Cephalostachyum capitatum var. *decompositum* Gamble (Poaceae-Bambuseae): separation, lectotypification, and conservation status

C. M. A. Stapleton[1]

Abstract: The identity and of a supposedly rare and threatened bamboo, a variety of *Cephalostachyum capitatum*, is discussed. Collections were examined to assess whether separation of a distinct variety on the basis of differences in synflorescence structure was justified or not. It was found that this variety did not really differ from the type and it is suggested that the more fragmentary or 'decomposed' synflorescences exhibited by some collections should be interpreted merely as examples of either later or more vigorous development of an otherwise normal synflorescence in this species. On the basis of this morphological evidence, neither the recognition of a separate variety, nor its current inclusion in the IUCN Red List of Threatened Plants would appear to be justified.

Introduction

The genus *Cephalostachyum* is characterised by a distinctive, solitary, subglobose, often red-coloured synflorescence terminating a leafy branch. At later stages of flowering, smaller, simpler, more spicate synflorescences also develop laterally, but the earlier terminal synflorescences are more frequently collected. The sub-globose terminal synflorescence in *Cephalostachyum* arises from amalgamation of structures from up to 10 adjacent apical nodes on a leaf-bearing axis. In this way it differs from capitate synflorescences in other genera such as *Dendrocalamus* and *Schizostachyum*. In those genera, a larger number of lateral globose structures arise from nodes all along each branch after dehiscence of leaves. Each has a much greater level of ramification, involving higher orders of branching, and each synflorescence arises from within a single bud, borne at well-spaced nodes, all along the branches.

It may be that the variation in synflorescence structure in *Cephalostachyum* is related to its semiscandent habit. When tropical bamboos start to flower, production of leaves from buds and primordia is replaced by less controlled development of simpler bracts, subtending spikelets and further axes. How the synflorescences appear depends largely upon how the vegetative primordia and buds were distributed prior to flowering. *Cephalostachyum*, being a semi-scandent genus, has more indeterminate branch growth than fully self-supporting bamboos. In this way long, leafy branches may continue to scramble horizontally. Consequently it has a larger number of closely spaced, partially developed nodes at the end of each branchlet. At the onset of flowering it would appear that these nodes all produce spikelet clusters together, without intercalary growth, forming a congested sub-globose structure. Buds and meristem elsewhere on the branching system however, are less densely distributed and later on, they produce much smaller, more spicate or racemose synflorescences. Thus great variation is seen in synflorescence structure in the species of *Cephalostachyum*, and this has led to confusion.

Within the widely distributed species *Cephalostachyum capitatum* Munro, a variety was separated on the basis of synflorescence structure that did not conform to the expected terminal sub-globose form (Munro 1868, Gamble 1896), the name var. *decompositum* being given to reflect the apparently atypical separation of components expected to be amalgamated into a sub-globose synflorescence. No further investigations into the taxonomic or conservation status of this variety were undertaken, although it was included in many subsequent accounts of Indian bamboos (Majumdar 1989, Tewari 1993, Seethalakshmi & Muktesh Kumar 1998). It has been categorised as requiring conservation in a survey of threatened bamboo species in

[1] Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB. c.stapleton@rbgkew.org.uk

India (Bahadur & Jain 1981), and it is currently included in the Red List of Threatened Plants (Walter & Gillett 1998).

Because of their restricted distributions and infrequent flowering many forest bamboo species are probably threatened, and bamboos could be expected to be at greater risk than other grasses. However, while 13.8% of vascular plants, and 9.7% of grass species were considered to be threatened (Walter & Gillett 1998), the 28 bamboos on the Red List constitute only 2.3% of bamboo species. In a first attempt to assess conservation status of Asian bamboos in an objective manner, their areas of possible forest occupancy have recently been quantified and ranked (Bystriakova et al. 2003a; 2003b), and it was estimated that nearly 450 species had areas below the ICBN criterion for extinction risk. This extreme disparity can only be explained by a severe lack of scientific knowledge on the classification, identification and distribution of many bamboos, especially uncultivated, forest species. The bamboos in the Red List clearly require critical reappraisal, if conservation resources are to be channelled appropriately.

