

Frerea indica Dalz. (Asclepiadaceae): a palaeoendemic plant of Maharashtra State, India

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ABSTRACT

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The genus *Frerea* (Asclepiadaceae) is a palaeoendemic monotypic genus, endemic to the Western Ghats of Maharashtra State. This genus has been categorized into Critically Endangered (CR) as per recommendation of International Union for Conservation of Nature and Natural Resources (IUCN). The plant has been reported only from six localities in Maharashtra, viz. Junnar and Purandhar (Pune District), Mahabaleshwar and Sajjangad (Satara District), Shivthalgadh (Raigad District) and Randha Falls (Ahmednagar District). However, it could not be recollected from Mahabaleshwar after its first report in 1924. At other localities, its area of occupancy and number of mature individuals are very limited and are gradually decreasing. So, from conservation point of view, the plant is very important and needs immediate conservation measures. Otherwise, we may lose another plant species from this planet in near future. A successful attempt has been made to conserve and multiply this species in Lucknow. The plant is well acclimatized in this environment and growing nicely with regular flowering and occasional fruiting. The present paper deals with a brief of morphological description of this plant as well as its distribution, habitat, population status and trends, threats, conservation strategies, agro technology, etc.

Key-words: *Frerea indica*, palaeoendemic, conservation, Maharashtra.

INTRODUCTION

Frerea indica Dalz., a palaeoendemic plant belonging to the family Asclepiadaceae, is restricted to a few localities in northern part of Western Ghats, Maharashtra. It has been included in the Red Data Book of Indian Plants as an Endangered species (Nayar & Sastry 1987). Later, it has been categorized into Critically Endangered (Mishra & Singh 2001) as per International Union for Conservation of Nature and Natural Resources (IUCN) recommendation 1994. According to IUCN, the plant is one of the world's 12 most endangered species and was included in Appendix II of the Convention on International Trade in Endangered Species of wild fauna and flora (CITES). However, due to insufficient trade information the plant name has been excluded from this list in the 11th Conference of Parties (COP). But, the species is still figured in the negative list of export [Public Notice No. 47 (PN) 92-97, dated 30th March 1994] and its collection from nature is completely banned.

Dalzell (1865) described the *Frerea indica* plant for the first time from the hills near Heware in Junnar Taluka of Pune District, Maharashtra. Later, it was collected from Kate's point of Mahabaleshwar in Satara District (Bombay 1940). Subsequently, it was also reported from Purandhar Hills of Pune District (Santapau 1951). After a long period, the plant was located at Shivneri of Junnar Taluka, near its type locality, in 1956 and 1997 by Puri (Mishra & Singh 2001) and Tetali et al. (1997 a, b) respectively. It was also recollected from Purandhar in 1963 by Rolla (Mishra & Singh 2001), in 1997 by Tetali et al. (1997 a, b) and in 2001 by Diwakar et al. (Mishra & Singh 2001). However, no recent report of this plant is available from Mahabaleshwar and surroundings as the habitats of this region have been denuded and eroded extensively in the last few decades. In recent years the species has been collected from some new localities of Maharashtra State, viz. Sajjangad of Satara District by Kumbhojkar et al. (1993), Tetali et al. (1997 a, b) and

Diwakar and Moorthy (Mishra & Singh 2001), Shivthalgargh of Raigad District by Kothari and Moorthy (1993) and Tetali et al. (1997 a, b) and Randha Falls, near Bhandardara of Ahmednagar District by Mishra and Singh (2000).

