichlis Raf., Eragrostis, Spartina, Sporobolus, Uniola, and Zoysia sampled) and are likewise consistent with our study. However, in other analyses of molecular data sets in GPWG (2001) that include Pappophorum in addition to the six genera above, there is conflict with respect to the position of Pappophorum. In analyses of all chloroplast data (i.e., chloroplast restriction sites + ndhF + rbcL + rpoC2) and all molecular data (i.e., chloroplast data + nuclear GBSSI + ITS + phyB), Pappophorum is sister to the Eragrostis-Uniola clade (BS 78% in both trees), whereas in the ndhF phylogeny it forms a clade with the four other genera (BS 97%), which is consistent with our study. Pappophorum also appears in trees from individual analyses of the rbcL and rpoC2 data sets, but sampling of chloridoids therein is insufficient to determine which of the above conflicting topologies these phylogenies support, and, unlike the *ndh*F data set, the source(s) of the material used for sequencing rbcL and rpoC2 is not provided (GPWG 2001).

Analyses of ITS data in studies of Gramineae as a whole have yielded results inconsistent with ours. Hsiao et al. (1999) sampled nine chloridoid genera. *Eragrostis* is well supported as sister to the remaining chloridoids, and *Spartina* and *Sporobolus* form a well-supported clade. However, the *Spartina–Sporobolus* clade (= clade B) is nested within genera that are in our clade C, a relationship that received statistical support in some but not all of their analyses. The GPWG (2001) sampled five chloridoid genera in their ITS analysis, but the subfamily did not resolve as monophyletic, although *Spartina* and *Sporobolus* form a well-supported clade.

Other family-wide studies that provide some insights into relationships within Chloridoideae based on molecular data include Clark et al.'s (1995) *ndh*F phylogeny and Duvall et al.'s (2007) chloroplast phylogeny based on *ndh*F and *rbcL* sequences. Only four chloridoid genera (*Eragrostis, Eustachys, Sporobolus,* and *Zoysia*) were sampled in the *ndh*F analyses, but *Sporobolus* and *Zoysia* form a well-supported clade. Seven chloridoids (including *Distichlis, Eragrostis, Spartina, Uniola,* and *Zoysia,* but not *Pappophorum*) were sampled in analyses of the *ndh*F + *rbcL* data set and their relationships are fully resolved, well supported, and congruent with our study.

Comparisons with Recent Classifications and Studies Based on Non-Molecular Data

Because Clayton and Renvoize's (1986) classification of Chloridoideae is one of the most recent, detailed, and widely followed worldwide treatments of the subfamily, we show in Fig. 4 (the strict consensus tree from the trnL–F + ITS analysis) the tribes and, as applicable, the subtribes associated with the genera we sampled. We did not sample Leptureae and Pommereullinae, and Triodiinae are represented by a single species in our study. Except for Orcuttieae (all three genera sampled) and Uniolinae (two of the four genera sampled), the remaining three tribes and five subtribes are

not monophyletic in the *trn*L–F and ITS phylogenies, although low resolution in clade C leaves open the possibility that Monanthochloinae are monophyletic. These results are consistent with the *mat*K phylogeny (Hilu and Alice 2001), wherein Triodiinae (three of the four genera sampled) are also monophyletic. In fact, all classifications of Chloridoideae correspond poorly to the molecular phylogenies.

