ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science

AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

Effect of Soilless Media (Hydroponic) on Growth and Yield of Two Varieties of Lettuce

Jhon Hardy Purba*, I Putu Parmila, Wayan Dadi

Faculty of Agriculture, Universitas Panji Sakti, Singaraja - Bali, Indonesia

*Corresponding author email: jhonhardy@yahoo.com

ABSTRACT

The purpose of this study was to determine the effect of media types, varieties and their combinations on the growth and yield of lettuce with hydroponic wick system cultivation. This research was carried out in the agronet house of the Agrotechnology Study Program, Faculty of Agriculture, Panji Sakti University, Singaraja with an altitude of 39 meters above sea level (above sea level) from May to July 2019. The experimental design used in this study was factorial randomized block design (RBD) which consisted of two factors, the first factor was growing media in a net pot (M) with 3 types, namely rockwool growing media (M1); husk charcoal growing media (M2), and coco peat growing media (M3), and the second factor is the variety (V) which consists of 2 types, namely the frizzy lettuce (V1) and the red lettuce (V2). The results of this study showed that the best medium which gave greater result was husk charcoal medium and compared to rockwool and cocopeat, the frizzy lettuce was better than the red lettuce, and the combination of the husk charcoal medium and the frizzy lettuce variety gave the best growth and yield parameters.

Keywords: coco peat, husk charcoal, hydroponics wick system, lettuce varieties, rockwool, ,

1. INTRODUCTION

In the Hydroponic Wick System, only requires wick that can be connected between the nutrient solutions in the container with the planting medium. The nutrient solution is drawn into the planting medium from the container through the wick, air and nutrients will be able to reach the plant roots by utilizing the capillary power on the wick. An air pump is needed to pump air into a water and nutrient solution, an air stone (aerator / water pump) is needed which can create bubbles to supply oxygen. The highest production and profitability of lettuce were found using uninterrupted nutrient solution flow, which provided higher shoot and root nutrient contents to plants, and resulted in a better nutrient use efficiency (Ali et al., 2020; Dalastra et al., 2020; Kristi, 2018; Madar et al., 2019).

The nutrients dissolved in water used in hydroponics are mostly inorganic and in the ionic form. The main nutrients include dissolved captions (positively charged ions), namely Ca^{2+} (calcium), Mg^{2+} (magnesium), and K^{+} (potassium), the main nutrient solution in the form of anions (positively charged ions) is $NO3^{-}$ (nitrate).), $SO4^{2-}$ (sulfate), and H2PO4- (dihydrogen phosphate). AB Mix nutrients used in hydroponics are inorganic salts that contain macro and micro elements. Inorganic salts are more water soluble and do not produce sediment. Giving AB mixture increases the number of leaves. AB-mix application affected all observed variables: plant height,

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

leaf width, leaf number, and leaf chlorophyll, but it was not significant for root length (Rosnina & Mauliza, 2020).

In general, the planting medium used for lettuce cultivation with a hydroponic system is rockwool. Rockwool has the advantages of being suitable for all types of plants, easy to absorb air, free of pathogens, practical and environmentally friendly but rockwool has disadvantages that are difficult to find because not all agricultural shops provide this planting medium and the price is relatively expensive.

Husk charcoal is commonly used for hydroponic growing media compared to coconut husk powder. Several studies have stated that coconut coir has excellent storage capacity (Muhit, and Qudriyah, 2016). According to (Wuryaningsih et al., 2003) stated that coconut husk powder media can produce shoots and rose flowers significantly more than sawdust media, because the nutrients that are absorbed, especially N in the coconut husk powder media are more than that of sawdust. Application of biological fertilizer has a significant effect on the growth and yield of pakcoy (Purba et al., 2019) and shallot (Purba et al., 2020). The results of the total fruit weight in the media with the addition of coconut husk powder charcoal are equivalent to the results of the total fruit weight of the husk charcoal media so that the coconut husk powder charcoal can be used as a hydroponic medium. Lettuce (*Lactuca sativa* L) is a horticultural commodity that is widely consumed by people because of its attractive texture and color (Indrawati et al., 2012; Wonning, 2018).

