

Response of Variety of Planting Media and Rootone-F Concentration on the Early Root Growth of Grape Cuttings (*Vitis Labrusca*)

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Article History

Received:	2023-04-11
Revised:	2023-05-05
Accepted:	2023-06-29
Published:	2023-07-31

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DOI: 10.47310/hja.2023.v04i02.010

How to Cite the Article:

Widiwurjani *et al.* "Response of variety of planting media and Rootone-F concentration on the early root growth of grape cuttings (*Vitis Labrusca*)."
Himalayan Journal of Agriculture, vol. 04, no. 02, 2023, pp. 01-04.

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Abstract: Increasing the production of grapes can be done through the multiplication of stem cuttings supported by planting media and the right concentration of Rootone-F so as to produce good vine roots. This study aims to determine the appropriate planting media and concentration of Rootone-F for the root growth of grape cuttings. The research was conducted from August to October 2022 in Beciro Village, Sidoarjo, East Java. The experiment used a factorial complete randomized design (CRD) with 3 replications with 2 factors. The first factor is the variety of planting media (M) which consists of 3 levels, namely M1 (soil and husk 1:1); M2 (soil, husk and chicken manure 1:1:1); M3 (soil, sand and chicken manure 1:1:1). The second factor is the concentration of Rootone-F (R) which consists of 4 levels, namely R1 (200 ppm); R2 (300 ppm); R3 (400 ppm); R4 (500 ppm). The results showed that the single treatment of soil and husk planting media 1:1 (M1) had a significant effect and gave better results on the parameters of root number of roots, root length and root wet weight. The single treatment of 300 ppm Rootone-F concentration (R2) also gave better results on the parameters of number of root and root length, yet it does not give any significant effect. In addition, there was no significant interaction between the combination of different types of planting media and the concentration of Rootone-F on the parameters that were also tested.

Keywords: Root, Grape, Planting Media, Rootone-F, Cuttings

INTRODUCTION

Grapes are one type of fruit that is in great demand by consumers. The development of the wine commodity has good opportunities on an agribusiness scale. This is because the vines themselves have a broad market target in the distribution of grapes as a whole or as industrial raw materials such as fruit juices, jams etc. According to Dewi [1], wine is a commodity that has a high selling value and currently wine has spread throughout the world. Grapes are a type of imported fruit that has long been known and cultivated in Indonesia because grapes are not native to Indonesia. Several varieties that have long entered Indonesia, one of which is the Isabella variety.

An easy and inexpensive way to propagate grapevines is by stem cuttings or grapevine branches. Propagation of grapes using cuttings requires a mother tree that has good properties. Factors that greatly determine the nature of the plant are genetic factors and environmental factors. The nature of the parent tree needs to be considered to get good results and if you want to get superior properties like the mother tree it can be obtained by means of vegetative propagation such as by cuttings [2]. According

to Darmo and Yeny [3], genetic factors also include the content of food reserves in cuttings tissue, water availability, plant age (mother tree) and endogenous hormones in cuttings tissue. Environmental factors also influence such as rooting media, humidity, temperature, light interaction and cutting techniques.

The planting medium is one of the environmental factors that need to be considered. This is because the planting medium itself functions to provide nutrition and provide a place for plant roots to grow and develop. Plants will grow and develop optimally if the soil conditions where they live are in accordance with the nutrient requirements of these plants, so that the conditions of the appropriate planting medium need to be considered. According to Hendrayana, Ismail and Herlina, a planting medium is said to be good when it meets the requirements such as being free of weeds, does not contain pests and diseases, is able to hold water, but is also able to drain or remove excess water, is porous and crumbs so that roots can grow and develop.

Cuttings often fail with no root growth. One effort to overcome failure in root growth on cuttings is to provide

Growth Regulatory Substances (ZPT). Root formation can be faster if given auxin. According to Altayani, Suaria and Arjana [4], Rootone-F is one of the most widely used root growth hormones and is found in the form of white powder and is useful for accelerating and multiplying the release of new roots. The treatment of various planting media and concentrations of Rootone-F is expected to increase the potential for root growth in vine cuttings, so that they can meet the needs of the community. Based on this, research is needed regarding the response of various types of planting media and concentrations of Rootone-F on the root growth of grape cuttings.

MATERIALS AND METHODS

This research was conducted in Beciro Village, Sidoarjo, East Java. This research was conducted from August 2022 to October 2022. This research was a factorial experiment with 2 factors arranged based on Completely Randomized Design (CRD) with 3 replications. The first factor is the variety of planting media (M) which consists of 3 levels, namely M1 = soil and husk (1:1); M2 = soil, husks and chicken manure (1:1:1); M3 = soil, sand and chicken manure (1:1:1). The second factor is the concentration of Rootone-F (R) which consists of 4 levels, namely R1 = 200 ppm; R2 = 300 ppm; R3 = 400 ppm; R4 = 500 ppm.

