

Table 4. Effect of time of NK application on groundnut yield, agronomic efficiency and economic returns : 1991-92

Treatments	Pod yield (q/ha)		Agronomic Efficiency (kg pod/kg nutrient)					
	Kharif	Rabi	For N	For K	Kharif	Rabi	Kharif	Rabi
N splits								
B, 25 DAS	20.80	17.80	36.5	11.5	8.49	5.59	1.68	1.45
B, 45 DAS	21.10	18.00	38.3	12.1	8.87	5.97	1.72	1.48
B, 25, 45 DAS	20.50	16.80	32.7	10.3	8.19	4.60	1.66	1.37
K splits								
B, 25 DAS	20.35	16.70	31.9	10.1	8.04	4.49	1.64	1.36
B, 45 DAS	20.60	16.90	33.3	10.5	8.37	4.76	1.68	1.39
B, 25, 45 DAS	19.60	16.30	28.6	9.0	7.29	4.08	1.59	1.33
NK splits								
B, 25 DAS	21.50	18.20	39.8	12.5	9.21	6.00	1.74	1.48
B, 45 DAS	22.20	19.00	44.2	13.9	9.98	6.88	1.81	1.56
B, 25, 45 DAS	21.05	17.60	36.6	11.6	8.75	5.40	1.71	1.44
NK - All basal	19.80	16.40	29.5	9.3	7.56	4.26	1.61	1.35
Control (no NPK)	13.50	12.70	-	-	2.56	1.63	1.23	1.17
SE d	0.79	0.69			0.79	0.71	0.06	0.06
CD (P=0.05)	1.66	1.44			1.77	1.59	0.14	0.13

B : Basal

at basal and 45 DAS. Latter stage coincides with pegging when earthing up operation is normally carried out. Nutrient use efficiency increased by resorting to split application of N and K in addition to getting higher pod yield and economic returns.

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## INFLUENCE OF PLANT POPULATION AND INTERCROPPING IN GROUNDNUT ON YIELD AND ECONOMIC RETURNS

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## ABSTRACT

Field experiments were conducted in *kharif* and *rabi*, 1991-93 on a sandy loam soil at Vridhachalam, Tamil Nadu to test the effect of intercropping of green gram, black gram and sesamum at 4:1 in groundnut sown at 33, 42, 50 plants/m<sup>2</sup>. It was inferred that pod yield varied at different plant population of sole and intercropped groundnut. Economic analysis of the treatment combinations indicated the possibility of obtaining higher monetary benefit by adoption of the groundnut + green gram intercropping. For this system, groundnut population is to be increased to 42 plants/m<sup>2</sup> than recommended population of 33 plants/m<sup>2</sup>.

KEY WORDS : Groundnut, Pulses, Sesame, Intercropping, Benefit-cost ratio

The yield advantages from intercrop result from efficient use of available moisture, solar energy, nutrients and space besides the possibility

crop involved (Venkateswarlu, 1977). Intra species competition, co-operative and competitive interaction could be avoided by providing suitable planting pattern which results in adequate

Table 1. Effect of intercropping at varied groundnut population on yield and economics during *kharif* 1991-93

Treatments	1991-92				1992-93			
	Yield (q/ha)		Net income (rs/ha)	B : C ratio	Yield (q/ha)		Net income (rs/ha)	B : C ratio
	Groundnut pod	Intercrop			Groundnut pod	Intercrop		
Sole crop								
Groundnut (33 plants/m <sup>2</sup> )	24.26	-	17970	3.40	20.22	-	11315	2.43
Groundnut (42 plants/m <sup>2</sup> )	23.50	-	17175	3.29	19.20	-	10345	2.31
Groundnut (50 plants/m <sup>2</sup> )	22.21	-	15820	3.11	22.20	-	13195	2.67
Groundnut (33 plants/m <sup>2</sup> )								
Groundnut + Black gram	22.51	6.12	22255	3.97	16.38	3.48	11145	2.41
Groundnut + Green gram	18.42	9.32	22090	3.95	15.78	2.16	9470	2.20
Groundnut + Sesamum	18.95	0.31	12800	2.71	13.02	0.38	4970	1.63
Groundnut (42 plants/m <sup>2</sup> )								
Groundnut + Black gram	20.47	7.60	21590	3.88	13.62	2.93	7975	2.01
Groundnut + Green gram	22.51	7.83	24420	4.26	15.00	1.85	8390	2.06
Groundnut + Sesamum	17.43	0.36	11270	2.50	11.40	0.37	3415	1.43
Groundnut (50 plants/m <sup>2</sup> )								
Groundnut + Black gram	20.24	9.46	23410	4.12	13.98	3.05	8435	2.07
Groundnut + Green gram	16.45	9.50	20220	3.70	13.90	2.02	7610	1.96
Groundnut + Sesamum	17.66	0.62	11850	2.58	13.42	0.34	7200	1.91
CD (P = 0.05)	5.9				3.6			

interception of sunlight by the groundnut crop canopy (Patel *et al.*, 1985). Growing groundnut in paired rows and utilising the wider interspace for raising other intercrops for maximum utilisation of available resources and securing higher net-returns appears to be a better practice under both irrigated and rainfed conditions (Sankara Reddi, 1988). The effect of intercropping of *kharif* and *rabi* groundnut grown at varying plant population was studied in this experiment.

