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Evaluation of Vegetative Growth of Local Avocado Plants after the Grafting Process with Avocado Butter

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A B S T R A C T

This study investigated the effectiveness of grafting butter avocado scions onto local avocado rootstocks as a vegetative propagation method. This research was carried out for four weeks with equipment such as scissors, knives, and polybags used to carry out the grafting procedure, and careful monitoring was carried out to assess plant development. Although the first week showed little change, the fourth week showed promising shoot growth, indicating successful grafting. Existing challenges, including humidity and leaf discoloration, have been appropriately addressed. This study concludes that grafting is feasible for propagating local avocado plants if carried out carefully and adequately after grafting. Regular monitoring and careful maintenance are recommended to ensure optimal plant growth to improve avocado cultivation in productivity and fruit quality.

INTRODUCTION

Plant propagation is classified in 2 ways: reproductive and vegetative. There are various ways to propagate plants, from easy to complex. Success ratings range from high to low. This situation is influenced by multiple factors, for example, the type of plant and the method of propagating the plants we choose (Gunawan & Si, 2014).

Propagating plants by reproductive means means multiplying plants using fruit contents, but multiplying plants by reproductive means has obstacles, such as not all plants produce fruit contents; there are plants that make fruit contents, but the fruit contents cannot develop as new plants. To avoid this, plants are propagated vegetatively. Propagating plants vegetatively is divided into two, namely the natural method and the synthetic method. The most commonly used vegetative propagation of plants is vegetative synthesis, including using the grafting procedure.

Vegetative cultivation techniques are a solution to the above problems. Vegetative cultivation means cultivation that uses asexual methods, namely, using the vegetative parts of plants. Where vegetative techniques are processes that can solve the issues above, using vegetative techniques to multiply plants does not require using plants that fertilize first and can claim that the resulting plants have similar characteristics to the parent plant (Luta, 2016).

The original technique for propagating plants by vegetative means is the grafting technique. The plant propagation technique is grafting, using only one bud to form a scion. The implementation uses adding nodes to the base bar between two nodes. The rootstock part is inserted, and the buds are removed so that the buds have the energy to grow to produce new stem shoots to replace the severed rootstock (Anjarwalla et al., 2017).

THEORETICAL FRAMEWORK

There are two types of plant propagation: reproductive and vegetative. Reproductive plant propagation is multiplying plants with fruit contents, while vegetative plant propagation propagates plants by humans. Vegetative propagation is usually used to reproduce fruit seeds. There are several vegetative propagation methods, for example, grafting, grafting, tissue culture, and cuttings (Dewi et al., 2022).

Plant propagation is done by grafting shoots, aiming to obtain good plants and results. Increasing the yield of quality fruit trees depends on the quality of the seed plant varieties. Grafting begins with the gluing of shoots and stems, and then nodes are formed, which initiate the formation of the plant into a new individual. The attached projections come from superior fruit plants, and the bottom (stem) is a plant with solid roots. Fruit plants commonly used for grafting include durian, rambutan, avocado, and mango (Hidayat et al., 2020).

The advantage of the grafting technique is that the number of shoots needed is not too much because only one node is required to produce seeds. Implementation takes little time and is cheaper with many bottoms (stems). Grafting (grafting) is a new way to get lots of plants to produce fruit as quickly as desired. Grafting is multiplying plants by combining the upper stem (shoot) and connecting it with the lower part (stem) (Rahayu et al., 2021).

Avocado comes from Aztec, which means ahuacatl. Avocados originate from the Aztec region (ancient Indian tribe) in Mexico and the Inca region in Peru (Central America). In these two tribes, avocado plants live fertile and productive lives. Human civilization recognizes the development of avocado cultivation by these two tribes as an advanced civilization equivalent to culture. The avocado plant is believed to have come to Indonesia in the 18th century and has now spread to almost all countries (Suhemy, 2021).

