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Effect of intercropping in upland cotton (*Gossypium hirsutum*) on growth and yield of component crops

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Cotton (*Gossypium* sp.) being a long duration and widely spaced crop having slow growth rate in the initial stages is ideally suited for intercropping. Yield of cotton may increase (Kairon *et al.*, 1975) or decrease (Shaktawat and Singh, 1985; Chelamuthu *et al.*, 1987) or remain unaffected (Giri and Upadhyay, 1980) due to intercropping.

Shortage of oilseeds and pulses in the country has focussed the attention on intercropping systems. The present study was taken up to study the effect of intercropping upland cotton (*G. hirsutum* L.) with greengram (*Phaseolus radiatus* L.) and groundnut (*Arachis hypogaea* L.) on the yield of cotton and the companion crops.

A field trial was conducted during the rainy seasons of 1989 and 1990 at New Delhi. The experiment was laid out in randomized block design with all 12 combinations of 2 varieties of upland cotton ('Pusa 31' and 'H 777'), 2 planting patterns (uniform rows of 75 cm and paired rows of 50l100 cm) and 3 cropping systems (sole cotton, cotton + greengram and cotton + groundnut). There were 3 replications. Half of the total N and full dose of P and K was applied basal at sowing. The crops were sown in first week of June. The soil was sandy loam with pH 7.9, and was low in organic carbon (0.34%) and medium in available P (13 kg/ha) and exchangeable K (143 kg/ha).

Significantly higher seed-cotton yield and seed-cotton equivalents were recorded with 'Pusa 31' in both the years. Planting pattern did not show any significant effect on the seed-cotton yield as well as seed-cotton equivalent.

In 1989, the highest yield of cotton was obtained with sole cotton and the lowest with cotton intercropped with greengram and groundnut, whereas in 1990 cropping systems did not show any significant effect on the seed-cotton yield.

The highest seed-cotton equivalent was recorded with cotton + groundnut, followed by cotton + greengram and lowest with sole cotton. In general, sole cotton produced lower seed-cotton equivalent than both the intercropping treatments. Intercropping gave higher net returns per rupee invested than sole cotton.

Uniform row planting produced more bold seeds of greengram and groundnut than paired-row planting.

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Table 1. Effect of variety, planting pattern and cropping system on yield of upland cotton, greengram and groundnut

Treatment	Seed-cotton yield (q/ha)		Yield of intercrops (q/ha)				Seed-cotton equivalent (q/ha)		Net return (Rs/ha)		Net return/ rupee invested	
			Greengram		Groundnut							
	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990
Variety												
'Pusa 31'	21.9	19.8	7.5	7.8	9.4	10.3	26.7	24.1	12,607	12,800	2.28	2.37
'H 777'	17.0	17.1	7.5	7.6	8.0	9.4	21.4	21.4	9,362	9,391	1.78	1.88
CD (P = 0.05)	2.66	2.12	NS	NS	NS	NS	2.05	2.07				
Planting pattern												
Uniform row	20.2	19.1	7.6	8.0	9.5	10.0	25.1	23.7	11,713	12,291	2.26	2.45
Paired row	18.7	18.4	7.4	7.5	8.9	10.2	23.1	22.7	10,298	10,504	2.00	2.20
CD (P = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS				
Cropping system												
Sole cotton	22.6	19.0					22.6	19.5	10,091	12,300	2.04	2.14
Cotton + greengram	18.1	18.4					23.9	24.3	10.691	10,891	2.25	2.36
Cotton + groundnut	17.6	18.3					25.8	26.8	12,172	12,606	2.37	2.40
CD (P = 0.05)	3.3	NS					2.25	2.34				

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Effect of genotype and time of harvesting on yield and quality of periwinkle (*Catharanthus roseus*)

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Since information is meagre on the effect of genotype and time of harvesting on the yield and quality of periwinkle [*Catharanthus roseus* (L.) G. Don.], the present study was conducted on these aspects.

A study was made during 1988–89 on a sandy-loam soil of low fertility, having pH 6.7. The experiment was laid out in randomized block design with 4 replications. Forty seedlings of 45 days of white and purple-flowered genotypes were transplanted at 45 cm × 30 cm spacing in the first week of August 1988 and the crop was grown with recommended agronomic practices. The plant samples were collected at 1-month interval from second to thirteenth months after transplanting. At each sampling 20 plants of each genotype were dug to obtain maximum root biomass. After recording plant height and number of leaves/plant, the leaves and roots were separated, oven-dried at 70°C to a constant weight and their dry weights recorded. Total alkaloids content in leaves and roots were estimated (Higuchi and Bodin, 1961) and the alkaloid yields were calculated by multiplying alkaloid content with biomass yield.

White-flowered genotype was superior to purple-flowered one for plant height, leaves/plant, biomass and alkaloid yields of leaves (Table 1). More number of leaves/plant were in white-flowered genotype, which in turn gave higher alkaloid yield of leaves. The 2 types did not differ significantly for biomass and alkaloid yields of roots. On the basis of total alkaloids, for higher alkaloid yield, white-flowered genotype may be preferred.

The plant height increased rapidly during the initial months and reached its maximum value at 12 months after planting (Table 1). Leaf production was continuous but the highest number of leaves/plant was recorded at 10 months after planting, after which defoliation due to senescence exceeded leaf production causing reduction in their