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INTERCROPPING STUDIES IN GROUNDNUT

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ABSTRACT

A field experiment was conducted during Summer 1986 and 1988 at Agricultural Research Station, Aliyarnagar to find out the most suitable intercrop for summer irrigated groundnut. Results revealed that though intercropping resulted in decreased groundnet yield, intercropping of groundnut with redgram, greengram and blackgram recorded significantly higher net returns compared to groundnut in pure stand. Intercropping of redgram with groundnut proved to be the most remunerative system while intercropping of ragi and cowpea with groundnut proved to be uneconomical.

Groundnut the most important oilseed crop of India. In Coimbatore district of Tamil Nadu considerable area of 13,000 hectare is grown as summer irrigated crop. At present the net returns from groundnut cultivation has a decreasing trend, due to increasing cost of inputs and labour. Intercropping is an important agronomic practice to increase the net returns from unit area besides being an effective method for utilisation of land, labour and other resources.

Hence with a view to find out the most suitable intercrops for summer irrigated groundnut in Pollachi tract of Coimbatore district, a study was undertaken and results are reported.

MATERIALS AND METHODS

A field experiment was conducted during summer 1986 and 1988 at Aliyarnagar in a sandy loam soil. The experiment was laid out in a randomised block design in plots of 5 x 3 Metres with six replications. The treatment details and varieties used are given below:

Teatments	Variety used	Duration (days)
Groundnut alone	POL.2	110
Groundnut + Blackgram		
Blackgram alone	Co.5	80
Groundnut + Greengram		
Greengram alone	Co.5	85
Groundnut + Redgram		
Redgram alone	Co.5	110
Groundnut + Sesamum		
Sesamum alone	TMV.6	90
Groundnut + Cowpea		
Cowpea alone	Co.3	85
Groundnut + Ragi		
Ragi alone	Co.11	95

The main crop and intercrops were sown in 4:1 proportion. The main crop was manured at 15:30:45 kg NPK/ha. All standard procedures relating to package of practices, recording yield and other components were followed. The data pertaining to different years were satistically scrutinised individually and presented in Tables 1 and 2.

RESULTS AND DISCUSSION

Main crop yield (Groundnut pod yield): In general, intercropping in groundnut resulted in reduction of pod yield compared to sole crop of groundnut. Sole crop of groundnut recorded significantly higher yield of 1670 kg/ha than groundnut yield in all other intercropping systems. Yield reduction in groundnut due to intercropping could be attributed to competition for nutrients, as intercrops were not manured and fertiliser application was limited only to the base crop, groundnut.

Number of pods per plant and sound matured kernel (SMK)

The highest number of pods per plant and SMK was recorded in sole crop of groundnut compared to other systems. This explains for increased groundnut pod yield recorded in sole crop of groundnut. Increased availability of nutrients (due to minimum crop competition) could have resulted in higher number of pods, better pod filling and maturity of kernels.

Shelling percent and 100 kernel weight: These two characters were not significantly altered due to intercropping.

Intercrop yields: Under intercropping situation with groundnut, Redgram recorded the highest

Table 1. Data on yield of maincrop, intercrop, yield attributing characters (1986).

Treatment	Pod yield kg/ha	Haulm yield kg/ha	No. of pods/plant	Shelling %.	100 kernel weight in gms	SMK %	Intercrop yield kg/ha	LER	Net return Rs/ha.
Groundnut alone	2290	4400	26.0	75.1	27.7	84.2	-	1.0	9140
Groundnut + Blackgram	2048	3978	21.6	75.7	29.0	79.8	250	1.12	9568
Blackgram alone	-	-	-	-	-	-	1330	1.0	6302
Groundnut + Greengram	2032	3855	22.5	76.0	27.9	80.4	279	1.13	9595
Greengram alone	-	-	-	-	-	-	1490	1.0	6547
Groundnut + Redgram	2088	3850	25.1	76.9	29.5	78.9	270	1.12	9628
Redgram alone	-	-	-	-	-	-	1600	1.0	6457
Groundnut + Sesamum	1902	3860	22.6	76.2	28.0	78.0	252	1.13	9079
Sesamum alone	-	-	-	-	-	-	1406	1.0	7655
Groundnut + Cowpea	1975	3883	23.0	76.1	28.1	79.0	322	1.16	8664
Cowpea alone	-	-	-	-	-	-	1622	1.0	5871
Groundnut + Ragi	1953	3927	22.8	76.9	29.6	78.8	316	1.16	7409
Ragi alone	-	-	-	-	-	-	232	1.0	2484
SE	66.6	75.2	0.85	0.93	0.62	1.71	30.9	0.01	370
CD	94.1	216.9	2.45	NS	NS	3.39	87.4	0.02	1048

Table 2. Data on yield of maincrop, intercrop, yield attributing characters, (1988).

