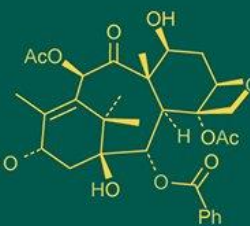
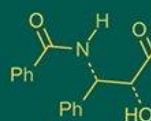


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Effect of nipping practices on growth, development and yield of chickpea (*Cicer arietinum* L.) varieties

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Abstract

A study was conducted in the field at Crop Research Centre 3 (CRC 3), ITM University, Gwalior (M.P.) during *rabi* 2023-24 to study the effect of nipping practices on growth, development and yield of chickpea varieties. Among nipping practices, nipping at 40 DAS showed significantly maximum number of secondary branches (18.2 plant⁻¹), leaf area index (5.56) and total dry matter (696.0 g m⁻²) followed by nipping at 50 DAS (16.6 plant⁻¹, 4.55 and 607.3 g m⁻², respectively), 30 DAS (15.7 plant⁻¹, 4.20 and 606.3 g m⁻², respectively) and minimum in no nipping treatment (14.0, 3.67 and 515.3 g m⁻², respectively). However, plant height (56.0 cm) and number of primary branches (11.5 plant⁻¹) were observed significantly higher in no nipping treatment followed by nipping at 50 DAS (48.8cm and 9.5 plant⁻¹, respectively), 40 DAS (42.6cm and 8.6 plant⁻¹, respectively) and minimum in nipping at 30 DAS (35.7cm and 7.4 plant⁻¹, respectively). Nipping of apical portion of chickpea at 40 DAS also exhibited significantly more numbers of pods plant⁻¹ (103.5) and the lowest with no nipping practice treatment (61.1 plant⁻¹). However, numbers of pods plant⁻¹ did not differ significantly between nipping practices at 30 DAS and 50 DAS. The significantly higher grain yield (2473 kg ha⁻¹), biological yield (6415 kg ha⁻¹) and straw yield (3942 kg ha⁻¹) were recorded with nipping practices at 40 DAS followed by nipping at 50 DAS (2177 kg ha⁻¹, 5942 kg ha⁻¹ and 3765 kg ha⁻¹, respectively), nipping at 30 DAS (2008 kg ha⁻¹, 5486 kg ha⁻¹ and 3475 kg ha⁻¹, respectively) and the lowest (1729 kg ha⁻¹, 4797 kg ha⁻¹ and 3068 kg ha⁻¹, respectively) with no nipping treatment. Nipping practice at 40 DAS increased the grain yield by 43.0%, 23.2% and 13.6% over no nipping treatment, nipping practices at 30 and 50 DAS, respectively.

Among varieties, JG-16 exhibited significantly maximum plant height (48.3cm), number of primary branches (9.8 plant⁻¹), number of secondary branches (16.9 plant⁻¹), leaf area index (4.88), total dry matter (689.1 g m⁻²), number of pods (84.1 plant⁻¹) and seed index (21.2g) followed by varieties JG 36 (44.8cm, 9.4 plant⁻¹, 15.9 plant⁻¹, 4.41, 578.7 gm⁻², 77.4 plant⁻¹ and 17.6 g, respectively) and the lowest in JG 12 (44.2cm, 9.2 plant⁻¹, 15.7 plant⁻¹, 4.20, 550.8 gm⁻², 74.6 plant⁻¹ and 16.7 g, respectively). The significantly higher seed yield (2233 kg ha⁻¹), biological yield (5983 kg ha⁻¹) and straw yield (3750 kg ha⁻¹) were also recorded in variety JG 16 followed by JG 36 (2062kg ha⁻¹, 5577 kg ha⁻¹ and 3515 kg ha⁻¹, respectively) and significantly the lowest in JG 12 (1995 kg ha⁻¹, 5420 kg ha⁻¹ and 3424 kg ha⁻¹, respectively). Variety JG-16 increased the grain yield by 11.9%, and 8.29% over JG-12 and JG-36, respectively. The interaction of nipping practice at 40 DAS and variety JG-16 resulted into significantly higher grain yield (kg ha⁻¹) i.e., 8.96% to 66.0% increased over rest of the combinations of treatment.

