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Madras agric. J.78 (9-12) Sep-Dec-1991 https://doi.org/10.29321/MAJ.10.A01899

EFFECT OF PRODUCTION FACTORS ON GROUNDNUT YIELD

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ABSTRACT

The results of a field experiment conducted during the special seasons (April-May) of 1987, 1988 and 1989 at Agricultural Research Station, Aliyarnagar to find out the optimum production factors for rainfed groundnut revealed that the selection of improved variety JL 24, adoption of a spacing of 15 x 15 cm, providing one supplemental irrigation between 50 to 90 days and fertillizing the crop with 15N, 30P, 45K, kg.ha^{-1} resulted in the highest pod yield, net returns and cost benefit ratio.

KEYWORDS : Ground nut, Production factor Fertilizer, Spacing variety population, irrigation.

Groundnut, the most important oilseed crop of India is mostly grown as a rainfed crop. Non doption of improved agronomic package of practices is one of the main reasons for the low production and productivity of this crop. Experimental evidences suggest that with the adoption of improved package of practices, the yield can be increased by 110 per cent. The exclusion of protective irrigation and fertilisation from the package of practices, brought in increases of only 61 and 64 per cent over control (Saini, 1984). An investigation on the effects of differ-

TABLE 1. EFFECT OF PRODUCTION FACTOR ON POD AND HAULM YIELD.

Treatment Combination	Dry pod yield (kg.ha^{-1})				Dry haulm Yield (kg.ha^{-1})
	1987	1988	1989	Pooled mean	
$V_1S_1F_1I_1$	811	1133	1005	983	1633
$V_1S_1F_1I_2$	677	956	883	839	1373
$V_1S_1F_2I_1$	755	1089	955	933	1389
$V_1S_1F_2I_2$	689	1022	856	856	1392
$V_1S_2F_1I_1$	944	1267	1139	1117	2100
$V_1S_2F_1I_2$	844	1244	1077	1055	1711
$V_1S_2F_2I_1$	955	1311	1166	1144	2155
$V_1S_2F_2I_2$	777	1111	977	955	1678
$V_2S_1F_1I_1$	1000	1200	1133	1111	2111
$V_2S_1F_1I_2$	833	1134	1017	995	1800
$V_2S_1F_2I_1$	877	1178	1061	1035	1900
$V_2S_1F_2I_2$	800	1200	1033	1011	1600
$V_2S_2F_1I_1$	1344	1556	1483	1461	3344
$V_2S_2F_1I_2$	1000	1333	1200	1178	2089
$V_2S_2F_2I_1$	1026	1378	1235	1213	2289
$V_2S_2F_2I_2$	981	1378	1213	1191	2178
SE	31	107	61	64	124
CD (5%)	90	219	175	184	357

ent production factors on groundnut showed that the highest pod yields of 1.59 t.ha^{-1} and the highest net returns and cost:benefit ratio of 1.61, were achieved by adopting the full recommended package of practies. The yield reductions caused by not using fertilizers and improved variety accounted for 23.9 per cent and 38 per cent respectively, of the total productivity (Rao *et al* 1987). Pollachi region of Tamil Nadu is a special tract, where in groundnut is raised with the summer showers received in April. As package of practices to be adopted for the special season groundnut crop has not been developed previously, the present study was undertaken.

MATERIALS AND METHODS

Field experiments were conducted at the Agricultural Research Station, Aliyarnagar on sandy loam soil having 48 kg.ha^{-1} N, 15.2 kg.ha^{-1} P and 412.ha^{-1} K status for three consecutive *kharif* seasons of 1987, 1988 and 1989 to find out the important production factors (viz, variety, spacing, fertilizer and protective irrigation) for the rainfed groundnut crop. The experiment was laid out in a 4^2 factorial randomised block design with three replications. The treatment details are as follows :

Factors	levels	Notation used
1) Variety	POL 2	V_1
	Jl 24	V_2
2) Population	30 x 10 cm (3,33,333 plants.ha^{-1})	S_1
	15 x 15 cm (4, 44, 444 plants.ha^{-1})	S_2
3) Fertiliser	15 N, 30P_2O_5,45 kg K_2O.ha^{-1}	F_1
	10 N, 10P_2O_5,45kg K_2O ha^{-1}	F_2
4) Protective irrigation	One irrigation at 50to90 days	I_1
	One irrigation at 90to10 days	I_2

The crop was sown during the second week of March. All standard procedures relating to crop cultivation, recording yield and other components were followed. The data were statistically scrutinised and the pooled analysis carried out. The rainfall received during the crop period is presented in Table 3.

