

***Bothriochloa* (Poaceae: Andropogoneae) in Malesia**

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ABSTRACT. In Malesia there are four species of *Bothriochloa* (Poaceae: Andropogoneae). *Andropogon modesta* is lectotypified.

Keywords. Andropogoneae, *Bothriochloa*, Malesia, Poaceae

Introduction

Bothriochloa Kuntze is a small genus of grasses with about 35 subtropical and tropical species (Clayton et al., 2008). It belongs to the Andropogoneae, a subtribe that is especially developed in the tropics. The species are usually found in areas with a pronounced dry season, where they may become vegetation forming. There is no recent overall revision, only some local accounts, e.g., Deshpande (1984) for India, Vega (2000) for South America, Neamsuvan et al. (2009) for Thailand, and Sumadijaya & Veldkamp (2009) for Malesia.

The generic delimitation is problematic, as *B. bladhii* (Retz.) S.T. Blake, better known as *B. intermedia* (R.Br.) A.Camus or *B. glabra* (Roxb.) A.Camus, is a most curious species (see e.g., Wet & Harlan 1970). In general, the plants are hexaploid and cleistogamous, but occasionally some are outbreeding. The off-spring then is diploid, tetraploid and hexaploid and can hybridise with species with the same ploidy level, not only of *Bothriochloa*, but also with some of *Capillipedium* Stapf and *Dichanthium* Willemet. Thus it is able to transfer genetic information from one genus to another. The F1 of these is cleistogamous again, and so within its area of distribution from Africa to Australia and the Pacific there are a great number of local clonal forms, differing more or less, and causing the description of numerous taxa in all three of these genera. The synonymy is therefore bewildering.

Some have advocated to join the genera into one, the oldest name being *Dichanthium* for it, but then immediately recognise infrageneric taxa in it, one step down, with no knowledge gained (Wet & Harlan, 1968). It may be noted that intergeneric hybrids in grasses are just as common as in orchids, so hybridisation is no argument to join genera.

The diagnostic characters for the taxa are as follows: *Bothriochloa* with spikes in a panicle or subdigitate, partial peduncles not capillary, racemes with more than 10, very slender joints, the pedicels and joints with a longitudinal, translucent, resinous channel. *Capillipedium* has panicles with capillary branches, racemes with up to 9 joints, the pedicels and joints have resinous channels. *Dichanthium* has inflorescences similar to those of *Bothriochloa*, but the pedicels and joints have no resinous channel.

Distribution

Note that *B. bladhii* is the most widespread species which locally may become dominant, yet as far as herbarium records are concerned it is very rare in Borneo and apparently introduced in New Guinea. Only three Bornean specimens were seen in L and SING. Moreover, there is only single specimen collected from Buru island, in the Moluccas. These facts give these areas a higher priority for collection in the future.

Interesting is the disjunct distribution of *B. pertusa*. It occurs from Africa [as *B. insculpta* (Hochst. ex A.Rich.) A.Camus] to Burma and then in Java, Madura, and the Lesser Sunda Islands (Flores, Sawu, Sumba, Sumbawa, Timor). Said to have been introduced, but already in 1858 it was collected by Zollinger in Madura. It may well be an Ice age relictual distribution. This is a pattern that is often seen in species that need a more or less seasonal climate with pronounced dry periods. They follow the former drought tracks from Burma over the Sunda platform, and from Taiwan through the Philippines to Australia during the last Ice Age, when the sea was perhaps 120 m lower than today.

A surprising result of our study was that *B. ewartianus* (Domin) C.E.Hubb. reported in the herbarium and literature for the Lesser Sunda Isl. (Sumbawa, Timor), and Papua New Guinea (Central, Madang) could not be distinguished from *B. ischaemum* (L.) Keng. For its wide distribution in Australia see the map in Mallett & Orchard (2002). For that in Eurasia see Conert (1979).

