Study on Government Gardens At Forest Beats In Coastal Purba Medinipur of West Bengal

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Abstract- *A large number of plant conservatory found in different parts of the globe but easy and sophisticated conservatory is nursery made by nature as sacred groves, natural forest or vegetation sites, sites of no disturbance even natural pockets with minimum interference. Normally plants grow there where naturally environmental factors play a vital role without any great fluctuations and all the ecological factors interacts with great pace in relation to good biological carriers indeed it is true that natural forces also. But due to excessive human pressure we are loosening the tight interactions even unpredicted loss of propagules in proximity of settlement during onset of germination. Grazing, browsing, soil loss, heavy rainfall, water logging condition, high tide, thick deposition of mud, altered seasonal duration, pathogenic attack, fire, settlement of buildings, roads, construction of monuments, changing pattern of land mass and establishment of new industries make it complete under the heading eco-degradation. In coastal Purba Medinipur area people facing loss of land due to landslides at the shoreline, high salinity, alkalinity and water logging condition that fit for fishery or fishing but not fit for agriculture or horticulture even not fit for nursery on ground. Successive and continuous cyclonic attack and saline water change the quality of soil. Therefore it is highly recommended that we need manmade nursery with scientific management that can raise nursery seedlings to re-vegetate the land and conserve the diversity of the area in addition to the ecosystem management in near future. In this communication, case studies show an idea of raised seedlings on four Governmental nurseries which have been presented with a brief structural and functional management to fulfil the general needs of people in coastal Purba Medinipur.*

Keywords- Governmental Gardens, Jellingham, Khejuri, Sankarpur and Nijkasba, management

I. INTRODUCTION

While studying in the field of Coastal Purba Medinipur during medicinal plant research, and interesting information came to our knowledge that is related to medicinal plant research and directly related to conservation biology. Many kinds of conservation strategies have been noticed since time immemorial but nursery is new points of view that play a key role to conserve species even we being distribution of species to establish good vegetation cover in and around us. Many private nurseries in coastal purba Medinipur have been found that played a role to conserve many valuable plants including ornamental and medicinal kind but none of them show conservation ethics on conservation for halophytes and halophytic associates.

Government gardens in Purba Medinipur exhibit such plants which need immediate planning to protect the land mass by a good plantation through plantation of halophytes. Many government nurseries show Avicennia alba, Avicennia maritima, Bruguiera gymnorrhiza and Casuarina equisetifolia that are grown on high level racks through hycopot. On ground seeds of some species are germinated and then placed on polypropline bags and on poly pots for long term establishment of seedlings or saplings. The interesting plants of halophytes in addition to medicinal, ornamental and economic kinds grow here with high potential adaptations that can fight against different salinity conditions. So, in terms of re-vegetation around the site people can raise shelter belt, wind break and green belt to cope various disasters and can get yield of maximum volume at the end of rotation. Not only has that it had its own value based point of attraction which serves the green environment and centre of attraction of many people. People planted plantlets on their own ground or land and get benefit after 8-10 years later. The valuable timber line species namely Dalbergia sissoo, Gmelina arborea, Tectona grandis, Terminalia arjuna, Acacia auriculiformis, Pterocarpus marsupium, Anthocephalus cadamba etc. support the plantation view of farmers and villagers who have common idea on plantation on their own land. The land based property and the utility value of ornamentals have similar attraction. People of coastal area use large scale plantation of Citrus aurantifolia, Psidium guajava, Artocarpus heterophyllus, Phyllanthus emblica and Santalum album. This means that there is a tenacity to use various plants of economic importance along with ornamentals like Portulaca grandiflora, Polyalthia longifolia and Polyalthia longifolia var. pendula.

Remembering the theme in mind the present study was conducted to record the various aspects of conservation strategies for medicinal and economic plant and their strategies of management in near future. Here, case study on government nurseries has been conducted and on the basis of data, general information has been raised to commemorate the balance nature in coastal region with special reference to develop eco-restoration programme a complete one for the society.