## MATERIALS AND METHODS

Field experiments were conducted in *kharif* (June- September) and *rabi* (November-February) seasons of 1991-93 under protective and fully irrigated conditions respectively at the Regional Research Station, Tamil Nadu Agricultural University, Vridhachalam. A bunch type of groundnut (*Arachis hypogaea*) cultivar, VRI 2 as sole and intercropping was compared at a population of 33 (30 x 10 cm), 42 (30 x 8 cm) and 50 (20 x 10 cm) plants per m<sup>2</sup>.

Black gram (*vigna mungo*(L.) Hepper) (Co.5), green gram (*vigna radiata* (L.) Wilczek) Tamil Nadu Agricultural University) (Co.3) and sesamum (*Sesamum indicum* (TMV 3) Were the intercrops in

groundnut at 4:1 ratio. Treatment combinations were tested in a randomized block design with three replications. Recommended fertilizer rate of 17-34-51 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O for groundnut was basally applied. Gypsum at 400 kg/ha was split applied at basal and 45 days after sowing for groundnut. Plot yield was computed to one ha and economic returns worked out.

## RESULTS AND DISCUSSION

### Yield of base and intercrops

Both groundnut and intercrop yield varied between the seasons. Groundnut pod yield was higher in *kharif* (Table 1) than in *rabi* (Table 2). Favourable climatic conditions that prevailed during the growth period of groundnut in *kharif* in addition to adequate soil moisture maintained due to frequent rainfall and protective irrigation might have contributed higher production.

Balasubramanian (1993) recorded more pod yield in *kharif* than in *rabi*. Both under sole and intercropping, yield variation noticed between the plant population tested. Sole crop of groundnut yielded similarly at different population though numerical variation existed. Jadhao *et al.* (1992)

Table 2. Effect of intercropping at varied groundnut population on yield and economics during *rabi* 1991-93

Treatments	1991-92				1992-93			
	Yield (q/ha)		Net income (Rs/ha)	B : C ratio	Yield (q/ha)		Net income	B : C ratio
	Groundnut pod	Intercrop			Groundnut pod	Intercrop		
Sole crop								
Groundnut (33 plants/m <sup>2</sup> )	19.00	-	11790	2.44	16.10	-	8425	2.01
Groundnut (42 plants/m <sup>2</sup> )	21.50	-	14410	2.77	17.50	-	10000	2.19
Groundnut (50 plants/m <sup>2</sup> )	18.70	-	11470	2.41	21.00	-	13675	2.63
Groundnut (33 plants/m <sup>2</sup> )								
Groundnut + Black gram	19.50	1.89	14200	2.74	17.00	1.35	10825	2.29
Groundnut + Green gram	22.50	1.79	17430	3.14	18.05	1.10	8585	2.03
Groundnut + Sesamum	18.00	1.74	13000	2.59	18.00	0.62	11330	2.35
Groundnut (42 plants/m <sup>2</sup> )								
Groundnut + Black gram	22.10	1.56	16600	3.03	18.00	1.58	12105	2.45
Groundnut + Green gram	18.40	1.46	12760	2.56	17.50	1.15	12265	2.35
Groundnut + Sesamum	16.50	1.67	11330	2.39	19.50	0.67	12970	2.55
Groundnut (50 plants/m <sup>2</sup> )								
Groundnut + Black gram	21.00	1.49	15180	2.86	18.50	1.73	12780	2.53
Groundnut + Green gram	18.60	1.34	13500	2.65	20.50	1.23	14500	2.73
Groundnut + Sesamum	18.00	0.96	11985	2.47	18.00	0.71	11450	2.37
CD (P=0.05)	NS				4.9			

population in groundnut. However, for intercropped groundnut, yield advantage has been obtained with the higher population of 42 plants/m<sup>2</sup> than 33 plants/m<sup>2</sup>.

Among the intercrops, pulse components performed better than the oilseed. Green gram yielded more in *kharif* 1991-92 while black gram performed better in other seasons.

#### Economic returns

Economic analysis of different treatments brought out the need for intercropping in groundnut than raising it as sole crop. Out of the four seasons of field experimentation, only in *kharif* 1992-93, sole crop of groundnut at 50 plants/m<sup>2</sup> gave higher income and benefit-cost ratio. In other seasons, however, higher returns were realised with the treatment of groundnut + green gram intercropping. Net income and benefitcost ratio varied in this combination at different seasons. Among them, highest net income (Rs.24,420/ha) and benefit: cost ratio (4.26) were obtained with the adoption of 42 plants/m<sup>2</sup> and inclusion of green gram. It has also

been reported that groundnut + greengram intercropping gave highest returns over sole cropping in sandy loam soil of Tirupathi (SVAC, 1978).

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