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MULTIPURPOSE TREE SPECIES RESEACH

NETWORK FIELD TRIAL IN PAKISTAN

BY

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Multipurpose Tree Species Research

Network Field Trial in Pakistan

By

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Abstract

F/FRED MPTS research trials in humid and sub-humid zone began in 1987 and PFRI Faisalabad also established a trial at its research garden during the same year. [The MPTS priority species under study are Leucaena diversifolia, Acacia mangium and Acacia auriculiformis.] RCBD with four replications, using a factorial of 3 species by 2 provenances each by 3 management treatments was used. The proposed management treatments are no cutting, pruning and pollarding. Experimental unit is a plot of 4x2=8 sq.m. having 4 plants at 2x1 m spacing. [Performance of the species for 6 months in the nursery stage and for over 12 months in the field stage has been observed and data recorded. Both the provenances of L. diversifolia have shown best results in respect of survival, height and diameter growth. Next comes A. auriculiformis, but A. mangium could not survive at all beyond 6 months in the field phase.] Although no definite conclusions can be derived from such a short-period trial but some indications of the future trends could be inferred.

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Introduction

Forestry/Fuelwood Research and Development (F/FRED) Project, helps scientists cooperatively address the needs of small Asian farmers for fuelwood, fodder and other tree products. In view of the rapid depletion of tree resources in this region, the project's task is noble. Through MPTS research network field trials, the F/FRED Project investigates the growth and yield of priority multipurpose tree species and how resource-poor farmers use and need trees.

Trials in humid and sub-humid tropical zone began in 1987 with 3-years trials established at 15 sites in six countries namely Indonesia, Malaysia, Pakistan, Philippines, Taiwan and Thailand. In Pakistan, Punjab Forestry Research Institute, Faisalabad established this trial at its research garden during Oct, 1987. The three MPTS priority species selected by research cooperators for trial in the humid and sub-humid zone are Lecucaena diversifolia, Acacia mangium and A. auriculiformis.

Objectives of these network trials are (i) to increase knowledge of growth, site requirements, and management practices of priority multipurpose tree species (MPTS) suitable for the needs of small-scale farmers in tropical regions of Asia, for tree crops and products in general, but with priority on fodder and fuelwood, (ii) to provide a focus for network development; and (iii) to help improve research methodologies used in forestry research.

The data furnished below correspond to the first year of the trial, therefore being of a preliminary nature, requiring future ratification.

Material and Method:

Two provenances of each of the three MPTS priority species namely Leucaena diversifolia (K 156, K 743), Acacia mangium (15642, 15677) and Acacia auriculiformis (15477, 15648) were used.

Nursery Phase: Seeds of three species each with two provenances was given hot water (90°C) treatment for five minutes. Then the seed was allowed to soak in ordinary tap water for 24 hours and swollen seeds were sown in black plastic containers of 6 x 15 cm size with 8 perforations filled with suitable potting medium.

Sowing of seed was done during March, 1987. Data regarding germination behaviour of seed of three species and their performance at nursery stage upto 6 months was recorded and is given in Table 1 and 2.

Field Planting Phase: Experimental area was prepared within the research garden close to the nursery site and planting was done during October, 1987. Randomized complete block with four replications, using a factorial of 3 species by 2 provenances each by 3 management treatments (18 treatment combinations per block) was used. Total number of plots was (18x4) 72. The management treatments proposed are no cutting, pruning and pollarding.

Treatments were randomly assigned to plots in complete blocks of 18 plots. Instead of each plot having 7x7 = 49 trees, it had only 4 trees due to limited number of seedlings available of various species. Each plot consists of 2 row spaced 2 m apart, each row contains 2 trees spaced 1 m apart. Plot size is 4m x 2 m = 8 sq.m x 72 plots = 576 sq. m of experimental area. Rows of trees were in the form of trenches ($\frac{12'' + 9''}{2} \times 9''$) for flow irrigation.

Data regarding survival percentage, height of plants and diameter at stump (10 cm) height were measured at 6 months interval during April and October, 1988, and is summerized in Table 3.