Quantitative analyses of non-molecular data involving a significant number of chloridoid genera (Hilu and Wright 1982; Phillips 1982; Van den Borre and Watson 1997; Peterson 2000) likewise demonstrate conflict with the molecular phylogenies. In a detailed study, Van den Borre and Watson (1997) conducted phenetic and cladistic analyses of Chloridoideae based on 120 morphological and leaf anatomical characters scored for all 166 recognized genera and two subgenera of Eragrostis. An outcome was an informal classification of the subfamily consisting of three tribes, two subtribes, four groups (at tribal level), and four subgroups (at subtribal level). Of these, Boutelouinae (= Bouteloua Lag.; Columbus 1999) and Orcuttieae are monophyletic in the matK (Hilu and Alice 2001), trnL-F, and ITS phylogenies, and Triodieae (= Triodiinae in Clayton and Renvoize 1986) and the Monanthochloë subtribal group (represented by Monanthochloë Engelm. and Reederochloa Soderstr. & H. F. Decker in Hilu and Alice 2001) are monophyletic in the matK phylogeny. However, although Pappophoreae group together in all of the Van den Borre and Watson (1997) analyses (in contrast to the molecular phylogenies), genera in Cynodonteae and Eragrostideae (Clayton and Renvoize 1986) are intermixed as in the molecular phylogenies (Fig. 4). A few of these intertribal groupings are reflected in the molecular phylogenies, revealing that some morphological and/or anatomical characters track the molecular phylogenies more closely than others. In two cases, genera in Cynodonteae having only primary inflorescence branches, Schedonnardus and Spartina, group with genera in Eragrostideae mostly having rebranched inflorescences. Schedonnardus groups with Bealia, Blepharoneuron, Chaboissaea E. Fourn., and Muhlenbergia (along with other genera in the Muhlenbergia clade in our study) in both studies, and Spartina groups with Calamovilfa, Crypsis, and Sporobolus (= clade B in our study excluding Zoysia; Sporobolus is not part of the group in some of Van den Borre and Watson's 1997 analyses) (Fig. 2-4). Morphological and anatomical characters common to the members of each group are detailed in Van den Borre and Watson (1997) and are summarized below. Therefore, with respect to Schedonnardus and Spartina, an inflorescence composed only of primary branches has been an unreliable character for classification, as this inflorescence type is inferred from analyses of molecular and non-molecular data to have evolved independently in these two lineages apart from other origins elsewhere in the subfamily. Another case where there is support for a close relationship between members of Cynodonteae and Eragrostideae in the molecular phylogenies and the Van den Borre and Watson (1997) analyses involves Chloris (Cynodonteae), Leptochloa (Eragrostideae), and relatives. Two species of Leptochloa, sometimes treated in Diplachne P. Beauv. (Table 1), are members of the well-supported Chloris clade in the ITS (Fig. 3) and ITS + trnL-F (Fig. 4) trees. A number of other genera in Eragrostideae group with

Chloris and relatives in Van den Borre and Watson (1997), including *Eleusine* Gaertn. *Eleusine* and *Leptochloa* also form a clade (C_1) with *Chloris* and relatives in the *mat*K phylogeny (Hilu and Alice 2001). *Eleusine* and *Leptochloa* both have an inflorescence of primary branches only, as do *Chloris* and relatives, but they have been classified apart from *Chloris* in Eragrostideae because most species have two or more fertile florets per spikelet (Clayton and Renvoize 1986). In this case, the inflorescence type is more indicative of relationship than the number of fertile florets per spikelet.

In sum, congruent, well-supported relationships in molecular phylogenies can lead us to those morphological and anatomical traits that are synapomorphies, even though these traits may be homoplastic in the larger context of the family or subfamily. In the following section we briefly explore morphological variation in light of the molecular phylogenies and, in concert with Peterson et al. (2007), propose changes to the classification based on what we know about relationships among Chloridoideae.

A Proposed Classification

The classification proposed in Peterson et al. (2007) is discussed here primarily with respect to tribes, which correspond to clades A, B, and C in the *mat*K (Hilu and Alice 2001), *trn*L–F (Fig. 2), and ITS (Fig. 3) phylogenies. We also discuss the subtribes in clade A. In the new classification, clades A, B, and C correspond to Eragrostideae, Zoysieae, and Cynodonteae, respectively (Fig. 4). Each clade is statistically supported in all analyses except for clades B and C in the analysis of the ITS data set.