Increasing production and improving the quality of production are carried out by means of hydroponics. The success of hydroponic cultivation of vegetables is determined by the nutrient solution given, therefore all nutritional needs are strived to be available in the right amount and easily absorbed by plants (Jones, 2005). The purpose of this study was to determine the types of growing media, varieties, and interactions of types of growing media and varieties of lettuce which gave the best growth and yield of lettuce in lettuce cultivation using the hydroponic wick system.

2. RESEARCH METHODS

This research was carried out in the paranet house of the Faculty of Agriculture, Panji Sakti University from March to April 2020. With an altitude of 39 meters above sea level. The materials used in this study were: Styrofoam 50 cm long, 35 cm wide and 14 cm high, bamboo, UV plastic, lettuce seeds, rockwool, plastic cups, plaster, AB Mix nutrients, and flannel. The tools used in this research were: type LP 40 aerator, TDS meter, pH meter, measuring cup, tweezers, solder, knife, scissors, hot glue gun, hole saw, hand drill, scale, and writing tools.

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

This study used a factorial randomized block design consisting of two factors. The first factor was the planting medium in a netpot (M) with 3 levels, namely M1: rockwool growing media, M2: husk charcoal growing media, and M3: cocopeat growing media. The second factor was the variety (V) with 2 levels, namely V1: frizzy lettuce varieties, and V2: red lettuce varieties. The two factors were combined to form 6 combination treatments. Each treatment was repeated 3 times so that there were 18 treatment units.

The hydroponic wick system media used a Styrofoam box with a length of 52 cm, a width of 35 cm and a height of 17 cm, a total of 18 boxes which are then coated on the inside of the Styrofoam box so that water does not come out through the Styrofoam gap, then cover the styrofoam in a hole using a hole saw with a spacing of 13 cm.

The netpot used in the wick system was a plastic cup that was perforated using solder on the bottom and sides, so that the roots of the plant can come out through the hole, then the bottom hole was given a flannel cloth, this flannel cloth functions as a wick to absorb water into the media. rockwool.

AB Mix nutrition consists of 2 different packages, namely Mix A and Mix B. In one box there were 8 liters of water, for at the beginning of planting (age 1-7 days after planting (DAP)) after planting, a low hydroponic nutrient solution was given, which is 500 ppm (equivalent to 2.5 ml of nutrition A + 2.5 nutrition B + liters of water). Entering the second week (age 8-14 DAP) after planting the dose of nutrition was increased to 700 ppm (equivalent to 3.5 ml of nutrition A + 3.5 nutrients B + 1 liter of water). At the third week (age 15-21 HST) nutrition was increased again to 900 ppm (equivalent to 4.5 ml of nutrition A + 4.5 nutrition B + 1 liter of water). The fourth week (age 22 DAP until harvest) was the same as the third week, which was 4.5 ml of nutrition A + 4.5 nutrients B + 1 liter of water.

Sowing of seeds was carried out in three media, namely rockwool media, rockwool was cut into squares with a diameter of 2cm x 2cm which is then placed on a tray, then the rockwool is moistened with enough water. The husk charcoal media, using a tray for the husk charcoal seedlings, was put into the seedling tray and then watered using a sprayer after it is wet enough, the lettuce seeds were placed using tweezers. In the cocopeat media, put the cocopeat seedling tray into the seedling tray, then water it using a sprayer after it was wet enough, the lettuce seeds were placed using tweezers, one hole for the seedling tray was filled with one lettuce seed.

