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# EFFECT OF NIPPING AND PLANT SPACING ON SEED PRODUCTION OF COWPEA IN HARYANA CONDITION

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**SUMMARY**

The present experiment was conducted at Seed Research Area, Department of Vegetable Science, CCS Haryana Agricultural University, Hisar (Haryana) in rainy seasons during 2017-18 and 2018-19. The objective of the investigation was to study the effect of nipping and plant spacing on growth, seed yield and quality parameters of cowpea. The experiment was comprised four treatments of nipping (no nipping, nipping at initiation of tendril, nipping at one week after initiation of tendril, nipping at two weeks after initiation of tendril formation stages) and four spacings (60x20 cm, 45x20 cm, 30x20 cm and 30x30 cm) was laid out in Randomized Block Design with three replications. Among all treatments, nipping at initiation of tendril formation stage with spacing of 60x20 cm significantly enhance all growth, yield and quality parameters of cowpea seed crop (except plant height) and followed by nipping at one week after initiation of tendril formation stage with spacing of 45x20 cm.

**Key words :** Cowpea, nipping, spacing, tendril, seed production

Pulses occupy an essential place in our daily diet as a source of protein. Pulse crops also have the unique ability to associate symbiotically with *Rhizobium* spp. and fix atmospheric nitrogen and enriching the soil (Arya *et al*., 2019). Today, as a result of ever increasing population, the per capita availability of pulses has shown a sharp decline in recent years and it has come to less than 40 g/day at present, against a normal requirement of 69 g/day but the production of pulses has remained almost same at around 13-14 million tonnes for the last many years (Sharma *et al*., 2003). The cowpea (*Vigna unguiculata*) is a warm/ rainy season, annual herbaceous legume from the genus Vigna and family Leguminosae (Nguyen *et al*., 2019). It is tolerant to drought as well as rain water stagnation conditions (Panchta *et al*., 2021). It is also known as Black-eye bean, Southern pea and Lobia and has multiple uses like food, feed, forage, fodder, green manuring and vegetables (Nagoc *et al*., 2017). It provides a nutritious grain and a less expensive source of protein for both human beings and animals in rural and urban areas (Vu *et al.,* 2016).

Nipping is an important agronomic practice of removal of apical bud, which helps to reduce the apical dominance, increase the number of branches, percent pod sets and attains better source-sink relationship and enhances the yield of plant. Nipping is also found as effective technique in encouraging flower production and reducing foliage production. Better plant canopy are also obtained by nipping. It also helps in production of more pod bearing branches with good foliage thus, increases the photosynthetic activity, accumulation of more photosynthates, ultimately resulting in good seed quality with higher yield of seed (Thakral *et al.,* 1991). The plant hormones auxins triggered to lateral shoot buds, which results in more branches. As nipping practice does not require any tools and equipment, it can be a handy and cost effective practice for small and marginal farmer as well (Dhital *et al.*, 2017).

Plant population also plays an important role in cowpea seed production. Cowpea cultivars with different plant morphology would require different optimum densities to express their full seed yield potential (Ndiaga, 2000). Cowpea responds to varied populated levels due to its elastic nature in adjusting to different spacing. Plant density is an important component of yield in grain crops such as cowpea and it is important to ascertain the optimum plant densities for different area (Kamara *et al.,* 2014). Management of plant density is an important aspect to optimize growth of the crop and the time required for canopy cessation to achieve maximum biomass and grain yield (Liu *et al.,* 2008). The crop is grown under various agro-climatic and diverse conditions, so its agronomic practices are required to be

standardized. Among them optimum plant spacing, number of reproductive branches per plant and nipping are the key factors determining the pod and seed yield. Keeping the above facts in mind the present experiment entitled "Effect of nipping and plant spacing on seed production of cowpea (*Vigna unguiculata*)" was planned with the objective to find out the effect of nipping and plant spacing on growth, seed yield and quality parameters of cowpea.

