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How to cite:

Paria N.D. 2000. Seedling Morphology and its relevance in Conservation of Biodiversity. *Rheedeia* 10(1): 85-86.

<https://dx.doi.org/10.22244/rheedeia.2000.10.01.12>

Published in print: 30.06.2000

Published Online: 01.01.2022

Seedling Morphology and its relevance in Conservation of Biodiversity



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Biodiversity refers to the variety and variability among living organisms, the genetic diversity they contain, the assemblages they form, and the ecological complexes in which they occur. This is autosustainable and self-regulating, if there are no natural and/or man-made perturbations.

In India, we have various types of ecosystems including mountain, arid, semi-arid, humid, coastal and island ecosystems. Altitudinal zones vary from sea level to the permanent snowline in the Himalaya. These ecosystems are very rich in biodiversity. But this biodiversity is facing erosion due to excessive population growth, intensive resource exploitation, extensive farming and alteration of habitats. Overgrazing of cattles, intensive shifting cultivation, global climate change also lead directly to the demise of species and habitats. Irreplaceable genes, species and ecosystems are disappearing at an alarming rate. In view of the conservation, programmes are accordingly implemented at three levels, namely genetic, species and ecosystems. Different approaches are adopted for this purpose, especially *in situ* and *ex situ* conservation methods.

In situ conservation of wild flora through protection of species habitats and ecosystems is chiefly being implemented by the Ministry of Environment and Forests. *Ex situ* conservation of genetic resources of cultivated plants and their wild relatives is managed and maintained largely by the National Bureau of Plant Genetic Resources under the Indian Council of Agricultural Research. Moreover, the non-governmental organisations (NGOs) play a pivotal role to make people's participation possible to protect and conserve biological diversity. In both the conservation methods, application of the knowledge of seedling morphology of flowering plants is of immense value, particularly in case of rare and threatened plants.

A dicot seedling consists of a root, a hypocotyl, two (para) cotyledons, first two leaves, subsequent leaves (eophylls) and a plumular bud in general. This may be phanerocotylar and cryptocotylar. Usually, the phanerocotylar and cryptocotylar seedlings

correspond to epigeal and hypogeal pattern of germination respectively. The seedlings may resemble or differ in varying degree from adult plants of the same species. The taxonomic significance of seedlings is derived mainly from the morphology. Readily observable characters are the number, the size and the shape of (para) cotyledons; and the form, the shape and the phyllotaxy of the earliest leaves both of which are diverse in manifestation (except number of paracotyledons or cotyledons). Of the earliest leaves (eophylls), the first two leaves are conservative and important in characters. The knowledge of seedlings is often of importance in the context of conservation, crop-weed interaction, vegetation dynamics, and rehabilitation of disturbed areas. For the conservationists and ecologists, the seedlings are often a source of embarrassment in that though they are often present in the study areas, their identities are usually unknown. With the current interests in conservation biology, turning more and more to the protection of biodiversity of plants, it has become necessary to develop special keys for identification of seedlings. In fact, there are multitude of characters available and such keys are possible to construct.

It is probable that the threatened or endangered plants produce seedlings in natural habitats, and these could be protected through *in situ* and *ex situ* conservation methods as per hazards of the environment prevailing on the species. In a tissue culture programme, the seedling plant in its early stage of development may provide suitable explants (particularly the hypocotyl) for the initiation of calli. Sometimes, hypocotyl protoplast is found to be the favourable material for protoplast isolation. In either case of conservation methods, the identification of plants at seedling stage is of enormous importance. As such, the comparative knowledge of the morphology of seedlings leading to the identification of taxa is to be employed in the maintenance and conservation of plant biodiversity either directly or indirectly.

*Abstract of the Dr. V.V. Sivarajan Memorial Gold Medal Lecture delivered on 18th December, 1999 during the IXth Annual Conference of the Indian Association for Angiosperm Taxonomy held at Calicut University, Calicut, India.