Effect of dates of sowing on growth and yield of Chickpea varieties

ABSTRACT

The field experiment was titled “Effect of dates of sowing on growth and yield of Chickpea varieties” was conducted during *rabi* 2022-23, at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (UP). The soil of the experimental plot was sandy loam in texture. The experiment consists of three varieties (Himmat, Shulabh-45 and Chirag) and three different dates of sowing November 5th, November 15th and November 25th including control i.e., blanket application of 20-60-20 kg/ha of NPK (farmer's practice) which were replicated thrice. The experiment was laid out in Randomized Block Design with ten treatments *viz.,* T1: Himmat + November 5, T2: Himmat + November 15, T3: Himmat + November 25, T4: Shulabh-45 + November 5, T5: Shulabh-45 + November 15, T6: Shulabh-45 + November 25, T7: Chirag + November 5, T8: Chirag + November 15, T9: Chirag + November 25, and control plot. The results of the experiment concluded that the variety Shulabh-45 with the date of sowing on November 25th significantly increased the growth parameters *viz.,* plant height (45.54 cm), Number of nodules per plant (31.87), Plant dry weight (20.45 g/plant), and yield parameters *viz.,* pods per plant (35.53), seeds per pod (1.35), seed yield (3.37 t/ha) and stover yield (4.90 t/ha). This treatment also showed its positive effect on economics *viz.,* gross returns (1,71,870 INR/ha), net returns (1,19,475 INR/ha), B:C (2.28).

Keywords: Chickpea, Growth parameters, Dates of sowing, Yield parameters and Economics.

INTRODUCTION

Chickpea This legume, also known as Bengal gram or Gram, has a significant economic impact on India. It belongs to the family Leguminoseae and can help people improve the nutritional value of their diet (Mahaveer et al. 2020). According to Rasool et al. (2015), India accounts for 65% of the annual production of chickpeas in the world. Desi and Kabuli are the two main varieties of chickpea. When compared to Kabuli, which has lighter-colored, larger seeds with smoother coats and is primarily grown in temperate regions, Desi has small, darker seeds and a rough coat. According to reports from the Directorate of Pulse Development, (DPD, 2021-22) the area under chickpea in Uttar Pradesh was 5.73 lakh hectares, with production of 7.09 lakh tonnes and productivity of 1236 kg/ha. Due to its biological ability to fix nitrogen, chickpea increases soil fertility. Through symbiotic nitrogen fixation, it is predicted to fix up to 140 N kg/ha from the air, which satisfies about 80% of the soil's N requirement (Wafula *et al.* 2022). Chickpea is the most important *rabi* season pulse crop cultivated in India, with over 30% of total area and 38% of total production under pulses. A gram of chickpea contains an adequate amount of vitamins, including vitamin A (161 U), thiamine (0.23 mg), and vitamin C (2.5 mg), and when combined with cereals, they create a balanced diet (Husnain *et al.* 2015). On the Indian subcontinent, chickpeas are split into "dhal" (cotyledons) and ground into flour (besan), which are then used to make a variety of snacks (Jukanti *et al.* 2012).

Its other names include kala chana meaning black chickpea in Hindi which means country or native in Hindi. Desi chana can be spotted, green, or black. The few desi chickpea varieties are Himmat, Shulabh-45, and Chirag. Himmat is one of the varieties of chickpea that has semi-spreading and high branching, has seeds that weigh 20–22 grams and matures in 100–

105 days. It is suitable for rain-fed and irrigated areas and is tolerant of wilt and pod borer disease. Shulabh-45, which contains 9% of the maximum moisture content, has an 85% germination percentage. These seeds should be kept at a temperature and relative humidity below 18°C and 50%, respectively. Chirag has very good grain quality with medium bold, yellow-brown grain and is a semi-erect, umbrella-shaped plant type (26 g test wt). Higher% (72-80%) of dal recovery is also present. The flavor of green seeds is sweet. It can be used for either besan (flour) or dal. The crop lasts for 100–110 days. Fusarium Wilt is not able to infect it. Typically, seeds are sown between the third and first weeks of October.

