



## New half-hardy bamboos

### *Himalayacalamus* & *Borinda* species

Chris Stapleton

Many bamboos introduced from Asia in the 19th century are now well established in western horticulture. They have demonstrated their value and hardiness consistently for long enough to have become important architectural garden components. From southern Europe to Scandinavia and Russia, tough customers from central China and Japan that can shake off severe frost and heavy snow, such as *Fargesia murielae*, *Pleiblastus viridistriatus*, *Sasa palmata*, *Pseudosasa japonica* and *Phyllostachys aurea* are now in widespread cultivation. These bamboos are not bothered by temperatures of 0°F (-18°C) or lower. Tropical ornamentals are also well known, and around the globe such favourites as *Bambusa vulgaris* and *Bambusa multiplex* with their striped-culmed relatives are very common, while other striking species are becoming ever more popular, such as the form of *Schizostachyum brachycladum* with brilliant yellow culms, the columnar small-leaved monastery bamboo *Thyrsostachys siamensis*, the small and delicate *Chusquea coronalis* from the Andes, *Otatea acuminata* from Mexico with its abundance of narrow, pendulous leaves, and also several large handsome *Gigantochloa* species from Indonesia. These species however, like the minimum temperature to be 0°C (32°F).

Not so well known are the bamboos of intermediate hardiness, accepting a minimum temperature between 0°C and 0°F. Most of them are uncomfortable in the tropics and unreliable in areas with heavy frosts. However, the last decade of the 20th Century may go down in bamboo history for a wave of new introductions of such horticulturally important species. They are a little more demanding in their site requirements, but much more rewarding than the truly hardy bamboos in their fast establishment and high growth rates in warmer temperate areas. They can bring a feel of lush vigorous growth, especially when planted with other fast-growing and fashionable plants such as Japanese bananas and Australian tree ferns. While many of the truly hardy bamboos are rampant spreaders, with long thin underground rhizomes that can send up annoying new shoots in unexpected and unwanted places, these bamboos are all well behaved, with short fat rhizomes that restrict their growth to a tight clump.

With ever more sophisticated gardeners wanting to try more exotic plants in milder areas, the scope is good for these bamboos. They are generally very recent discoveries, introduced only into specialist nurseries and collections, but a few, such as *Himalayacalamus falconeri* and its candy stripe cultivar 'Damarapa' are already firmly established in a few areas. Identification of these bamboos has been a constraint on their use in the past. Without good information on the species names, how to identify them, and their site requirements, it has been risky to push any but the truly hardy bamboos for temperate areas in the past.

Better knowledge of bamboo taxonomy now allows greater use of these more demanding cool temperate plants. Increased globalisation of horticulture has also helped. On an international scale the areas in which they are appropriate are extensive. To generalise, they can all be expected to cope easily with temporary winter temperatures down to -5°C, some down to -15°C, but many do require reasonable summer rainfall with some cloud cover and partial shade. In Europe there is no doubt that they will be very successful in Eire, S & coastal NW England, W France and the coast of N Spain. In Australia, conditions are good in all of coastal New South Wales. In New Zealand all of North Island except the central mountains will be eminently suitable, as will NW South Island. In N America they should thrive from Delaware through the Carolinas on the E Coast, and along the W Coast of Oregon and Washington, and then keeping near the coast, well up past Vancouver Island. Add to these areas drier climates where irrigation is used in gardens, such as S Europe and California, and together these areas constitute a substantial global market.

## Species now in cultivation

### *Himalayacalamus*

A genus with tall culms, potentially up to 12m tall and 4cm in diameter. Branches are subequal, with up to around 25 small branches around a larger central branch, culm sheaths are completely smooth inside, and the majority of spikelets have a single floret. These bamboos originate in the Himalayas, where they are used for weaving mats and baskets, and they also produce edible shoots. They are closely related to the genus *Drepanostachyum*, the species of which are generally much smaller, with a larger number of equal-sized branches, culm sheaths that are internally rough towards the top, and more than one flower in the majority of spikelets. The pattern of evolution in this genus makes it appear that one successful species, *H. falconeri*, spanning the Himalayan range, has evolved by mutation or hybridisation into different localised varieties and species.

#### *Himalayacalamus asper*

One clone, from Langtang Valley, C Nepal was misidentified as *Neomicrocalamus microphyllus* in the United States. It has smaller leaves, sensitive to summer chills, which turn some leaves red and yellow. Another clone, from W Nepal has very rough culm sheaths.

