Pak. J. Bot., 37(4): 969-972, 2005.

A NEW TECHNIQUE FOR GROWING THE GREY MANGROVE *AVICENNIA MARINA* (FORSSK.) VIERH., IN THE FIELD

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Abstract

The present paper describes a new technique for growing the grey mangrove *Avicennia marina* (Forssk.) Vierh., in nurseries developed near the high tide mark of the coastal belts. It consists in making long narrow furrows with slanting walls with a 'V' shaped cross section. The propagules were sowed on the slanting sides to avoid submergence and exposure for longer periods. The results showed 98% survival rate of both propagules and seedlings.

Introduction

Mangrove forest cover is gradually decreasing day by day along the coast of Pakistan (Saifullah *et al*., 2004). Various organizations are, therefore, involved in mangrove restoration work and among them World Wide Fund for Nature – Pakistan (WWF-P) is one of the leading environmental organizations taking various initiatives to protect and manage this fragile ecosystem (Rasool *et al*., 2002). Since 1995 it has rehabilitated more then 400 ha with mangroves along Balochistan coast mostly in Miani Hor lagoon, which is rich in mangrove species diversity (Saifullah & Rasool, 2002), through different techniques like nursery raised plantation, direct sowing of the fruits (Rasool & Saifullah, 2000, 2002) and transplantation of the mangrovelings (a term coined for mangrove seedlings). The results revealed that *A.marina* did not grow as good as *Ceriops tagal* and *Rhizophora mucronata* while employing the nursery raising technique, but performed better in transplantation (Rasool & Saifullah, 2000). Similarly *C. tagal* and *R. mucronata* also showed good results in the direct sowing method. A new technique is hereby devised for growing mangroves in nurseries which supersede the already existing techniques in performance and is therefore recommended for their restoration and propagation.

Material and Methods

Hundred meter long and 30 cm wide furrows were dug out on the ground three meters apart in the intertidal mudflats of Miani Hor (Fig. 1). They were 15 cm deep with side walls tapering down to a pointed bottom to form a 'V' shaped cleft (Fig. 2). Tidal water was allowed to move freely through them for a week before sowing the propagules. They were sowed along the slanting sides and not at the bottom to avoid submergence for longer period of time. As many as 5-6 kg propagules (300 – 310 propagules per Kg) were planted in a 100 meter long furrow. The field experiments started in August 2003 when propagules are available (Rasool & Saifullah, 2000) and observations were taken for six months until January 2004. The leaf area was calculated by applying the formula L x B x 0.66, where L = length of the leaf and B= breadth of the leaf (Cain & Castro, 1950).

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Fig. 1. Longitudinal furrows with slanting walls for growing *A. marina* propagules.

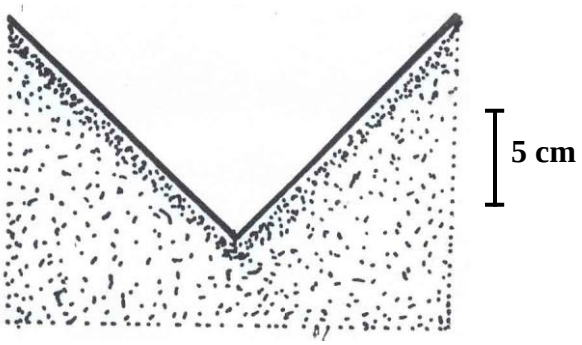

Fig. 2. Cross section of a furrow showing 'V' shaped cleft.

Observations and Discussion

A. marina occurs abundantly at Miani Hor lagoon along with other species *C. tagal* and *R. mucronata* (Saifullah & Rasool, 2002). It starts flowering in the month of May and propagules (fruits) are produced in August and September (Rasool & Saifullah, 2002). After they are shed off from the trees they float to long distances by water movement, because they are buoyant (Rumbold & Snedaker, 1994). They grow better in the shallow than in deeper waters or exposed areas. The conventional method of growing the mangroves consists in growing them in shallow pits with erect walls and flat bottom in the intertidal mudflats (Qureshi, 1990). We tried a different method where we established furrows rather than pits. The furrows had slanting walls with a pointed bottom making a 'V' shaped cleft (Fig. 2) and the propagules were sown on the sides and not on the

bottom. This prevented them from submergence for longer periods of time and therefore also from growth of barnacles. The barnacles cause physical damage to the seedlings through blocking respiration, photosynthesis and transpiration (Rasool & Saifullah, 2002). There is also an increasing chance of decomposition by bacteria and fungi (Mehdi & Saifullah, 2000). In other types of growing techniques the walls of the furrows are erect and therefore, the propagule cannot be sown on them except at bottom.

