

**The Effect Of Types Of Manure And Pruning  
On The Growth And Yield Of Cucumber  
(*Cucumis sativus* L.)**

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**Abstract**

Cucumber (*Cucumis sativus* L.) is a high-value horticultural item that is widely grown throughout Indonesia. Increased market demand drives the need for more optimal agricultural practices to boost crop yields. To boost plant development and yield, one approach is to utilize various manures and suitable pruning procedures. The purpose of this study is to examine the effects of different types of manure and pruning, as well as their interactions, on cucumber plant development and yield. The study was conducted from December 2023 to January 2024 on entrepreneurial land at the Faculty of Agriculture, Tunas Pembangunan University, Surakarta, with Alfisol soil type (PPT = Chocolate Latosol). The investigation was conducted in Plosorejo Village, Matesih District, Karanganyar Regency, at an elevation of 461 meters above sea level. The approach employed was a Randomized Complete Block Design (RAKL) with two factors: type of manure (T0: No Manure, T1: Duck Manure, T2: Cow Manure) and pruning type. The study's findings revealed that (1) treatment with various types of manure had a significant effect on the parameters of plant stem length, wet stover weight, number of flowers, number of fruit ovaries, and fruit length. Fruit weight per plant and fruit number per plot are both significantly affected. (2) The pruning procedure had a substantial impact on wet stover weight, number of flowers, number of ovaries, fruit length, fruit weight per plant, and fruit weight per plot. has a significant impact on the number of fruit parameters per plot. (3) The effect of manure and pruning on cucumber yield was highly significant in terms of number of flowers, number of fruit ovaries, fruit length, and fruit weight per plant. It has a considerable impact on wet stover weight, fruit number, and fruit weight per plot. The T1P2 treatment produced the best yield, with a fruit weight per plot of 17.53 kg (87.68 tons per ha). The T2P0 treatment produced the lowest fruit weight per plot, with a yield of 11.97 kg (59.85 tonnes per Ha). The use of manure and chicken trimming, either separately or in combination, has a beneficial effect on cucumber growth and yield, implying that this treatment is helpful for enhancing cucumber productivity.

**Keywords:** crop yield, cucumber, growth, manure, pruning

**Introduction**

Cucumber (*Cucumis sativus* L.) is a highly economically valuable vegetable. Cucumber is a valuable and popular horticulture crop farmed by Indonesian farmers. Plant specialists assume that the cucumber plant originated in India, specifically on the Himalayan mountains. Then, while approaching China in 1882, De Condole added it to

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the list of native Indian flora. Cucumber is one of the plant items that has begun to reach the international market as fresh fruit. Cucumber production in Indonesia continues to expand year after year (Gumelar et al., 2021).

Cucumber plants are frequently planted in lowlands and mountains, particularly at elevations ranging from 0 to 1,000 meters above sea level. In Indonesia, the areas producing cucumbers and kernels are West Java, Central Java, East Java, and the Special Region of Aceh (Gumelar et al., 2021).

Chemicals are used in agriculture for a variety of purposes, including fertilization, growth stimulants, binders and insect control. These substances can pollute the environment and have a negative impact on health. The proposed approach involves planting crops in an organic farming method that does not utilize chemicals. Plant growth is supported by organic elements derived from the surrounding environment. Organic farming is an agricultural approach that uses natural materials while avoiding or limiting the use of synthetic chemicals. The goal is to provide agricultural products that are safe for the health of producers and consumers while also ensuring environmental balance by sustaining the natural cycle (Marsuhendi et al., 2021).

Organic fertilizers, such as duck manure and cow dung, can provide the best benefits for plant growth. Organic fertilizers have several advantages over chemical fertilizers, including the ability to neutralize soil pH, neutralize toxins caused by heavy metals in the soil, improve soil structure by making it more porous, and directly increase the amount of chemical fertilizers. Water in the soil aids in absorbing nutrients from extra chemical fertilizers (Sastrawan et al., 2020).

Manure can also promote soil aeration, boost water holding capacity, increase soil carrying capacity, act as an energy source for soil microbes, and provide nutrients. Goat dung includes N nutrients, which can promote leaf growth and increase photosynthesis in plants. Cow manure includes many bacteria and organic substances and is a source of macronutrients for plant growth and development (Haedar et al., 2022).

