Zeuxine reflexa (Orchidaceae) - a report on its occurrence and conservation status in India

Anant Kumar¹, Avishek Bhattacharjee²,*, P. Venu³ & Y.V. Rao⁴

Mots-clés/Keywords: Buxa Sanctuary, Goodyerinae, IUCN, West Bengal.

Abstract
Zeuxine reflexa, a less known terrestrial orchid belonging to the subtribe Goodyerinae, has been collected from Buxa Wildlife Sanctuary, Jalpaiguri, West Bengal, India. The status of the species in India is assessed as Critically Endangered [CR B2ab (ii, iv)] according to IUCN Red List Categories and Criteria. Its detailed description supported by an illustration and pertinent photographs is presented and its affinity with Z. affinis is discussed.

Résumé

Introduction
The genus Zeuxine Lindley is represented by ca. 80 species (Xinqi et al., 2009). Its distribution extends from Tropical Africa to Central Asia and West Pacific.

---
a: manuscrit reçu le 9 juillet, accepté le 31 juillet 2013
article mis en ligne sur www.richardiana.com le 02/08/2013 – pp. 283-294 - © Tropicalia
ISSN 1626-3596 (imp.) - 2262-9017 (élect.)
Zeuxine reflexa in India - A. Kumar et al.

(Bhattacharjee, 2010) listed 17 species of Zeuxine from India and in the same year Bhattacharjee & Sabapathy (2010) added a new species of the genus to the Indian orchid flora. While exploring the Buxa Wildlife Sanctuary, one of the authors (AK) discovered a single population of a Zeuxine sp. with 12 mature individuals which has been identified as Zeuxine reflexa King & Pantling. Its original description by King & Pantling (1898) was based on a collection (in April, 1895) from Mungpoo, Darjeeling district, West Bengal. The species is closely allied to Zeuxine affinis (Lindley) Bentham ex Hooker f. but differs from it essentially in having much thicker appendages of hypochile, slightly longer and reflexed epichile-lobules, and distinct, oblong columnar processes which are not prominent in Zeuxine affinis.

A detailed description as well as a dissection-plate (Fig. 1) and relevant photographs (Fig. 2) are provided to facilitate identification. The threat status of the species in India is also assessed according to IUCN’s guidelines (IUCN, 2012).

Results

Zeuxine reflexa G. King & R. Pantling

Terrestrial herbs, 17-23 cm tall. Rhizome up to 6 cm long, 3-6 mm thick, terete, creeping, rooting at nodes. Roots 1-5 cm long, pale brown, fleshy, with minute root-hairs. Stem unbranched, erect, sometimes decumbent at base, 5-8 cm long, 3-6 mm in diameter, pale green, glabrous, with membranous sheaths formed by withered leaf-bases. Leaves 3-5, scattered along stem, sometimes crowded near apex, 1.2-3 cm long, withered during flowering, glabrous; petioles 1-3 mm long, sheathing at base; lamina 1.2-2.8 x 0.4-0.8 cm, narrowly ovate to lanceolate, obtuse at base, acute at apex.
I

Zeuxine reflexa in India - A. Kumar et al.