Keywords: Chickpea, growth, nipping practice, yield, varieties

Introduction

Chickpea which is commonly known as gram and Bengal gram is grown in India during *rabi* season and it is the second-most major pulse crop after pigeon pea in diet and other uses. India is undisputed leader in global chickpea production which accounts for 65% to 75% of the world's total annual chickpea output. Chickpea in India is cultivated over an area of 9.0 million ha producing 11.08 million tonnes with a productivity of 1231 kg ha⁻¹, contributing 35 to 42 per cent of the national pulses acreage and production, respectively. The chickpea production in the country had gone up from 5.5 to 11.9 million tonnes during last five decades, registering a modest growth. During the same period, area increased from 7.83 to 9.99 million ha and productivity has steadily increased from 663 kg ha⁻¹ to 1192 kg ha⁻¹. Average yield of some of the improved chickpea varieties reported by Anonymous (2023) [1] were like GJG 0809 (16 q ha⁻¹), GNG 1958 (26.8 q ha⁻¹) and CSJ 515 (24 q ha⁻¹). As we can that the national productivity was much lower than the average yield of high yielding

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varieties of chickpea in our country. So, it becomes necessary to know the reasons for this yield gap. Among various low yield attributing factors, luxuriant growth of the chickpea plants may restricts the number of branches and ultimately the yield attributes causes the lower yield. The over growth of the foliage can be reduced by nipping practice at specific stage of growth which may be helpful to decline the phenomenon of apical dominance and enhance the initiation of more branches and ultimately encourage the more and more flowering, fruiting and grain formation and enhances the grain yield of the chickpea (Aziz, 2000) ^[2].

The different varieties of chickpea may vary for showing the response to of nipping for enhancing the growth and yield attributes as well as yield. The crop growth and yield of chickpea varieties under nipping at various stages help to pick the foremost promising variety in term of yield potential. Grain, straw and biological yield of chickpea crop were significantly influenced by the different varieties and nipping. The yield diversity concerning different varieties may also be caused by variation in pod bearing ability and therefore the number of seeds per pod (Choudhary *et al.*, 2020) ^[8]. There is highly significant difference in the interaction of chickpea varieties with nipping which indicates that different varieties of chickpea reacted in a different way to nipping (Khan *et al.*, 2017) ^[12]. Considering these facts in view, field experiment was conducted to study the effect of nipping practices on growth, development and yield of chickpea varieties.

Materials and Methods

An experiment was conducted on chickpea during *rabi* 2023-24 at Crop Research Centre 3 (CRC3), ITM University, Gwalior (Madhya Pradesh). The experimental field is situated in the Northern part of Madhya Pradesh and situated in Gird zone at the latitude of 26°13' North and longitude 76°14' East with an altitude of 211.52 meters above mean sea level. The soil of experimental field was sandy loam in texture having organic carbon 0.42%, available N 213 kg ha⁻¹, available P₂O₅ 12.7 kg ha⁻¹ and available K₂O 247 kg ha⁻¹. The average annual rainfall of this region is about 750mm. The average temperature ranges between 4.0 °C to 47 °C. The experiment was conducted in factorial randomized block design with two factors and replicated thrice. The first factor consisting 4 nipping treatments viz., N0; no nipping, N1: nipping at 30 DAS, N2: nipping at 40 DAS and N3: nipping at 50 DAS; and 3 varieties viz., V1: JG-12, V2: JG16 and V3: JG-36. The full recommended doses of nitrogen (20 Kg N ha⁻¹), phosphorus (40 Kg P₂O₅ ha⁻¹) and potassium (20 kg K₂O ha⁻¹) were applied at sowing. The chickpea crop was sown in lines 30 cm apart using a seed rate of 80 kg ha⁻¹. Nipping was done at 30 DAS, 40 DAS and 50 DAS in the respective treatments. All other agronomic and plant protection measures were applied as per recommendations. The data on various growth characters, yield attributes and yields were recorded under various treatments. The results were analyzed statistically to draw suitable inference as per standard ANOVA technique (Gomez and Gomez, 1984) ^[10].