DESCRIPTION

Herbs, trailing, succulent, 10-15 cm long, perennial, glabrous; branches thick, pale green. Leaves opposite, fleshy, subsessile, 3-5 x 1-2.5 cm, elliptic-oblong, obtuse, shining, glabrous. Flowers extra-axillary, solitary or in pairs, bracteate; pedicels ca. 5 mm long, glabrous. Calyx 5-lobed, ca. 3 x 1.5 mm, glabrous, lobes deltoid. Corolla rotate, ca. 2.2 cm across, 5-lobed; lobes

valvate, deltoid, acute, fringed with fine deep purple hairs on edges, purple with pale yellow spots. Outer corona 1-2 mm long, 5-lobed, bowl shaped; inner ca 1.5 mm long, 5-lobed. Staminal column short, anthers red, pollinia 1 in each cell. Style apex flat, pearl white. Follicles paired or single, 6.3-8.2 cm long, terete, smooth, curved at apex. Seeds many, ca 8 x 3.5 mm; coma silky white, ca. 1.3 mm long.

Flowering and fruiting: September - January.

Vernacular name: Shindal makudi

Habitat: It grows between 750-1350m altitude on rock crevices and exposed hill slopes facing south-east or north-west directions forming large patches.

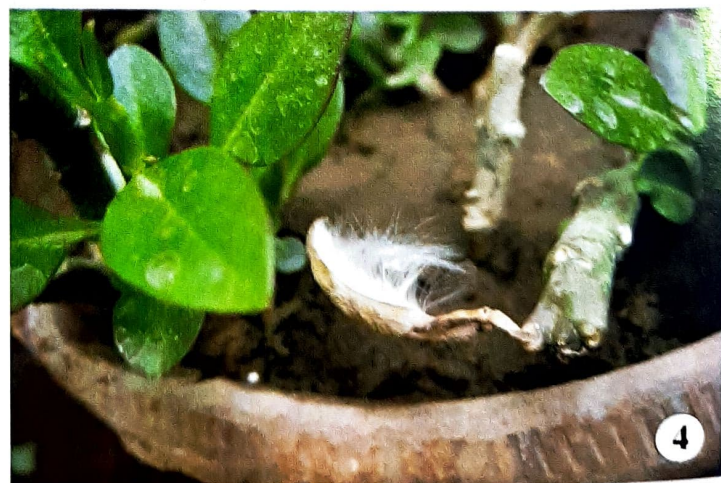
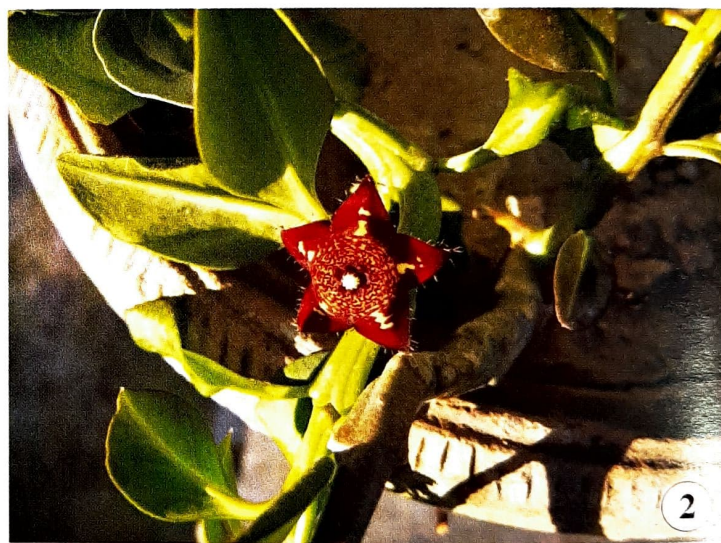


Plate 1

Vegetative propagation and multiplication of *F. indica* Dalz. through stem cuttings. 1. Multiplication and acclimatization. 2. Single plant with flower. 3. Magnified view of a flower. 4. Plant with a fruit.

POPULATION STATUS

In the natural habitats, the species is represented by few populations with limited number of mature individuals. Probably, it has been vanished from Mahabaleshwar because it could not be recollected from this locality after its first report in 1924. At Randha falls of Ahmednagar District only 10 mature individuals were counted where its area of occupancy was less than 100m² (Mishra & Singh 2000). At Sajjangad and Purandhar the number of mature individuals of this species traced were ca 700 and 230 respectively with a total area of occupancy was ca 6 km² (Mishra & Singh 2001).