#### *Himalayacalamus cupreus*

Very vigorous with long, bright green internodes, and tough culm sheaths with erect blades and very prominent copper-coloured cilia. From Annapurna, Nepal. Shoots delicious.

#### *Himalayacalamus falconeri* Hort.

Green culms, purple above & below white nodes. Well-known. Introduced from NW India in the 19th Century. New shoots have a gelatinous exudate, probably to keep insects away. Plants cultivated as *Drepanostachyum khasianum* are probably a variety of this species.

#### *Himalayacalamus falconeri* 'Damarapa'

Culms striped red and yellow. Also known as the candy-stripe bamboo, and identified incorrectly as *Arundinaria hookeriana* in Lawson's 1968 book 'Bamboos'. Introduced in the 19th Century, probably from India. Tentatively placed in this species, but flowers not known and leaves are rather different. Sometimes confused with *Bambusa multiplex* 'Alphonse Karr'.

#### *Himalayacalamus fimbriatus*

Long-fimbriate culm sheath ligule. From Kathmandu, Nepal, cultivated in Japan.


#### *Himalayacalamus hookerianus*

The Blue Bamboo. Culms with blue wax, turning dark blue to purple as temperatures approach freezing. Tall, narrow culm sheath tops. Introduced from Darjeeling to Kew Gardens in 1896. Misidentified in California as *Drepanostachyum falcatum*. The poor hardiness of this species has been rather a disappointment, but it can reach 12m in height in the right conditions.

#### *Himalayacalamus porcatus*

Culms with fine vertical ridges. From Langtang Valley, C Nepal.

'*Himalayacalamus intermedius*' Bol, a name not properly published.

Present identification uncertain. Probably not a species of *Himalayacalamus* at all, and originating well away from the other bamboos placed in the genus. Apparently introduced from Sichuan to Japan (Fuji Bamboo Garden) and hence to Europe & USA. Leaves and branching as *Himalayacalamus*, but with slightly lengthened rhizomes, and too many florets. Not yet associated with any wild collections or descriptions of wild material from China. Hardy. 

## *Borinda*

Most of the species in this genus were described initially in the genus *Fargesia*. However, true *Fargesia* species, such as *spathacea*, *murieliae*, *nitida*, *robusta*, *dracocephala*, etc. all have distinctive small, tight, one-sided inflorescences, held in a group of spathes. *Borinda* species have much more open

inflorescences projecting from the terminal branchlets. While *Fargesia* species come from Sichuan and other Central Chinese Provinces, *Borinda* species are from the Himalayas and the mountains running down from their eastern end through Tibet, Burma, Yunnan, and Vietnam, with only a few species extending into C China.

Some people would like these species to go into *Yushania*, a genus with similar, though even more open inflorescences. However, as the 81 species of *Yushania* are all running, while *Borinda* species are all clump-forming, that does not seem desirable from a horticultural point of view.

While *Fargesia* species are mainly very hardy, with leaves that can withstand substantial frost, *Borinda* species have thinner, softer, more delicate leaves. In most species these will persist through the winter if the weather is mild, but there is a group emerging which is now known to shed practically all its leaves, even in a mild winter. This deciduous behaviour appears to be one form of adaptation to winter cold that is peculiar to this group of bamboos. When soil temperatures drop to freezing point it becomes impossible for many bamboos to replenish water lost from their leaves. This can kill the leaves, the culms or even the whole plant. Many species reduce leaf number in winter. Others hang their leaves vertically to shade them or shed frost and snow quickly. A further adaptation is the death of leaf margins in *Sasa*. This reduces area for transpiration but maintains the shading effect of the leaves to suppress other vegetation, a useful technique in these low-growing ground-cover bamboos.

In the summer the species from the highest altitudes suffer greatly from direct sunlight and require shade from trees to the south (in the northern hemisphere that is), or else the leaves curl completely, no new shoots are produced, and the plants remain disappointingly small.

When such bamboos were first noticed in cultivation in Europe in the early 1990s it was not clear whether the plants were new introductions or overlooked plants from much earlier times (Stapleton 1993). The records of the sources and origins of several plants still remain obscure or contentious, and new introductions are appearing all the time, especially from China and Tibet. While some plants are the results of well-documented botanical expeditions, others have been sold from China with scant documentation on their source or natural habitat. Most of these bamboos have theoretically been covered taxonomically by Chinese botanists. However, the confusion in the naming to species of many of the plants suggests that further fieldwork is required before the full and prolific range of such bamboos in Yunnan and Tibet can be satisfactorily named.

