Pak. J. Agri. Sci., Vol. 41(1-2), 2004

CHOICE OF EXOTIC AND INDIGENOUS TREE SPECIES FOR PLANTING ON FARMLANDS

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The study was conducted at Chichawatni irrigated plantation from 1989 to 2000 for suggesting the appropriate indigenous and exotic tree species with similar irrigated conditions for planting on farmlands. The naturally indigenous tree species included in the study were *Dalbergia sissoo*, *Bombax ceiba*, *Melia azedrach* and *Albizzia procera*, whereas the common exotic species are *Populus deltoides* and *Eucalyptus camaldulensis*. Each tree species was planted at a spacing of 3m x 2m. Tree height and diameter at breast height (DBH) were measure of each species at the end of the eleventh year. Total volume of all tree species was calculated by using their plant height and DBH in equations provided in the local volume tables. The diametre and height of *E. camaldulensis* was greater than all other tree species but the volume of both *E. camaldulensis* and *A. procera* was also better than all other species. *D. sissoo* and *M. azedarach* had lower diameter, height and volume than all other tree species.

Key words: Exotic trees, indigenous trees, tree planting

INTRODUCTION

It has been mentioned in different studies that indigenous trees have better resistance to diseases and pathogens as compared to exotic species (Byerlee *et al* 1992). Conversely, exotic species have faster rate of growth as compared to indigenous species (Hafeez 1986). The pros and con of both types of species have to be considered before selecting trees for planting on farmlands. The most commonly planted indigenous tree species on irrigated farmlands of Punjab are *Dalbergia sissoo*, *Bombax ceiba*, *Melia azedrach* and *Albizzia procera*, whereas the common exotic species are *Populus deltoides* and *Eucalyptus camaldulensis* (Khan *et al* 1999). These tree species have differences in growth i.e. diameter, height and volume. The general perception is that the exotic species have better growth than indigenous species (FAO 2001). The performance of these different species have been studied individually under different conditions and not under similar conditions. Therefore, to suggest the appropriate tree species for planting under irrigated condition there is a need to study the performance of main indigenous and exotic tree species under similar conditions. Such a study will benefit the farmers in assessing the quantity of wood expected from different trees. It will also benefit the researchers in attaining further information about possible effects of trees on agricultural crops.

MATERIALS AND METHODS

The study was carried out at Chichawatni irrigated plantation during May, 1989. Each tree species was planted in trenches that were three metres apart. Distance between plants was two metres. Tree height and diametre at breast height (DBH) were measured of each species at the end of the eleventh year during May, 2000. There was an imbalance in sample size due to missing values of plant height and DBH since few of the plants died or their tops broke during the course of study. Since the data was stratified into strata of unequal sample sizes hence Residual Maximum Likelihood (REML) method was used to analysis the data using Genstat 4.2 (Lawes Agricultural Trust 2000). Plant height and DBH were included as variables whereas replication of each tree species was used as random factor. Total volume of all tree species was calculated by using their plant height and DBH in equations provided in the local volume tables (Cheema *et al* 1998).

RESULTS AND DISCUSSION

There was significant difference between the diameter (Figure 1), height (Figure 2) and volume (Figure 3) of different tree species. The diameter and height of *E. camaldulensis* was greater than all other tree species probably due to unlimited availability of water which provided extra impetus towards its better growth (Figure 1 & 2). Champion *et al* (1965) and Brandis (1921) also reported that the growth of *E. camaldulensis* was better if water and distance between plants was suitable to allow penetration of light. *B. ceiba*, *A. procera* and *P. deltoides* had higher diameter than *D. sissoo* and *M. azedarach* presumably due to lesser competition with weeds during the early age. It was probably due to similar reason that *D. sissoo* and *M. azedarach* had the lower height than all

other tree species (Figure 2). The large sized crown of both *D. sissoo* and *M. azedarach* induces crown competition during the pole stage of these trees and consequently retards growth in diametre and height (Singh 1985). Tewari (1994) and Parker (1924) reported that the diametre and height of *D. sissoo* and *M. azedarach* improved on increasing the spacing between plants and also on reducing the competition with weeds.

B. ceiba and *A. procera* had greater height than *P. deltoides* probably due to the reason that the former two species naturally grow taller in size than the later (Parker 1924). Although *P. deltoides* attains greater height in earlier years but after eighth year its growth in height becomes slow (Singh 1985). It was due to similar reasons that Bokhari (1970) also recommended the economically viable age of ten years for *P. deltoides* in Changa Manga irrigated plantation.

Figure 1: Mean (with standard errors) diameter of different indigenous and exotic tree species.