RESEULTS AND DISCUSSION

Yield

Pod yield during *kharif* 1987, and *kharif* 1989 were generally low due to the severe drought experienced by the crop at flowering phase. Even then the dry pod yield was greatly influenced by the treatments (Table 1). In all the three years of experimentation, the treatment $V_2S_2F_1I_1$ (growing variety JL 24 in 15 x 15 cm spacing, with a fertiliser schedule of 15:30:45 kg.ha^{-1} and providing a supplemental irrigation at 50to90 days after sowing) recorded the highest mean yield of 1461 kg.ha^{-1}. The role of a higher population density is quite obvious. In this package, when spacing ($V_2S_1F_1I_1$), Variety ($V_1S_2F_1I_1$), time of supplemental irrigation ($V_2S_2F_1I_2$) and fertiliser dose (V_2S_2F2I1) were substituted with the other level of the respective factors, it resulted in yield reductions of 350, 344, 283 and 248 kg.ha^{-1} respectively, indicating the importance of variety and supplemental irrigation. Lowest pod yield of 839 kg.ha^{-1} was recorded in the treatment $V_1S_1F_1I_2$ (Growing variety POL 2 in 30 x 10 cm spacing with a fertiliser schedule of 10 : 10 : 45 kg.ha^{-1} and providing one supplemental irrigation at 90-110 days of crop growth). The higher yield obtained in the treatment $V_2S_2F_1I_1$ may be attributed to the increase in yield components like hundred kernel weight, SMK per cent and shelling per cent.

Quality Attributes

Shelling per cent, hundred kernel weight and SMK were the highest in $V_2S_2F_1I_1$. This was due to the application of higher dose of fertilizer,

Table 2. **Effect of production faactors on quality attributes and economics. (Pooled mean over three years)**

Treatment combination.	Shelling per cent	100 kernel weight (g)	SMK per cent	Total return (Rs.ha^{-1})	Net return (Rs.ha^{-1})	B-C ratio
$V_1S_1F_1I_1$	61.9	26.9	52.1	6420	2114	1.53
$V_1S_1F_1I_2$	57.4	22.6	50.3	5360	987	1.26
$V_1S_1F_2I_1$	59.4	23.5	50.9	5922	1472	1.36
$V_1S_1F_2I_2$	60.7	23.0	50.6	5420	920	1.28
$V_1S_2F_1I_1$	65.7	28.8	55.3	7483	2883	1.66
$V_1S_2F_1I_2$	64.6	27.6	53.9	6651	1976	1.46
$V_1S_2F_2I_1$	66.5	29.7	57.4	7622	2872	1.64
$V_1S_2F_2I_2$	60.7	24.4	51.2	6208	1408	1.33
$V_2S_1F_1I_1$	66.6	30.0	57.6	7937	3537	1.84
$V_2S_1F_1I_2$	62.8	27.5	53.2	6571	2163	1.52
$V_2S_1F_2I_2$	65.4	28.8	55.7	6963	2448	1.60
$V_2S_1F_2I_2$	61.1	26.3	52.3	6307	1757	1.42
$V_2S_2F_1I_1$	70.4	31.5	62.6	11157	6507	2.43
$V_2S_2F_1I_2$	65.9	30.4	58.7	7960	3261	1.73
$V_2S_2F_2I_1$	68.3	31.3	60.5	8789	4014	1.88
$V_2S_2F_2I_2$	67.8	30.9	58.9	8269	3419	1.74
SE	0.66	0.29	0.85	–	312.5	0.09
CD (5%)	1.92	0.84	2.47	–	637.5	0.19

Table 3. Rainfall data for the crop period.

Rainfall received/year	1987	1988	1989
1-50 days	57.2 (7)	184.0 (9)	73.2 (4)
50-90 days	59.0 (6)	190.7 (8)	49.8 (5)
90 days-harvest	393.2 (17)	29.2 (3)	30.2 (3)
Total	509.4 (30)	403.9 (20)	153.2 (12)

and timely and adequate irrigation which helped in better seed development. Abdul Samad (1957) reported that for rainfed groundnut in Tamil Nadu, the optimum spacing was 15 x 15 cm spacing. Suraj Bhan (1979) reported that the most sensitive period for irrigation in groundnut is from pegging to pod filling. Reddy, (1988) has stated nutrition management as one of the prime-factors influencing quality attributes of groundnut.

Economics

Local market rates for the pod and haulms prevailed during that particular season was considered for computing the returns in all the three years. The treatment $V_2S_2F_1I_1$ recorded the highest net returns of Rs.6507.ha^{-1} with a benefit-cost ratio of 2.43, which were significantly superior to all other treatments.

Thus the study has revealed that for Pollachi tract, the yield of rainfed groundnut could be substantially increased by growing JL 24 in 15 x 15 cm spacing, adopting a fertilizer schedule of 15N, 20P_2O_5, 45K_2O kg.ha^{-1} and providing a supplemental irrigation between 50 to 90 days of crop growth.

Acknowledgement

The authors are thankful to Dr.S.Chelliah, Director of Research, Tamil Nadu Agricultural University for the encouragement during the investigation.

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