



# Effects of Spacing and Nipping on Yield Attributes and Yield of Chickpea

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The experiment was laid out during years 2018-19 to 2020-21 at Krishi Vigyan Kendra, Anand Agricultural University, Muvaliya Farm, Dahod, Gujarat. A field experiment was conducted in RBD (Factorial concept) design with four replications. The treatments comprised of three treatments of nipping viz., no nipping ( $N_1$ ), nipping at 25 DAS ( $N_2$ ) and nipping at 35 DAS ( $N_3$ ) and plant to plant spacing viz., 10 cm ( $S_1$ ) and 20 cm ( $S_2$ ) in sub plot. The tested variety was Gujarat Junagadh Gram 3. The results of the experiment indicated that significantly maximum number of pods per plant (51.04), number of grains per pod (1.75), 100-grain weight (23.12 g), seed yield (1300 kg/ha) as well as straw yield (2194 kg/ha) were recorded in nipping performed at 35 DAS ( $N_3$ ) over the control treatment. Where is incase of plant spacing showed that significantly maximum number of pods per plant (48.51), number of grains per pod (1.70), 100-grain weight (22.98 g), grain yield (1258 kg/ha) as well as straw yield (2194 kg/ha) were observed with plant to plant spacing of 20 cm ( $S_2$ ) over the control treatment. The data were depicted on the pooled basis of three years.

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## 1. INTRODUCTION

“Chickpea is the important pulse crop cultivated during post rainy season under rainfed condition. In India chickpea is cultivated on an area of 8.31 million/ha with a production of 7.00 million tons of grain with productivity of 843 kg/ha” [1]. “In Gujarat, chickpea occupies an area of 2.15 lakh hectares with a production of 2.10 lakh tonnes with an average yield of 977 kg/ha which accounts 2.46 % of area and 2.80 % of production of country, respectively” [2]. The major chickpea growing areas in Gujarat are Dahod, Panchmahal, Ghed area of Junagadh and Bhal area of Ahmedabad, Surendranagar and Bhavnagar districts. Chickpeas are a popular and profitable winter pulse crop to the middle Gujarat region. They are adapted to the heavier alkaline soil types of the region and are able to tolerate relatively high temperatures during the flower to grain filling period. They contribute to the profitability of Gujarat farming systems through the ability to fix nitrogen and provide weed and disease breaks for winter season crops. Chickpea is an economical source of quality protein food. It is used in a wide variety of dishes and snacks around the world. It is mainly roasted, boiled or fried and is used as the central ingredient in main dishes. The seeds can be eaten whole split and decorticated (dal), the shoots and green leaves are even cooked and eaten as green vegetables.

“The low productivity of chickpea crop may be ascribed besides other factors its growing either in high rainfall areas or on very unproductive or marginal lands. Nevertheless, it is imperative to increase productivity in different Agro-ecological zones by manipulating various agronomic practices. Nipping in chickpea is one of the important parameters for the enhancement of yield and yield attributing parameters” [3] revealed that “foliage nipping at early stages of crop could increase number of branches while restricting profuse vegetative growth thereby promoting crop yield”. “Nipping at various levels would enhance yield and yield attributing parameters” [4]. “Nipping practice in the research area has two-fold advantage. On the one hand nipping at prescribed growth stages could improve yield of the crop while on the other hand during time the chickpea in the field is usually a shortage of fodder and poor farmers could not afford to buy forage at distant locations, so chickpea may provide them an opportunity to

fetch green fodder for their livestock” [4,5] reported that “chickpea nipping after 45 days after sowing increased yield as well as controlled disease severity”. Aslam et al. [6] witnessed “an increased in height and number of pods bearing branches with respect to topping of chickpea at various levels under water deficit systems”.

## 2. MATERIALS AND METHODS

A field experiment was conducted during *rabi* season of years 2018-19 to 2020-21 at Krishi Vigyan Kendra, Anand Agricultural University, Dahod, Gujarat. The experiment consisted of six treatment combinations, comprised of three nipping treatments *viz.*, no nipping ( $N_1$ ), nipping at 25 DAS ( $N_2$ ) and nipping at 35 DAS ( $N_3$ ) and plant to plant spacing *viz.*, 10 cm ( $S_1$ ) and 20 cm ( $S_2$ ) in sub plot. The experiment was laid out in Randomized Block Design (Factorial Concept) design with four replications. Nitrogen (20 kg/ha) Phosphorus (40 kg/ha) was applied as basal in full dose at the time of sowing. During the crop season, light irrigations were given and intercultural operation was done to remove the weeds and maintained the moisture level. The crop matured in 120 to 125 days and was harvested in the second fortnight of February. After harvesting, the data on yield attributes and yield parameters *viz.*, number of pods per plant, number of grains per pod, 100-grain weight (g), seed yield (kg/ha) and straw yield (kg/ha) were statistically analysed and critical differences were calculated.

## 3. RESULTS AND DISCUSSION

### 3.1 Effect of Spacing and Nipping on Yield attributes of Chickpea

#### 3.1.1 Effect of nipping

Data depicted in Table 1 revealed that significantly maximum number of pods per plant (51.04), number of grains per pod (1.75) and 100-grain weight (23.13 g) were recorded under nipping performed at 35 DAS and which was at par with nipping performed at 25 DAS, respectively. However, the lowest number of pods per plant (42.77), number of grains per pod (1.48) and 100-grain weight (21.76 g) were recorded under no nipping during the experimental years. “Similarly, chickpea nipping has been reported to an innovative and profitable

venture in D. I. Khan by using crop for grazing goats and sheep at seedling stage resulting profuse growth of the plants” (Khattak et al.,[7]. “Nipping of chickpea especially during last week of December to the end of January not only instrumental in providing extra feeding material for cattle but also have significant effect on number of productive branches per plant, number of pods per plant, 100 seeds weight and yield (kg ha<sup>-1</sup>) of this crop” (Khan et al.,[8]. These finding in accordance with Aziz, M. A. (2000) and Sujata *et.al.*,[9] in chickpea.

