Effectiveness of Dayak Onion *Plants (Eleutherine bulbosa)* in the Influence of Mycorrhiza-Enriched Photosyinthetic Bacteria (Psb)

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Dayak onion (*Eleutherine bulbosa*) is one of the medicinal plants developed today. However, it faces challenges related to the limited availability of nutrients, especially phosphorus, which plays a crucial role in supporting plant growth and development. Phosphorus deficiency can inhibit the photosynthesis process, which further results in inhibition of the growth rate of Dayak onion plants. This study aims to evaluate the effect of mycorrhizal and *photosynthetic bacteria* (PSB) on the growth and production of Dayak onions. The research was prepared in the form of an experiment using a Factorial Design based on a Group Random Design (RAK). The first factor is the dose of mycorrhiza (D), consisting of 4 levels, namely D0 (control), D1 (10 grams), D2 (20 grams), and D3 (30 grams). The second factor is the administration of PSB in three levels, namely K0 (control), K1 (10 ml), and K2 (20 ml). The parameters observed include plant height, number of leaves, root volume, and root length. The results showed that the application of mycorrhiza and PSB was the highest in the parameters of plant height, number of leaves, root volume, and root length in the D3K2 treatment, namely the administration of mycorrhiza 30 g + 20 mL of PSB solution). This shows that the application of mycorrhiza and PSB is effective for Dayak onion plants.
Keywords: Dayak onions, mycorrhiza, PSB (*photosynthetic bacteria*), phosphorus.

1 pendahuluan

Dayak onion is a plant that has the Latin name Eleutherine palmifolia. The plant belongs to the Iridaceae family (Order Liliales) originating from the tropical regions of America, in Indonesia it is suspected that the beginning of its spread from the island of Kalimantan, the naming 'sabrang' is also related to the location of the origin of the plant, because people from outside the island of Borneo (Java) if they want to take it must "nyabrang" or cross (Heyne, 1987). Dayak onions have various local names such as Tiwai onions, Sabrang onions, diamond onions, lubak onions, teki sebrang or ghost onions. Tiwai onion is a typical plant of Central Kalimantan where the Dayak tribe lives (Backer and Bakhuizen, 2019).

One of the methods that can be used to provoke the presence of photosynthetic bacteria is by using the baiting method. The method is done by giving the bacteria what it needs. One of them is by providing food elements that are able to provoke the presence of photosynthetic bacteria. Eggs are used to meet the needs of bacteria for protein elements while MSG is used to fulfill the element Nitrogen which is the food (Sari, R. and Prayudyaningsih, R., 2015).

Fulfillment of the elements needed by photosynthetic bacteria for food is one of the things included in the baiting method. Photosynthetic bacteria can be easily found in solids and liquids, but from the various available literature, it is stated that photosynthetic bacteria are mostly found in calm waters and have access to sunlight (laeminck, S. E., 2019).

The baiting method is included in one of the possible ways to provoke the presence of the desired bacteria (photosynthetic bacteria), by using the baiting method will increase the probability of the presence of photosynthetic bacteria. This method is a common method that is often used by farmers in fishing for microorganisms. By providing the needs of bacteria, it is likely that bacteria will be present in the media. Plant growth and development The photosynthesis process is one of the important processes that play a role in increasing the yield for a plant. The ability of plants to carry out photosynthesis processes varies, this is due to several factors (Setyani, 2013).

One way to increase the rate of photosynthesis is to increase photosynthetic bacteria. The participation of photosynthetic bacteria in accelerating the photosynthesis process, because

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photosynthetic bacteria have chlorophyll a and b which results in bacteria being able to photosynthesize (Sasaki. K, 2019)

so that the photosynthate produced can be absorbed by plants and add element N for plants, with the availability of element N for plants naturally, the amount of chlorophyll in plants will also increase (Nurhidayati, T., 2014).

