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BRACHIARIA GRISEB. AND *UROCHLOA* P.— BEAUV. (POACEAE) IN INDIA - A CONSPECTUS

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The grass genera *Panicum* L., *Brachiaria* (Trin.) Griseb., and *Urochloa* P. Beauv., are closely related. *Brachiaria* was a section under *Panicum* and it was Grisebach who elevated it to the generic rank. Nash (1903) recognized the adaxial orientation of the spikelets as the diagnostic feature of this genus and transferred some species of *Panicum* to *Brachiaria*. Similarly Stapf (1919) brought many American species of *Panicum* to this genus. According to him the presence of racemose branches is the most important character that separates it from *Panicum*. Various other authors also used this character and nature of the spikelet orientation to separate these two genera. Chase (1920) states that in *Brachiaria* spikelets are adaxial whereas in *Panicum* they are abaxial. Studies made by Webster (1987) clearly indicate that in many cases *Panicum* species also show adaxial spikelet orientation and have racemose primary branches. There are also many species that show characters intermediate between that of racemes and panicles. According to him, the most reliable characters to separate *Brachiaria* and *Panicum* are the form of the inflorescence, dorsiventral main axis and discoid pedicel apices of *Brachiaria*.

Basappa and Muniyamma (1983) based on their biosystematic studies erected some new species and varieties under the generic name *Brachiaria*. Since polymorphism in chromosome nature is a widely recognized character of Poaceae (see Darlington and Wylie, 1955 ; Tateoka, 1960), exhibiting all types and degrees of ploidy levels, this data may not be of great help in ascertaining the separate status of the individual taxa. A detailed study of the isotypes available in MH clearly indicates that some of these new taxa are to be relegated to synonymy.

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Various authors like Fischer (1957) and Bor (1960) use the orientation of the spikelets to separate *Brachiaria* and *Urochloa*. Cope (1982) states, "*Urochloa* is distinguished from *Brachiaria* by its abaxial cuspidate spikelets with mucronate upper lemma" while admitting that the boundary between these two genera is confused by a number of intermediate or anomalous species. But in reality both these characters are found to be inadequate for separating these two genera.

The futility of the use of the mucronate tip as a reliable character is well illustrated by *Urochloa setigera* (Retz.) Stapf. The African forms of this plant have the upper lemma with very well developed and distinct mucro. But in Asia this plant has only mucronulate upper lemma and is thus often identified as a *Brachiaria*. This size of the mucro is also variable in different forms. In the key given by Cope (*l.c.* p. 160) the range of length of the mucro in *Urochloa* is given as 0.3 to 1.2 mm. Many species at present treated under *Brachiaria* like *B. distachya*, *B. reptans*, *B. ovalis* and similar others also have acute to mucronate tips, thus making this character of dubious value for recognizing these two genera.

Cope (*l.c.*) considers the orientation of the spikelets on the raceme to be a better character than the other one already discussed and admits that even this is not obvious in plants where the spikelets are borne in pairs. Then the question arises as to where the plants with only paired spikelets can be placed. A detailed study of spikelet orientation in *Urochloa reptans* conducted by Webster (*l.c.*) has yielded some interesting

results. In this species the spikelets are usually solitary towards the base as well as the apex of the primary rachis and paired at the middle. In the paired ones, the lower one was observed to be adaxial whereas the basal solitary ones are abaxial and the upper ones adaxial. From the presence of vestigeal spikelets below or above the fertile spikelets he concludes that when the upper one of the pair is fertile - it is abaxial and when the lower one is fertile it is adaxial. This type of mixed orientation of the spikelets clearly indicates that this character also does not have any utility in the separation of these two genera. Webster (*l.c.*) concludes that *Brachiaria* should be limited to its type species *B. eruciformis* (Sm.) Griseb. and taxa with a similar morphology of the upper spikelet and suggests that other species at present treated under this genus should find a place under *Urochloa*. He also transfers *Panicum maximum* Jacq. to *Urochloa* as it has also a rugose upper lemma as in the case of the latter genus. The view of Webster (*l.c.*) seems to be the most plausible one to solve this taxonomic muddle. Some Indian species treated under *Brachiaria* at present do not have a name under *Urochloa*. These new combinations and the enumeration of all Indian species of the two genera are presented here.

