

Conference Paper

Grafting Durian Seedlings (*Durio zibethinus* Murr.) Using the P1-P5 Technique

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ABSTRACT

This research purpose to determine the effect of several scions with different numbers of leaves using the P1-P5 technique. This research used a Completely Randomized Design (CRD) consisting of 5 treatment levels and 3 replications to obtain 15 experimental units. Each experimental unit consisted of 5 stems, so a total of 45 stems. Treatment consisted of P1 (leaf shoot 1), P2 (leaf shoot 2), P3 (leaf shoot 3), P4 (leaf shoot 4), P5 (leaf shoot 5). The observations observed were the number of leaves, leaf width, and percentage of life. The observations were analyzed by means of variance, if the F count from the F table was 5%, then further testing was carried out with the Duncan New Multiple Range Test (DNMRT) at the 5% level. The results of the research can conclude that grafting durian shoots using the P5 technique is the best technique for growth and grafting success.

Keywords: Entres, durian, connect

Introduction

Durian (*Durio zibethinus* Murr.) is a fruit that contains various nutrients and is nicknamed "the king of the fruit". By maintaining it intensively, its sustainability will be maintained and it will become increasingly known abroad (Sukarmin, 2019). Every 100 grams of durian flesh contains 65 grams of water, 134 energy, 2.5 grams of protein, 3 grams of fat, 28 grams of carbohydrates, 7.4 mg of calcium, 44 mg of phosphorus, 1.3 mg of iron, and 175 SI of vitamin A and 53 mg of vitamin C, the odor that is released is caused by sulfur bound to butyric acid and other volatile acids. Durian fruit has high economic value in Indonesia with a wide and varied market range, from traditional markets to modern markets. This shows that the durian commodity has the potential to be developed (Yuniastuti et al., 2018).

In Indonesia, most durian plants are not planted evenly, only as plants in yards and gardens on a small scale and the seeds come from seeds, causing production with high variability and low productivity, so that it has not been able to meet consumer demand both domestically and abroad (Sukarmin, 2015). Indonesia has excellent natural potential for the development of durian plants, where the climate and soil conditions are supportive of the growth of durian plants.

Durian plant propagation can be done in two ways, namely vegetatively using seeds and generatively such as grafting, grafting, and grafting. Generative propagation is usually easier and the percentage of growth is higher (> 8.5%) compared to vegetative propagation which requires special skills, suitable environment, and suitable rootstock and scion conditions.

Vegetative propagation generally takes a long time, but the advantage of seed propagation is that in general, the tree trunks that produce seeds are stronger, healthier, and long-lived (Sukarmin, 2015). Vegetative plant propagation is a vegetative method for obtaining high-quality seeds, which do not deviate from the nature of the parent and the harvest period is faster. Vegetative propagation can be done by grafting, grafting, or grafting (shoot grafting). Various

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types of joints can be made, namely the gap connection type, the cuff connection type, and the insert connection type (Yanti et al., 2013).

To support durian development, the availability of superior seeds is needed. To meet the need for superior durian seeds in large quantities, the development of good cultivation techniques is needed. Good seeds are seeds that come from mother trees that are genetically superior, productive, and produced through proper breeding (Sukarmin, 2019). Durian plant propagation is divided into two, namely vegetative (seeds) and generative. Seedlings derived from seeds grow more slowly and have a long vegetative period, and the properties of the seeds produced often deviate from the characteristics of the parent tree but have a strong root system. Seedlings originating from regenerative breeding, one of which is shoot grafting, have advantages such as fast fruiting and the same hereditary characteristics as the parent.

Grafting is a technique of joining shoots that function as scion candidates with rootstock candidates so that new stems with superior properties can be obtained. The advantages of grafting include: 1) Maintaining the properties of clones 2) obtaining strong plants because the rootstock is resistant to unfavorable soil conditions, low vegetation, or other disturbances found in the soil 3) improving the types of plants that have grown, so that the unwanted type is replaced with the desired type 4) can speed up the fruiting of the plant (Savitri & Afrah, 2019). Cuttings are less efficient because they produce fibrous roots and grafting cannot provide many healthy seedlings in a short time. Therefore, the top grafting technique is the right way to increase the multiplication of quality seeds to support the availability of durian plants and to replace plants that are no longer productive so that Indonesian durian production increases and can compete with durians from abroad.

Shoot grafting is one of the grafting techniques commonly used in durian plant propagation. The main obstacle during grafting was the distance between the nursery for grafting (rootstock source) and the superior Aceh eget mother tree (rootstock source). The grafting site and the parent tree are usually far apart, even on different islands. In addition, the number of plants to be connected is so large that it is difficult to complete it in one day.

