

## RANGE EXTENSION OF *EULOPHIA FLAVA* (LINDL.) J.D. HOOK. (ORCHIDACEAE) IN INDIA

RAHUL J. SHRIVASTAVA

Southeast Environmental Research Center, Florida International University,  
Miami, FL 33199 USA.  
E-mail: shrivast@fiu.edu

**ABSTRACT.** The westward range extension of the orchid *Eulophia flava* (Lindl.) J.D. Hook. in the central Indian state of Madhya Pradesh is described as an addition to the flora of Bori and Pachmarhi Wildlife Sanctuaries.

**Key words:** *Eulophia flava*, Madhya Pradesh, Bori, Pachmarhi, range extension, terrestrial orchids

### INTRODUCTION

Terrestrial species of many plants, including orchids, have subterranean tubers or fleshy rhizomes that produce a new shoot each year, when climatic conditions are favorable. Species of the mainly terrestrial genus *Eulophia* R.Br. ex Lindl. produce two shoots from each underground rhizome (pseudobulb), one flowering and the other leafy. The only two epiphytic species in this genus occur in Madagascar (Cribb et al. 2002). The large genus *Eulophia* was published in the Edwards's Botanical Register in 1821 and is a conserved name, I.C.B.N. (1983) No. 1648. *Eulophia* has a wide distribution, extending from the Caribbean to Australia and from the neotropics throughout tropical and subtropical parts of Asia. The genus is particularly well distributed in Africa (Stewart 1996). A total of 230 species are reported worldwide, many of them attractive and showy (Thomas 1998).

At least 22 species of *Eulophia* are known in India (Bhattacharjee 1984). Most of the species of this diverse but mainly tropical genus are found below 2200 m. The plants have green leaves, which are not always visible at flowering. The pseudobulb may be underground or upright at or just above the soil-surface. The flowering stem arises from the mature pseudobulb either alongside the leaves or before or after they have fully developed. The inflorescence is simple and upright, often up to 100 cm, but may be taller and branching as in the case of *Eulophia petersii* Rchb.f. in the dry grasslands of Kenya. The flower column in the subtribe Eulophiinae represented by *Eulophia* and five other genera may have a prominent foot or wings (Dressler 1993). At the apex of the column, under the anther cap, there are always two bright yellow pollinia attached by a short stipe to a large sticky viscidium (Stewart 1996). The flowers are high-

ly varied in size and shape and demonstrate almost all colors.

### *EULOPHIA FLAVA*

In India, *Eulophia flava* has been reported from the tall and wet sub-Himalayan Terai grasslands of Uttar Pradesh (Mathur et al. 2003), in the Indian Himalaya (Thomas 1998, Pradhan 1979), in the Travancore region (now in Kerala state) of south India (Pradhan 1979), and in Central India (Tiwari & Maheshwari 1963, Bhattacharjee 1984). Outside of India, *E. flava* is found in China, Myanmar, Nepal, Thailand, and Indo-China (Thomas 1998), in Hong Kong (Thomas 1998, Hu 1977), in Vietnam (Averyanov et al. 2003), and in Laos and Cambodia (Pradhan 1979).

### Study Area and Species Account

Previously, accounts of the family Orchidaceae have appeared in the floristic descriptions of various regions of Madhya Pradesh state (Tiwari & Maheshwari 1963, Oommachan 1977, Mukherjee 1984, Verma et al. 1985, Roy et al. 1992, Oommachan & Shrivastava 1996, Samvatsar 1996). In Madhya Pradesh, Tiwari and Maheshwari (1963) reported *Eulophia flava* in the open sal (*Shorea robusta* Gaertn.f.) forests of Maharpal, Bastar, Raipur, and Madla on clay-loam soils. Among the 778 species of trees, shrubs, and herbs described for the Bori and Pachmarhi reserves, *Eulophia explanata* Lindl. and *E. herbacea* Lindl. were previously the only members of the genus *Eulophia*, and both were from Pachmarhi (Mukherjee 1984). *Eulophia ochreatea* Lindl. then was added to the flora of Madhya Pradesh (Khanna et al. 1999). This species earlier was reported in the flora of neighboring Bombay (Santapau & Kapadia 1966).