Results and Discussion

Effect of nipping practices on growth parameters

The data in Table 1 reveals that plant height (56.0 cm) and number of primary branches (11.5 plant⁻¹) were significantly higher with no nipping treatment (N0) followed by nipping

practices (N3) done at 50 DAS (48.8 cm and 9.5 plant⁻¹), nipping practices (N2) done at 40 DAS (42.6 cm and 8.6 plant⁻¹) and these parameters were significantly lower in nipping practice (N1) done at 30 DAS (35.7 cm and 7.4 plant⁻¹). The reduction in plant height under nipping practices done at different growth intervals may be due to the removal of apical portion containing auxins which probably reduced apical dominance of auxins and arrests the vertical growth of plants and begin to produce secondary branches instead increasing plant height. As in nipping practice, the apical bud is nipped and so the utilization of the photosynthates by the crop for secondary branches could be higher and this might be the reason for reduced plant height with nipping treatments (Khan *et al.*, 2018 and Bhavana *et al.*, 2019) ^[5, 11] in chickpea. The higher plant height with no nipping treatment (N0) compared to nipping practices at 50 DAS, 40 DAS and 30 DAS was mainly due to the reason that nipping was not done and continuous supply of auxins to apical portion which leads apical dominance and inhibits secondary branches and thus plant continued its height. The number of primary branches plant⁻¹ was recorded significantly higher with no nipping (N0) due to taller plants and apical dominance followed by nipping practice done at 50 DAS, 40 DAS and the lower number of primary branches plant⁻¹ were noticed under nipping practice at 30 DAS due to lower plant height.

However, results in Table 1 confirm that chickpea plants had a significantly higher number of secondary branches when it was nibbled at 40 DAS (18.2 plant⁻¹) followed by 50 DAS (16.6 plant⁻¹), 30 DAS (15.7 plant⁻¹) and no nipping treatment (14.0 plant⁻¹). This could be the result of the apical region being clipped, which produced more secondary branches and stopped vertical growth because growth regulators, especially auxins, were effectively translocated to the secondary shoot buds, which normally remain dormant. By pruning the plant at various growth intervals, the energy that the plant had been using for temporary growth was redirected towards branching. These results corroborate the findings of Gnyandev *et al.* (2019) ^[9] in chickpea. The significantly higher number of secondary branches plant⁻¹ in nipping treatments of chickpea might also be due to the vigorous vegetative growth of the lateral shoots as a result of apical bud elimination, which decreased apical dominance of auxins and promoted sprouting of lateral secondary buds. If the source of auxins was removed by removing of apical portion through nipping, the secondary branches get activated below clipped portion which accelerate growth. This might be due to dispersion of carbohydrates or food materials toward the auxiliary vegetative buds below nipped portion. Also, nipping of terminal bud might have activated the dormant lateral buds to produce more secondary branches. The similar results were also reported by Campell *et al.* (2008) and Khan *et al.* (2018) ^[11] in chickpea. The lower number of secondary branches plant⁻¹ in no nipping treatment (N0) might be due to inhibition of auxiliary buds by production of IAA in the apical portion. Nipping practices done at 30, 40 and 50 DAS leads to reduction in plant height and apical dominance and supporting the primary branches for producing a greater number of secondary branches and leaf area which determines the photosynthetic ability, growth and total dry matter production of a plant. Thus, nipping practices done at 30, 40 and 50 DAS significantly reduced the plant height and promoted the number of secondary branches. Similar

results were also reported by Khan *et al.* (2018) ^[11] in chickpea and Teggelli *et al.* (2020) ^[19] in pigeon pea.