Cucumber yields can be reduced by a variety of factors, including inappropriate agricultural procedures. When planting cucumbers, dense branches and leaves can induce disease assaults, resulting in lower cucumber yields that require pruning. Pruning seeks to eliminate unproductive plant sections so that photosynthetic assimilation results can be directed toward the growth of other plant parts. Pruning also seeks to promote nutrient efficiency and improve plant growth and development, resulting in larger yields. Pruning side branches is used to maintain and boost plant productivity. Pruning should be done at the proper age to get the best outcomes in terms of plant development and productivity, because it is closely tied to photosynthesis and metabolic rate (Suwandi et al., 2023).

Cucumber pruning success is determined by a number of factors, including size and variety. In general, Indonesian farmers do not trim cucumbers or limit the removal of side shoots, which causes the leaves to grow thickly and reduces the fruit's photosynthetic potential. Cucumber yields can be increased by a variety of cultivation practices, including trimming. Pruning is an endeavor to eliminate non-vital sections of the tree while optimizing those that are necessary for growth and productivity. The type of cucumber utilized is very significant in the cultivation process. Cultivation strategies such as seed size and quality, as well as a supportive atmosphere, will boost plant productivity. Cucumbers react differently when pruned (Maulana et al., 2023).

The purpose of this study was to determine the effect of types of manure on plant growth and yield of cucumbers (*Cucumis sativus* L.), to determine the effect of pruning

on growth and yield of cucumbers (*Cucumis sativus* L.), to determine the effect of interaction on growth and yield of cucumbers (*Cucumis sativus* L.).

## **Method**

### **Place and Time of Research**

The study was done from December 2023 to January 2024 on the entrepreneurial land of the Faculty of Agriculture, Tunas Pembangunan University, Surakarta, with Alfisol soil type (PPT = Brown Latosol). The investigation was conducted in Plosorejo Village, Matesih District, Karanganyar Regency, at a height of 461 meters above sea level.

### **Research Materials and Tools**

Materials for this research Cucumber plant variety Zatavy F1, study land, and forms of manure. Tools utilized in this research: Bucket, sprayer, meter, digital scales, raffia rope, stationary, and labels.

### **Research Methods**

The study approach employed is factorial, with a basic design of Complete Randomized Block Design (RAKL), consisting of two treatment components and three replicates. The first factor is the type of manure (T), which has three levels: T0 (no manure), T1 (duck manure 20 tons/ha or 0.6 kg/plant), and T2 (cow manure 20 tons/ha or 0.6kg/plant). The second component is pruning treatment (P), which has three levels: P0 (no pruning), P1 (pruning of the main shoot stem), and P2 (pruning of the lateral stem).

### **Research Implementation**

This research's implementation will take place in numerous stages. The first stage is land preparation, which involves scratching the soil with a hoe, making beds, and applying manure, namely duck manure and basic fertilizer from cow manure at a rate of 20 tons per hectare. After that, the beds are covered with synthetic mulch. Block mapping is then used to mark the planted ridges. Each block has four ridges, and each plot is labeled according to the treatment used. The next stage is seedling production, which involves spreading cucumber seeds. The seeds are steeped for 24 hours before planting in nursery polybags for five days. Once the seedlings are ready, they are placed in the prepared soil. Planting is done in the morning or evening using five-day-old seedlings at a planting distance of 50 cm. Fertilization is done during plant maintenance with poured NPK fertilizer. Weeding is also done to keep weeds from disturbing the plants and becoming a breeding ground for Plant Pest Organisms (OPT). Watering was done in two ways: leaving water stagnant in each bed line twice a week and watering straight into the planting hole. Pruning was carried out according to the research treatment, which included no pruning, trimming the main stem, and pruning the lateral stem. Pruning occurred 21 days after planting. Cow manure and duck manure were each supplied up to 4.8 kg per plot, or 20,000 kg per hectare, as fertilizer during land preparation. Meanwhile, 32 grams of NPK fertilizer were applied to each plot four times (for a total of 16 kg per hectare), with one application every week for four weeks. The harvest stage was carried out in accordance with the harvest criteria, specifically when the cucumber plants were 35-40 DAP and the fruit was neither too young nor too old. Harvesting took place every two days until the bushes ceased producing fruit. Finally, observations were collected from the start of the study to the end of the cucumber planting season. The observation method was modified to reflect the parameters observed.

