Budapest International Research and Critics Institute-Journal (BIRCI-Journal)
Humanities and Social Sciences
ISSN 2615-3076 Online)
ISSN 2615-1715 (Print)
www.bircu-journal.com/index.php/birci
Budapest Institute

The Effect of City Waste Giving With Various Concentrations on Growth and Results Red Lettage Plants

Devi Andriani Luta[1], Armaniar[2]
[1,2]*Universitas Pembangunan Panca Budi*
deviluta89@gmail.com

Abstract

The research was conducted at the Development University of Pancabudi, the agricultural lab of Glugur Rimbun starting from January until April 2020. This research was conducted using an experimental method using a Randomized Block Design (RAK) with 4 treatments and 6 groups/replication. The observed plant response was in the form of a plant height variable (cm), several leaves (strands), wet weight of plants (g), dry weight of plants (g), root length (cm), and organoleptic test. Based on the research results obtained, then it can be concluded that hydroponic nutrition with a concentration of 450 ppm (P1) has a good effect on the growth of red lettuce plants, namely producing high18.64 cm at the 4th week and the number of leaves 21.80 at the 4th week, weight 114.22 g in wet, 5.94 in dry, and 29.18 cm in root length.

Keywords
hydroponics; DFT; red lettuce

I. Introduction

Hydroponics is the origin of the word Latin consists of the word hydro which means water and the word ponos which means work, so that hydroponics can be interpreted as a method of plant cultivation without using soil as a medium planting, but using other media substitute for soil that can absorb water, nutrients and nutrients as well as a place establishment of plants (Prakoso, 2010).

Decrease in the land area due to conversion land, especially agricultural land resulting in gaps in the fulfillment of food needs. Fulfillment the need for agricultural products requires technology and innovation. The minimum agricultural land in the city causes the emergence of the concept of urban farming. Urban farming is the concept of moving conventional farming to agriculture in urban areas to support food needs in urban areas (Natalia et al., 2017).

Technology hydroponic cultivation is one of the one urban farming techniques that can utilized in the development and increase in crop yields. Production technique hydroponically capable plants increase yield and improve quality a product so the use of this system increased fivefold in 10 years the last in the hydroponic commercial industry (Lee & Lee, 2015).

Hydroponic cultivation can provide more benefits than traditional farming systems. The advantages that can be obtained include: harvested when really cooked, can be done close to the market or consumers, does not depend on the season and can be adjusted to the high market demand, guaranteed optimal growth climate because the environment is controlled, there is no problem with the land because it does not use soil media, safer because of handling biological pests and diseases, high quality results will be accepted by consumers at high prices so as to provide high profits as well (CropKing in Zailani, M. et al, 2019).

DOI: *https://doi.org/10.33258/birci.v4i3.2492*

The use of many hydroponic systems applied to vegetable crops and highly dependent on nutrients, light, water according to the needs of each plant. One of the Ebb-Flow system hydroponic techniques has the advantage of providing nutrients and water automatically. Supply hydroponic nutrients come from fertilizers inorganic which have a weakness, namely: requires expensive financing and does not economical for farmers. Utilization of one of the biological agent's Fungi.

Arbuscular mycorrhizae (AMF) can help plants in the fulfillment of nutrients, especially the elements of P. Mycorrhizal Fungi Arbuscula is a mutualistic fungus associated with plant roots almost with 90% tall plants, including vegetable crops. FMA considered. The advantages that make hydroponics is more popular because does not require tillage wider, more controlled planting system, more efficient use of water and fertilizers, pesticide-free, not affected by seasons, and productivity levels and quite high quality (Sastradihardja, 2011).

Necessary nutrients are dissolved in water, so it can be calculated and regulating the concentration of fertilizer used with care only as much as necessary. Nutrition provided in hydroponic cultivation systems in the form of a solution containing the elements macro and micro. The macro elements are Nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S). The microelements are manganese (Mn), cuprum (Cu), molybdine (Mo), zincum (Zn) and iron (Fe). Many nutritional brands traded in the market, however the quality varies. Difference

The quality of these nutrients is affected a lot factor. Differences in type, nature, and chemical completeness of fertilizer raw materials used will certainly be very affect the quality of the fertilizer produced (Sutiyoso, 2006 in Siregar et al., 2015).

Method cultivation method Hydroponics has an advantage compared to other systems. This method soaking plant roots in solution nutrients, the depth of the layer ranges from 4 – 6 cm. The working principle of this system is circulating plant nutrient solution continuously for 24 hours.

