Indian J. Agron. **40** (3) : 499–501 (September 1995)

Yield components and yield of sunflower (*Helianthus annuus*), sesame (*Sesamum indicum*) and greengram (*Phaseolus radiatus*) as influenced by irrigation and intercropping

R. K. SARKAR AND A. CHAKRABORTY[1]

Department of Agronomy, College of Agriculture, Calcutta University, Calcutta, West Bengal 700 019

Received: March 1994

In eastern India, sunflower (*Helianthus annuus* L.) is gaining importance as a winter-season crop owing to wide adaptibility and high-yield potential. It is a widely-spaced crop and provides ample scope for growing short-duration pulse and oilseed crops in its interspaces to increase and stabilize yield (Shivaramu and Shivasankar, 1992). This system could increase pulse and oilseed production even under delayed planting on wet-season *aman* rice fallows. Hence an experiement on intercropping of sesame (*Sesamum indicum* L.), greengram (*Phaseolus radiatus* L.) with sunflower and their monoculture with different schedules of irrigation was undertaken in rice–fallow

Table 1. Effect of irrigation and cropping system on the yield components of sunflower, sesame and greengram (mean data of 2 years)

Treatment	Head diameter (cm)	Filled seeds (%)	1,000-seed weight (g)	Capsules/ plant	Pods/ plant
Irrigation					
1 irrigation	8.25	67.74	54.41	17.36	7.40
2 irrigations (1 each at 30 and 40 days)	9.60	75.95	52.14	21.06	9.60
3 irrigations (1 each at 30, 40, 50 days)	10.04	76.44	53.55	24.61	11.70
CD (P = 0.05)	0.23	1.69	0.56	0.99	1.64
Cropping system					
Sunflower (sole)	10.07	79.87	53.31		
Sesame (sole)				22.89	
Greengram (sole)					10.20
Sunflower + sesame	8.74	69.24	50.79	19.22	
Sunflower + greengram	9.08	70.85	52.05		8.93
CD (P = 0.05)	0.90	1.70	0.28	1.97	0.47

Present address : [1]Department of Agronomy, BCKV, Kalyani, West Bengal 741 235

Table 2. Effect of irrigation and intercropping system on yield of sole and intercrops (q/ha)

Treatment	1989–90		1990–91	
	Sole crop	Intercrop	Sole crop	Intercrop
Intercropping system				
Sunflower	10.80	10.45		
Sesame	6.26	6.10		
Greengram	9.12		9.17	
Sunflower + sesame	9.51	2.26	9.98	2.42
Sunflower + greengram	10.48	3.17	9.98	3.33
CD (P = 0.05)				

	Sunflower		Sesame		Greengram		Sunflower + sesame				Sunflower + greengram			
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Irrigation														
1 irrigation	9.89	9.52	6.62	5.42	7.29	7.91	8.50	8.00	2.41	2.31	9.17	8.66	2.91	2.72
2 irrigations	10.94	10.43	6.28	5.95	9.47	9.13	9.43	8.93	2.47	2.36	10.63	10.13	3.63	3.43
3 irrigations	11.50	11.41	6.88	6.82	10.60	10.40	10.60	10.10	2.20	2.60	11.63	11.13	2.96	3.63
CD (P = 0.05)	0.90	1.11	0.74	0.83	1.98	1.46	1.24	1.24	0.16	0.18	1.45	1.45	0.47	0.56

A, 1989–90; B, 1990–91

alluvial land.

The experiment was conducted during the winter (*rabi*) season of 1989–90 and 1990–91 at Baruipur (West Bengal) in Gangetic alluvial soil (Entisol), having pH 6.4, field capacity 24% and wilting point 6.5%. The treatments, comprising 3 irrigation levels, viz. 1 irrigation at 30 days after sowing (early growth), 2 irrigations, 1 each at 30 and 40 days (bationing) and 3 irrigations, 1 each 30, 40 and 50 days (pre-flowering) in main plots and 5 cropping systems, viz. pure crop of 'Morden' sunflower, 'B 67' sesame and 'T 44' greengram and intercrop of sesame and greengram with sunflower in subplots, were tested in split-plot design with 3 replications. Irrigations of 5 cm each, measured with 15 cm Throat parshall flume, were applied as per treatment.

Sunflower was planted in paired rows 30 cm apart with interspace of 60 cm between 2 pairs of rows (30/60 cm). Two rows of either sesame or greengram were sown in the space between 2 pairs of sunflower. All crops were fertilized at their recommended dose and area occupied by them. The amount of rainfall received between December and March was 19.5 mm during 1989–90 and 21.5 mm during 1990–91.

Three irrigations produced significantly maximum head diameter and 1,000-seed weight over 2 and 1 irrigations, whereas up to 2 irrigations sole crop of sunflower gave significantly higher values of yield components. Among intercroppings, sunflower + greengram system gave significantly higher values of yield components in sunflower over sunflower + sesame (Table 1). In sesame and greengram maximum values of yield-contributing characters were recorded with 3 irrigations, followed by 2 and 1 irrigations respectively, indicating the necessity of 3 irrigations when grown as sole crop and 2 irrigations in intercropping system (Table 1).

Yield of sole sunflower, sesame, greengram and mixed stand of sunflower increased with 3 irrigations over 1 irrigation. In mixed stand of sesame and greengram, 2 irrigations were more productive than 3 irrigations, indicating increased water-use efficiency due to intercropping. Sole crop of sunflower gave appreciably higher seed yield than intercropped sunflower (Table 2). Association of greengram gave higher sunflower yield than with sesame. More decrease in yield of intercropped sunflower with sesame might be due to higher degree of competition by sesame on sunflower. The yield of sesame and greengram reduced by 61 and 64% respectively when intercropped with sunflower probably due to competitive effects.

Thus 3 irrigations for sole crops and 2 irrigations for intercropping system seem to be optimum irrigation schedule. Sunflower + greengram system was found more productive than sunflower + sesame.

REFERENCE

Shivaramu, H. S. and Shivashankar, K. 1992. Performance of sunflower (*Helianthus annuus*) and soybean (*Glycine max*) in intercropping with different plant populations and planting patterns. *Indian Journal of Agronomy* **37** (2) : 231–236.