5 to many veined. Inflorescence a terminal raceme, laxly 6-12 flowered, pubescent; peduncles 6-8 cm long, with 1-2 bracts; bracts 0.8-1.3 cm long, acuminate at apex, clasping, pubescent; rachis 5-7 cm long. Floral bracts 4-9 × 1.5-2 mm, usually as long as ovary, ovate-lanceolate, acuminate at apex, 1-veined. Flowers 0.6-1.2 cm long, resupinate. Sepals free, greenish brown, pubescent; dorsal sepal 4.2-5.2 × 1.8-2.2 mm, ovate-lanceolate, subacute at apex, adnate to petals to form a hood on column, 1-veined; lateral sepals 4-5 × 1.5-2 mm, ovate-lanceolate to oblong-ovate, obtuse at apex, spreading, 1-veined. Petals 3.8-4.2 × 0.8-1.2 mm (at widest portion), obliquely elliptic-lanceolate, obtuse at apex, white, glabrous, 1-veined. Labellum ‘Y’ shaped, 3.5-5.5 mm long; hypochile saccate, creamy white with yellowish tinge and with 1 oblong-conical appendage on either side; mesochile 1-1.5 × 0.8-1 mm, oblong, creamy white, sometimes with yellowish tinge, margins incurved; epichile 2-lobed, lobules oblong, 2.8-3.5 × 1.8-2.2 mm, creamy white to pale yellowish-white, reflexed (acquired specific epithet – ‘reflexa’, based on the reflexed epichile-lobules), diverging, forming an acute angle to the axis of the labellum, with a minute apiculus at apex of sinus. Column c. 2 mm long, with 2 obliquely oblong wings just below the rostellum. Rostellum c. 1 mm long, bifid, projecting, subacute to obtuse at apex. Stigma 2-lobed, elliptic, well separated, lateral. Anther c. 2.6 × 1.8 mm. Pollinarium c. 2 mm long; pollinia 2, c. 1.2 mm long, obovate to obclavate, sectile, bifid; caudicles c. 0.3 mm long; tegula c. 0.7 mm long, linear-spathulate, semi-transparent; viscidium c. 0.5 × 0.3 mm, oblong-elliptic, covering the tegula. Ovary sessile, 4-9 × 2-4 mm, terete to elliptic-fusiform, green, pubescent.

Flowering & Fruiting: February–May.

Habitat: The species is found growing in leaf-litter, in the shaded areas of forests at elevations from 75 to 1400 m. Although habit and habitat of Zeuxine reflexa are very similar to that of some other Zeuxine species, viz. Z. affinis, Z. flava (N. Wallich ex Lindlley) Trimen, Z. clandestina Blume, Z. gracilis (Breda) Blume etc., Z. reflexa is known by relatively more limited collections in India than its related species. Its assessment in national perspective is presented below.

