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Response Water Spinach *(Ipomoea Aquatica)* to Different Medium Treatment with AB Mix Nutrients on The Cultivation Hydroponic DFT (Deep Flow Technique)

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ABSTRACT

Water spinach (Ipomoea aquatica) is a plant that is included in the type of vegetables and is widely cultivated as food. Every year the demand for water spinach in the market continues to increase, besides that consumers also want the quality of water spinach which is more nutritious, clean, and hygienic. Therefore, hydroponic water spinach is used to support consumer demand in the market. In addition, by cultivating water spinach hydroponically as well as an alternative to farming in narrow areas. In hydroponic cultivating water spinach, there are several things that need to be considered, such as the provision of nutrition, the planting media used, and what hydroponic system will be used. This study aims to determine the response of water spinach plants to the treatment of different planting media, as well as to obtain information about what planting media is suitable for use in the DFT water spinach hydroponic system to support its growth and development. The experimental method used was a completely randomized design, which consisted of three different levels of treatment, namely the use of rockwool, charcoal, and moss media. The results of this study of differences in planting media showed the treatment with the best tendency for the parameters of plant height, number of leaves, and plant fresh weight

INTRODUCTION

As a function of time growing agricultural cultivation practices, various kinds of agricultural cultivation methods have emerged that can help agricultural actors. One of the most widely used plant cultivation methods, especially horticultural crops, is the hydroponic method. Water spinach is a plant that is easy to cultivate and can be done in the midst of limited land using the hydroponic method (Nanda and Khozin, 2022). According to mulasari (2018) hydroponic is a business of cultivating plants without using soil media but using nutrient mineral solutions or using

other media such as coconut fiber, broken brick, sawdust and others. The hydroponic system becomes more efficient because it can regulate the water and fertilizer used, so it is more effective and does not depend on the climate around where the plant lives (Kumari, et al 2018). Plants can grow and develop in a supportive environment (Khozin and Restanto, 2022). External factors that affect plant growth and development are the provision of hormones and nutrients (Khozin et.al., 2022). Apart from internal factors, internal plant factors such as genetics and plant hormones also affect plant development (Restanto et.al., 2018). As is well known, hydroponic technique also have the small possibility of using pesticides so that they do not cause adverse effect to the surrounding environment. This clearly makes hydroponic techniques more profitable in terms of economy when applied by farmers.

Hydroponic plants only need water added with nutrients as a food source for these hydroponik plants. In hydroponic cultivation there are several types of hydroponic systems, namely a) drip system (System Drops); b) Deep Water Culture (DWC) or Floating raft; c) nutrient NFT (Nutrient film technique); d) deep flow technique (DFT) and e) wick system. In general, hydroponic cultivation of horticultural crops uses two types of system, namely NFT hydroponic and DFT hydroponic. NFT and DFT system are the most widely used hydroponic systems ranging from hobby activities to industrial scale (Moesa, 2016). Fundamental differences in both hydroponic installation on nutrition is on the distribution. Nutrient will continue to flow in hydroponics that use the NFT systems. Nutrients will continue to flow throughout the plant along with the flow of water (Kammalla et. al, 2017). In contrast to the hydroponic system with the NFT system, the DFT system is required to keep flowing, the nutrients do not have to flow because the instalation is flat so that water can settle.

Hydroponic technique can generally be grouped into two groups, substrate hydroponics and non-substrate hydroponic. Substrate hydroponic can use any media other than soil, such as gravel, bricks, sand, hisk charcoal, and others as a substitute for soil. According to (Effriyadi 2018), of various types of substrates in hydroponic techniques, husk charcoal is a substrate that can provide better result than other substrates. The results obtained in the hydroponic technique also cannot be separated from the role of the nutrient solution provided so as to get good result. According to Purnomo et. al, (2016), AB mix nutrient solution added with other nutrients such as NPK will increase plant growth in variable number of leaves. This will obviously be very benefical when the expected hydroponic result are leaves such as mustard greens, spinach, kale, etc. Based on the hydroponics system and techniques described above, in the hydroponic technology practikum, the practitioner applies kale cultivation with the Deep Flow Technique (DFT) system using different palnting media, namely rockwool, charcoal and moss media.

METHOD

Location and Time

This research was conducted Ajung Wetan, Ajung Village, Ajung district, Jember regency , East Java, Indonesia. With an elevation level of 100-250 mdpl. Implementation time is carried out in March-May 2022.

Method of Colloecting Data

Methods of data collection in hydroponic cultivation research of water spinach using Completely Randomized Design (CRD) with one factor, namely differences in planting media. The treatments to be given were 3 different types of planting media, where each treatment consisted of 10 replications. There are 3 levels of treatment, namely the type of planting media charcoal, rockwool, and cotton. So, there are 30 experimental units of this experimental design. The number of sample plants taken was three plants for each experimental unit. The treatments in the experiment were as follows: A1: The use of charcoal growing media, B2: The use of rockwool growing media, and C3: The use of moss growing media.

