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A Review On Ecorestoration and Dryland Intervention with Nano-Technology : A Review

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ABSTRACT

The major objective for this Technology is to evolve models of sustainable development in the coastal regions through mutually reinforcing linkages among the livelihood security of the rural communities with ecological security of the coastal regions. Both Marine and Land-based alternative livelihoods were to be developed to reduce overexploitation of the already degraded coastal bio-resources and thereby reconcile development with conservation in a harmonious and sustainable manner. These programmes focus on developing appropriate technological interventions in costal regions both representing coastal wetland ecosystems and dryland ecosystems. The interventions in the coastal estuarine system were taken up in the coastal regions of TamilNadu and Puducherry. These programmes were also strengthened during the aftermath of Tsunami in providing ecological, economic and knowledge connectivity in the regions.

Key words: Bio-Diversity, Conservation, Environment and Eco-Restoration

I. INTRODUCTION

E Biotechnology has both multidimensional and multifunctional role for achieving social development in the face of the challenging problems of growing population, diminishing resources and ecological hazards of development and growth. All over the world, particularly in the developed countries, biotechnologies has played a very significant role in the manufacturing of health products, secondary metabolites, biopharmaceuticals, enzymes, microbial production of chemicals and other farm-biotechnological industries and also has played a very significant role in ply important roll ecological restoration at the time natural calamity or mankind particularly as a disaster management.

Coastal estuarine regions

1. Standardization of mangrove plants propagation protocols
2. Standardization of vegetative propagation protocols and mass multiplication
3. Establishment of Mangrove Genetic Resource Conservation Centre

Figure 1

C.S, Ajay Parida Theoritical and applied genetics (1997) 94:1121-1127.

4. Science Reporter, June 1999. Micropropagation protocols have been successfully developed for a number of mangrove and associated species (*Intsia bijuga, Porteresia coarctata*, *Salicornia brachiata* and *Sesuvium portulacastrum.* Both micro propagation and vegetative propagation protocols were standardized for almost all the mangrove plant species (*Acanthus illicifolius, Amoora cucullata, Avicennea marina, Avicennia officinalis, Bruguiera cylindrica, Bruguiera gymonorrhiza, Bruguiera parviflora, Bruguiera sexangula, Cerbera manghas, Cerbera odollam, Ceriops decandra, Excoecaria agallocha, Heritiera fomes, Heritiera littoralis, Intsia bijiuga, Kandelia candel, Rhizophora apicuata, Rhizophora apiculata, Rhizophora mucronata, Rhizophora* x hybrid*, Sesuvium portulacastrum*, *Sonneratia apetala, Xylocarpus granatum* and *Xylocarpus moluccenensis)* for continuous supply of saplings for restoration and afforestation programmes. Above plant species were successfully introduced and established at Mangrove Genetic Resource Conservation Centre in Pichavaram area, Tamil Nadu.

The following mangrove plants were selected for coastal bioenergy programme viz. *Avicennia marina, Avicennia officinalis*, *Bruguiera cylindrica, Ceriops decandra, Excoecaria agallocha, Jatropha curcas, Rhizophora apiculata, Rhizophora mucronata, Rhizophora* hybrid, *Salicornia brachiata*. People were trained in selection of plus tree materials from mangrove forest, seed collection, maintaining nursery, vegetative propagation of the selected species. The low cost mist propagation facilities has been provided for vegetative propagation and hardening of tissue culture propagated plants. The local communities are now directly involved activities for identification of suitable coastal site for mangrove plantation, plantation and after care plantation areas.

Cultivation of *Salicornia brachiata,* a mangrove associate species*,* is important for economic benefits for both human and livestock. Farmers in and around coastal lagoons, mangrove areas, and hyper saline areas are being involved cultivation of *Salicornia* for harvest salts from land and biomass production. Young shoots can be harvested for salad preparation yields 3600kg/acre (2-3 months old plants). Half matured shoots can be utilized for salt extraction yields 600kg/acre (3-5 months old plants). Matured plants (completely turned to yellow) can be used for oil extraction (40kg seeds/acre) and remaining husk good for fodder yield 2700kg/acre (5-8 month old plants). 6500 to 9787 kg fresh biomass/acre from 3rd to 6th month.

Nursery raised and propagated mangrove plants were successfully field transferred into mangrove forest area in Tamil Nadu and Union Territory of Puducherry.

