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EFFECT OF NIPPING AT VARIOUS STAGES ON YIELD AND YIELD COMPONENTS OF CHICKPEA (*Cicer aritinum* L.)

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Abstract
Nipping the young tender shoots during the early and middle growth phases of chickpea is a normal practice in Southern districts of N.W.F.P. To check the nipping effects on yield and yield components, a three year study (1995-1998) was conducted at ARS, Ahmad Wala, Karak. Eight nippings with 20 days interval were done following the RCB design during the growing seasons. Data collected for each trait during the years were averaged and statistically analyzed. The analyzed data revealed that traits like number of productive branches per plant, number of pods per plant, 100 seeds weight and yield (kg ha^{-1}) varied significantly due to nippings. However, number of seeds per pod remained non-significant. Plants nipped in the last week of December to the end of January showed enhancement in productive branches, pods and grain yield while reduction in 100 seeds weight. A very strong positive correlation (0.946) was observed between number of pods per plant and yield which is reported to be 0.04 in the ordinary situations. Quantitative increase up to 53 % in yield (kg ha^{-1}) was observed in the plants when nipped on December 26, 1997. Based on the findings of this study it is recommended that nipping be done in the chickpea crop from the last week of December to the end of January to have increased yield and extra feed to the cattle.

Keyword: Chickpea, nipping, statistical analysis, yield.

INTRODUCTION
In Southern districts of NWFP, Chickpea (*Cicer aritinum* L.) is a traditional crop, grown on an area of 87.3 thousand hectares annually with a total production of 33.0 thousand tones [MINFAL 2000]. The cropping area is mostly rainfed (60%) and the soils are sandy. In the absence of proper rains at proper intervals, the crop yield adversely affected. Other biotic factors are continuous presence of white ants, potential epidemics of

gram blight, and incidence of pod borers which play a significant role in the over all yield reduction.

The farming community of the area mostly belongs to the poor class of the society. Normally, farmers raise sheep and goats for their livelihood. Since there is no ample supply of dry or green fodder in winter, therefore, it is a common practice that the animals are fed by ber (*Ziziphus* species) branches and leaves and nippings obtained from chickpea. Also the tender young shoots are used as potherbs (feed) and are consumed in various styles. Farmers start this practice right form the emergence of the crop and continue it till late flowering stage. In some areas of D.I. Khan, farmers even allow their cattle to graze frequently in the fields of chickpea.

No doubt, nipping and grazing might have a significant role in developing well desired plant canopies and number of productive branches, at early stages, as through both processes, plant growth hormones particularly auxins are triggered to the lateral shoot buds which ultimately result in more branches. But uncontrolled nipping and grazing may create undesired results at the end because at latter stages of Plant growth, the temperature rises and the flowering and podding periods starts. Excessive nipping at these stages cause reduction in the photosynthetic area and thus less carbon assimilation takes place, which has negative effect on yield.

To quantify the affects of nipping on yield and its components at various intervals, a study was conducted at ARS, Ahmad Wala, Karak for three years and the results obtained are discussed here.

MATERIALS AND METHODS

The study was done on leading chickpea variety Karak-1. It germinates in 8-12 days and takes 160 to 170 days to reach maturity. Eight nipping treatments with 20 days interval were made including control (no nipping) in a randomized complete block design with four replications. Plots size was kept 4 x 1.2 m (four rows), with plant to plant distance of 10 cm and row to row distance of 30 cm. The experiment was planted on October 13, 17 and 9 during 1995-1996, 1996-1997 and 1997-1998, respectively. Each year, one bag or DAP per acre was applied at the time of land preparation. For confirmation of the results, the experiment was continued for three years. Details of the nipping treatments are as under:

Treatment	Date
T1	(Control)
T2	34 days after emergence
T3	54 days after emergence
T4	74 days after emergence
T5	94 days after emergence

T6	114 days after emergence
T7	134 days after emergence
T8	154 days after emergence

For Nipping, 8 cm of the growing tip of each branch of every plant was removed in each respective plot. For data recording, ten plants in each plot were selected randomly; however, for yield the entire plots were harvested. Data on number of productive branches per plant, number of pods per plant, number of seeds per pod, 100 grain weight (g) and Yield (kg ha^{-1}) were recorded for three consecutive years and finally averaged for years and statistically analyzed using MSTAT Package. Means were separated using new Duncan's Multiple Range Test. Similarly the correlation coefficient (Pearson) of the traits studies were calculated by the same package.

RESULTS AND DISCUSSION

NUMBER OF PRODUCTIVE BRANCHES PER PLANT

The analysis of variance for number of productive branches per plant due to the various nipping treatments has shown highly significant differences (Table 3). The mean values (Table 1) for productive branches were in the range of 4.2-11.6 branches per plant.

Table 1: Showing Mean Values Obtained for Various Traits.