METHODS

This research was conducted for 4 weeks. The tools used in this research were scissors, knives, polybags, plastic, shovels and cameras. The materials used are local avocado and butter avocado, soil and water. The steps in the research are:

1. Choose a Donated Tree (Rootstock): Choose a local avocado tree for rootstock use. Make sure the rootstock is healthy and free from disease.
2. Rootstock Cutting: Carefully divide the rootstock stem down the middle using a sharp grafting knife.
3. Cut the Top of the Butter Avocado Tree: Cut the top of the butter avocado tree to be grafted into several pieces. Make sure this cutting has a healthy grafting eye.
4. Cut Insertion: Insert the buttery avocado shoot pieces into the cuts made in the rootstock. Ensure the grafting eye on the butter cutting is aligned with the rootstock cutting.
5. Wire Connection: Wire the buttery avocado shoot pieces tightly to the rootstock. Make sure they are connected firmly and neatly.
6. Tying: Tie the cuttings tightly with plastic or grafting rope to ensure that the connection between the shoot and rootstock is strong and does not allow water to penetrate.
7. Care: After grafting is complete, provide enough water and fertilizer to support the growth of the newly grafted plants. Make sure the plants receive good care during the union period.
8. Monitor Growth: During the mating period, monitor plant development closely. Ensure that the grafting is successful and the connection between the shoot and the rootstock is stronger.

RESULTS & DISCUSSION

Grafting is a method of plant propagation that combines the desired plant part with an existing plant part (the rootstock or mother tree) so that the two parts can grow together as one more potent plant. This technique generally produces new plants with specific characteristics, such as good traits or fruit superior to existing plants. This research carried out grafting between local

avocado plants and butter avocado. In the grafting process, the scion (butter avocado) will be inserted into the stem of the stock (local avocado) so that the two can grow together as one plant.

Figure 1. Grafting of Local Avocado and Avocado Butter

Local avocados may have certain advantages in adapting to the local environment and resistance to certain diseases, while butter avocados may be known for their larger fruit or better quality. Therefore, grafting between these two types of avocado can bring double benefits. However, it should be remembered that the success of this grafting depends not only on the correct technique but also on the selection of the suitable variety and good care after grafting.

Figure 2. Development of grafted plants for 4 weeks

The following are the developments observed over four weeks from the observations of grafting between local avocado plants (Persea americana) and butter avocado. In the first week, avocado plants that have been grafted do not appear to experience significant changes, with conditions remaining the same as on the first day after the grafting was carried out.

However, in the second week, changes began to appear. The appearance of white spots on the stem in the area wrapped in grafting plastic is an early

sign that attracts attention. This is caused by the accumulation of moisture inside the grafting plastic, creating a moist environment that could support mold growth. Therefore, the next step is to replace the grafting plastic to avoid the problem of fungal growth, which can be detrimental to plants.

Also, in the second week, the leaves on the grafted plants begin to turn black and decrease. This could indicate that the plant adapts to the grafting process and environmental changes. In the third week, after the grafting plastic was replaced, the grafted plants began to show positive development. The grafting plastic was removed, and at that time, the stem of the grafted plant adhered well between the butter avocado and the local avocado.

Finally, in the fourth week, shoot growth was visible on the grafted butter avocado plants. This is a sign of the success of the grafting process, which allows the butter avocado to grow and develop on the stem of the local avocado. In conclusion, with proper care, although there are challenges in the grafting process, such as dew problems and leaf discoloration, this process can successfully produce the desired new growth.

In the context of grafting between local avocado and butter avocado, shoot growth is a critical aspect in evaluating the process's success. After successful grafting, the main focus is on the vegetative growth of the scion, which is a chunk of buttery avocado grafted onto the stem of local avocado stock. Shoot growth, in particular, is an important indicator reflecting the extent of adaptation between scion and stem stock. When new shoots grow from the grafted scion, this is a positive sign that the grafting process has been successful and that the two types of avocado have "come together" to form one more vigorous plant.

CONCLUSIONS AND RECOMMENDATIONS

This research concludes that grafting between local avocado plants and butter avocados can be successful with proper techniques and care. Although challenging environmental factors such as humid conditions can affect plant growth, shoot growth observed in the fourth week indicates the success of grafting. The recommendation of this research is to provide good post-grafting care monitoring plant growth regularly. With the right actions, the grafting process can effectively increase productivity and fruit quality in avocado cultivation.

FURTHER STUDY

With research limited to variables, researchers recommends that similar research be conducted targeting different variables different groups or contexts. As a result, adding mediating variables can. It can also be studied by future researchers to gain new insight into this matter relationship between variables. The results of this research can help future researchers identify what improvements the company can make in order to improve their operations to be more sustainable and able to face change. The recommendations above will help researchers to identify what factors have a significant influence.

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