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The Effect of Water Type on the Growth of Mung Bean Sprouts for 6 Days

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ABSTRACT

*Green beans (*Vigna radiata L.*) are an important food crop that has high nutritional value and is easy to cultivate. This research aims to analyze the effect of water type (well water, rice washing water, and rainwater) on the growth of green bean sprouts for six days. Green bean seeds are soaked in the three types of water for five hours before being planted in soil. Parameters observed included plant height and time of first leaf appearance. The results showed that the type of water had a significant influence on the growth of sprouts. Rice washing water produced the highest average sprout height, followed by well water, while rainwater gave lower results. In addition, the emergence of the first leaves occurred more quickly in sprouts soaked in rice washing water compared to other types of water. The nutritional content in rice washing water, such as carbohydrates and vitamins, is thought to have a positive effect on plant growth. This research concludes that rice washing water is the most effective choice for supporting the growth of green bean sprouts during the initial phase. These findings can provide practical guidance in utilizing water resources for sustainable agriculture, especially in regions that face limited access to quality water.*

***Keywords**: green beans, types of water, sprout growth, rice washing water, sustainable agriculture*

INTRODUCTION

Green beans (Vigna radiata L.) are one of the important food crops in Indonesia because they have high nutritional value and a strategic role as a source of vegetable protein. This plant is easy to cultivate in various environmental conditions, making it the main choice for small and large-scale farmers. One of the critical stages in growing green beans is the germination phase, which determines the success of plant growth in the next stage. This process is influenced by various factors, including the quality of the water used during seed soaking and watering (Ministry of Agriculture, 2020

Types of water such as well water, rice washing water and rainwater have various characteristics, which can have different effects on sprout growth. Well water, which is often used in agricultural activities, generally contains minerals such as calcium and magnesium which can support plant growth. Rice washing water is known to contain nutrient residues such as carbohydrates, B vitamins and minerals, which have the potential to accelerate germination and support early plant growth (Mulyani et al., 2018). Meanwhile, rainwater that is natural and free of pollution tends to have lower mineral content but is more environmentally friendly and easy to obtain (Prasetyo & Wibowo, 2021).

The main parameters that are often used to assess germination success include plant height and the appearance of the first leaves. Plant height reflects the rate of vertical growth, while the appearance of leaves is an early indicator of the development of photosynthesis

functions which are important for plant survival (Sari & Nugraha, 2019). Therefore, choosing the right type of water can be a simple but effective strategy in supporting successful plant growth from an early stage.

This research aims to examine the effect of water type (well, rice washing, and rain) on the growth of green bean sprouts for 6 days. By understanding the impact of each type of water, it is hoped that the results of this research can provide practical guidance in utilizing water resources to support the success of green bean cultivation, especially in areas that have limited access to quality water.

METHOD

This research was conducted to examine the effect of water type on the growth of green bean sprouts (Vigna radiata). The experiment lasted for 6 days, with measurements of the parameters of sprout height and leaf emergence time. The samples used were green bean seeds of uniform quality, selected based on similar size and no physical defects.

Before planting, green bean seeds are soaked for 5 hours in three different types of water, namely well water, rain water and rice washing water. After the soaking process, the seeds are planted in plastic containers filled with soil with a uniform humidity level. Each type of water had three replications to ensure data validity. Watering was carried out using the same type of water as the soaking water for each group. Observations were made every day for 6 days to record the height of the sprouts using a ruler with an accuracy of 1 mm. In addition, the time of first leaf emergence was also recorded in each treatment group. All treatments were carried out in locations with natural lighting and stable room temperature, without additional fertilizer or other treatments that could affect the results. Before planting, green bean seeds are soaked for 5 hours in three different types of water, namely well water, rain water and rice washing water. After the soaking process, the seeds are planted in plastic containers filled with soil with a uniform humidity level. Each type of water had three replications to ensure data validity. Watering was carried out using the same type of water as the soaking water for each group. Observations were made every day for 6 days to record the height of the sprouts using a ruler with an accuracy of 1 mm. In addition, the time of first leaf emergence was also recorded in each treatment group. All treatments were carried out in locations with natural lighting and stable room temperature, without additional fertilizer or other treatments that could affect the results.

