

Viability Level of Soybean Seed (*Glycine max* L) Based on Treatment of Some Types of Onion Extract

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Soybean plant in Indonesia is an important plant as a food buffer for the community. The constraint in soybean cultivation is the success rate of the germination process. Poor germination results in wasted soybean seeds. This resulted in farmers needing to spend additional capital to obtain substitute soybean seeds. One of the efforts that support the success of soybean germination is the use of growth regulators. Growth regulators (ZPT) are divided into two, namely natural and synthetic. Research uses natural PGRs such as shallots, onions and Dayak onions. and synthetic ZPT with the trademark Atonic. Based on this research, it was found that natural PGR with a concentration of 20 g/100ml of water was not able to compete with synthetic PGR with a concentration of 1ml/l of water in increasing the success of soybean seed germination.

Keywords:

ZPT, Seed, Onion,
Soybean

INTRODUCTION

Soybeans are included in the type of legumes. It is an annual plant, in the form of a low shrub, growing upright, soft-leaved, with a variety of morphologies. Plant height ranges from 10-200 cm. Can branch a little or a lot depending on the cultivar and environment. Soybean plant morphology is supported by its main components, namely roots, leaves, stems, flowers, pods and seeds so that growth can be optimal [1]. Roots consist of institutional roots (radicula), tap roots (radix primaria), and branch roots (radix lateris) in the form of hair roots [2]. The benefits of soybeans, among others, are antioxidants, reduce the risk of heart disease, prevent cancer, reverse the effects of

endometriosis, prevent osteoporosis, overcome menopausal symptoms, have a good effect on diabetes and kidney disease and maintain weight.

Soybean cultivation techniques are no different from plant cultivation techniques in general. One of the obstacles experienced in the cultivation process is the success in the hatchery process [3]. Lack of germinating seeds can result in non-uniformity of plants in the field. This non-uniformity can lead to pest attacks and other negative impacts.

One of the things that can be used to support the success of germination is to use growth regulators (ZPT). Shallots are the most commonly used natural PGRs in the community. Shallots in

addition to containing vitamin C, potassium, calcium, iron, folic acid and fiber also contain growth regulators in the form of the hormones auxin and gibberellins [4]. In the world of agriculture, PGR is needed to help plant growth and development.

Shallots have been shown to have the potential to support germination, therefore it is necessary to study the effect of other onions on the viability of soybean seeds.

METHOD

The study was conducted Plant Protection Laboratory, Faculty of Agriculture, University of Borneo Tarakan in March 2019.

The tools used in this research are measuring cup, ruler, label paper, filter paper, petri dish, stationery and camera. The materials that will be used in this research are soybean seeds, shallots, onions, Dayak onions, water and growth-regulating hormones. This study used a completely randomized design (CRD) with 4 treatments and 5 replications. The seeds were soaked with treatments consisting of: P0 = Control (aquades), P1 = 20 g shallots + 100 mL water, P2 = 20 g onions + 100 mL water, P3 = 20 g Dayak onions + 100 mL water, P4 = Atonic growth regulator 1 mL/L

Seed preparation, The seeds of soybean plants are uniform in size. The number of seeds tested in each treatment was 10 grains in each replication, so that the number of seeds used was 300 grains.

Preparation of germination media, The media used for germination was sterile filter paper with a

diameter of 9 cm which was placed in a petridis dish.

Treatment preparation, First, the various types of onions are peeled and blended so that the extract produced in the onions is maximized. The control only used water, for P1, P2, P3 and P4 used water which was given three different types of onions. In P4 Atonic PGR was used with a concentration of 1 mL/L.

Treatment application, The seeds were put into a glass bottle filled with water, treatment and Atonic PGR were soaked for 20 minutes. The seeds were arranged in a petri dish for germination.

Seed care, The filter paper as the germination medium was kept moist by giving water (1 ml) every day.

