

SANDRA S. ALISCIONI, LILIANA M. GIUSSANI, FERNANDO O. ZULOAGA, AND ELIZABETH A. KELLOGG. 2003. A molecular phylogeny of *Panicum* (Poaceae: Paniceae): tests of monophyly and phylogenetic placement within the Panicoideae. *American Journal of Botany* 90(5): 796-821.

**Appendix 1.** List of taxa used in the analyses, voucher information of new sequences, chromosome numbers of *Panicum* s. l. species, and GenBank accession numbers. Taxonomic arrangement follows GPWG (2001) for subfamily and tribe classification, and Zuloaga (1987a) for *Panicum*. Abbreviations for voucher specimens of new sequences are BE = Becky Erickson; D = Deginani; E = Ekman; FZ = F. Zuloaga; G = Gutierrez et al.; Ge = Gereau; GD = G. Davidse; LMG = L. M. Giussani; O&H = Ortiz and Huber; OM = O. Morrone; O&B = Orzell and Bridges; P = Polley et al.; R = Reekmans; S&M = Stevens and Martínez; TF = T. Filgueiras; W = Wheeler; and Z&T = Zardini and Tilleria. Herbarium location is indicated by acronyms in parentheses: MO = Missouri Botanical Garden; SI = Instituto de Botánica Darwinion. Abbreviations for references documenting chromosome numbers are: AVA = Ahsan, Vahidy, and Ali (1994); B = Brown (1948, 1950); BS = Bir and Sahni (1983, 1986); Bu = Burton (1942); DP = Davidse and Pohl (1972, 1978); D = Dujardin (1979); DZ = Dubcovsky and Zuloaga (1991); F = Fairbrothers (1954); G = Gould (1968); GS = Gould and Soderstrom (1967); H = Haroun (1995); HD = Hoshino and Davidse (1988); HHMR = Hamoud et al. (1994); HQV = Honfi et al. 1991 [1990]; HZME = Hunziker et al. (1998); KH = Kessler and Hatch (1984); Ko = Koul and Gohil (1991); LL = Love and Love (1981); MHZE = Morrone et al. (1995); N = Núñez (1952); NQK = Norrmann et al. (1994); Pa = Parodi (1925, 1946); PD = Pohl and Davidse, 1971; RZ = Renvoize and Zuloaga (1984); RV = Riley and Vogel (1982); SBS = Sinha et al. (1990); S = Spellenberg (1970); U = Uhríkova (1978); WD = Watson and Dallwitz (1992); Z = Zuloaga (1987a, 1987b, 1989); ZS = Zuloaga and Sendulsky = 1988; ZMD = Zuloaga et al. (1989); ZEM = Zuloaga et al. (1992); ZSM = Zuloaga et al. (1986).

\* = published GenBank sequence from Clark et al. 1995; \*\* = published GenBank sequence from Spangler et al. 1999; \*\*\* = published GenBank sequence from Giussani et al. 2001.

### **Subfamily Panicoideae**

#### **Tribe Andropogoneae**

*Andropogon gerardii* Vitman; AF117391 \*\*  
*Bothriochloa bladhii* (Retz.) S. T. Blake; AF117395 \*\*  
*Chionachne koenigii* (Spreng.) Thwaites; AF117397 \*\*  
*Cymbopogon flexuosus* (Nees ex Steud.) J.F. Watson; AF117404 \*\*  
*Phacelurus digitatus* (Sibth. & Sm.) Griseb.; AF117418 \*\*  
*Sorghum bicolor* (L.) Moench; U21981 \*  
*Zea mays* L.; U21985 \*

#### **Tribe Arundinelleae (Panicoideae)**

*Arundinella hirta* (Thunb.) Tanaka; AF117393 \*\*

#### **Tribe Paniceae (Panicoideae), not *Panicum***

*Acroceras zizanioides* (Kunth) Dandy; AY029618 \*\*\*  
*Altoparadisium chapadense* Filg., Davidse, AY029619 \*\*\*  
*Anthaenantiopsis rojasiana* Parodi; AY029620 \*\*\*  
*Arthropogon villosus* Nees; AY029622 \*\*\*  
*Axonopus anceps* (Mez) Hitchc.; AY029623 \*\*\*  
*Brachiaria eruciformis* (Sm.) Griseb.; FZ and OM 7045; AY188452

