

Comparative Performance of Groundnut Based Intercropping System

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ABSTRACT

A field experiment was conducted at the main Oilseeds Research Station, Junagadh, Gujarat during *kharif* season of 1994, 1995 and 1996 on medium black soil to find out the most suitable intercrops viz., castor, sunflower, greengram and pigeonpea with bunch groundnut. All the intercrops reduced the yield of groundnut than sole groundnut. The reduction was less when groundnut was intercropped with pigeonpea. This system resulted in highest groundnut equivalent yield (1392 kg/ha), net returns (Rs. 11629/ha) and LER (1.30) as compared to others.

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INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is one of the most important *kharif* oilseed crops in Saurashtra region of Gujarat. Its productivity is low because of erratic and uneven distribution of monsoon rains as well as prolonged dry spell observed frequently. The problem is further aggravated as irrigation facility in the region is limited. Under the circumstances, an intercropping system with groundnut as base crop gives an insurance against failure of crop due to monsoon vagaries. Besides, it reduces the risk, increases the income with an efficient utilization of solar energy, moisture and nutrients. Keeping these views, the present study was initiated to find out the most compatible and remunerative inter crop with bunch groundnut during *kharif* season.

MATERIALS AND METHODS

A field experiment was conducted during the *kharif* seasons of 1994-95 to 1996-97 at Main Oilseeds Research Station, Gujarat Agricultural University, Junagadh (Gujarat), which fall under South Saurashtra Agroclimatic Zone of Gujarat. The soil of the location is medium black in texture, having PH. 7.7, total nitrogen (0.094%) available phosphorus (28 kg/ha) and potash (285 kg/ha).

The experiment was laid out in a randomized block design replicated thrice with nine treatments. The various crops tried as intercrops in groundnut var. GG-2 were castor (GCH-4), sunflower (GAUSF-15), greengram (G-2) and pigeonpea (BND-2). One row of intercrop was sown in between three rows of groundnut spaced at 45 cm row width. Chemical

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TABLE 1**Yearwise cultural operations.**

<i>Crop</i>	<i>Operations</i>				
	<i>Date of sowing</i>	<i>Date of harvesting</i>	<i>No. of irrigation</i>	<i>No. of weedings</i>	<i>No. of interculturing</i>
1994-95					
Groundnut	28.06.94	21.10.94	—	2	3
Castor	28.06.94	30.01.95	2	2	3
Sunflower	28.06.94	23.09.94	—	2	3
Greengram	28.06.94	06.09.94	—	2	3
Pigeonpea	28.06.94	30.01.95	2	2	3
1995-96					
Groundnut	13.07.95	20.10.95	—	2	4
Castor	24.07.95	22.02.96	2	2	4
Sunflower	13.07.95	10.10.95	—	2	3
Greengram	13.07.95	19.9.95	—	2	2
Pigeonpea	24.07.95	22.2.96	2	2	3
1996-97					
Groundnut	12.07.96	23.10.96	—	2	4
Castor	12.07.96	28.02.97	2	2	2
Sunflower	12.07.96	08.10.96	—	2	2
Greengram	12.7.96	18.09.96	—	2	2
Pigeonpea	12.07.96	28.02.97	2	2	2

fertilizers, seed rate and other package of practices were adopted as per recommendations made for different crops in the region. The yearwise schedule of cultural practices are given in Table 1. The total output gained from different intercropping systems were converted into groundnut equivalent yield. The Land Equivalent Ratio (LER) was calculated using the equation suggested by Jha and Chandra (1982).

RESULTS AND DISCUSSION

The yield data of base and intercrops, groundnut equivalent yield and monetary returns as influenced by different intercropping systems during 1994-95, 1995-96, 1996-97 and in pooled analyses are presented in Table 2 and 3.

In general, the productivity of groundnut was significantly influenced due to

intercropping systems. The reduction in pod yield was minimum when it was intercropped with pigeonpea. The probable reason for reduction in groundnut yield is that the pigeonpea being a deep rooted and non-depletive crop did not compete strongly with base crop groundnut (Mehta *et al.*, 1985). The magnitude of yield reduction was relatively greater when groundnut was intercropped with sunflower. Guggari *et al.* (1994) observed yield reduction in groundnut when intercropped with sunflower.