II. MATERIALS AND METHODS

Several ecological surveys were done in the coastal areas of Purba Medinipur during last 6 years. In this year some surveys on market field have been conducted. Survey was conducted in four ways. Field study was done at village boundary, coastal roads, canal boundary, road sides, and rice field boundary, edges near wet lands, wastelands, and open field and in the public garden of the coastal Medinipur to study medicinal plants and pockets of vegetation for halophytes. Study was made with quadrat method seasonally. In domestic purpose people use medicinal plants. Data sheet was made earlier and house survey was done. In each site 5 members were selected randomly and in such a way 5% sampling was done successfully to know the present status of use value of medicinal plants along with other medicine used by them for their treatment upon ailments.

During survey it was interesting that some sites showed nurseries in government areas of the coastal belt. The study sites rose for specific plantations as well as to raise seedlings on some species along with medicinal plants and ornamental plants. Keeping these in mind, we have selected some governmental nurseries to know the status of medicinal plants as well as plants raised on halophytes. Camera, pen pencil, data sheet, GPS was used along with earlier references. Dry parts of fruits, seeds, barks, roots etc were preserved with naphthalene balls. Plant identification was done with the help of standard literature (Duthie, 1960; Hooker 1892-1897, Haines, 1921-1925; Prain, 1963; Das 2007, Anonymous, 1997, 2005, 2010, 2012, 2017) The names of plants were crossed checked following Bennet, 1987. Publications consulted for last few years were Chakraborty et al. 2012; Das and Das, 2014; Das, 2013; Das, 2015. Wetland plant species were indentified with the help of fresh water vegetation of Rimer, 1984. The specimens of medicinal plants were indentified with the help of museum specimens and herbarium specimens of CAL. Herbarium specimens were prepared as per the methodology of Jain and Rao, 1977. To study use pattern of medicinal plants, different books of Government sections have been consulted. But for general consideration the common book used was Kirtikar and Basu, 1918. Herbarium specimens were collected as per the manual published by Rao and Sharma, 1990. Halophytic species have been identified with the help of manual on mangroves in India (Banerjee et al. 1986). Other literature used were Blasco (1975), Banerjee (1987), Dwivedi et al (1974), Mukherjee (1978), Naskar et al. (1978), Rao et al. (1972), Sanyal et al. (1984), Sidhu (1960), Thothatri (1981), Wahead Khan (1959), Walson (1928), Gul and Khan (1995), Subhanian et al. (2010), Jha et al. (2011), Ahmed et al. (2011), Das and Ghosh (2017, 2018), Das and Das (2019a,b) . All references are tagged 1-43 as record references. Cross checking of plant's name were done with the help of taxonomist from BSI and Institutions along with literature available in forest range office as well as housed plantation journal in beat offices under Tamluk Forest Divisional office, Purba Medinipur.

III. RESULTS AND DISCUSSION

Habitats for medicinal plants available along the coast of Purba Medinipur are very interesting. This is due to high and low tide round the year. Here, people use medicinal plants dawn to dusk for their own purpose as these are ready remedies for curing ailments. Knowing the theme in mind, private and governmental nurseries prepare seedlings in nurseries and distribute among people. Governmental nurseries in Purba Medinipur found in areas like Khejuri, Hijli, Nandigram or Jellingham and Sankarpur under Tamluk forest Division. Here staff members in the nursery; prepare stocks on various plants under the category namely medicinal, economic, ornamental, halophytes and some extent wood producers. Result revealed that, Nandigram forest nursery develops seedlings and or stocks of 9 plant species. Among them, Bruguiera gymnorrhiza (Beng.-Kankra, Eng.-Black mangrove) and Sonneratia apetala (Beng.- Keora, Eng.-Mangrove apple) are true halophytes. Along the shore line all helophytes are planted and kept in nursery for further readymade use if required (Table 1). Here, Portulaca grandiflora and Mirabilis jalapa are ornamentals though large scale use of Polyalthia longifolia and Casuarina equisetifolia have been used by people to decorate landscape.

