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*RESEARCH ARTICLE*

# EFFECT OF PINCHING METHODS ON GROWTH AND YIELD OF CAPSICUM AT CHAPAGAUN, LALITPUR

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**ABSTRACT**

A study on "Effect of pinching methods on growth and yield of Capsicum at Chapagaun, Lalitpur" was conducted at Godawari Municipality, Lalitpur from March to June, 2024. Pinching, a horticultural practice involving the removal of the apical bud, has been widely studied to enhance branching and the study was conducted to identify their effects in growth and yield of capsicum under Randomized Complete Block Design with three replications of seven treatments i.e. Pinching at 30 DAT, Pinching at 35 DAT, Pinching at 40 DAT, Pinching at 30 and 40 DAT, Pinching at 45 DAT, Pinching at 30 and 45 DAT and Control. The observations were recorded for various floral parameters and growth yield parameters. The highest plant height was observed in pinching treatment at 30 and 45 DAT in 10 and 20 days after pinching while in 30, 40 and 50 days it was observed in 30 and 40 DAT. While the shortest plant height was recorded in treatment pinching at 30 DAT. The experimental findings shows that the number of leaves per plant was significant only at 10 and 20 days after pinching. Similarly, the highest number of branches was recorded from the pinching performed at 30 and 45 DAT. The highest plant height was found at Control where pinching was not performed. The highest fruit diameter was found in pinching at 30 and 45 DAT (4.95) whereas, the highest fruit length was observed in same treatment which was (7.17). In case of floral parameters, the capsicum with the treatment 40 DAT and 45 DAT flower earlier than the other. The experimental findings on yield per sample plant and plot both was observed highest in pinching at 30 and 45 DAT among the seven treatments. Yield was obtained highest from pinching at 30 and 45 DAT i.e. 6.93 mt/ha. An enhanced branching and more compact growth habit were the outcomes of pinching, which had significantly influences plant architecture, according to preliminary findings. The results of this study suggest that horticultural practices such as targeted pinching can be beneficial in enhancing the yield of capsicum.

**KEYWORDS**

Capsicum, Yield, Pinching, Growth

## 1. INTRODUCTION

Capsicum (Capsicum annuum), also called sweet pepper or chili pepper, is a major vegetable crop grown in tropical and subtropical regions of the world and has been used as a spice for over 9500 years. Native to Tropical South America, sweet pepper and chili are known as capsicum (Bhusal and Mmbaga, 2020). In our everyday culinary practice, capsicum pods or chili pepper are the second most consumed vegetable crop and spice in the world after tomatoes (Tripodi, 2019).

The term "Capsicum" refers to the genus of pepper plants, which includes bell peppers, chili peppers, and other species. The term "annuum" implies that the plant is annual, which means it completes its life cycle in a single year. So, the original name of the Capsicum plant, encompassing all types and cultivars, is Capsicum annuum. The fruit of the capsicum plant contains a chemical called capsaicin. Capsaicin is what seems to help reduce pain and swelling. They provide healthy levels of vitamin C and antioxidants. Capsicum has very low-fat content and a high water and fiber content. Capsicum has a low calorie and carbohydrate content, which is another reason why it is so useful for weight loss programs or if you're searching for a nutritious (Sood et al., 2017).

Capsicum is grown in regions with an annual rainfall of 75-100 cm as well as tropical and subtropical regions up to 2000 m above mean sea level. The growing height of C. annuum is from 25 to 50 cm. Growing areas of C. annuum may vary from forest-like conditions to wide range of altitudes and climatic conditions (tropical to warmer temperatures), but the climatic preferences of C. annuum is warm. Well drained loamy soils pH 5.5 to 6.8, temperature 18 to 30°C (night temperature 15°C) best suits C. annuum (Lohani, 2020). In Nepal, C. annuum is grown from terai, mid hills to high hills in different time of the year. Globally, it has a total area of 2 million ha and a production volume of 36.97 million mt (FAOSTAT, 2022). Major Sweet pepper producing districts of Nepal are Kavrepalanchok, Banke, Dhading, Chitwan, Lalitpur, Makawanpur etc. Banke has the highest area of production (195 ha) while Kavrepalanchok has the highest production (3428 t) and highest productivity (19. 20 t/ha) is recorded in Lalitpur (MoALD, 2023). During the vegetative stage, sweet peppers like a warm, humid atmosphere; during the reproductive stage, they prefer dry weather (Chadha, 2002). Sweet pepper is very sensitive to growing environment, especially temperature. When daily air temperature during fruit set ranges between 18 and 32 ºC, sweet pepper yield is high (Bhattarai et al.,1991). The mid-hills of Nepal have ideal growing conditions for sweet pepper fruits of superior quality (Bhattarai, 2010). The mid-hills of our country could be leading supplier of high-quality fresh fruits of sweet pepper to the plains during summer and rainy seasons, 14 which could of great benefit to marginal and small-scale farmers of mid-hills (Bhattarai and Poudyal, 2011). Not all kinds perform equally in all areas. Understanding the performance of different kinds in various areas is crucial (Lohani, 2020).

