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Review Article

A note on botanical, medicinal and ecological aspects of Blue & Red Vanda (Orchidaceae): Schedule VI species of the Wildlife Protection Act, 1972

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Abstract: Blue Vanda (*Vanda coerulea*) and Red Vanda (*Renanthera imschootiana*) are epiphytic orchids renowned for their striking flowers and medicinal properties. As Schedule VI species under the Wildlife Protection Act, 1972, they are protected due to over-exploitation and habitat destruction. This note highlights their botanical characteristics, medicinal uses, ecological significance, and conservation strategies. The orchids' unique adaptations enable them to thrive in specific habitats, providing ecological benefits. Their medicinal properties have been utilized in traditional medicine, but unsustainable harvesting practices threaten their survival. Conservation efforts, including cultivation and habitat protection, are essential to preserve these species. This review aims to raise awareness about the importance of Blue and Red Vanda, promoting sustainable utilization, regulated trade, and conservation to ensure their long-term survival.

Keywords: Conservation, endangered, endemic, orchid, ornamental

Introduction

Orchidaceae is one of the largest families of flowering plants (Kumar, 2022; Kumar, 2023; Sharma et al., 2024). Orchids are renowned for their beautiful flowers with vibrant colours and intricate shapes, possessing a significant ornamental value in various regions of the world (Dolce et al., 2020; Kumar et al., 2021). They also possess significant medicinal properties (Kumar and Kumar, 2020; Chakraborty et al., 2022). However, due to the excessive use of orchid species for numerous applications, the natural plant populations are decreasing, and some of them are now categorised as threatened species (Wraith and Pickering, 2017). Sometimes, the attractiveness, exotic nature, and rarity of orchid species make them more vulnerable, leading to overexploitation and extinction in their natural habitats (Pillon and Chase, 2007; Kumar et al., 2022). Climate change and urbanization also pose significant threats to wild orchid species (Kumar, 2025). The Blue Vanda (*Vanda coerulea*) and Red Vanda (*Renanthera imschootiana*) are two striking epiphytic orchids belonging to the family Orchidaceae (Kishor and Sharma, 2008). These species are highly prized for their stunning flowers, which are not only a delight to behold but also possess medicinal properties that have been utilized in traditional medicine for centuries (Khan et al., 2019). However, their beauty and utility have led to over-exploitation, resulting in their inclusion in Schedule VI of the Wildlife Protection Act, 1972, which prohibits their hunting, harvesting, and trade (Kumar et al., 2024). As protected species, they require coordinated conservation efforts to ensure their survival. This note aims to provide a comprehensive overview of the botanical characteristics, medicinal uses, and ecological significance of these species. By exploring their unique features, uses, and importance, there can be a better understanding of the need for conservation and sustainable management practices to preserve these remarkable orchids for future generations.

The orchid species, *Renanthera imschootiana* Rolfe, commonly known as Red Vanda (Figure 1) is named after M Van Imschoot, who sent the plant specimen to the Royal Botanic Gardens, Kew, for identification (Williams, 1874). It was grouped under the *Vanda* genus and is endemic to Manipur, Mizoram, and Nagaland, especially the northeastern states in India (Dressler, 1993). It is an endangered orchid species belonging to the Indo-Burma mega biodiversity hotspot. Red Vanda is listed in Appendix I, CITES (Committee for International Trade in Endangered Species of Wild Fauna and Flora) due to its vulnerable status, because of overexploitation (Ecosystem Profile: Indo-Burma Biodiversity Hotspot 2011 Update, 2011). It is included in the negative list of exports and its export is prohibited under the Foreign Trade Development and Regulation Act 1992, due to its enlistment in Schedule VI of the Wildlife (Protection) Act 1972 of India. Due to the destruction of habitat, the population of this species is gradually depleting in the wild (Devadas et al., 2011). It is a monopodial epiphyte of 35-60 cm height. Stem is stout with 14 linear leaves measuring 7.9 cm x 1.8 cm. Generally, the inflorescence is an unbranched raceme, however, raceme branching of length about 38.4 cm is also observed. The flower size is 4.5 cm x 2.8 cm. The species has short and lanceolate-shaped dorsal sepals with broader and free lateral sepals, with a length of 2.7 cm, which are its peculiar characteristics. The sepals are red-purple or crimson, which is the dominant colour of the flower, and the petals are colored greyish-orange with red spots. The petals are smaller, with a length of 1.3 cm, and the lip size is 0.6 cm x 0.3 cm, with the presence of callus. The throat and column are yellow. The fruiting and

flowering period is from March to September. The flower has a minimum vase life of about 24 days, which shows high breeding value for developing new hybrids (Devadas et al., 2009). It grows on small shrubs and tree trunks at altitudes ranging 1000-2000 m, preferably in sunny areas. It is generally found in areas receiving moderate to high rainfall.

Figure 1: Flowers of *Renanthera imschootiana*

Distribution: Manipur, Mizoram, and Nagaland of North-eastern India, Myanmar, China, Vietnam, New Guinea, Malaysia, Indonesia, and Philippines (Kishor and Sharma, 2008; Wu et al., 2014).

Commercial importance: Long-lasting orange-red flowers of Red Vanda are highly valued in horticulture as ornamental plants.