Eragrostideae (clade A).—As can be gleaned from Fig. 4, the circumscription of Eragrostideae differs significantly from Clayton and Renvoize (1986). Based on current sampling, members of subtribes Monanthochloinae, Sporobolinae, and Triodiinae are excluded along with most genera in Eleusininae. Included are Uniolinae, some Eleusininae, and some Pappophoreae, each of these groups corresponding to well-supported (except in ITS) clades in the matK (Hilu and Alice 2001), rps16 (Ingram and Doyle 2004, 2007), trnL-F (Fig. 2), ITS (Fig. 3), and trnL-F + ITS (Fig. 4) trees. These clades are classified as three subtribes: Uniolinae, Eragrostidinae, and Cotteinae, respectively (Peterson et al. 2007). Eragrostidinae and Uniolinae are sister, and sister to this clade are Cotteinae in each of the phylogenies above except rps16 (relationships unresolved); the matK and ITS + trnL-F data sets provided statistical support for these relationships. Predominant features in the tribe include a ligule of hairs, multiple fertile florets per spikelet, and lemma nerves three or more. Lemmas in Cotteinae and Uniolinae have five or more nerves, in contrast to the typically three-nerved lemma in Eragrostideae, which indicates, based on their relationships, that five or more nerves is ancestral and there has been a reduction in nerve number in the Eragrostideae clade.

Cotteinae.—The long-recognized tribe Pappophoreae is polyphyletic in our molecular phylogenies. Of the three genera sampled (of five), *Cottea* and *Enneapogon* form a clade (Cotteinae) and *Pappophorum* forms a well-supported clade with *Tridens flavus* in clade C (Fig. 2–4). *Tridens* Roem. & Schult. is not monophyletic in our phylogenies (discussed below), but analyses of trnL-F and ITS sequences from other species of Pappophorum and Tridens confirm a close relationship (J. T. Columbus and R. Cerros unpubl. data). The main characters that have been used to circumscribe Pappophoreae are lemmas with many nerves and awns and/or lobes, but the molecular phylogenies tell us that these traits evolved independently in Pappophorum and Cotteinae. Reeder (1965) provided evidence of a more distant relationship between Pappophorum and the other genera in the tribe than was previously thought. Unlike Pappophorum, Cotteinae possess many-nerved glumes and distinctive, elongate bicellular microhairs, among other differences. We have not yet carried out detailed morphological and anatomical studies comparing Pappophorum and Tridens, but examination of Pappophorum specimens revealed the presence of hairs along the central and marginal nerves of the lemma, which are also found in Tridens. Hilu and Alice (2001) and Ingram and Doyle (2004, 2007) sampled Schmidtia Steud. ex J. A. Schmidt, another genus in Pappophoreae, which resolved in the Cotteinae clade in the matK and rps16 phylogenies.

Uniolinae.—Although Entoplocamia has yet to be sampled, Clayton and Renvoize's (1986) Uniolinae are monophyletic in the matK (Hilu and Alice 2001), trnL–F (Fig. 2), and ITS (Fig. 3) phylogenies. Two of the four genera, Fingerhuthia and Uniola, were sampled in our study, and Hilu and Alice (2001) and Ingram and Doyle (2004, 2007) also sampled Tetrachne Nees. In the rps16 phylogeny, Stiburus Stapf is also in the clade (Ingram and Doyle 2004, 2007). The genus is sometimes included in Eragrostis and was not sampled in our study nor in Hilu and Alice (2001).

