

SUSTENANCE OF BIODIVERSITY: AN ACTION LINE THROUGH VIABLE APPROACHES

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ABSTRACT:

India is one of the world's 'mega diversity' countries. The more diverse an ecosystem the more productive it is and able to withstand environmental stress. Increasing population and anthropogenic activities like deforestation and destruction of wetlands threatening biodiversity to great extent. Some of tree species like *Syzygium travancoricum*, *Dysoxylum malabaricum* and some medicinal plants like *Stevia rebaudiana* and *Picrorhiza Kurro* are critically endangered. Strategies like somatic embryogenesis, botanical garden, on- farm conservation and gene bank are used to conserve biodiversity. Promotion of indigenous resource management systems and practices, involvement of local people in conservation planning and endeavours, development of appropriate benefit-sharing mechanisms and awareness creation are some of the multi- disciplinary approaches for the conservation of bio-diversity.

Keywords: conservation, bio-diversity , endangered , somatic embryogenesis and botanical garden.

INTRODUCTION

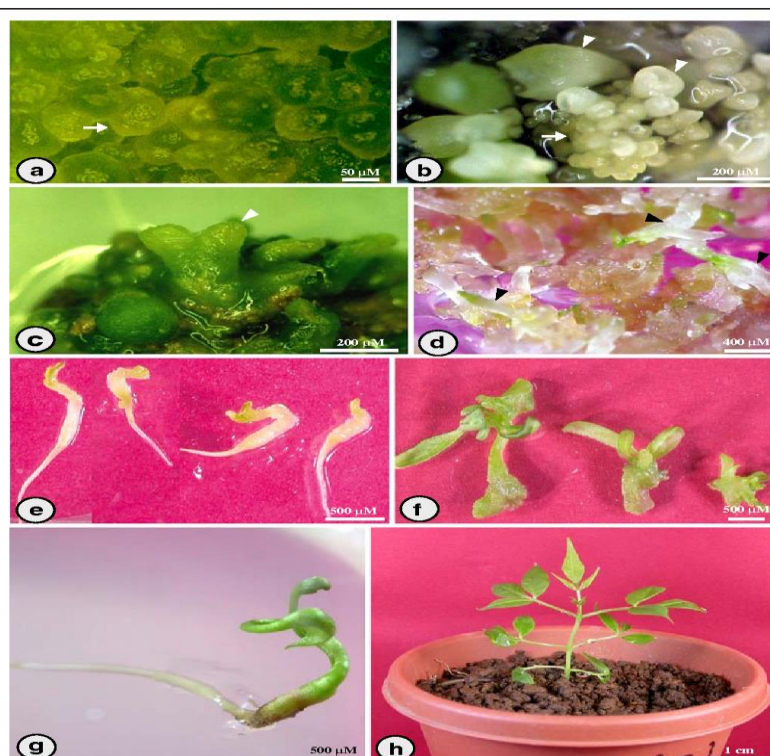
India is known for its rich biological diversity due to the presence of variety of flora and fauna. It is one of the top-ranking, mega-biodiversity rich countries of the world. Our cultural diversity has played a key role in conserving plant and animal diversity. But now, this diversity is in danger. Take for instance, trees. Trees are being destroyed ruthlessly because of growing industries ,developmental projects and increased dependence, because of their valuable services to humanity. Pristine forests have been fragmented due to intense developmental activities over the past few decades. Western Ghats is one of the bio-diversity hotspot but more than 100 tree species of high economic importance have become threatened and critically endangered . The convention on biological Diversity held in June, 1992 stressed the need of the conservation of the Biodiversity for the sustainable development and perpetuation of human beings on earth. India is also rich in medicinal plant diversity with all the three levels of biodiversity such as species diversity, genetic diversity, and habitat diversity (Mukherjee and Wahile, 2006). International Union for Conservation of Nature and Natural Resources (IUCN) has included a total of 560 plant species of India under red List of Threatened species , out of which 247 species are in the threatened category. When it comes on global basis, the IUCN has estimated that about 12.5% of the world's vascular plants, totalling about 34,000 species are under threat of varying degrees (Phartyal et al., 2002). In view of the tremendously growing world population, increasing rapidly anthropogenic activities like deforestation, eroding natural ecosystem, etc the natural habitat for a great number of herbs and trees are dwindling and of per capita consumption has resulted in unsustainable exploitation of Earth's biological

diversity, exacerbated by climate change, ocean acidification, and other human environmental impacts (Rands et al., 2010). Tree species which requires decades to regenerate the optimum population and if there is lacuna of regeneration or habitat, their present population cannot be considered healthy. Fragmentation of population caused limitations in seed dispersal flow and limited pollen which resulted in inbreeding and can have huge impact in regeneration of the species. In case of *Dysoxylum malabaricum*, an endangered tree species in the Western Ghats, inbreeding between related individuals has caused reduced regeneration. *Syzygium travancoricum*, an economically important tree species, is reported to exist with a population size of only 15-20 individuals. Similarly, *Dipterocarpus bourdillonii*, another endangered species has only 14 individuals occurring in three patches in Karnataka. *Stevia rebaudiana* Bertoni a natural sweetener perennial herb commonly known as “Sweet Weed”, The leaves of this plant are estimated to be 300 times sweeter than sucrose and the sweetness is due to glycosides of which the most abundant is stevioside. (Dushyant et al., 2014). Kutki or *Picrorhiza Kurroa* is from *Scrophulariaceae* family. According to Ayurveda the plant has utility as laxative, liver-stimulant, appetite and stimulant, febrifuge are now endangered.