In general, the application of the DFT system is very ideal for growing vegetables (Chadirin,2007). Based on the description above, then need to be studied about optimization level the concentration of the nutrient solution that can be given to the technology system DFT (Deep Flow) hydroponics Technique) for lettuce (Lactuca sativa L). where L.) is a vegetable that has been long known by the public Indonesia, but not yet widespread its cultivation. Lettuce consumption recently showing improvement because it has a nice appearance very attractive to consumers, can used as a salad, contains nutrition is quite high, especially the content of minerals and vegetables are easy found on the market at an affordable price affordable (Sastradihardja, 2011).

Leading sector is certain to have greater potential to grow faster than other sectors in an area, especially the supporting factors towards the superior sector, namely capital accumulation, growth of absorbed workforce, and technological progress. The creation of investment opportunities can also be done by empowering the potential of leading sectors owned by the region concerned (Rachbini in Hasibuan, A. et al, 2020).

The business of composting organic waste is very potential to be developed because of the composition organic waste in several cities in Indonesia is very large (Damanhuri, 2006). Apart from benefiting the economy of the compost produced, effort composting also opens job opportunities for the public. According to Rahardyan et al., (1996), because the biggest source of waste is domestic (settlement) then the business of composting waste organic matter will be more efficient if it is done as close as possible to possible with the source and regional scale such as residential areas (RT/RW) and urban villages.

Composting organic waste on a regional scale will reduce transport and disposal costs landfill waste. Composting is a technique treatment of solid waste containing materials

biodegradable organic (can be decomposed microorganisms). Apart from being an organic fertilizer,

Compost can also improve soil structure, increase the ability of the soil to absorb water and retain water and other nutrients. Composting naturally will take a relatively long time, that is about 2-3 months even 6-12 months. Composting can take place with faster fermentation with the help of micro-organisms (Saptoadi, 2003).

Local micro-organisms (MOL) is one of the one activator that can help speed up composting process and is useful for improving compost nutrients. From this explanation, then came the idea of a composting research household organic waste by using combination activator sold in the market (EM4) with MOL to determine its effect on the quality of the resulting compost and the composition of the ingredients optimal compost that can be applied on site residential areas (RT/RW) and urban villages.

The purpose of this research is to determine the optimal composition of use combination of EM4 activator and MOL activator in composting from home organic waste ladder. Through composting home organic waste stairs using a combination of activators EM4/MOL is expected to be an alternative in reduce the amount of waste that goes to landfills, improve the quality of compost products so that they can used as organic fertilizer and provide the economic value of household organic waste through sale of the resulting compost.

Red lettuce is a plant that comes from Europe and Asia, this plant belongs to the Aresteceae family which has leaf shape wavy and red (Ansoruddin et al, 2017). In Indonesia, tamanan lettuce is cultivated by the community in the center vegetables, namely in the lowlands and in the plains high with a wide variety of varieties plant.

Cultivation of red lettuce requires nutrients which are used to increase growth and its development. These nutrients can come from organic or inorganic sources. Continuous use of chemical fertilizers and pesticides continuously can cause damage to biota soil, resistance to pests and diseases and canreduce the vitamin and mineral content of vegetables and fruit (Ryan, 2010). Fertilizer use Excessive chemicals can also cause Soil acidification and crust formation thereby reducing the organic matter content. Humus content, kills organisms beneficial, inhibits growth plants, changing soil pH, increasing pests, even contributing to the release of gases greenhouse (Chandini et al., 2019).

The red lettuce plant has benefits as a vegetable plant that has good nutritional content. In addition, lettuce plants red also has benefits for treatment therapy for various types of diseases because it has anthocyanin pigments that are useful as antidote to free radicals that damage body cells (Chairani, 2017).

Stale rice waste is the result of processed liquid organic fertilizer that is easily available and environmentally friendly. This stale rice waste is often just thrown away even though the waste can be used as liquid organic fertilizer for plant growth. Stale rice waste contains essential nutrients for plants so that if it has been processed into organic fertilizer,

This stale rice waste will not damage the environment and also harmless to humans and animals, and very useful for needs community in fertilizing the soil. Liquid organic fertilizer (POC) is a liquid which has been processed from raw materials in the form of dirt, waste, compost and other natural materials. Fertilizer liquid organics from stale rice can be applied to red lettuce plants in increasing the quality of plant growth, because total nitrogen contained in organic fertilizer liquid stale rice is 92 mg/L and contains one or more carriers of macro and micro elements needed by plants and organic matter used is easily soluble in water (Hadisuwito, 2012).