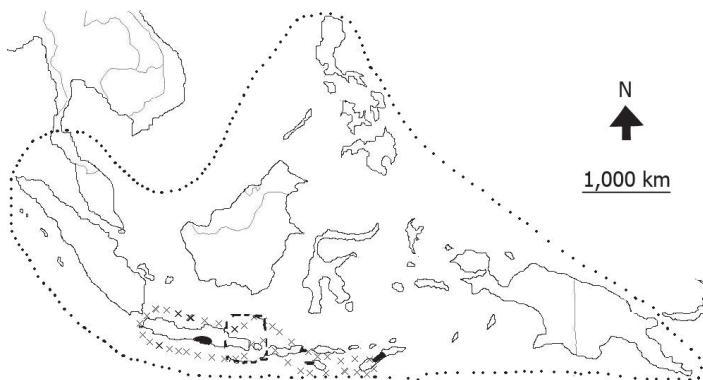


Fig. 1. Distribution of *Bothriochloa* Kuntze in Malesia. Range marked with dots is used for *B. bladhii*, marked with crosses for *B. ischaemum*, and marked with dashes for *B. modesta*; blackened areas indicate *B. pertusa*.

The species are easy to distinguish. Important characters are the relative lengths of the main axis of the inflorescences and of the racemes: main axis longer or shorter than the lowermost racemes; also whether the lowermost racemes are whorled, or fascicled, or solitary; whether there are “pits” on the lower glume. It is not clear what the function of the latter is: it has been suggested that they would be extra-floral nectaries.

Key to the Malesian species

- 1a. Axis of the panicle much longer than the lowermost branches 2
 1b. Axis of the panicle much shorter than the branches 3
- 2a. Axis of the panicle 10–20 cm long, possibly shorter in under-developed specimens. Racemes whorled, the lowermost often branched, with 8–many joints. Widespread *B. bladhii*
 2b. Axis of the panicle 4–8 cm long. Racemes solitary, simple, with 3–6 joints. (E Java, Bawean, Madura, Bali) *B. modesta*
- 3a. Nodes usually glabrous. Blades usually glabrous. Upper glume setulose. (Lesser Sunda Isles, Papua New Guinea) *B. ischaemum*
 3b. Nodes bearded. Blade usually hairy. Upper glume slightly rough. (Lower glume of sessile spikelet 1–3-pitted.) (Java, Madura, Lesser Sunda Isles) *B. pertusa*

LECTOTYPIFICATION: *Andropogon modesta* Backer, the basionym of *Bothriochloa modesta* (Backer) Backer & Henrard is lectotyped here with *Beumée* 2672 (lecto BO; isolecto L, PNH†).

An index to Malesian specimens identified as the various species of *Bothriochloa* is given at the end of this account.

Excluded species

A single collection of *Bothriochloa saccharoides* (Sw.) Rydb. from an experimental garden in Manila was seen in L, with two other collections from that garden (without exact date and year) in BO. Therefore its presence is excluded from Malesia. *Bothriochloa kwashotensis* (Hayata) Ohwi and *B. parviflora* (R.Br.) Ohwi var. *mutispicula* Ohwi belong to *Capillipedium*.

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Appendix A. Index to the specimens.

bla = *Bothriochloa bladhii* (Retz.) S.T. Blake
 isc = *Bothriochloa ischaemum* (L.) Keng
 mod = *Bothriochloa modesta* (Backer) Backer & Henrard
 per = *Bothriochloa pertusa* (L.) A. Camus

Afriastini 1664 (BO): bla; 1808 (BO): bla; *Alston* 15312 (BO): bla; *Alvarez & Fernando* 4195 (BO): bla; *Arendsen Hein* 22 (BO): isc; *Arsin s.n.* (BO): bla; *Ass. Resident Timor s.n.* (BO): bla;

Backer Jul 1918 (L): bla; 134 (BO): bla; 6424 (BO): bla; 6630 (BO): bla; 6883 (BO): bla; 6986 (BO): bla; 9542 (BO): bla; 12950 (BO, L): bla; 13375 (BO, L): bla; 13405 (BO): per;
Backer 13496 (BO): bla; 13887 (BO): bla; 18089 (BO, L): bla; 20316 (BO): per; 20342 (BO): bla; 20342 (L): per; 20929 (BO): per; 21145 (BO): mod; 22807 (BO): bla; 23512 (BO, L): bla; 24184 (BO): isc; 24186-bis (BO, L): mod; 24291 (BO): mod; 24321 (BO): per; 24402 (BO, L): bla; 24485 (BO): bla; 24531 (BO): bla; 24613 (BO): per; 24882 (BO, L): mod; 26407 (BO, L): bla; 26558 (BO): bla; 27055 (BO, L): bla; 27735 (BO): bla; 27987 (BO): bla; 28342 (L): per; 28530 (BO): bla; 28770 (BO): bla; 28996 (BO): bla; 29513 (BO): bla; 29670 (BO): bla; 30035 (BO): per; 30054 (BO): mod; 30409 (BO): isc; 30746 (BO): mod; 33579 (BO, L): bla; 33685 (BO): per; 36018 (BO): per; 36019 (L): per; 36096 (L): bla; 36217 (BO, L): mod; 36925 (BO): per; 37558 (L): per; *Bakhuizen*

