

and 10 tons/ha T_8 and T_9) and water hyacinth at 5 and 10 tons/ha (T_{10} and T_{11}) have recorded 280, 267, 280, 270 and 280 kg/ha of available N respectively as compared to 200 kg/ha in the NPK control. These treatments were on par with each other and significantly superior to all other treatments. Similar trend was observed in 1982-83 also. Indira Raja and Raj (1981) have reported increase in available N status due to pressmud application. The available P status was also significantly increased by the application of the various farm waste materials, particularly due to groundnut shell, rice husk and water hyacinth. In respect of available K, application of groundnut shell at 5 tons/ha (T_5) and rice husk at 10 tons/ha (T_{10}) have considerably increased the available K status and were found to be significantly superior to all other treatments.

Thus there seems to be an overall improvement in the physical and chemical properties of the soil which have been responsible for the higher yields in the treatments.

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STUDIES ON GROWTH AND YIELD OF CHICK PEA CULTIVARS AS AFFECTED BY SOWING DATES

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Field experiments were conducted at Jobner (Asalpur Farm) during winter season of 1980-81 and 1981-82. The treatments comprised of three sowing dates (October 22, November 6 and 21) and four varieties (RS-10, RS-11, RSG-2 and C-235 in first year and five varieties (RS-10, RS-11, RSG-2 Pant G-114 and Local) in second year. Planting of chick pea on 22nd October was significantly superior to other dates. Varieties RS-11, G-114 and RSG-2 being at par were found better than others.

To obtain remunerative yield from different crops they should be provided

with optimum environment during their various stages of growth and

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development. This necessitates the adjustment of sowing time of different varieties of the same crop. The present study was therefore undertaken to decide the optimum time of sowing for chick pea cultivars.

A field experiment was conducted Jobner (Asalpur Farm) during *rabi* 1980-81 and 1981-82. The soil of experimental plot was loamy sand with 7.9 p H. The total N, available P and organic carbon of the soil were 0.014%, 12 kg/ha and 0.13% respectively. Treatments consisting of 3 sowing dates (October 22, November 6 & 21) and four varieties (RS-10, RS-11, RSG-2, and C-235 in 1980-1981 and five varieties (RS-10, RS-11, RSG-2, Pant G-114 and Local) in 1981-82, were tested in 4 replicated Randomized Block Design. 20 Kg N and 40 Kg P₂O₅/ha was applied as urea and single superphosphate to all the plots at the time of sowing. Chick pea varieties were sown at 60 kg/ha manually in rows 30 cm apart at a depth of 5 cm. Hoeing, weeding and thinning was done after 30 days of sowing as to maintain uniform plant population. Three irrigations to each sowing date were given at pre-flowering stage (45 days stage), flowering stage (75 days stage) and 100 days after sowing. The yield attributing characters and yields were recorded at harvest.

RESULTS AND DISCUSSION.

Effect of sowing dates :

The maximum plant height, dry matter production, number of branches number of pods per plant and test weight was recorded in the first date with a significant reduction thereafter. Similarly the yields and harvest index

were also maximised when the crop was sown on 22nd October. A significant reduction was observed in yield with each successive delay in sowing due to unfavourable conditions of temperature and humidity particularly during grain filling and development of grains. These results are in close conformity with the findings of Verma and Singh (1974) who reported that both 15th and 30th October sowings being statistically at par produced significantly higher yields of chick pea. Choudhary *et al.*, (1971) also obtained higher yields of chick pea sown on 2nd October than 17th November.

Effect of varieties :

Significant effect of varieties on yield attributes i. e. dry matter production, number of pods per plant and test weight in both the years revealed that variety RS-11 superseded rest of the varieties in both the years excepting in 1981-82 when it was at par with G-114 as far as number of branches and pods were concerned. The plant height and number of branches per plant were influenced significantly only in the year 1981-82. The varieties RS-11 and G-114 being at par, produced significantly more plant height and number of branches per plant as compared to RS-10, RSG-2 and Gram local (Table-1).

