

Response of chickpea (*Cicer arietinum*) to planting date and irrigation schedule

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With the available facility of Tawa canal irrigation, existing productivity of the chickpea (*Cicer arietinum* L.) can be doubled by timely sowing and irrigating the most promising varieties. The variety 'Radhey' gram performs better than traditional ones, and yield loss up to 30-40 kg/ha/day can be saved by planting the crop in time (Masood Ali and Kushwaha, 1985). Hence an experiment was conducted to study the response of gram to plant date and irrigation schedule.

The experiment was conducted during the winter seasons of 1985-86 and 1986-87 at Powarkheda. The field soil was deep-black Vertisol, having pH 7.6, organic carbon 0.66%, available N, P₂O₅ and K₂O, 99.0, 30.9 and 326.0 kg/ha respectively, with field capacity 34% and wilting point 16%. The treatments comprised 5 dates of sowing (5 and 26 October, 16 November, 7 and 28 December) and 4 levels of irrigations [0, 1, 2 and 3 at 0, 0.4, 0.6 and 0.8 depth of irrigation water : cumulative pan evaporation (IW : CPE) ratio, respectively] as the main-plot treatment, and 2 varieties ('Ujjain 21' and 'Radhey') as the subplot treatments. These were laid out in split-plot design with 3 replications. The crop was sown on different dates as per treatment by

drilling the seed in rows 30 cm apart. A basal dose of 20 kg N, 80 kg P and 20 kg K/ha was applied along with the seed. One initial (come-up) irrigation was given uniformly to all the treatments to facilitate complete germination and crop stand. The rainfall received during the cropping seasons of 1985-86 and 1986-87 was 25.44 cm and 11.40 cm respectively. The net return from each treatment was worked out by subtracting the cost of cultivation and expenditure made as per treatment from the gross profit of that treatment.

Planting of gram on 26 October and 16 November proved the best period for obtaining maximum number of branches/plants and yield attributes like number of pods/plant, double-seeded pods/plant, grains/plant and 100-seed weight (Table 1). The seed yield was also higher when gram was planted on 26 October and 16 November compared earlier planting (5 October) or late planting (7 and 28 December). Planting on 28 December decreased the seed yield by 8.3 q/ha (43%) compared with 16 November planting, the monetary loss being up to Rs 3,238/ha. Jummegae and Dadheech (1985) also reported reduction in yield due to delayed sowing.

Irrigating chickpea at 0.6 and 0.8 IW :

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Table 1. Yield attributes and yield of chickpea as affected by sowing date, irrigation schedule and variety

Treatment	Branches/ plant		Pods/ plant		Double-seeded pods(%)		Grains/ plant		100-seed weight(g)		Grain yield (q/ha)		Net return (Rs/ha)	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
<i>Sowing date</i>														
T ₁	12.2	20.5	31.7	39.8	38.6	36.4	30.7	51.0	21.11	19.63	14.86	15.36	2,931	4,395
T ₂	20.3	22.2	33.6	42.2	41.4	39.1	32.3	58.6	20.89	20.13	16.33	21.63	3,516	7,073
T ₃	22.0	23.8	40.5	45.8	46.1	43.1	33.3	59.1	21.27	19.90	16.79	21.72	3,670	6,728
T ₄	14.1	16.1	27.4	31.9	35.3	30.9	23.9	36.9	21.04	19.75	13.71	15.11	2,451	4,225
T ₅	11.8	13.2	20.5	29.1	13.5	13.0	15.1	29.9	19.99	19.15	9.10	12.80	860	3,062
CD (P=0.05)	2.5	2.8	10.0	13.1	5.6	4.2	6.5	2.7	0.41	1.19	1.34	1.30		
<i>Irrigation schedule</i>														
T ₆	11.5	12.5	18.5	15.2	24.4	19.7	14.7	17.4	19.30	19.24	9.98	12.53	1,501	3,335
T ₇	13.9	14.5	27.2	33.7	34.9	31.0	25.7	43.3	20.80	19.64	13.63	17.46	2,428	5,105
T ₈	16.3	19.4	37.5	48.2	41.9	38.1	31.6	55.5	20.89	20.32	15.72	19.29	3,121	5,964
T ₉	16.1	18.2	39.6	45.7	38.5	35.5	36.7	64.7	21.73	20.46	17.32	20.01	3,691	5,338
CD (P=0.05)	2.5	2.5	9.0	11.7	2.2	3.8	5.8	2.5	0.36	1.06	1.29	1.19		
<i>Variety</i>														
T ₁₀	14.6	18.0	26.8	34.9	31.1	28.0	24.0	51.3	18.10	17.28	14.96	16.67	2,371	4,738
T ₁₁	18.0	20.4	34.5	36.6	37.4	34.4	29.2	53.9	23.85	22.55	16.50	17.96	3,001	5,455
CD (P=0.05)	3.5	2.0	3.9	NS	NS	2.3	4.2	2.1	0.26	0.68	0.91	0.81		

T₁, 5 Oct; T₂, 26 Oct; T₃, 16 Nov; T₄, 7 Dec; T₅, 28 Dec; T₆, IW : CPE 0; T₇, IW : CPE 0.4; T₈, IW : CPE 0.6; T₉, IW : CPE 0.8; T₁₀, 'Ujjain 21'; T₁₁, 'Radhey'
A, 1985-86; B, 1986-87

Table 2. Interaction effect between sowing dates × irrigation levels on grain yield of chickpea (average of 2 seasons)

Sowing date	Irrigation level (IW : CPE ratio)			
	0.0	0.4	0.6	0.8
5 Oct	9.51	15.31	17.56	18.01
26 Oct	11.99	20.06	21.77	22.18
16 Nov	12.63	19.76	21.51	23.09
7 Dec	11.50	12.99	14.48	16.90
28 Dec	10.12	10.35	11.28	12.42
CD (P=0.05)				
Dates × irrigation			2.80	
Dates × variety			NS	
Irrigation × variety			NS	

CPE ratio, i.e. 2 and 3 irrigations, respectively, proved more advantageous in respect of higher number of branches, grain yield and yield attributes. At these irrigation levels, the grain production was significantly higher (17.50–18.66 q/ha) over irrigation at 0.4 IW : CPE ratio (1 irrigation). The net returns were Rs 4,542–5,014/ha. These findings are in agreement with those of Patel *et al.* (1989) and Bihari *et al.* (1992).

The 'Radhey' chickpea proved superior to 'Ujjain 21,' as it gave significantly higher number of branches, pods and double-seeded pods/plant, grains/plant and 100-seed weight and consequently the grain yield. The grain

yield of 'Radhey' was significantly higher than that of 'Ujjain 21'. The net returns from 'Radhey' were Rs 4,228/ha compared with 'Ujjain 21' which gave up to Rs 3,554/ha. The results confirm the findings of Masood Ali and Kushwaha (1985) and Verma and Yadav (1988).

The interaction was significant only between sowing dates and irrigation levels. The highest grain yield was recorded under 16 November sowing date with 3 irrigations applied at an 0.8 IW : CPE ratio (Table 2). It was concluded that the highest seed yield of gram can be achieved by planting 'Radhey' variety under these inputs.

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