Observation Parameter

Germination Percentage (%)

Percentage of germination was carried out in order to obtain data on the number of normal germination produced by pure seeds under certain environmental conditions and time periods. Germination percentage was calculated on the tenth day. [5] The germination percentage formula is:

$$\% \text{ Germination} = \frac{\text{Normal number of sprouts}}{\text{Number of test seeds}} \times 100\%$$

Germination Rate

Germination rate was measured by calculating the number of days required for the emergence of radicles or plumules using the formula [6]:

$$\text{Average Day} = \frac{N_1T_1 + N_2T_2 + \dots + N_xT_x}{\text{Total number of germinated seeds}}$$

Note:

N = Number of seeds that germinate in a certain time unit.

T = Indicates the amount of time between the start of the test to the end of a certain interval of an observation.

Vigor Index

The vigor index is calculated using the formula created [7] :

$$\text{Vigor Index} = \frac{G_1}{D_1} + \frac{G_2}{D_2} + \frac{G_n}{D_n}$$

Note:

G = Number of seeds that germinated on a given day.

D = Time that corresponds to a certain amount.

Sprouts Wet Weight (g)

Analysis of the data using the analysis of ANOVA with a level of 95% and if there is a significant difference, it will be continued with the Duncan Multiple Range Test (DMRT) with a confidence level of 5%.

RESULT AND DISCUSSION

Results of analysis of variance showed that the effect of soaking various types of onions had a significant effect on the percentage of germination and germination rate, but had no significant effect on the vigor index.

Table 1. Recapitulation of ANOVA Analysis Results Viability Level of Soybean Seed (*Glycine max* L) Based on Treatment of Some Types of Onion Extract

No	Parameters	F Test Result
1	Germination Percentage	*
2	Germination Rate	*
3	Vigor Index	*

Note: ns = not significantly different; * = significantly different

Germination Percentage

Germination percentage is the percentage of normal germination that can be produced by pure seeds under favorable conditions within a predetermined period of time (Purnobasuk 2011). Germination percentage was observed for 7 days. Furthermore, the seeds that grow are calculated for the percentage of life according to the formula that is the unit used for this parameter (%).

Based on analysis of variance, soaking extracts of various types of onions significantly affected the percentage of germination. So that further tests were carried out using the 5% level ANOVA test. The results showed that the percentage of germination from treatment P4 (Atonic PGR) with a yield of 40% was the highest percentage of germination, significantly different from P0 (control, 16%), P1 (shallots, 6%), P2 (onions, 16%) and P3 (dayak onion, 10%). Furthermore, for P0, P1, P2 and P3 were not significantly different from each other. Germination percentage data in Figure 1.



Figure 1. Effect of treatment on percentage of germination

Germination Rate

Germination rate was measured by calculating the number of days required for the emergence of radicles or plumules using the existing formula. Based on analysis of variance (Appendix 2), soaking extracts of various types of onions significantly affected the germination rate, so further tests were carried out using the 5% level ANOVA test. The results showed that the percentage of germination rate from treatment P4 (Atonic PGR) with a result of 23.99 was the highest percentage of germination rate, significantly different from P0 (Control, 22.64), P1 (shallots, 21.95), P2 (onions, , 23.05) and P3 (dayak onion, 22.35). Furthermore, for P0 it was not significantly different from P1, P0 was significantly different from P2 and P0 was not significantly different from P3. Germination percentage data in Figure 2.

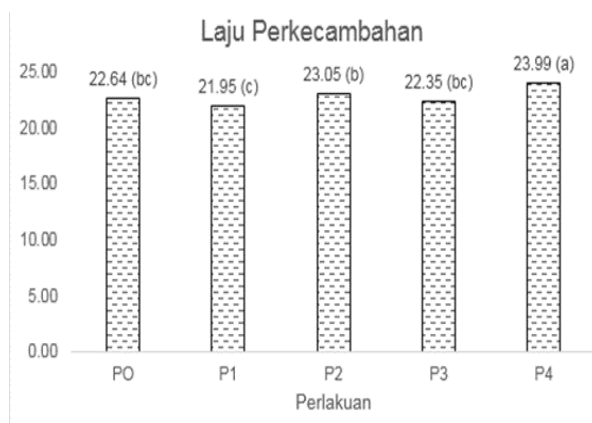


Figure 2. Effect of treatment on germination rate

Vigor Index

Vigor index is the uniformity and speed of seed germination at a certain time, calculated by the formula made [8]. Based on analysis of variance.