The results of germination and growth of mangrove seedlings employing the new technique was therefore several times better than the other conventional methods (Table 1). The propagules germinated within a week after sowing while in other techniques it usually takes 2-3 weeks. All the growth parameters like height, leaf area and number of leaves showed better performance and the survival value was significantly higher than the other two techniques.

Table 1. The average growth of *Avicennia marina* in terms of percentage propagule survival, plant height, leaf area and number of leaves during six months period (± SE).

Activity	Survival %	Plant height (cm)	Leaf area (cm^{-2})	Number of leaves
New technique	98 ± 1.65	38.91 ± 2.0	4.54 ± 0.32	19.7 ± 0.20
Transplantation of wildings*	70 ± 2.01	12.35 ± 7.40	3.54 ± 0.50	14.57 ± 0.67
Nursery raised saplings**	40 ± 0.34	26.87 ± 2.61	3.08 ± 0.54	8.25 ± 0.82

*Source: Rasool *et al*., 2002
**Source: Rasool and Saifullah 2002

To avoid crowding and over shadowing of mangrovelings in the furrows thinning is recommended after one year of growth (Fig. 3). The plants that are smaller in height and with less number of leaves may be transplanted in the open or denuded areas whereas the taller left as such. In addition this nursery will also cater to the needs for extensive plantation in other areas. This technique is also cost effective and would not be a burden on the purse of the growers.

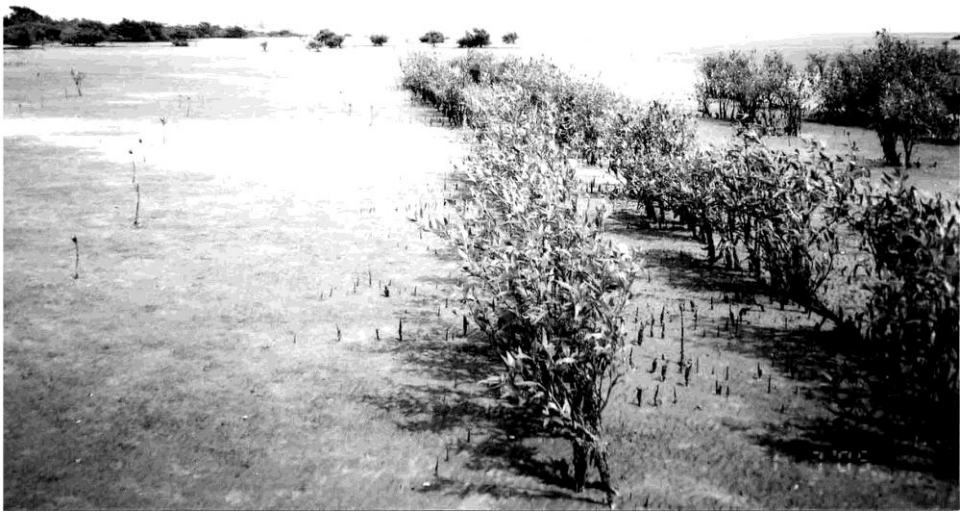

Fig. 3. One year old saplings of *A. marina*

Acknowledgements

This study was financed by the European Commission through the project "Tackling poverty along the coast of Pakistan through sustainable coastal livelihood". We are deeply thankful to Dr Ejaz Ahmad Deputy, Director General of WWF – Pakistan for his guidance and support during the project activities. The authors are also obliged to Mr. Pir Bux, Field Assistant and Muhammad Moosa, Resource Watcher of WWF-P for helping in establishment of the furrows and taking the field notes.

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(Received for publication 1 September 2005)