The Effect of Frequency of Stem Wounds Towards The Growth and Yield of Cassava Renek

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ABSTRACT
This study was aimed to investigate the effect of the number and frequency of stem wounds towards the growth and yield of cassava Renek. This study was conducted experimentally in the preparation of a single factor RAKL (Complete Randomized Block Design) which consisted of 4 treatments, namely control treatment, frequency of wounding 1 time before planting, frequency of wounding 2 times before planting, and 1.5 BST. and frequency of wounding 3 times before planting cropping, 1.5 BST and 2.5 BST. Observation parameters include the number of mycorrhizal infections in cassava roots, number of spores, root length, root weight, root dry weight, root proliferation, plant height, shoot fresh weight, shoot dry weight, number of leaves, number of tuber plants, tuber length, tuber diameter, tuber weight per plant, and tuber yield. At the age of 5 months, the frequency of wounding 3 times of mycorrhizal cassava Renek only gave a significant difference in the parameters of root length, root weight, and root dry weight. The best number and frequency of wound treatment in 5-month-old mycorrhizal cassava was the frequency of 1 time before planting had a good effect on the parameters of tuber weight per plant (5.09 kg) and tuber yield (50.91 Ton / Ha).

Keywords - Frequency of wounding, Mycorrhiza, Cassava Renek.

INTRODUCTION

The potential of cassava as food and industrial material must be supported by an increase and continuity of production. Cassava production in Indonesia from 2014-2018 has decreased. Statistical data on food crops in Yogyakarta province states that the area of cassava land in 2018 was 49.416 Ha, production reached 859.393 tons with a productivity level of 1917.03 tons/Ha (BPS, 2018). Meanwhile, cassava productivity in other provinces can reach 4518.92 tons/ha (BPS, 2018). The decline in productivity was partly due to the use of land for planting cassava that did not meet the needs of plant growth, including physical, physiological factors, and pests and diseases that attack cassava (Fajria, 2017).

According to Deviani et al., (2020) that root growth can be accelerated by wounding, binding, etiolation, and disorientation of the stem so that it can affect the movement and accumulation of carbohydrates and auxins needed to stimulate root initiation. The content of food ingredients in cuttings, especially protein and carbohydrates, greatly affects root growth. This is one of the categories of success in root initiation. The existence of ratification then the surface area where the roots grow becomes larger so that more roots and sweet potatoes grow. Based on research conducted by Rusbadila (2018), the treatment with 3 and 4 pieces of cutting on the growth and yield of cassava of the glutinous variety, had a yield of 51 tons/ha of cassava.

The success of root initiation is also influenced by the number of shoots on a cutting. According to Hayati et al., (2012), the presence of shoots is very important for the root initiation process. Root growth will not occur if all shoots are removed or in a resting state, because shoots act as a source of auxin which stimulates root formation, especially when shoots begin to grow (Oboho & Iyadi, 2013). Based on research conducted by Rofiq (2011), plants that were injured at 2.5 BST tend to produce more tubers.

The purpose of this study was to examine the effect of stem cutting frequency and determine the best stem cutting frequency on the growth and yield of mycorrhizal cassava Renek.

METHODS

This research was conducted in the experimental field of the Faculty of Agriculture, University of Muhammadiyah Yogyakarta Jl. South Circle, Tirto Park, Kasihan District, Bantul Regency, DIY. The research will be carried out from June to November 2020. The tools used include hoes, polybags, analytical balances, filter paper, microscopes, graded filters, knives, petridishes, spray bottles, clock bottles, tweezers, scales, deglass, glass preparations, rulers, knife as a rodent. The materials used include cassava seeds of Renek variety, aquades, Gunungkidul indigenous corn root mycorrhizae, cassava seed cuttings of Renek variety, 10% KOH, 1% HCl, Acid Fuchsin, compost, Urea, KCl, SP-36.

This study used a field experiment method with a single factor experimental design arranged in a Completely Randomized Block Design (RAKL). The treatments tested were the cutting of the mycorrhizal Renek cassava stems with 2 cuts per application, which consisted of 4 frequency treatments, namely A. Control or no cutting, B. Cutting once before planting, C. Cutting twice before planting and 1 month after planting. , D. Trimming 3 times before planting, 1 month, and 2 months after planting). Each treatment was repeated 3 times so that there were 12 units. Each unit consists of 3 samples, 4 victims, and 1 reserve, so a total of 96 plants are required.

The method of the research includes the first preparation of the mycorrhizal inoculum by checking the number of spores and the percentage of mycorrhizal infection, secondly, land preparation is carried out 3 days before planting. The three preparations of cassava seedlings aged about 10-12 months showed good seeds. Fourth planting and application of Mycorrhizae. The application of mycorrhizae at the time of planting, because the growth of cassava roots takes 5-7 days. Mycorrhizal application as much as 40 g/plant.

The data obtained from the observations of this study were analyzed descriptively using graphs and histograms. Data from agronomic observations were analyzed using variance (Analysis of variance) at an error level of 5% to determine the effect of treatment. If there is a significant difference between treatments, then the Duncan Multiple Range Test is continued at an error level of 5% to determine the significant difference between treatments.

RESULTS AND DISCUSSION

1. The Development of Cassava Roots

Root development is the main factor in the association of mycorrhizae to the host plant and has an important role in the vegetative and generative growth of the cassava Renek plant. Stem tightening in cassava Renek besides affecting the physical, chemical, and biological properties of the soil, also affects the development of plant roots by observing root length, root fresh weight, root dry weight, and root proliferation. Root development in various treatments is presented in table 3.

