

## ACACIA AURICULIFORMIS PROVENANCES FOR LARGE-SCALE PLANTING IN DEGRADED HILLY AREAS OF BANGLADESH

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*Acacia auriculiformis* is a multipurpose nitrogen-fixing tree species naturally occurring in Australia, Papua New Guinea and Indonesia (Pinyopusarerk *et al.* 1991, Turnbull *et al.* 1998). It has been widely planted in many tropical countries in south and south-east Asia, Africa and Latin America. The species has early rapid growth, tolerance to infertile, acid, alkaline, saline or seasonally waterlogged soils and moderate dry climate, and is able to fix nitrogen, which make it a very useful species for plantation in degraded lands (Marcar *et al.* 1991, Pinyopusarerk *et al.* 1991, Turnbull *et al.* 1998). The naturally grown *Acacia* species shows considerable morphological variation in stem length, ranging from 10 m in stunted trees to 30 m in single-stemmed trees with less than 1 m bole length (Gunn & Midgley 1991). Rapid growth (2–4 m in height per year) in the first few years after planting is common for this species, even on low fertile soils (Boland 1989).

In Bangladesh, this *Acacia* species is being preferred for plantation programme to indigenous and exotic species (Osman *et al.* 1992a, Hossain *et al.* 1997). The main purpose of the introduction of this species was for either ornamental purpose or for firewood but this species has now become popular for use as timber for furniture and building purposes. The physical and mechanical properties of the timber of this species are found comparable with those of *Tectona grandis* (Kumar *et al.* 1987).

The Chittagong university campus is located in the longitude of 91° 50' E and latitude of 22° 30' N, under the Fatikchari-Sitakunda hill ranges (Gafur *et al.* 1979). The hills are low to medium high and the slope ranges from gentle to steep. Soils are moderate to strongly acidic (pH 5.1–5.3) and texture ranges from loam to sandy clay (Osman *et al.* 1992b). The annual rainfall of this area is 250–300 cm, which mostly occurs from June to September. The natural vegetation of these hills has been degraded by illicit felling, fire, followed by firewood collection and grazing. As a result, most of the lands have been either converted to scrub type of vegetation or left barren (Osman *et al.* 1992b). In order to have a quick vegetation cover in these barren hills, both the indigenous and exotic species have been tried for plantation (Ara *et al.* 1989, Osman *et al.* 1992b). However, the use of original species for plantation in these areas has been found unsatisfactory.

*Acacias* have been planted in many countries in preference to local species because of its fast growth, and adaptability to a wide range of sites and environmental conditions (Harwood *et al.* 1991, Gafur *et al.* 1992, Turnbull *et al.* 1998). However, the wood of this species is not widely used for construction due to its crooked stem and short clear bole. Nevertheless, the occurrence of good form trees with long, straight clear boles and light crowns has been reported (Semsuntud & Nitiwattanachai 1991, Venkateswarlu *et al.* 1994) and this has initiated the interest in this species. Thus, the present study aims to single out the superior provenances of *A. auriculiformis* possessing the characteristics that lead to healthy trees with single stem and good clear bole for plantation in the degraded hilly areas of the country.

The seeds of eight different provenances of *A. auriculiformis* (Table 1) planted in this trial were obtained from CSIRO Division of Forest Research of Canberra, Australia. Seedlings were raised in the nursery of the Institute of Forestry and Environmental Sciences according to the standard nursery procedures (Das 1986). When the seedlings attained planting height (50–55 cm), they were planted in the field in a randomised complete block design with three replicate multiple tree plots. A total of 24 plots, each with 7.5 × 7.5 m size, were established for the trial with a spacing of 1.5 × 1.5 m between plants.

The eight provenances of *A. auriculiformis* planted in the trial showed variation at the age of three years in their survival percentage, total height, diameter at breast height (DBH), crown diameter and clear bole length (Table 1). The mean survival per cent of the provenances ranged from 70 to 93 but the variations were not statistically significant. The maximum mean height (7.6 m) was obtained by seedlot No. 19255, followed by 18854 (7.3 m) and the mean heights of these provenances were significantly higher than the other provenances. Similarly, plants of seedlot No. 18854 showed maximum DBH (6.8 cm), followed by seedlot No. 19255 (6.7 cm) and seedlot No. 18719 (6.4 cm). Similar trends of superiority of seedlots (18854 and 19255) were also observed in crown diameter and clear bole length (Table 1), but the differences were not statistically significant. However, this variation offers an opportunity for further improvement of the species following provenance selection.

**Table 1** Seedlot and their origin, survival, height, diameter, crown diameter and clear bole length of 3-year-old trees

CSIRO seedlot No.	Location	Survival (%)	Height (m)	DBH (cm)	Crown diameter (m)	Clear bole length (m)
18058	Sewirimabu, Fly River, PNG	70 ns	5.91 c	5.48 bc	1.32 ns	2.60 ns
18247	Wenlock River, QLD	93 ns	4.71 d	5.39 bc	1.41 ns	2.59 ns
18564	Morehead River, QLD	87 ns	4.14 d	5.55 bc	1.74 ns	2.82 ns
18719	Sakaerat, THAI	73 ns	6.60 b	6.38 ab	1.76 ns	2.63 ns
18854	Archer R & Tribes, QLD	89 ns	7.27 a	6.79 a	2.30 ns	3.01 ns
19250	Coen River, QLD	89 ns	4.27 d	4.86 c	1.60 ns	2.65 ns
19253	Kings Plains Lake, QLD	87 ns	4.51 d	5.32 bc	1.43 ns	2.76 ns
19255	Seed Orch Melville Is, NT	86 ns	7.63 a	6.71 a	1.86 ns	2.80 ns

ns = not significant

DBH = diameter at breast height

Means followed by the same letter(s) are not significantly different.

Since *A. auriculiformis* is one of the fast growing tree species for degraded sites, suitable provenances possessing vigorous growth with single stem and a good clean bole may be selected for the degraded barren hilly areas of Chittagong and Chittagong Hill tracts where the native species are not successful. The initial 3-year growth performance of the provenances showed that seedlots No. 18854 and 19255 attained higher growth with clear bole length in this degraded hilly areas. The growth performance was also higher in comparison with the earlier two *A. auriculiformis* provenances in central and northern plain lands of the country (Hossain *et al.* 1997). Based on the preliminary results obtained in the

present study, two provenances (No. 18854 Archer R & Tribes, QLD and No. 19255 Seed Orch Melville Is, NT) have been found superior in their growth and they may be considered for large-scale plantations in the degraded hilly areas of Bangladesh.

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