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Effects of Dates of Sowing and Fertilizers on Yield, Quality and Economics of Gram (*Cicer arietinum* L.)

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A field experiment was carried out at College Farm of N. M. College of Agriculture, Gujarat Agricultural University, Navsari Campus, Navsari, during *rabi* season of 1981-82 in split-plot design with three dates of sowing (October, 22; November, 6 and November, 21) as main plots and six treatment combinations consisting of two levels of nitrogen (0 and 25 kg N/ha) and three levels of phosphorus (0.25 and 50 kg P_2O_5/ha) as sub-plot treatments. All the treatments were replicated four times. The Dahod yellow variety of gram was sown 30 cm apart with 75 kg seed rate/ha and was harvested on attainment of maturity. The soil was clayey in texture having pH 7.6, organic carbon 0.92%, total nitrogen 0.06%, available P_2O_5 24.78 kg/ha and K_2O 416.0 kg/ha.

Nitrogen content from the grain was estimated by adopting modified Kjeldahl's method. Subsequently the protein content of grain was computed for each treatment by multiplying its nitrogen percentage with the conversion factor 6.25. Protein yield per hectare was worked out by employing the following formulae:

$$\text{Protein yield (kg/ha)} = \frac{\text{Grain protein content (Per cent)} \times \text{Grain yield (kg/ha)}}{100}$$

The gross realization in terms of rupees per hectare was estimated on the basis of the yield of grain and chaff for each of the treatments with the prices of the produce prevailing in market. The net realization was worked out by deducting the total cost of cultivation from the gross realization per hectare for each treatment.

The data presented in Table-1 indicated that protein content, protein yield and grain yield per hectare were significantly influenced by the sowing time. The highest protein content (19.77%) was recorded when the crop was sown on 21st November and this resulted into significantly higher protein yield (271.47 kg/ha). The highest protein yield obtained with late sowing might be due to the higher protein content and higher grain yield obtained under late sowing.

Data further indicated that protein content, protein yield and grain yield showed significant increase with the nitrogen application. Higher protein content (19.69%) was recorded with 25 kg N/ha. Similar results were also obtained by Mishra, and Ram (1971) and Singh and Yadav (1971). Application of nitrogen also increased the protein yield by 20.71

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TABLE 1

Yield, quality and economics of gram as influenced by dates of sowing and fertilizer application.

Treatment	*Grain protein content (%)*	*Protein yield (kg/ha)*	*Grain yield (kg/ha)*	*Chaff yield (kg/ha)*	*Net realization (Rs/ha)*
Dates of sowing(D)					
D_1 22nd October	19.63	231.95	1182	2003	1430
D_2 6th November	18.77	217.48	1156	1853	1352
D_3 21st November	19.77	271.47	1372	2156	1922
S.Em. ±	0.13	6.00	31.94	65.28	—
C.D. (5%)	0.46	20.71	109.72	225.00	—
C.V. (%)	3.32	12.25	12.81	15.80	—
Nitrogen levels(N) (kg/ha)					
N_0 0	19.09	217.75	1138	1916	1380
N_1 25	19.69	262.85	1335	2092	1756
S.Em.±	0.14	4.28	23.61	48.61	—
C.D. (5%)	0.39	12.17	66.67	138.20	—
C.V. (%)	4.25	10.74	11.68	14.53	—
Phosphorus levels (p) (kg/ha)					
P_0 0	19.30	212.50	1105	1187	1406
P_1 25	19.33	251.45	1296	2049	1717
P_2 50	19.63	256.94	1308	2077	1581
S.Em. ±	0.17	5.25	29.17	59.72	—
C.D. (5%)	NS	14.92	82.92	NS	—
C.V. (%)	4.25	10.74	11.68	14.53	—
Interactions					
D×N	NS	Sig.	Sig.	NS	—
D×P	NS	Sig.	Sig.	NS	—
N×P	NS	NS	NS	Sig.	—
D×N×P	NS	NS	NS	Sig.	—

Sig.=Significant.

NS=Non-Significant.

per cent over that of no nitrogen. Though application of phosphorus did not show any response with respect to grain protein content, the application of 25 and 50 kg P_2O_5/ha increased the protein yield by 18.33 and 20.91 per cent over control.

From the economics point of view, the increased net returns of Rs. 1922, 1756 and 1717 per hectare were received from 21st November sowing, application of 25 kg N/ha and 25 kg P_2O_5 per-hectare, respectively (Table-1). However, maximum net realization of Rs. 2265 was obtained when the crop was sown on 21st November and was fertilized with 25 kg N and 25 kg P_2O_5 per hectare ($D_3N_1P_1$) (Table-2).

TABLE 2

Economics of gram as influenced by dates of sowing and fertilizers.

Sr. No.	Treatments	Yields kg/ha		Realization Rs./ha		Gross realization Rs/ha	Cost of production Rs./ha	Net realization Rs./ha
		Grain	Chaff	Grain	Chaff			
1	D_1 N_0 P_0	956	1697	2390	170	2560	1469	1091
2	D_1 N_0 P_1	1243	2135	3108	214	3322	1667	1655
3	D_1 N_0 P_2	1257	2013	3143	201	3344	1835	1509
4	D_1 N_1 P_0	1040	2026	2600	203	2803	1623	1180
5	D_1 N_1 P_1	1321	2106	3303	211	3514	1791	1723
6	D_1 N_1 P_2	1271	2040	3178	204	3382	1959	1423
7	D_2 N_0 P_0	1001	1648	2503	165	2668	1469	1199
8	D_2 N_0 P_1	961	1561	2403	156	2559	1667	892
9	D_2 N_0 P_2	1068	1778	2670	178	2848	1835	1013
10	D_2 N_1 P_0	1268	2046	3170	205	3375	1623	1752
11	D_2 N_1 P_1	1322	1985	3305	199	3504	1791	1713
12	D_2 N_1 P_2	1317	2106	3293	211	3504	1959	1545
13	D_3 N_0 P_0	985	1607	2463	161	2624	1469	1155
14	D_3 N_0 P_1	1393	2390	3483	239	3722	1667	2055
15	D_3 N_0 P_2	1376	2419	3440	242	3682	1835	1847
16	D_3 N_1 P_0	1381	2299	3453	230	3683	1623	2060
17	D_3 N_1 P_1	1538	2114	3845	211	4056	1791	2265
18	D_3 N_1 P_2	1558	2106	3895	211	4106	1959	2147

Notes: 1. Market price: Grain Rs. 250/Quintal.
Chaff Rs. 10/ Quintal.

2. Cost of Fertilizer nutrients.
Nitrogen (Urea)—Rs. 4.96/kg N
Phosphorus (SSP)—Rs. 4.71/kg P_2O_5

For getting higher production of grain and protein, sowing of gram variety Dahod yellow on 21st November with application of 25 kg N + 25 kg P_2O_5/ha was found profitable for South Gujarat region.

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