FIGURE 1. *Eulophia flava* blooming in an abandoned teak plantation in the Bori Wildlife Sanctuary, within the Satpura-Bori Tiger Reserve, Madhya Pradesh, India.

During fieldwork in June 1993, the terrestrial orchid *Eulophia flava* was observed in the Churna area of Bori Wildlife Sanctuary in Hoshangabad district of Madhya Pradesh. This locality is ca. 400 km west of previous known localities in eastern Madhya Pradesh (Tiwari & Maheshwari 1963). The forests are broadly of the Tropical Moist Deciduous type (Champion & Seth 1968). In contrast to the earlier reports of *E. flava* growing in the moist sal forests of eastern Madhya Pradesh, the orchid found in 1993 was growing under teak (*Tectona grandis* L.f.), the dominant tree species in Bori. The climatic conditions of the site are drier compared to those in eastern sal forests. Average summer temperatures are 22°C–40°C, with a winter average minimum of 8°C; and soils vary from coarse sandstone derivatives to extruded or inter-bedded trap and sandy shales (Mukherjee 1984). Drier forests are more prone to fire events, and terrestrial orchids with subterranean rhizomes stand a better chance of surviving.

The Churna area where the orchid was found had earlier been clearcut and managed as an experimental teak-monoculture plantation, which subsequently was declared a failure and abandoned. Although overrun by grasses, a roughly 15-year-old even-aged teak stand developed with open canopy, dense grass growth, and an occasional *Holarrhena antidysenterica* Wall. The bamboo, *Dendrocalamus strictus* Nees, was sparse in the immediate vicinity but planted and densely clumped on nearby hills. Abundant grass and browse material in teak plantations support high densities of wild ungulates, especially Sambar deer (*Cervus unicolor*) and Axis deer (*Cervus axis*) (Shrivastava 1993).

The orchid was found as a single individual with a tall, upright yellow-flowered inflorescence. The bright flowers contrasted vividly against a background of dark green teak leaves and grass, and made the orchid conspicuously visible even from a slow-moving vehicle. It was photographed, and no collection was made. Rao and Hajra (1974) observed similar conspicuous yellow flowers blooming in tall grass in the case of *Eulophia mannii* Hook.f.

#### Taxonomic Treatment

The following diagnostic characters of *Eulophia flava* are reproduced from Pradhan (1979).

***Eulophia flava*** (Lindl.) J.D. Hook. in Fl. Brit. Ind 1890, 6: 7; Tiwari & Maheshwari 1963: 438; Pradhan 1979: 458; Seidenfaden 1984: 33; Thomas 1998: 180.—*Cyrtopera flava* Lindl., Gen. Sp. Orch. 1833: 189.—*Eulo-*

*phia cullenii* C.E.C.Fisch. in Gamble, Fl. Madras, 1928: 1435. (non Blume).

**Rhizome** tuberous, roughly ovoid, 5–6 cm. long, hypogaeal; leaves 3, 120 cm. × 10 cm when fully grown, developing later than the inflorescence. **Inflorescence** stout, 60–150 cm arising from side of leaf-bearing pseudostem, clothed basally with 2–3 sheathes 10–15 cm long; raceme 30–60 cm long; floral bracts 10–20 mm long, ovate, acuminate, much shorter than ovary; flowers many, large, lemon-yellow; sepals 30 mm long, oblong lanceolate, acuminate; petals shorter, much broader, obtuse or rounded; labelum 3-lobed, lateral lobes large, erect, rounded, midlobe oblong, narrower than lateral lobes; disc with three keels ending basally in 2 pyriform calli; conical sac present at base of the labelum; column 20 mm; long, footed anther with a long anterior process; flowering June–July.