*Canastra lanceolata* (Filg.) Morrone et al.; AY029621 \*\*\*  
*Cenchrus ciliaris* L.; AY029625 \*\*\*  
*Chaetium bromoides* (J.Presl) Benth. ex Hemsl.; AY029626 \*\*\*  
*Digitaria setigera* Roth ex Roem. and Schult.; AY029629 \*\*\*  
*Echinochloa colona* (L.) Link; FZ, 6769 (SI); AY029631 \*\*\*  
*Echinolaena inflexa* (Poir.) Chase; AY029633 \*\*\*  
*Eriochloa punctata* (L.) Desv.; AY029634 \*\*\*  
*Homolepis glutinosa* (Sw.) Zuloaga and Soderstr.; AY029637 \*\*\*  
*Hymenachne donacifolia* (Raddi) Chase; AY029635 \*\*\*  
*Ichnanthus pallens* (Sw.) Munro ex Benth.; AY029638 \*\*\*  
*Lasiacis sorghoidea* (Desv.) Hitchc. and Chase; AY029639 \*\*\*  
*Leptocoryphium lanatum* (Kunth) Nees; AY029640 \*\*\*  
*Melinis repens* (Willd.) Zizka; AY029675 \*\*\*  
*Mesosetum chaseae* Luces; AY029641 \*\*\*  
*Ophiochloa hydrolithica* Filg., AY029642 \*\*\*  
*Oplismenopsis najada* (Hack. & Arechav.) Parodi; FZ and OM, 7030; AY188453  
*Oplismenus hirtellus* (L.) P. Beauv.; AY029644 \*\*\*  
*Otachyrium versicolor* (Döll) Henrard; AY029643 \*\*\*  
*Paspalidium geminatum* (Forssk.) Stapf; AY029662 \*\*\*  
*Paspalum* L.  
 Group Conjugata; *P. conjugatum* Bergius; AY029669 \*\*\*,  
 Group Disticha; *P. vaginatum* Sw.; AY029665 \*\*\*  
 Group Livida; *P. remotum* J. Remy; AY029668 \*\*\*  
 Group Quadrifaria; *P. arundinellum* Mez; AY029663 \*\*\*  
*Pennisetum alopecuroides* (L.) Spreng.; AY029672 \*\*\*  
*P. montanum* (Griseb.) Hack.; Z sn (SI); AY188498  
*P. setaceum* (Forssk.) Chiov.; AY029673 \*\*\*  
*Plagiantha tenella* Renvoize; AY029674 \*\*\*  
*Pseudechinolaena polystachya* (Kunth) Stapf; AY029676 \*\*\*  
*Sacciolepis indica* (L.) Chase; AY029677 \*\*\*  
*Setaria lachnea* (Nees) Kunth; AY029683 \*\*\*  
*S. macrostachya* Kunth; AY029678 \*\*\*  
*S. parviflora* (Poir.) Kerguélen; AY029682 \*\*\*  
*S. viridis* (L.) P. Beauv.; U21976 \*  
*Stenotaphrum secundatum* (Walter) Kuntze; AY029684 \*\*\*  
*Streptostachys asperifolia* Desv.; AY029687 \*\*\*  
*S. ramosa* Zuloaga & Soderstr.; AY029686 \*\*\*  
*Tatianyx arnacites* (Trin.) Zuloaga & Soderstr.; AY029688 \*\*\*  
*Thrasya glaziovii* A.G.Burm.; AY029689 \*\*\*  
*Urochloa acuminata* (Renvoize) Morrone & Zuloaga; AY029692 \*\*\*  
*U. plantaginea* (Link) R.D. Webster; AY029693 \*\*\*