Lalitpur district is a part of the Bagmati zone and is situated in the Central

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region's Kathmandu Valley. There are 43 VDCs in the district, with Patan (Lalitpur Sub-Metropolitan City) serving as the district headquarters. Lalitpur occupies 50.67 square kilometers and is located 1350 meters above sea level. About 3 miles (5 km) to the southeast of Kathmandu is Lalitpur. The majority of residents in Lalitpur grow tomatoes and mushrooms, while others also grow cucumbers, cabbage, cauliflower, radish, and other vegetables.

Sweet pepper is grown in 34,705 hectares of land in Nepal, yielding 265 mt/ha and 14.41 mt of production (MoALD, 2023). With a 155 ha area, 1589 mt production, and a yield of 10.25 mt/ha, Chitwan is the main district in Nepal that produces sweet peppers among the regions that grow capsicum (MoALD, 2023). Nepal imports 2,859,587 kg of sweet and chili peppers from India. It's a reality that not every variety performs the same in every situation. Understanding how different types function in a certain region is crucial. Its lack of plentiful varieties and reduced productivity are the main causes of the negative trade deficit. As of the now, Nepal has only three registered varieties. This scenario illustrates the need and urgency of creating bell pepper cultivars that are suited to Nepal's various regions and have a respectably high productivity that can be widely supplied to producers. This will help to reduce the trade deficit, increase the nation's overall production to meet demand, and close the productivity gap between Nepal and the global scenario.

The Lalitpur district's capsicum productivity is below the national average. There is not enough varietal knowledge in the current agro-ecology to increase crop quality and quantity (Shrestha, 2023). Few studies have been conducted on the pinching approach, and most farmers are unaware of it. The quantity of blooms, flower diameter, stem diameter, plant height, and days to 50% blooming are all greatly impacted by pinching, (claims Acharya, 2022). The purpose of the study was to address farmers' ignorance of crop management practices, particularly the pinching technique. Therefore, the purpose of this study is to use pinching to greatly boost plant growth and production. Pinching, on the other hand, encourages branching, which leads to bushy growth and a greater number of blooms, ultimately increasing seed yield.

Capsicum is an increasingly prominent vegetable crop in Nepal. The average production of capsicum cannot keep up with the rising demand from the people of Nepal. The most effective strategy to meet capsicum demand and build a successful business while enhancing cost effectiveness is through suitable pinching and planting practices. The purpose of this research is to outline the benefits of pinching practice in capsicums. Regularly pinching off the growing tips of capsicum plants encourages bushier growth by stimulating lateral branching. This results in more side shoots, leading to a fuller and more productive plant. By promoting lateral branching, pinching helps the capsicum plant produce more fruit-bearing stems. This can lead to a higher yield of capsicum throughout the growing season. So, this study will be useful for farmers to understand the benefits of following pinching practice in plants.

## 2. Materials and Methods

### 2.1 Field Experiment

From the first week of March 2024 to the first week of June 2024, a field experiment was carried out at Chapagaun, Lalitpur, to determine the impact of pinching techniques on capsicum growth and yield.

### 2.2 Experimental Site

The research was conducted in Godawari Municipality-11, Chapagaun, Lalitpur. The climate of the district is mild, and generally warm and temperate which is quite cooler than terai region situated within 27°59′ north latitude, 85°32′ east longitude and altitude of 1395 meters above sea level with an area of 50.67 sq.km. Lalitpur gets on average 415.30 mm of rain.

#### *2.2.1 Nursery bed preparation*

To prepare nursery bed, the bed preparation area was completely ploughed and decomposed FYM was introduced into the soil. The hybrid cultivar California Wonder was used in this study. The nursery plot measured 3 meters in length and 1 meter wide in a depth of about 2 cm in lines 5cm apart. The seeds were planted on March 2nd, 2024. Watering was done on a regular basis as required. After full germination of the seed and seedling they were transplanted onto the main field.

#### *2.2.2 Experimental Design*

The research will be carried out to find out the effect of pinching methods on growth and yield of Capsicum at Chapagaun, Lalitpur. The experiment will be conducted in Randomized Completely Block Design (RCBD) in the experimental field with seven treatments and three replications of each treatment.

### 2.3 Experimental Details

| | |
|---|---|
| Crop | : Capsicum |
| Variety | : California Wonder |
| Plant spacing | : 50 cm (RR) 40 cm (PP) |
| Design | : RCBD |
| Treatments | : 7 |
| Replications | : 3 |
| Plot size | : 2.4 m2 (2 m×1.2 m) |
| Date of transplant | : April 9th, 2024 |

#### *2.3.1 Experimental Field Layout*

Spacing between the replication and treatment was maintained at 0.6 m and 0.5 m respectively, each replication having 7 plots. Thus, the total area of research field was 84 m2 with total length and breadth of experimental design 17.5 m and 4.8 m respectively. Each plot consisted of 20 plants with 5 rows and 4 columns. Data was collected from the 5 sample plants of each plot.