Similarly, Khejuri shows 9 important plants which are raised in nursery by forest department. Here, we see Bruguiera gymnorhiza an important halophytic plant (Table 2). Casuarina equisetifolia and Bruguiera gymnorhiza are used for degraded land restoration. Here, medicinal plants like Abroma augusta, Alstonia scholaris and Azadirachta indica are used for medicinal purpose. Wood producing species like Acacia auriculofirmis, Dalbergia sissoo and Tectona grandis are used widely by the people for commercial purpose.

Sankarpur shows 14 important plant species which are raised in nursery by forest department. Here, we see Bruguiera gymnorhiza an important halophytic plant (Table 3). Casuarina equisetifolia and Bruguiera gymnorhizai are used for restoration of degraded land in coastal area. Other plant species found in nursery are Acacia auriculiformis, Alstonia scholaris, Anthocephalus cadamba, Artocarpus heterophyllus, Azadirachta indica, Dalbergia sissoo, Milletia pinnata, Phyllanthus emblica, Pterocarpus marsupium, Pterocarpus santalinus, Santalum album and Tectona grandis.

Nursery of Nijkasba, Hijli area shows 21 important plants which are raised in nursery by forest department. Here, we see Avicennia officinalis and Bruguiera gymnorhiza as important halophytic plants (Table 4). Casuarina equisetifolia and Bruguiera gymnorhiza are used broadly to fill the ground cover and make vegetation in low lying areas. Other plant species found in nursery are Acacia auriculiformis, Alstonia scholaris, Anthocephalus cadamba, Artocarpus heterophyllus, Azadirachta indica, Dalbergia sissoo, Ficus benghalensis, Milletia pinnata, Phyllanthus emblica, Pterocarpus marsupium, Pterocarpus santalinus, Santalum album and Tectona grandis. Medicinal plants raised in nursery are Alstonia scholaris, Azadirachta indica, Terminalia arjuana and Pterocarpus santalinus. Citrus aurantifolia is used in orchard area and the demand is high as commercial plant (Table 4).

Study revealed that highest species found in Hijli Govt. nursery and lowest in Nandigram (Jellingham) and Khejuri dually (Bar graph 1). As a whole the study area has high potentiality to raise nursery seedlings particularly halophytes though seeds are not available here. The great Sunderban of Indian part supply large scale propagules to raise nursery seedlings and manage the nursery a true one for future conservation.

Following are the case studies given below for general consideration.

Case study 1.

Name of the Garden: Nandigram Forest office Garden or Jellingham Forest Garden
Division: Tamluk
Range: Bajkul
Beat: Nandigram
Location: Jellingham
Area: 20.00 hector
Distance from Tamluk Head Quarter: 56.8 km (in Purba Medinipur)
Plants available in Nursery:

Table 1. Plants raised on Nandigram nursery, Purba Medinipur..

Sl. No.	Name of the Plant species	Family	Mode of preparation
1.	*Azadirachta indica*	Meliaceae	Propagation through seeds
2.	*Bruguiera gymnorrhiza*	Rhizophoraceae	Seeds
3.	*Casuarina equisetifolia*	Casuarinaceae	Seeds
4.	*Catharanthus roseus* (Fig. 13)	Apocynaceae	Seeds
5.	*Mirabilis jalapa*	Nyctaginaceae	Seeds
6.	*Polyalyhia longifolia*	Annonaceae	Seeds
7.	*Portulaca grandiflora*	Portulacaceae	Stem cuttings
8.	*Sonneratia apetala*	Lythraceae	Seeds
9.	*Tectona grandis*	Lamiaceae	Seeds

Case study 2.

Name of the Garden: Forest Range Office garden, Khejuri.
Division: Tamluk
Range: Bajkul
Beat: Khejuri
Location: Khejuri
Area: 6 Acre
Distance from Tamluk Head Quarter: 65.7 km (in Purba Medinipur)
Plants available in Nursery:

Table 2. Plants raised on Khejuri nursery, Purba Medinipur.