Results in Table 1 reveals that nipping practices at 40 DAS also produced significantly higher total dry matter (696.0 g m⁻²) followed by nipping practices done at 50 DAS (607.3 g m⁻²), 30 DAS (606.3 g m⁻²) and the minimum with no nipping treatment (515.3 g m⁻²). The higher dry matter production with nipping practices might be due to better utilization of available resources with nipping practices which resulted in more photosynthesis and hence more dry matter was produced. The production of dry matter depends on leaf area and photosynthetic rate of plant. The increased number of secondary branches plant⁻¹ might have offered higher chance for the increased production of more leaf area which reflected into more photosynthesis by leaves which subsequently resulted into higher dry matter production plant⁻¹. These results corroborate the findings of Choudhary *et al.* (2020) ^[8] and Kushwaha *et al.* (2023) ^[15] in chickpea.

Effect of varieties on growth parameters

The data in Table 1 clearly indicates that chickpea varieties significantly affected the growth and development parameters viz., plant height, number of primary branches plant⁻¹, number of secondary branches plant⁻¹, leaf area index and total dry matter production (g m⁻²). Chickpea variety JG-16 registered higher plant height (48.3 cm) followed by JG-36 (44.8 cm) and JG-12 (44.2 cm). This may be mostly caused by the vegetative plant parts' effective photosynthates accumulation. It could also be a genetic character of varieties (Gnyandev *et al.*, 2019) ^[9]. The number of primary and secondary branches were also higher in JG 16 (9.8 plant⁻¹ and 16.9 plant⁻¹) followed by varieties JG-36 (9.4 plant⁻¹ and 15.9 plant⁻¹) and JG-12 (9.2 plant⁻¹ and 15.7 plant⁻¹). Such varietal differences in number of branches might be due to higher growth of variety which was also reported by Merwade (2000) ^[17], Gnyandev *et al.* (2019) ^[9] and Kushwaha *et al.* (2023) ^[15] in chickpea. Similarly, notably increased output of total dry matter and leaf area index was also reported in variety JG-16 (689.1 g m⁻² and 4.88) followed by varieties JG-36 (578.7 g m⁻² and 4.41) and JG-12 (550.8 g m⁻² and 4.2). This variation in dry matter production and leaf area index might be due to variation in overall growth and development of individual variety, which indicates more photosynthetic activity. The varietal differences in respect of dry matter production and leaf area index were also reported by Choudhary *et al.* (2020) ^[8] and Kushwaha (2022) ^[16] and Kushwaha *et al.* (2023) ^[16] in chickpea.

Interaction effects on growth and development

Interactions between nipping practices done at different growth intervals and varieties significantly affected all growth and development attributes of chickpea (Table 1). In comparison to other interactions, the N0V2 (no nipping practice with variety JG-16) generated a greater number of primary branches (11.4 plant⁻¹) and recorded a much higher plant height (57.6 cm). In the interaction of N0V2 (no nipping treatment with variety JG-16), the plants grew to their original height in contrast to nipped plants, which may have been caused by apical dominance owing to auxins. This resulted in a higher plant height and a bigger number of primary branches on plant⁻¹. The interaction of N2V2 (nipping at 40 DAS with variety JG-16) recorded a greater number of secondary branches (19.3 plant⁻¹), higher LAI at

90 DAS (6.0), total dry matter production (822.9 g m⁻²) over all other interactions. This might be due to nipping effects on apical bud of chickpea variety which resulted in production of more secondary branches, higher LAI, dry matter and cessation of vertical growth on account of effective translocation of growth regulators particularly auxins. Similar interactional effect of nipping practices and varieties were also reported by Khan *et al.* (2017) ^[12] and Kushwaha (2022) ^[16] and Kushwaha *et al.* (2023) ^[15] in chickpea.