Distribution: INDIA: Assam (fide R. Das & K. Gogoi, l.c. as ‘Z. grandis’ – see above), Sikkim (fide S.Z. Lucksom, l.c.), West Bengal; BHUTAN; CHINA; TAIWAN; THAILAND.
Fig. 1: Zeuxine reflexa King & Pantling
A. Habit; B. Rachis; C. Flower; D. Bract; E. Dorsal sepal; F. Petal; G. Lateral sepal; H. Labellum; I. Close-up of appendage inside hypochile; J. Column with a portion of ovary; K. Pollinarium
[A: Anant Kumar 58801 A (CAL); B-K: Anant Kumar 58801 B (CAL)]
Fig. 2. A1-A2: Zeuxine reflexa King & Pantling: B1-B2: Z. affinis (Lindley) Bentham ex Hooker f.
Conservation Status: *Z. reflexa*, apart from India, is known from Bhutan (N. Pearce & P.J. Cribb, l.c.), China (Xinqi et al., 2009), Taiwan (Xinqi et al., 2009) and Thailand (Xinqi et al., 2009) but its conservation status in these floras was not discussed. As far as India is concerned, its occurrence has been reported four times: (1) from Mungpoo (type locality), West Bengal by G. King & R. Pantling (l.c.), (2) from Sakyong and Linchom of West Sikkim by S.Z. Lucksom (l.c., specimens not cited but treated as ‘Rare’), (3) from Chirang and Bhumeshwar Reserve Forests of Assam by R. Das & K. Gogoi (l.c.) as ‘Zeuxine grandis Seidenfaden’ (treated as ‘Rare’) and (4) in the present report from Checko (Buxa Wildlife Sanctuary), Jalpaiguri district of West Bengal. P. Bruhl (l.c.) and N. Pearce & P.J. Cribb (l.c.) cite its presence in the Sikkim and Darjeeling hills based on the type collection in Mungpoo, whereas Srivastava (1996) doubtfully reports its occurrence in Sikkim [as ‘Sikkim (?)’ and without citing any locality]. Later S.Z. Lucksom (l.c.) specified its occurrence in West Sikkim (Sakyong, Linchom). The specimens cited by R. Das & K. Gogoi (l.c.) are not found in ASSAM (probably not deposited) and therefore not available for study. But it is evident from the coloured dissection-plate and photographs provided by R. Das & K. Gogoi (l.c.) that their species is not *Z. grandis* but *Z. reflexa*. Several attempts to rediscover *Zeuxine reflexa* in its type-locality (Mungpoo and its surroundings; located at the fringe of Mahananda Wildlife Sanctuary) by the second author (AB) remained unsuccessful during the revisionary studies of subtribe Goodyerinae in India. Even the comprehensive flora of the Mahananda Wildlife Sanctuary, recently prepared (Paul 2013, *ined.*), does not mention the presence of *Zeuxine reflexa*. Increasing population size inevitably paired with settlement pressure and the conversion of hill-slopes to agricultural areas as well as the ‘Jhum cultivation’ (a type of shifting cultivation in India) are responsible for the increasing rarity and elimination of the *Zeuxine reflexa* populations. In India the species is reported only from 6 locations (Fig. 3). The estimated ‘Extent of Occurrence’ (EOO; criterion B1) of *Zeuxine reflexa* in India is ± 6968 km². The EOO is measured by plotting the known collection localities in a base-map of ArcGIS and then calculating the area (excluding the area belonging to Bhutan) within a hypothetical boundary created by joining the localities with help of the software. The ‘Area of Occupancy’ (AOO; criterion B2) is derived and placed at < 10 km² (severely fragmented and with a projected decline of mature individuals, being
Fig. 3. Map showing occurrence and ‘EOO’ of *Zeuxine reflexa* King & Pantling in India
(the area belonging to India is marked with red lines; Map created with ArcGIS.)
Zeuxine reflexa in India - A. Kumar et al.

sparsely distributed; Critically Endangered). The AOO is measured against the grid size of 1 km² for each of the 6 locations in India as the species occupies very small area (< 100 m²) in every recorded cluster with very short period of flowering and fruiting. The number of mature individuals (criterion D) is estimated to be less than 250 in all subpopulations/clusters. The phrase ‘severely fragmented’ can be applied to this taxon as most of its individuals are found in small and relatively isolated clusters/subpopulations with increased extinction risks. As per guidelines (IUCN, 2012) - ‘only the criterion for the highest category of threat that the taxon qualifies for should be listed’ and therefore, the threat perception on the species is assessed as a Critically Endangered [CR B2ab (ii, iv)] in Indian perspective.

Beside the above mentioned six locations (Fig. 3), Zeuxine reflexa is not reported in other parts of India as authors thoroughly perused literature focused on Indian orchids (Gammie, 1911; Duthie, 1906; Hara, 1966; Mathew, 1966; Santapau & Kapadia, 1966; Mukherjee, 1972; Sikdar & Rao, 1975; Hore & Balakrishnan, 1984; Jain & Mehrotra, 1984; Deva & Naithani, 1986; Ghatak & Devi, 1986; Kataki, 1986; Das, 1987; Joseph, 1987; Pradhan, 1976; Singh et al., 1990; Banerjee, 1993; Sathishkumar & Manilal, 1994; Chowdhery, 1998; Bist & Katham, 1999; Bose et al., 1999; Hynniewtta et al., 2000; Barua, 2001; Chowdhery, 2001; Chauhan, 2001; Deb et al., 2003; Sathishkumar & Manilal, 2004; Sathishkumar & Sureshkumar, 2005; Misra 2007; Rao, 2007; Jalal et al., 2008; Chowdhery, 2009). It can be concluded with reasonable certainty that in India the species is presently restricted to Assam, Sikkim and West Bengal.

