Effect of pruning on the growth and yield of cucumber (Cucumis sativus L.) Mercy Varieties

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ABSTRACT. This study aims to determine the effect of pruning on the growth and yield of cucumber variety Mercy. This research was organized using a Randomized Group Design (RAK) with treatments, namely: No pruning (P0), pruning shoots on the main stem (P1), pruning shoots of all lateral branches after the third internode (P2) and pruning 2 lateral branches that appear first after the 3rd internode (P3) with 5 replications. The variables observed in this study consisted of; plant length, number of leaves, total number of fruits, number of harvestable fruits, harvestable fruit length, harvestable fruit diameter, and harvestable fruit weight. Data were analyzed using the F test and if there were significant differences followed by the 5% BNT test. The results showed that the treatment without pruning (P0) was able to produce a better number of fruits than the pruning treatment, but the number of fruits produced was of poor quality. The best plant results were found in the shoot pruning treatment on the main stem (P1) because it was able to increase the number of leaves 24.19% compared to no pruning treatment (P0).

Keywords : cucumber, growth, pruning, yield

INTRODUCTION

Cucumber (Cucumis sativus L.) is one of the horticultural products that has promising market prospects because it has many benefits and has high economic value. The need for cucumber fruit tends to continue to increase in line with population growth, improving living standards, education levels, and public awareness of the importance of nutritional value. However, the production of cucumber, especially hybrid cucumber in Indonesia, is currently still very low because hybrid cucumber is only planted as an intercrop (Cahyono, 2003).

There are several factors that affect the success of pruning cucumber plants. One of these factors is the cultivated cucumber variety. In line with the opinion of Sutapraja (2008), the results of the interaction between cultivation techniques such as pruning and good seed quality (varieties) and a favorable environment will increase crop yields. Each variety of cucumber will respond differently when pruning is done. Some cucumber varieties are recommended to be pruned, one of which is the Harmony variety. Harmony variety, but there are also varieties that are not recommended for pruning.

There is information that says that Mercy Variety is not recommended for pruning, but there are no research results that support this statement. Cucumber variety Mercy is one type of hybrid cucumber that is widely grown by cucumber farmers in Tarakan City. This variety has several advantages including resistance to Geminivirus, feather dew and Anthracnosa, has an early age and is suitable in all seasons. Information on pruning on cucumber plants of Mercy variety is still quite small, so further research is needed to prove the effect of pruning on cucumber plants of Mercy variety.

MATERIALS AND METHODS

This research was conducted on farmers' land in Padanggarugur village, Batangonang sub-district, North Padang Lawas district from August to November 2023. This study used a Randomized Group Design (RAK) with the following treatments:

P0: without pruning

P1: pruning shoots on the main stem

P2 : pruning the shoots of all lateral branches after the third internode

P3 : pruning 2 lateral branches that appear first after the third internode

In total there were 4 treatments with 5 replications so that there were 20 units of experimental units

Observation Parameters

1.Plant Height (cm)

Plant length was measured when the plants were 40 days after planting using a raffia tool and

measured to a meter and then recorded.

2.Number of Leaves (strands)

        The number of leaves was calculated when the plants were 40 days after planting using a hand counter.

3.Total number of fruits (fruit)

        The total number of fruits was calculated by counting the total number of fruits in each plant sample.

Research Implementation

1. Preparation of Research Area

        The research area is measured, then cleared of weeds and other plants growing on it. Then the land is cultivated to a depth of ± 20 cm using a hoe.

2. Planting

        Planting is done using a digging tool with a depth of 3 - 5 cm at a distance of 60 cm between rows and 30 cm in rows. 2 seeds are inserted per planting hole, then covered with thin soil.

3. Watering

        Routine watering is done every day in the morning before 09.00 WIB, especially in the early growth phase, namely 1 - 2 weeks after planting. After the cucumber flowers appear, watering is done every two days. Watering is not done when it rains.

4. Replanting and thinning

        Replanting is done when the plants are two weeks old after planting by replacing dead plants or abnormal growth with new plants. Thinning is done by leaving one best plant per planting hole when the plants are three weeks old after planting.

5. Installation of Stakes

        Stakes are installed when the plants are one week old after planting. Stakes are in the form of bamboo or wooden slats that are installed on each plant and combined with other stakes with raffia rope.