Higher yields are produced by using suitable varieties and sowing at the right time. These elements aid in making use of resources like nutrient- and moisture-rich soil left overs. As well height of the plants and the accumulation of dry matter in the chickpea crop are influenced by the sowing of these varieties at various times. Different sowing dates have a significant impact on yield-attributing traits like the number of pods per plant and the number of seeds per plant. Keeping all the above facts into consideration the present study entitled "Effect of dates of sowing on growth and yield of Chickpea varieties" was undertaken with objectives such as to find out the influence of dates of sowing of Chickpea varieties on growth and yield attributes of Chickpea and to study the economics of different treatment combinations.

MATERIALS AND METHODS

The experiment was carried out during *rabi* season of 2022-23 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj. The soil was sandy loam in texture, medium in available nitrogen (283.93 kg/ha), available phosphorous (18.3 kg/ha) available potassium (223.5 kg/ha). The experiment was laid out in Randomized Block Design along with 10 treatment combinations and replicated thrice. Treatments were randomly

arranged in each replication, divided into 30 plots. The treatments involve 3 varieties of Chickpea (Himmat,Shulabh-45 and Chirag) and 3 dates of sowing (November 5th, November 15th and November 25th). The treatment combinations are as follows, T_1 – Himmat on November 5th, T_2 – Himmat on November 15th, T_3 – Himmat on November 25th, T_4 – Shulabh-45 on November 5th, T_5 – Shulabh-45 on November 15th, T_6 – Shulabh-45 on November 25th, T_7 – Chirag on November 5th, T_8 – Chirag on November 15th, T_9 – Chirag on November 5th and T_{10} – control 20-60-20 NPK/ha. The experimental field was ploughed thoroughly to obtain fine seed bed. The fertilizers were applied as per treatment combination as basal dose. The Chickpea seeds were sown at spacing of 30 cm x 10 cm with the seed rate of 80 – 115 kg/ha, gap filling and thinning was carried out respectively in order to maintain optimum plant population. All agronomic practices were followed at all growth stages and the data was statistically analyzed using ANOVA technique (Gomez and Gomez 1984).

RESULTS AND DISCUSSIONS

Growth attributes

The observations related to growth parameters were Presented in Table 1. Results revealed that significantly higher plant height (45.54 cm), number of nodules per plant (30.87) and dry weight (20.45 g/plant) were recorded with sowing of Shulabh-45 on November 25th. Different varieties effects on plant height were observed at all growth stages. The statistical maximum was found for the mean value of sowing dates to plant height. The enhanced vegetative development of the crop caused by the favorable weather conditions may be the cause of the increased plant height in early sowing. The results are similar with (Thombre *et al.*, 2019). The best conditions for plant growth are provided by later sowing, which is essential for

achieving higher growth. The similar results were reported by (Sikdar *et al.,* 2015). Similarly maximum number of nodules per plant is due to, Sowing different varieties of chickpea on different sowing dates had an impact on the crop. The sowing dates have a significant impact on the number of nodules. Late sowing decreased the number of root nodules in the chickpea crop, which interfered with the idea that nodulation is decreasing as the temperature drops. The results are similar with (Sah *et al.,* 2019). The amount of dry matter accumulated increased on the first sowing date, November 5th, compared to the second, and continued until the crop was fully mature. On the third sowing date, November 25, however, the amount of dry matter accumulated is lower. The results are in conformity with (Nishad *et al.,* 2018). This might be caused by variations in the general development and growth of each individual variety, which point to increased photosynthesis activity. The results are similar with (Choudhary *et al*., 2020).

Yield attributes and yield

The observation related to yield attributes were presented in Table 2. The results revealed that significantly higher pods per plant (35.53), seeds per pod (1.35), seed yield (3.37 t/ha) were recorded with sowing of Shulabh-45 on November 25th. The increase in the number of pods per plant and seeds per pod may be caused by the soil having enough nutrients during pod formation and pod filling to produce productive pods and seeds in plants. Significantly and statistically, seed yield (t/ha) rises. The varieties used and the different sowing times have a significant impact on the seed yield (t/ha) which is observed to vary significantly. The similar results were reported by (Thombre *et al*., 2019). However, as a result of the delayed sowing date, the seed yield was

decreased. The study also showed that to obtain a satisfactory yield, the sowing date could be postponed up until early December. The results are in conformity with (Kabir *et al.*, 2009).