### **Research Parameters**

The observation parameters in this study encompass numerous elements of cucumber plant growth and yield. A fabric meter was used to measure the length of the plant stem from its base to its greatest growing point once a week. The weight of the wet stubble was determined by weighing all parts of the plant, including the roots, stems, and leaves, in their fresh state. Meanwhile, the weight of the dry stubble was determined after the plant had been dried in an oven at 65°C for 24 hours until it was consistent. Furthermore, the number of flowers was counted each week after they began to bloom. The number of ovaries was determined after the flowers matured into ovaries by recording each ovary that developed and had a minimum length of 1-2 cm as a marker of fruit development. The amount of fruits was counted from the initial to the final harvest. Fruit length was measured using a ruler from the base to the tip of the fruit after counting the number of fruits harvested. The amount of fruits per plot was determined by counting the fruits in each research experiment. Furthermore, the weight of the fruit per plant was obtained by weighing the fruit upon harvest, and the weight of the fruit per plot was calculated by adding the weight of all samples in a single research plot.

### **Data Analysis**

The observation findings were evaluated using analysis of variance at 1% and 5% levels. If it is significantly different or very significantly different, the Duncan's Multiple Range Test (DMRT) is used to distinguish between treatment levels.

### **Result And Discussion**

#### **Growth Parameters of Cucumber Plants (*Cucumis sativus* L.)**

A variance analysis was performed to investigate the influence of several types of manure and pruning treatments on the growth of cucumber plants (*Cucumis sativus* L.), as shown in Table 3. Summary of Research Results. Meanwhile, to establish the influence of the amount of feeding various types of manure and pruning on the growth of cucumber plants (*Cucumis sativus* L.), a DMRT (Duncan's Multiple Range Test) test was carried out at a level of 5%, as shown in Table 1 below:

**Table 1. The results of the DMRT (Duncan's Multiple Range Test) with a level of 5% on the growth of cucumber plants (*Cucumis sativus* L.) due to the administration of manure doses and pruning**

Treatment	Length of Plant Stem (cm)	Wet Stove Weight (kg)	Dry Stove Weight (kg)
Manure (T)			
T <sub>0</sub>	214,06b	1,48b	1,11
T <sub>1</sub>	284,24a	1,56a	1,15
T <sub>2</sub>	220,88b	1,49b	1,13
Pruning (P)			
P <sub>0</sub>	229,36	1,50b	1,12
P <sub>1</sub>	232,90	1,49a	1,13
P <sub>2</sub>	256,91	1,5b	1,14
Treatment Interaction TxP			
T <sub>0</sub> P <sub>0</sub>	207,58	1,48bc	1,11
T <sub>0</sub> P <sub>1</sub>	203,67	1,46c	1,09
T <sub>0</sub> P <sub>2</sub>	230,92	1,5bc	1,12
T <sub>1</sub> P <sub>0</sub>	48,71	1,53b	1,14
T <sub>1</sub> P <sub>1</sub>	295,92	1,51bc	1,13
T <sub>1</sub> P <sub>2</sub>	308,08	1,64a	1,18
T <sub>2</sub> P <sub>0</sub>	231,79	1,48bc	1,11
T <sub>2</sub> P <sub>1</sub>	199,11	1,49bc	1,16
T <sub>2</sub> P <sub>2</sub>	231,73	1,51bc	1,12

Description :

T : Manure

P : Pruning

TxP : Treatment Interaction

DMRT Statement: Treatments in columns followed by the same letter show no significant difference in the DMRT test at the 5% level.

### **The effect of various types of manure on the growth of cucumber plants**

Manure type (T) significantly affects cucumber stem length (*Cucumis sativus* L.) due to its essential nutrients (N, P, K), which support vegetative growth. Nitrogen aids chlorophyll formation and protein synthesis, promoting stem elongation. Manure also improves soil structure and water retention, enhancing nutrient absorption. Duncan test results showed T<sub>1</sub> (manure) had the longest stem (56.84 cm), significantly higher than T<sub>0</sub> (42.81 cm) and T<sub>2</sub> (44.17 cm). The difference highlights that T<sub>1</sub> provides optimal nutrients, while T<sub>2</sub>, despite higher nutrient content, may have less ideal composition. This underscores the role of manure type and quality in stem growth. The difference between T<sub>0</sub> and T<sub>1</sub> demonstrates that manure application (T<sub>1</sub>) provides a more appropriate supply of important nutrients like nitrogen, phosphate, and potassium, resulting in increased stem development. Meanwhile, the discrepancy between T<sub>0</sub> and T<sub>2</sub> indicates that, while T<sub>2</sub> contains more nutrients, the composition or availability of nutrients may be less ideal than

in T1. The distinction between T1 and T2 also demonstrates how the type and quality of manure affect its effectiveness in stimulating plant stem growth (Mading et al., 2021).