Tabel 3. Average The Development of Renek Cassava Roots in Week 8.

	Observation Parameter		
Treatment	Root Length (cm)	Root Fresh Weight (grams)	Root Dry Weight (grams)
Control	34,00 a	17,71 a	3,19 a
Stem 1 time	29,67 ab	7,25 b	1,40 b
Stem 2 time	27,00 b	10,44 b	1,73 b
Stem 3 time	30,33 ab	18,85 a	3,65 a

a. **Root Length.** Table 3 shows the root length at week 8 which shows a significant difference. In the control treatment with the treatment of 2 times the ratting frequency. Rusbadila (2018) states that the cutting section will accelerate the occurrence of root swelling so that tubers begin to form, then root extension decreases because it will focus more on enlargement or tuber formation.
b. **Root Fresh and Root Dry Weight.** Table 3 shows that the control treatment was significantly different from the treatment with the frequency of rattling 1 time and the treatment frequency of ratting 2 times, but it was not significantly different from the treatment with the frequency of ratting 3 times. This shows that the dry weight of cassava gives results that are in line with the fresh weight of agar roots. High root dry weight is obtained from high root fresh weight because of the higher the fresh weight, the higher photosynthate (root dry weight) yield.

2. The Plant Growth of Cassava Renek

Plant height is one of the characteristics of plants in experiencing growth because they will experience changes in increasing number and size. According to Sastrahidayat (2011), plant height observations were made from the lowest limit of growth to the upper limit of plant growth, namely the top stem of the plant. An increase in plant height is a process of division (increase) and cell enlargement. To be able to grow plants require protein synthesis which is the result of metabolism. Plant height development is presented in Figure 4.

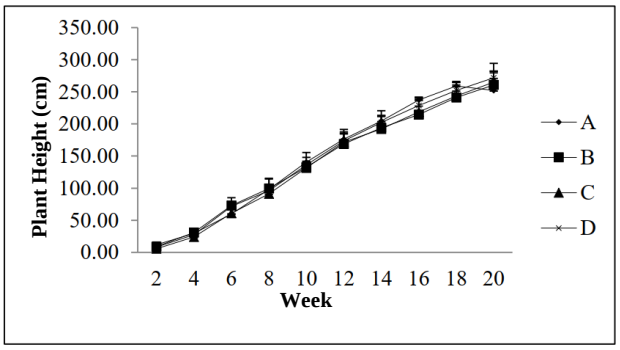

Figure 4. Cassava Plant Height Chart

In Figure 4 it is shown that plant height growth increases slowly from week 2 to week 4 because at this time the plant experiences a lag phase or slow phase. In this phase, plants experience slow growth because the number of cells is still small and has not actively carried out cell division. Then the plant experiences a phase of rapid plant height growth

called the exponential phase, which is the phase of rapid plant growth in the 6th to the 12th week. This is because the plant actively performs cell division, especially at the tip of the apical meristem cells to form stems and leaves, as well as the addition of root length to strengthen the plant, so that the plant height increases rapidly (Noviana, 2009).

3. The Yield of Cassava Renek

Cassava Renek is a local variety of cassava originating from Karanganyar, the advantage of this cassava compared to other varieties of cassava is the faster harvesting age of 4-5 months. Parameters observed for cassava yields were the number of potatoes per plant, length of potatoes, the diameter of potatoes, the weight of potatoes per plant, and yield of potato per ton. The average yield of cassava Renek based on the treatment and control are presented in table 5.

	Observation Parameter				
Treatment	Number of potatoes per plant (fruit)	Length of potato (cm)	Diameter of potato (mm)	Weight of potato per plant (kg)	Yield of potato (tons/ha)
Control	4,67 a	28,83 a	34,68 a	3,52 b	35,26 b
Stem 1 time	6,33 a	29,10 a	36,47 a	5,09 a	50,91 a
Stem 2 time	10,00 a	28,88 a	40,47 a	4,50 ab	45.01 ab
Stem 3 time	8,67 a	28,49 a	35,05 a	5,43 a	54.32 a

Table 5. Average The Yield of Cassava Renek in Week 20.

The yield of Potato per hectare. In table 5, the results of the variance show that there is a significant difference between the control treatment and the treatment of ratting frequency. However, from the cassava yields obtained for 5 months of planting, Figure 11 shows that the treatment frequency of cutting once has an effect on increasing the yield of cassava by 50.91 tons/ha with results that are almost the same as those shown in the results of treatment with the frequency of cutting three times, namely 54. ,32 Tons/Ha. This indicated that in the treatment with 3 times of cutting frequency before planting, 1.5 BST and 2.5 BST had the same tuber growth results as the treatment with a frequency of 1 time before planting. This is following research conducted by Rusbadila (2018), the treatment of 3 and 4 pieces of cutting before planting on the growth and yield of cassava of the glutinous variety, had a yield of 51 tons/ha of cassava. This is supported by Based on research conducted by Rofiq (2011) plants that received wounds or cuts at 2.5 BST (Months After Planting), tended to produce a higher number of tubers.

CONCLUSION

Firstly, at the age of 5 months, treatment frequency of 3 times cutting on cassava plants with mycorrhizal Renek variety gave significant effect on the parameters of root length, root fresh weight, root dry weight. Second, the best frequency during treatment of mycorrhizal Renek cassava at the age of 5 months, namely the frequency treatment of 1 time before planting gave the best effect on the parameters of sweet potato weight per plant (5.09 kg) and sweet potato yield (50.91 Ton/ Ha).

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