

## Effect of Certain Agronomic Practices on the Yield of Rainfed Bunch Groundnut (*Arachis hypogaea* L)

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Studies conducted during Kharif 1975 and 1976 on rainfed bunch groundnut revealed that the combined adoption of seed treatment, spacing of 30 x 8 cm, chemical method of weed control and prophylactic plant protection measures increased the pod yield 30 per cent more with maximum net profit and the highest cost benefit ratio over ryots' method.

Though the production efficiency of a variety depends largely on its genetic potentials, its yield could be increased to a perceptible magnitude by adopting improved agronomic practices. Gautam and Dastane (1970) reported that proper integration of improved agronomic practices such as timely sowing, optimum plant population, effective weed control, irrigation and plant protection measures would increase the yield more than by a single factor. The present study was taken up to evaluate the impact of various agronomic practices such as seed treatment, optimum plant population, fertilizer application, chemical method of weed control and prophylactic plant protection measures individually and in combination on the yield of rainfed bunch groundnut.

### MATERIAL AND METHODS

Studies were conducted at Tindivanam during Kharif 1975 and 1976 with the bunch variety TMV 9. The treatments

were: Seed treatment - (A), adoption of optimum plant population (B), application of farmyard manure and fertilizers (C), chemical method of weed control (D), and prophylactic plant protection measures (E). These treatments were compared against Ryots' method (Rm) which involved no seed treatment, adoption of a spacing 15 x 15 cm, application of farm yard manure @ 6.25 tonnes/ha, manual method of hoeing and weeding and curative plant protection measures. Under the treatment 'A' seeds were treated with Thiram @ 2 gm/kg of seeds and in the treatment 'B' a spacing of 30 x 8 cm was followed. The treatment 'C' consisted of application of NPK @ 10 : 10 : 45 kg/ha besides a basal dressing of farm yard manure at 6.25 tonnes/ha. For the treatment 'D' the herbicide TOK-E-25 @ 2 kg ai/ha was sprayed on the second day of sowing and the treatment 'E' comprised of prophylactic spraying of insecticides (Nuvan @ 0.05%) twice on 20th and 40th day and the

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third one mixed with fungicides (Dithane -Z-78) on 60th day after sowing against pest and diseases. The treatments were tried in a randomised block design, replicated twice. The nutrient status of the soil was low in nitrogen, medium in P and low in K.

## RESULTS AND DISCUSSION

The pod yield and economics due to different treatments are presented in Table. The yield difference due to treatments was significant in both years. In the second year the yield was relatively low due to drought at the pod developing stage. The treatment 'B' in the first year, 'B' and 'E' in the second year recorded significantly higher pod yield than 'Rm'. Among the two factor combinants, 'BE' and 'DE' were significantly superior in both the years. The treatments 'ABC', 'ABD', 'ACD', 'BCE', 'BDE' and 'CDE' in three factor combination excelled the 'Rm' in 1975 and 1976 seasons. All the four factor treatments barring 'BCDE' in the second year and the five factor treatments 'ABCDE' pronounced significant over the 'Rm' in both the years even though they did not differ among themselves.

The respective increase in yield due to the adoption of the spacing of 30 x 8 cm was 18.7 and 21.4 percent over the ryots' method in both years. The increase was due to more number of pods/plant and better filling up of pods as evident from increased 100 kernel weight over the spacing of 15 x 15 cm. The results revealed that increasing the row spacing from 15 to 30 cm and reducing the plant spacing from 15 to 8 cm resulted in increased

number of pods/plant and better development of kernels. Adoption of this spacing resulted in a net profit of Rs. 349 over the ryots' method without any extra input cost on seeds as the seed rate was lesser by 6.7 per cent than needed for 15 x 15 cm spacing. The cost of production of one Kg of pod and the cost benefit ratios were Rs. 1.68 and 1.49 respectively against Rs. 2.06 and 1.22 under ryots' method. The results revealed that even with a lesser input cost on seeds the improved spacing of 30 x 8 cm could be adopted keeping other inputs at the conventional level which would result in more than 18.7 per cent increased production.

The treatment 'E' increased the yield substantially by 35.9 per cent over the ryots' method in second year as the incidence of 'leaf miner' a major pest of groundnut was severe. It was evident that the curative plant protection measures reduced the yield to a considerable extent when the pest incidence was severe.

Though the treatments 'BE' were superior to Rm they did not differ with other similar treatments. The additive effect due to the integration of any two factors however was not proportional. Adoption of the improved spacing with prophylactic plant protection measures registered a net profit of Rs. 279/ha over the ryots' method for an additional input cost of Rs. 63/ha on plant protection alone. Even under the most stress input conditions the improved spacing with prophylactic plant protection measures could be adopted with ease as the additional investment is only on one factor.

