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***Pongamia pinnata* (L.) Pierre – A Promising Plantation Species for the Coastal Area of Bangladesh**

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Pongamia pinnata (L.) Pierre is a fast growing medium-sized, nearly evergreen tree species. It attains a height up to 25m, with straight or crooked trunk up to 50 cm diameter (Allen and Allen 1981). The crown is broad, spreading or dropping branches with dense foliage. The species is found in humid and sub-tropical environments. It occurs naturally in lowland, near canals, rivers, waste places, along the edges of mangrove forest and tidal streams. In Bangladesh, it usually grows on the sandy mud in the coastal districts and in the fresh water swamp forests of the north-eastern wetlands.

P. pinnata (karanja) is a nitrogen-fixing multipurpose tree species. It has many industrial and medicinal importance, and ecological benefits. It is a strong candidate to contribute significant amount of fuel feedstock and a potential source of biodiesel (Kesari and Rangan 2010). A single tree can produce between 9 and 90 kg seed per year and the seeds contain 30-40% oil (Rao *et al.* 2011). The non-edible pongam oil is used for tanning leather, lamp oil, soap making, lubricant and as a liniment to treat scabies, herpes and rheumatism (Burkill 1966). The juice of leaves is used as a remedy for dyspepsia, diarrhea, cough, leprosy and gonorrhoea. Timber is used for construction works, carpentry works, agricultural implements, carts and carriages, post and fuel wood. It is a preferred species for controlling soil erosion and binding sand dunes because of its

extensive lateral root system. Mature trees can also withstand water logging, salinity and resist high winds (Tomer and Gupta 1985).

Bangladesh coastline extends over 710 km long along the Bay of Bengal comprises various forms of *char* lands and off-shore islands (Siddiqi 2001). Bangladesh Forest department has been raised about 1,92,000 ha mangrove and 8,690 ha non-mangrove plantations on the accreted lands along the coastal belt (Hasan 2013). Among the mangrove plantations, *Sonneretia apetela* (keora) is the major planting species comprising 94.4% area in the newly accreted lands of the coastal area (Siddiqi 2001). Plantations of *P. pinnata* were raised scattered in some areas of the coastal belt. But a very little information on the growth performance of this species was documented. Therefore, an experiment was carried out in the coastal area to determine the suitability and growth performance of the species.

The experiment was laid out in three *char* lands namely Char Rawshan, Xylar Khal (North) and Xylar Khal (South) under Char Kukri-Mukri island of Bhola district since 1995. Char Kukri-Mukri is located at latitude 21°85' N and longitude 90°72' E. Soils of the area is non-calcareous, grey floodplain and silt-clay-loam. Soils are slightly saline (1.5-4.0 ds/m), soil pH is slightly alkaline (7.5-8.0) and soil organic carbon content is 0.5-1.5% (Siddiqi and Khan 2000).

were collected during March-April. Seedlings were raised in polybags of size 25cm x 15cm filling with soil and cowdung mixture at 3:1 ratio. One-year-old seedlings were planted at 1.5m x 1.5m spacing. The experiment was laid out in Randomized Complete Block design (RCBD) with 3 replications. Each plot was planted with (9 x 9) 81 seedlings. Data on tree density, height, diameter at breast height (DBH) and bole height were collected in December 2012 when stands age varied from 12-17 years and all these data were analyzed.

Initially, a total of 4,444 seedlings/ha area were planted in the experimental plots. After 17 years, tree density per hectare area was 1,333 trees at Char Rawshan. It was 1,066 trees at Jylar Khal (North) and 992 trees at Jylar Khal (South) after 12 years. The average height of trees was 19.65m, 6.14m and 6.34m at Char Rawshan, Jylar Khal

(North) and Jylar Khal (South) respectively. The greater DBH (35.86cm) and bole height (9.36m) of trees was also recorded at Char Rawshan site. The mean annual increment (MAI) in height was greater (1.15m) at Char Rawshan while it was only 0.53m at Jylar Khal (South) and 0.51m at Jylar Khal (North). The MAI in diameter was higher (2.11cm) at Char Rawshan but it was only 0.69cm at Jylar Khal (South) and 0.66cm at Jylar Khal (North) shown in Table 1. Although, growth performance of this species were found promising at Char Rawshan site (Figure 1 & 2) but showed poor survival at all planting sites. Several factors such as heavy sedimentation in the plantation sites, high tidal inundation, cyclone and storm surge affect the survival of planted seedlings initially. In addition, deer browsing, buffalos and cattle grazing also affected the growth and survival of this species.



Figure 1. *Pongamia pinnata* (L.) Pierre tree.

