

OBSERVATIONS ON POPULATIONS ON *BIOPHYTUM REINWARDTII*  
EDGW. & HOOK. F.

Heteromorphic and monomorphic populations of *Biophytum reinwardtii* Edgw. & Hook. f. in Kerala have been studied for their taxonomic significance.

## MATERIALS AND METHOD

Plants collected from Vadakumpad, Tellicherry, Kerala, in July 1970 and grown in the college garden were used for initial studies. Herbarium specimens and flowers stored in fluid were authentically identified at Kew and by Dr. J. F. Veldkamp. Similar populations were later observed in other distant localities like Parambikolam, Nelliampathy and Kunnankulam. Dry specimens of both heteromorphic and monomorphic populations were sent to Rijksherbarium, Leiden, where they were identified as two forms of *Biophytum reinwardtii* Edgw. & Hook. f.

Occurrence of self-pollination was ascertained by allowing the flowers to open within cellophane bags and retaining them within the bags until fruits were formed. Cross-pollinations were made using bagged flowers and clean, sterile needles.

## OBSERVATIONS

The common form of *Biophytum reinwardtii* Edgw. & Hook. f. widely distributed in Kerala, is heteromorphic, tristylous and entomophilous. Bagging experiments have proved the indispensability of insect-visit for successful pollination and fertilisation in all the three forms of flowers which are :

- (i) Long-styled flowers with low and mid-level anthers.
- (ii) Medium-styled flowers with low and high-level anthers.
- (iii) Short-styled flowers with mid-level and high-level anthers.

The medium-styled form makes up the largest class and the long-styled, the smallest in all observed populations.

There is no definite numerical ratio between the three forms. Breeding experiments have shown an incompatibility system in the three forms. Medium-styled flowers are almost completely self-fertile, whereas long-styled flowers are entirely self-sterile. Short-styled forms are partially self-fertile. Morphologically all flower types are alike except for the difference in the relative length of style and stamens.

The monomorphic plants are much smaller than the common tristylous form and are generally weaker and have smaller flowers. They are not only monomorphic but are adapted for self-pollination and are fully self-fertile. Structurally this form is close to the medium-styled flower of the tristylous form. A comparative account of the average sizes of floral parts for fifty flowers is given below.

	Medium-styled form of tri- stylous type	Monomorphic type
Diameter of corolla	15 mm	7.9 mm
Length of sepal	3-3.5 mm	3 mm
Length of petal	9-11 mm	7.9 mm
Width of petal	5-7 mm	4.5 mm
Height of ovary	2 mm	1.35 mm
Length of short stamen	0.75 mm	1.25 mm

The styles of the monomorphic flowers are shorter than those of medium styled flowers of the tristylous form, but are not comparable to those of the short-styled flowers in which they are bent horizontally. Anthers of the short stamens of the monomorphic form are held close to the stigmas whereas in the medium-styled flower of the tristylous form anthers of the short stamens are able to reach only the top of the ovary. The glands at the base of the short stamens are better developed in the tristylous form than in the other. In the monomorphic form,

anthers of the short stamens remain close to or even touching the stigmas and in open flowers a good load of pollen can be seen on the stigmas. Bagged flowers show 100% fruit-set, despite the absence of insect vectors.

#### CONCLUSION

According to Veldkamp who revised *Biophytum reinwardtii* in Flora Malesiana, the only form in Malesia is the medium-styled one. However, he has not checked the self-compatibility of this form (pers. com.). Similar populations in Kerala are found to be 100% self-compatible and structurally adapted for self-pollination.

The existence of two kinds of populations, different in their adaptations and breeding systems requires further investigation.

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### A NOTE ON THE OCCURRENCE OF *RHODIOLA FASTIGIATA* (HK. F. ET TH.) FU CRASSULACEAE IN THE HIMALAYA

During a recent collection tour in the Garhwal Himalaya, the second author collected the female plants of this rare species from the environs of Lake Hemkund (Chamoli Dist.) at an altitude of Ca 4200 m. *Rhodiola fastigiata* is a characteristically dioecious species and had been collected in Garhwal previously by Strachey and Winterbottom during their extensive collection tour of Garhwal and Kumaon as far back as 1846-49. Hooker f. and Thomson described it a few years later from a Sikkim collection. It is also known from recent collections in Kumaon and Kashmir in Western Himalaya. Though it has a wide

range of distribution, its frequency of occurrence is rare. Further, due to its resemblance in the general appearance to and—occurrence usually with other species of *Rhodiola* like *R. quadrifida* and *R. tibetica*, it is likely to be missed in the field. It can, however, be distinguished from the other species by its smaller size, smaller leaves, petals, gynoecium and fastigiate stems. The authors have also noticed, during their examination of the materials in the Indian Herbaria for a revision of the Indian Crassulaceae, that some of the recent collections of this species from Kashmir and Kumaon have been wrongly identified as