

# Effect of Soybean Plant Growth on Bio-Priming Treatment

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## **Abstract**

By understanding and implementing this bio-priming practice in soybean cultivation, it is hoped that farmers can utilize the plant's potential to the maximum in a more natural and sustainable way. This study aims to increase the growth of soybean plants due to bio-priming treatment. Bio-priming of seeds to produce high-vigor seeds which can then increase plant growth. In addition to improving seed quality, bio-priming treatment has also been reported to be able to increase plant growth. By providing bio-priming treatment to seeds, it is expected to increase the growth of soybean plants. The results showed that bio-priming treatment had a significant effect on the height of soybean plants by soaking the seeds for 20 minutes.

**Keywords:** Growth, Plant, Soybean, Treatment

## **Introduction**

Soybeans are an important food commodity because of their high protein nutritional [1]. According to [2], soybeans contain 37-42% protein and 14-19% fat. Soybeans are one of the groups of food crops that are widely used by people, especially in Indonesia, as a source of protein derived from plants [3]. The development of plant seeds is expected to improve growth from germination to vegetative growth so that it will produce good [4].

Bio-priming is one of the priming techniques in seed treatment that combines biological aspects (seed inoculation with beneficial organisms to protect the seeds) and physiology (seed hydration) in controlling diseases. Bio-priming is the process of coating or treating seeds with beneficial PGPR under controlled hydration conditions, which improves the preparation method before germination without radicle emergence [5]. Bio-priming seeds can result in better plant growth.

## **Literature Review**

In an effort to increase agricultural productivity, bio priming practices promise innovative solutions involving seed treatment using rhizobacteria. The success of this research can have a positive impact on the growth of soybean plants, becoming an alternative that has the potential to reduce dependence on chemical fertilizers and other synthetic chemicals. In addition, bio-priming can also increase the efficiency of agricultural input use and help soybean plants become more resilient to environmental stress, such as suboptimal soil conditions.

Seeds that have been infected or contaminated with pathogens can be improved during priming so that they do not cause unwanted effects on plants [6]. Benefits of Bio-Priming That is increasing Germination Power where Bio-priming can accelerate germination and increase seed germination power. Microorganisms produce substances that stimulate growth, such as auxin

and gibberellin hormones. **Increasing Stress Tolerance** This technique helps seeds to be more resistant to non-ideal environmental conditions, such as drought, extreme temperatures, or high salinity.

### Research Methodology

This research was conducted from December to March 2024. The materials used were soybean variety Dega 1, livestock manure and Rhizobium. The tools used in this study were hoes, watering cans, writing tools, standard stakes, and ropes. The parameters observed were plant height (cm), number of leaves (blades) and number of branches (branches).

### Results

#### Plant Height (cm)

Observation data based on statistical analysis of soybean plant height (cm) due to the administration of bio-priming using the seed soaking method. Based on the results of observations and statistical analysis, it is known that the bio-priming treatment has a significant effect on soybean plant height (cm). The average results of soybean plant height (cm) due to bio-priming treatment are shown in Table 1. Table 1. Average Soybean Plant Height (cm) Due to Bio-Priming Treatment

Treatment	Weeks (cm)		
	2	3	4
B0= Without Treatment	14.43 e	18.58 e	23.12 e
B1=10 Minutes	18.14 a	24.62 a	30.54 b
B2=20 Minutes	16.12 b	23.16 c	32.38 a
B3=30 Minutes	15.18 d	22.10 d	29.86 c
B4=40 Minutes	15.57 c	22.24 b	28.40 d

Description: Numbers followed by the same letter in the same column show no significant difference at the 5% level based on the Duncan Distance Test (DMRT)

The results of statistical data analysis show that the effect of bio priming soaking on soybean seeds on growth and production has a significant effect on observations of plant height (cm). This is because soaking can trigger growth and production in soybean plants. Soybeans are a group of food crops that are widely used as a source of protein from plants by the Indonesian [7]. Soybean seeds are seeds that do not have a dormancy period, their protein and fat content causes the seed shelf life to be very low. This causes soybean seeds to quickly experience deterioration or a decrease in quality. Low seed quality results in low germination quality, thus affecting production value. One way to improve the quality of soybean seeds that have experienced deterioration is by incubation or priming treatment [8], [9], [10].

#### Number of leaves (strands)

Observation data based on statistical analysis of the number of soybean leaves due to the administration of rhizobium bacteria using the bio-priming method. Based on the results of observations and statistical analysis, it is known that the bio-priming treatment has no a significant effect on the number of soybean leaves (strands). The average results of the number of soybean leaves (strands) due to the bio-priming treatment are shown in Table 2.

**Table 2.** Average Number of Soybean Leaves (strands) Due to Bio-priming Treatment

Treatments	Weeks (strands)		
	2	3	4
B0= Without Treatment	3.80	4.48	6.00
B1=10 Minutes	3.76	4.52	6.64
B2=20 Minutes	3.84	4.72	7.64
B3=30 Minutes	3.64	4.48	7.12
B4= 40 Minutes	3.68	4.44	6.72

Table 2 shows that the largest number of leaves (strands) was found in treatment B2, namely 7.64 cm, and the lowest number of plant leaves was found in treatment B0, namely 6.00 cm. Providing appropriate treatment will increase plant growth where the plants will. Soybean leaf growth will respond to the provision of adequate and appropriate nutrition. If the nutrition is not appropriate, the leaves will not have a significant [11]. This also agrees [12]. The plant's need for nutrients will affect the growth of a plant.

### Number of Branches (Branch)

Observation data based on statistical analysis of the number of soybean productive branches due to the administration of rhizobium bacteria with the bio-priming method. Based on the results of observations and statistical analysis, it is known that the bio-priming treatment has no significant effect on the number of branches. The average results of the number of soybean productive branch due to the bio-priming treatment are shown in Table 3.

**Table 3.** Average Number of Productive Branches of Soybean Plants Due to Bio-priming Treatment

Treatment	Number of Productive Branches
B0= Without Treatment	2.52
B1=10 Minutes	2.80
B2=20 Minutes	3.44
B3= 30 Minutes	3.36
B4= 40 Minutes	2.96

Table 3 shows that the highest number of productive branches was found in treatment B2, namely 3.44, and the lowest number of productive branches was found in treatment B0, namely 2.52.

### Conclusion

The results of the study concluded that the best treatment for soybean plant growth was the bio-priming technique for 20 minutes.

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