Effect of nipping practices on yield attributes and yield

Data recorded on yield attributes and grain yield as affected by nipping practices is given in Table 2 and Table 3, respectively. Results revealed that nipping practices in chickpea crop significantly influenced the yield attributing characters, especially number of pods plant⁻¹. Nipping of apical portion of chickpea at 40 DAS resulted into significantly more numbers of pods plant⁻¹ (103.5) followed by nipping practices at 50 DAS (78.4 plant⁻¹), 30 DAS (71.7 plant⁻¹) and the lowest number of pods plant⁻¹ was observed with no nipping practice (61.1 plant⁻¹). However, nipping practices at 30, 40 and 50 DAS were failed to significantly influence the number of seeds pod⁻¹ and seed index (g), however numerically, values of these parameters were observed higher in nipping practice at 40 DAS.

The increased number of pods noticed with nipping practice at 40 DAS was mainly due to accumulation of more photosynthates which were utilized for production of more number of productive secondary branches and more number of pods plant⁻¹ in chickpea (Aziz, 2000 and Khan *et al.*, 2006) ^[2, 13]. The nipping practice at 40 DAS might have efficiently altered the crop architecture by activating the dormant lateral secondary branches which ultimately increased the number to pods plant⁻¹ which leads to greater chance for development of source and sink relationship in chickpea and thereby would have facilitated the significant increase in the yield attributes of the chickpea. This has also been documented in chickpea (Kushwaha *et al.*, 2022) ^[15]. The significant improvement in the number of pods plant⁻¹ in nipping practices at 40 and 50 DAS might be due to initiation of higher number of branches plant⁻¹ which probably originated more flower buds that resulted in more pods (Baloch and Zubir, 2010 and Khan *et al.*, 2018) ^[3, 11].

The increased yield components might also be attributed to activation of lateral dormant buds by arresting the terminal growth through nipping which might have facilitated the significant increase in the yield attributes (Teggelli *et al.*, 2020) ^[19]. The increase in yield attributes with nipping at 40 DAS and 50 DAS might also be due to enhanced branching and dispersion of carbohydrates towards auxiliary vegetative buds below nipped portion which might have helped in production of more number of pods plant⁻¹ and grain yield compared to no nipping (Sonboir *et al.*, 2019 and Kushwaha *et al.*, 2022) ^[16, 18].

The significantly higher grain yield (2473 kg ha⁻¹), biological yield (6415 kg ha⁻¹) and straw yield (3942 kg ha⁻¹) were recorded with nipping practice at 40 DAS followed by Nipping at 50 DAS (2177 kg ha⁻¹, 5942 kg ha⁻¹ and 3765, respectively), 30 DAS (2008 kg ha⁻¹, 5486 kg ha⁻¹ and 3478 kg ha⁻¹, respectively) and the lowest (1729 kg ha⁻¹, 4797 kg ha⁻¹ and 3068 kg ha⁻¹, respectively) with no nipping treatment. The higher yield under nipping treatments might be because of the development of auxiliary buds which is

inhibited by indole acetic acid (IAA) produced in the apical portion. When the source of auxins is removed by nipping, the lateral branching gets activated which resulted in increased number of pods plant⁻¹ (Table 2) thereby increased grain yield (Bharathi *et al.*, 2014 and Kithan and Singh, 2017)^[4, 14]. Increase in yield with nipping as compared with no nipping treatment clearly indicates that the energy which was previously used by plant to become taller was diverted towards grain formation. Grain yield depends on yield attributes *i.e.*, number of branches (data not given) and number of pods plant⁻¹ that is why grain yield was higher with nipping practice at 40 DAS, 50 DAS and 30 DAS as compared to no nipping treatment (Kushwaha *et al.*, 2022 and Khan *et al.*, 2018)^[11, 16].

Effect of varieties on yield attributes and yield

Varieties were also significantly influenced the yield attributes and yields of chickpea (Table 2 and 3). Among varieties, JG 16 produced significantly more number of pods plant⁻¹ (84.1) and seed index (21.2 g) followed by varieties JG 36 (77.4 plant⁻¹ and 17.6 g) and the lowest in variety JG 12 (74.6 plant⁻¹ and 16.7 g). However, these parameters did not differ significantly between varieties JG 12 and JG 36. Similarly, number of seeds pod⁻¹ did also not differ significantly among varieties. The differences in yield attributes observed among chickpea varieties might be due to their differences in growth habit and genetic yielding ability. Similar varietal difference in chickpea with respect to yield attributes was also reported in chickpea (Merwade, 2000 and Kushwaha *et al.*, 2022)^[16, 17].