Economics

The observation related to economics were presented in Table 3. The maximum gross return (1,71,870 ₹ /ha), net return (1,19,475 ₹ /ha) and benefit cost ratio (2.28) were recorded with sowing of Shulabh-45 on November 25th. while the lowest gross return (1,22,060 ₹ /ha), net return (78,365 ₹ /ha) and benefit cost ratio (1.49) were recorded with sowing of Shulabh-45 on November 25th.

CONCLUSION

It is concluded from the above discussion that Chickpea variety Shulabh-45 with date of sowing on November 25th was found to be more desirable in terms of growth and yield attributing parameters viz., seed yield and stover yield. It also fetched the maximum gross return, net return, and benefit-cost ratio as compared to other treatments.

ACKNOWLEDGEMENT

I express my gratitude to my advisor for constant support, guidance and for her valuable suggestions for improving the quality of this research work and also to all the faculty members of Department of Agronomy, SHUATS, Prayagraj, Uttar Pradesh (U.P). for providing all necessary facilities, for their cooperation, encouragement and support.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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Table 1. Effect of dates of sowing and varieties on growth of Chickpea

Sl. No.	Treatments	Plant height (cm)	Number of nodules/plant	Plant dry weight (g/plant)
1.	Himmat + November 5	44.22	30.73	19.94
2.	Himmat + November 15	42.91	28.40	18.88
3.	Himmat + November 25	43.25	30.13	15.38
4.	Shulabh-45 + November 5	43.06	26.07	13.90
5.	Shulabh-45 + November 15	42.91	28.33	19.38
6.	Shulabh-45 + November 25	45.54	31.87	20.45
7.	Chirag + November 5	42.51	28.93	12.44
8.	Chirag + November 15	42.93	27.67	12.96
9.	Chirag + November 25	42.25	26.73	18.14
10.	20-60-20 kg NPK/ha (control)	42.74	25.80	14.36
	SEm(±)	0.35	0.25	0.75
	CD (P=0.05)	1.04	0.73	2.24

Table 2. Effect of dates of sowing and varieties on yield attributes and yield of Chickpea

Sl.No.	Treatments	Pods/plant	Seeds/pod	Seed yield (t/ha)
1.	Himmat + November 5	34.73	1.31	3.07
2.	Himmat + November 15	33.33	1.19	2.50
3.	Himmat + November 25	33.53	1.23	2.68
4.	Shulabh-45 + November 5	33.80	1.23	2.68
5.	Shulabh-45 + November 15	33.33	1.23	2.75
6.	Shulabh-45 + November 25	35.53	1.35	3.37
7.	Chirag + November 5	33.20	1.21	2.56
8.	Chirag + November 15	33.53	1.24	2.65
9.	Chirag + November 25	34.00	1.19	2.54
10.	20-60-20 kg NPK/ha (control)	32.07	1.21	2.39
	SEm(±)	0.57	0.03	0.18
	CD (P=0.05)	1.69	0.09	0.52

Table 3. Effect of dates of sowing and varieties on economics of Chickpea

Sl. No.	Treatments	Gross returns (INR/ha)	Net returns (INR/ha)	B:C
1.	Himmat + November 5	1,56,740.00	1,05,545.00	2.06
2.	Himmat + November 15	1,27,330.00	76,135.00	1.49
3.	Himmat + November 25	1,36,850.00	85,655.00	1.67
4.	Shulabh-45 + November 5	1,36,680.00	84,285.00	1.61
5.	Shulabh-45 + November 15	1,40,250.00	87,855.00	1.68
6.	Shulabh-45 + November 25	1,71,870.00	1,19,475.00	2.28
7.	Chirag + November 5	1,30,560.00	79,865.00	1.58
8.	Chirag + November 15	1,35,320.00	84,625.00	1.67
9.	Chirag + November 25	1,29,540.00	78,845.00	1.56
10.	20-60-20 kg NPK/ha (control)	1,22,060.00	78,365.00	1.79

* Data was not subjected to statistical analysis.