## MATERIALS AND METHODS

The present experiment was conducted at Seed Research Area, Department of Vegetable Science, CCS Haryana Agricultural University, Hisar (Haryana) in rainy season during 2017-18 and 2018-19. Hisar is located at latitude of 29º 10' North, longitude of 75º 46' East and at an altitude of 215.2 meters above mean sea level on South Western border of the Rajasthan state and at a distance of about 175 km in West of the National capital city, New Delhi. There were total sixteen treatments in which four nipping treatments *viz.,* No nipping, nipping at tendrils formation stage, nipping at one week after tendril formation stage, nipping at two week after tendril formation stage along with four spacings treatments *viz.,* 60×20 cm, 45×20 cm, 30×20 cm and 30×30 cm. Pure and healthy seed of cowpea cv. Kashi Kanchan was obtained from the Department of Vegetable Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar. The experimental was laid out in Factorial Randomized Block Design with three replications. Every replication had sixteen plots where sixteen treatments were allotted randomly. The net size of each plot was 3.6 m×3.6 m. Farmyard manure was incorporated @ 10 t/ha in the soil before field preparation. The experimental field was prepared by 2-3 ploughing followed by planking to prepare suitable field. The recommended fertilizers were applied according to package of practices. 40 kg Phosphorus and 25 kg nitrogen per hectare was applied at the time of sowing in cowpea field.The pure and healthy seed was sown 3-4 cm deep in the row with the help of hand drawn rack at spacing of as per treatments in rainy season. Ten days after sowing thinning and gap filling operations were also performed. Irrigation was applied as and when the crop required. First hoeing was given 25 days after sowing and one more hoeing was given at 45 days after sowing to control the weeds. A pre-emergence weedicide Stomp 30EC (Pendimethalin) @ 2.5 l/ha was also applied to suppress the weed. The recommended plant protection

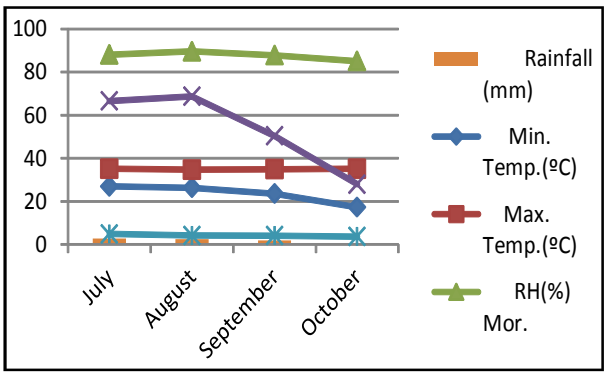


Fig. 1. Mean monthly meteorological data for season 2017-18.

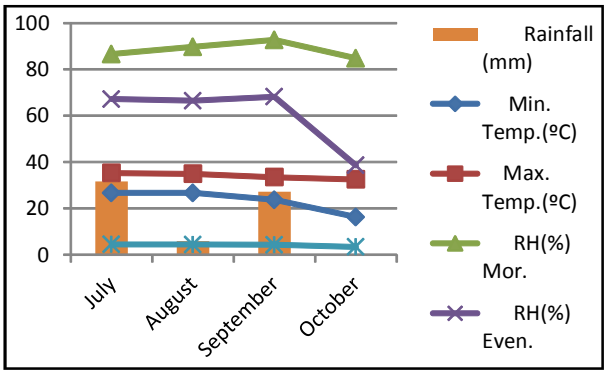


Fig. 2. Mean monthly meteorological data for season 2018-19.

measures were adopted as and when required for raising a healthy seed crop. In nipping treatments, apical bud of cowpea plant at about 4-5 cm was pinched out with forefinger and thumb as per treatments. Field inspections were made when the plants are in full flower and a second when pods are sufficiently developed to specify varietal purity. Pods were harvested when they were fully mature, turn brown color and then placed these harvested pods in pakka floor for further drying and then threshing by beating pods.