Manure type (T) significantly influences wet stover weight by affecting nutrient availability, soil structure, water retention, and microbial activity, all of which enhance vegetative growth. These factors lead to higher biomass production with increased water content. Duncan test results showed T1 had the highest wet stover weight (1.56 kg), compared to T0 (1.48 kg) and T2 (1.49 kg). The increase at T1 indicates better water retention in plant tissue, supporting optimal growth. Differences between T0, T1, and T2 highlight the role of manure composition and decomposition rate in nutrient absorption and biomass formation.

Manure type (T) has no significant impact on dry stover weight, likely due to similar dry matter content, slow nutrient release, stable absorption efficiency, and uniform environmental conditions. Despite variations in wet stover weight, the final dry weight remains comparable across treatments.

### **The effect of pruning on the growth of cucumber plants**

Pruning (P) had no significant impact on cucumber stem length, as genetic factors and nutrient availability play a greater role. While pruning affects energy and nutrient distribution, it mainly influences branch, leaf, and fruit growth rather than stem elongation.

Pruning (P) significantly affected wet stubble weight by optimizing nutrient and energy distribution, promoting biomass growth. The Duncan test showed the highest wet stubble at 1.55 kg, followed by P0 (1.50 kg) and P1 (1.49 kg). Pruning minimizes branch competition, enhancing resource efficiency.

Pruning (P) had no significant influence on dry stubble weight. Pruning does not have a direct effect on dry biomass buildup, which could explain this.

### **The effect of interaction between types of manure and pruning on the growth of cucumber plants**

Manure type and pruning (TP) showed no significant interaction on cucumber stem length, likely due to their independent effects, limited influence on growth, environmental dominance, and high data variability.

The interaction of manure and pruning (TP) significantly affects wet stubble weight by enhancing nutrient efficiency, vegetative growth, energy distribution, and photosynthesis. Proper manure application combined with effective pruning increases biomass production. Duncan test results showed that T1P2 had the highest wet stubble weight (1.64 kg), significantly more than other combinations, while T0P1 had the lowest (1.46 kg). This indicates that optimal manure and pruning improve photosynthesis and water use efficiency. Meanwhile, T0P1's low weight suggests pruning alone cannot maximize biomass without sufficient nutrients. The distinction between T2P0 and T1P1 demonstrates that specific forms of manure have variable efficacy in increasing the weight of the compost, which is likely impacted by the levels of nitrogen and organic matter present in them (Lubabah, 2022).

The combination of manure and pruning (TP) had no significant effect on dry matter weight. While biomass increased, factors like transpiration rate and dry biomass conversion were more influential. Pruning had minimal impact, and manure may have reached its biomass-enhancing limit. Environmental factors and data variability likely obscured treatment differences.

### Yield Parameters in Cucumber Plants (*Cucumis sativus* L.)

A variance analysis was performed to investigate the influence of several types of manure treatments and pruning on cucumber plant production (*Cucumis sativus* L.), as shown in Table 3. Summary of Research Results. Meanwhile, to establish the influence of the level of manure and pruning on the production of cucumber plants (*Cucumis sativus* L.), a DMRT (Duncan's Multiple Range Test) test was carried out at a level of 5%, as shown in table 2:

**Table 2 The results of the DMRT (Duncan's Multiple Range Test) with a level of 5% on the yield of cucumber plants (*Cucumis sativus* L.) due to the administration of manure doses and pruning**

