

RESPONSE TO THE USE OF PLANTING MEDIA TYPES IN AQUAPONICS SYSTEM FOR THE VEGETATIVE GROWTH OF A FEW VARIETIES RED CHILI (*Capsicum annum* L.)

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ABSTRACT

The rapid pace of development and the increase of the population, especially in urban areas, makes the reduction of land used for agriculture as cultivation of agriculture and fisheries. This study aims to determine the response to the use of planting media types in aquaponics system for the vegetative growth of a few varieties red chili (*Capsicum annum* L.). This research was carried out at growth center from Juni - August 2018. The experiment was carried out using a Randomized Block Design Factorial with 2 factors and 2 blok. The first factor is planting media consists of 4 planting media (Rockwall, husk charcoal, cocopeat and ferlit). The second factor are varieties consisting of 4 varieties (kirana, pasemah, kopay). Parameters observed ie plant height (cm) and number of leaves (strands). The results showed that the best planting media ie rockwall followed by the application of cocopeat planting media (plant height) and husk charcoal (number of leaves) for the best varieties ie kirana.

Keywords : *Aquaponics, Planting media, Red Chili*

A. INTRODUCTION

Aquaponics is an alternative cultivation of plants and fish in one place. In this technique integrating closed fish cultivation (resirculating aquaculture) combined with plants. The technology has been carried out in developed countries, especially those that have limited land to optimize the productivity of aquatic biota.

Red chili plants grown in plant houses have better quality compared to planting in open land. The use of plant houses aims to create a controlled environment for optimal plant growth, such as protecting plants from wind and rain, protecting plants from pests and diseases and maintaining the temperature and humidity of the environment (Wijayani and Widodo, 2005).

Selection of a good planting medium is based on four criteria as follows: (1) can be a nutrient storage for plants, (2) has the ability to store water for plants, (3) does not prevent air exchange between the roots and the atmosphere above the media and (4) has the ability of mechanical carrying capacity for plants (Nelson, 1978).

Varieties are one aspect that needs to be considered in the management of plant cultivation techniques. Selection of varieties plays an important role in cultivation, because to achieve high levels of

productivity is largely determined by its genetic potential. If the management of the growing environment is not carried out properly, the high yield potential of the seed varieties cannot be achieved (Adisarwanto, 2006).

B. MATERIALS AND METHODS

Material used Husk charcoal, Cocopeat, ferlit, water, fungicides and insecticides, some varieties of red chili seeds, fish seeds. Tools used simple pyrolysis, aquaponic rack, pH meters and ruler.

This study uses Factorial Randomized Block Design with 2 factors and 3 blocks.. The first factor is Media Planting which consists of 4 media (Rockwool, Husk Charcoal, Cocopeat and Perlite). The second factor is the varieties (Kirana, Pasemah and kopay). Parameters observed were plant height (cm) and number of leaves (strands).

Observations are carried out once a week by measuring plant height and number of leaves of each treatment on 2 blocks. The data were analyzed statistically based on variance analysis on each observed variables measured evidently continued by using Duncan Multiple Range Test at 5 % level.

plants aged 1, 2 and 3 weeks after transplanting, while the interaction between planting media and varieties showed no significant effect on plant height (cm).

C. RESULTS AND DISCUSSION

Plant Height (cm)

The results of the analysis showed that the planting medium had a very significant effect on the height of

Table 1. Average Plant Height (cm) of Some Red Chili Varieties Due to Planting Media at the age of 1, 2 and 3 weeks after transplanting

Treatment	Plant Height (cm)		
	1	2	3
M = Growing Media			
M ₁ = Rockwool	10,03 aA	22,36 aA	25,89 aA
M ₂ = Husk Charcoal	6,69 bB	14,61 bB	23,94 dD
M ₃ = Cocopeat	6,81 bB	15,11 bB	27,31bB
M ₄ = Perlite	5,81 cC	13,25 cC	24,89 cC
V = Varietas			
V ₁ = Kirana	7,75 aA	17,35 aA	30,17 aA
V ₂ = Pasemah	6,85 bB	14,96 bB	25,71 bB
V ₃ = Kopay	7,40 cC	16,69 cC	28,15 cC

Description: The numbers followed by the same letter show very different according to the Multiple Range Test (Duncan) at the level of 5% (lower case) and level 1% (uppercase)

Plant growth is a process of increasing size, increasing the number of cells and increasing the number of leaves that will not return to their original shape. In plant growth is influenced by genetic factors and environmental factors. The difference in response that is shown due to differences in varieties is thought to be due to differences in the genetic traits of the three varieties. This difference in genetic traits causes differences in responsiveness of these three varieties to various environmental conditions so that growth activities such as the height of the plants shown are different (Harjadi, 1991).