### 3.1.2 Effect of spacing

Regarding the effect of spacing, closer spacing of chickpea exhibited lesser number of pods per plant, number of grains per pod and 100-grain weight as compared to wider row spacing of 20 cm during experimental years (Table 1). Significant maximum number of pods per plant (48.51), number of grains per pod (1.70) and 100-grain weight (22.98 g) were observed under chickpea grown wider space as 20 cm, respectively. However, lowest number of pods per plant (45.80), number of grains per pod (1.56) and 100-grain weight (22.03 g) were noted under chickpea grown at closer spacing as 10 cm, respectively. This is because of efficient utilization of nutrient, water and solar radiation at wider row spacing as compared to narrow row spacing. Increase in yield attributing characters with increase in row spacing has also been

reported by Saini and Faroda [10], Thakur et al.[11,12].

### 3.1.3 Interaction effect

The interaction effect among nipping and spacing on number of pods per plant, number of grains per pod and 100-grain weight was found to non-significant during all experimental years.

## 3.2 Effect of Spacing and Nipping on Yield of Chickpea

### 3.2.1 Effect of nipping

In the present study, plant nipping of chickpea exhibited maximum grain yield and straw yield as compared to no nipping during the experimental years. Significantly higher grain yield (1300 kg/ha) and straw yield (2194 kg/ha) were observed under nipping performed at 35 DAS. However, it was at par with nipping performed at 25 DAS. The lowest grain yield (1065 kg/ha) and straw yield (1940 kg/ha) were recorded under no nipping (Table 2). The highest seed yield was found from nipping after 50 days of emergence at 5 cm from growing tip and the lowest seed yield was found when chickpea crops were no nipping in 30 days after emergence. This may be happened due to light nipping at certain period of time can enhance number of pods per plant, days to flower as well as days to mature, those lead to increase in seed yield. Aslam et al. (2010) reported that “removal of 2 cm from growing tip

**Table 1. Effect of spacing and nipping on yield attributes of chickpea (Pooled basis of three years)**

Treatments	Number of pods per plant	Number of grains per pod	100-grain weight (g)
<b>Nipping</b>			
N <sub>0</sub> : No nipping	42.77	1.48	21.76
N <sub>1</sub> : Nipping at 25 DAS	47.66	1.67	22.62
N <sub>2</sub> : Nipping at 35 DAS	51.04	1.75	23.13
SEm±	0.66	0.03	0.25
CD (P=0.05)	1.89	0.10	0.72
<b>Spacing</b>			
S <sub>1</sub> : 45 x 10 cm	45.80	1.56	22.03
S <sub>2</sub> : 45 x 20 cm	48.51	1.70	22.98
SEm±	0.54	0.03	0.20
CD (P=0.05)	1.54	0.08	0.58
<b>N X S</b>			
SEm±	0.94	0.05	0.35
CD (P=0.05)	NS	NS	NS
CV %	6.91	11.06	5.50

DAS-Days after Sowing

**Table 2 . Effect of spacing and nipping on seed and straw yield of chickpea (Pooled basis of three years)**

Treatments	Seed yield (kg/ha)	Straw yield (kg/ha)
<b>Nipping</b>		
N <sub>0</sub> : No nipping	1065	1940
N <sub>1</sub> : Nipping at 25 DAS	1242	2123
N <sub>2</sub> : Nipping at 35 DAS	1300	2194
SEm±	26	38
CD (P=0.05)	74	109
<b>Spacing</b>		
S <sub>1</sub> : 45 x 10 cm	1147	2002
S <sub>2</sub> : 45 x 20 cm	1258	2194
SEm±	21	31
CD (P=0.05)	60	89
<b>N X S</b>		
SEm±	37	54
CD (P=0.05)	NS	NS
CV %	10.69	9.00

at 70 days after sowing gave the highest seed yield and the lowest seed yield was found in control". Similar trend also found by Gnyandev *et. al.* [13] and Shukla *et. al.* [14] in chickpea; [15] in rape seed and [16] in Phasey bean (cowpea).

### 3.2.2 Effect of spacing

Regarding the effect of spacing, wider row spacing of 20 cm of chickpea exhibited higher grain yield and straw yield as compared to closer spacing of 10 cm during both years. Significant higher grain yield (1258 kg/ha) and straw yield (2194 kg/ha) were noted under chickpea grown between row spacing with 20 cm during experimental years. Whereas, significantly lowest grain yield (1147 kg/ha) and straw yield (2002 kg/ha) were noted under 10 cm row spacing. The seed yield was increased due to optimum utilization of light, nutrients and water by the plants reported by Abd, *et. al.* [17] in wheat. The results are in agreement by Baloch M.S. and Zubair, M. [10], Thakur et al. [11,12], in chickpea [18].

### 3.2.3 Interaction effect

The interaction effect among nipping and spacing on grain yield and straw yield were found non-significant.

## 4. CONCLUSION

From the results of three year experimentation, it can be concluded that higher yield attributes, seed yield and straw yield of *rabi* chickpea

variety GJG 3 can be obtained through nipping performed at 25 to 35 day after sowing with 45 X 20 cm spacing.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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