Photosynthetic bacteria themselves have been widely available in nature, but not many know the type of bacteria. From one substance, both solid and liquid, it can contain many types of various kinds of bacteria, both beneficial and detrimental. This makes it necessary to isolate one type of bacteria that meets the criteria for photosynthetic bacteria. After taking one of the dominant types in the substances used in bacterial fishing (Baiting Method), this identification process can be carried out to find out whether the bacteria are included in the bacteria sought or not. The process of isolation and identification of one of these bacteria is important because not all bacteria are suitable for the type of plant that wants to increase production.

1 Methodology

This research was carried out in the form of an experiment compiled based on RAK (Group Random Design) which was researched, including:

1. **The treatment factors for mycorrhiza (D) administration with 4 levels, namely:**

D0 = Control (no treatment)
D1 = 10 gram mikoriza / Polybag
D2 = 20 gram mikoriza / Polybag
D3 = 30 gram mikoriza / Polybag

2. **Composting factor (K), with 4 levels, namely:**

K0 = Control (no treatment)
K1 = 10 ML PSB
K2 = 20 ML PSB

There were 14 treatment combinations that were repeated 4 times, so that each group had 5 polybags, so that there were 280 observation units.

Results and Discussion

1. Number of Leaves

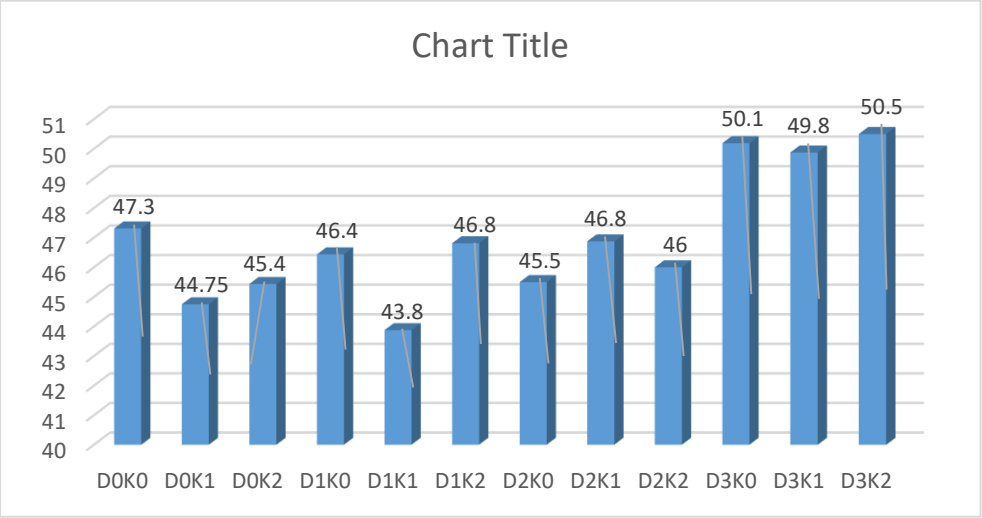


Fig. 1. Stem diagram Number of leaves.

This study observed the effect of mycoiza (D1), PSB (Photosynthetic Bacteria) treatment on the number of leaves in Dayak onion plants at six weeks. The observation data is displayed in the form of a bar chart every week.

The results of the variegated fingerprint analysis showed that treatment with mycorrhiza and PSB (Photosynthetic Bacteria) did not have a significant effect on the number of leaves of Dayak onion plants. Each week the average number of leaves observed showed no noticeable difference as a result of the treatment given. In the first observation, the highest number of leaves was found in the combination (D3K1), while in the second observation, the highest number of leaves was still in the combination (D3K1), then in the third observation, the highest was in the combination (D3K1), while in the fourth observation there was an observation (D3K1).

Thus, based on the results of this study, the use of mycorizes, and PSB (Photosynthetic Bacteria) in the tested conditions did not have a significant impact on the growth of Dayak onion plants.