The data obtained were analyzed descriptively and compared between treatments to assess the effect of each type of water on sprout growth. The results are used to determine the type of water that is most effective in supporting the initial growth of green beans.

RESULT AND DISCUSSION

Plant growth, especially in the germination phase, is influenced by various environmental factors, including the type of water used. The germination process is the initial stage of plant life which is characterized by the absorption of water by the seeds, which is called imbibition. Water plays an important role in activating the enzymes needed to break down food reserves in seeds, so that it can support the development of embryos into sprouts.

Each type of water has different physical and chemical characteristics that can influence this process. Well water usually contains minerals such as calcium and magnesium which can contribute to plant growth. However, a mineral content that is too high (hardness) can also inhibit water absorption by the roots.

Rainwater tends to have a neutral pH and is free from heavy mineral contamination, so it is often considered ideal for plant growth. Additionally, rainwater usually has a higher dissolved oxygen content, which can support sprout metabolism. Rice washing water is known to contain organic nutrients such as carbohydrates, protein and a small amount of phosphorus which comes from rice residues. These nutrients can function as natural fertilizers that help stimulate plant growth, especially in the early germination phase. However, using excessive amounts of rice washing water can cause a buildup of organic compounds which can inhibit growth.

Based on the theory above, this research was conducted to test whether different types of water (well water, rainwater and rice washing water) had a significant influence on the growth of green bean sprouts, especially on the parameters of plant height and leaf emergence time. It is hoped that this study can provide scientific information that is useful for managing water resources in plant cultivation practices.

Result

The results of this research show that the type of water used in the process of soaking green bean seeds affects the growth of the sprouts on various parameters observed, namely plant height and time of leaf emergence. From the results obtained, rice washing water has the most significant influence on plant height growth, followed by rainwater, while well water tends to show lower results. This indicates that the organic nutrient content in rice washing water can provide additional encouragement to the initial growth of sprouts. Nutrients such as carbohydrates, protein, and a small amount of phosphorus contained in rice washing water likely serve as additional food sources for the sprouts, enhancing metabolic processes that support their growth.

In contrast, rainwater, which has a neutral pH and relatively low mineral content, has been shown to speed up the emergence of the first leaves compared to well water and rice washing water. Higher dissolved oxygen content in rainwater also contributes to increased cellular respiration processes and faster root development. This explains why sprouts soaked in rainwater tend to emerge more quickly even though the plant height is not as good as those in the rice rinse water group.

Well water, although often considered a good source of water for irrigation, shows lower results in terms of sprout height and leaf emergence compared to the other two types of water. This may be due to the higher mineral content, such as calcium and magnesium, which can cause water hardness that inhibits water absorption by seeds and root growth. Additionally, harder well water may also contain other chemical compounds that can negatively affect plant development in the early stages.

Overall, these findings suggest that the type of water used to soak mung bean seeds can have a significant impact on germination success and early plant growth. Therefore, it is important to consider the quality of the water used in the green bean cultivation process, especially in the early stages of germination, in order to maximize plant growth results. Apart from that, this research also opens up opportunities to develop alternative uses of water in agriculture, especially by using rice washing water which is relatively easy to access and contains nutrients that can improve the quality of plant growth.

CONCLUSIONS

Based on the research results, it can be concluded that the type of water used in soaking green bean seeds has a significant influence on the growth of the sprouts, especially on the parameters of plant height and leaf emergence time. Rice washing water has been proven to provide the best results in increasing plant height, while rainwater speeds up the emergence of leaves. Meanwhile, well water tends to show lower yields than the other two types of water, which may be due to the higher mineral content that inhibits water absorption and root growth. These findings indicate that the use of rainwater and Rice washing water can be an effective

alternative in supporting the early growth of green bean plants. Therefore, choosing the right type of water is very important to maximize germination and plant growth.

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