The significantly higher grain yield (2233 kg ha⁻¹), biological yield (5983 kg ha⁻¹) and straw yield (3750 kg ha⁻¹) were recorded in variety JG 16 followed by JG 36 (2062 kg ha⁻¹, 5577 kg ha⁻¹ and 3515 kg ha⁻¹, respectively) and

significantly the lowest in JG 12 (1955 kg ha⁻¹, 5420 kg ha⁻¹ and 3424 kg ha⁻¹, respectively). This yield variation in respect of various varieties might be due to variation in pod bearing ability and vigorous growth. The higher yield could be attributed due to greater growth parameters *viz.*, secondary branches, more LAI and cumulative effect of yield attributes. The variety JG 12 was poor yielder because of its poor growth, yield attributes and canopy makeup (Choudhary *et al.*, 2020)^[8].

Interaction effect on yield attributes and yield

Interaction between nipping and varieties significantly influenced yield attributes of chickpea (Table 2). The interaction effects of nipping at 40 DAS with variety JG-16 recorded higher number of pods plant⁻¹ (110.9) and seed index (21.9 g) over other treatment combinations. However, number of seeds pod⁻¹ did not differ significantly due to various interaction effects. The increase in yield attributes noticed in the interaction of nipping with varieties was mainly due to accumulation of more photosynthates which were utilized for production of more number of productive secondary branches and more number of pods plant⁻¹ in chickpea (Khan *et al.*, 2006)^[13].

Interaction between nipping and varieties was also significantly influenced the grain yield, biological yield and straw yield (Table 3). The interaction effects of nipping at 40 DAS with variety JG-16 recorded significantly highest grain yield (2662 kg ha⁻¹), biological yield (6887 kg ha⁻¹) and straw yield (4225 kg ha⁻¹) over other treatment combinations. Increase in yield of varieties with nipping as compared to no nipping treatment due to that the energy which was previously used by varieties to become taller was diverted towards grain formation due to nipping (Sonboir *et al.*, 2019 and Choudhary *et al.*, 2020)^[8, 18].

Table 1: Effect of nipping practices on growth and development of chickpea varieties

Treatments	Plant height (cm)	No. of Primary branches plant ⁻¹	No. of Secondary branches plant ⁻¹	Leaf area index at 90 DAS	Total dry matter (g m ⁻²)
Nipping practices					
N0: No nipping	56.0	11.5	14.0	3.67	515.3
N1: Nipping at 30 DAS	35.7	7.4	15.7	4.20	606.3
N2: Nipping at 40 DAS	42.6	8.6	18.2	5.56	696.0
N2: Nipping at 50 DAS	48.8	9.5	16.6	4.55	607.3
S.E.m±	1.4	0.2	0.3	0.15	29.1
CD (P=0.05)	4.0	0.6	0.9	0.45	88.6
Varieties					
V1: JG-12	44.2	9.2	15.7	4.20	550.8
V2: JG-16	48.3	9.8	16.9	4.88	689.1
V3: JG-36	44.8	9.4	15.9	4.41	578.7
S.E.m±	1.2	0.2	0.3	0.13	25.3
CD (P=0.05)	3.4	0.5	0.8	0.39	76.5
Interaction (NxV)					
N0V1	54.7	11.1	13.4	3.13	466.0
N0V2	57.6	11.4	15.1	4.22	582.0
N0V3	55.6	11.2	13.5	3.66	498.0
N1V1	34.4	7.4	15.4	4.05	542.2
N1V2	38.1	8.4	16.2	4.45	705.2
N1V3	34.7	7.5	15.5	4.10	571.5
N2V1	40.1	8.6	17.4	5.25	628.5
N2V2	47.4	9.3	19.3	6.00	822.9
N2V3	40.3	9.1	18.3	5.43	636.5
N3V1	47.5	9.5	16.3	4.36	566.6
N3V2	50.3	10.0	17.2	4.83	646.4
N3V3	48.4	9.8	16.4	4.46	608.8
S.E.m±	2.4	0.3	0.5	0.27	55.4
CD (P=0.05)	6.9	1.0	1.6	0.78	168.2