The characteristics and hardiness of many of these species remain largely unknown. Many are currently being cultivated in Holland, but they have also been established in Cornwall, where the climate should suit them much better.

### **The deciduous Borindas**

*Borinda emeryi* (EMAK 599, 967; Edwards 101)

The highest altitude bamboo in Nepal, introduced from E Nepal in 1992 and also from the Annapurna Sanctuary of West Nepal in 1994, this is a deciduous small-stature, small-leaved bamboo with a rather open clump form, cultivated in Edinburgh and Kew Botanic Gardens.

*Borinda* sp. (SICH 987)

Collected as seed in 1992 from 3690m on Kangwuliangzhi Shan in Muli, a once independent Tibetan Kingdom, now part of Sichuan Province, near its southern border with Yunnan, this is certainly one of the highest altitude bamboos known. It is the most strongly deciduous bamboo seen to date, but its full characteristics will only be known when it has grown properly in a good site. Apparently the dense clumps are often being cut back each winter in the mistaken view that it has died, but if left uncut it will

produce a vivid flush of pea-green, almost iridescent, very broad leaves from the end of every single branchlet in the Spring. Culm sheaths have scabrous edges. Widely distributed.

*Borinda frigidorum* (Stapleton, Li & Hsueh 1047, 1048, 1056)

The bamboo 'of cold places' and the highest altitude bamboo from the Cang Shan mountains near Dali as well as mountains further west in Yunnan, this is another deciduous bamboo with small leaves, often curling slightly. Different clones were introduced in 1995 and some may remain as dwarf forms while others attain 3m in height, with tough, slightly asymmetrical culm sheaths, which turn a strikingly deep red in the autumn while the culms are waxless and remain a bright green.

### **The evergreen Borindas**

*Borinda fansipanensis* (KR 2304, seedlings)

A potentially large, evergreen bamboo from medium altitudes, 2300-2800m, towards the top of the highest mountain in northern Vietnam, Fan Si Pan. Probably the first *Borinda* species in cultivation in Europe, introduced in 1991 & 1992. Hardiness of this species is not expected to be its strong point, but it should make up for that in its vigour. Culms and sheaths often have a strong wine-red colouration.

*Borinda albocerea* (Yunnan 1, 2, & 3a)

Similar to *B. fansipanensis*, and sent from subtropical W Yunnan under different names including *B. papyrifera* and *B. lushuiensis* are 4 bamboos, which all appeared to be forms of the species named *Fargesia albocerea* because of the white wax on its new culms. These bamboos also have limited hardiness.

*Borinda lushuiensis* (Yunnan 4)

Similar to *B. fansipanensis* and *B. albocerea*, this is another vigorous subtropical species with limited hardiness, sent from Yunnan under the name *B. edulis*.

*Borinda papyrifera* (Stapleton, Li & Hsueh 1046; KR 3968)

Found in 1995 in the locality from where this species was first described, at altitudes of up to 3600m, this is one of the most promising introductions. A large bamboo with culms up to 5m tall, the fresh green of the leaves contrasts with the steely grey-blue of the new culms, marked with strong vertical striations. Branching is open, and the long branches of this species are quick to fill gaps in an imposing manner. Hardiness still being assessed.

*Borinda fungosa*


Sent from Yunnan as seed in 1992, this species has short branches and prominent, white leaf sheath oral setae. Expected to reach 4.5m this bamboo was initially disappointing in Europe because of poor survival and lack of hardiness, and the 2400m elevation of the provenance may explain this. Once established hardiness is better, and early casualties may have arisen because of roots becoming too wet rather than too cold in winter, as in California this is proving to be well adapted to near-drought conditions. A beautiful variegated form of the 'Akebono' type is in cultivation in California. Leaves can look messy.

*Borinda perlonga* (Stapleton, Li & Hsueh 1054; Yunnan 6)

Another promising introduction, this species also has short branches and is quite similar to *B. fungosa*. However, it is an improvement on that species as it has substantially greater hardiness. Initially found only up to 2900m on Cang Shan near Dali, below the range of *B. frigidorum*, a later discovery of the species much higher up by the treeline may explain its hardiness. The culm sheaths are very long indeed and the culms develop a purple colour in the cold.