Tubers of *Eulophia flava* are consumed by wild pigs, and the plant is used to counter spider poison (C. Kumar, pers. comm.). Open well-lighted forests with seasonally moist grassland patches on clay-loam soils in the western low-lying parts of Bori are likely favorable habitat for this species. The occurrence of *E. flava* in the Bori Wildlife Sanctuary is an addition to the flora of Mukherjee (1984). The identification represents a westward extension of the range of this species in Madhya Pradesh, outside of the moist sal-dominated forests of Bastar.

#### ACKNOWLEDGMENTS

I thank C. Sathish Kumar of TBGRI, Thiruvananthapuram, for identification of the orchid and for providing correct nomenclature. The Wildlife Institute of India and the Madhya Pradesh Forest Department facilitated fieldwork, and the Bori Wildlife Sanctuary granted permission for the research.

#### LITERATURE CITED

- Averyanov, L., P. Cribb, P.K. Loc and N.T. Hiep. 2003. Slipper Orchids of Vietnam. Timber Press, Oregon.
- Bhattacharjee, S.K. 1984. Indian Eulophias. Amer. Orchid Soc. Bull. 53(4): 390–393.
- Champion, H.G. and H.K. Seth. 1968. A Revised Survey of the Forest Types of India. Government of India Press, Delhi.
- Cribb, P.J., D. Du Puy and J. Bosser. 2002. An unusual new epiphytic species of *Eulophia* (Orchidaceae) from southeastern Madagascar. Adansonia 24: 169–172.
- Dressler, R.L. 1993. Phylogeny and Classification of the Orchid Family. Dioscorides Press, Portland, Oregon.

- Hu, S. 1977. The Genera of Orchidaceae in Hong Kong. Chinese University Press, Hong Kong.
- Khanna, K.K., V. Mudgal and A. Kumar. 1999. Three orchids new to Madhya Pradesh. J. Econ. Taxon. Bot. 23: 711–712.
- Mathur, P.K., H. Kumar and J.F. Lehmkuhl. 2003. EN-VIS Bull. Grassland Ecosystems & Agrofor. 1(1): 1–28.
- Mukherjee, A.K. 1984. Flora of Pachmarhi and Bori Reserves. Botanical Survey of India. Howrah.
- Oommachan, M. 1977. The Flora of Bhopal. J.K. Jain Brothers, Bhopal.
- Oommachan, M. and J.L. Shrivastava. 1996. Flora of Jabalpur. Scientific Publications, Jodhpur.
- Pradhan, U.C. 1979. Indian Orchids: Guide to Identification and Cultivation, Vol. II. Kalimpong.
- Rao, A.S. and P.K. Hajra. 1974. *Eulophia mannii* Hook.f.: a scarcely known ground orchid from Assam. Bull. Bot. Surv. India 16(1–4): 156–157.
- Roy, G.P., B.K. Shukla and B. Dutt. 1992. Flora of Madhya Pradesh (Chattarpur and Damoh). Ashish Publishing House, New Delhi.
- Samvatsar, S. 1996. The Flora of Western Tribal Madhya Pradesh. Scientific Publications, Jodhpur.
- Santapau, H. and Z. Kapadia. 1966. The Orchids of Bombay. Government of India Press, Delhi.
- Seidenfaden, G. 1984. Orchid genera in Thailand XI. Cymbidieae Pfitz. Opera Bot. 72: 33–34.
- Shrivastava, R.J. 1993. Wild ungulate densities in plantations and worked forests of Bori Wildlife Sanctuary. 7<sup>th</sup> Annual Research Seminar. Wildlife Institute of India, Dehradun.
- Stewart, J. 1996. Orchids of Kenya. Timber Press Inc., Portland, Oregon, USA.
- Thomas, S.A. 1998. A preliminary checklist of the genus *Eulophia*. Lindleyana 13(3): 170–202.
- Tiwari, S.D.N. and J.K. Maheshwari. 1963. The orchids of Madhya Pradesh. Indian Forester 89: 426–444.
- Verma, D.M., P.C. Pant and M.I. Hanfi. 1985. Flora of Raipur, Durg, and Rajnandgaon. Botanical Survey of India, Howrah.