2.. Plant height

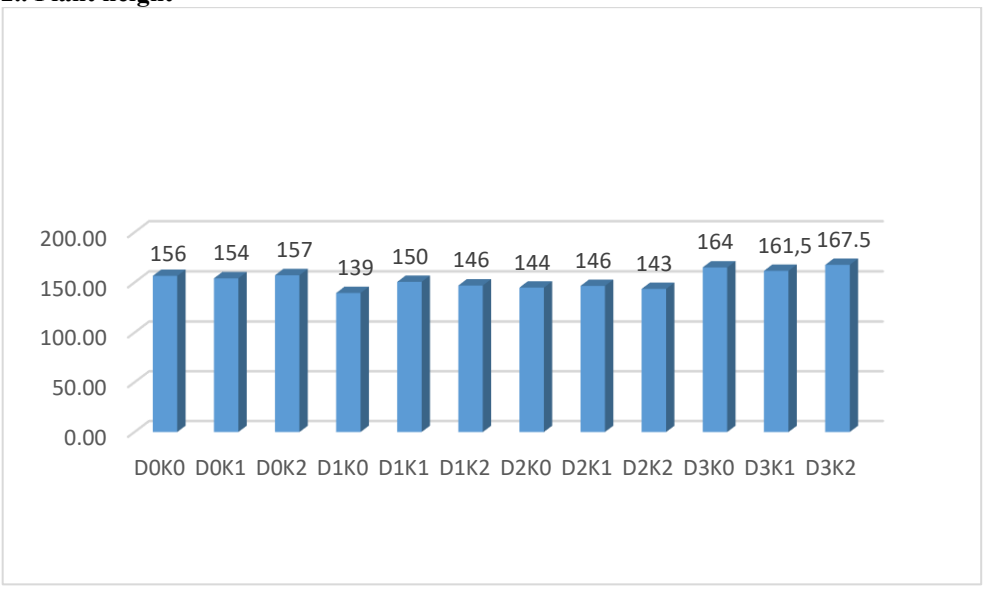


Fig. 2. Stem Diangram Height Plant

The conclusions should clearly show the results obtained, strengths and weaknesses, and this study observed the effect of mycorrhizal and PSB (Photosynthetic Bacteria) treatment on Dayak onion plant height for six weeks.

The results of the variegated fingerprint analysis showed that the treatment with mycorrhiza and PSB (Photosynthetic Bacteria) in combination, did not have a significant effect on the height of Dayak onion plants. For each observation, the average height of the plants observed did not show any noticeable difference as a result of the treatment given.

Thus, based on the results of this study, the use of mycorrhiza and PSB (Photosynthetic Bacteria) in the tested conditions did not have a significant impact on the high growth of Dayak onion plants.