Data Analysis

The data of this study were analyzed quantitatively and qualitatively. Quantitative data was obtained through the growth data of water spinach every week and at the end of the observation. Among others, such as plant height, plant fresh weight, and number of leaves. Qualitative data was obtained from the development of water spinach plants every week. Comparative analysis was used to test and compare each treatment with different planting media.

RESULT AND DISCUSSION

The effect of differences in planting media used in this study showed a significant effect on the growth and development of water spinach plants, for more details can be seen from the following table.

Effect of medium treatment on plant height

Plant height is an indicator of plant growth (Avivi et.al., 2018). Based on the data above, it can be seen that the difference in height of water spinach plants with different planting media every week does not have too much difference. However, based on these data, rockwool growing media had better plant height data than charcoal and moss media. That's because water spinach can grow in any medium, but rockwool is still the best because rockwool can hold water better than charcoal and moss. So it will also affect the absorption of nutrients.

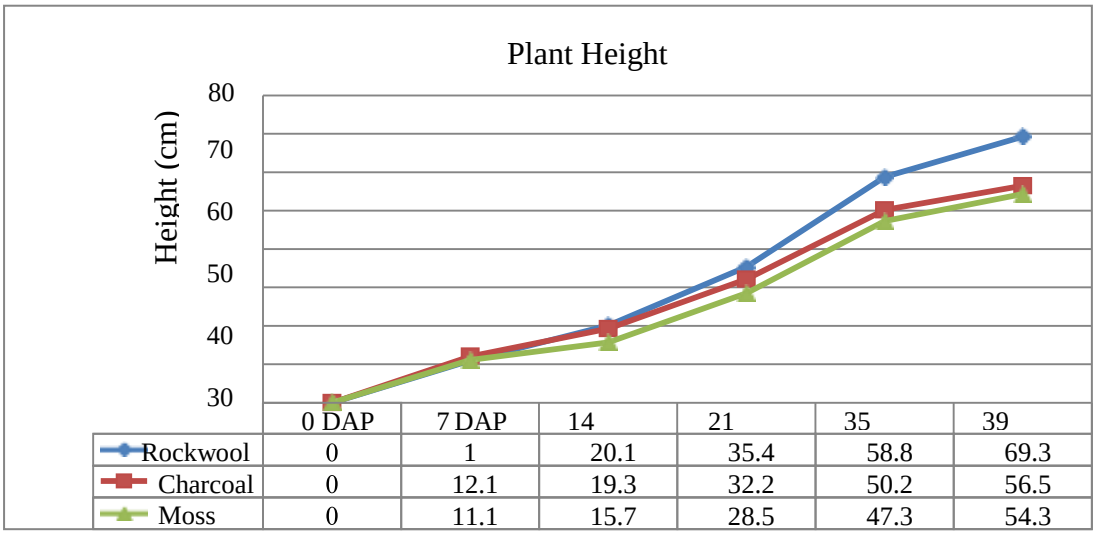
The effect of medium treatment on the average leaves number of water spinach

Based on the data on it can be seen that number of leaves plant by the different water spinach on each week not having the difference that are too far apart.According to the data in the media rockwool have data number of leaves plant more than by the charcoal and moss. It was

because the absorption of nutrients in a media cropping rockwool more optimal charcoal and moss was compared to the media .In addition is also influenced by each of the properties of these forms of media .So it is also will affect on the growth of plants water spinach.

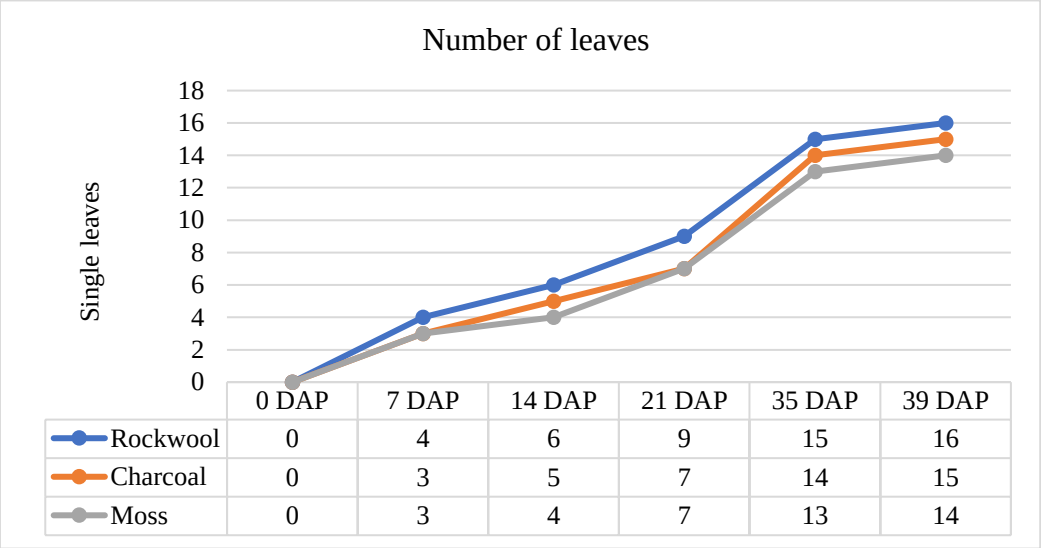
The results of plant production parameter