STRATEGIES FOR CONSERVATION AND REGENERATION:

SOMATIC EMBRYOGENESIS:

Somatic embryogenesis is the process of formation of embryo like structure from somatic tissue. This pathway has offered a great potential for the production of plantlets and its biotechnological manipulation. In many medicinal plant species plant regeneration via somatic embryogenesis from single cells, which can be induced to produce an embryo and then a complete plant, has been demonstrated (Tripathi and Tripathi, 2003). Arumugam and Bhojwani (1990) noted the development of somatic embryos from zygotic embryos of *Podophyllum hexandrum* on MS medium containing BAP and IAA.



BOTANICAL GARDENS:

Botanic gardens are institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education (Wyse Jackson, 1999). Many of the world's threatened plant species which are represented in their seed-banks or living collections they collectively provide an insurance policy supporting the maintenance of global biodiversity (Waylen, 2006). Most of the botanical gardens around the world have developed as an effective seedbanks for conserving germplasm of the wild plant species. Millennium Seed Bank (MSB) at the Royal Botanic Gardens, Kew, UK, is perhaps the most important one to date in a major investment for the long-term future of plant diversity (Smith et al., 2007). They are involved in habitat management and restoration, control of invasive species, plant reintroduction and environmental education. Botanic gardens are considered as living laboratories. They are involved to undertake and promote scientific research on plants in particular and biological diversity in general. But, most of the botanic gardens do not have sufficient human, financial and physical resources to be able to achieve much effective conservation and research into biodiversity. Therefore, there is a need to provide the necessary resources so that botanic gardens play important roles in the assessment and conservation of biodiversity.



ON FARM CONSERVATION

On-farm conservation is the conservation of crops and their wild relatives, agroecosystems and the livestock, in which they occur. Agroecosystems include crop fields, home-gardens agroforestry systems, fallow fields and grazing lands. Agricultural biodiversity, or agro biodiversity, is that component of biodiversity that contributes to food and agricultural production. Domesticated plants and animals are maintained by indigenous resource management systems and agricultural practices play an important role in the maintenance and diversification of (McNeely et al., 1995). Low-input agricultural systems are important sources and custodians of agrobiodiversity. Farmers and pastoralists maintain a tremendous diversity of crop and livestock varieties around the world. Some of the Indigenous technical knowledge, skills and practices of farmers play a huge role in the conservation and management of agricultural bio-diversity. They are better options for building the scientific basis of *in situ* conservation of agro-biodiversity on-farm (Deribe et al., 2002). The expansion of large-

scale/modern agricultural systems, has caused erosion of agricultural biodiversity in which relatively a few improved varieties have replaced many farmers' varieties. In order to ensure the maintenance and continual use of the diverse genetic resources associated with traditional agricultural systems, there is a need for basing the rural development strategy on traditional farming systems, knowledge and agro-ecological techniques (Miller et al., 1995).

GENEBANK:

Genebanks are important for the conservation of germplasm or genetic material. Germplasms that can be stored in genebanks include seeds, pollen, spores, semen (sperms), eggs, embryos, cells and tissues. Recently, DNA sequences are also kept in specialized banks (Smith et al., 2007). Some of the *In vitro* conservation methods (storage of germplasm in laboratory conditions) such as cryopreservation (storage of germplasm in dormant state) and tissue culture storage (micropropagation, that is, in slow growth condition) are important for preservation of germplasm. For the long-term storage of germplasm, cryopreservation of biological material using liquid nitrogen (-196°C) has a good potential (Santos and Stushnoff, 2002). Increasingly, the difficult-to- conserve species are being maintained as *in vitro* collections.

CONCLUSION:

Biodiversity is essential for sustaining the natural ecosystems on which humans, and all life, depend. When the ecosystem is more diverse, the more stable it is, the more productive it tends to be, and they better it is able to withstand environmental stress. Promotion of indigenous resource management systems and practices, involvement of local people in conservation planning and endeavours, development of appropriate benefit-sharing mechanisms, awareness creation, promotion of the involvement of all relevant stakeholders and provision of adequate human, financial and physical resources for conservation efforts are important measures that should be taken in order to ensure the conservation, management and sustainable use of biodiversity. Biodiversity conservation needs a multidisciplinary approach, and requires to be a continuous endeavour.

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