Based on the existing background, then researchers are interested in conducting research with the title analyze the effectiveness of giving stale rice as organic fertilizer for red lettuce (Lactuca sativa var. crispa)".

II. Research Methods

This research was conducted in Glugur rimbun area University Pembangunan Panca Budi Medan, This research was carried out from January to April 2020. Materials used are red lettuce seeds, water, the stock solution, A and B, petrogenic, and Rockwool. Tools used in this research consists of TDS/EC, pH meter, injection, net pot, flannel, ruler, pump 2000L/H Max 1.5m, plastic trays, pest traps, tendons, paragon strung together in parallel with DFT system and stationery.

Presence of biological agents AMF and MHB on hydroponic system vegetable cultivation provide benefits in fulfilling nutrition. The effect of the concentration of P 0 ppm has a significant effect on the absorption P in mycorrhizal red lettuce.

The concentration of P 20 ppm shows the effect significant effect on P uptake in non-mycorrhizal water spinach and kale mycorrhizal. While at a concentration of P 40 ppm red lettuce mycorrhizal significantly different to P uptake. P concentration 80 ppm indicates no there is a significant effect there is absorption P. The presence of AMF is beneficial for plants especially in facilitating nutrients such as phosphorus, zinc, copper, potassium, calcium, and helps plants to absorb nutrients from areas of low concentration on roots (Sharma et al., 2017)

This research uses Randomized Block Design (RAK) with 4 treatments and 6 group/test, each group consists of 10 plants, then the number plants in this experiment as much as 240 plant. Number of samples has taken each unit / experimental unit as much as 10 sample plants. As for the treatment studied is the concentration of the solution as following: P1 = 450 ppm, P2 = 600 ppm, P3 = 750 ppm and P4 900 ppm. Variable on The research observed is: High Plants (cm), Number of Leaves (strands), Root Length (cm), Total Weight Wet (g), Plant Dry Weight (g) and Organoleptic Test.

Ingredients used in this research includes Mycorrhizal Fungi Arbuscula (FMA) Glomus sp. and Gigaspora decipien which is a collection of the UNPAB Soil Biology Laboratory 10 sporang-1, Bacillus mycoides, Bacillus subtilis, Pseudomonas diminuta, Burkholderia gladioli, and B. cenocepacia which is a collection Soil Biology Laboratory Unpad other than that.

The plant seeds used are seeds Romaine lettuce, red lettuce seeds Varieties New Red Fire, and varieties of kale seeds Bangkok LP-1. Nutrient formulation used CaNO3 (Calcium Nitrate), KNO3 (Potassium Nitrates), MKP (Monopotassium Phosphate), K2SO4 (Potassium Sulfate), (NH4)2SO4 (Ammonium sulphate), MgSO4 (Magnesium sulfate), and trace elements (Fe, Cu, Mn, Zn, B, Mo at pH 5.8). The growing media used are: mixture of zeolite and husk charcoal (3:1 v/v) (Prafithriasari and Nurbaity, 2010) and rockwool. Obtained 24 treatments with three times replications, so that the total experimental unit is 72 experimental units.

Percentage of root colonization in Table 1 showing mycorrhizal romaine lettuce significant effect on the concentration of P 20 ppm and not significantly different from the concentration of P 0 ppm and 40 ppm. While the plant response mycorrhizal red lettuce and kale mycorrhizal with various treatments P concentration has no effect which is significantly different from the percentage AMF root colonization.

Phosphorus concentrations of 0 ppm and 80 ppm at mycorrhizal romaine lettuce plant, lettuce mycorrhizal red and mycorrhizal kale does not have a significant effect against AMF

root colonization. P concentration 20 ppm on mycorrhizal romaine lettuce significantly different effect on root colonization and did not differ real with mycorrhizal red lettuce.

While the effect of the concentration of P 40 ppm on mycorrhizal romaine lettuce and mycorrhizal red lettuce shows significant effect on root colonization FMA. High colonization of plant roots vegetables related to photosynthesis and host root exudate.

Table 1. Effect of Phosphorus Concentration and Some Vegetable Plants against Root Colonization

Concentration P	Root Colonization (%)		
	Lettuce Romain	Lettuce red	spinach
0 ppm	97,8 AB a	94,4 A a	95,6 A a
20 ppm	100 B b	98,9 A ab	88,9 A a
40 ppm	98,9 AB b	100 A b	90,0 A a
80 ppm	95,6 A a	97,8 A a	95,6 A a

Note: Numbers followed by the same letter are not significantly different according to the distance further test Duncan multiple at the 5% significance level. Lowercase letters are read horizontally and capital letters vertically.