Eragrostidinae.--The Eragrostidinae clade in our study is represented by Ectrosia R. Br., Neeragrostis, Pogonarthria, and three species of Eragrostis, all classified in Clayton and Renvoize's (1986) subtribe Eleusininae (Fig. 2-4). Relationships are fully resolved in the ITS and trnL-F + ITS trees, and all clades in the latter analysis are well supported. Eragrostis is not monophyletic. In the matK phylogeny (Hilu and Alice 2001), the clade comprises Eragrostiella Bor, Heterachne Benth., and several species of Eragrostis, but relationships are not well resolved or supported. In Ingram and Doyle's (2004, 2007) studies focused on Eragrostis, the Eragrostidinae clade includes Acamptoclados (as E. sessilispica in our study), Diandrochloa De Winter, Neeragrostis, Pogonarthria, and many species of Eragrostis, including the type species, E. minor Host. The rps16 phylogeny is virtually unresolved with respect to this clade, in contrast to the well-resolved waxy phylogeny, but Eragrostis is not monophyletic in either phylogeny. However, Acamptoclados, Diandrochloa, and Neeragrostis are often treated as synonyms of Eragrostis (e.g., Clayton and Renvoize 1986). Ingram and Doyle (2004, 2007) suggested that Pogonarthria also should be included in the genus. Our study shows that Ectrosia likewise is nested within Eragrostis. Unlike most species of Eragrostis, lemmas of Ectrosia and Pogonarthria are acuminate to one-awned. Pogonarthria also has an inflorescence of primary branches only (these tardily deciduous) in contrast to the rebranched inflorescence characteristic of most species of Eragrostis. A number of additional genera morphologically similar to *Eragrostis* need to be included in future molecular studies.

Zoysieae (clade B).-The five genera that form Zoysieae in our study are positioned in two tribes in Clayton and Renvoize (1986). Calamovilfa, Crypsis, and Sporobolus were placed in Eragrostideae subtribe Sporobolinae based on rebranched inflorescences and spikelets with a single floret. Spartina was placed in Cynodonteae subtribe Chloridinae based on spikelets having a single fertile floret and arranged along one side of nondeciduous, primary inflorescence branches, and Zoysia was positioned in subtribe Zoysiinae based on a spiciform inflorescence and spikelets having a single floret and falling as a single unit. The molecular phylogenies indicate that the single floret per spikelet is indicative of relationship among these genera exhibiting morphologically diverse inflorescences, although numerous other chloridoids have spikelets with a single floret. Other prevalent features in Zoysieae include a ligule of hairs, onenerved, awnless lemmas, and a free pericarp. Many species in the tribe grow in sandy, saline, and/or wet soils.

As mentioned above, some species of *Eragrostis* that we did not sample, including *E. advena*, resolved in this clade in the *mat*K phylogeny (Hilu and Alice 2001), Ortiz-Diaz and Culham's (2000) ITS phylogeny, and (as *Thellungia* Stapf) in the *rps*16 and *waxy* phylogenies (Ingram and Doyle 2004, 2007). Clayton and Renvoize (1986) pointed out that a few species of *Eragrostis*, including *E. advena*, are morphologically close to *Sporobolus*. Morphological support for a close relationship of this species to *Sporobolus* and relatives are its one-nerved lemma and free pericarp. Clearly, more of these morphologically intermediate species need to be sampled in future studies.

The matK and trnL-F phylogenies are virtually unresolved with respect to relationships in the Zoysieae clade (Hilu and Alice 2001; Fig. 2). However, Calamovilfa and Spartina form a well-supported clade in the rps16, waxy, ITS, and *trn*L–F + ITS trees (Ingram and Doyle 2004, 2007; Fig. 3, 4). In addition, Zoysia is supported as sister to the other members of the clade in the ITS and trnL-F + ITS trees. Peterson et al. (2007) placed Zoysia in subtribe Zoysiinae apart from the other genera (Sporobolinae) based on, among other characters, a suppressed or highly reduced lower glume and fused pericarp. Our phylogenies also show that Sporobolus is not monophyletic. Spartina and Zoysia were not sampled in the Ortiz-Diaz and Culham (2000) study focused on Sporobolus, but their ITS phylogeny shows Calamovilfa, Crypsis, and two species of Eragrostis nested within Sporobolus, which was represented by many species.

Cynodonteae (clade C).—Cynodonteae, the most densely sampled tribe in our study, display nearly the full range of morphological variation seen in the entire subfamily. Relatively low resolution and support within the clade (Fig. 2–4), perhaps resulting from one or more rapid diversification events, severely hinder classification as well as studies of character evolution and biogeography. Nonetheless, some well-supported clades provide important insights into relationships, and these are discussed below. Peterson et al. (2007) recognized ten subtribes, but about half of the genera in the tribe are treated as incertae sedis with respect to sub-

tribe. Additional data are needed to further resolve relationships in this morphologically diverse clade.