Examination of collections

Munro (1868) described *Cephalostachyum capitatum*, referring to *Bambusa capitata* Wall. & Griff. in Wall. Cat. 8913 *nom. nud.* That invalid name was based on the collection *William Gomez* 99, made in February 1830 in Cherrapunji, Meghalaya (K-W), and it is designated here as lectotype of *Cephalostachyum capitatum.*

Munro (l.c.) also separated 'variety *β*, collected at Cherrapunji in 1830'. He did not cite the collection in more detail, but he annotated a collection (Fig. 1) from Cherrapunji, made by Griffith in November 1830 (K) as var. *decomposita.* He distinguished variety *β* on the basis of its synflorescences being borne on short branches without leaves, in groups of 2-3 smaller 'heads', one above the other, with more perfect flowers (as they had fewer supporting bracts). In Griffith's collection the usual terminal synflorescence is still present, but all leaves on more proximal nodes have fallen, and the solitary synflorescence has been supplemented by many smaller synflorescences that have developed from buds subtended by the fallen leaves, and from new, smaller branches. It would appear that Griffith's collection merely represents material collected from a more advanced phase of flowering, with which Munro was not familiar, and this is supported by the collection date, of November 1830 rather than February 1830.

On his personal copy of his monograph (Munro 1868), he later made the handwritten annotation, 'Also (in Hb. Anderson) one very strongly marked specimen of var. *β decomposita* with the spiculae almost racemose. I have a specimen of this in my herbarium from Anderson.'

Gamble (1896) followed up on Munro's observations by describing *Cephalostachyum capitatum* var. *decompositum*, 'var. *β decomposita*; spikelets arranged in spicate almost paniculate clusters with many fertile spikelets. Collected by T. Anderson and Kurz in Sikkim.'

No collection by Kurz has been located. There is only one collection at K from Gamble's herbarium annotated as var. *decomposita.* It is from Darjeeling, West Bengal (then known as British Sikkim), collected by T. Anderson in 1866 (Fig. 2). Including as well as a perfectly normal synflorescence terminating a leafy branch, a small, almost racemose synflorescence, this would appear to be the basis of Munro's annotation, and Gamble's name. As the only Gamble syntype extant, it has to be designated as the lectotype of *Cephalostachyum capitatum* var. *decompositum* Gamble. It clearly does not fit Gamble's description of 'spicate, almost paniculate clusters', which referred to Griffith's Cherrapunji Nov. 1830 collection.

The racemose synflorescence in the Anderson syntype would appear to be from a very small branch shoot, from each node of which a single spikelet or small group of spikelets has arisen. It is also in a way 'decomposed', having several, smaller, separated sections of a synflorescence rather than the denser, terminal synflorescence usually seen. This explains Munro's choice of epithet, and his concept of the taxon, later formalised as *Cephalostachyum capitatum* var. *decompositum* by Gamble (1896).

The presence in both the Cherrapunji collection and the Anderson syntype of perfectly normal capitate synflorescence as well as 'decomposed' structures supports the contention that these merely represent different development stages for synflorescences in the same taxon. Thus it would appear that *Cephalostachyum capitatum* var. *decompositum* does not represent a distinct taxon, but is merely an expression of normal synflorescence development in *Cephalostachyum capitatum.*

Conclusions

Cephalostachyum capitatum var. *decompositum* Gamble was described from collections in which the single, compact, subglose synflorescence was supplementeded by a 'paniculate' collection of smaller, lateral, spicate, synflorescences, or by a looser terminal synflorescence. These are expressions of normal synflorescence development in this genus. Consequently it would appear that *Cephalostachyum capitatum* var. *decompositum* Gamble does not differ substantially from the type variety. It does not represent a good taxon, and should no longer be recognised.

Bahadur & Jain (1981) listed threatened bamboo species of India, and included the taxon *Cephalostachyum capitatum* var. *decompositum.* Describing it as endemic to Sikkim, they included it in their category of taxa 'represented by a few individuals over a small geographic area that needed to be conserved'. On the basis of this it has subsequently been included in 1997 IUCN Red List of Threatened Plants (Walter & Gillett 1998).

However, it would appear instead to merely represent two collections made in Meghalaya and West Bengal, rather than Sikkim, no different from the type variety of *Cephalostachyum capitatum*, which is widespread in the NE Himalaya from Central Nepal to Arunachal Pradesh, SE Tibet and Burma, and possibly also Yunnan Province. It should be removed from the Red List.