3. Root Volume

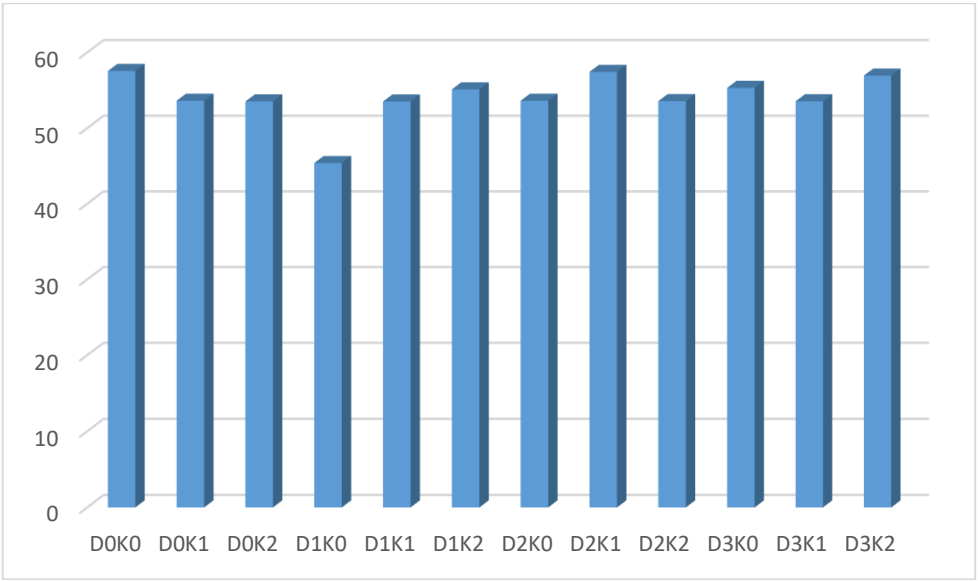


Fig. 3. Root Volume stem digram

This study observed the effect of mycorrhiza and PSB (Photosynthetic Bacteria) treatment on the height of Dayak onion plants for six weeks.

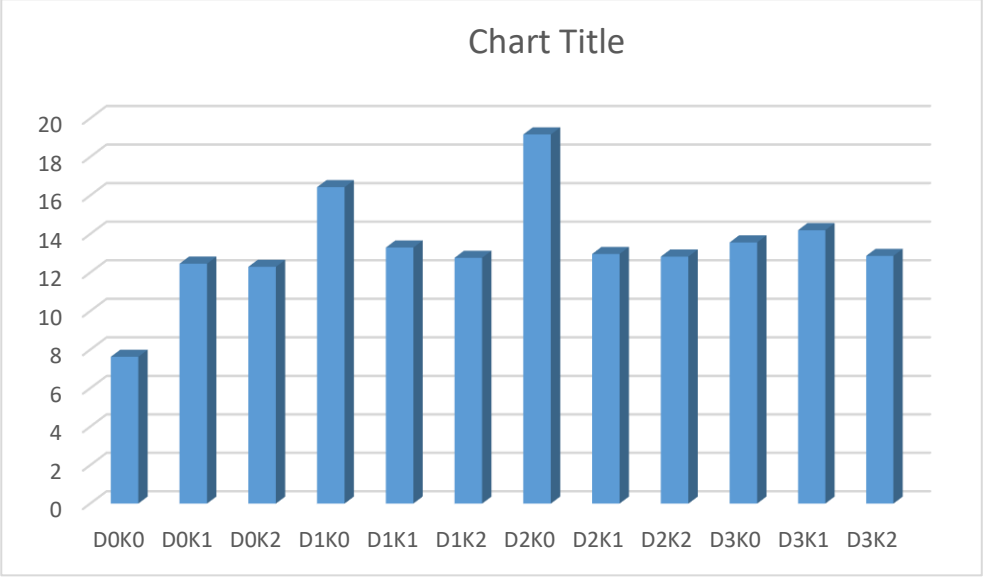
The results of the analysis of various fingerprints showed that the interaction with mycorrhiza and PSB (Photosynthetic Bacteria) in combination, did not have a significant effect on the root volume of Dayak onion plants.

Based on the results obtained, the volume of roots is directly proportional to the plant's ability to absorb water and nutrients, especially in plants that have a deeper and more widespread root system. Plants with greater root volumes tend to have better access to water that is at deeper soil depths, which greatly affects the plant's resistance to drought.

In addition, this study also revealed that there is variation between plant types in terms of root volume distribution. Some plants have more fibrous roots, which allows for a more even spread over the entire area of soil, while others develop larger primary roots to penetrate deeper into the soil. These results show that the volume of roots depends not only on the size of the roots, but also on their distribution patterns.

Overall, this study shows that root volume is an important factor in plant productivity and soil ecosystem balance. Through a deeper understanding of root volume, it is hoped that new ways can be found to improve the efficiency of water and nutrient use, as well as support the development of more environmentally friendly agricultural techniques.

4. Root Length



This study observed the effect of mycorrhiza and PSB (Photosynthetic Bacteria) treatment on the height of Dayak onion plants for six weeks.

The results of the analysis of various fingerprints showed that the interaction with mycorrhiza and PSB (Photosynthetic Bacteria) in combination, did not have a significant effect on the root volume of Dayak onion plants.