Brachiaria eruciformis (Sm.) Griseb. in Ledeb., Fl. Ross. 4 : 469. 1853 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 283. 1960. *Panicum eruciforme* Sm. in Sibth. & Sm., Fl. Graec. I : 44, t. 59. 1806. *Brachiaria eruciformis* (Sm.) Griseb. var. *divaricata* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 379. 1983, *syn. nov.*

Basappa & Muniyamma (*l.c.*) distinguish the new variety *divaricata* based on the divaricate nature of the racemes which are also pulvinate at the base. The isotype available in MH clearly indicates that this is only an age related phenomenon. On this sheet the younger racemes found towards the apex of the inflorescence are adpressed to the central axis and without any pulvinus whereas the lower older racemes are pulvinate and divaricate.

Urochloa brizantha (Hochst. ex A. Rich.) R.D. Webster, Austr. Panic. 233. 1987. *Panicum brizanthum* Hochst. ex A. Rich., Tent. Fl. Abyss. 2 : 363. 1851. *Brachiaria brizantha* (Hochst. ex A. Rich.) Stapf in Prain, Fl. Trop. Africa 9 : 531. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 281. 1960.

var. **brizantha**

var. **ciliata** (Basappa & Muniy.) Ashalatha & V. J. Nair *comb. nov. Brachiaria brizantha* (Hochst. ex A. Rich.) Stapf var. *ciliata* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 378. 1983.

U. **chennaveeraiana** (Basappa & Muniy.) Ashalatha & V. J. Nair *comb. nov. Brachiaria chennaveeraiana* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 378. 1983.

U. **decumbens** (Stapf) R.D. Webster, Austr. Panic. 234. 1987. *Brachiaria decumbens* Stapf in Prain, Fl. Trop. Africa 9 : 528. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 281. 1960.

U. **deflexa** (Schumach.) Ashalatha & V. J. Nair *comb. nov. Panicum deflexum* Schumach., Beskr. Guin. Pl. 63. 1827. *Brachiaria deflexa* (Schumach.) C.E. Hubb. ex Robyns in Bull. Jard. Bot. Etat. 9 : 181. 1932 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 281. 1960 ; Cope in Nasir & Ali, Fl. Pak. 143 : 206. 1982. *Pseudobrachiaria deflexa* (Schumach.) Launert in Mitt. Bot. Staatssamml. Muenchen 8: 158. 1970.

U. **distachya** (L.) Nguyen in Novosti Sist. Vyssh. Rast. 1966 : 13. 1966. *Panicum distachyum* L., Mant. Pl. 1 : 183. 1771. *Brachiaria distachya* (L.) Stapf in Prain, Fl. Trop. Africa 9 : 565. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 281. 1960.

U. **hybrida** (Basappa & Muniy.) Ashalatha & V. J. Nair *comb. nov. Brachiaria hybrida* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 379. 1983.

Urochloa kurzii (Hook. f.) Nguyen in Novosti Sist. Vyssh. Rast. 1966 : 13. 1966 ; R. D. Webster, Austr. Panic. 241. 1987. *Panicum kurzii* Hook. f., Fl. Brit. India 7 : 38. 1896. *Brachiaria kurzii* (Hook. f.) A. Camus in Lecomte, Fl. Indo-Chine 7 : 438. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 283. 1960.

U. **lata** (Schumach.) C. E. Hubb. in Kew Bull. 1934 : 112. 1934. *Panicum latum* Schumach. Beskr. Guin. Pl. 61. 1827. *Brachiaria lata* (Schumach.) C. E. Hubb. in Hook. Icon. Pl. subt. 3363. in adnot 1938, incl. var. *pubescens* C. E. Hubb.; Bor, Grass. Burm. Ceyl. Ind. Pak. 283. 1960.