6. Weeding

        Weeding is done if weeds are considered to interfere with plant growth by removing weeds that grow in the beds.

7. Fertilization

        Basic fertilization uses chicken manure with a dose of 20 tons/ha. The fertilizers given are: urea 280 kg/ha (6 grams/plant), SP-36 260 kg/ha (5 grams/plant) and KCl 525 kg/ha (9.5 grams/plant). Half the dose is given at planting and half is given after the plants are 10 days old after planting. Fertilizer is dug into the soil at a distance of ± 15 cm from the stem.

RESULTS AND DISCUSSION

Plant Height (cm)

        The results of the Analysis of Variance showed that pruning had a significant effect on plant height. The effect of pruning on plant height (Figure 1) shows that the treatment of no pruning (P0), pruning the shoots of all lateral branches after the third internode (P2), and pruning the 2 lateral branches that appear first after the third internode (P3) are significantly different from the treatment of pruning the shoots on the main stem (P1). P1 treatment significantly produced the lowest plant height of the other treatments. Pruning shoots on the main stem (P1) is thought to stop the synthesis of auxin in plant shoots. One of the roles of auxin in plants is to affect the elongation of the apical meristem. Plant shoots are where auxin is produced, in this case IAA (Indole Acetic Acid) which is one type of auxin that causes apical dominance.

        The cessation of auxin synthesis at the shoot tip results in plant growth no longer focusing on the shoot, so that growth is diverted to increase lateral branches. As a result, the height of the plants that were pruned were lower than the other treatments. Similar research results were submitted by Srirejeki et al. (2015), pruning shoots in bean plants stops apical dominance so that stem length growth is slower. Research conducted by Munawaroh and Aziz (2014) explained that pruning treatment on torbangun plants can inhibit the increase in plant height.
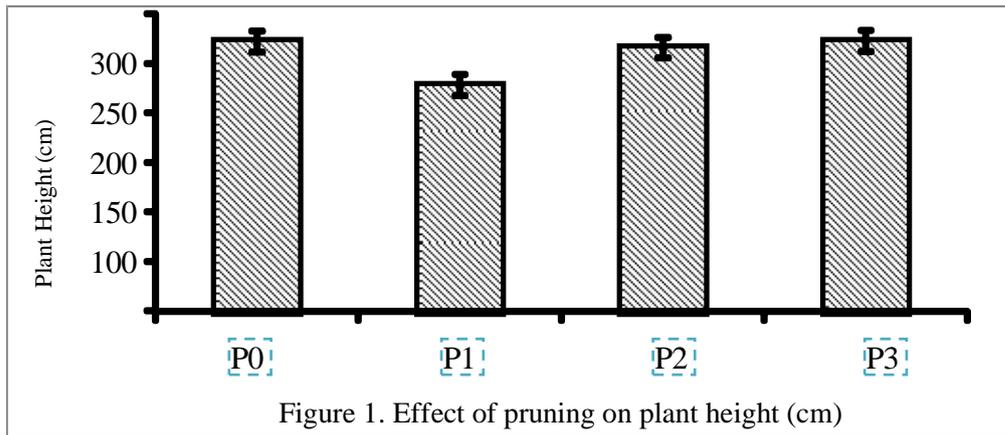
Figure 1. Effect of pruning on plant height (cm)

Number of leaves (blades)