#### *2.3.2 Treatment Details*

Seven treatments were used. The treatments used in the experiment were Pinching at 30 DAT, Pinching at 35 DAT, Pinching at 40 DAT, Pinching at 30 and 40 DAT, Pinching at 45 DAT, Pinching at 30 and 45 DAT and Control. These treatments were performed as single and double pinching. After the transplantation of the seedlings, the treatments were followed accordingly.

#### *2.3.3 Transplanting*

Almost 5-6 weeks old healthy seedlings raised in the nursery bed were transplanted in the late afternoon in the main field.

#### *2.3.4 Manuring And Fertilizer Application*

The recommended dose of fertilizer for Capsicum are:Urea: 10 kg per ropani, DAP: 5 kg per ropani, MOP: 5 kg per ropani, Compost: 1500 kg per ropani (Krishi Diary, 2080) Before transplanting, well decomposed compost was thoroughly mixed with 52 g of Urea, 52 g of MOP and 40 g of DAP per plot according to the recommended dose during field preparation. The split dose of urea was followed.

#### *2.3.5 Intercultural Operation*

Several intercultural tasks, including weeding, irrigation, and earthing up, were followed after the seedlings were transplanted. A key intercultural task in capsicum farming includes weed management. Immediately following the transplantation of seedlings, the first irrigation was provided. After the seedling establishment, it was irrigated at every four to five days interval depending on the soil's moisture condition and until a week before harvest. Weeding was done several times during the study period due to high number of weeds being faced at 10-15 days interval. Mostly seen weeds were Chenopodium album, Alternanthera philoxeroides and Cannabis sativa during the period of research. Earthing up was done after 30 days of transplanting.

### 2.4 Tabulation And Analysis Of Data

Microsoft Excel 2013 was used to enter and tabulate the data. R Studio (4.4.1 version) was used to do the treatment's ANOVA. The R was used to compute the grand mean, standard error of the mean, and coefficient of variance. DMRT performed the mean comparison at the 5% significance level.

## 3. Results and Discussions

### 3.1 Plant Height

It was discovered that pinching had a substantial impact on plant height on various days. In comparison to the plants that were pinched at 40 DAT and (30 and 40) DAT, the treatment (Control) exhibited the tallest plants, which was statistically comparable (Table 4). In contrast, 30 DAT had the least plant height. The height of the plants that were pinched at 30 and 40 DAT and 40 DAT is statistically equivalent to the height of the plants that were pinched at 30 and 45 DAT, 35 DAT, and 45 DAT. (Acharya, 2022) Additionally, it was noted that the constricted plot's chilli plants were noticeably shorter than those in the control plot. The removal of the apical section during pinching is what caused the pinched plants to be shorter, whereas the control plants were taller because pinching was not done

(Aryal et al., 2023). The average height of the plant at harvest ranges from 13.540 cm at 10 DAP to 36.284 cm at 50 DAP. A 12.34% coefficient of variance indicated a substantial difference in plant height 10 days after pinching.

### 3.2 Number Of Buds

Data collected 10 and 30 days after pinching (DAP) did not show a significant impact of pinching on the number of buds. The group that experienced pinching at (30 and 40) DAT had the most buds per plant at 50 DAP; this was statistically identical to the plants that experienced pinching at (30 and 45) DAT, 30 DAT, and 35 DAT. The group where pinching took place at 40 DAT had the fewest buds on record. Additionally, pinching at 30 DAT, 35 DAT, and 45 DAT was statistically equivalent to control. Apical dominance is crucial for longitudinal growth and is diminished when the apical bud is pinched. Therefore, eliminating the apical buds leads to an increase in lateral buds and decrease in plant height (Rezazadeh, 2015). The number of buds at 20 and 50 days after pinching was substantially different with a 34.90% and 32.58% coefficient of variance.

### 3.3 Branches

With a 29.35% coefficient of variance, there was a substantial difference in the number of branches 10 days after pinching. The number of branches at 10, 20, 30, and 40 days after pinching (DAP) was significantly altered by pinching, but not at 50 DAP (Table 6). The group that experienced pinching at 30 and 45 DAT had the most branches, which was statistically comparable to the groups that had pinching at 30 and 40 DAT, 35 DAT, 40 DAT, and 45 DAT, respectively. In the control, the fewest branches were found. Ten days after pinching, the mean branch number is 2.887; fifty days after pinching, it is 10.133. The importance of pinching frequency and timing is demonstrated by the fact that double pinching consistently performed better than single pinching or no pinching. Pinching is crucial for appropriate branching and possibly increased plant output, as seen by the control group's constant lowest number of secondary branches (Khanal, 2024). Subsequent pinching treatments applied during the active branching stage did not promote the growth of new productive branches or allow the current branches to mature (Dorajeerao, 2020).

### 3.4 Number Of Flowers

There was no discernible impact of pinching on the quantity of leaves at 10 and 50 days following the pinch. Twenty days after pinching, the mean number of flowers is 1.721; forty days after pinching, it is 9.526. According to Table 7, the group that was pinching at 30 and 45 DAT had the most blooms, which was statistically comparable to the group that was pinching at 40 and 45 DAT. Likewise, the pinching that produced the fewest blooms was at 30 DAT (Chandio, 2023). Several horticultural techniques, like pinching, typically alter the flower's characteristics. A double pinch produced the most blooms per plant (34.91) in Pusa Narangi Gainda, followed by a single pinch and no pinch (31.97 & 28.90). The beneficial effects of pinching may be an increased number of flowers because of an increase in primary branches and plant height control by removing apical dominance (Rezazadeh, 2015).

