ISBN 978-623-99026-4-3

Growth Response of Romaine (Lettuce Romaine) Plants in the DFT (Deep Flow Technique) Hydroponic System Fertilized with Chinese Cabbage Leaves and AB Mix Fertilizer

Situmeang Doli[1,*] & Simbolon Yulita[2]

[1,2]Universitas Advent Indonesia

*Corresponding email: dolisitumeang@unai.edu

Abstract

Hydroponic is one of the future agricultural systems because it can be cultivated in various places, such as in villages, in cities, in open land, even above apartments. Hydroponic can be cultivated throughout the year regardless of the season. In this study, two types of fertilizers were used, namely Chinese Cabbage leaf and AB mix. The preparation of AB mix nutrition solution is done by dissolving two kinds of AB mix, AB mix A (83 grams) with AB mix B (83 grams) by dissolving both of them into 2 liters of water. Vegetables are one of the horticultural products which are in great demand by the public because they have high nutritional content and are beneficial for health. One type of vegetable that almost everyone needs is romaine lettuce. The purpose of this study was to determine growth with nutrient AB mix and leaves of Chinese Cabbage. This study was tested by one-way analysis of ANOVA and Duncan with a = 0.05. The results showed the difference in the growth of romaine plants, the width of the leaves was wider, and the roots were longer when AB mix nutrition was used compared with leaves of Chinese Cabbage.

Keywords: AB mix, romaine plants (lettuce romaine), Hydroponic (Deep Flow Technique).

INTRODUCTION

Vegetables are very important ingredients for our food. It contains vitamins, minerals, and fiber which are essential for the health of our body, and it will increase the quality of human resource development. One of the vegetables which have a high nutritional value is Romaine (Lettuce Romaine) (Husnaeni et al., 2018).

Lettuce Romaine is in high demand for the public in Indonesia. Total different kinds of vegetable production are up to 11,3 million tons in the year of 2011 in Indonesia, but this is only 0.92% of the world's vegetables produced. (Peni and Nurul, 2018)

In order to increase the production of Lettuce Romaine, we can use the Hydroponic Technique because it can be used in a limited space available.

Hydroponics is the cultivation of plants by utilizing water for their growth without soil media, where specific fertilizers are continuously added. A hydroponic system also maintains plant growth and protects from climate, pests, diseases, and rain. This system also may improve the quality of crop production and ensure the quality of plants. (Susanto, 2001).

Hydroponic systems usually use chemical fertilizers such as AB mix, in which the price is costly. The purpose of this research is to find an alternative fertilizer for hydroponic where the growth of the crops can be maintained properly. One possible fertilizer which is easily found nearby the UNAI campus was discarded parts of green vegetables. In this experiment, we use Chinese cabbage.

AB mix solution is liquid nutrition used for the plantation in a hydroponic system with 16 multivitamins contents in the solution, namely N, P, K, Ca, Mg, S, Fe, Mn, Bo, Cu, Zn, Mo, Cl, Si, Na, and Co (Novi et al., 2016). For comparison, we also apply liquid organic fertilizer from discarded Chinese cabbage vegetables. We did not use chemical pesticides in this experiment to make sure that health concerns were observed.

METHODOLOGY

We started the research with the preparation of tools and equipment using the DFT (Deep Flow Technique) of a hydroponic system in which the root of the plant was placed in the pipe with the root length was 1-2 cm. The plant nutrients solution was circulated in the closed pipe for 24 hours continuously. The nutrient solution in the tank was pumped by an electric water pump to the pipe irrigation system on a circulatory basis.

Since we used two kinds of nutrient solution, then we used two hydroponic piping circulatory systems, one system for each nutrient solution.

Then we collected the discarded Chinese cabbage from the vegetable garden of the villagers who stay nearby the UNAI campus at the amount of 5 kg, cut it into small pieces, then did the fermentation by adding 500 g of sugar and EM4 (effective microorganism 4) in a jar, then we close the jar for four weeks.

In the meantime, we did the process of raising a seedling of Romaine Lettuce in the Rockwool, covering it with black plastic.

Fermented solutions were placed inside the hydroponic piping system, and then we put the seedlings, which have about 1-2 cm length of roots, in the net pot with flannel cloth in the holes prepared at the pipe. The flannel cloth is for the water to be absorbed and transferred to the seed in the Rockwool.

We measure the plant after one week of planting, and then we do the measurement twice a week until four weeks. The measurement was for the length of the plant, the width of the leaf, and the length of the root.

When the measurement has been done after four weeks, then we put the data using one-way ANOVA and Duncan statistics.

ISBN 978-623-99026-4-3

RESULTS

Table 1: Length of Romaine Lettuce

Variation	n	Mean	Std Deviation
AB Mix	64	17,3988	2.0430
Chinese cabbage	32	7,9084	0.4198

From Table 1, we can see that the length of the plant using AB Mix is 17,3988 cm, longer than using Chinese cabbage fermented solution of 7,9084.

Table 2: Width of leave of Romaine Lettuce

Variation	n	Mean	Std Deviation
AB Mix	64	4,5514	0,8041
Chinese cabbage	32	4,3253	0,4019

From Table 2, we can see that the width of the plant's leaves using the AB Mix is 4,5514 cm is wider than the Chinese cabbage using the fermented solution of 4,3253.

Table 3: Length of Romaine Lettuce Root

Variation	n	Mean	Std Deviation
AB Mix	64	19,1902	6,3922
Chinese cabbage	32	12,7281	3,4688

From Table 3, we can see that the length of the root of a plant using AB Mix is 19,1902, longer than using Chinese cabbage fermented solution of 12,7281.

CONCLUSION

AB Mix nutritional solution is better than Chinese cabbage fermented solution for the growth of Romaine Lettuce.

In this study, the Chinese cabbage fermented solution can be used as an alternative fertilizer in the hydroponic system even though AB Mix still has the highest value.

ISBN 978-623-99026-4-3

REFERENCES

Atikah, et all (2014). Pengaruh pupuk organis cair berbahan dasar limbah sawi putih terhadap Pertumbuhan tanaman jagung manis. Bulletin anatomi dan fisiologi vol XXII, nomor 1

Atmaja, F.D (2009). Analisis Keseimbangan panas pada bak penanaman dalam system Hidroponik DFT. Fakultas teknologi pertanian, Institut Pertanian Bogor

Azzamy (2015). Tebel PPM dan Ph nutrisi sayuran daun.

Hadisuwito S. (2011). Membuat pupuk kompos cair. Jakarta: Agro media Pustaka

Husnaeni, eet all (2018). Pengaruh pupuk hayati dan anorganik terhadap populasi Azotobacter, Kandungan N, dan hasil pakcoy pada system nutrient film technique.Jurnal biojati 3.

Masduki Anang. (2017). Hidroponik sebagai sarana pemanfaatan lahan sempit di dusun Randubelang, bangun Harjo, sewon, Bantul. Jurnal pemberdayaan I.

Ningrum, et all (2014). Pengaruh lama aerasi terhadap pertumbuhan dan hasil tanaman sawi DFT hidroponik. Jurnal teknik pertanian lampung.

Novizan L.B. (2017). Mempercepat panen sayuran hidroponik. Teknik penyemaian Menggunakan busa, aplikasi hidroponik. PT Agromedia Pustaka.

Pranata, A.S. (2004). Pupuk organic cair. Aplikasi dan manfaatnya. Agromedia Pustaka, Jakarta

Sunarjono, Hendro. (2013). Bertanam 36 jenis sayur. Penebar Swadaya, Jakarta