Sl. No.	Name of the Plant species	Family	Mode of preparation
1	*Abroma augusta*	Malvaceae	Seeds
2.	*Acacia auriculiformis*	Fabaceae	Seeds
3.	*Alstonia scholaris*	Apocynaceae	Seeds
4.	*Azadirachta indica*	Meliaceae	Seeds
5.	*Bruguiera gymnorhiza*	Rhizophoraceae	Seeds
6.	*Casuarina equisetifolia*	Casuarinaceae	Seeds
7.	*Dalbergia sissoo*	Fabaceae	Seeds
8.	*Psidium guajava*	Myrtaceae	Seeds
9.	*Tectona grandis*	Lamiaceae	Seeds

N.B.: *Bruguiera gymnorrhiza* seeds are collected from Sunderban of West Bengal.

Case study 3.

Name of the Garden: Sankarpur Forest Beat Office garden, Khejuri.
Division: Tamluk
Range: Contai
Beat: Sankarpur
Location: Sankarpur
Area: 11 Acre
Distance from Tamluk Head Quarter: 90.7 km (in Purba Medinipur)
Plants available in Nursery:

Table 3. Plants raised on Sankarpur nursery, Purba Medinipur.

Sl. No.	Name of the Plant species	Family	Mode of preparation
1.	*Acacia auriculiformis*	Fabaceae	Seeds
2.	*Alstonia scholaris*	Apocynaceae	Seeds
3.	*Anthocephalus cadamba*	Rubiaceae	Seeds
4.	*Artocarpus heterophyllus*	Moraceae	Seeds
5.	*Azadirachta indica*	Meliaceae	Seeds
6.	*Bruguiera gymnorhiza*	Rhizophoraceae	Seeds
7.	*Casuarina equisetifolia*	Casuarinaceae	Seeds
8.	*Dalbergia sissoo*	Fabaceae	Seeds
9.	*Milletia pinnta*	Fabaceae	Seeds
10.	*Phyllanthus emblica*	Phyllanthaceae	Seeds
11.	*Pterocarpus marsupium*	Fabaceae	Seeds
12.	*Pterocarpus santalinus*	Fabaceae	Seeds
13.	*Santalum album*	Santalaceae	Seeds
14.	*Tectona grandis*	Lamiaceae	Seeds

Case study 4.

Name of the Garden: Nijkasba Forest Office garden, Nijkasba.
Division: Tamluk
Range: Bajkul
Beat: Nijkasba
Location: Hijli, Nijkasba
Area: 7.5 Acre
Distance from Tamluk Head Quarter: 71.7 km (in Purba Medinipur)

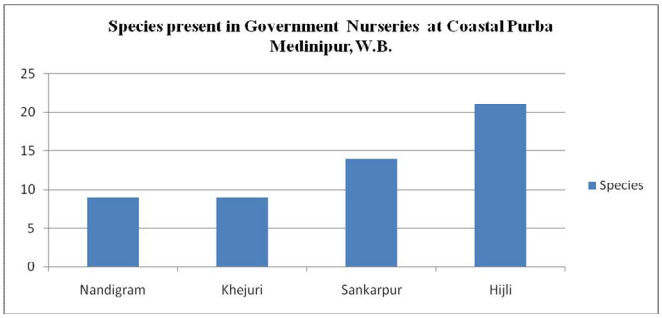
Plants available in Nursery:

Table 4. Plants raised on Nijkasba, Hijli, Purba Medinipur.

Sl. No.	Name of the Plant species	Family	Mode of preparation
1	*Acacia auriculiformis*	Fabaceae	Seeds
2	*Alstonia scholaris*	Apocynaceae	Seeds
3	*Anthocephalus cadamba*	Rubiaceae	Seeds
4	*Artocarpus heterophyllus*	Moraceae	Seeds
5	*Avicennia officinalis*	*Acanthaceae*	Seeds
6	*Azadirachta indica* (Margosa)	Meliaceae	Seeds
7	*Bruguiera gymnorhiza*	Rhizophoraceae	Seeds
8	*Casuarina equisetifolia*	Casuarinaceae	Seeds
9	*Citrus aurantifolia*	Rutaceae	Seeds, grafting
10	*Dalbergia sissoo*	Fabaceae	Seeds
11	*Ficus benghalensis*	Moraceae	Sedds
12	*Milletia pinnta*	Fabaceae	Seeds
13	*Peltophorum pterocarpum*	Fabaceae	Seeds
14	*Phyllanthus emblica*	Phyllanthaceae	Seeds
15	*Polyalthia longifolia*	Annonaceea	Seeds
16	*Psidium guajava*	Myrtaceae	Seeds, grafting
17	*Pterocarpus marsupium*	Fabaceae	Seeds
18	*Pterocarpus santalinus*	Fabaceae	Seeds
19	*Swietenia mahagoni*	Meliaceae	Seeds
20	*Tectona grandis*	Lamiaceae	Seeds
21	*Terminalia arjuna*	Combretaceae	Seeds