## ***Panicum* L.**

### **Subgenus *Agrostoides* Zuloaga**

#### **Section *Agrostioidea* (Hitchc. & Chase) Hsu**

*Panicum anceps* Michx.; BE, 79 (MO);  $x = 9$  (Bu; B, 1948; G); AY188455

*P. rigidulum* Bosc ex Nees; GD, 37901 (MO);  $x = 9$  (B, 1948); AY188482

#### **Section *Bulbosa* Zuloaga**

*P. bulbosum* Kunth;  $x = 9$  (Z, 1987a; HHMR); AY029648 \*\*\*

#### **Section *Obtusa* Pilg.**

*P. obtusum* Kunth;  $x = 10$  (B, 1950; Z, 1987a); AY029659 \*\*\*

#### **Section *Prionitia* Zuloaga**

*P. petersonii* Hitchc. & Ekman; E, s.n. (MO);  $x =$  unknown; AY188479

*P. prionitis* Nees;  $x = 10$  (Z, 1987a; 1989); AY029652 \*\*\*

**Section Tenera (Hitc. & Chase) Pilg.**

*P. caricoides* Nees ex Trin.; O&H, 4450 (MO); *x* = unknown; AY188458

*P. stenodes* Griseb.; G, 1177 (MO); *x* = 10 (PD); AY188487

*P. tenerum* Beyr. ex Trin.; O&B, 8453 (MO); *x* = 10 (DP, 1972); AY188491

**Section Tuerckheimiana Zuloaga**

*P. tuerckheimii* Hack.; S&M, 25890 (MO); *x* = unknown; AY188494

**Section Valida Zuloaga & Morrone**

*P. validum* Mez; FZ, 7032 (SI); *x* = 10 (ZMD); AY188495

**Ungrouped**

*P. antidotale* Retz.; FZ, 7091 (SI); *x* = 9 (BS, 1986, SBS, KG, AVA, HHMR); AY188456

**Subgenus Dichantherium Hitc. & Chase**

**Section Cordovensia (Hitc. & Chase) Parodi**

*P. cordovense* E. Fourn.; FZ, 6718 (SI); *x* = 9 (DP, 1978); AY188463

*P. missionum* Ekman; FZ, 7201 (SI); *x* = 10 (GS); AY188473

*P. ovuliferum* Trin.; *x* = 9 (ZSM; Z, 1987a); AY029653 \*\*\*

**Section Dichantherium**

*P. acuminatum* Sw.; GD, 37918 (MO); *x* = 9 (S); AY188485

*P. clandestinum* L.; GD, 37887 (MO); *x* = 9 (S); AY188461

*P. cumbucana* Renvoize; FZ, 6975 (SI); *x* = unknown; AY188464

*P. koolauense* H. St. John and Hosaka; *x* = 9 (Z, 1987a; WD; HZME); AY029627 \*\*\*

*P. penicillatum* Nees ex Trin.; TF, 2254 (SI); *x* = 9 (MHZE); AY188477

*P. sabulorum* Lam.; *x* = 9 (DZ); AY029654 \*\*\*

**Subgenus Megathyrsus Pilg.**

*Panicum maximum* Jacq. [= *Urochloa maxima* (Jacq.) R.D. Webster]; *x* = 8, 9, 16 (D; HD; AVA); AY029649