The varieties have marked influence on grain yield, straw yield and harvest index in both the years (Table 2). Varieties RS-11 and RSG-2 (1980-81) and RS-11 and G-114 (1981-82) being at par, superseded significantly to all other varieties with respect to grain and straw yields. Whereas variety C-235 produced significantly

Table-1 : Effect of sowing dates and varieties on growth and yield attributes of gram

Treatments	Height (CM)		DM (g/plant)		No. of branches/ plant		No. of pods/ plant		Test Weight	
	80-81	81-82	80-81	81-82	80-81	81-82	80-81	81-82	80-81	81-82
<i>Sowing dates</i>										
22 October	43.1	46.30	14.4	30.70	6.00	6.70	40.6	65.6	132.2	143.8
6 November	37.1	45.90	12.1	26.00	5.1	5.30	25.7	49.9	130.4	132.2
21 November	34.4	43.90	9.5	23.30	4.3	4.30	25.2	39.0	128.2	132.9
S.E.m ±	0.65	0.10	0.08	00.52	0.26	0.08	0.94	1.92	1.9	0.43
C.D. at 5%	1.87	00.40	0.24	1.69	0.74	0.23	2.70	5.49	5.6	1.24
<i>Varieties</i>										
RS-10	36.9	43.90	11.5	26.10	5.2	5.10	27.7	46.7	130.0	136.1
RS-11	39.3	47.30	12.8	31.10	5.4	5.9	39.3	59.9	130.7	143.2
RSG-2	38.8	46.10	12.7	25.80	5.2	5.2	37.4	48.3	130.7	139.0
C-235	37.7	—	10.9	—	4.8	—	30.8	—	129.7	—
G-114	—	46.80	—	28.10	—	5.6	—	57.4	—	140.6
Local	—	41.10	—	23.00	—	4.7	—	45.1	—	134.2
S.E.m ±	0.75	0.17	0.09	0.67	0.30	0.10	1.08	2.49	0.23	0.56
C.D. at 5%	NS	0.48	0.28	1.92	NS	0.30	3.11	7.09	0.65	1.61

Table-2: Effect of sowing dates and varieties on grain yield, straw yield (q/ha) and harvest index of gram.

Treatments	Grain yield		Straw yield		Harvest index	
	80-81	81-82	80-81	81-82	80-81	81-82
<i>Sowing dates</i>						
22 October	10.6	16.0	17.6	23.4	39.1	41.0
6 November	9.1	12.0	15.7	19.6	37.0	39.1
21 November	4.2	10.2	11.9	17.3	26.0	37.3
S.E.m ±	0.22	0.45	0.96	0.7	1.0	0.45
C. D. at 5%	0.63	1.28	2.78	2.1	3.0	1.29
<i>Varieties:</i>						
RS-10	7.2	11.40	15.7	17.9	31	39.3
RS-11	8.8	15.2	16.9	23.4	33	39.5
RSG-2	8.6	13.1	15.7	20.1	35	39.6
C-235	7.3	—	12.0	—	37	—
G-114	—	14.6	—	21.9	—	40.1
Local	—	10.4	—	17.1	—	37.3
S.E.m ±	0.25	0.58	1.11	0.94	1.0	0.58
C. D. at 5%	0.73	1.66	3.21	2.69	3.0	1.66

Table-3 : Combined effect of sowing dates and varieties on grain yield of gram (q/ha)—(1980-82).

Gram Varieties	Sowing dates		
	22 October	6 November	21 November
RS-10	10.0	7.6	4.1
RS-11	12.5	10.4	3.5
RSG-2	10.9	9.7	5.1
C-235	9.2	8.5	4.1
S. Em±		0.44	
C. D. at 5%		1.27	

more harvest index than RS-10 and RS-11 in 1980-81 but RS-10, RS-11, RSG-2 and G-114 were at par with regards to harvest index and significantly better than local variety in 1981-82. The probable reason for getting more yield under RS-11 may be due to cumulative effect of growth and yield attributes and its genetic constituents, suitable for the climatic conditions of this locality.

The results are in accordance with the findings of an experiment conducted at Navagaon (Rajasthan) revealing that genotype RS-11, GNG-16 and RSG-2 produced significantly higher yields over the yield under rest of the genotypes (Anon, 1979).

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