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on the environmental importance of mangroves*

Close group planting of mangroves on atolls and coral islands of the Pacific

With more than 10 years of experience in planting mangroves on atolls and coral islands of Tonga, Kiribati and Tuvalu in the Pacific, I have successfully developed a unique silvicultural technique for the establishment of mangroves along the shores of sheltered lagoons of the islands. It involves close group planting of propagules of *Rhizophora stylosa* between mean water level and mean high water level. In successful sites, e.g. Ananau Causeway of Kiribati, survival can be 90% a year after planting and over 50% after 3 years (Suzuki *et al.*, 2009). Height and diameter of seedlings can reach 1.2 m and 1.8 cm after 3 years, respectively (Figs. 1a & b).



Figs. 1a & b Two to three years old *Rhizophora stylosa*

Site conditions of these islands are extremely harsh because of salt spray, low rainfall and absence of surface water (Chan & Baba, 2009). There are no rivers on the islands and salt accumulates in the soil during prolonged dry season. Mangrove forests are structurally poor since they are rooted in shallow coarse coral gravel with low fertility and poor freshwater retention.

Propagules of *R. stylosa* are group-planted (three per group) at close spacing of 25 x 25 cm or 50 x 50 cm. Sometimes an iron bar is needed to

create planting holes (Figs. 2a & b). Planting of propagules should be confined to the shore profile between the mean water level (MWL) and the mean high water level (MHWL) (Suzuki *et al.*, 2009). Below MWL, seedlings will not survive due to prolonged submersion during high tide, barnacle infestation and seaweed entanglement. Above MHWL, seedlings will wither away due to direct scorching by the sun and heat accumulated in the coarse coral gravel during mid-day (>40°C). The resultant plantations will be long narrow belts with 3-6 rows of seedlings. Low-lying sites with poor drainage where puddles of stagnant water remain during low tide should be avoided (Baba *et al.*, 2009). The stagnant water in the shallow puddles, which can reach 40°C in the afternoon, kills the planted seedlings, similar to the cooking effect of hot springs.



Figs. 2a & b Close group planting (three propagules per group) at close spacing of 50 x 50 cm

Close group planting (preferred spacing of 50 x 50 cm) promotes faster seedling growth within and between groups through competition. Within each group, at least one seedling will usually grow faster (Fig. 3). The foliage of the established seedlings

would provide shade to the soil surface beneath. The shade ameliorates the surface soil temperature and reduces evaporation, leading to less salt accumulation. Furthermore, the established plants will start to flower and fruit after 4-5 years, and propagules produced will seed up adjacent areas through natural regeneration (Fig. 4).



Fig. 3 At least one of the seedlings per group grows faster



Fig. 4 Four and a half years old *Rhizophora stylosa* starts to flower and fruit

The cost of planting per unit area is high and a large number of propagules is needed. The problems of barnacle infestation and seaweed entanglement will be encountered. Only narrow strips of the shoreline can be established. It is not the intention of this planting technique to establish neat rows of mangrove seedlings as in large-scale plantations, but to have sufficient number of mangrove trees as pioneer populations to gradually seed up the adjacent areas, through natural regeneration.

Close group planting of mangroves has been accepted by the island governments as a successful technique of rehabilitation. Adopting the same technique, UN Secretary-General Ban Ki-moon planted propagules of *R. stylosa* on Tarawa in Kiribati on 5 September 2011 to help to protect the shore against the rising sea levels caused by climate change (United Nations, 2011). His Excellency was accompanied by his wife, Australia's Permanent Secretary for Pacific Island Affairs and the President of the Republic of Kiribati (Fig. 5).



Fig.5 UN Secretary-General Ban Ki-moon plants mangrove propagules on Tarawa in Kiribati using the close group planting technique. (UN Photo by Eskinder Debebe downloaded from <http://www.unmultimedia.org/photo/>)

References

- Baba, S., Nakao, Y. & Yamagami, S., 2009. Challenges of planting mangroves in Kiribati. *ISME/GLOMIS Electronic Journal* 7(5): 9–10.
- Chan, H.T. & Baba, S., 2009. *Manual on Guidelines for Rehabilitation of Coastal Forests damaged by Natural Hazards in the Asia-Pacific Region*. ISME and ITTO Publication, 66 pp.
- Suzuki, T., Mochida, Y. & Baba, S., 2009. Relationship between habitat and structure of a *Rhizophora stylosa* forest on Tarawa atoll, Republic of Kiribati. *Mangrove Science* 6: 17–23.
- United Nations, 2011. Secretary-General and Kiribati President plant mangroves. <http://www.unmultimedia.org/photo>.

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