Original Research Article

Effects of Spacing and Nipping on yield attributes and yield of chickpea

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 filed 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.

KEYWARD: Nipping, Spacing, Yield and Chickpea

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 (Anon., 2015-16). 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 (Singh, 2010). 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. Singh and Diwakar (1995) 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 (Baloch and Zubair, 2010). 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. Chaube and Pundhir (2005) reported that chickpea nipping after 45 days after sowing increased yield as well as controlled disease severity. Aslam *et al.* (2008) witnessed an increased in height and number of pods bearing branches with respect to topping of chickpea at various levels under water deficit systems.

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.

RESULTS AND DISCUSSION:

A. Effect of Spacing and Nipping on Yield attributes of Chickpea

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*., 2007). 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-1) of this crop (Khan *et al*., 2006). These finding in accordance with Aziz, M. A. (2000) and Sujata *et. al.* (2017) in chickpea.

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 (1997), Thakur *et al.* (1998) and Mondal (2000).

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)
Nipping			
N_0 : No nipping	42.77	1.48	21.76
N_1 : Nipping at 25 DAS	47.66	1.67	22.62
N_2 : 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
Spacing			
S_1 : 45 x 10 cm	45.80	1.56	22.03
S_2 : 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
N X S			
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

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.

B. Effect of spacing and nipping on yield of chickpea

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 at 70 days after sowing gave the highest seed yield and the lowest seed yield was found in control. Similar trend also found by Even and Wahab (1983) in rape seed and Othman and Wan (1987) in Phasey bean (cowpea).

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)
Nipping		
N_0 : No nipping	1065	1940
N_1 : Nipping at 25 DAS	1242	2123
N_2 : Nipping at 35 DAS	1300	2194
SEm±	26	38
CD (P=0.05)	74	109
Spacing		
S_1 : 45 x 10 cm	1147	2002
S_2 : 45 x 20 cm	1258	2194
SEm±	21	31
CD (P=0.05)	60	89
N X S		
SEm±	37	54
CD (P=0.05)	NS	NS
CV %	10.69	9.00

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, *el. al.* (2012) in wheat. The results are in agreement by Baloch M.S. and Zubair, M. (2010), Saini and Faroda (1997), Thakur *et al.* (1998) and Mondal (2000) in chickpea.

Interaction effect

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

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.

REFERENCES:

Abd El, Maahoud MS, Medany MA, Edriss M, Abouhadid AF. (2012). Climate change and productivity of some wheat cultivars under *rainfed* and supplementary irrigation conditions. CIHEAM – I AMZ, pp 335.

Anonymous (2015-16). http://www.commoditiescontrol.com/eagritrader/common/newsdetail.php?type=SPR&itemid=8204&comid=,2,&frm=admin

Aslam M, Khalil AH, Himayatullah K, Ayaz M, Ejaz M and Arshad M. (2008). Effect of available soil moisture depletion levels and topping treatments on growth rate and total dry biomass in chickpea. *Journal of Agriculture Research*. 46 (3) : 229-243.

Baloch and Zubair M. (2011). Effect of nipping on growth and yield of chickpea. *The Journal of Animal & Plant Sciences*, 20 (3) : 208-210.

Chaube H and Pundhir VS. (2005). Crop diseases and their management. Prentice Hall of India (Pvt. Ltd.), New Delhi.

Even EJ and Wahab AG. (1983). Effect of leaf removal on the growth of winter oil seed rape (*Brassica napus* L.). Proc. 6th International Rapeseed Congress, Paris. pp. 104-109.

Khan H, Latif A, Mahmood S and Khan MSS. (2006). Effect of nipping at various stages on yield and yield components of chickpea (*Cicer aritinum* L.). *Journal of Research Science.* Bahauddin Zakariya University, Multan, Pakistan.

Khattak GSS, Ashraf M, Zamir R and Saeed I. (2007). High yielding *desi* chickpea (*Cicer arietinum* L.) variety Nifa-2005. *Pakistan Journal of Botany*, 39 (1) : 93- 102.

Kithan Lizabeni and Singh R. (2017). Effect of nipping, crop geometry and different levels of nitrogen on the growth and yield of sesame (*Sesamum indicum* L.) *Journal of Pharmacognosy and Phyto-chemistry*, 6 (4): 7089-1092.

Mondal S. (2000). Response of chickpea (*Cicer arietinum* L.) varieties to dates of sowing and row spacing under late sown condition. M.Sc. (Agronomy) Thesis, G.B. Pant University of Agriculture and Technology, Pantnagar, 2000.

Othman M and Wan. (1987). The effects of height and frequency of previous defoliation on nodulation, nitrogen fixation and regrowth of Phasey bean AGRIS record FAO of the United Nations. 10 (1) : 1- 10.

Saini SS, Faroda AS. (1997). Effect of sowing time, its pattern and seed rate of growth and yield of 'H86-143' chickpea (*Cicer arietinum* L.). *Indian Journal of Agronomy*. 42 (4) : 645-649.

Singh H and Diwakar B. (1995). Chickpea botany and production practices. ICRSAT. Skill Development Series No.16.

Singh NP. (2010). Project Co-ordinators Report 2009-10, Annual group meet Aug. 29-31, 2010. AICRP on chickpea, IIPR, Kanpur, pp: 30-32.

Sujatha M, Uppar DS, Deahpande VK, Nawalagatti. (2017). Seed hardening, nipping and foliar spray of cycocel on growth, yield quality of chickpea (*Cicer arietinum* L.*). Environment & ecology*. 35 (2) : 703-707.

Thakur HS, Sinha NK, Raghuwanshi RKS, Sharma RS. (1998) Response of gram (*Cicer arietinum* L.) varieties to plant population and date of sowing, *Indian Journal Agronomy*. 1998; 43 (2) : 315-317.