U. **maxima** (Jacq.) R. D. Webster, Austr. Panic. 241.1987. *Panicum maximum* Jacq., Icon. Pl. Rar. 1: 2. 1781.

U. **mosambicensis** (Hack.) Dandy in J. Bot. 69: 54. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak. 372. 1960. *Panicum mosambicense* Hack. in Bolet. Soc. Brot. 6 : 140. 1888. *Urochloa pullulans* Stapf in Prain, Fl. Trop. Africa 9 : 590. 1920 ; Bor, *l.c.* 373.

U. **munae** (Basappa) Ashalatha & V. J. Nair *comb. nov. Brachiaria munae* Basappa in Proc. Indian Acad. Sci. 93 : 53. f. 1. 1984.

U. **mutica** (Forssk.) Nguyen, Novosti Sist. Vyssh. Rast. 1966 : 13. 1966; R.D. Webster, Austr. Panic. 244. 1987. *Panicum muticum* Forssk., Fl. Aegypt.-Arab. 20. 1775. *Brachiaria mutica* (Forssk.) Stapf in Prain, Fl. Trop. Africa 9 : 526. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 284. 1960.

U. **nilagirica** (Bor) Ashalatha & V. J. Nair *comb. nov. Brachiaria nilagirica* Bor, in Bot. Tidsskr. 67 : 325.1973.

U. **oligotricha** (Fig. & De Not.) Henrard in Blumea 502. 1941; R.D. Webster, Austr. Panic. 245. 1987. *Panicum oligotrichum* Fig. & De Not., Mem. Acad. Sci. Turin ser. 2, 14: 333. 1853. *Urochloa bulbodes* (Steud.) Stapf in Prain, Fl. Trop. Africa 9 : 593. 1920 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 372. 1960. *Helopus bulbodes* Steud., Syn. Pl. Glumac. 1 : 100. 1854.

U. **panicoides** P. Beauv., Ess. Agrost. 53. t. 11, f. 1. 1812, incl. var. *marathensis* Bor, *pubescens* Bor et *velutina* Bor ; Bor, Grass. Burm. Ceyl. Ind. Pak. 372. 1960; R.D. Webster, Austr. Panic. 246. 1987; Cope in Nasir & Ali, Fl. Pak. 143: 209. 1982. *Panicum javanicum* Poir. in Lam., Encycl. 4: 274. 1816. *Urochloa pubescens* Kunth, Revis. Gramin. 1 : 31. 1829. *Urochloa marathensis* Henrard in Meded. Rijks-Herb. 43 : 2. 1922, incl. var. *velutina* Henrard.

U. **paspaloides** J. Presl. ex C. Presl. Rel. Haenk. 1: 318. 1830. *Brachiaria paspaloides* (J. Presl. ex C. Presl.) C. E. Hubb. in Hook. Icon. Pl. subt. 3363. 1938; Bor, Grass. Burm. Ceyl. Ind. Pak. 284. 1960.

U. **ramosa** (L.) Nguyen in Novosti Sist. Vyssh. Rast. 1966 : 13. 1966 ; R.D. Webster, Austr. Panic. 251. 1987. *Panicum ramosum* L., Mant. Pl. 1 : 29. 1767. *Brachiaria ramosa* (L.) Stapf in Prain, Fl. Trop. Africa 9 : 542. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 284. 1960. *Brachiaria ramosa* (L.) Stapf var. *pubescens* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 380. 1983, *syn. nov.*

Urochloa ramosa is a polymorphic species showing all types of variations including the nature of the indumentum. It is very difficult to maintain var. *pubescens* as a separate entity.

U. **remota** (Retz.) Ashalatha & V. J. Nair *comb. nov. Panicum remotum* Retz., Obs. Bot. 4 : 17. 1786. *Brachiaria remota* (Retz.) Haines, Bot. Bihar, Orissa 1005. 1924; Bor, Grass. Burm. Ceyl. Ind. Pak. 285. 1960.

U. **reptans** (Linn.) Stapf in Prain, Fl. Trop. Africa 9 : 601. 1920 ; R.D. Webster, Austr. Panic. 251. 1987. *Panicum reptans* L., Syst. Nat. ed. 10. 870. 1759. *Brachiaria reptans* (L.) Gard. & C. E. Hubb. in Hook. Icon. Pl. subt. 3363. 1938; Bor, Grass. Burm. Ceyl.