Medicinal importance: Leaves are used to treat skin diseases after grinding and making a paste with water (Deorani and Sharma, 2007).

Ecological importance: Red Vanda is a good indicator of a healthy forest ecosystem with microclimatic conditions that provide habitat for various insects, birds, and other organisms. The bright red flowers attract a huge array of pollinators like bees, butterflies, hummingbirds, etc., supporting plant reproduction and ecosystem health.

Conservation through propagation

1. By seeds: The pod of the orchid grows after fertilization and ripens in 6 months to 1 year. After ripening, the seeds are collected and stored in a cool and dry place. Under natural conditions, the seeds germinate into seedlings, which grow in a flask of culture media containing agar, inorganic nutrients, and sugar. They are then transferred to community pots. A shady but well-aerated greenhouse with high humidity will promote the growth of seedlings. Watering should be done daily in normal seasons and 2-3 times in summer by spraying. Alkaline water is injurious to orchids, so slightly acidic water or at pH up to 7 should be used (Wu et al., 2014).
2. By vegetative propagation: It is a commercial method of propagation. As these plants produce adventitious roots, the stem is cut into sections at the nodes, which are then potted in propagation beds or directly in pots after the cut ends are treated with fungicides to prevent rot. They are placed in a cool and dry place for wound healing and allowed to root in moist sand or damp moss. A balanced feed on nitrogen, phosphate, and potash is provided and supplemented with a very small amount of magnesium, calcium, manganese, iron, boron, and zinc. About 2 tablespoons of the above mixture are mixed in 10 L of water and sprayed once a week on the plants. They are watered daily, and 2-3 times a day, in summer. Indirect sunlight is ideal for orchids (Seeni and Latha, 1992).
3. Plant tissue culture techniques: An *in vitro* method was developed to regenerate large numbers of phenotypically uniform plants from the basal parts of the leaves of *R. imschootiana* (Seeni and Latha, 1992).

Vanda coerulea Griff ex Lindl. generally known as Blue Vanda (Figure 2) for its blue colour flowers, is a perennial epiphyte that grows at elevations of 1000-1500 m in Manipur state and the Khasia and Jaintia hills of Meghalaya state in India (Manners et al., 2010). It is known as the “Queen of Vandas” as it blooms 3-5 times a year (Jitsopakul, 2008). The orchid species is also included in the Appendix II list of CITES (Committee for International Trade in Endangered Species of Wild Fauna and Flora), which prevents their illegal trade (Nag and Kumaria, 2018). The survival of this species is threatened due to habitat destruction, overexploitation, deforestation, and reproductive challenges due to self-pollination within the same inflorescence, forming a single seed pod, limiting its genetic diversity and reducing the ability of the plant to adapt to a changing environment (Roy et al., 2011). It is also included in the Threatened Plants List of India, which is published by the International Union of Conservation of Nature and Natural Resources (Seeni and Latha, 2000). Several researchers have worked on different ways for the conservation of this particular orchid species, such as micropropagation (Wochok, 1981). Plant tissue culture techniques were adopted for *ex-situ* multiplication and restoration purposes (Seeni and Latha, 2000), shoot regeneration using thin shoot tip sections and thidiazuron (Malabadi et al., 2004), asymbiotic seed germination (Roy et al., 2011), vegetative method of propagation through cutting and division (Rachna et al., 2013), etc. It is a monopodial orchid with a single stem 2-3 feet long, strap-like leaves arranged dichotomously, i.e., in 2 rows on the stem, and large pale to deep lilac flowers. The stem is erect and often branches from the base. The inflorescence is axillary raceme of more than 30 cm in length, and 10-15 flowers emerge from the leaf axils (Tikendra et al., 2025). Flowers are large,

flat, vivid blue, and long-lasting, typically 4-6 inches in diameter. Tessellated or netted colour ornamentation is present in sepals. The lip is oblong-lanceolate with a yellow-orange base, yellow mid-part, and a white apex. Spur length is 0.5-1 cm (De et al., 2015). Thick, aerial roots are important for absorbing moisture and nutrients. The flowers are produced from September to November, lasting for 2 to 3 months, and show a range of coloration from light blue to darker shades of blue (Hrahsel and Thangjam, 2015).

Figure 2: Flowers of *Vanda coerulea*

Distribution: India's northeastern states of Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, and Nagaland, Myanmar, Thailand, and southern China.

Commercial importance: It holds high ornamental value and is used for making blue and purple *Vanda* hybrids by the orchid growers and breeders (Tikendra et al., 2025).

Medicinal importance: Leaves are used as an expectorant. Flowers are used to make juice, which helps in curing eye problems like glaucoma, cataract, and blindness (Deorani and Sharma, 2007).

Bioactive compounds: Phytoconstituents like flavidin, imbricatin, coelonin, methoxycoelonin, gigantol, and phytosterol are found in the plant species (Simmler et al., 2010).

Traditional knowledge: Leaves are commonly used to treat aging and ailments such as diarrhoea, dysentery, and various skin disorders (Medhi and Chakrabarti, 2009).

Ecological importance: It is also an indicator of a healthy forest, providing habitat for various insects, birds, and other organisms, preserving biodiversity and promoting sustainable forest. These orchids contribute to the forest structure and attract several pollinators, maintaining the life cycle and ecosystem health.

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