- van den Brink 4877* (BO, L): bla; *Brink 6755* (BO, L): per; *Balansa 1 Dec 1886* (L): per; *Beumée A 674* (BO): per; *A 788* (BO): bla; *1013* (BO): mod; *1042* (BO, L): mod; *1498* (BO): bla; *2672* (BO, L): mod; *5396* (BO): bla; *5506* (BO): per; *Bloembergen 3207* (BO, L): bla; *3296* (BO, L): bla; *3320* (BO, L): bla; *Bouman 4* (L): bla; *Brown 8* (SING): bla; *BS 4858 (Ramos)*: (BO): bla; *6734 (Merrill)* (SING): bla; *30072 (Fénix)*: (BO): bla; *84951 (Ramos & Edaño)* (SING): bla; *Bünnemeijer 1284* (BO, L): bla; *6001* (B), L, SING: bla; *3338* (BO, L): mod; *3812* (BO): bla; *8011* (BO, L): bla;
- Carr 11329* (L, SING): bla; *CHB* (BO): bla; *Cinatti 38* (L): bla; *44* (L): bla; *46* (L): isc; *98* (L): per; *Classon K 43* (BO): mod; *Clemens 18198* (SING): bla; *Cuming 1400* (CGE, G, GOET, K, L, P,W): bla;
- De Voogd 2443* (BO): bla; *2503* (BO): mod; *2530* (BO): bla; *De Wilde 22 Jun 1946* (L): bla; *De Wit 4114* (L): bla; *Docters van Leeuwen 19 Mar 1911* (L): per; *Dorgelo 3012* (L): per; *3021* (L): per;
- Edeling 141* (BO): per; *Elbert 2885* (L): bla; *Elmer 12024* (BO): bla;
- Fukuoka & Sukasdi J-1583* (BO): bla;
- Gezagh. Sawoe 2* (BO): bla; *4* (BO): per; *Gouv. Veearts 4* (BO): per; *18* (L): per; *Gouvern. Veearts Soembawa B.* (BO): bla; *Gouvern. Veearts te Watampone* (BO): bla; *Gutterink 3165* (BO): bla;
- Hallier M 39* (BO): per; *M 41* (BO): per; *Henty 221* (L): mod; *Hoekstra 19* (BO, L): per; *Höft 2793* (L): bla; *3061* (L): bla; *3072* (L): bla; *Holttum 26 Oct 1946* (SING): bla;
- Jaag 1200* (L): bla; *1395* (L): bla; *852* (L): bla; *Javasuikerindustrie 92* (BO): bla;
- Kjellberg 3008* (BO): bla; *3704* (BO): bla; *Knaap 15* (BO): bla; *Kooy 660* (L): per; *688* (L): isc; *Kuswata 180* (BO): bla;
- Lambinon 87/134* (L): bla; *Leefmans 94* (BO): per; *Lörzing 3732* (BO): bla; *5811* (BO): bla; *8069* (BO): bla; *8811* (BO): bla; *9033* (BO): bla; *9102* (BO, L): bla; *11010* (BO): bla; *11101* (BO): bla; *12885* (BO): bla;
- Malvins 31 Jan 1886* (SING): bla; *Mehra 4* (BO): bla; *6* (BO): bla; *11* (BO): bla; *51* (BO): bla; *84* (BO): bla; *91* (BO): bla; *111* (BO): bla; *Mehra & Dadi Supriadi 1173* (BO): bla; *Metzner 90* (L): per; *Monod de Froideville 995* (BO, L): bla; *1028* (BO): bla; *1218* (BO): bla; *1243* (BO): per; *1376* (BO): per; *1444* (BO, L): bla; *1498* (BO, L): bla; *1515* (BO): bla; *1515a* (BO): bla; *1598* (BO, L): bla; *1621* (L): per; *1721 c* (BO): per; *1760* (BO): bla; *1818* (BO, L): bla; *1882* (BO): bla; *1884* (BO): bla; *1886* (BO): bla; *1893* (BO): bla; *1982* (BO, L): per; *1996* (BO, L): per; *1999* (BO): per; *2029* (BO): per; *2041* (BO): isc;
- NGF 20987 (Henty)* (L): bla; *22058 (Gillison)* (L): bla; *39411 (Streimann & Kairo)* (BO): bla; *49815 (Henty & Katik)* (L): bla;