This study aims to examine the factors that affect root length in various types of plants. Root length is an important indicator in the absorption of water and nutrients by plants, which contributes directly to plant growth and yield. In this study, root length measurements were carried out using a direct observation method on plant samples planted under controlled conditions.

The results showed that there was a significant variation in root length between various plant species. Plants with a fibrous root system generally have more root length than plants with a taproot system. This can be explained by the adaptation of root morphology to obtain resources from different soil layers.

Additionally, environmental factors such as soil depth, moisture, and nutrient availability also have a significant influence on root length. Plants grown in deeper, more fertile soil conditions tend to develop longer roots in search of water and nutrients, while in shallow or less fertile soils, plants are more likely to develop lateral roots for more efficient water uptake in the surface layer.

DISCUSSION

This study was conducted to observe the effect of mycorrhizal and PSB (Photosynthetic Bacteria) treatment on the growth of Dayak onion plants for six weeks, with the parameters observed including the number of leaves, plant height, and root volume. The observation data is presented in the form of a bar chart every week to provide a visual picture of plant development during the research period.

The results of the variegated fingerprint analysis showed that the treatment with mycorrhiza and PSB did not have a significant effect on the number of leaves of Dayak onion plants. Each week, the average number of leaves observed showed no noticeable difference as a result of the treatment given. Although there was a variation in the number of leaves higher in certain combination treatments, such as D3K1 consistently showing the highest number of leaves in various observations, this difference was not significant enough to indicate a direct effect of the treatment on the growth of Dayak leeks. This suggests that other factors, such as environmental conditions and plant genetics, may play a greater role in determining the number of leaves produced.

In addition to the number of leaves, this study also analyzed the effect of mycorrhizal and PSB treatment on the height of Dayak onion plants. The results of the analysis showed that the combination of treatments also did not have a significant effect on plant height. Each observation showed that the height of the observed plants did not experience any noticeable changes due to the treatment given. This indicates that under the tested conditions, the application of mycorrhiza and PSB is not able to significantly increase plant height, likely due to other factors that are more dominant in influencing plant growth, such as the availability of basic nutrients and other environmental factors.

In addition to vegetative growth, this study also highlights the influence of mycorrhiza and PSB on the root volume of Dayak onion plants. The results of the analysis showed that the treatment did not have a significant effect on the volume of plant roots. Although root volume is strongly related to the plant's ability to absorb water and nutrients, this study shows that under the tested conditions, treatment with mycorrhiza and PSB is not effective enough in increasing root volume markedly. This can be due to soil conditions that may already be sufficiently supportive of root growth, so the addition of mycorrhiza and PSB does not have a significant effect.

Furthermore, this study revealed that the volume of roots is directly proportional to the plant's ability to absorb water and nutrients. Plants with a deeper and more widespread root system have better access to resources in the soil, which has an effect on the plant's resistance to drought. In addition, this study also shows that there is a variation in the distribution of root volume between plant types. Some plants have wider fibrous roots, allowing for a more even spread over the entire soil area, while others have larger, deeper primary roots to penetrate harder layers of soil. This difference suggests that not only the size of the roots plays a role in the absorption of nutrients, but also their distribution pattern in the soil.

Overall, this study shows that under the tested conditions, the use of mycorrhiza and PSB does not have a significant impact on the growth of Dayak onion plants, both in terms of leaf count, plant height, and root volume. However, a deeper understanding of root volume and its distribution could provide new insights into efforts to improve the efficiency of water and nutrient use for plants.

Conclusion

Giving mycorrhiza and PSB (Photosynthetic Bacteria) on plants showed the best treatment for Dayak onion plants (Eleutherine Bulbosa).

Mycorrhiza and PSB (Photosynthetic Bacteria) were administered in combination with D3K1 with parameters of plant height, number of leaves, root volume, and root length in Dayak onion plants (ELEUTHERINE BULBOSA).

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