On pooled data basis, intercropping of castor, sunflower, greengram and pigeonpea reduced the groundnut pod yield to an extent of 27.0, 32.7, 30.6 and 21.7 per cent, respectively over sole groundnut. During 1994, groundnut pod yield was higher in sole and intercropping systems. This might be due to even distribution of rainfall during crop growth period. On an average of three years, sole groundnut recorded pod yield of 938 kg/ha followed by groundnut + pigeonpea intercropping system (728 kg/ha).

All the intercrops recorded higher yield when sown as sole crop than as an intercrop in groundnut. The reduction in yields due to intercropping was more than compensated by additional yields of intercrops compared to their respective sole crops. The reduction was to an extent of 61.8, 53.5, 78.9 and 47.7 per cent in castor, sunflower, greengram and pigeonpea, respectively. This may be due to differential ability of these crops to compete with groundnut when grown in association. Similar findings were also reported by Guggari *et al.*, (1994) and Mehta *et al.*, (1985).

Among the intercrop treatments, groundnut + pigeonpea recorded significantly the highest yield in all the season and in pooled results. In terms of groundnut equivalent yield, groundnut + pigeonpea produced significantly higher mean groundnut yield (1392 kg/ha) and remained at par with pigeonpea sole and groundnut + castor intercropping system. The probable reason for increasing the yield in groundnut + pigeonpea

TABLE 2

Yield of base and intercrops as influenced by various intercropping system.

Treatments	Yield (kg/ha)							
	1994-95		1995-96		1996-97		Mean	
	Base	Inter	Base	Inter	Base	Inter	Base	Inter
Groundnut + Castor	880	518	565	485	592	398	697	467
Groundnut + Sunflower	861	194	546	207	472	528	626	310
Groundnut + Greengram	826	167	555	194	555	89	645	150
Groundnut + Pigeonpea	917	648	676	648	592	417	728	571
Groundnut sole	1120	—	944	—	750	—	938	—
Castor sole	—	1296	—	1148	—	1222	—	1222
Sunflower sole	—	620	—	694	—	657	—	667
Greengram sole	—	787	—	1055	—	287	—	710
Pigeonpea	—	1241	—	1194	—	842	—	1092

intercropping system may be that in sole and intercropping systems the yield of groundnut per plant was similar. Almost similar trend was observed with respect to light interception. However, the solar radiation was more efficiently converted to dry matter due to intercropping (ICRISAT, 1980). Another fact for higher yield in intercropping system is that groundnut makes rapid canopy coverage at the ground and uses the resources more efficiently in such situations. Almost similar findings were reported by Appandurai and Selvaraj (1974).

The highest net monetary returns of Rs. 11629/ha were obtained in groundnut + pigeonpea followed by groundnut + castor

(Rs. 8646/ha) intercropping systems (Table 3). In case of different sole crops, pigeonpea and groundnut gave the highest net monetary returns of Rs. 9700/ha and Rs. 8421/ha, respectively on pooled basis. Studied conducted at Raichur, Karnataka Guggari *et al.* (1994) also showed superiority of intercropping system in terms of monetary return.

The three years average values of LER were higher in groundnut + pigeonpea intercropping system (1 : 30) followed by the groundnut + sunflower (1.14) and groundnut + castor (1.11). The results are in accordance with those reported by Guggari *et al.* (1994).

TABLE 3

Influence of various intercropping systems on groundnut equivalent yield, net return and LER.

Treatments	Groundnut equivalent yield (kg/ha)				Net returns (Rs/ha)	LER
	1994-95	1995-96	1996-97	Mean		
Groundnut + Castor	1250	938	905	1034	8646	1.11
Groundnut + Sunflower	1025	738	1000	921	6970	1.14
Groundnut + Greengram	1018	780	661	82	6339	0.90
Groundnut + Pigeonpea	1684	1473	1039	1392	11629	1.30
Groundnut sole	1120	944	750	938	8421	1.00
Castor sole	997	882	968	847	6728	1.00
Sunflower sole	525	641	648	605	3440	1.00
Greengram sole	908	1299	328	845	7539	1.00
Pigeonpea sole	1431	1470	908	1268	9700	1.00
C. D. at 5%	96.8	131.0	191.2	386.9	—	—

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