Treatment	Number of flowers	Number of fruit buds	Number of Fruits (fruits)	Fruit Length (cm)	Number of Fruits Per Plot	Fruit Weight Per Plant (kg)	Fruit Weight Per Plot (kg)
<b>Manure (T)</b>							
T <sub>0</sub>	6,04b	6,51b	2,57	45,57b	25,60b	1,51ab	14,02
T <sub>1</sub>	6,47a	6,95a	2,70	53,50a	26,86a	1,57a	14,52
T <sub>2</sub>	6,07b	6,54b	2,70	51,64a	25,35b	1,40b	12,98
<b>Pruning (P)</b>							
P <sub>0</sub>	6,17b	6,66b	2,61	47,88b	25,46b	1,41b	13,10b
P <sub>1</sub>	6,01b	6,47b	2,64	47,35b	25,60b	1,44b	13,39b
P <sub>2</sub>	6,40a	6,88a	2,73	55,48a	26,75a	1,62a	15,03a
<b>Treatment Interaction TxP</b>							
T <sub>0</sub> P <sub>0</sub>	6,17bc	6,67bc	2,70	48,50cd	26,13b	1,57b	14,52b
T <sub>0</sub> P <sub>1</sub>	5,99bc	6,45bc	2,46	42,52d	25,25b	1,44bc	13,36bc
T <sub>0</sub> P <sub>2</sub>	5,97bc	6,42bc	2,55	45,70cd	25,42b	1,53bc	14,19bc
T <sub>1</sub> P <sub>0</sub>	6,01bc	6,49bc	2,60	46,82cd	25,58b	1,39bc	12,82bc
T <sub>1</sub> P <sub>1</sub>	6,16bc	6,58bc	2,66	48,28cd	25,92b	1,42bc	13,21bc
T <sub>1</sub> P <sub>2</sub>	7,24a	7,78a	2,84	65,39a	29,08a	1,90a	17,53a
T <sub>2</sub> P <sub>0</sub>	6,33b	6,80b	2,53	48,32cd	24,67b	1,29c	13,61c
T <sub>2</sub> P <sub>1</sub>	5,88c	6,38c	2,79	51,25bc	25,63b	1,46bc	13,38bc
T <sub>2</sub> P <sub>2</sub>	6,07bc	6,43bc	2,79	55,36b	25,75b	1,4bc	11,97bc

Description :

T : Manure

P : Pruning

TxP : Treatment Interaction

DMRT Statement: Treatments in columns followed by the same letter show no significant difference in the DMRT test at the 5% level.

### The effect of various types of manure on cucumber crop yields

Different types of manure significantly affect the number of cucumber (*Cucumis sativus* L.) flowers by providing essential nutrients, balancing hormones, enhancing soil

fertility, and improving photosynthesis. The Duncan test showed flower counts of 6.04 (T0), 6.47 (T1), and 6.07 (T2). The higher count in T1 suggests duck manure supports flower development better, likely due to its balanced nutrients. Meanwhile, T2's similarity to T0 may result from its higher C/N ratio, causing slower nutrient release (Gosai et al., 2020).

Manure application significantly affects the number of fruit ovaries by supplying essential nutrients, stimulating hormones, enhancing soil fertility, increasing photosynthesis efficiency, and accelerating the vegetative-to-generative transition. Duncan test results showed T0 had 6.51 fruit ovaries, T1 had 6.95, and T2 had 6.54. The higher count in T1 suggests that phosphorus (P) and potassium (K) support generative growth. Meanwhile, the decline in T2 indicates that manure type influences nutrient release, where a high C/N ratio may slow nutrient availability, limiting fruit ovary formation (Rozi, 2020).

Manure type (T) did not significantly affect the number of fruits per cucumber plant. While manure boosts fruit ovary formation, not all develop into ripe fruit. Factors like pollination, plant physiology, environment, and resource competition influence fruit yield, making manure type less impactful.

Manure type (T) significantly affects cucumber fruit length due to differences in nutrient composition, organic matter, soil moisture, and photosynthetic activity. Fertilizers rich in nitrogen, potassium, and organic matter promote longer fruit. Duncan test results showed fruit lengths of 45.57 cm (T0), 53.50 cm (T1), and 51.64 cm (T2). The difference between T0 and T1 highlights the role of nutrient availability, especially nitrogen, in fruit growth. Meanwhile, the difference between T1 and T2 demonstrates that the type of manure enhances fruit length. This can be linked to the longer decomposition time of manure, which causes the release of nutrients to be slower, hence its effect on fruit length is slightly lower than T1 (Sinurat et al., 2023).

The number of fruits per plot is significantly influenced by manure type (T), as its nutrient content affects fruit production. Fertilizer choice impacts nutrient availability, influencing yield. Duncan test results show T1 produced the most fruits (26.86), while T2 had the fewest (25.35), likely due to differences in nutrient effectiveness. T1's superior performance suggests an optimal nutrient balance, while T2's lower yield may result from an imbalance or reduced nutrient absorption.

