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Performance of Arable Crops with *Acacia albida* in Dry Lands

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The crop yields from the dry lands of the country are undependable, low and the returns are not economical owing to aberrations in monsoon, small holdings and farmers' inaccessibility to expensive agricultural inputs. For such dry lands an efficient land use system other than arable cropping would be more appropriate. Agroforestry is an age old practice, which envisages approach of integration of woody perennials and agricultural crops in a land use system for sustainable plant production in dry lands. There has not been any research on tree-crop interactions and their short term or long term effects in Andhra Pradesh. Hence the present investigation was undertaken to study the compatability of arable crops in association with *Acacia albida* under different alley widths in drylands.

The field trial was conducted in randomised block design with three replications on red sandy loam soil. The treatments consisted of three alley widths of *Acacia albida* ($A_1 = 3$, $A_2 = 4.2$ and $A_3 = 5.4$ m) and three intercrops (castor, sunflower and redgram) with respective sole crops and sole tree plots. About 3 months old seedlings of *A. albida* were planted in pits of 0.3 m^3 size during November 1988 in all the alley widths with a 3 m spacing between plants. Watering was done with an interval of fifteen days till the rainy season during the first year for better establishment of seedlings. The arable crops namely castor sunflower and redgram were sown as intercrop with a spacing of 60x30 cm, 60x 20 cm and 60x30 cm respectively during *kharif* of 1989 and 1990. The trees were fertilized with 50 g at the time of planting and 100 g of DAP in two splits during monsoon season in the first year after plantation. The three arable crops were fertilized with a common dose of 60 kg P_2O_5 + 60 kg K_2O ha^{-1} at the time of planting where as nitrogen was applied at the rate of 100kg 120kg and 40kg ha^{-1} to castor, sunflower and redgram respectively in two splits i.e. at the time of planting and flowering. The gross plot sizes were 6x9 m, 8.4x9 m and 10.8x9m in A_1, A_2 and A_3 alley widths respectively (including areas under tree).

Significant differences were not observed in grain yields of arable crops in all alley widths (Table 1). The grain yield of three arable crops were not affected when intercropped with *A. albida* in all the three alley widths in comparision with the grain yield of respective sole crops which indicates the compatability in this system of tree crop association. Similarly the mean grain yield of castor (754 and 684 kg ha^{-1}), sunflower (616 and 707 kg ha^{-1}) and redgram (557 and 1035 kg ha^{-1}) during 1989 and 1990 respectively were also not influenced in the intercropping situation with *A. Albida* irrespective of alley width when compared to the yields of respective sole crops. This beneficial effect of *A. albida* on crop productivity may be due to deciduous nature in the rainy season, high leaf N content (4%), deep root system, less crown size and leguminous nature. Felker (1978) reported that the associated crops of sorghum, millet, castor etc. gained the advantage of enriched site due to plantation of *A. albida*. Poschen (1986) found a significant increase in crop yield (56% on average) for the different crops under *A. albida* canopy, compared to those away from the trees in eastern Ethiopia.

The average values of growth increment in height and girth of *A. albida* in intercropping situation revealed that though the increment in height and girth of *A. albida* were reduced by growth of companion crops during both the years of experimentation, but the differences in increment of growth were not much pronounced, when compared to those of sole trees.

Thus, growing of various arable crops with *A. albida* results in crop yield advantage in marginal lands under rainfed conditions in addition to tree

Table 1 *Grain yield of arable crops and growth of A. albida*

Treatments	Grain yield (kg ha^{-1})		Growth increment (cm)			
			Height		Girth	
	1989	1990	1989	1990	1989	1990
Sole Sunflower	498	658	–	–	–	–
A_1 + Sunflower	668	728	57	33	2.9	1.0
A_2 + Sunflower	573	668	33	33	2.7	0.7
A_3 + Sunflower	608	726	47	29	2.8	1.7
Mean of alley width	616	707	45	32	2.8	1.2
CD at 5 %	NS	NS	–	–	–	–
Sole Castor	711	633	–	–	–	–
A_1 + Castor	788	709	46	26	3.4	1.8
A_2 + Castor	734	670	47	52	4.1	3.3
A_3 + Castor	741	675	36	33	3.3	2.0
Mean of alley width	754	684	43	36	3.6	2.4
CD at 5 %	NS	NS	–	–	–	–
Sole Redgram	557	1056	–	–	–	–
A_1 + Redgram	561	1066	33	26	4.2	1.6
A_2 + Redgram	516	1091	37	33	5.6	1.7
A_3 + Redgram	596	991	46	37	3.7	0.9
Mean of alley width	557	1035	38	32	4.2	1.4
CD at 5 %	NS	NS	–	–	–	–
A_1 Sole tree	–	–	53	38	3.5	4.1
A_2 Sole tree	–	–	53	54	4.1	3.7
A_3 Sole tree	–	–	43	58	3.6	1.4
Mean of alley width	–	–	50	50	3.7	3.1

* Tree alley width A_1 = 3m, A_2 = 4.2 m, A_3 = 5.4 m

products during initial years of plantation which may help poor farmer to have sustainable income under dry lands where crop production is a risky proposition.

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