It would appear that many of the other rare and threatened Indian bamboos listed by Bahadur & Jain (1981) could also be of rather questionable taxonomic status. Some of them may merely represent poorly identified collections or nomenclatural problems, rather than well-defined taxa of known distribution and threatened conservation status. Unfortunately, knowledge of the plants behind so many of these Indian names, and their real taxonomic status, is so poor that it is completely impossible to evaluate their conservation status until further taxonomic studies have been made, in the field as well as the herbarium.

Cephalostachyum capitatum Munro, Trans. Linn. Soc. London 26: 139 (1868). Type: India, Meghalaya, Cherrapunji, ii 1930, *William Gomez* 99 (lectotype selected here, K-W);
(=) *Cephalostachyum capitatum* var. *decompositum* Gamble, Ann. Roy. Bot. Gard. (Calcutta) 7(1): 105 (1896), '*decomposita*'. Type: India, West Bengal, Darjeeling, 12 xi 1866, *T. Anderson* s.n. (lectotype selected here, K).

Acknowledgements

Missouri Botanical Gardens funded this work through the Flora of China Project. The Royal Botanic Gardens Kew is thanked for providing working facilities.

References

BAHADUR, K. N. & JAIN, S. S. (1981). Rare bamboos in India. *Indian Journal of Forestry* 4(4): 280–286.

BYSTRIAKOVA, N., KAPOS, V., STAPLETON, C., & LYSENKO, I. (2003a). *Bamboo Biodiversity: Information for planning conservation and management in the Asia-Pacific Region.* UNEP-WCMC/INBAR, Cambridge.

BYSTRIAKOVA, N., KAPOS, V., LYSENKO, I., & STAPLETON, C. M. A. (2003b). Distribution and conservation status of forest bamboo biodiversity in the Asia-Pacific Region. *Biodiversity and Conservation* 12(9): 1833-1841.

GAMBLE, J. S. (1896). The Bambuseae of British India. *Ann. Roy. Bot. Gard.* (*Calcutta*) 7(1): 1–133.

KUMAR, S. (1996). *Bambusoideae.* In: P. K. HAJRA, D. M. VERMA, & S. BANDYOPADHAYA (eds.). *Flora of Sikkim Volume 1* (*Monocotyledons*): 237–243. Botanical Survey of India, Howrah, Calcutta.

MAJUMDAR, R. B. (1989). In: KARTHIKEYAN, S. et al., (eds.) *Flora Indicae, Enumeratio Monocotyledonae,* pp. 274–283. Botanical Survey of India, Howrah, Calcutta.

MUNRO, W. (1868). A monograph of the *Bambusaceae*. *Trans. Linn. Soc. London* 26: 1–157.

SEETHALAKSHMI, K. K., & MUKTESH KUMAR, M. S. (1998). *Bamboos of India: A Compendium*. Kerala Forest Research Institute & INBAR.

STAPLETON, C. M. A. (2000). *Bambuseae*. In: H. J. NOLTIE (ed.), *The Grasses of Bhutan*, *Flora of Bhutan* 3(2): 482–515. Royal Botanic Garden Edinburgh & Royal Government of Bhutan.

TEWARI, D. N. (1993). *A monograph on bamboo*. International Book Distributors, Dehra Dun, India.

WALTER, K. S. and GILLETT, H. J. [eds.] (1998). 1997 *IUCN Red List of Threatened Plants.* Compiled by the World Conservation Monitoring Centre. IUCN - The World Conservation Union, Gland, Switzerland and Cambridge, UK.

Figure 1. Detail from material collected by Griffith in Cherrapunji, Meghalaya, in Nov. 1830, the basis of Munro's 'var. *β*', with many older 'decomposing' leafless synflorescences from nodes at several different orders of branching, after complete dehiscence of leaves.

Figure 2. Material collected by Dr. Anderson in Darjeeling, West Bengal in 1866. A perfectly normal solitary synflorescence terminates a leafy shoot, which is typical for *Cephalostachyumi* in the early stages of flowering. It is accompanied by a more vigorous synflorescence with more elongated internodes. This demonstrates that such 'decomposed' synflorescences are merely a later developmental stage. This is the type of *Cephalostachyum capitatum* var. *decompositum* Gamble.