

No-6. Missing

## PERFORMANCE OF SUNFLOWER BASED INTERCROPPING SYSTEMS UNDER IRRIGATED CONDITION

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### ABSTRACT

A two year field study (1993 and 1994) revealed that intercropping of sunflower (*Helianthus annuus* L.) with black gram (*Phaseolus mungo* L.) was most productive in terms of sunflower equivalent yield. Sunflower + black gram recorded the highest sunflower equivalent yield (1377 kg/ha) land equivalent ratio (1.19), highest net return (Rs.10088/ha) and benefit cost ratio (3.74). Among the sole cropping, pigeon pea recorded more sunflower equivalent yield, (1559 kg/ha) the highest net return, (Rs. 11588/ha) and benefit cost ratio (3.90). Intercropping of pigeonpea (*Cajanus cajan*) with sunflower was least productive combination among the intercropping combinations.

**KEY WORDS :** Sunflower, intercropping system, yield attributes, yield

Sunflower (*Helianthus annuus* L.) has established its place as a newly introduced oil seed crop in Tamil Nadu. Intercropping systems in sunflower are more staple and more remunerative due to higher productivity. Intercropping of grain legumes with sunflower is quite common in Tamil Nadu. The most important benefit of intercropping is the higher output per unit area per unit time which is very crucial in small farms (Veerabadrhan, 1989). In sunflower-soybean intercropping system the land equivalent ratio, and gross income were higher than sole cropping (Shivaramu and Shivasankar, 1992). Hence, the present investigation was undertaken to find out the

information on best suited intercropping system of irrigated sunflower under Tamil Nadu conditions.

### MATERIALS AND METHODS

An investigation was carried out during the rabi 1993 and kharif 1994 at the Tamil Nadu Agricultural University Farm, Coimbatore to identify the suitable intercrop in sunflower. There were 9 treatment combinations comprising 5 sole crops, viz., sunflower (*Helianthus annuus* L.) pigeonpea (*Cajanus cajan* L.) groundnut (*Arachis hypogaea* L.), soybean (*Glycine max* (L.) Merrill and black gram (*Phaseolus mungo* L.) and 4 intercrop combinations viz., sunflower + pigeonpea

**Table 1.** Performance of Sunflower based intercropping systems

Treatment	yield (kg/ha)				Sunflower equivalent Yield (kg/ha)		Net return (Rs/ha)		Benefit cost Ratio		Land equivalent ratio	
	1993		1994		1993	1994	1993	1994	1993	1994	1993	1994
	Main crop	Inter crop	Main crop	Inter crop								
Sole sunflower	1317	-	1282	-	1317	1282	9620	9070	3.61	3.42	1.00	1.00
Sole pigeon pea	977	-	1102	-	1466	1653	10700	12475	3.71	4.08	1.00	1.00
Sole groundnut	950	-	1382	-	950	1382	4300	8470	1.83	2.58	1.00	1.00
Sole soybean	1070	-	1173	-	856	998	4535	5311	1.99	2.14	1.00	1.00
Sole black gram	850	-	945	-	1020	1134	7250	8290	3.46	3.71	1.00	1.00
Sunflower + Pigeonpea (1:1)	424	546	463	572	1243	1321	8191	8856	2.93	2.67	0.85	0.88
Sunflower + soybean (1:4)	535	856	523	844	1220	1368	8198	10155	2.85	2.78	1.14	1.18
Sunflower + groundnut (1:4)	540	760	512	754	1300	1153	8150	6976	2.68	2.53	1.15	1.03
Sunflower + black gram (1:4)	528	680	532	732	1344	1410	9786	10390	3.68	3.80	1.15	1.16
CD (P = 0.05)	-	-	-	-	88	142	-	-	-	-	-	-

Table 2. Performance of Sunflower based intercropping systems (sean of two years).

Treatment	Pooled sunflower equivalent yield (Kg/ha)	Yield (kg/ha)		Net return	B:C ratio	LER
		Pure crop	Inter crop			
Sole sunflower	1299	1300	-	9345	3.52	1.00
Sole pigeon pea	1559	1040	-	11588	3.90	1.00
Sole groundnut	1166	1166	-	6385	2.21	1.00
Sole soybean	927	1122	-	6385	2.21	1.00
Sole black gram	1077	898	-	7770	3.59	1.00
Sunflower + pigeonpea (1:1)	1282	444	559	8524	2.80	0.88
Sunflower + soybean (1:4)	1294	532	850	9153	2.82	1.16
Sunflower + groundnut (1:4)	1186	524	805	7587	2.58	1.12
Sunflower + black gram (1:4)	1377	530	706	10088	3.74	1.19
CD (P = 0.05)	80.30	-	-	-	-	-

(1:1), sunflower + soybean (1:4), sunflower + groundnut (1:4) and sunflower + black gram (1:4) formed the treatments. The experiment was laid out in randomised block design with three replications. The variety tried in the experiments were CO<sub>2</sub> sunflower, CO<sub>5</sub> pigeonpea, VRI.1 groundnut, CO<sub>1</sub> soybean and CO<sub>5</sub> black gram. The recommended fertilizers were applied for each crop. The soil was sandy loam, low in available N, (212 kg/ha) medium in available P<sub>2</sub>O<sub>5</sub> (13.8 kg/ha) and high in available K<sub>2</sub>O (438 kg/ha) with a pH7.4.

## RESULTS AND DISCUSSION

### Grain yield and sunflower equivalent yield (SFEY)

The grain yield in terms of SFEY was significantly influenced by various sole cropping as well as intercropping systems in both the years (Table 1). Among the various sole cropping systems, growing of pigeon pea recorded the highest SFEY followed by sole sunflower. Among the various intercropping situations, the SFEY was increased when it was intercropped with black gram or soybean or groundnut in both the years. Thus the present investigation clearly indicated that the three inter cropping situations viz., sunflower + black gram + sunflower soybean and sunflower + groundnut may be grown in the intercropping system of sunflower.

### Land equivalent ratio

Mean land equivalent ratio (LER) was the highest under sunflower + black gram followed by

sunflower + soybean and sunflower + groundnut (Table 2). Further, LER calculated from combined intercrops yield was always higher than sole crop except sunflower + pigeon pea during both the years. This indicates greater biological efficiency of intercropping treatments. Beneficial effect of intercropping on land utilisation was reported in maize + grain legumes (Shan *et al.*, 1991).

### Net return and benefit cost ratio

Sole cropping of pigeon pea recorded the highest net return and benefit cost ratio over other systems (Tables 1, 2). However, among the intercropping systems, sunflower + black gram recorded the highest net return and benefit cost ratio over other intercropping systems. The lowest net return and benefit cost ratio recorded in growing of sole soybean. Sunflower + groundnut recorded the lowest net return and benefit cost ratio under various intercropping systems.

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(Received : December 1995 Revised : April 1996)