

Intercropping Groundnut and Soybean with Cotton

P. K. Patel, M. K. Dobaria and L. D. Vavadia

Main Oilseeds Research Station, Gujarat Agricultural University, Junagadh campus

ABSTRACT

This investigation was carried out at the Main Station for Oilseeds Research at Junagadh, during *khari* seasons of 1971-72 and 1973-74 to study the possibilities of intercropping groundnut and soybean with cotton under rainfed/irrigated conditions. The results indicated that intercropping of two rows of groundnut 'Junagadh-11' with Deviraj cotton planted at 180 cm apart was the most profitable. It gave additional income of 19.7, 25.2, 6.6 and 148 per cent over sole crop of cotton planted at 180 cm apart, sole cotton planted at 90 cm apart, groundnut alone and soybean alone, respectively. Growing groundnut as a sole crop fetched higher gross returns over sole crop of cotton or soybean.

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INTRODUCTION

GROUNDNUT (*Arachis hypogaea* L.) is a common intercrop in cotton fields in the Saurashtra region. This practice primarily aims at increased total production and income per unit area. It has also been considered as a safeguard against total failure of a particular crop. Groundnut variety 'J-11' and cotton variety 'Deviraj' (170-CO2) which are the most important crops are extensively grown in this region. The grain of soybean is much richer in protein than groundnut and cotton. Generally, groundnut and soybean crops mature at about the same time while cotton matures late. Hence, groundnut and soybean offer scope for their choices in intercropping programme. The present investigation is intended to study the possibilities of intercropping two important crops viz., groundnut and soybean with cotton, in order to obtain

maximum monetary return per hectare under rainfed/irrigated conditions.

MATERIALS AND METHODS

A field trial was conducted at the main Oilseeds Research Station, Gujarat Agricultural University, Junagadh, on medium black soil during the years 1971-72 and 1973-74. There were eight treatments, the details of which are given in Table 2.

The experiment was laid out in a randomized block design with four replications having a net plot size of 10.00 m $\times$ 5.40 m. The varieties were cotton 'Deviraj' (170-CO2), soybean 'J-231', and groundnut 'J-11'. These crops were fertilized at the rate of 75.00 + 35.50, 20 + 50 and 12.5 + 25.00 kg/ha nitrogen and phosphate, respectively. The whole dose of nitrogen and phosphate were applied before sowing to ground-

TABLE 2

Effect of different treatments of yield and gross income.

Treatments	Yield (kg/ha)			Gross income (Rs/ha)		
	1971-72	1973-74	Mean	1971-72	1973-74	Mean
A. Cotton sole, 180 cm apart	894	1058	976.00	2013	3702	2858
B. Cotton sole, 90 cm apart	1039	892	965.50	2337	3128	2733
C. Groundnut sole	1458	1394	1426.00	2448	3976	3212
D. Soybean sole	1106	1129	1117.50	1202	1557	1380
E. Cotton 180 cm apart + Soybean	740	489	614.50	2383	2691	2537
two rows	657	772	714.50			
F. Cotton 180 cm apart + Soybean one row	829	648	738.50	2130	3022	2571
	224	618	431.00			
G. Cotton 180 cm apart + Groundnut	717	769	743.00	2524	4320	3422
two rows	538	543	540.50			
H. Cotton 180 cm apart + Groundnut one	839	788	813.50	2457	3956	3207
row	340	350	345.00			
			S.Em. $\pm$	10.6	88.9	141.7
			C.D. 5%	31.0	259.0	405.00
			C.V. %	1.4	2.7	14.2

nut and soybean, while $\frac{1}{2}$ N and the whole dose of phosphate were applied before sowing and $\frac{1}{2}$ N was applied as a top dressing one month after sowing to cotton. Fertilizers for crop mixtures were applied in proportion of different ratios of the crops in the mixture. The seeds of soybean were treated with a bacterial culture of *Rhizobium japonicum*. After harvest of soybean and groundnut, cotton was given two and five irrigations during 1971-72 and 1973-74, respectively. It is evident that two factors are involved in making final assessment of the potentialities of intercropping: (i) The yield of the crop and (ii) its price. These factors vary from year to year. To eliminate these interaction effects, the total monetary return per plot was calculated by converting yield into rupees and statistical analysis was based on data of the total monetary return. The value of seed cotton was taken at Rs 225/- and Rs 350/- per quintal and for groundnut at Rs

150/- and Rs 250/- while that of soybean at Rs 100/- and Rs 100/- per quintal in 1971-72 and 1973-74, respectively.