**Subgenus Panicum**

**Section Dichotomiflora (Hitc. and Chase) Honda**

*P. aquaticum* Poir.; *x* = 9 (Z, 1987b; 1989); AY029658 \*\*\*

*P. dichotomiflorum* Michx.; FZ, 7120 (SI); *x* = 9 (DZ; HHMR); AY188466

*P. elephantipes* Nees ex Trin.; *x* = 9 (Z, 1987b; 1989); AY029647 \*\*\*

*P. gouinii* E. Fourn.; FZ, 7047 (SI); *x* = 9, 10 (Pa, 1946; N); AY188467

*P. pedersenii* Zuloaga; *x* = 9 (Z, 1987b); AY029646 \*\*\*

*P. repens* L.; *x* = 9 (D; BS, 1986; SBS; AVA; H); AY029651 \*\*\*

**Section Panicum**

*P. bergii* Arechav.; FZ, 6778 (SI); *x* = 9 (DZ); AY188457

*P. fauriei* Hitc.; *x* = 9 (Z, 1987b); AY029650 \*\*\*

*P. miliaceum* L.; OM, 3606 (SI); *x* = 9 (U; AVA; HHMR; H); AY188472

*P. nephelophilum* Gaudich.; *x* = 9 (Z, 1987b); AY029645 \*\*\*

*P. stramineum* Hitc. & Chase; OM, 3331 (SI); *x* = 9 (F); AY188489

**Section Rudgeana Zuloaga**

*P. cervicatum* Chase; TF, 3483 (SI); *x* = 9 (DZ); AY188459

*P. rudgei* Roem. & Schult.; *x* = 9 (DP, 1978; Z, 1987b; DZ); AY029661 \*\*\*

**Section Urvilleana (Hitc. & Chase) Pilg.**

*P. chloroleucum* Griseb.; D, 807 (SI); *x* = unknown; AY188460

*P. racemosum* (P. Beauv.) Spreng.; FZ, s.n. (SI); *x* = 9 (N); AY188481

**Section Virgata (Hitc. & Chase) Pilg.**

*P. tricholaenoides* Steud.; FZ and OM, 7036; *x* = 9 (Pa, 1946; N); AY188493

*P. virgatum* L.; *x* = 9 (LL; RV; HHMR); U21986 \*

**Ungrouped**

*P. mistasypus* Zuloaga & Morrone; TF, 2111 (SI); *x* = unknown; AY188474

*P. olyroides* Kunth; FZ, 7195 (SI); *x* = 9 (DP, 1978; DZ; NQK); AY188475

**Subgenus Phanopyrum (Hitchc.) Zuloaga**

**Section Laxa (Hitchc. & Chase) Pilg.**

- P. grumosum* Nees; OM, s.n. (SI);  $x = 10$  (N); AY188468  
*P. hylaeicum* Mez; FZ, 6789 (SI);  $x = 10$  (DP, 1978); AY188470  
*P. laxum* Sw.;  $x = 10$  (DP, 1978; Z, 1987a; ZEM; NQK); AY029655 \*\*\*  
*P. pernambucense* (Spreng.) Mez ex Pilg.; FZ, 7037 (SI);  $x = 10$  (DZ); AY188478  
*P. pilosum* Sw.; OM, 2122 (SI);  $x = 10$  (DP, 1978; DZ); AY188480

**Section Lorea Zuloaga**

- P. euprepes* Renvoize;  $x = 10$  (RZ; Z, 1987a; MHZE); AY029657 \*\*\*  
*P. subtiramilosum* Renvoize & Zuloaga; FZ, s.n. (SI);  $x =$  unknown; AY188490

**Section Megista Pilg.**

- P. mertensii* Roth; Z&T, 33397 (MO);  $x = 9, 10$  (PD; DP, 1978; NQK); AY188471

**Section Monticola Stapf**

- P. millegrana* Poir.;  $x = 9$  (Z, 1987a; 1989); AY029660 \*\*\*  
*P. sellowii* Nees; FZ, 2123 (SI);  $x = 9$  (PD); AY188484

**Section Parvifolia (Hitchc. & Chase) Pilg.**

- P. cyanescens* Nees ex Trin.; TF, 2113 (SI);  $x = 9$  (D; DZ; MHZE); AY188465  
*P. parvifolium* Lam.; FZ, s.n. (SI);  $x = 9$  (DP, 1978); AY188476  
*P. schwackeanum* Mez; OM, 115 (SI);  $x =$  unknown; AY188483  
*P. trichanthum* Nees; FZ, 7034 (SI);  $x = 9$  (DP, 1978; HQV; NQK); AY188492  
*P. wettsteinii* Hack.; FZ, 6972 (SI);  $x = 9$  (MHZE); AY188497

**Section Phanopyrum Raf.**

- P. gymnocarpon* Elliott; P, 54 (MO);  $x = 10$  (KH); AY188469

**Section Stolonifera (Hitchc. & Chase) Pilg.**

- P. piauiense* Swallen;  $x = 10$  (Z, 1987a; ZS); AY029656 \*\*\*  
*P. stoloniferum* Poir.; D, 1806 (SI);  $x =$  unknown; AY188488  
*P. chapadense* Swallen; FZ, s.n. (SI);  $x =$  unknown; AY188486

**Section Verrucosa (Hitchc. & Chase) Hsu**

- P. verrucosum* Muhl.; W, s.n. (MO);  $x = 9$  (B, 1948); AY188496

**Section Clavelligera Stapf**

- P. adenophorum* K. Schum.; R, 5436 (MO);  $x =$  unknown; AY188454  
*P. claytonii* Renvoize; Ge, 2986 (MO);  $x =$  unknown; AY188462

**Subgenus Steinchisma Raf.**

- Panicum decipiens* Nees ex Trin. [= *Steinchisma decipiens* (Nees ex Trin.) W.V. Br.]; FZ, 2169 (SI);  $x = 10$  (DZ); AY188499  
*P. hians* Elliott [= *Steinchisma hians* (Elliott) Nash];  $x = 10$  (DZ); AY029685 \*\*\*  
*P. spathellosum* Döll [= *Steinchisma spathellosa* (Döll) Renvoize]; OM and LMG, s.n. (SI);  $x = 10$  (DZ); AY188500

**Subfamily Centothecoideae**

- Chasmanthium laxum* (L.) H.O. Yates subsp. *sessiliflorum* (Poir.) L. G. Clark; U27296 \*  
*Danthoniopsis dinteri* (Pilg.) C.E. Hubb.; AY029695 \*\*\*  
*Thysanolaena maxima* (Roxb.) Kuntze; U21984 \*  
*Zeugites pittieri* Hack.; U21987 \*

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