**Threat Status in India:** Critically Endangered [CR B2ab (ii, iv)].

**Specimens Examined:** INDIA. West Bengal: Darjeeling dist., Mungpoo, c. 1067 m, April 1895, Pantling 361 (CAL; BM, photo!; K, photo!); Jalpaiguri dist., Buxa Wildlife Sanctuary, Checko, c. 78 m, 9 February 2013, Anant Kumar 58801 A-D (CAL).

**Acknowledgements**
The authors express their gratefulness to Dr. Paramjit Singh, the Director, Botanical Survey of India, Kolkata for facilities. The permission and assistance received during field works from the Forest Department of Government of West Bengal is gratefully acknowledged. They are also
thankful to Dr. M. Fay and Dr. H. Rankou, of the IUCN/SSC Orchid Specialist Group, Royal Botanic Gardens, Kew for their valuable opinion. The second author (AB) is thankful to Mr. Olivier Hasinger, SSC Network Support Officer, IUCN for providing ArcGIS software on behalf of IUCN/SSC for Red Listing of Indian orchids and to Dr. D.K. Agrawala, Botanical Survey of India, Sikkim Himalayan Regional Centre, Gangtok for his suggestions. We thank Mr. D.K. Sah, Botanical Survey of India, who has drawn the illustration.

References


Le genre *Zeuxine* Lindley est représenté par 80 espèces environ, distribuées depuis l’Afrique tropicale jusqu’en Asie Centrale et le Pacifique ouest. Dix sept
espèces ont été énumérées pour l'Inde en 2010 et une nouvelle espèce a été ajoutée un peu plus tard. Au cours de l'exploration botanique du Sanctuaire Buxa, le premier auteur a découvert une population unique de *Zeuxine* comprenant douze individus adultes, identifiés comme *Z. reflexa* King & Pantling. La description originale était basée sur une collecte effectuée en avril 1895 à Mungpoo, district de Darjeeling, West Bengal. L'espèce est étroitement apparentée à *Z. affinis* (Lindley) Bentham ex Hooker f. mais en diffère principalement par ses appendices beaucoup plus épais sur l'hypochile, ses lobules d'épichile un peu plus longs et réfléchis, et ses processus oblongs distinctifs sur la colonne. L'article propose une description détaillée de l'espèce, accompagnée d'une planche botanique et de photographies, ainsi qu'une première évaluation de son état de menace en Inde conformément aux critères de l'UICN.

Habitat. L'espèce pousse dans une litière de feuilles, dans des endroits ombragés en forêts, à des altitudes comprises entre 75 et 1 400 m. Bien que les habitats soient les mêmes pour d'autres espèces de *Zeuxine*, *Z. reflexa* a été beaucoup moins collecté.


L'accroissement de la population humaine, qui va inévitablement de pair avec la pression des constructions et la conversion des pentes des collines en zones agricoles, entraîne la destruction progressive des populations de l'espèce. La discussion de ces données permet aux auteurs d'évaluer plusieurs critères de l'UICN et de proposer un statut final « En danger critique » [CR B2ab (ii, iv)].

View This Item Online: [https://www.biodiversitylibrary.org/item/258812](https://www.biodiversitylibrary.org/item/258812)
Permalink: [https://www.biodiversitylibrary.org/partpdf/273097](https://www.biodiversitylibrary.org/partpdf/273097)

Holding Institution
Harvard University Botany Libraries

Sponsored by
BHL-SIL-FEDLINK

Copyright & Reuse
Copyright Status: In copyright. Digitized with the permission of the rights holder.
Rights Holder: Tropicalia
License: [http://creativecommons.org/licenses/by-nc-sa/4.0/](http://creativecommons.org/licenses/by-nc-sa/4.0/)
Rights: [http://biodiversitylibrary.org/permissions](http://biodiversitylibrary.org/permissions)

This document was created from content at the Biodiversity Heritage Library, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at [https://www.biodiversitylibrary.org](https://www.biodiversitylibrary.org).