*Borinda hygrophila* (ABS in 1997)

The same as the former species, identified from the same provenance with this name by Chinese taxonomists.

*Borinda grossa* (KR in 1999) 

In C Bhutan at 90°E clumps of a bamboo with blue culms up to 12m in height and 4.5cm in diameter at 2500-2800m were the original inspiration for describing the genus *Borinda*. They were tentatively identified as *B. grossa*, although that name applies specifically to plants from further East, in Tibet at 92°E. Recent introductions from 94°E, not yet seen, are also tentatively grown under this name. From the altitude at which it grows in Bhutan it is not likely to be hardy, but the 1999 Tibetan collections may be better.

*Borinda macclureana* (KR in 1995, 1997, & 1999)

Although plants found growing in the UK and initially thought to be this species (Stapleton 1993) are more likely to have been *B. fansipanensis*, there is no question about the identity of many of the large number of recent introductions. They are from exactly the same area of Tibet where dried herbarium specimens of this species were first collected by Ludlow, Sherriff, & Taylor in 1938, from which the species was named by Bor in 1958. They combine tall culms with a variety of grey to purple colouration, elegant branching and foliage, and substantial hardiness, coming from altitudes of up to 3700m. This species probably has the greatest horticultural merit.

*Borinda* 'yulongshanensis' (Yunnan 3b) 

Sent from Kunming under the name *F. albocerea*, this has entered the horticultural trade under this speculative species name, which is wrong. The densely hairy culm sheaths seem distinctive, but other *Borinda* species also are very prominently hairy.

*Borinda angustissima*

Apparently introduced to the US by Waddick from 1200m from the Giant Panda reserve in Wolong, Sichuan in 1989 (Ohrnberger 1999). Also sent from China in 1997, with collection details given as 'Hongya 1750m'. This would appear to have the potential of becoming a substantial species, up to 7m tall, but one with very small, narrow leaves, making it a highly attractive bamboo. Unfortunately the provenance altitudes given suggest that it will be tender.

*Borinda?* *yulongshanensis* (KR 4206)

From glacial moraine under *Abies* forest, this species has the highest altitude reported, at 4200m, though the introduction is from 3250m. With tough rubbery leaves this is a speculative inclusion in the genus *Borinda*. A separate introduction was made into Switzerland in 1997.

Other bamboos that have been sent from China, and which have not yet been evaluated in any way have had the names *F. obliqua*, *F. contracta*, & *F. demissa*.

#### Reference

STAPLETON, C.M.A. (1993). *Fargesia macclureana* (new combination): A Tibetan bamboo in Europe. *Bamboo Soc.(GB) Newsletter* 17: 17.

### **Biography of Dr Bor**

#### **Dr Norman Loftus Bor (1893-1972)**

Born in Ireland from Dutch ancestors, he studied Medicine in Dublin until the 1st World War. After fighting in France, Flanders, Macedonia & Palestine he studied Forestry in Scotland, and became a Forest Officer in Assam, N.E. India. He served as Deputy Commissioner of Forests for the Naga Hills, Forest Botanist & Silviculturalist at Shillong, Forest Botanist at FRI Dehra Dun, Editor of Indian Forester, acting Inspector-General of Forests, and Political Officer of Balipara Frontier Tract. He was also famous for keeping a pet rhinoceros, which he bottle-fed. During the Second World War he used his knowledge of the tribal peoples and languages of Assam to manage the delicate situation there resulting from a flood of Burmese refugees escaping the Japanese invasion. After the war he returned to Britain, where he worked as Deputy Director of the Royal Botanic Gardens Kew for 11 years. His botanical work had centred on grasses while in India and he continued this work while at Kew, producing accounts of the grasses of India, Burma, Sri Lanka, Pakistan, Iran, Iraq and Cyprus. It was while working on an account of the Grasses of Assam that he described a little-known bamboo from Tibet in honour of F.A. McClure, *Arundinaria macclureana*. This is the type species of the genus *Borinda*, a name derived from Bor and India, in recognition of his great contributions to India, to Kew and to Botany. He was a man of great strength of character, renowned for his generosity, friendliness, courage and frankness. He was always glad to assist others with advice and help over botanical problems. For his outstanding services in India he received the CIE and the OBE, as well as other awards for his botanical work.