### 3.5 Number Of Fruits

The effect of pinching on number of fruits at 10 days, 20 days and 50 days after pinching (DAP) was not found to be significant. Table 8 shows that the highest number of fruits observed in the pinching occurred at (30 and 45) DAT and was statistically partially similar to the group subjected to the pinching at (30 and 40) DAT and 45 DAT. On the other hand, the lowest number of fruits was observed in the pinching occurred at 30 DAT and Control. The mean varies from 2.914 at 30 days after pinching to 5.251 at 50 days after pinching. In this study, pinched plants produced more fruits than un-pinched plants. Strong vegetative development and increased translocation of photosynthates from source to sink are two advantages of plants with more lateral branches for reproductive growth (K.A. Aikins, 2017) and photosynthetic efficiency, respectively (K.K. Dhedhi, 2017). Pinching has been shown to have a positive impact on reproductive growth in fenugreek (S.N. Vasudevan, 2010), sunflower (K.K. Dhedhi, 2017), and butternuts (K.A. Aikins, 2017). These results are consistent with the findings of this study. Fenugreek plants were found to have more pods pinched later than at an early stage (P. T. Sowmya, 2017).

### 3.6 Leaf Area Index

According to the study, the pinching that took place at 30 and 40 DAT and 30 and 45 DAT at 10 and 20 days after pinching had the highest leaf area index. Table 9 at 50 DAP showed that the pinching that took place at 30 and 40 DAT had the highest leaf area index, which was statistically similar to the pinching that took place at 30 DAT, 30 and 45 DAT, and 35 DAT but statistically different from the pinching that took place at 40 DAT and control. Additionally, the lowest leaf area index was derived from the pinching that took place at Control.

At 10 DAP, the mean is 0.0078, while at 50 DAP, it is 0.0231. Generally, the parameters of leaf area models have been the combination of maximum width (W) and leaf length (L) (Aminifard, 2017). Because there were more stems per plant in T3, the poblano pepper crop's LAI was highest there. This causes LAI to rise until a particular point, at which point it starts to fall. Senescence and the fall of the lower dry leaves cause the LAI to decline once the plant has completed its maximal growth and development (Mendoza-Pérez, 2017).

### 3.7 Days To Flowering And Fruiting

The study demonstrated that, with a coefficient of variation of 6.50%, the days to flowering were extremely significant. Table 10 shows that the pinching that took place at 40 and 45 days after the onset of flowering was statistically comparable to the pinching that took place at 30 and 35 days after the onset of flowering. In terms of statistics, pinching at 30 DAT is comparable to pinching at 30 and 40 DAT. At 30 and 45 DAT, the late blossoming was seen in the pinching. It was shown that the average time for capsicum to flower following transplantation was 62 days. Pinching practices have been linked to delayed flowering in a variety of crop species, such as bottle gourd (Patel AN, 2017) and fenugreek (S.N. Vasudevan, 2010).

Because the physiologically mature portion was removed during pinching, the new shoots that emerged from the pinched plants need more time to become physiologically inductive in order to produce flowers than non-pinched plants, which resulted in a delay in flowering. (2019, Kitty Rajan) Results for Chrysanthemum were comparable. Similarly, it was shown that the pinching at 30 DAT, 40 DAT, 45 DAT, and Control resulted in the days to early fruiting. In terms of statistics, pinching at 35 DAT is comparable to pinching at 30 and 40 DAT. At 30 and 45 DAT, the late fruiting was seen in the pinching.

### 3.8 Fruit Length, Fruit Diameter And Fruit Weight

The average fruit weight, diameter, and length were determined to be 70.321, 4.513, and 6.951, respectively. Fruit diameter and weight were found to differ significantly, with coefficients of variation of 5.33% and 9.20%, respectively. Accordingly, fruit length was determined to be not relevant. Pinching at 30 and 45 days after harvest produced the largest fruit diameter and weight. Similarly, at 45 DAT, fruit weight was seen in pinching, while the lowest fruit diameter was seen in Control. Pinching can increase fruit length because it increases cytokinin concentrations and decreases auxin concentrations, which helps the plant balance its carbon-nitrogen ratio and store more photosynthate (Khanal, 2024).

In addition to having more lateral branches, which in turn have more leaves, pinched plants produce more photosynthetic energy. Weighted pods in constricted plants may therefore be explained by the source and sink theory (Khanal, 2024).

### 3.9 Yield

The yield from pinching varies significantly depending on the treatment. According to Table 12, pinching at 30 and 45 DAT produced the maximum yield per sample plant (373.67), followed by Control, which was statistically comparable to pinching at 35, 40, 45, and (30 and 40) DAT. The yield per sample plant decreased as a result of the treatment pinching at 30 DAT, or 140.44. With a CV of 20.33%, the average yield per sample plant was found to be 229.235. However, the pinching done at 30 and 45 DAT produced the largest fruit number, or 7.86 on average, whereas the pinching done at 30 DAT produced the lowest, or 3.12 on average.