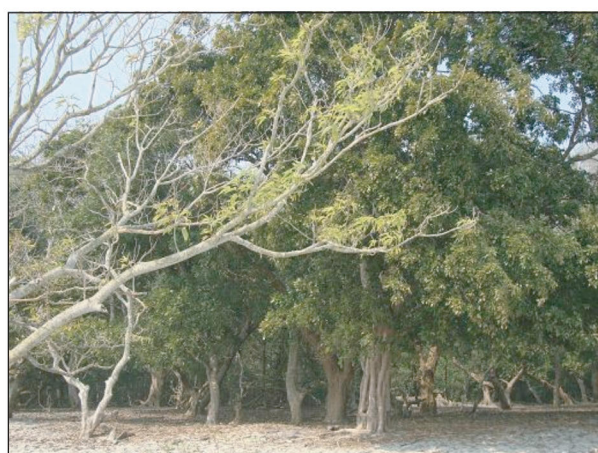


Figure 2. Seventeen years old *P. pinnata* plantation at Char Rawshan of Char Kukri-Mukri island.

Serajuddoula *et al.* (1995) conducted an experimental trial with eleven mesophytic species at Rangabali island of Patukhali district. They reported that *P. pinnata* showed 42% survival with an average height of 1.84m and dbh of 2.21cm at the age of four years. Siddiqi *et al.* (1993) reported

that the height and diameter of *P. pinnata* was 8.06m and 14.17cm after 17 years at Char Nangulia and it was 6.26m and 8.24cm after 13 years at Char Mohiuddin under Noakhali district. Nandy *et al.* (2002) made a survey for assessment of growth performance of different tree species on

Table 1. Growth performance of *P. pinnata* planted at three *char* lands of Char Kukri-Mukri island of Bhola district.

Location	Age (year)	Tree density/ha	Mean height (m) ± SE	MAI in height (m)	Mean DBH (cm) ± SE	MAI in diameter (cm)	Mean bole height
Char Rawshan	17	1333	19.65 ± 0.49	1.15	35.86 ± 1.32	2.11	9.36
Jylar Khal (North)	12	1066	6.14 ± 0.14	0.51	7.97 ± 0.18	0.66	3.73
Jylar Khal (South)	12	992	6.34 ± 0.17	0.53	8.31 ± 0.16	0.69	4.15

the coastal embankment. They reported that *P. pinnata* showed 2.27m in height and 4.21cm in diameter in the central coastal belt, while it was 2.08m and 1.59cm in the western coastal belt at the age of three years.

The growth of *P. pinnata* was found satisfactory in comparison to other available plantation species in the coastal belt of Bangladesh. Therefore, this may be one of the promising plantation species for the coastal area

for its multipurpose uses. Plantations can be raised with this species in the degraded or accreted lands for increasing biodiversity and maintaining sustainable forest cover in the coastal area. It can play a role to protect coastal people from cyclone and storm surges as a good shelterbelt species. However, there is a further need for research into various areas to evaluate growth, yield, phenology and seed productions in both newly accreted land and relatively mature lands of the coastal belt.

References

- Allen, O. N. and Allen, E. K. 1981. *The Leguminosae*. The University of Wisconsin Press, Madison. 812 pp.
- Burkill, I. H. 1966. *A Dictionary of Economic Products of the Malay Peninsula*. Art Printing Works, Kuala Lumpur. 2 vols. 1773 pp.
- Hasan, D. Z. 2013. *Plants in Mangroves and Coastal Afforestation in Bangladesh*. Dewan House, Ukilpara, Naogaon. 164 pp.
- Kesari, V. and Rangan, L. 2010. Development of *Pongamia pinnata* as an alternative biofuel crop-current status and scope of plantations in India. *Journal of Crop Science Biotechnology* 13 (3): 127-137.
- Nandy, P.; Haider, M. R.; Islam, M. R.; Alam, M. J.; Moula, M. G.; and Habib, M. A. 2002. *Growth Performance of 37 Species Raised in the Embankments of Eastern, Central and Western Coastal Belts of Bangladesh*. Research Bulletin. Coastal Greenbelt Project, Bangladesh Forest Department. 41 pp.
- Rao, G. R.; Shanker, A. K.; Srinivas, I.; Korwar, G. R. and Venkateswarlu, B. 2011. Diversity and variability in seed characters and growth of *Pongamia pinnata* (L.) Pierre accessions. *Trees* 25: 725-734.
- Serajuddoula, M.; Khan, M. A. S.; Islam, M. R. and Shahjalal, M. A. H. 1995. Introduction of non-mangrove in raised land- a way to maintain sustainable forest in coastal belt of Bangladesh. *Pakistan Journal of Forestry* 45 (4): 163-169.

- Siddiqi, N. A. 2001. *Mangrove Forestry in Bangladesh*. Institute of Forestry & Environmental Science, University of Chittagong, Chittagong. 201 pp.
- Siddiqi, N. A. and Khan, M. A. S. 2000. Raising plantations of *Phoenix paludosa* - a mangrove palm in the coastal areas of Bangladesh. *Journal of Asiatic Society of Bangladesh, Science* 26 (2): 259-264.
- Siddiqi, N. A.; Hoque, A. K. F. and Alam, M. S. 1993. The performance of some non-mangrove species in the coastal areas of Bangladesh. *Bangladesh Journal of Forest Science* 22 (1&2) : 71-72.
- Tomer, O. S. and Gupta, R. K. 1985. Performance of some forest tree species in saline soils under shallow and saline water-table conditions. *Plant Soil* 87: 329-335.