THREATS AND CONSERVATION STRATEGIES

This palaeoendemic genus is on the verge of extinction because of loss, destruction and shrinkage of its natural habitat mainly due to fire, grazing and landslides. The species also flowers poorly and sets very little seeds due to lack of specific pollinators. However, the most dangerous threat to this species is infestation by caterpillars of the plain and striped tiger and *Aphis* sp. (Tetali et al. 1997a). It has also been reported that the local inhabitants eat the succulent stems and leaves of this plant, which is another factor for its rarity (Mamgain et al. 1996).

In Lucknow, multiplication and ex situ conservation of *Frerea indica* was first tried by National Botanical Research Institute (NBRI). Here, its propagation through stem cuttings was successful but seed set was not found (Mamgain et al. 1996). Recently, one of us (DKM) has made another successful attempt for its multiplication and ex situ conservation. It has been observed that the plant is well acclimatized in environmental conditions of Lucknow and grows nicely with regular flowering and occasional fruiting (Plate 1, figures 1-4). Mature seeds from these plants have been collected and experiments on the viability of seeds and sexual propagation are in progress. In all natural habitats, it is found that the spiny hedge *Euphorbia nerifolia* L. is the most preferred associate of *F. indica*. So, for its in situ conservation it is suggested that this hedge must be grown together. *E. nerifolia* has some

repellence to certain larvae and it has been presumed that this factor combined with thorny habit of this plant protects *F. indica* from plain tiger (Tetali et al. 1997b).

AGRO TECHNOLOGY

Multiplication and agro technology of *Frerea indica* have been studied to some extent (Chakraverty 1999). It is suggested that a mixture of fine sand, garden soil and leaf manure in the ratio of 10:2:2 would be the most suitable media for its mass multiplication through vegetative means using stem cuttings. Various growth regulators like Indole Butyric Acid (IBA), Indole Propionic Acid (IPA) and Naphthalene Acetic Acid (NAA) have been reported to promote the root initiation. The commercial formulation 'Phytonol Mi' also stimulates the vegetative growth and early onset of flowering (Chakraverty 1999). Its natural growth habit of elongated stems hanging down cliffs makes it a suitable subject for a hanging basket. During the course of in vitro propagation, special care needs to be taken particularly through the winters. Warm temperature (31-35°C) is the ideal condition for its optimal growth. It is also observed that the plant is very much sensitive to water logging and roots are decayed very rapidly. So, during irrigation, special attention is required.

CONCLUSION

At the natural habitat, the plant normally grows on rock crevices and exposed hill slopes, where sufficient water is available only during rainy seasons. In other seasons, the plant has to survive in dry condition. The physiology of the plant has therefore been changed and some xerophytic characters, like leafy stems and succulent leaves, are developed. The leaves are shed in dry conditions as a water conservation mechanism, which is further supported by condenses of stems into thick succulent knots and development of a reflective silvery surface on the stems. As a gift of nature, the flowers of this plant contain several variations in the ratio of purple and yellow markings on their petals, which make the plant more attractive.

As the plant is a palaeoendemic and is listed in the Red Data Book of Indian Plants (Nayar & Sastry 1987), many private and government organizations like

Botanical Survey of India, Council of Scientific and Industrial Research, Naorji Godrej Centre for Plant Research, various universities, etc., are engaged in multiplying this plant in their respective gardens for its conservation. Due to its beautiful flower, people are also growing it as an ornamental pot plant, which is also minimizing its probability of extinction. Further efforts should also be made to popularize the ornamental importance of this plant so that it can be conserved at more and more places. The biological activities of this plant could not be explored so far due to its rare occurrence in nature. It is possible only after its mass propagation in gardens or laboratories through cultivation and tissue culture respectively.

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