According to Acharya (2022), pinching caused a significant variation in chili production. The 25th and 40th DATs produced the highest output. (Zobia Naheed1, 2013) showed that pinching increases yield by reversing apical dominance and focusing energy on the growth of new branches. In the past, pinching was found to be beneficial for enhancing yield characteristics in a variety of crop species, such as okra (Abid Ali1, 2022), field beans (E. S. Kumar et al., 2018), bottle guard (Muhammad Naafe1, 2022), and fenugreek (P. T. Sowmya, 2017).

**Table 1:** Effect of pinching methods on plant height of Capsicum at Chapagaun, Lalitpur, 2024

| Treatments | Plant height (cm) | | | | |
|---|---|---|---|---|---|
| | 10 DAP | 20 DAP | 30 DAP | 40 DAP | 50 DAP |
| Pinching at 30 DAT | 9.81$^{c}$ | 14.96$^{c}$ | 22.94$^{c}$ | 27.87$^{c}$ | 30.96$^{c}$ |
| Pinching at 30 and 40 DAT | 13.78$^{b}$ | 18.79$^{bc}$ | 27.14$^{abc}$ | 36.44$^{ab}$ | 37.85$^{ab}$ |
| Pinching at 30 and 45 DAT | 19.59$^{a}$ | 26.39$^{a}$ | 32.84$^{a}$ | 35.43$^{ab}$ | 36.85$^{abc}$ |
| Pinching at 35 DAT | 10.37$^{c}$ | 17.86$^{bc}$ | 24.42$^{bc}$ | 30.32$^{bc}$ | 32.76$^{bc}$ |
| Pinching at 40 DAT | 12.67$^{bc}$ | 22.14$^{ab}$ | 29.53$^{ab}$ | 36.03$^{ab}$ | 38.06$^{ab}$ |
| Pinching at 45 DAT | 15.80$^{b}$ | 22.91$^{ab}$ | 29.92$^{ab}$ | 34.35$^{ab}$ | 35.35$^{bc}$ |
| Control | 12.77$^{bc}$ | 21.55$^{ab}$ | 31.68$^{a}$ | 37.91$^{a}$ | 42.16$^{a}$ |
| SEm(±) | 0.965 | 1.923 | 1.945 | 1.840 | 1.916 |
| $LSD_{0.05}$ | 2.974 | 5.926 | 5.993 | 5.669 | 5.905 |
| F-test | *** | * | * | * | * |
| CV, (%) | 12.34 | 16.12 | 11.88 | 9.35 | 9.14 |
| Grand mean | 13.540 | 20.657 | 28.356 | 34.049 | 36.284 |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, * significant at 0.05% level, *** significant at 0.001% level.

**Table 2:** Effect of pinching methods on Number of buds of Capsicum at Chapagaun, Lalitpur, 2024

| Treatments | Number of buds | | | | |
|---|---|---|---|---|---|
| | 10 DAP | 20 DAP | 30 DAP | 40 DAP | 50 DAP |
| Pinching at 30 DAT | 4.40$^{c}$ | 9.07$^{d}$ | 27.87 | 44.93$^{ab}$ | 53.80$^{ab}$ |
| Pinching at 30 and 40 DAT | 6.20$^{b}$ | 24.93$^{cd}$ | 61.00 | 57.60$^{a}$ | 67.00$^{a}$ |
| Pinching at 30 and 45 DAT | 9.93$^{a}$ | 33.27$^{bc}$ | 57.93 | 53.20$^{a}$ | 54.73$^{ab}$ |
| Pinching at 35 DAT | 5.40$^{c}$ | 17.13$^{cd}$ | 42.47 | 41.80$^{ab}$ | 50.63$^{ab}$ |
| Pinching at 40 DAT | 12.67$^{bc}$ | 54.67$^{a}$ | 50.40 | 58.80$^{a}$ | 13.93$^{c}$ |
| Pinching at 45 DAT | 9.40$^{b}$ | 46.00$^{ab}$ | 47.73 | 51.40$^{a}$ | 22.07$^{c}$ |
| Control | 4.16$^{bc}$ | 11.27$^{d}$ | 31.87 | 32.97$^{b}$ | 33.20$^{bc}$ |
| SEm(±) | 1.897 | 5.651 | 7.451 | 5.269 | 7.938 |
| $LSD_{0.05}$ | - | 17.414 | - | 16.235 | 24.460 |
| F-test | ns | *** | ns | * | *** |
| CV, (%) | 44.09 | 34.90 | 28.29 | 18.75 | 32.58 |
| Grand mean | 7.451 | 28.048 | 45.610 | 48.671 | 42.195 |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, * significant at 0.05% level, *** significant at 0.001% level.