One well-supported clade corresponds to Orcuttieae, the lone tribe in Clayton and Renvoize (1986) that is monophyletic in our study. Peterson et al. (2007) treated this clade as subtribe Orcuttiinae. All three genera were sampled in the *mat*K (Hilu and Alice 2001), *trn*L–F (Fig. 2), and ITS (Fig. 3) phylogenies. In each phylogeny *Neostapfia* Burtt Davy is sister to the *Orcuttia* Vasey–*Tuctoria* Reeder clade, although relationships lack statistical support in the *trn*L–F trees. This topology supports Roalson and Columbus's (1999) hypothesis of relationships based on non-molecular data.

The largest clade within Cynodonteae that resolved with statistical support in our study consists of Muhlenbergia and nine other genera (the Muhlenbergia clade, Fig. 2-4). Although there are some topological differences between the *trn*L–F and ITS trees, the conflict involves clades lacking statistical support in one or both phylogenies. Relationships among Chaboissaea, Schedonnardus, and Lycurus Kunth-Schaffnerella remain uncertain, but the position of M. ra*mulosa* is well supported in the *trn*L-F and *trn*L-F + ITS trees. As testament to homoplasy in inflorescence form, genera in the Muhlenbergia clade (= subtribe Muhlenbergiinae, Peterson et al. 2007) were classified in two tribes and four subtribes by Clayton and Renvoize (1986; Fig. 4), although most species share membranous ligules, one floret per spikelet, and three-nerved lemmas. Redfieldia Vasey is intriguing in having a ligule of hairs and two or more florets per spikelet. The genus is also in the *Muhlenbergia* clade in Duvall et al.'s (1994) phylogenetic study based on chloroplast restriction site variation. Because of the anomalous morphological features, the authors suggested that the monotypic Redfieldia may be of hybrid origin, involving a species outside the clade, but there is no evidence for this based on our molecular phylogenies. As in Duvall et al. (1994), Muhlenbergia is not monophyletic in our study.

Another large clade that is well supported in the ITS and trnL-F + ITS trees but not in the trnL-F phylogeny is the Chloris clade (Fig. 2-4), including Chloris, Cynodon, Enteropogon Nees, Eustachys, Microchloa, Trichloris E. Fourn. ex Benth., and two of three sampled species of Leptochloa. Peterson et al. (2007) placed all of these genera in subtribe Chloridinae except for Leptochloa (incertae sedis). Inflorescences of all members of the Chloris clade bear only nondeciduous primary branches, the spikelets arranged along one side, and the lemmas are three nerved. Except for the two species of *Leptochloa* we sampled, which have multiple fertile florets per spikelet, the other genera in the clade share a single fertile floret per spikelet, usually accompanied by one or more sterile upper florets. This distinction led Clayton and Renvoize (1986) to place Leptochloa in Eragrostideae apart from the other genera in Cynodonteae. Each genus in the *Chloris* clade that is represented in our study by two or more species-Chloris, Enteropogon, and Leptochloa-is not monophyletic in the matK (Hilu and Alice 2001), trnL-F (Fig. 2), and ITS (Fig. 3) phylogenies. The third species of Leptochloa we sampled, L. panicea, forms a well-supported clade with Dinebra Jacq. outside the Chloris clade. In the *mat*K phylogeny, *Dinebra*, *Eleusine*, and several other genera that we did not sample form a clade (C_1) with the genera represented in our Chloris clade (Hilu and Alice

2001). Phillips (1973), in a taxonomic revision of *Dinebra*, stated that the genus is closely related to *Leptochloa*, differing in part by its deciduous inflorescence branches. Additional data are required to evaluate relationships between *Chloris* and its near relatives.