Tools and Materials

The tools used in this experiment included cutting scissors, markers, tweezers, polybags, paranet, measuring cups, buckets, labels, rulers, handsprayer, stationery and documentation. The materials used in this study included grape stems of Isabella variety, soil, husks, sand, chicken manure, gandasil-d fertilizer, Rootone- F, benomyl fungicide.

Planting and Plant Maintenance

Cutting a stem is done by cutting the base of the stem horizontally and the tip of the stem is cut obliquely. Soaking the cutting material before use with a solution of the fungicide Benomyl (0.5gr/liter) and then drying it. The preparation of the Rootone-F solution is by weighing 200 mg of Rootone-F and then dissolving it in 1 liter of distilled water, so that a 200 ppm solution will be obtained. Rootone-F solution with other concentrations can be carried out in the same way according to the level of concentration. The base of the cuttings was soaked in Rootone-F solution for 1 hour according to each treatment. The cuttings that have been soaked in Rootone-F are air-dried before planting. The planting media used were soil and husks (1:1), soil, husks and chicken manure (1:1:1) and soil, sand and chicken manure (1:1:1). Each planting media material is put into a polybag. After filling the polybags, proceed with planting according to the treatment. Treatment of vine cuttings with embroidery, watering, fertilizing and controlling pests and diseases.

Observation Parameters

The parameters observed in this experiment consisted of the number of roots, root length (cm), root wet weight and root dry weight. This research was conducted for 9 weeks.

Data Analysis

The data analysis used was ANOVA with a formula according to the design used, namely Completely Randomized Design (CRD), then continued with the 5% BNJ Test if there was a significant difference in the treatment.

RESULTS

Number of Roots

The results of the analysis of variance showed that there was no significant interaction between the different variety of planting media and the concentration of Rootone-F. The single treatment of various planting media had a significant effect on the number of grapevine roots. A single treatment with Rootone-F concentration had no significant effect on the number of roots. The average value of the number of roots of the vines against the treatment of various types of planting media and concentrations of Rootone-F is shown in Table 1.

Table 1 shows that the soil and husk (1:1) planting media gave the best average number of roots and was significantly different from the soil, sand and chicken manure (1:1:1), but not significantly different with the planting media of soil, husks and chicken manure (1:1:1).

Table 1: Average Number of Roots Treated with Different Variety of Planting Media and Concentration of Rootone- F aged 9 WAP

Treatment	The Average Number of Roots
Variety of Planting Media	
M1 Soil and Husk (1:1)	13,17 b
M2 Soil, Husk and Chicken Manure (1:1:1)	11,08 ab
M3 Soil, Sand dan Chicken Manure (1:1:1)	8,75 a
BNJ 5%	3,60
Concentration of Rootone-F	
R1 200 ppm	12,00
R2 300 ppm	12,22
R3 400 ppm	10,56
R4 500 ppm	9,22
BNJ 5%	tn

The mean number followed by the same letter at the same age and treatment is not significantly different in the 5% BNJ test; tn = no significant effect; WAP = week after planting

Table 2: Average Root Length Treatment of Various Planting Media and Concentration of Rootone-F aged 9 WAP

Treatment	The Average Root Length (cm)
Variety of Planting Media	
M1 Soil and Husk (1:1)	26,18 b
M2 Soil, Husk and Chicken Manure (1:1:1)	20,58 ab
M3 Soil, Sand and Chicken Manure (1:1:1)	17,73 a
BNJ 5%	3,60
Concentration of Rootone-F	
R1 200 ppm	18,44
R2 300 ppm	23,82
R3 400 ppm	22,42
R4 500 ppm	21,30
BNJ 5%	tn

The mean number followed by the same letter at the same age and treatment is not significantly different in the 5% BNJ test; tn = no significant effect; WAP = week after planting

Table 3: Average Root Wet Weight Treatment of Various Planting Media and Concentration of Rootone-F aged 9 WAP

Treatment	The Average Root Wet Weight (g)
Variety of Planting Media	
M1 Soil and Husk (1:1)	3,84 b
M2 Soil, Husk and Chicken Manure (1:1:1)	3,12 ab
M3 Soil, Sand and Chicken Manure (1:1:1)	2,13 a
BNJ 5%	1,19
Concentration of Rootone-F	
R1 200 ppm	3,39
R2 300 ppm	3,28
R3 400 ppm	2,57
R4 500 ppm	2,88
BNJ 5%	tn

The mean number followed by the same letter at the same age and treatment is not significantly different in the 5% BNJ test; tn = no significant effect; WAP = week after planting

This shows that soil and husk planting media tend to provide better conditions compared to other treatments that were also tested. a large number of roots can have a better effect on the growth of grapevines. According to Ichwan, Syakur and Lasmini [5], a large number of roots will be able to support the growth of the plants themselves because the roots are used to store water and biomass from the soil which is then flowed to the plants which will be used by the metabolic processes of the plants later.