Top grafting is one of the solutions to overcome the availability of superior seeds and can be uniform with the broodstock so that it will produce good fruit production according to what we want, so this is the reason why the author took the title grafting of durian seeds (*Durio zibhetinus*) using the p1-p5 technique. and you can also see later how the results of some of them are suitable during the research.

Material and Methods

This activity was held on the 12th of September 2022 at the greenhouse of the agro-industry department, Sijunjung campus.

The tools used in this activity are hoes, machetes, polybags, PE plastic, sharp knives, cellphone cameras, rulers, and writing tools. While the materials used in this activity include durian seeds as rootstock, durian shoots from superior breeders, top soil, and organic fertilizer.

This activity used a Completely Randomized Design (CRD) consisting of 5 treatment levels and 3 replications to obtain 15 experimental units. Each experimental unit consisted of 5 stems, so a total of 45 stems. Treatment consisted of P1 (leaf shoot 1), P2 (leaf shoot 2), P3 (leaf shoot 3), P4 (leaf shoot 4), P5 (leaf shoot 5). This activity was analyzed using variance, if the calculated F is greater than the F table of 5%, then a further test is carried out with the Duncan New Multiple Range Test (DNMRT) at the 5% level.

Implementation stages

Land preparation for the top grafting technique for durians begins with providing polybags filled with soil that has been mixed with basic fertilizer for sowing durian seeds. This seeding is done by placing the durian seeds in a polybag which is already filled with mixed soil with organic

fertilizer, the durian seeds are put in a standing way because it will make it easier for the seeds to grow.

Shoot grafting technique

Prepare the tools and materials, then cut the rootstock into two parts, then split the rootstock into two parts 1-2 cm deep with a knife, then prepare the existing Entres cut like the letter "V" with different lengths shoot 2, shoot 3, shoot 4, and shoot 5. Then insert the scion that has been cut into the rootstock which has been divided into two parts, then tie it to the scion and rootstock which have been connected with PE plastic. The lid is connected with ice plastic to reduce the transpiration/evaporation process. After 2 weeks the hood can be opened and the plastic binding can be left alone

Maintenance after connection needs to be carried out regularly so that the growth of the connection results grow optimally. Maintenance carried out includes watering every 2 days, weeding of weeds around plants by manual method, fertilization, and control of pests and disease. Other maintenance such as untying the plastic straps in the connection area done after the durian seeds are 1.5-2 months old after grafting. This matter The aim is that the connection area is not easily broken or disturbed due to tight ties. Untying the connection rope must be careful so as not to injure the joint area.

Observation parameters:

The parameters observed were the number of leaves, leaf width, and survival percentage

Results and Discussion

Number of leaves (strand)

Table 1. Average results of Number of leaves (strand)

No	Treatment	Number of leaves (strand)
1	2 shoots	1,2
2	3 shoots	3,4
3	4 shoots	7,2
4	5 shoots	17,4

Based on Table 1 above, the durian shoot grafting treatment using various different leaf treatments has a big effect on success, this can be seen from the number of leaves produced.

The results of the average observation show that the highest number of leaves parameter is in the treatment of 5 remaining shoots with an average of 17.4 leaves, followed by the treatment of 4 remaining shoots with a value of 7.2 leaves, and then on 3 shoots, the remaining value is 3.4 leaves and the lowest is in the treatment of 2 remaining shoots with a value of 1.2 leaves. This proves that the more leaves that are left will help the plant carry out photosynthesis, the number of leaves will be very closely related to the length of the shoot, because the longer the shoot, the more leaves will also be. According to Putri et al. (2016). The number of leaves will increase along with the length of the shoot because the shoots that have longer shoots cause an increase in the number of nodes and nodes where the leaves grow. Leaf growth occurs as a result of division, elongation, and differentiation of cells in the meristems of terminal buds and lateral buds which produce new cells periodically, so they will form new leaves.

One of the factors that influence plant growth is internal and external factors. Internal factors include genes and hormones while external factors include nutrients, water, temperature, light, and humidity. According to Fahmi et al. (2013), external factors are factors that come from outside the plant which include sunlight, air humidity, nutrients, water content, oxygen or carbon dioxide, pH or equivalent acidity, population density, and plant growing media. The number of leaves which was not significantly different was influenced by the intensity of sunlight at the time of the research. The plants did not receive enough sunlight so plant growth did not influence treatments. This is also in line with Salisbury and Ross (2005), who states that one of the causes of an increase

in the number of leaves on a plant is the supply of nutrients to the plant, and is also influenced by the number of branches and plant height, the number of leaves is also influenced by the number of minerals contained in water.