Table 2: Effect of nipping practices on yield attributes of chickpea varieties

Treatments	Number pods plant ⁻¹	Number seeds pod ⁻¹	Seed index(g)
Nipping practices			
N0:No nipping	61.1	1.6	18.0
N1: Nippingat 30DAS	71.7	1.6	18.5
N2: Nippingat 40DAS	103.5	1.8	19.0
N2: Nippingat 50DAS	78.4	1.6	18.4
S.Em±	2.5	0.1	0.4
CD (P=0.05)	7.3	NS	NS
Varieties			
V1: JG-12	74.6	1.6	16.7
V2: JG-16	84.1	1.7	21.2
V3: JG-36	77.4	1.7	17.6
S.Em±	2.2	0.1	0.3
CD (P=0.05)	6.3	NS	1.0
Interaction (NxV)			
N0V1	55.4	1.5	16.3
N0V2	67.1	1.7	20.5
N0V3	60.7	1.7	17.1
N1V1	67.3	1.5	16.6
N1V2	75.2	1.7	21.2
N1V3	72.7	1.6	17.8
N2V1	99.7	1.7	17.4
N2V2	110.9	1.8	21.9
N2V3	100.0	1.8	17.7
N3V1	76.0	1.6	16.4
N3V2	83.1	1.7	21.2
N3V3	76.1	1.6	17.7
S.Em±	4.3	0.1	0.6
CD (P=0.05)	12.7	NS	1.7

Table 3: Effect of nipping practices on yield of chickpea varieties

Treatments	Seed yield (kg ha ⁻¹)	Biological yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)
Nipping practices			
N0:No nipping	1729	4797	3068
N1: Nippingat 30DAS	2008	5486	3478
N2: Nippingat 40DAS	2473	6415	3942
N2: Nippingat 50DAS	2177	5942	3765
S.Em±	58	159	152
CD (P=0.05)	170	467	445
Varieties			
V1: JG-12	1995	5420	3424
V2: JG-16	2233	5983	3750
V3: JG-36	2062	5577	3515
S.Em±	50	138	131
CD (P=0.05)	147	405	385
Interaction (NxV)			
N0V1	1604	4485	2881
N0V2	1883	5290	3407
N0V3	1700	4616	2916
N1V1	1947	5310	3363
N1V2	2088	5708	3620
N1V3	1989	5439	3450
N2V1	2315	6069	3754
N2V2	2662	6887	4225
N2V3	2443	6290	3847
N3V1	2114	5815	3700
N3V2	2300	6048	3748
N3V3	2116	5963	3847
S.Em±	100	276	263
CD (P=0.05)	294	809	771

Conclusion

Nipping practice performed at 40 DAS of crop growth exhibited significantly improved growth parameters, yield attributes and yields over nipping practices performed at 50 and 30 DAS and no nipping treatment in chickpea varieties.

Nipping practice performed in chickpea at 40 DAS increased the grain yield by 43.0%, 23.2% and 13.6% over no nipping, nipping practices at 30 and 50 DAS, respectively. Among chickpea varieties, JG-16 was found significantly superior over other varieties in terms of yield

attributes and seed yield. Variety JG-16 increased the grain yield by 11.9%, and 8.29% over JG-12 and JG-36, respectively. The interaction effects between nipping practice done at 40 DAS with variety JG-16 was found superior over rest of the combination for growth, development, yield attributes and yield. The combination of nipping at 40 DAS with variety JG-16 increased the grain yield by 8.96% to 66.0% over rest of the combinations of treatments.

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