TABLE. Yield, morphological characters and economics as affected by different treatments

Treatment	Pod yield (Kg/ha)		Pods/Plant		100 Kernel weight(gm)			Mean Pod yield (Kg/ha)	Net profit (Rs/ha)	Cost of treatments over Rm (Rs/ha)	Cost of production (Rs/ha)	Cost of benefit ratio
	Percent over Rm		Percent over Rm		1975	1976	1975					
	1975	1976	1975	1976	1975	1976	1975					
Rm	811	100.0	496	100.0	8.4	7.1	32.1	29.5	290	—	2.06	1.22
A	835	102.9	498	100.4	8.9	7.3	33.6	30.5	504	18	2.04	1.23
B	963	118.7	602	121.4	9.7	8.9	35.2	33.2	639	-27	1.68	1.49
C	875	107.9	498	100.4	9.2	8.1	33.4	30.6	207	165	2.20	1.14
D	848	104.5	550	110.9	9.4	8.3	32.2	29.8	406	34	1.92	1.30
E	845	102.2	674	135.9	10.5	8.2	34.0	33.9	465	90	1.89	1.32
AB	847	104.4	586	118.1	10.0	8.7	34.5	30.1	456	-9	1.86	1.34
AC	895	110.4	521	105.0	10.0	8.0	35.6	30.2	242	183	2.15	1.16
AD	945	116.5	648	130.6	9.9	8.1	33.3	29.1	629	48	1.71	1.46
AE	900	111.0	561	113.1	10.4	9.0	34.5	29.5	357	108	2.01	1.25
BC	976	120.3	503	101.4	10.2	8.7	34.0	30.1	367	138	2.00	1.25
BD	983	121.2	580	116.9	12.4	9.2	33.5	30.7	641	7	1.68	1.46
BE	959	118.2	628	126.6	12.1	10.2	33.0	30.5	569	63	1.77	1.35
CD	978	120.5	576	116.1	10.8	8.7	34.1	31.0	436	195	1.94	1.29
CE	951	117.2	524	105.6	9.7	7.6	35.2	32.1	245	255	2.17	1.15
DE	938	115.7	605	122.0	11.6	9.4	34.1	31.2	499	120	1.85	1.35
ABC	901	111.1	640	129.0	9.6	7.6	35.2	30.4	431	155	1.94	1.29
ABD	942	116.2	588	118.5	9.5	7.9	34.2	31.2	580	21	1.74	1.44
ABE	1000	123.3	532	107.3	10.6	9.2	35.6	31.3	489	81	1.86	1.33
ACD	930	114.7	607	122.4	10.3	8.9	36.0	31.9	394	217	1.99	1.26
ACE	991	122.2	577	116.3	9.5	8.3	35.2	32.5	342	273	2.06	1.21
ADE	946	116.6	545	109.9	11.6	9.3	36.9	31.7	426	104	1.91	1.31
BCD	970	119.6	560	112.9	10.4	8.4	34.7	33.7	403	68	1.96	1.27
BCE	964	118.9	638	128.5	11.5	9.9	35.6	31.5	437	228	1.96	1.28
BDE	955	117.8	694	139.9	9.6	8.3	35.5	32.9	668	93	1.66	1.48
CDE	970	119.6	628	126.6	12.0	9.8	34.9	31.1	384	251	2.02	1.24
ABCD	1030	127.0	589	118.8	12.3	9.9	35.1	32.6	528	186	1.85	1.35
ABCE	1037	127.9	639	128.4	9.5	8.3	35.9	30.5	504	246	1.90	1.32
ABDE	1060	130.7	658	132.7	11.5	9.0	37.5	33.2	725	101	1.69	1.51
ACDE	968	119.4	649	130.8	10.2	8.2	36.0	33.0	408	303	2.00	1.25
BCDE	1060	130.7	547	110.3	11.1	9.0	35.0	32.1	440	258	1.95	1.28
ABCDE	1013	124.9	666	134.3	12.0	9.2	35.9	33.0	513	276	1.89	1.32
CD at 5%	77.1		85.8		3.16	NS	2.29	2.13				

Cost of pods @ Rs. 2.50/kg.; Cost of seeds @ Rs. 3.25/kg.; Cost of cultivation for Rm - Rs. 1345/ha

Among the significant three factor combinants, 'BDE' registered the highest net profit of Rs. 668/ha which was more by Rs. 378/ha for an additional expenditure of Rs. 93/ha over the 'Rm'. The cost of production of pods was Rs. 1.69/Kg and the cost benefit ratio was 1.48. Under a less constrained input conditions to the best advantage, the spacing of 30 x 8 cm, chemical method of weed control and prophylactic plant protection could be adopted for increased crop protection.

The treatment 'ABDE' resulted in an increased yield by 30.8 and 32.7 per cent respectively over 'Rm' in the first and second year. The maximum net profit of Rs. 725/ha the highest cost benefit ratio of 1.51 and the lowest cost of production of Rs. 1.66/Kg were obtained under this treatment. An increased profit Rs. 57/ha over the treatment 'BDE' for an additional expenditure of Rs.18/ha on the seed treatment resulted when the treatment 'A' was combined. Even though the seed treatment had no appreciable effect on yield when applied individually, the additive effect was pronounced in combination with other factors.

When all the improved agronomic practices 'ABCDE' were applied together the yield increase was by 24.9 and 34.3

percent over the ryots' method in the first and second year respectively. The inclusion of the treatment 'C' along with 'ABDE' failed to increase the yield in the first year while in the second year the percent of increase was negligible. The poor response to the application of fertilizers confirmed the previous findings of Jayachandran *et al* (1973). They reported that application of N and P even at a higher dose of 33 Kg/ha did not produce any positive effect on yield of rainfed groundnut.

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