## RESULTS AND DISCUSSION

### Effect of nipping and plant spacing on growth, flowering and pod length

The data presented in Table 1 revealed that the maximum plant height (65.32 cm) was observed in control, where no nipping treatment was given. It might be due to undisturbed and continue top growth of cowpea plant, which helped the crop to attain the maximum plant height. Similar kinds of results were also recorded in pigeonpea by Sharma *et al.*, (2003). Whereas the, minimum plant height (59.66 cm) was recorded when nipping occurred two week after tendril

formation stage during both the years 2017-18 and 2018-19. Data regarding spacing clearly indicate that plant height varied significantly and reduced with increase in spacing between rows. Maximum plant height (64.27 cm) was observed at a spacing of 30x20 cm followed by (62.56 cm) with spacing of 30x30 cm while, plant height was recorded minimum (56.47 cm) with spacing of 60x20 cm. This might be due to more competition among the plants for sunlight, other nutrients and diversion of energy directly toward plant height than on branches under narrow row-to-row spacing. Similar results were obtained by Baloch and Zubair (2010) in chickpea and El Naim and Jabereldar (2010) in cowpea.

A perusal of data on number of branches of cowpea under different nipping treatments and plant spacing showed that number of branches varied significantly with nipping treatments during both the years and maximum number of branch (5.49) was recorded under treatment of nipping of tendril formation stage, which was at par (5.34) in treatment of nipping at one week after initiation of tendril formation stage (Table 1). This might be due to nipping of terminal bud, which favoured lateral branching and ultimately increased more number of branches per plant. The results are in conformity with Reddy (2005) in cowpea, Sharma *et al.,* (2003) and Ramrao (2018) in pigeonpea. The minimum number of branch (5.05) was observed in treatment having no nipping (control). Among spacing, the data revealed that number of branches varied significantly and decreased with decrease in spacing between rows. Maximum number of plant branches (5.67) were reported with a spacing of 60x20 cm while, the number of branches was registered minimum (5.02) with spacing of 30x20 cm.

Similar trends were observed in length of branch in cowpea to nipping and spacing treatments during both years. Among nipping, the maximum length of branches (42.68 cm) was recorded under treatment of nipping at initiation of tendril formation stage while among spacings, maximum length of branches (42.20 cm) was observed with spacing of 60x20 cm. Whereas, the minimum branch length was recorded in no nipping treatment (control) and at a plant spacing of 30x20 cm.

Days to flower emergence varied significantly with nipping treatments (Table-1) during both the years. The minimum number of days (40.34 days) taken to flower emergence when nipping was occurred at tendril formation stage. On the other hand, day to flower emergence showed non-significant effect to spacing treatments, however, minimum days to flower emergence taken with spacing of 60x20 cm.

Pod length was not influenced with nipping treatments while, among spacing, it was clear from the data that pod length varied significantly and showed decrease with decrease in spacing between rows. The maximum pod length (20.16 cm) was observed with spacing of 60x20 cm.

**Effect of nipping and spacing on seed yield**

The data presented in Table-2 revealed that the number of pods per plant varied significantly with nipping treatments and the maximum number of pods per plant (22.14) was recorded under treatment of

TABLE 1
Effect of nipping and plant spacing on growth, flowering and pod length of cowpea

| Treatments | Plant height (cm) | No. of branches/ plant | Length of branch (cm) | Days to flower emergence | Pod length (cm) |
|---|---|---|---|---|---|
| **Nipping** | | | | | |
| No (Control) | 65.32 | 5.05 | 37.02 | 41.50 | 19.30 |
| At tendril formation | 61.31 | 5.49 | 42.68 | 40.34 | 19.58 |
| One week after tendril formation | 60.52 | 5.34 | 40.95 | 42.67 | 19.59 |
| Two week after tendril formation | 59.66 | 5.16 | 38.45 | 44.83 | 19.41 |
| C. D. (P=0.05) | 2.09 | 0.23 | 1.04 | 1.32 | NS |
| **Spacing** | | | | | |
| 60x20 cm | 56.47 | 5.67 | 42.20 | 40.96 | 20.16 |
| 45x20 cm | 61.07 | 5.29 | 38.37 | 41.92 | 19.30 |
| 30x20 cm | 64.27 | 5.02 | 35.83 | 43.34 | 19.00 |
| 30x30 cm | 62.56 | 5.24 | 37.28 | 42.00 | 19.11 |
| C. D. (P=0.05) | 1.95 | 0.22 | 0.92 | N.S. | 0.34 |

(Pooled data of 2 years, 2017-18 and 2018-19).