The rainfall data for *kharif* seasons of 1971-72 and 1973-74 are presented in Table 1.

RESULTS AND DISCUSSION

The data in Table 2 revealed that during the year 1971-72, the sole crop of groundnut gave significantly higher gross income (Rs 2448/ha) than the sole crop of soybean (Rs 1202/ha) and the sole crop of cotton planted at 180 cm (Rs 2013/ha) and 90 cm (Rs 2337/ha) apart. The gross income from soybean sole was significantly the lowest (Rs 1202/ha) as compared to rest of the treatments. The sole crop of cotton at 90 cm spacing gave significantly higher income (Rs 2337/ha) than that of 180 cm spacing (Rs 2013/ha). In intercropping treatments, cotton spaced at 180 cm intercropped with two rows of soybean

TABLE 1

Distribution of rainfall during two seasons at Junagadh.

Month	Standard week	Rainfall (mm)	
		1971-72	1973-74
June	22	24.0	37.2
	23	90.0	66.4
	24	—	40.8
	25	13.6	—
July	26	57.4	—
	27	—	100.0
	28	11.2	324.9
	29	191.7	114.5
	30	9.8	13.0
August	31	159.0	5.8
	32	19.5	31.8
	33	1.2	16.6
	34	—	45.3
September	35	373.0	81.8
	36	—	20.9
	37	—	28.2
	38	—	8.0
	39	45.5	14.8
October	40	—	—
	41	—	—
	42	—	—
	43	—	—
	Total	995.9	950.0

gave significantly higher gross income (Rs 2373/ha) than cotton spaced at 180 cm intercropped with one row of soybean (Rs 2130/ha). Cotton spaced at 180 cm intercropped with two rows of groundnut produced significantly the highest gross income (Rs 2524/ha) among all the treatments involving sole and mixed crops followed by cotton intercropped with one row of groundnut (Rs 2457/ha) and groundnut sole (Rs 2448/ha).

During the year 1973-74, the sole crop of groundnut produced significantly higher gross income (Rs 3976/ha) than the sole crop of soybean (Rs 1557/ha) and the sole crop of cotton spaced at 180 cm (3702/ha) and 90 cm (Rs 3128/ha) apart. The sole crop of soybean produced

significantly the lowest gross income (Rs 1557/ha) of all the treatments. However, the wider spacing of 180 cm in cotton gave significantly higher income (Rs 3702/ha) than that of 90 cm spacing (Rs 3128/ha). The treatment of cotton intercropped with one row of soybean gave significantly higher gross income (Rs 3022/ha) than cotton intercropped with two rows of soybean (Rs 2691/ha). Cotton spaced at 180 cm apart with two rows of groundnut was significantly superior (Rs 4320/ha) over rest of the treatments followed by groundnut sole (Rs 3976/ha) and cotton spaced at 180 cm intercropped with one row of groundnut (Rs 3956/ha).

The pooled analysis showed that cotton spaced at 180 cm apart intercropped with two rows of groundnut gave significantly the highest gross income (Rs 3422/ha) and it was on par with the treatments of groundnut sole (Rs 3212/ha) and cotton spaced at 180 cm intercropped with one row of groundnut (Rs 3207/ha). Thus it gave 19.7, 25.2, 6.6 and 148 per cent higher gross income than sole crops of cotton spaced 180 cm apart, cotton spaced at 90 cm apart, groundnut alone and soybean alone, respectively. These findings are in agreement with the results reported by Anjanjala and Rao (1939) and Joshi and Joshi (1965).

The sole crop of groundnut gave significantly higher gross income (Rs 3212/ha) than sole cotton spaced at 90 cm apart and sole soybean. Cotton planted at 180 cm spacing gave signifi-

ificantly higher gross income of Rs 2858/ha than that of cotton planted at 90 cm which gave gross income of Rs 2733/ha. Intercropping cotton with soybean one row and two rows did not differ significantly among themselves, however, both produced significantly higher gross income than sole soybean crop.

The results thus suggested that intercropping of cotton planted at 180 cm with two rows of groundnut was the most advantageous and proved to be the best than sole crops of cotton, groundnut and soybean in combination with

other intercropped treatments in respects of yield and gross income per unit area under Saurashtra condition of Gujarat State. The results also pointed out that the sole crop of groundnut also gave good return to the farmers as compared to other treatments in absence of irrigation facilities.

REFERENCES

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