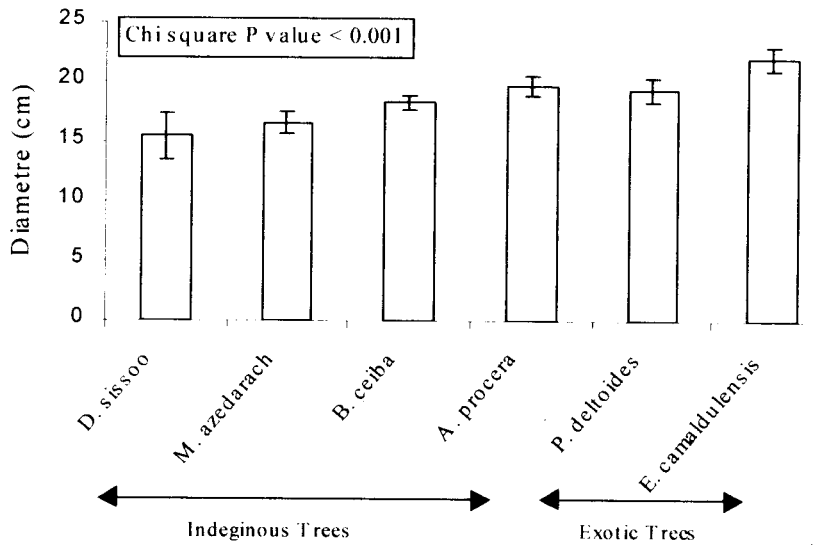


Figure 2: Mean (with standard errors) height of different indigenous and exotic tree species.

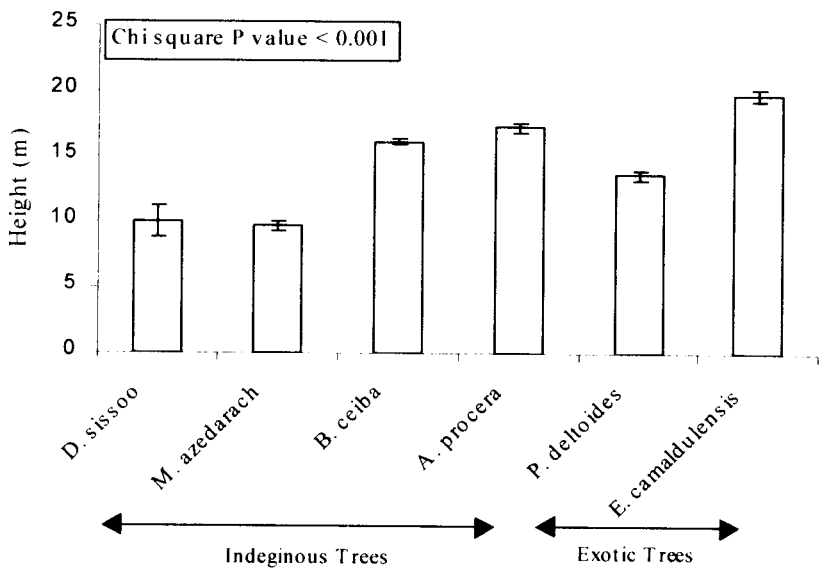
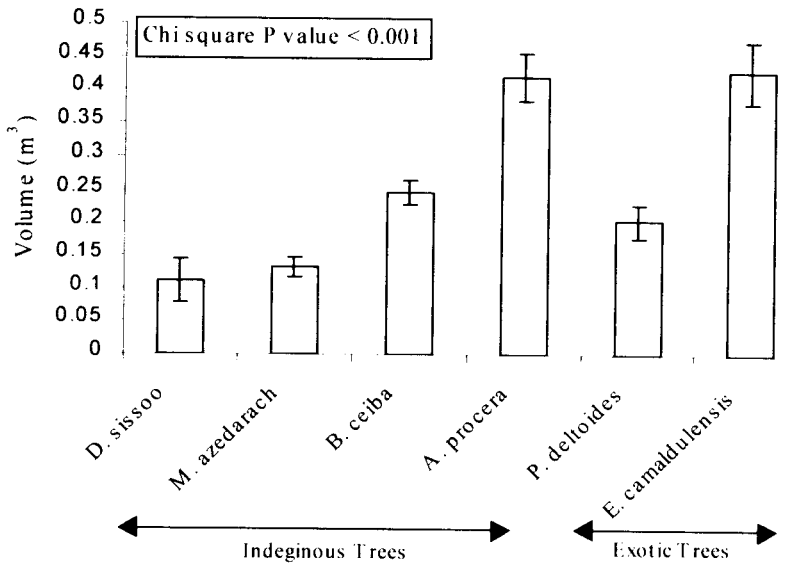


Figure 3: Mean (with standard errors) volume of different indigenous and exotic tree species.



The total volume of *E. camaldulensis* and *A. procera* was more than all other tree species since their diameter and height was comparatively better than is normally found under similar locations (Venkataramany 1968a). *E. camaldulensis* tends to attain better volume if provided better edaphic conditions. *B. ceiba* and *P. deltoides* had higher volume than *D. sissoo* and *M. azedarach* probably due to better height and diameter of the former two species that is normally found under such conditions (Singh 1985 and Venkataramany 1968b).

CONCLUSIONS

Although the overall performance of an exotic species (*E. camaldulensis*) was better than other species but the volume produced by an indeginous species (*A. procera*) equalled the former. The high water requirement of both the exotic species limits their potential for planting on farmlands since they compete extensively with the agricultural crop for water and nutrients. Planting of *E. camaldulensis* on waterlogged and saline soils is beneficial for biological amelioration of the land to make it suitable for cultivation of agricultural crops. Two of the indigenous species (*A. procera* and *B. ceiba*) are suitable for planting on farmlands particularly due to their importance for providing light quality timber and also fuelwood. Although the growth of *D. sissoo* and *M. azedarach* was slower than other species but the importance of these two indigenous species for providing good quality timber increases their feasibility as long term investment.

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