**Table 3:** Effect of pinching methods on number of branches of Capsicum at Chapagaun, Lalitpur,2024

| Treatments | Number of branches | | | | |
|---|---|---|---|---|---|
| | 10 DAP | 20 DAP | 30 DAP | 40 DAP | 50 DAP |
| Pinching at 30 DAT | 1.33$^{c}$ | 3.40$^{c}$ | 5.73$^{c}$ | 7.20$^{b}$ | 9.07 |
| Pinching at 30 and 40 DAT | 4.40$^{a}$ | 6.93$^{ab}$ | 9.00$^{ab}$ | 10.00$^{a}$ | 10.53 |
| Pinching at 30 and 45 DAT | 4.60$^{a}$ | 8.13$^{a}$ | 10.13$^{a}$ | 10.73$^{a}$ | 11.20 |
| Pinching at 35 DAT | 1.66$^{bc}$ | 3.67$^{c}$ | 7.13$^{bc}$ | 10.47$^{a}$ | 10.67 |
| Pinching at 40 DAT | 2.68$^{b}$ | 5.40$^{bc}$ | 8.40$^{ab}$ | 10.07$^{a}$ | 10.73 |
| Pinching at 45 DAT | 4.20$^{a}$ | 7.20$^{ab}$ | 9.53$^{a}$ | 10.27$^{a}$ | 11.13 |
| Control | 1.33$^{c}$ | 3.21$^{c}$ | 5.27$^{c}$ | 7.40$^{b}$ | 7.60 |
| SEm(±) | 0.356 | 0.759 | 0.682 | 0.770 | 0.774 |
| $LSD_{0.05}$ | 1.097 | 2.338 | 2.101 | 2.373 | - |
| F test | *** | ** | ** | * | ns |
| CV, (%) | 21.35 | 24.25 | 14.97 | 14.11 | 13.23 |
| Grand mean | 2.887 | 5.420 | 7.886 | 9.448 | 10.133 |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, * significant at 0.05% level, ** significant at 0.01% level, *** significant at 0.001% level.

| **Table 4:** Effect of pinching methods on number of flowers of Capsicum at Chapagaun, Lalitpur, 2024 | | | |
|---|---|---|---|
| | No. of flowers | | |
| Pinching at 30 DAT | 1.13$^{c}$ | 2.24$^{c}$ | 6.05$^{b}$ |
| Pinching at 30 and 40 DAT | 1.71$^{bc}$ | 7.13$^{ab}$ | 13.27$^{a}$ |
| Pinching at 30 and 45 DAT | 2.63$^{a}$ | 9.20$^{a}$ | 13.67$^{a}$ |
| Pinching at 35 DAT | 1.47$^{bc}$ | 4.62$^{abc}$ | 6.27$^{b}$ |
| Pinching at 40 DAT | 1.68$^{bc}$ | 5.38$^{abc}$ | 9.67$^{ab}$ |
| Pinching at 45 DAT | 2.14$^{ab}$ | 8.22$^{a}$ | 10.00$^{ab}$ |
| Control | 1.29$^{c}$ | 2.75$^{bc}$ | 7.77$^{b}$ |
| SEm(±) | 0.215 | 1.369 | 1.643 |
| $LSD_{0.05}$ | 0.661 | 4.233 | 5.063 |
| F test | ** | * | * |
| CV, (%) | 21.58 | 42.11 | 29.87 |
| Grand mean | 1.721 | 5.650 | 9.526 |
| Pinching at 30 DAT | 1.13$^{c}$ | 2.24$^{c}$ | 6.05$^{b}$ |
| Pinching at 30 and 40 DAT | 1.71$^{bc}$ | 7.13$^{ab}$ | 13.27$^{a}$ |
| Pinching at 30 and 45 DAT | 2.63$^{a}$ | 9.20$^{a}$ | 13.67$^{a}$ |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, * significant at 0.05% level, ** significant at 0.01% level.

| **Table 5:** Effect of pinching methods on number of fruits of Capsicum at Chapagaun, Lalitpur, 2024 | | | |
|---|---|---|---|
| Treatments | No. of fruits | | |
| | 30 DAP | 40DAP | 50 DAP |
| Pinching at 30 DAT | 1.00$^{b}$ | 3.02$^{c}$ | 5.23 |
| Pinching at 30 and 40 DAT | 3.17$^{b}$ | 6.62$^{ab}$ | 5.07 |
| Pinching at 30 and 45 DAT | 6.33$^{a}$ | 9.00$^{a}$ | 5.93 |
| Pinching at 35 DAT | 1.57$^{b}$ | 5.02$^{bc}$ | 5.80 |
| Pinching at 40 DAT | 2.00$^{b}$ | 5.51$^{bc}$ | 5.17 |
| Pinching at 45 DAT | 4.23$^{ab}$ | 6.28$^{ab}$ | 4.49 |
| Control | 2.10$^{b}$ | 3.02$^{c}$ | 5.07 |
| SEm(±) | 0.964 | 0.947 | 1.326 |
| $LSD_{0.0\,5}$ | 2.970 | 2.920 | - |
| F test | * | ** | ns |
| CV, (%) | 57.28 | 29.86 | 43.74 |
| Grand mean | 2.914 | 5.495 | 5.251 |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, * significant at 0.05% level, ** significant at 0.01% level.