Ind. Pak. 285. 1960. *Brachiaria reptans* (L.) Gard. & C. E. Hubb. var. *hispida* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 380. 1983, *syn. nov.*

The variety *hispida* erected by Basappa & Muniyamma is based on the degree of hairiness on the spikelets. This variety has also the chromosome number, n = 7, just like the typical variety. Even on the apparently glabrous spikelets short appressed hairs are often found. The degree of pubescence was observed to be very variable and when the caryopsis matures these hairs totally disappear. The variety is very difficult to be maintained as a separate entity.

Urochloa semiundulata (Hochst. ex A. Rich.) Ashalatha & V.J. Nair *comb. nov. Panicum semiundulatum* Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 364. 1851. *Brachiaria semiundulata* (Hochst. ex A. Rich.) Stapf in Prain, Fl. Trop. Africa 9 : 556. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 285. 1960. *Brachiaria semiundulata* (Hochst. ex A. Rich.) Stapf var. *intermedia* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49: 380. 1983, *syn. nov.*

var. **semiundulata**

The var. *intermedia* scarcely differs from the typical one. The characters mentioned by Basappa & Muniyamma (*l.c.*) are not of much help in keeping it as a separate variety.

var. **lanata** (Basappa & Muniy.) Ashalatha & V. J. Nair *comb. nov.*

Brachiaria semiundulata (Hochst. ex. A. Rich.) Stapf var. *lanata* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49: 380. 1983.

U. **semiverticillata** (Rottler) Ashalatha & V.J. Nair *comb. nov. Panicum semiverticillatum* Rottler in Ainslie, Mat. Med. Hindost. ed. 1. 219. 1813. *Brachiaria semiverticillata* (Rottler) Alston in Trimen, Handb. Fl. Ceylon 6, suppl. 318. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak 286. 1960.

U. **setigera** (Retz.) Stapf in Prain, Fl. Trop. Africa 9 : 598. 1920. *Panicum setigerum* Retz., Obs. Bot. 4 : 15. 1786. *Brachiaria setigera* (Retz.) C. E. Hubb. in Hook. Icon. Pl. 34 : subt. 3363. 1938 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 286. 1960.

var. **setigera**

var. **albistyla** (Basappa & Muniy.) Karth. in Karth. *et al.*, Fl. Ind. Enum. Monocot. 273. 1989. *Brachiaria setigera* (Retz.) Stapf var. *albistyla* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 380. 1983.

U. **stapfiana** (Basappa & Muniy.) Ashalatha & V. J. Nair *comb. nov. Brachiaria stapfiana* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 379. 1983.

U. **subquadripara** (Trin.) R. D. Webster, Austr. Panic. 252. 1987. *Panicum subquadriparum* Trin., Gram. Panic. 145. 1826. *Brachiaria subquadripara* (Trin.) Hitchc. in Lingnan. Sci. J. 7 : 214. 1913 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 286. 1960. *Brachiaria miliiformis* (J. Presl. ex C. Presl.) Chase, Contrib. U.S. Natl. Herb. 22 : 35. 1920 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 283. 1960. *Panicum miliiforme* J. Presl. ex C. Presl. Rel. Haenk. 1:300. 1830.

U. **trichopus** (Hochst.) Stapf in Prain, Fl. Trop. Africa 9 : 589. 1920 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 373. 1960. *Panicum trichopus* Hochst. in Flora 27 : 254. 1844.

U. **villosa** (Lam.) Nguyen in Novosti Sist. Vyssh. Rast. 1966 : 14. 1966. *Panicum villosum* Lam., III. 1: 173. 1791, p.p. *Brachiaria villosa* (Lam.) A. Camus in Lecomte, Fl. Indo-Chine 7 : 433. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 286. 1960.

var. **villosa**

var. **glaberrima** (Basappa & Muniy.) Ashalatha & V.J. Nair *comb. nov. Brachiaria villosa* (Lam.) A. Camus var. *glaberrima* Basappa & Muniy. in Proc. Indian Natl. Sci. Acad. B. 49 : 341. 1983.

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