The concentration of Rootone-F of 300 ppm (R2) has a better number of roots than the concentrations of Rootone-F 200 ppm (R1), 400 ppm (R3) and 500 ppm (R4) in the parameters tested. The concentration of Rootone-F 300 ppm in the treatment of grapevine (*Vitis labrusca*) cuttings became a concentration with suitable conditions and was able to increase the growth of the number of roots of grapevine (*Vitis labrusca*) cuttings. Rootone-f is an auxin type growth regulator which can increase root growth. According to Siswanto, Nurmaini and Romeida [6], addition of auxin as a growth regulator can increase the percentage of cuttings that form roots, accelerate root initiation and homogenize the roots of cuttings.

Root Length

The results of the analysis of variance showed that there was no significant interaction between the different types of planting media and the concentration of Rootone-F. The single treatment of various types of planting media had a significant effect on the root length of grapevines. A single treatment with Rootone-F concentration had no significant effect on root length. The average value of the root length of grapes against the treatment of various types of planting media and concentrations of Rootone-F is shown in Table 2.

Table 2 shows that soil and husk (1:1) media gave the best average number of roots and was significantly different from soil, sand and chicken manure (1:1:1), but not significantly different with the planting medium of soil, husks and chicken manure (1:1:1). Giving a variety of soil and husk planting media (1: 1) is used in the process of loosening the soil to bind nutrients to plants. According to Nafingah [7], the use of rice husks can indirectly improve the physical properties of the soil by immersing or mixing rice husks during soil management. The main

effect can be seen in soil structure which is related to compaction, aeration and root development.

R2 treatment (Rootone-F 300 ppm) gave longer root length compared to other Rootone-F treatments such as 200 ppm Rootone-F concentration (R1), 400 ppm Rootone-F concentration (R3) and 500 ppm Rootone-F concentration (R4). Increasing the concentration of Rootone-F up to 300 ppm can promote better root length growth. This can be seen from the results of the average root length at Rootone-F concentrations of 400 ppm and 500 ppm which tended to decrease. According to Ramadan, Kendarini and Ashari [8], giving appropriate concentrations of growth regulators can help plant growth and can control the development of meristem tissue so that it will result in cell elongation.

Root Wet Weight

The results of the analysis of variance showed that there was no significant interaction between the different variety of planting media and the concentration of Rootone-F on the wet weight of grapevine roots at 9 WAP. The single treatment of various types of planting media had a very significant effect at the age of 9 WAP, while the single treatment with the concentration of Rootone-F had no significant effect. The average value of the wet weight of the roots of the vines against the treatment of various types of planting media and concentrations of Rootone-F is shown in Table 3.

The results of the average wet weight of the roots of the vines in Table 3. show that the different variety of soil and husk (M1) planting media gave a higher average wet weight of the roots and were significantly different from the composition of the soil, sand and chicken manure (M3) planting media, but not significantly different from the composition of the soil, husk and chicken manure (M2) planting media at 9 WAP. The process of absorption of nutrients by the roots is still very limited so that the nutrients in the planting media containing chicken manure have not been fully absorbed by the plants. In addition, this is also suspected due to the use of chicken manure that is not fully mature, which affects the slow growth of grapevines. According to Surya *et al.* [9], ripe fertilizers have the following characteristics, namely dark brown to black in color, crumbs, room temperature and odorless.

Treatment with a concentration of 300 ppm Rootone-F (R2) gave better average root wet weight compared to other Rootone-F treatments that were also tested. An increase in the wet weight of the roots indicated that the water content and organic matter of the roots increased. Lower auxin concentrations are able to interact with endogenous auxin thereby affecting assimilate transport in the root area [10].

CONCLUSION

There was no significant interaction in the combination of different types of planting media and concentration of Rootone-F on the parameters of the number of roots, root length, root wet weight and root dry weight. The results showed that the single treatment composition of soil and

husk planting media 1:1 (M1) gave the best average number of roots (13,17), root length (26,18 cm) and root wet weight (3,84 g). In addition, the single treatment with a concentration of 300 ppm Rootone-F (R2) also gave the best average results on the parameters of number of roots (12,22) and root length (23,82 cm) compared to the single treatment of other types of planting media and concentrations of Rootone-F which were also tested.

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