III. Result and Discussion

The results of the calculated F test and coefficient the diversity of all the variables that observed are listed in Table 2 below:

Table 2. Results of Diversity Analysis for all observed variables

Changes observed	F count	KK (%)
Plant height (cm)		
Ages 7 hst	1,89tn	5,20
Ages 14 hst	0,18tn	3,52
Ages 21 hst	3,15tn	5,71
Ages 28 hst	4,36n	4,14
Number of leaves (strands)		
Ages 7 hst	0,95 tn	5,81
Ages 14 hst	3,66n	4,97
Ages 21 hst	12,58sn	4,57
Ages 28 hst	24,38sn	8,75
Root Length (cm)	11,34sn	9,29
Wet Weight (g)	4,45sn	12,29
Dry Weight (g)	12,5sn	5,55
Organoleptic Test	4,40n	9,86
F table	**5 %**	**3,29**
F tables	**1%**	**5,42**

The results of the analysis of diversity on Table 1 hows that the effect of administration of various concentrations of the solution hydroponic nutrition has no real effect at 7 hst, 14 hst, and 21 hst, while at 28 hst had a significant effect on plant height.

Presumably at the age of 1.2 and 3 weeks the plant is still in the stage early growth so not yet optimally absorb nutrients. Supardi's opinion (2003), that increase in plant height not only influenced by the element nitrogen. But the elements that play a role in process of increasing plant height.

According to Ruhnayat (2007), the use of the concentration of N nutrient solution above point optimum causes growth stunted crop. This result is also inline with the fact that nutrient N is toxic for plants when given too much a lot

Treatment 450 ppm (P1) very significant effect on the number of leaves, root length, lightweight wet and dry weight.

The growth of lettuce leaves is very fast by providing adequate nutrition appropriate, if nutrition is not precisely causes plants to become small and bitter. Main results lettuce plants are leaves so plant vegetative growth is necessary endeavored as optimally as possible, quality lettuce that consumers expect in developed countries have quality in and beyond good. Outstanding quality expected is a leaf measuring normal and has a green color, quality in what is expected is to have standard nitrate level or not too high. In line with the results.

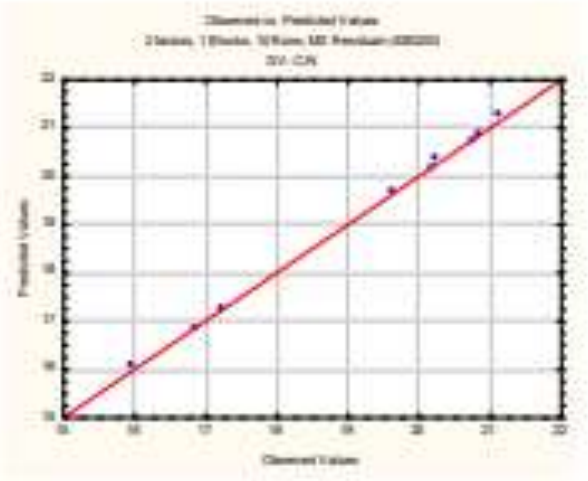

Figure 1. *The graph of the relationship between the observed data and the data predictable for C/N*

Figure 2 is a graph of the data relationship observed with predictable data for carbon or is a data validation graph with a model that generated. The closer the data (experimental results) with a mathematical model, the data will approach a diagonal line. The graph obtained shows that the points approaching the diagonal line show that the predicted value is close to the observed value. Thing this can be seen in the very high MS Residual price small, that is 0.008. Therefore, the model can represent the process of increasing the value of C/N.

Pavement research, with the title the effect of giving various concentrations nutrient solution on growth and the yield of green lettuce with the system DFT. Yield and plant growth The best lettuce was found at the concentration of AB Mix 500 ppm nutrient solution with parameter number of leaves, the weight of the plant base and root length.