| **Table 6:** Effect of pinching methods on leaf area index of Capsicum at Chapagaun, Lalitpur, 2024 | | | | | |
|---|---|---|---|---|---|
| Treatments | Leaf area index ($m^2$) | | | | |
| | 10 DAP | 20 DAP | 30 DAP | 40 DAP | 50 DAP |
| Pinching at 30 DAT | 0.0046$^{b}$ | 0.0049$^{c}$ | 0.0105$^{c}$ | 0.0121$^{d}$ | 0.0245$^{ab}$ |
| Pinching at 30 and 40 DAT | 0.0121$^{a}$ | 0.0176$^{a}$ | 0.0204$^{ab}$ | 0.0218$^{ab}$ | 0.0289$^{a}$ |
| Pinching at 30 and 45 DAT | 0.0069$^{b}$ | 0.0183$^{a}$ | 0.0237$^{a}$ | 0.0261$^{a}$ | 0.0254$^{ab}$ |
| Pinching at 35 DAT | 0.0049$^{b}$ | 0.0066$^{c}$ | 0.0120$^{c}$ | 0.0224$^{ab}$ | 0.0264$^{ab}$ |
| Pinching at 40 DAT | 0.0082$^{b}$ | 0.0106$^{bc}$ | 0.0117$^{c}$ | 0.0177$^{bcd}$ | 0.0190$^{bc}$ |
| Pinching at 45 DAT | 0.0117$^{a}$ | 0.0129$^{ab}$ | 0.0162$^{bc}$ | 0.0192$^{abc}$ | 0.0222$^{abc}$ |
| Control | 0.0061$^{b}$ | 0.0098$^{bc}$ | 0.0109$^{c}$ | 0.0132$^{cd}$ | 0.0155$^{c}$ |
| SEm(±) | 0.0011 | 0.0019 | 0.0020 | 0.0021 | 0.0026 |
| $LSD_{0.05}$ | 0.003 | 0.0058 | 0.0061 | 0.0066 | 0.0081 |
| F test | ** | ** | ** | ** | * |
| CV, (%) | 24.75 | 28.42 | 23.13 | 19.54 | 19.60 |
| Grand mean | 0.0078 | 0.0115 | 0.0149 | 0.0189 | 0.0231 |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, * significant at 0.05% level, ** significant at 0.01% level.

| **Table 7:** Effect of pinching methods on days to flowering and fruiting of Capsicum at Chapagaun, Lalitpur, 2024 | | |
|---|---|---|
| Treatments | Days to Flowering | Days to fruiting |
| Pinching at 30 DAT | 63.67$^{ab}$ | 77.33$^{a}$ |
| Pinching at 30 and 40 DAT | 56.67$^{bc}$ | 62.67$^{bc}$ |
| Pinching at 30 and 45 DAT | 52.33$^{c}$ | 60.67$^{c}$ |
| Pinching at 35 DAT | 64.00$^{ab}$ | 71.33$^{ab}$ |
| Pinching at 40 DAT | 71.33$^{a}$ | 80.67$^{a}$ |
| Pinching at 45 DAT | 71.33$^{a}$ | 81.33$^{a}$ |
| Control | 60.00$^{b}$ | 73.00$^{a}$ |
| SEm(±) | 2.358 | 3.140 |
| $LSD_{0.05}$ | 7.265 | 9.674 |
| F test | *** | ** |
| CV, (%) | 6.50 | 7.50 |
| Grand mean | 62.762 | 72.429 |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, ** significant at 0.01% level, *** significant at 0.001% level.

| **Table 8:** Effect of pinching methods on fruit length, fruit diameter and fruit weight of Capsicum at Chapagaun, Lalitpur, 2024 | | | |
|---|---|---|---|
| Treatments | Fruit length (cm) | Fruit diameter (cm) | Fruit weight (g) |
| Pinching at 30 DAT | 6.86 | 4.16$^{cd}$ | 73.56$^{abc}$ |
| Pinching at 30 and 40 DAT | 6.84 | 4.64$^{ab}$ | 64.08$^{bc}$ |
| Pinching at 30 and 45 DAT | 7.17 | 4.95$^{a}$ | 81.04$^{a}$ |
| Pinching at 35 DAT | 6.93 | 4.73$^{ab}$ | 75.39$^{ab}$ |
| Pinching at 40 DAT | 7.16 | 4.38$^{bc}$ | 67.93$^{bc}$ |
| Pinching at 45 DAT | 7.12 | 4.82$^{ab}$ | 61.36$^{c}$ |
| Control | 6.59 | 3.91$^{d}$ | 68.88$^{abc}$ |
| SEm(±) | 0.204 | 0.139 | 3.735 |
| $LSD_{0.05}$ | - | 0.429 | 11.509 |
| F test | ns | ** | * |
| CV, (%) | 5.09 | 5.33 | 9.20 |
| Grand mean | 6.951 | 4.513 | 70.321 |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, * significant at 0.05% level, ** significant at 0.01% level.