Erioneuron is well supported as sister to the *Dasyochloa–Munroa* clade in our molecular phylogenies (Fig. 2–4). This topology differs from an analysis of chloroplast restriction site variation in Duvall et al. (1994), wherein *Dasyochloa* is sister to *Erioneuron–Munroa*. In 1961, Tateoka conducted a study of *Tridens*, at the time circumscribed to include *Dasyochloa* and *Erioneuron*. Based on morphological, anatomical, and cytological evidence, he resurrected *Erioneuron*, treated *Dasyochloa* as a synonym therein, and hypothesized a closer relationship of the genus to *Munroa* than to *Tridens*. Originating from a study by Sánchez (1983), *Dasyochloa* is now widely recognized. For a fuller discussion of these genera, including the characters they share, see Peterson et al. (1995, 1997, 2007). These authors placed the three genera in subtribe Munroinae.

Even with Dasyochloa and Erioneuron removed, Tridens is not monophyletic in the trnL-F and ITS phylogenies (Fig. 2, 3). As discussed above, T. flavus and Pappophorum form a well-supported clade in both phylogenies. Tridens muticus, on the other hand, forms a clade with Gouinia E. Fourn. ex Benth. & Hook. f. and Vasevochloa Hitchc. The clade is well supported in all but the trnL-F analysis, wherein the relationships among the three taxa are also unresolved. In the ITS and trnL-F + ITS trees (Fig. 3, 4), Vaseyochloa is sister to Gouinia-T. muticus, a relationship that receives bootstrap support. Furthermore, in the same trees, Triplasis P. Beauv. is sister to the Gouinia-Tridens muticus-Vasevochloa clade, a relationship also receiving support. Peterson et al. (2007) placed Gouinia and Vaseyochloa in subtribe Gouiniinae (Tridens and Triplasis were treated as incertae sedis). These four taxa have inflorescences of primary branches only, these persistent and rarely rebranched, pedicellate spikelets with multiple fertile florets, and hairs along the central and marginal nerves of the lemma.

Another interesting result of our analyses is the well-supported *Tragus* Haller–*Willkommia* Hack. clade (Fig. 2–4). Clayton and Renvoize (1986) treated these genera in separate subtribes of Cynodonteae—Zoysiinae and Chloridinae, respectively. Peterson et al. (2007) placed *Tragus* and *Willkommia* in subtribe Traginae. The genera differ in a number aspects, most notably in the five to seven rows of long, usually hooked projections on the upper glume of *Tragus*. However, traits in common include inflorescences with primary branches only, dorsally compressed spikelets, a single floret per spikelet, and three-nerved lemmas.

The remaining well-supported clades in the *trnL*–F and ITS phylogenies are the *Bouteloua* and *Distichlis* clades (Fig. 2–4). Because *Aegopogon* and *Schaffnerella* are in the well-supported *Muhlenbergia* clade, Clayton and Renvoize's (1986) Boutelouinae are rejected as monophyletic. Columbus et al. (1998, 2000) carried out molecular phylogenetic studies of the *Bouteloua* clade based on *trnL*–F and ITS sequences. In the *Distichlis* clade, *Reederochloa* and *Monanthochloë* are well supported as sister. Low resolution in the Cynodonteae clade leaves open the possibility that Monanthochloinae sensu Clayton and Renvoize (1986) are mono-

phyletic. Peterson et al. (2007) placed the members of these two clades in Boutelouinae (= *Bouteloua*) and Monanthochloinae, respectively.

Concluding Remarks

The results of this study, in concert with previous research, point to significant homoplasy in morphological characters which hinders efforts to produce a classification of Chloridoideae based on common ancestry. The problem is by no means restricted to the subfamily, yet the molecular phylogenies indicate homoplasy in all of the principal characters that have been employed in classification of the chloridoids, notably inflorescence type, number of florets per spikelet, and number of lemma nerves. Although far from exhaustive, a great deal is known about the morphology, anatomy, and cytology of chloridoid grasses. Where we are most deficient, however, is in our understanding of phylogenetic relationships. Large molecular studies are needed not only to improve the classification of this diverse, widespread group, but also to evaluate existing morphological, anatomical, and other data in a phylogenetic context to gain new insights into character evolution and biogeography.

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