Plant height increase in Kirana varieties is due to each variety having genetic differences, thus affecting plant growth. Each variety has different adaptations to the environment in which it grows, both climate elements and growth media. Each variety consists of a number of different genotypes, where each genotype has a certain ability to adapt to the environment in which it grows (Ashari and Andi, 2000). That certain characteristics of a growth are influenced by genotypes while others are influenced by the environment. The high plant height is due to the variety that has been able to adapt to its environment. Therefore, even though genetically there are varieties that have the highest plant potential, the height of the plant can only be achieved after interacting with the environment. In this study Kirana varietal has better genotypic characteristics and is able to adapt to its environment compared to varieties of Pasemah and Kopay.

Growing media shows a very real effect, where the planting medium is the main component needed in the cultivation of a plant. The planting medium used is adjusted to the type of plant to be planted. In general, planting media must maintain moisture around the roots, provide enough air and can withstand the availability of nutrients. In this study rockwool is the best planting medium. Rockwool is able to hold water, accommodating the addition of roots in the intake of nutrient molecules. Plant growth will develop well if supported by water, nutrients and air from growing media (Widodo, 1996). Growing media is one of the external factors that greatly affect plant growth such as plant height. This is because the media is not only a place for plants to grow but also supports metabolic processes.

The recirculation function of the aquaponic system is very closely related to the process of "washing" the residual waste of metabolic waste of fish (feces) and undigested leftover food. This is closely related to the nitrogen cycle and the nitrification process in aquatic media (Nugroho, *et.al.* 2012).

Number of Leaves (strands)

The results of the analysis showed that the planting medium had a very significant effect and the variety had significant effect on the number of leaves at the age of 1, 2 and 3 weeks after transplanting while the interaction between growing media and varieties showed an unreal effect on the number of leaves.

Tabel 2. Average Number of Leaves (strands) of Some Red Chili Varieties Due to Planting Media at the age of 1, 2 and 3 weeks after transplanting

Treatment	Number of Leaves (strands)		
	1	2	3
M = Growing Media			
M ₁ = Rockwool	8,39 aA	13,67 aA	21,33 aA
M ₂ = Arang sekam	6,39 bB	10,61 bB	16,78 bB
M ₃ = Cocopeat	6,00 cC	10,06 cC	15,89 cC
M ₄ = Perlit	5,72 dD	9,61 dD	15,06 dD
V = Varieties			
V ₁ = Kirana	6,75	11,25	18,00
V ₂ = Pasemah	6,46	10,27	16,79
V ₃ = Kopya	6,67	11,24	17,00

Description: The numbers followed by the same letter show very different according to the Multiple Range Test (Duncan) at the level of 5% (lower case) and level 1% (uppercase)

The existence of a very significant difference in the planting medium due to the condition of the planting media is good as a result of the influence of the planting medium which encourages the roots of plants to grow optimally. The number of leaves shows the process and rate of plant photosynthesis, which is by efficiency of the light energy for photosynthesis normally in low light intensity conditions. Observation of the number of leaves is based on the function of the leaves as a photosynthesis tool. The large number of leaves obtained in rockwool growing media due to good growing media must be able to provide water, air and retain nutrients obtained in balanced conditions to

ensure perfect root development and better plant growth (Hakim, *et. al.* 1986)

Rockwool is a mineral fiber derived from rock, generally rockwool is a combination of basalt, limestone and coal which is heated to 1.600⁰C until it melts like lava. In the liquid state it is converted into fiber by rotating and adding binder. After cold, the fiber is cut to the size needed. Rockwool is able to hold water, does not contain disease pathogens, helps optimize the role of fertilizer where the fertilizer obtained from the dissolved water of fish droppings will be absorbed by rockwool to meet the needs of the plant body to support plant growth



Gambar 1. Vegetative Growth of Several varieties of Red Chili and Growing Media on aquaponics

D. CONCLUSIONS

Kirana varieties are the best variety and rockwool planting media is the best planting medium for vegetative growth of red chili.

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