| **Table 9:** Effect of pinching methods on Yield (g) of Capsicum at Chapagaun, Lalitpur, 2024 | | | |
|---|---|---|---|
| Treatments | Fruit numbers/plant | Yield (g/plant) | Yield per plot (g) |
| Pinching at 30 DAT | 3.12$^{b}$ | 140.44$^{c}$ | 683.44$^{c}$ |
| Pinching at 30 and 40 DAT | 4.17$^{b}$ | 195.07$^{bc}$ | 1439.07$^{a}$ |
| Pinching at 30 and 45 DAT | 7.86$^{a}$ | 373.67$^{a}$ | 1664.33$^{a}$ |
| Pinching at 35 DAT | 3.32$^{b}$ | 223.42$^{bc}$ | 774.08$^{bc}$ |
| Pinching at 40 DAT | 5.08$^{b}$ | 230.22$^{bc}$ | 1192.22$^{ab}$ |
| Pinching at 45 DAT | 3.31$^{b}$ | 199.89$^{bc}$ | 770.56$^{bc}$ |
| Control | 3.33$^{b}$ | 241.94$^{b}$ | 832.28$^{bc}$ |
| SEm(±) | 0.851 | 26.910 | 150.675 |
| $LSD_{0.05}$ | 2.623 | 82.919 | 464.276 |
| F test | * | ** | ** |
| CV, (%) | 34.174 | 20.333 | 24.835 |
| **Grand mean** | **4.314** | **229.235** | **1050.854** |

Treatment means followed by common letters (s) within columns are not significantly different among each other based on DMRT value at 5% level of significance. ns = non-significant, * significant at 0.05% level, ** significant at 0.01% level.

## 4. Summary

Capsicum (Capsicum annum) is one of the vegetables that is most frequently cultivated in tropical and subtropical regions of the world and is also the most important crop of Nepal too. It is grown in all seasons over a wide range of environmental conditions. The study on the "Effect of pinching methods on growth and yield of Capsicum at Chapagaun, Lalitpur" was conducted in Godawari-11, Bajrabarahi, Lalitpur, Nepal.

- Seven different treatments of Pinching on capsicum were evaluated for their different growth parameters like plant height, number of leaves, number of buds, number of branches, number of flowers, number of fruits, days to flowering, days to fruiting, leaf area index, yield and dry weight.
- A fully randomized block design was used for the experiment. There was a uniform climate. There were three replications, and seven treatments performed. With a length of 2m and a width of 1m, each plot measured 2.4 $m^2$. Five randomly selected plants from each plot were used to gather data. On the 27th of Chaitra 2080, capsicum plants

were transplanted with a 60*50 cm plant spacing.

- The effect of Pinching on height was found to be significant from each other. The mean plant height observed at 10 DAP was 13.540cm, at 20 DAP it was 20.657, at 60 DAP it was 28.356, at 40 DAP it was 34.049 and at 50 DAP it was 36.284 (Table 4).
- The number of buds observed at 10 DAP and 30 DAP was not found significantly different from each other. The mean number of buds observed at 10 DAP was 7.451, 20 DAP was 28.048, at 30 DAP was 45.610, at 40 DAP was 48.671, and 50 DAP was 42.195 respectively.
- The number of branches observed at 10 DAP, 20 DAP, 30 DAP and 40 DAP was found to be significant where at 50 DAP it was found to be non-significant.
- The fruit diameter, fruit weight, yield per plant and yield per ha was found significantly different from each other.
- The mean fruit diameter was found 4.513cm. The highest fruit diameter was found in the treatment pinching at (30 and 45) DAT i.e. 4.95cm whereas lowest fruit diameter was found in control i.e. 3.91cm.
- The fruit length was found to be non-significant from each other.
- The Fruit weight was found significant from each other. The mean fruit weight was found (70.321). The highest fruit weight was found in the treatment pinching at (30 and 45) DAT whereas, lowest fruit weight was found in pinching at 35 DAT.
- The yield per sample plant was found significant to each other. The highest yield per sample plant was observed in pinching at (30 and 45) DAT i.e. 373.67gm likewise the lowest yield per sample plant was observed in pinching at 30 DAT i.e. 140.44gm.
- The overall yield was deemed noteworthy. The highest yield, 6.93 mt/ha, was obtained from pinching at (30 and 45) DAT. The second-highest yield, 5.99 mt/ha, came from pinching at (30 and 40) DAT. The lowest yield, 2.85 mt/ha, was obtained from pinching at 30 DAT.

## 5. Conclusion

Pinching can have a major impact on the development and yield and productivity of capsicum plants, according to study findings on the "Effect of pinching methods on growth and yield of Capsicum at Chapagaun, Lalitpur". Pinching at (30 and 45) days after transplantation was found to be most effective which holds a significantly positive impact on both the growth and yield of Capsicum. The yield depends on the number and quality of flowering branches, which can be improved by pinching the apical growth. In contrast, the capsicum without any application of treatment exhibited the lowest effect, indicating that pinching played a crucial role in enhancing Capsicum growth and yield in the study area. These findings underscore the possible advantages of implementing pinching and provide producers of capsicum with insightful information.

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