TABLE 2
Effect of nipping and spacing on seed yield of cowpea

| Treatments | No. of pods/plant | No. of seeds/pod | Seed yield/ plant (g) | Seed yield (q/ha) | 100-seed weight (g) |
|---|---|---|---|---|---|
| **Nipping** | | | | | |
| No (Control) | 19.99 | 12.44 | 15.16 | 12.13 | 8.98 |
| At tendril formation | 22.14 | 13.24 | 17.32 | 14.07 | 9.32 |
| One week after tendril formation | 21.24 | 12.90 | 16.74 | 13.55 | 9.17 |
| Two week after tendril formation | 20.54 | 12.33 | 16.00 | 12.79 | 8.81 |
| C. D. (P=0.05)CD at 5% | 0.85 | 0.38 | 0.61 | 0.60 | 0.24 |
| **Spacing** | | | | | |
| 60x20 cm | 23.18 | 12.70 | 16.94 | 13.83 | 9.49 |
| 45x20 cm | 21.75 | 12.65 | 16.45 | 13.41 | 9.05 |
| 30x20 cm | 19.77 | 12.16 | 15.11 | 12.23 | 8.59 |
| 30x30 cm | 20.74 | 12.53 | 15.97 | 12.81 | 9.03 |
| C. D. (P=0.05) | 0.74 | NS | 0.50 | 0.48 | 0.30 |

(Pooled data of 2 years, 2017-18 and 2018-19).

nipping at initiation of tendril, which was followed by number of pods per plant (21.24) in treatment of nipping at one week after initiation of tendril and the minimum number of pods per plant (19.99) was observed in treatment having no nipping (control). Among spacing, it was clear from the data that number of pods per plants showed significant effect and reduced with reduction in spacing between rows. The maximum number of pod per plant (23.18) was observed with plant spacing of 60x20 cm, which was recorded at par (21.75) with spacing of 45x20 cm. The reason behind this might be that wider spacing registered more number of branches per plant, which enhanced the number of pods per plant. These findings are in close agreement with the results of Mula *et al.,* (2013) and Pramod *et al.*, (2010) in pigeonpea, El Naim and Jabereldar (2010) and Ndor *et al.,* (2012) in cowpea.

Number of seeds per pod varied significantly with nipping treatments and maximum number of seed per pod (13.24) was recorded with treatment of nipping at initiation of tendril formation stage, which was at par with number of seeds per pod (12.90) in treatment of nipping at one week after initiation of tendril. Further data revealed that spacing showed non-significant effect regarding number of seeds per pod. However, the maximum number of seeds per pod (12.70) observed with spacing of 60x20 cm.

A similar trend was observed in seed yield per plant, seed yield per hectare and test weight (100 seed weight) regarding nipping treatments (Table-2). The maximum seed yield per plant (17.32 g), seed yield per hectare (14.07 q) and test weight (9.32 g), respectively were recorded with treatment of nipping at initiation of tendril formation stage which was at par with in treatment of nipping at one week after initiation of tendril formation stage (16.74 g, 13.55 q/ ha and 9.17 g) and minimum of these parameters were recorded in control treatment. Nipping at various stages tends to enhance number of branches and number of pods that in turn boost yield. It also helps in production of more pod bearing branches with good foliage thus, increases the photosynthetic activity, accumulation of more photosynthates, ultimately resulting in good seed quality with higher yield of seed (Thakral *et al.,* 1991). Among the spacing, these all parameters were recorded significantly higher with 60x20 cm spacing which was at par with 45x20 cm. Ndiaga (2000) concluded that cowpea cultivars with different plant morphology would require different optimum densities to express their full seed yield potential. Cowpea responds to varied populated levels due to its elastic nature in adjusting to different spacing. Plant density is an important component of yield in grain crops such as cowpea and it is important to ascertain the optimum plant densities for different area (Kamara *et al.*, 2014).

## CONCLUSION

Based on two years study, it may be concluded that nipping treatment in cowpea cv. Kashi Kanchan should be performed at tendril formation stage in a plant spacing of 60x20 cm to obtain significantly higher seed yield.

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