Management

The study sites are far remote and no general information available for the common people around the nursery that might be a negative draw back except departmental plantation. People centric idea must be made and ear wise plan thoroughly to be distributed among interested feeder group round the year not only for a 'Arany Saptaha' programme. Schools, Colleges, Institutions along with NGOs and other government sectors should be incorporated in a web based integrated programme to distribute more sapling in almost all places except a specific site. Scientific study, research, extension and other people centric training must be conducted round the year by the department for the community people.



Graph 1 Plant species of economic importance at four study sites i.e. 4 Forest nurseries at Coastal Purba Medinipur, West Bengal,. India

IV. CONCLUSION

Plants are raised in nursery in a large number. Plantlets are distributed among people to vegetate the area during pre monsoon particularly during 'Aranya Saptaha' each year. These are planted in sea shores even in protected places or distributed to another site from the nursery. The limitations must be expanded to educate more people for large scale application of reforestation programme. Ornamental and medicinal plants may be included more and more along with spices to grow more interest among people.

Photo plates: (Photo 1-24)

Fig. 1 Coastal canal in Purba Medinipur, West Bengal

Fig. 2 **Avicennia marina** sub sp. **marina at coastal area**

Fig. 6 **Terminalia arjuna at Nursery**

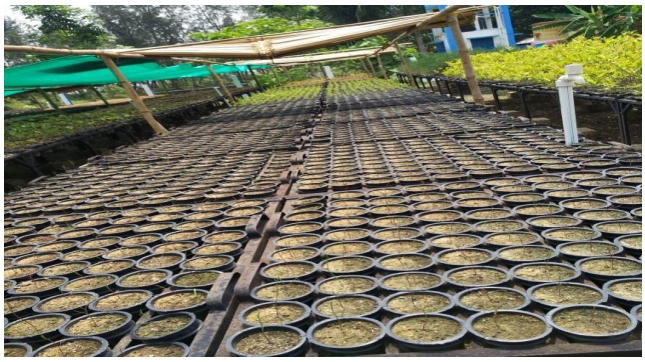


Fig. 3 Nursery of Forest Deapartment, Purba Medinipur

Fig. 7 **Peltophorum pterocarpum** at nursery

Fig. 4 **Citrus aurantifolia** on plastic pot at nursery

Fig. 8 **Azadirachta indica** at Nursery

Fig.5 **Casuarina equisetifolia** at Nursery

Fig. 9 **Bruguiera gymnorhiza** seedlings at Nursery

Fig. 10 **Portulaca grandiflora** in nursery

Fig. 11 **Polyalthia longifolia** in front of Hijli Sarif

Fig. 12 **Acacia auriculiformis** at Khejuri

Fig. 13 **Catharanthus roseus** an important medicnal plant in forest nursery, Nandigram

Fig. 14 **Emblica officinalis/Phyllanthus emblica** in nursery

Fig. 15 **Pterocarpus santalinus** in nursery

Fig. 16 Quality timber of Margosa at Nijkasba in Forest Department

Fig. 17 First author during field study at Nijkasba

Fig. 18 **Citrus aurantifolia** at Forest Nursery

Fig. 19 **Milletia pinnata** in field

Fig. 20 **Ficus benghalensis** in field

Fig. 21 Old plantation of Halophytes at high tidal zone at Hijli

Fig. 22 *Swietenia mahagoni* in nursery

Fig. 23 Author (1st) with resource woman at village

Fig. 24 During discussion at field with local person

Fig. 25 Nandigram (Bajkul), Purba Medinipur Forest Division

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