Leaf width (cm)

Table 2. Average results of Leaf width (cm)

No	Treatment	Leaf width (cm)
1	2 shoots	0,43
2	3 shoots	0,78
3	4 shoots	0,50
4	5 shoots	1,8

Leaf width is an indicator that determines plant growth and development. The process of increasing leaf width is the result of the development of leaf cells which divide and elongate. In table 2. above, the widest leaves in the shoot treatment were 5 leaves with a width of 1.8 cm. This is obtained because with lots of leaves, there will be greater photosynthesis and the more the leaves will grow, the better they will grow. The increase in leaf width continues to increase with each planting age at each time of fertilization. Budi et al. (2016) in their writing said that the width of leaves in plants is caused by the activity of meristem tissue which produces several new cells located along the edge of the leaf axis and is a result of anticlinal division. Sufficient nutrients are needed, especially nitrogen, so that the cells in the leaves can divide and lengthen optimally. The balance between factors such as nutrients and water will affect plant growth, therefore if one is not available to the plant it can inhibit plant growth. Therefore, this may be what makes the pattern of improvement for each treatment different.

Number of branches (fruit)

Table 3. Average results of Number of branches (fruit)

No	Treatment	Number of branches (fruit)
1	2 shoots	0
2	3 shoots	1,2
3	4 shoots	0,4
4	5 shoots	2,4

Based on the table above, the number of branches of durian plants that were grafted shows that the best treatment lies in the 5 shoots treatment with a number of branches of 2.4 followed by the 3 shoots treatment and the value obtained is 1.2 and the 4 shoots treatment is 0.4. the lowest was in the 2 shoots treatment with only 0 fruit, this happened because not all the perfect connections were attached properly, causing some branch development to be imperfect and some even no branches appearing. Apart from that, it is thought that because the nutrient content in the soil is sufficient, it has a significant influence on plants treated with 5-leaf shoots. Sukarmin (2019) said that the better the link between the rootstock and the upper stem together, the nutrients from the roots to the shoots of the plant will run smoothly. Helilusiatiningsih et al. (2021) reinforce in their article that if the number of branches and leaves is greater Many indicate better and more perfect connection quality.

The branch observed is the primary branch. According to Santoso et al. (2008) stated that the number of primary branches increases with increasing plant age. According to Pujiasmanto et al.

(2009) stated that increasing the number of primary branches of Sambiloto tends to be similar to increasing plant height.

Live percentage (%)

Table 4. Average results of Live percentage (%)

No	Treatment	Live percentage (%)
1	2 shoots	25 %
2	3 shoots	50 %
3	4 shoots	52 %
4	5 shoots	100 %

Based on the table above, the percentage of survival of durian shoot connections varies, but the 5 shoot treatment gives a percentage of 100%, followed by 4 shoots with a percentage of 52%, then there is the 3 shoot treatment with a percentage of 50% and finally, the lowest is 2 shoots with a percentage. only 25%. This means that there are various percentages of life from the grafting activities that we carry out, this can happen because there are several factors and one of them is that the joints are not glued perfectly and this is reinforced by (Pardede, 2017) in his thesis which states the factors that influence live connections, namely combining power (compatibility) between the scion and rootstock. Compatibility influences the survival of the grafted plants and results in an increase in the length of the scion and an increase in the diameter of the rootstock. Incompatible junctions, cell wall lignification is thought to occur which can unite adjacent cells outside the region of junctional fusion. On the other hand, the cell walls of the junction areas in incompatible compounds do not produce lignin and are only connected by cellulose fibers. Failure of fusion between the scion and rootstock (incompatibility) can be caused by physiological responses between the two parts being connected, the transmission of viruses or phytoplasma, and anatomical abnormalities in the vascular tissue in the callus bridge and lack of closeness between the cambium of the rootstock and the scion. According to Roselina et al. (2007), a tight and precise cambium relationship between the two stems being connected influences the success of the connection.

Hartman et al. (1990) reported that if there are more cambium meetings from the scion and rootstock in the grafting, the grafting will be more successful. Apart from that, this failure is caused by the failure to form xylem and phloem vessels to channel water and nutrients to the upper stem. The shoots that emerge from the rootstock are a mechanism for the plant to survive to replace the upper stem that has been cut.

Conclusion

Shoot grafting is a combination of plant propagation between vegetative propagation (branches/twigs) originating from other plants. The shoot grafting activity is often used by combining rootstock and scion. The rootstock is expected to be a stem that is resistant to soil pathogens and sturdy while the scion is parts that have the desired production characteristics. Rootstock is usually used from plants that grow from seed or vegetatively so that the roots are stronger. And from the activities carried out it can be concluded that the 5 shoot treatment had the best results in all our observation parameters, while the 2 shoot treatment was the lowest of all observation parameters.

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