Results and Discussion:

In the nursery stage, germination percentage of seed was highest (72) in case of A. auriculiformis (15477) followed (40%) by its provenance 15648. Low germination percentage almost in all the species could be due to old seed or its unsatisfactory pretreatment. Table 1 shows the germination percentage of the seed of three species. Similarly survival percentage of plants at the age of 6 months in the nursery was highest (91%) for A. auriculiformis(15477), followed (90 and 82%) by L. diversifolia (K 156 and K 743) respectively. Table 2 contains data regarding survival percentage after six months at nursery stage.

Table-1. Germination Percentage of Seeds of Three Species

S.No.	Species/provenance	Date of sowing	Total No. of seeds	Number Germinated	Germination %age
1.	<u>Leucaena diversifolia</u> (K-156)	5.3.87	700	150	21
2.	<u>Leucaena diversifolia</u> (K-743)	5.3.87	1000	358	36
3.	<u>Acacia mangium</u> (15642)	18.3.87	500	70	14
4.	<u>Acacia mangium</u> (15677)	18.3.87	500	160	32
5.	<u>Acacia auriculiformis</u> (15643)	18.3.87	500	200	40
6.	<u>Acacia auriculiformis</u> (15477)	18.3.87	500	360	72

Table-2.Survival percentage after Six Months at Nursery Stage.

S.No.	Species/Provenance	No. of Seedlings germinated	No. of seedlings available for out planting after six months	Survival %age
1.	<u>Leucaena diversifolia</u> (K-156)	150	135	90
2.	<u>Leucaena diversifolia</u> (K-743)	358	295	82
3.	<u>Acacia mangium</u> (15642)	70	55	79
4.	<u>Acacia mangium</u> (15677)	160	121	76
5.	<u>Acacia auriculiformis</u> (15648)	200	130	65
6.	<u>Acacia auriculiformis</u> (15477)	360	328	91

In the field phase, best performance in respect of survival, height and diameter has been shown by L. diversifolia, both the provenances fairing almost equally well. Next comes A. auriculiformis 15648 followed by 15477. Acacia mangium could not survive at all beyond 6 months in the outplanting phase. Table 3 shows the average survival percentage, height in meters and diameter in cm at 10 cm from the ground level after 6 months and 12 months of the layout of the field trial.

Table-3.

Average Survival %age, Height and Diameter of Plants at 6 and 12 months Age.

Sl. No.	Species/Provenances	Survival %age		Height in meters		Dia in Cm	
		6 months	12 months	6 months	12 months	6 months	12 months
1.	<u>Leucaena diversifolia</u> (K-156)	96	83	0.96	3.99	-	5.70
2.	<u>Leucaena diversifolia</u> (K-743)	100	85	1.20	3.31	-	4.67
3.	<u>Acacia mangium</u> (15642)	4	0	0.18	-	-	-
4.	<u>Acacia mangium</u> (15677)	17	0	0.19	-	-	-
5.	<u>Acacia auriculiformis</u> (15648)	81	77	0.32	1.63	-	1.93
6.	<u>Acacia auriculiformis</u> (15477)	85	58	0.18	1.49	-	1.37

The trial is programmed for a duration of three years at the end of which the growth and biomass produced by different species and provenances under various management treatment is to be evaluated. It is natural, therefore, that after the first year no concrete indications are yet evident on some of the goals set forth. Nevertheless, there is some data pointing to the likely results in the future.

Conclusions:

Both the provenances (K-156 and K-743) of L. diversifolia have done well so far and are expected to continue their good performance in future. These can be promising candidates as future MPTS for large scale use on farmlands for the production of fodder, fuelwood and other products or services.

The performance of A. auriculiformis, especially its provenance 15648 is also quite satisfactory and deserves further study and observations for drawing definite conclusions about its adaptability in this zone.

No definite conclusions may be derived from such a short period of time in the trial. Nevertheless, some indications of the future trends may be inferred.