Treatment	Pod yield kg/ha	Haulm yield kg/ha	Shelling %.	SMK %	100 kernel weight in gms	No. of pods/plant	Intercrop yield kg/ha	Net return Rs/ha.
Groundnut alone	1049	2038	75.67	73.6	30.38	12.27		4032
Groundnut + Blackgram	818	1734	72.33	75.8	28.17	12.63	334	5022
Blackgram alone	-	-	-	-	-	-	931	2302
Groundnut + Greengram	1000	1790	73.17	70.8	28.67	11.80	400	5386
Greengram alone	-	-	-	-	-	-	820	2136
Groundnut + Redgram	858	1809	69.33	59.2	26.00	9.87	501	5997
Redgram alone	-	-	-	-	-	-	1003	3433
Groundnut + Sesamum	950	1700	71.50	54.8	27.83	9.13	270	5617
Sesamum alone	-	-	-	-	-	-	800	4224
Groundnut + Cowpea	765	1752	71.00	48.0	26.67	8.00	238	3116
Cowpea alone	-	-	-	-	-	-	1148	2352
Groundnut + Ragi	810	1734	72.17	55.2	27.83	10.87	350	3910
Ragi alone	-	-	-	-	-	-	1529	928
SE	34.8	43.2	0.61	0.99	0.73	0.79	40.8	212
CD	101.4	125.9	1.78	2.89	NS	2.30	115.4	599.6

grain yield of 386 kg/ha, while Sesamum recorded the lowest yield of 261 kg/ha.

Land Equivalent Ratio (LER): LER was influenced by intercropping. LER was higher in respect of intercropped groundnut (irrespective of the intercrops tried), as compared to groundnut in pure stand. Among the different intercropping systems tried, groundnut + redgram recorded the

highest LER of 1.35, which is due to significant additional yield realised in this system from the intercrop.

Net returns (Rs/ha): The different treatments significantly influenced the net returns. Except in groundnut intercropped with ragi or cowpea, the net returns from other intercropping systems were higher than that from groundnut in pure stands (Rs.6,586/ha). Drastic reduction in groundnut + ragi and groundnut + cowpea could be attributed to significant lower groundnut yield and poor intercrop yield recorded in these systems. Groundnut + red gram proved to be the most remunerative system (Rs.7,813/ha).

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STUDIES ON RESIDUAL, DIRECT AND CUMULATIVE EFFECT OF PHOSPHORUS SOURCES ON THE AVAILABILITY, CONTENT AND UPTAKE OF PHOSPHORUS AND YIELD OF MAIZE

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ABSTRACT

Field experiment conducted at Coimbatore with maize in a typic ustropept soil revealed that application of phosphatic fertilizers irrespective of source, level and effects increased the available P. Among the sources, DAP and SSP were superior over RP and its combinations. The various sources and levels and the effects did not produce any significance in the P content of grain and stalk of maize. Significant difference among the sources for P uptake in grain was observed under cumulative effect whereas it was the direct effect for stalk uptake. The DAP and SSP proved significantly superior over RP and its combinations in the grain yield under direct and cumulative effects. However, the same trend was observed for residual and direct effects in the stalk yield.

Fertilizer P is a costly input and its utilization by individual crops is poor due to fixation and immobility in the soil. A single crop uses about 20 per cent of the applied P and the rest remains as residue and converted to various reaction products of varying solubility which is utilized by the

Table 1. Available P (ppm) in soil of maize.

	Treatment	Knee high stage				Tasseling stage				Harvest state			
		RE	DE	CE	Pool	RE	DE	CE	Pool	RE	DE	CE	Pool
a)	Source												
	SSP	13.4	19.7	21.9	18.3	13.0	19.8	19.4	17.4	11.0	17.3	18.0	15.6
	RP	13.6	14.3	18.7	16.3	11.5	15.1	15.0	13.8	10.7	14.1	13.9	12.1
	2/3 RP + 1/3 SSP	14.2	18.4	19.3	17.3	12.8	17.9	17.4	16.0	11.8	16.4	15.5	14.6
	RP + PB	14.4	17.3	19.1	16.9	12.0	16.4	16.7	15.0	10.5	16.0	15.3	14.1
	DAP	14.9	21.3	23.0	19.8	15.1	22.4	21.1	19.6	13.9	19.8	19.6	17.8
	Control	4.6	4.5	4.1	4.4	4.6	4.6	4.3	4.5	4.1	4.5	4.5	4.3
b)	Level												
	30 kg P_2O_5/ha	11.3	14.9	17.0	14.4	10.9	15.0	14.8	13.3	9.1	14.2	13.7	12.3
	60 kg P_2O_5/ha	13.8	18.8	20.4	17.7	12.7	18.5	17.7	16.3	10.9	17.1	16.1	14.7
	90 kg P_2O_5/ha	17.2	21.1	23.8	21.0	15.9	21.5	21.2	19.5	14.7	19.8	19.9	17.9
	Source : SED	0.8	0.8	0.7	0.4	0.9	0.8	1.6	0.5	0.6	0.8	1.0	0.5
	CD	NS	1.7	1.5	0.9	1.9	1.7	2.1	1.0	1.3	1.7	2.1	1.0
	Level : SED	0.6	0.6	0.6	0.3	0.7	0.6	0.8	0.4	0.5	0.6	0.8	0.3
	CD	1.3	1.3	1.2	0.7	1.5	1.3	1.6	0.8	1.1	1.3	1.6	0.7
	S x L : SED	1.5	1.4	1.3	0.8	1.6	1.4	1.8	0.9	1.1	1.3	1.8	0.8
	CD	NS	3.0	2.7	1.6	NS	NS	NS	1.8	NS	NS	NS	1.7

RE : Residual effect; DE : Direct effect; CE : Cumulative effect