

INTERCROPPING OF SUNFLOWER IN MILLETS UNDER RAINFED CONDITIONS

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Experiments were conducted during north east monsoon period of 1983-84 and 1984-85 at Agricultural Research Station, Kovilpatti to study the effect of sunflower as intercrop on the yield of base crops of sorghum and bajra. In both the years of study, grain yield of base crops was the highest in 2:1 ratio. Intercropping of sunflower in millets at 1:2 ratio recorded maximum gross return and Land Equivalent Ratio (LER).

Intercropping systems particularly in rainfed tracts are more stable than sole cropping due to higher productivity (Singh and Jha, 1984). Since sorghum is one of the most important crops of the rainfed areas, intercropping systems have been taken up to identify and fix suitable intercrop (Masthan and Goud, 1983). The productivity and intensity of cropping were stabilised and increased by intercropping of sorghum with legumes (Dabholkar *et. al.*, 1985). Pawar *et.al.* (1980) suggested that grain yield and monetary returns were increased by intercropping systems under dryland condition. Hence, this study was undertaken to quantify and identify a suitable crop combination with sunflower and its effect on the production and economics of base crops of sorghum and bajra.

MATERIALS AND METHODS

Field experiments were conducted

at Agricultural Research Station, Kovilpatti two consecutive years commencing from *rabi* 1983. Nine treatments viz. sole sorghum, sole bajra, sole sunflower, sorghum + sunflower (2:1), sorghum + sunflower (3:1), sorghum + sunflower (4:1), bajra + sunflower (2:1), bajra + sunflower (3:1) and bajra + sunflower (4:1) were tested in a randomised block design with four replications. Both sorghum and bajra as well for intercropping systems, a manurial level of 40:20 kg, of N:P₂O₅ was adopted. Spacing adopted were 45 × 15 cm for sole crop of sorghum and bajra while it was 30 × 15 cm for sunflower sole crop. Uniform spacing of 45 × 15 cm was adopted both for base and intercrop.

Soil pH was 8.2, (neutral reaction) with low available nitrogen (92kg/ha) and phosphorus (7.6 kg/ha) and high available potash (386 kg/ha). The total rainfall received during the cropping period is furnished in Table

ratios of 2:1, 3:1 and 4:1 on October 18, 1983 and September 30, 1984. Grain yield data were subjected to statistical analysis and also used for computing Land Equivalent Ratio (LER). The economics were also worked out for the treatments studied.

RESULTS AND DISCUSSION

Data on grain yield, economics and LER are presented in Table 2. From the perusal of the table, it is observed that highest LER of 1.85 was obtained under sorghum+sunflower at 2:1 ratio during 1983-84 and 1.24 for bajra+sunflower (2:1 ratio) during 1984-85. The increased LER was mainly due to high total grain yield under the intercropping system as compared to solid stand. The mean LER in terms of both yield and monetary return were higher under sorghum sunflower and bajra + sunflower intercropping system at 2:1 ratio respectively. Singh and Jha (1984) reported that intercropping systems are more stable than sole cropping due to higher productivity. In the first year of the study, bajra had recorded higher grain yield in combination with sunflower as compared to sorghum, while it was reverse during 1984-85. The increased yield in bajra is mainly due to even distribution of rainfall while the reverse was true for the second season. In respect of sunflower, grain yield as intercrop, its yield was maintained

Table 1. Rainfall (mm) during crop period and normal rainfall

Date of sowing : 18-10-83; 30-9-84		Date of harvest : 25-1-84; 22-1-85		
Standard Period	1983-84	1984-85	Norm week No	
39	Sept. 24-30	—	121.7	17.1
40	Oct. 1-7	—	0.2	22.7
41	8-14	—	—	36.0
42	15-21	108.3	—	58.0
43	22-28	78.5	73.5	46.5
44	29-Nov. 4	80.2	21.5	55.7
45	5-11	79.7	23.8	46.5
46	12-18	—	35.6	35.1
47	19-25	3.0	—	34.2
48	26-2 Dec.	6.9	20.6	20.3
49	3-9	5.9	0.5	23.6
50	10-16	11.0	—	15.2
51	17-23	16.9	—	10.2
52	24-31	26.5	—	9.7
1	1-7 Jan.	16.0	135.6	2.5
2	8-14	3.3	—	9.31
3	15-21	34.2	44.5	2.56
4	22-28	—	—	2.74
Total rainfall		470.4	477.5	448.46

Among the intercropping combinations, there was a reduction in base crop yield when the rate of base crop is increased beyond two rows. This is possibly due to severe competition offered by both base crop of millets as well as intercrop of sunflower for soil moisture and nutrients,

2. Grain yield of millets and sunflower, economics and LER

	Grain yield of millet (kg./ha)		Grain yield of sunflower (kg/ha)		Gross return (Rs./ha)		LER		Mean	
	1983-84	1984-85	1983-84	1984-85	1983-84	1984-85	1983-84	1984-85	LER in terms of yield	LER in terms of monetary return
sole sorghum	861	2601	—	—	1119	3381	1.00	1.00	1.00	1.00
sole bajra	1203	1090	—	—	1805	1689	1.00	1.00	1.00	1.00
sole sunflower	—	—	762	315	3354	1260	1.00	1.00	1.00	1.00
sorghum+ bajra (2:1)	1285	1886	335	70	3127	2715	1.85	1.05	1.45	1.30
sorghum+ bajra (3:1)	600	1800	331	33	2255	2469	1.12	0.80	0.96	1.05
sorghum+ bajra (4:1)	734	1873	287	35	2216	2592	1.23	0.84	1.04	1.07
sorghum+ bajra (2:1)	1324	1136	282	62	3225	1968	1.47	1.24	1.36	1.49
sorghum+ bajra (3:1)	1060	948	205	60	2492	1712	1.15	1.06	1.11	1.20
sorghum+ bajra (1:4)	1053	937	202	52	2465	1708	1.14	1.03	1.09	1.19
S. E.	56.9	184	120.4	38.0	35.0	—	—	—	—	—
C. D. (5%)	167.5	541	354.3	112.8	94.9	103.9	—	—	—	—
Cost of sorghum					= Rs. 1.75/kg					
Cost of bajra					= Rs. 1.85/kg					

crop, the intercrop sunflower was also found to react drastically to smother its associated crops as reported by Chandrasekar (1978) who found that sunflower affected the associated crops due to its aggressive growth. It was also seen from the table that with increasing level of base crop population the intercrop yield was also decreased proportionately.

Hence, from the results, it is observed that increasing base crop population beyond two rows for each row of intercrop sunflower resulted in reduction of grain yield of both base as well as intercrops. Eventhough solid cropping had registered high total return per hectare, the combination of 2:1 ratio recorded higher total return in bajra during 1983-84 and sorghum during 1984-85 among intercropping situations. Pawar *et al.* also observed (1980) that net grain yield and monetary returns were increased by intercropping systems under dryland conditions.

From the results of the experiments conducted during the year 1983-84

and 1984-85, it could be concluded that the 2:1 ratio of sorghum+sunflower or bajra+sunflower found to be the best intercropping system under rainfed black soil condition.

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