Bioshield establishment and maintenance in the coastal areas:

The coastal bio-shield programme facilitates both ecological and economical benefits to the coastal communities. The bioshield aims to conserve the bund; sand dunes in the coastal areas from natural disasters like Tsunami, cyclone, heavy coastal wind, control soil erosion etc. Thus it would protect the soil erosion and also save coastal hamlets. Additionally, mangrove plantation will help increase the aquatic biodiversity in the river and river mouth.

3½ year old bioshield plantations are being managed by traditional leaders and SHGs at Sadras (Mangrove 2 ha and 3 ha Non-mangrove) and 2½ year old mangroves (8 hac) Karaikal; two year old non mangrove (5 hac) at Chandrapadi; 2½ year old (2.2 hac) sand dune vegetation and 3 hac of non-mangrove at Pudukupam; Nagai Dist. and 1½ year old sand dune vegetation (3hac) at Pazayar.

Conservation of rare, endangered, medicinal and mangrove plants

Successful action to conserve biodiversity must address the full range of causes of its current loss and embrace the opportunities that genes, species and ecosystems provide for sustainable development. Because the goal of biodiversity conservation and supporting sustainable development by protecting and using biological resources in ways that do not diminish the worlds variety of genes and species or destroy important habitats and ecosystems. But the campaign can be broken down into three basic elements: saving biodiversity, studying it, and using it sustainably and equitably.In India, Botanical Survey of India has listed numerous endemic plant species that are rare, endangered and threatened.

Mangrove plant species conservation programme

NGOs successfully developed micropropagation protocols for *Excoecaria agallocha, Avicennia marina, Avicennia ojficinalis, Heritiera, Acanthus, Intsia bijuga, Porteresia coarctata, Salicornia brachiata and Sesuvium portulacastrum.* Large scale propagation of vegetative propagation protocols were also developed for almost all the mangrove plant species like *Acanthus illicifolius, Amoora cucullata, Avicennea marina, Avicennia officinalis, Bruguiera cylindrica, Bruguiera lljmonorrhiza, Bruguiera parviflora, Bruguiera sexangula, Cerbera manghas, Cerbera odollam, Ceriops decandra, Excoecaria agallocha, Heritiera fornes, Heritiera littoral is, Intsia bijiuga, Kandelia candel, Rhizophora apicuata, Rhizophora apiculata, Rhizophora mucronata, Rhizophora x hybrid, Sesuvium portulacastrum, Sonneratia apetala, Xylocarpus granatum and Xylocarpus moluccenensis*. Particularly Rhizophora hybrid (sterile) was for the first time successfully propagated and established at the field. Most of the above plant species were successfully introduced and established at Mangrove Genetic Resource Conservation Centre in Pichavaram area, Tamil Nadu.

The following mangrove plants were selected for coastal bioenergy programme viz. *Avicennia marina, Avicennia ojficinalis, Bruguiera cylindrica, Ceriops decandra, Excoecaria agallocha, Jatropha curcas, Rhizophora apiculata, Rhizophora mucronata, Rhizophora hybrid, Salicornia brachiata.* The local community was trained in selection of plus tree materials from mangrove forest, seed collection, maintaining nursery, vegetative propagation of the selected species. The low cost mist propagation facilities has been provided for vegetative propagation and hardening of tissue culture propagated plants. The people are directly involved for identification of suitable coastal site for mangrove plantation, plantation and after care plantation areas.

Cultivation of *Salicornia brachiata* is an economically important plant species. Farmers in and around coastal lagoons, mangrove areas, and hyper saline areas are trained in cultivation of *Salicornia* to harvest salts and for biomass production.

II. CONCLUSION

Twentieth century gave birth to two technological revolutions in the areas of Information Technology and Biotechnology. These two are expected to touch every sphere of human activity. Application of Biotechnology for the production of transgenic plants is primarily meant for higher yield potentials, increased resistance to stress and better crops. Plant tissue culture is now capable of producing a large number of clones with specific traits and the technique when applied in conjunction with transgenic plant development by gene technology, will be able to produce better crop varieties in the shortest possible time. Thus mangroves are the special habitats of the tropical and subtropical countries like India. Unfavorable environmental conditions during the monsoon months and natural disasters like tsunami do have effect on mangroves; however, mangrove flora and fauna can withstand large variations in environmental factors. Man exploits the vegetation of the mangroves and every year many trees are being cut for domestic fuel thereby reducing the bio wall and its wealth. This results in the

disturbance of animal life in that region. Unless preventive measures are taken, the mangrove swamps may disappear in due course of time and the natural fence (Bio wall) of the country to safeguard the coastal areas from natural calamities will be a question.

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