Soaking extracts of various types of onions had no significant effect. The results show that the percentage of Vigor Index from treatment P4 (Atonic PGR) with a result of 5.54 is the percentage of vigor index which has a tend to be higher than P0 (control) with a result of 4.79, P3 (dayak onion) with a result of 4.50. P2 (onions) with a result of 4.48, and P1 (shallots) with a result of 4.36. Vigor Index percentage data is shown in Figure 3.

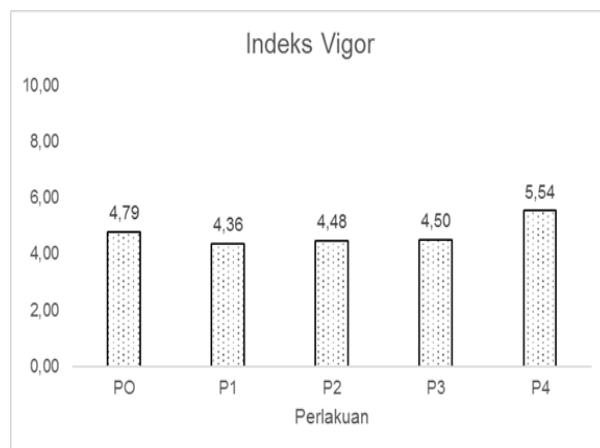


Figure 3. Effect of treatment on the vigor index

Germination percentage in this study was conducted to determine how many seeds germinated in one container. Percentage of germination was done by counting the number of soybean seeds that germinated in a petridish dish with several treatments. Based on the results of the study in Figure 1, the soaking treatment of various types of onions showed that P4 (ZPT Atonic) was the best treatment which gave a significant effect on the percentage of germination with a success rate of 40%.

P0 (Control) resulted in the percentage of germination with a value of 16%, P1 (shallots) produced the percentage of germination with the lowest value of 6%, P2 (onions) resulted in the percentage of germination with a value of 16%, and P3 (Dayak onions) resulted in the percentage of germination with a value of 10%. P0, P1, P2 and P3 are not significantly different from each other. P4 (Atonic PGR) also gave the best and significantly different effect on the germination rate of 23.99. Meanwhile, in the vigor index parameter, there was no significant difference between treatments.

This difference was due to the different content of Atonic ZPT compared to shallots, onions and Dayak onions. Dayak onions contain phytochemicals in the tubers indicating the presence of secondary metabolites, including: alkaloids, glycosides, flavonoids, phenolics, quinones, steroids, tannins and essential oils. The leaves and roots contain flavonoids and polyphenols [9].

Onions contain natural antioxidants, able to suppress the sinogenic effects of free radical compounds that function to reduce the risk of degenerative diseases such as colon cancer. Shallots contain growth regulators in the form of the most active auxin and gibberellins hormones for various plants and play an important role in promoting optimal growth [10]

Atonic ZPT contains nitroorganic compounds that function to stimulate physiological and metabolic processes so that nutrients in plants and uptake can be utilized optimally and in a balanced

manner. [11] stated that Atonic PGR is a form of synthetic PGR in the form of a brownish yellow liquid, easily absorbed by plants, effectively accelerating cell development, increasing seed germination, increasing plant strength, number of flowers and ultimately increasing plant production.

In addition to the content of each ingredient, this difference was due to the concentration used in the P1 (shallot), P2 (Bombay) and P3 (Dayak onions) treatments were not able to compete with the P4 content (Atonic PGR). The results of [12] showed that synthetic PGR was able to provide higher shoot growth than natural PGR.

CONCLUSION

Conclusion obtained from this study was that the effect of soaking various types of onions had a significant effect on the percentage of germination and germination rate, but had no significant effect on the vigor index. The concentrations used in the P1 (shallot), P2 (Bombay) and P3 (Dayak onions) treatments have not been able to compete with the content of P4 (Atonic PGR).

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