Manure type (T) significantly affects fruit weight per plant by influencing photosynthesis, nutrient availability, soil quality, and stress tolerance. The Duncan test confirmed statistically significant differences, with T0 at 1.51 kg, T1 at 1.57 kg, and T2 at 1.40 kg. The higher weight in T1 suggests balanced nutrient availability, while T2's lower yield than T0 indicates that certain manure types may not immediately enhance fruit weight (Rozi, 2020).

Manure type (T) did not significantly affect fruit weight per plot, likely due to environmental factors and plant competition. Its impact is more evident over time, influencing fruit quality rather than total yield.

### **The effect of pruning on cucumber plant yields**

Pruning (P) significantly affects the number of flowers in cucumber plants (*Cucumis sativus* L.) by promoting lateral growth, balancing hormones, enhancing nutrient absorption, and reducing competition. This optimizes nutrient allocation for flowering, improving yield potential. The Duncan test showed P0 (no pruning) had 6.17 flowers, P1 (main stem pruning) 6.01, and P2 (lateral stem pruning) 6.40. The lower count in P1 suggests main stem pruning limits flower formation, while P2's higher count indicates lateral pruning reduces competition, directing more nutrients to flowers (Hidayatullah et al., 2024).

Pruning (P) significantly affects fruit ovary quantity by promoting lateral growth, balancing hormones, enhancing nutrient absorption, and reducing competition. It helps cucumbers allocate more nutrients to fruit development. Duncan test results showed P1 at 6.47, P0 at 6.66, and P2 at 6.88. The decrease in P1 suggests main stem pruning slightly reduces fruit ovaries, while the increase in P2 indicates lateral stem pruning improves nutrient distribution, boosting fruit production (Agustia et al., 2024).

Pruning (P) has little impact on fruit count per plant. While it boosts flowers and ovaries, not all develop into mature fruits. External factors like pollination, climate, and nutrient distribution also affect fruit production in cucumbers.

Pruning (P) significantly affects cucumber fruit length by enhancing nutrient distribution, photosynthesis, hormone regulation, and reducing fruit competition. The Duncan test showed the longest fruit at P2 (55.48 cm) and the shortest at P1 (47.35 cm). The similarity between P0 and P1 indicates that main stem pruning has no impact, while the difference in P2 suggests that removing lateral stems allows more nutrients for fruit growth, leading to longer cucumbers (Hidayatullah et al., 2024).

Pruning (P) significantly affected fruit yield per plot by reducing branch competition for light and nutrients, enhancing photosynthetic efficiency. The P2 treatment had the highest yield (26.75 fruits/plot), while P0 had the lowest (25.46). This indicates that intensive pruning (P2) improves light access and resource use, increasing fruit production, whereas no pruning (P0) limits yield due to higher competition.

Pruning (P) significantly affects fruit weight per plant by enhancing photosynthesis, optimizing nutrient distribution, and reducing competition. This promotes better fruit development, leading to higher yields. Duncan test results showed P2 had the highest fruit weight (1.62 kg), while P0 had the lowest (1.41 kg). The difference suggests that pruning the main stem (P1) slightly increases fruit weight, while lateral stem pruning (P2) has a greater impact by reducing nutrient competition, resulting in heavier fruit (Samin, 2024).

Pruning (P) significantly increases fruit weight per plot by enhancing photosynthesis, nutrient distribution, and growth hormone activity. The Duncan test

showed P2 had the highest fruit weight (15.03 kg), while P0 was the lowest (13.10 kg). P2 boosts fruit weight by reducing branch competition, directing more energy to fruit growth, whereas P0 limits yield due to resource competition (Firmansyah & Irawati, 2023).

### **The effect of interaction between types of manure and pruning on cucumber plant yields**

The interaction of manure and pruning (TP) significantly affects flower production in cucumber plants (*Cucumis sativus* L.) by improving nutrient availability and growth efficiency. Manure enriches the soil, while pruning optimizes energy use for generative growth, enhancing photosynthesis and hormone production. Duncan test results showed T1P2 had the most flowers (7.24), while T1P1 had the fewest (5.88). This suggests that lateral stem pruning in duck manure-treated plants boosts flowering more than leaf pruning by reducing nutrient competition. Additionally, T0P1's lower flower count than T1P2 highlights the effectiveness of duck manure in promoting flower initiation (Salsabila et al., 2024).

