



A new species of *Boesenbergia* and rediscovery of *B. rotunda* (Zingiberaceae) from India

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Abstract

A new species of *Boesenbergia* from northeast India is described and illustrated. Besides, the rediscovery of *B. rotunda* from India after a century is reported. In addition to morphology, data from anatomy, molecular biology and pollen morphology are also used.

Introduction

The genus *Boesenbergia* Kuntze (1891: 685) comprises about 80 species throughout tropical Asia (Saensouk & Larsen, 2002). Baker (1890) described 6 species and recorded three taxa under imperfectly known and undescribed species [as *Gastrochilus* Wallich (1829: 22)]. In addition, *B. rotunda* Linnaeus (1753: 2) Mansfield (1958: 239) was also described, but as *Kaempferia pandurata* Roxburgh (1810: 328). Das & Sikdar (1982) described six species from India occurring mainly in North-eastern and Peninsular India, and Andaman and Nicobar Islands. Sabu *et al.* (2004) transferred *Kaempferia siphonantha* King ex Baker (1890: 222), described from Andaman Islands, to *Boesenbergia*. Recently, in the review of *B. longiflora* Wallich (1829: 22) Kuntze (1891: 685), Mood *et al.* (2013) added five new related species out of which three are represented in India.

As part of the revision of Zingiberaceae in India, a few specimens were collected, which do not match with any of the known species. To confirm the novelty of the species, anatomical, molecular and palynological aspects were also studied in addition to morphology.

The species *B. rotunda* was first reported by Linnaeus (1753) as *Curcuma rotunda* (1753: 2) as native of India based on the material of Rheede (1690: t.10) cited as ‘Manja-kua’. Based on that Nicolson *et al.* (1988) and thereafter Manilal (2003) reported it to be occurring on forest margins in Malabar. A specimen sent by Dr. Charles Cambell from Sumatra to the Botanic Garden at Calcutta which Roxburgh (1810, 1820) described as *K. pandurata* along with icons via., Roxburgh’s icon no.1765 (K!) and t.2 (1810). Graham (1839), on the authority of Nimmo, noted this as occurring in Konkans and Gujarat. But, Dalzell & Gibson (1861: suppl. 87) inserted this species as not indigenous to Western India and added “*K. pandurata* being described as found in South Concan by Nimmo, we beg on this head to solicit information, as we have been unable to trace it”.

Baker (1890) included this species based on the specimens of Graham (from Concan & Gujarat) and Kurz (from South Andaman Islands). Probably, based on the above literature Schumann (1904) reported the species as native of India. Cooke (1907) also described this species, but with the note that they haven’t seen any specimen. Later, Das & Sikdar (1982) described the species in ‘Review on the genus *Boesenbergia* from India’ based on a specimen from Manipur but left it untraceable without furnishing the details of the herbarium in which it is deposited.

Under these circumstances, it can be concluded that *B. rotunda* was not reported from India based on original material after 1869 (collection of Kurz from South Andaman), although it was reported to be cultivated there (Holtum, 1950 and Burt & Smith, 1983)

We could collect a number of specimens of *Boesenbergia* from different parts of India. After a detailed study, the specimen collected from Umran, Meghalaya is identified as *B. rotunda*. A thorough perusal of literature and a comparison of the present specimen with the relevant herbaria and illustrations were carried out. The illustrations or

Molecular study

A phylogenetic analysis was carried out based on nucleotide sequences (Tab. 3) of the plastid *matK* and nuclear internal transcribed spacer (ITS) regions. For that, we sequenced eight species of *Boesenbergia* from India. *Etilingera linguiformis* (Roxb.) Smith (1986: 246) was chosen as outgroup. Only six species (including the outgroup) yielded ITS sequence by direct sequencing.

TABLE 3. Primers used for sequencing

Gene	Primer name	Annealing Temp.	Sequence
<i>matK</i>	F	45°C, 50°C	CGATCTATTCATTCAATATTTC
	R	45°C, 50°C	TCTAGCACACGAAAGTCGAAGT
ITS	ITS F5	58°C	AATGGTCCGGTGAAGTGTTTC
	ITS R2	58°C	CTCGCCGTTACTAGGGGAAT

Phylogenetic trees constructed using *matK* (Fig. 4) and ITS (Fig. 5) sequence data are highly supportive to consider *B. meghalayensis* (*Boesenbergia* sp. 72.2 in the trees) as a new species. This species is nesting in a distinct clade along with *B. rotunda* in both the trees, supported by a bootstrap value of 100 % for ITS and 94 % for *matK*. In the tree constructed using ITS sequences, the two species differs from each other at a much higher level than that between *B. hamiltonii* Mood *et al.* (2013: 80) and *B. maxwellii* Mood *et al.* (2013: 72); the clade formed by *B. hamiltonii* and *B. maxwellii* is also supported by 100% bootstrap value. In the tree constructed using *matK* sequences, *B. meghalayensis* differs from *B. rotunda* at the same level as *B. hamiltonii* and *B. kingii* Mood & Prince (Mood *et al.*, 2013) differs from each other; the clade consisting of *B. hamiltonii* and *B. kingii* is supported by 86 % bootstrap value.

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