

PRODUCTION POTENTIAL AND ECONOMICS OF SUNFLOWER - BASED CROPPING SYSTEM UNDER SCARCE RAINFALL ZONE OF ANDHRA PRADESH

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ABSTRACT

Field experiments conducted during five consecutive years from 1996-97 to 2000-01 revealed that among different sunflower based cropping sequences, the sunflower equivalent yield of groundnut-sunflower was the highest (1555 kg/ha) and found at par with setaria - sunflower (1545 kg/ha) and sunflower - sunflower (1503 kg/ha). However, the net returns and benefit - cost ratio were the highest for setaria - sunflower followed by sunflower - sunflower sequences.

Sunflower is an important oilseed crop grown in India for edible oil. It occupies an area of 2.09 M ha with production of 1.19 Mt, representing the average productivity of 566 kg/ha (Damodaram and Hegde, 2000). By virtue of its short duration, low photo and thermo sensitivity and wider adaptability to different soil types, sunflower fits well in various multiple cropping systems. These features offer a potential scope to explore the system of cropping in sequence preceding to sunflower. Hence, the present investigation was conducted to assess the production potential and economic feasibility of different sunflower-based cropping systems and to find out the best sequence suitable for the region under rainfed conditions.

The field experiment was conducted

during five consecutive years from 1996-97 to 2000-01 at Regional Agricultural Research Station, Nandyal located in Scarce Rainfall Zone of Andhra Pradesh. The soil of the experimental site was deep black, clayey (clay content > 40%), medium in available N (270 kg/ha), medium in available P (19.2 kg P₂O₅/ha) and high in available K (291 kg K₂O/ha) having soil pH 8.2. The experiment was conducted in randomized block design with three replications in a permanent layout at respective fixed locations. The treatments consisting of six sunflower-based cropping sequences viz., sunflower - sunflower, fallow - sunflower, greengram - sunflower, soybean - sunflower, groundnut - sunflower and setaria - sunflower were grown under rainfed conditions with their recommended doses of fertilizers and spacings (Table 1).

Table 1. Different crops, their varieties, spacing and recommended doses of fertilizers for sunflower-based cropping sequences

Crop	Varieties	Fertilizer (kg/ha)			Spacing
		N*	P ₂ O ₅	K ₂ O	
Sunflower	APSH 11	60	60	30	60 cm x 30 cm
Greengram	ML 267	20	50	40	30 cm x 10 cm
Soybean	JS 335	30	60	40	30 cm x 10 cm
Groundnut	K 134	20	40	50	30 cm x 10 cm
Setaria	Narasimharaya	20	50	0	30 cm x 10 cm

• Split application of N for

Sunflower - 3 equal splits at sowing, 30-45 DAS and 50-60 DAS;

Groundnut - 2 equal splits at sowing and at 30 DAS;

Setaria - 2 splits of 20 N at sowing and 10 N at 25 - 30 DAS.

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Table 2. Yield, economics and other parameters under different sunflower-based cropping sequences (Pooled of 5 years)

Cropping sequence	Yield (kg/ha)		Sunflower seed-equivalent yield (kg/ha)	Duration (days)	Land-use efficiency (%)	Production efficiency (kg/ha/day)	Gross returns (Rs./ha)	Production cost (Rs./ha)	Net returns (Rs./ha)	Benefit: Cost ratio
	Kharif	Rabi								
Sunflower - sunflower	617	885	1502	180	49.3	8.3	22538	10574	11964	2.13
Fallow - sunflower	-	675	675	90	24.7	7.5	10130	5287	4843	1.92
Greengram - sunflower	380	907	1237	155	42.5	8.3	18549	10347	8202	1.79
Soybean - sunflower	769	714	1227	195	53.4	7.6	18399	10910	7489	1.69
Groundnut - sunflower	554 (1656)	733	1555	195	53.4	7.6	23318	13552	9766	1.72
Setaria - sunflower	1183 (2383)	991	1545	210	57.5	10.4	23171	6455	13716	2.45
CD (P=0.05)	-	-	186	-	-	-	-	-	1732	0.24

Figures in parentheses indicate haulm/straw yield;

Market price of different commodities:

Sunflower seed - Rs. 15/kg; Greengram seed - Rs. 13/kg; Soybean seed - Rs. 10/kg; Groundnut pods - Rs. 13/kg;

Groundnut haulm - Rs. 3/kg; Setaria seed - Rs. 4/kg; Setaria straw - Rs. 1.50/kg.

Rainfall received from July to February during 1996-97, 1997-98, 1998-99, 1999-2000 and 2000-01 was 1042, 1140, 1063.8, 345.4 and 1119.4 mm respectively. Final crop yields (main and by-products) were recorded and their total gross returns, production costs and net returns were calculated on the basis of prevailing market prices of the produce. For comparison between cropping sequences, the yield of all the crops were converted into sunflower- equivalent yield on price basis. Land - use efficiency values were calculated by dividing the total duration of crop sequences with 365 and expressed in percentage. Production efficiency values were calculated by dividing the total seed production/ha in a sequence with total duration of crops in that sequence (Tomar and Tiwari, 1990).

Production potential

Data (Table 2) revealed that the groundnut - sunflower cropping sequence recorded the highest sunflower equivalent yield of 1555 kg/ha, followed by setaria - sunflower (1545 kg/ha) and sunflower - sunflower (1503 kg/ha). Monocrop of sunflower recorded the lowest seed yield and sunflower equivalent yield of 675 kg/ha, which indicates that growing any of the crops preceding to sunflower was found profitable than monocrop of sunflower. Higher sunflower seed equivalent yield in groundnut - sunflower and setaria - sunflower cropping sequences may be attributed to higher

tonnage and better price of these crops.

However, land-use efficiency was the highest in setaria - sunflower cropping sequence because it occupied the land for longer period of 210 days (Table 2). Fallow - sunflower sequence had the lowest land-use efficiency. The production efficiency was also highest in setaria - sunflower cropping sequence because of higher tonnage of produce from this sequence (Table 2). Being a drought resistant crop, setaria might have performed well even under dry spell conditions that prevailed during 1999-2000, which resulted in better yield and production efficiency.

Economics of cropping system

Highest gross returns were obtained with groundnut - sunflower followed by setaria-sunflower and sunflower - sunflower sequences (Table 2). However, the maximum net returns were realized from setaria - sunflower followed by sunflower - sunflower sequence as the total production costs for groundnut - sunflower sequence was high. Similarly, highest benefit - cost ratio was recorded with setaria - sunflower sequence.

Thus, in vertisols of Scarce Rainfall Zone of Andhra Pradesh, setaria - sunflower cropping sequence was more remunerative as it gave higher crop yield with higher monetary returns under rainfed conditions.

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