PNH 11401 (*Farinas & Abordo*) (L): isc; 17024 (*Sulit*) (L): bla; 19065 (*Conklin*) (L): bla; 20464 (*Mendoza*) (L): bla; 82029 (*Mendoza*) (L): bla; *Posthumus 2652* (BO): bla; *Proppe 22* (BO): bla; 23 (BO): bla; 33 (BO): per; *Pullen 3142* (L): isc; 6748 (L): bla;

Ramos 1842 (BO, SING): bla; *Reid May 1956* (SING): bla; *Ridley 14* (SING): bla; 11689 (SING): bla; 14844 (SING): bla;

Saakov 45 (BO): bla; *SAN 151251 (Laegaard et al.)* (L): bla; 151306 (*Laegaard et al.*) (L): bla; *Santos J.V. 4607* (L): bla; 5095 (L): bla; 5104 (L): isc; 5240 (L): bla; 5826 (L): bla; 6089 (L): bla; 6280 (L): bla; 6365 (L): bla; 6613 (L): bla; 6763 (L): bla; 6883 (L): bla; 6906 (L): bla; 6950 (L): bla; 7313 (L): bla; 7323 (L): bla; 7364 (L): bla; 7387 (L): bla; 7422 (L): bla; 7426 (L): bla; 7578 (L): bla; 7587 (L): bla; 7648 (L): bla; 7718 (L): bla; 7815 (L): bla; 8116 (L): bla; 8253 (L): bla; *Schmutz 4969* (L): bla; 5047 (L): bla; 5933 (L): bla; *SF 7284 (Nur)* (SING): bla; 7771 (*Ridley*) (SING): bla; 13301 (*Burkill & Haniff*) (SING): bla; 22899 (*Henderson*) (SING): bla; *Simon 4228* (L): per; *Sinclair 8879* (SING): bla; *Siwon 1026* (L): bla; *Sohns 4* (BO): bla; 10 (BO): per; 18 (BO): bla; *Sumadijaya & Fanani 5* (BO): bla; *Sunarti & Hamzah PTU 34* (BO): bla;

Van Balgooy 5094 (BO, L): bla; *Van Borssum Waalkes 3157* (BO): bla; *Van der Meer & De Hoed 2099* (L): per; *Van Harreveld s.n.* (BO): per; *Van Leeuwen JEF 6* (L): bla; *TSIOF 2* (L): bla; *Van Ooststroom 12645* (L): per; *Van Slooten 2065* (BO): per; *Van Steenis 6669* (BO): bla; 7514a (BO, L): bla; 7763 (BO): mod; 11229 (BO): bla; 17(8)73 (BO): per; 17450 (BO): per; 17450 (mixed with *Zoysia matrella*) (L): per; 17473 (L): per; 17978 (L): per; 18062 (BO, L): bla; 18084 (BO, L): bla; 18476 (L): bla; *Veearts Sibolga 20* (BO): bla; *Veeartsenijk. Dienst 40* (BO): bla; *Veldkamp 6955* (L): mod; *Veldkamp 7165* (BO, L): bla; 8905 (BO, L): bla; 8961 (BO, L): bla; *Verheijen 3148* (L): per; 5277 (L): bla; *Volkens 196* (SING): bla;

Walsh 13 (BO): bla; 42 (BO): bla; *Widjaja 4690* (BO): bla; *Widjaja & Hamzah 2950* (BO): bla; *Wisse 429* (BO): isc; 683 (BO): isc;

Yakob 6 (SING): bla;

Zollinger 3960 (Madura, 6 Jun 1858!) (L): per.