

Influence of planting techniques and performance of tree species in rainfed alkali soils

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SUMMARY

Field experiment was conducted at Agricultural College and Research Institute, Trichy, in an alkali soil (EC 0.18dS/m, pH 8.65 and ESP 25.6) receiving an average rainfall of 754 mm to find out the tree species and planting techniques suitable for alkali soils. Eight tree species were planted to study their suitability in rainfed alkali soils. Two planting techniques viz., pit system (0.6m x 0.6m x 0.6m) and pit with auger hole (0.30 m dia, 0.60 m deep) were evaluated. Among the tree species *Leuceana leucocephala* survived more than 90 per cent thereby found to be promising in rainfed alkali soils. The mortality was very high in *Annona squamosa* and *Punica granatum*. The highest growth and collar girth was observed in *Leuceana leucocephala* followed by *Hardwickia binata* at 2 years after planting. All the tree species had significant effect on lowering soil pH and ESP. *Hardwickia binata* recorded the lowest pH value. Among the planting techniques, auger hole method recorded higher plant height compared to pit method. The girth of different species followed the same trend as that of plant height. The maximum girth was recorded with *Leucaena leucocephala* followed by *Hardwickia binata*. In pit method, there was reduction in soil pH and ESP at 0-15 cm. However, higher pH and ESP were observed at 60-90 cm depth.

Key words : Alkali soils, Planting techniques, Tree species, Performance, Bioamelioration.

In India, about 8.6 m. ha of land area is affected with the menace of salinity, alkalinity and water logging. In order to rehabilitate the salt lands, specialized location specific and problem oriented planting techniques and tree species are required. Choice of proper tree species depends upon the local agro-climate, purpose of planting, tolerance to salinity /alkalinity and drought stress (Tomar and Minas, 1999). The tree growth in alkali soils is constrained due to inability of their roots to proliferate through the hard cankar (calcite pan existing usually at depths below 50-75 cm from the surface). Earlier pit planting technique suffers from the disadvantage of high requirements of amendments, laborious and non-perforation of roots through calcic horizon. Addition of gypsum @ 50 GR and FYM was recommended for replacement of original alkali soil (Yadav, 1980). With this point in view, experiment was conducted to evolve suitable tree species and planting techniques to raise tree crops in rainfed alkali soils.

MATERIALS AND METHODS

Field experiment was conducted at Agricultural College and Research Institute, Trichy, Tamil Nadu, in an

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alkali soil (EC 0.18dS/m, pH 8.65 and ESP 25.6) receiving an average rainfall of 754 mm. Eight tree species were planted to study their suitability in rainfed alkali soils. Two planting techniques viz., pit system (0.6m x 0.6m x 0.6m) and pit with auger hole (0.30 m dia, 0.60 m deep) were evaluated. The experiment was conducted in a randomized block design with two factors viz., tree species and planting techniques with three replications. Each replication had 24 plants with recommended spacing.

Six months old saplings of these tree species were planted either in pits or pits with auger hole which were filled with a uniform mixture of original soil, 3 kg gypsum, 10 kg FYM and 20 kg red earth. Supplemental watering was done upto one year during dry spells. Performance of these tree species was evaluated in terms of per cent survival, plant height and girth at base. Bio ameliorative effects of these trees in alkali soils were also studied in terms of changes in pH and ESP of the soil at various depths.

RESULTS AND DISCUSSION

Among the tree species, *Leuceana leucocephala* survived more than 90.7 per cent thereby found to be promising in rainfed alkali soils. Other promising species were *Acacia nilotica* (79.6%), *Ceiba pentandra* (68.5%) and *Hardwickia binata* (64.8%). The mortality was very high in *Annona squamosa* and *Punica granatum*. Such variation in survival of different tree species is mainly due to their alkali tolerance.

The plant height and girth at the base of different