Treatments (Day after Emergence)	Productive Branches	Pods per Plant	Grains per Pod	100-grains weight (g)	Yield (kg ha^{-1})
Control	4.2 D	24.5 DE	1.6	18.0 A	1656 EF
34	6.3 C	25.2 CDE	1.4	18.0 A	1721 E
54	6.3 C	28.3 C	1.5	17.0 B	1915 D
74	8.9 B	32.1 B	1.4	17.0 B	2535 A
94	8.9 B	36.3 A	106	16.4 C	2532 A
114	11.0 A	32.3 B	1.4	16.3 C	2234 B
134	11.0 A	27.6 CD	1.4	16.0 CD	2075 C
154	11.6 A	22.3 E	1.3	15.7 D	1587 F

LSD for

Branches	= 1.307
Pods/Plant	= 3.371
100 Seed Weight	= 0.4337
Yield (kg ha^{-1})	= 82.47

An overall increase of 176% in productive branches over control (no nipping) was observed in the plot nipped on 154th day after emergence, followed by 134th day (161%), respectively. Minimum productive branches of 4.2 per plant were obtained in Control plot. It is clear from the mean Table that each nipping increased the number of productive branches per plant. By nipping, the translocation of growth regulators, particularly auxins is diverted to the potential secondary and tertiary shoot buds, which in normal conditions remain dormant. Thus each potential shoot

bud was stimulated. Similar criterion was reported by Robert and Francis [1983].

NUMBER OF PODS PER PLANT

The analysis of variance for the number of pods per plant due to various nipping treatments has shown highly significant differences (Table 3). The mean values for pods per plant were in the range of 22.3-36.3 pods per plant (Table 1). Maximum increase of 48.5% over control was observed in the plot nipped on 94th day after emergence, followed by 114th days of 31.2%. However, minimum pods of 22.3 per plant were obtained in the plot nipped on 154th day after emergence.

It can be inferred from the data that nipping has considerable contribution in producing more number of pods per plant. A trend of gradual increase to the maximum (till 154th day after emergence) and then decrease in the magnitude of pods per plant can be seen as the nipping time was varied across the growing period of chickpea crop. Normally every flower has a potential to develop in to a pod. At flowering time, flowers are the key sites of physiological activities and are comparatively stronger sinks compared to the growing meristems [Singh and Panday 1983, Singh 1984]. But source relationship and the growing meristems became stronger, and less number of flowers was converted in to pods. Thus by nipping after 94th day after emergence the numbers of pods per plant were reduced significantly.

NUMBER OF GRAINS PER POD

The analysis of variance for number of grains per pods due to various nipping treatments has shown non-significant differences (Table 3). The mean values for grains per pods were in the range of 1.3 – 1.6 grains per pods (Table 1). Maximum number of grains per pod was recorded in the control plot, closely followed by the plots nipped on 54th and 94th day after emergence by giving 1.5 grains per pod. Minimum numbers of grains of 1.3 per pod were obtained in the plot nipped on 154th day.

The data showed the number of grains per pod, a genetic trait of particular variety, remained less affected by environment (time of nipping).

100-GRAIN WEIGHT (g)

The data for 100-grain weight revealed that various nippings significantly reduced this trait, and statistically remain non significant (Table 3). A range of 15.7-18.0 g was observed in the mean values for different nippings (Table 1). Maximum grain weight of 18.0 g was obtained in control plot, compared to minimum of 15.7 g in the plot nipped on 154th day after emergence.

Chickpea is a typical long day crop. In spring, with the increase in temperature, the days also start elongating. However, due to reduced

photo-period, the grains developed in late spring bear less weight than ones developed in early spring [Saxena and Sheldrake 1980].

YIELD (kg ha^{-1})

The analysis of variance for yield (kg ha^{-1}) due to different treatments of nipping has shown highly significant differences (Table 3). Maximum increase of 53% was observed in the plot nipped on 74th day after emergence, followed by 94th day (52.9%) over control treatment. Yield by itself is a complex genetic trait and several other parameters like branches per plant, days to flowering, flowering duration, number of pods per plant etc. have significant role in the final yield. Among them, some contribute positively while other negatively. A detailed contribution of these parameters towards yield is explained by Singh *et al.* [1983].

In this study we observed a lot of variation in the correlation between yield and other yield components as compared to Singh *et al.* [1983] (Table 2). The simple explanation of this deviation is that in our case chickpea crop was subjected to several nippings at different intervals while in the former case the study was made on normal plant populations. However, our findings are much encouraging. By nipping at proper time, seed yield can be increased up to 50% plus free feed to farm cattle. Similarly by nipping, the contribution of other traits like number of branches and pods per plant can also be molded beneficially. Although the correlation between number of branches and seed yield is always positive but in this study the magnitude has been increased considerably. Similarly correlation of 0.946 between number of pods per plant and yield was obtained with normal conditions remain only 0.04.

Table 2: Correlation Matrices for different Characters.

	Productive Branches	Pods per Plant	Grains per pod	100-grains weight (g)	Yield Pods per Plant
Pods per Plant	0.187	---	---	---	---
Grains per Pods	-0.419	0.339	---	---	---
100-grains Weight (g)	-0.909	-0.193	0.346	---	---
Grain Yield	0.303	0.946	0.275	-0.253	---

Based on the findings of this study, it is recommended that nipping at proper time (last week of December to the end of January) is beneficial in chickpea crop. However, from February onwards, since the temperature starts rising and flowering and pod formation start, nipping should be avoided.

Table 3: Showing mean squares (ANOVA) for different characters as recorded in effect of nipping at various stages on yield and yield components of chickpea.

Source of variation	Degree of Freedom	Productive Branches	Pods per Plant	Grains Per Pod	100-grain wt	Yield (kg ha^{-1})
Years	2	0.00	0.67	0.161	0.009	5613.87
Treatments	7	21.68**	65.04**	0.034 NS	2.24**	426631.23**
Error	14	0.080	0.113	0.023	0.78	2510.87

** Highly Significant, NS: Non-Significant

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