Based on the table above, it can be seen that moss media has a heavier root weight than rockwool and charcoal media, this is because moss media is more porous than charcoal media which is relatively dense and rockwool media which is not so hollow like moss media it affects the amount formed roots. So the number of roots in moss media is more than other media. This also affects the weight of the roots.Average weight header water spinachshows that media rockwool weighs a heading that is greater than other media , and of the trees also fully large of plants in other media that tends to are thinner .It is even though media rockwool having roots that media are not as many as moss but the absorption of mutrisi rockwool better from the media was compared to the media moss or charcoal.



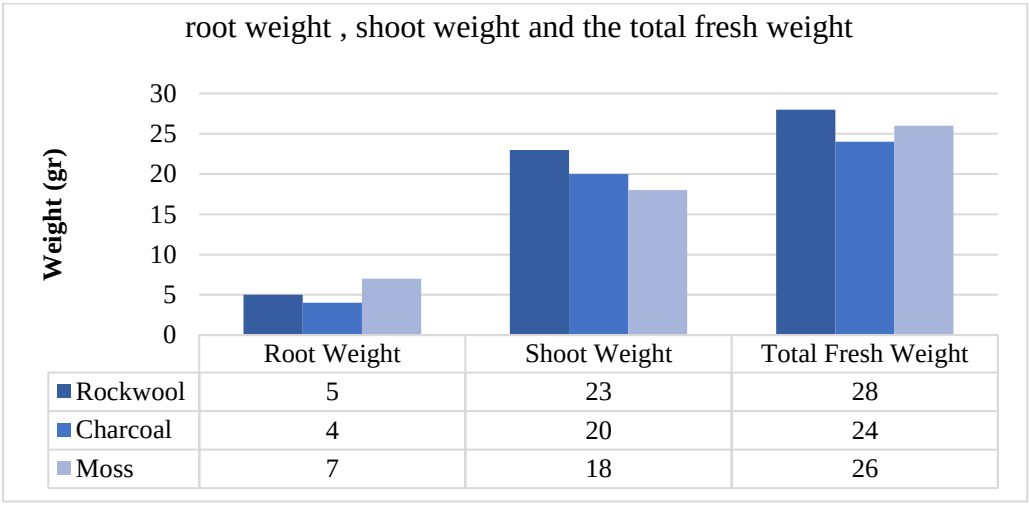
	0 DAP	7 DAP	14	21	35	39
Rockwool	0	1	20.1	35.4	58.8	69.3
Charcoal	0	12.1	19.3	32.2	50.2	56.5
Moss	0	11.1	15.7	28.5	47.3	54.3

Fig. 1. The average of plant height every week



	0 DAP	7 DAP	14 DAP	21 DAP	35 DAP	39 DAP
Rockwool	0	4	6	9	15	16
Charcoal	0	3	5	7	14	15
Moss	0	3	4	7	13	14

Fig. 2. The average number of leaves water spinach every week



	Root Weight	Shoot Weight	Total Fresh Weight
Rockwool	5	23	28
Charcoal	4	20	24
Moss	7	18	26

Fig. 3. Effect of medium treatment for root weight, shoot weight, and total fresh weight

The average crown weight of water spinach showed that rockwool media had a higher crown weight than other media, and the plants were also larger than plants in other media which tended to be thinner. This is because although rockwool media has roots that are not as much as moss media, the absorption of mutations from rockwool media is better than moss or charcoal media.

The average total fresh weight of water spinach showed that rockwool was the best medium, after that was moss and charcoal was the last. Rockwool media and charcoal media showed more parallel data than moss media. From root weight, crown weight, and total fresh weight as a whole are parallel to each other. In contrast to moss media, which showed high root weight data, the crown weight was lower than other media. From the total fresh weight above, it is only natural that moss media is heavier than charcoal media because moss media has a higher root weight than charcoal media, but even though it has a high root weight, moss media produces a lower crown weight than charcoal media.

Fig. 4. Water spinach at 35 DAP

The picture above is a comparison sample of each planting medium used. From the picture, it can be seen that there is no significant/significant difference in the growth and development of water spinach. Although rockwool media has data that is superior to other media, the difference is not too different, the difference between one media and another is only thin and the difference is also small.

In this hydroponic practicum, there are no serious problems, it's just that during Lebaran homecoming, the plants are left within one week and are not maintained, but the water spinach plants are still able to survive and are still fresh even though the water in the installation is little and some of the water spinach leaves turn yellow. The water spinach harvesting, which was supposed to be 21-28 DAP, was delayed until 39 DAP, which caused the plant to be too old.

CONCLUSION

The results of this study of differences in planting media showed the rockwool treatment have the best tendency for the parameters of plant height, number of leaves, and plant fresh weight. the use of rockwool media also shows the best development every week as can be seen from the visual appearance of water spinach.

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