The results of the Analysis of Variance showed that pruning treatment had a significant effect on the number of leaves (Table 11). The effect of pruning on the number of leaves (Figure 2) showed that the treatment of top pruning (P1) was significantly different compared to the treatment without pruning (P0), pruning of all lateral branch shoots after the third node (P2), and pruning of 2 lateral branches that first appeared after the third node (P3). The top pruning treatment gave the best effect by increasing the number of leaves by 16.19% compared to no pruning treatment (P0).
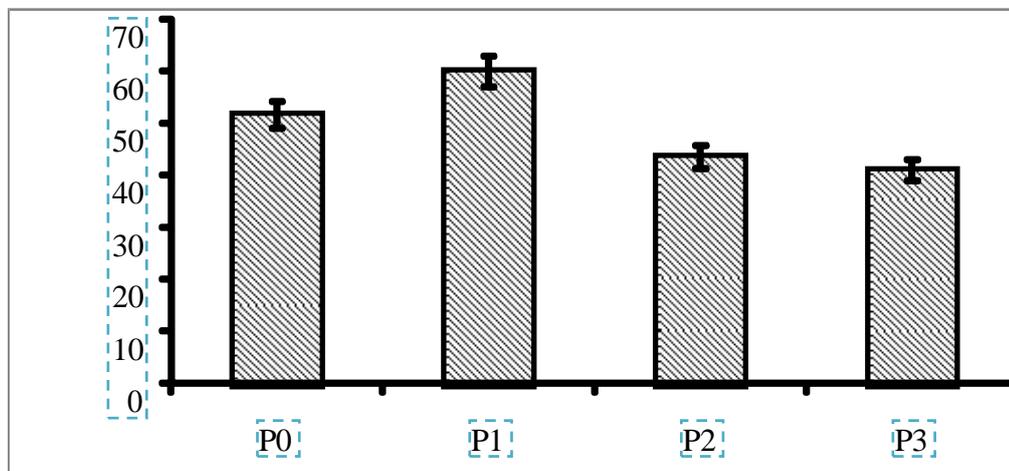

Figure 2. Effect of pruning on the number of leaves (blades)

The presence of cytokinins will accelerate the growth of lateral shoots or branches. The growth of lateral branches will result in an increase in the number of internodes followed by an increase in the number of leaves. Irawati and Setiari (2006) stated that plants with a higher number and length of branches have a greater number of leaves so that they will produce more assimilates. Taiz and Zeiger (2002) stated that the more leaves there are, the greater the ability to form photosynthate so that the formation of vegetative organs will be better because the leaves in plants function as photosynthetic organs that convert light energy into chemical energy. The optimal number of leaves is expected to be able to produce a lot of assimilates so that plant yields can be increased (Fumey et al., 2011). The carbohydrates from photosynthesis that are stored will later be accumulated to increase the weight and diameter of the fruit.

Number of Fruits Per Plant (fruit)

Based on the Analysis of Variance, it shows that pruning treatment has a significant effect on the total number of fruits, but does not have a significant effect on the number of harvestable fruits. The effect of pruning on the total number of fruits (Table 3) shows that the treatment without pruning (P0) is significantly different from other treatments (P1, P2 and P3). The effect of pruning on the number of harvestable fruits is not significantly different in all treatments. The treatment without pruning (P0) produces the highest total number of fruits with an average of 8.10 fruits compared to the pruning treatments (P1, P2 and P3).

Table 3. Effect of pruning on the total number of fruit

Treatment	Total number of fruits (fruits)
P0	7.12 c
P1	5.28 b
P2	4.09 a
P3	4.65 b
BNT 5%	0.82

The number of fruits formed in the P0 treatment does not guarantee that the cucumber plant will produce good fruit. In addition to considering quantity, plant production also needs to consider quality (fruit quality). The formation of too many fruits actually causes the fruit size to become smaller because the translocation of assimilates from the source to the sink is divided. Fruit is a user organ (storage of assimilates), this fruit enlargement is caused by the presence of assimilates produced by the leaves. Sonnewald and Willmitzer (1992), stated that the assimilates received by the sink (user) come from the source (source) whose amount is determined by the proportion of assimilates allocation. The presence of fruit fly attacks causes the fruit to rot so that it is not suitable for consumption, the more fruit that is not suitable for consumption will harm cucumber farmers.

The yield of a plant is influenced by several factors, one of which is the environment. Cucumber plants will grow optimally at a pH ranging from 5.5–6.5 (Sumpena, 2001). Based on soil analysis conducted, the soil conditions at the research location are classified as acidic soil with a pH ranging from 4.5. Meanwhile, acidic soil as a plant growth medium has multiple fertility problems (multifactors stress), such as minimal availability of nutrients P, K, Ca, Mg, Cu, Zn, Mo, B, very slow mineralization and nitrification and very high Al content (Gruba and Mulder, 2008).

CONCLUSION
The results of the research analysis that has been carried out conclude that:
1. Cucumber plants that were not pruned (P0) were able to produce a better number of fruits compared to those treated with pruning, but the number of fruits produced was of poor quality
2. The best plant results were found in the treatment of pruning the tops of the main stem (P1) because it was able to increase the number of leaves by 24.19% compared to those without pruning (P0).

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