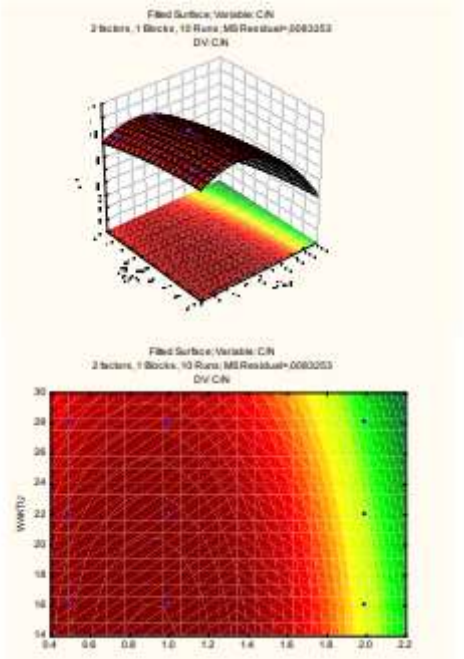

Figure 2. *Response Fitted Surface and Contour Profile Plot with Response Level of C/N*

Based on the results of the analysis the diversity in Table 1 shows that the assessment of some red lettuce plant based on test Organoleptic that treatment P1 shows a value of 4.83 (sweet taste) which significantly different to P2, while to other treatments is not different real. Presumably at low concentrations affect the taste of lettuce,

The main product of lettuce is leaves so that the vegetative growth of plants need to be optimized as much as possible. The quality of lettuce that consumers expect developed countries have external qualities and in good. Outstanding quality expected is a leaf measuring normal and has a green color, quality in what is expected is to have standard nitrate level or not too high.

Results of plant fresh weight measurement vegetables with effect treatment concentration of phosphorus (P) in some plants mycorrhizal and non-mycorrhizal vegetables presented in Figure 1. Plant fresh weight non-mycorrhizal romaine lettuce at concentration P 80 ppm indicates plant fresh weight the tallest. Lettuce plant fresh weight mycorrhizal romain at a concentration of P 40 ppm gives the highest fresh weight compared to other treatments. Whereas on non-mycorrhizal lettuce and red lettuce mycorrhizal plant fresh weight is shown at a concentration of P 80 ppm. On plantsHighest fresh weight non-mycorrhizal kale indicated at a concentration of P 40 ppm. Weight fresh mycorrhizal kale has the highest fresh weight at P concentration 80 ppm.

IV. Conclusion

The results of the study can be concluded that the administration of various concentrationshydroponic nutrient solution 450 ppm/l water tends to give the best results on plant growth and yield DFT system red lettuce, with variable plant height 18.64 cm at week 4, the number of leaves is 21.80 pieces a week 4, wet weight 114.22 g, dry number 5.94 and root length 29.18 cm.

References

Chadirin, Y. (2007). Teknologi GreenHouse dan Hidroponik. Diktat Kuliah. Departemen Teknik Pertanian. IPB.

Buckman H.O., and Brady, N.C. (1982). Ilmu Tanah. Terjemahan Prof Dr. Soegiman. Bharata Karya Aksara. Jakarta.

Hasibuan, A. et al, (2020). The Analysis of the Effect of Determinant Factors of Palm Oil Plantation Sector on Agricultural Sector Growth in North Sumatera. Budapest International Research and Critics Institute-Journal (BIRCI-Journal). P. 1083-1094.

Kinasihati, E. (2008). Studi Kebutuhan Nitrogen Tanaman Selada. Universitas Jember. Jember.

Prakoso, S.P. (2010). Selada Hidroponik. Tanggal Akses 11 Februari 2017 http://prakosoisme.blogspot.com/ 2010/09/selada-hidroponik.html.

Ruhnayat, A. (2002). Penentukan Kebutuhan Pokok Unsur Hara N, P, K untuk pertumbuhan tanaman panili (Vanilla planifolia Andrews). Buletin Littro (online)

http://balittro. Litbang.deptan.go.id/ind/images/s tories/Buletin/.../5-panili.pdf. diakses tanggal 11 september 2017.

Sastradiharja. S. (2011). Praktis Bertanam Selada dan Andewi secara Hidroponik. Bandung; Penerbit Angkasa Bandung.

Supardi. (2003). Lingkungan Hidup dan pelestariannya. Diakses dari https://www.academia.edu/22510 186/ Aplikasi Pertanian Organik pada Tanaman Sawi, pada Tanggal 9 Januari 2017.

Sutiyoso, Y. (2006). Hidroponik Ala Yos. Penebar Swadaya. Jakarta.

Zailani, M. et al, (2019). Growth Response and Crop Production (Brassica Juncea L.) Against Watering Time Interval at Various Hydroponics Media. Budapest International Research in Exact Sciences (BirEx) Journal. P. 9-22.