The interaction of manure and pruning (TP) significantly affects fruit ovary formation by improving nutrient balance and growth efficiency in *Cucumis sativus* L. Manure provides essential nutrients for generative growth, while pruning reduces branch competition, directing energy toward flower and fruit ovary development. It also boosts auxin and gibberellin production, supporting reproductive organ formation. Duncan test results showed T1P2 had the highest fruit ovaries (7.78), while T1P1 had the lowest (6.38). This suggests lateral stem pruning is more effective than main stem pruning in enhancing fruit ovary numbers. Additionally, the difference between T0P1 and T1P2 indicates that duck manure, rich in phosphorus, supports flower and ovary formation.

The interaction of manure and pruning (TP) did not significantly affect fruit count per plant. While both support generative growth, factors like environment, plant variety, and pollination play a key role. Manure enhances nutrients, and pruning aids fruit formation, but their impact on yield is not always proportional.

The interaction of manure and pruning (TP) significantly influenced cucumber fruit length by enhancing nutrient efficiency and growth hormone activity. Manure improves soil structure and nutrient supply, while pruning reduces competition, directing resources to fruit growth. Pruning also promotes cell elongation, increasing fruit length. Duncan test results showed T1P2 had the longest fruit (65.39 cm), while T0P1 had the shortest (42.52 cm). This suggests that duck manure and lateral stem pruning are more effective in promoting fruit growth than no fertilizer and main stem pruning, likely due to reduced competition and better nutrient balance (Koryati & Zakaria, 2023).

The interaction between manure type and pruning (TP) had a substantial effect on the amount of fruits per plot. The combination of these treatment interactions improved plant growth and fruit output by improving nutrient availability and energy distribution. Duncan test results were highest in the T1P2 treatment, with 29.08 fruits per plot, and lowest in the T2P0 treatment, with 24.67 fruits per plot. These findings support the notion

that manure at the appropriate dose (T1) and optimal pruning (P2) might work together to increase fruit yield per plot. Meanwhile, the combination of no pruning and a reduced manure dose (T2P0) increased competition between branches, and the available nutrients were insufficient, resulting in fewer fruits produced.

The interaction of manure and pruning (TP) had a highly significant effect on fruit weight per plant. The combination of these interactions can improve the efficiency of nutrient absorption and energy allocation in fruit growth. Manure supplies nutrients that aid in fruit production and development, but pruning minimizes competition among branches, allowing plants to devote more nutrients to fruit enlargement. Furthermore, trimming can improve light penetration and air circulation in the fruit, promoting photosynthesis and biomass formation. According to the Duncan test results, the T1P2 treatment produced the most fruit weight per plant (1.90 kg), while the T2P0 treatment produced the least (1.29 kg). The difference between T1P2 and T2P0 demonstrates that duck dung combined with lateral stem trimming produces more fruit per plant than cow manure alone. This is most likely because duck manure's nitrogen concentration is more immediately available to plants than cow manure, and lateral stem trimming permits plants to devote more nutrients to fruit growth (Samin, 2024).

The interaction of manure type and pruning (TP) significantly affected fruit weight per plot by enhancing nutrient availability and energy distribution. Duncan test results showed T1P2 had the highest yield (17.53 kg/plot), while T2P0 had the lowest (11.97 kg/plot). Duck manure and lateral pruning improved growth by providing fast-releasing nutrients and reducing branch competition. This highlights that optimal manure (T1) and intensive pruning (P2) work together to increase fruit weight. In contrast, T2P2 yielded less, likely due to inefficient fertilizer residues and insufficient pruning to offset nutrient limitations.

### **Summary of Variation Analysis of Cucumber Plant (*Cucumis sativus* L.) Research Results**

To determine the real, very real, and non-real effects of various types of manure and pruning treatments on the growth and yield of cucumber plants (*Cucumis sativus* L.), observation data was analyzed using ANOVA (Analysis of Variance) or analysis of variance, the results of which are shown in the summary of analysis of variance Table 3:

**Table 3. Summary of Variation Analysis of Cucumber Plant (*Cucumis sativus* L.) Research Results**

No	Observation Parameters	Types of Manure	Pruning	Interaction of Manure Types and Pruning	Value	
					Highest	Lowest
1	Plant Stem Length (cm)	**	ns	ns	61,61 (T <sub>1</sub> P <sub>2</sub> )	39,82 (T <sub>2</sub> P <sub>1</sub> )
2	Wet Stove Weight (kg)	**	**	*	1,64 (T <sub>1</sub> P <sub>2</sub> )	1,46 (T <sub>0</sub> P <sub>1</sub> )
3	Dry Stove Weight (kg)	ns	ns	ns	1,18 (T <sub>1</sub> P <sub>2</sub> )	1,09 (T <sub>0</sub> P <sub>1</sub> )
4	Number of Flower	**	**	**	7,24 (T <sub>1</sub> P <sub>2</sub> )	5,88 (T <sub>2</sub> P <sub>1</sub> )
5	Number of fruit buds	**	**	**	7,78 (T <sub>1</sub> P <sub>2</sub> )	6,38 (T <sub>2</sub> P <sub>1</sub> )
6	Number of Fruits (fruits)	ns	ns	ns	2,84 (T <sub>1</sub> P <sub>2</sub> )	2,46 (T <sub>1</sub> P <sub>0</sub> )
7	Fruit Length (cm)	**	**	**	65,39 (T <sub>1</sub> P <sub>2</sub> )	42,52 (T <sub>0</sub> P <sub>1</sub> )
8	Number of Fruits Per Plot	*	*	*	29,08 (T <sub>1</sub> P <sub>2</sub> )	24,67 (T <sub>2</sub> P <sub>0</sub> )
9	Fruit Weight Per Plant (kg)	*	**	**	1,90 (T <sub>1</sub> P <sub>2</sub> )	1,29 (T <sub>2</sub> P <sub>0</sub> )
10	Fruit Weight Per Plot (kg)	ns	**	*	17,53 (T <sub>1</sub> P <sub>2</sub> )	11,97 (T <sub>2</sub> P <sub>0</sub> )

Description :

T : Manure

P : Pruning

TxP : Treatment Interaction

ns : no significant effect

\* : significant effect

\*\* : very significant effect

According to the summary of variance analysis in table 3, manure has a highly substantial effect on plant stem length, wet stalk weight, flower count, fruit ovaries, and fruit length. This demonstrates that manure contains important nutrients that promote vegetative growth, allowing plants to develop more efficiently in terms of light absorption and photosynthesis. However, manure has a profound impact on all elements of growth. Parameters include the number of fruits per plot and the weight of fruit per plant. Furthermore, this treatment had no significant effect on the parameters of dry stalk weight, number of fruits, or fruit weight per plot.

Pruning treatments have an impact on fruit output. According to the findings of the analysis of variance, pruning has a highly significant effect on the weight of wet stalks, number of flowers, number of ovaries, fruit length, fruit weight per plant, and fruit weight per plot. Pruning allows plants to better allocate energy and nutrients to more productive regions, resulting in increased fruit weight. However, trimming has a considerable impact on the number of fruits per plot. This demonstrates that, while pruning improves overall

growth efficiency and yields, it does not affect all elements of plant growth. There is no substantial variation in plant stem length, dry stalk weight, or fruit number.

The combination of manure and pruning had different outcomes. The analysis of variance revealed that the combination of these two treatments had a highly significant influence on the number of flowers, fruit ovaries, fruit length, and fruit weight per plant. However, this treatment combination had a substantial effect on wet stubble weight, fruit number, and fruit weight per plot. Although the combination of treatments increased fruit production, not all growth indicators and harvest results improved significantly. There was no significant effect on the parameters of plant stem length, dry stubble weight, or fruit number.

### **Conclusion**

The treatment of manure types had a very substantial effect on the parameters of plant stem length, wet stubble weight, number of flowers, number of ovaries, and fruit length, as well as fruit weight per plant and fruit count per plot. However, this treatment had no significant influence on dry stubble weight, number of fruits, or fruit weight per plot. Meanwhile, pruning treatment had a significant effect on wet stubble weight, number of flowers, number of ovaries, fruit length, fruit weight per plant, and fruit weight per plot, as well as the number of fruits per plot, but no significant effect on plant stem length, dry stubble weight, or number of fruits. The interaction of manure types and pruning had a significant effect on the number of flowers, ovaries, fruit length, and fruit weight per plant, as well as wet stubble weight, number of fruits per plot, and fruit weight per plot. However, this interaction had no significant effect on plant stem length, dry stubble weight, or fruit number. The T1P2 treatment yielded the best results, with a fruit weight per plot of 17.53 kg, or 87.68 tons per hectare, whereas the T2P0 treatment yielded the worst, with a fruit weight per plot of 11.97 kg, or 59.85 tons per ha.

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