After the lettuce seeds were 7 days old the seeds were ready to be transferred to the hydroponic installation. Further nutrition was given at the same time as the added water, the nutrient concentration of AB Mix was adjusted to the treatment in the study, if the water availability in the styrofoam box media had decreased. The pH control of the solution was carried

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

out every time the water was added to the styrofoam media, the pH measurement of the solution used a pH meter which was adjusted to the standard pH level of neutral water, namely 7.0. So that plants can grow to the maximum. If the pH was below 5.5, you can add a 10% KOH chemical solution or with baking soda and if the pH is above 6.5 you can add a H2SO4 solution.

Harvesting was done after the lettuce is 35 days old. Harvesting was done by pulling out the lettuce plant and its netpot, then the plant was separated from the netpot. The variables observed in this study were a) plant length (cm), b) number of leaves (strands), c) leaf area (cm2), d) crown wet weight (g), e) oven dry weight of the crown (g), f) root wet weight (g), g) Root oven dry weight (g), h) Total wet weight (g), i) Total oven dry weight (g), and j) shoot-root ratio

The data from the results of this study were analyzed statistically using excel, if there were significant differences between treatments, followed by the LSD test at the 5% level. To determine the closeness of the relationship between variables, a correlation test was carried out.

3. RESULTS AND DISCUSSION

The results of the analysis of various effects of treatment on the observed variables showed that the treatment of the planting medium had no significant effect ($p \geq 0.05$) on plant length, number of leaves, shoot wet weight, oven dry weight, total wet weight, oven dry weight of roots, volume. root, leaf area, economic fresh weight and leaf-root ratio, but significantly ($0.05 < p \leq 0.01$) on root wet weight, had a very significant effect on total oven dry weight.

Treatment of lettuce varieties had a significant effect on plant length, number of leaves at 30 days after planting and total oven dry weight, had a very significant effect on plant length at 23, 30 days after planting and leaf area, but had no significant effect on plant lengths at 9, 16 dast number of leaves at the age of 9, 16, 23, shoot wet weight, oven dry weight of the crown, root wet weight, root oven dry weight, total wet weight, root volume, economic fresh weight and leaf-root ratio.

The combination of the use of growing media and lettuce varieties had a significant effect on leaf area aged 30 DAP, oven dry weight of crowns, oven dry weight of roots, had a very significant effect on root wet weight, total wet weight, total oven dry weight, root volume (Table 3), However, there was no significant effect on plant length, number of leaves at age 9, 16, 23, shoot wet weight, leaf area, economic fresh weight, and leaf root ratio.

Plant length (cm)

Lettuce varieties had a very significant effect ($p < 0.01$) during periods of 23 and 30 days. The frizzy lettuce variety (V1) gave the longest plant length at 30 days after planting with a plant length of 40.62 cm, while ed variety (V2) was 31.59 cm (Table 1 and Figure 1). Growing media

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

and the interaction between the two treatments had no significant effect on plant length parameters at the age of 9 days, 16 days a week, 23 days a week and 30 days a week.

Number of leaves

The planting medium had a significant effect on the age of 30 DAP, the planting medium for husk charcoal (M2) gave the highest number of leaves, namely 18.63 leaves, while the lowest number of leaves was on cocopeat media (M3) 17.33 leaves. Lettuce varieties had a significant ffect on the age of 30 days after planting, the frizzy lettuce variety (V1) gave the highest number of leaves, namely 18.33 pieces, wahile the lowest was on V2 which was 17.80 leaves. The combination between the two treatments showed a significant effect on the age of 30 DAP, the best combination of treatments was given to the husk charcoal growing medium with the frizzy lettuce variety (M2V1) producing the highest number of leaves, namely 19.60, while the lowest one was on combination of cocopeat media and frizzy variety (M3V1) 17.27 leaves (Table 2).

Shoot oven dry weight(g)

The planting medium had no significant effect on oven dry weight of the crown. Lettuce varieties had no significant effect on oven dry weight of crowns. The combination between the use of growing media and lettuce varieties showed a significant effect on oven dry weight of the crown. The best combination of treatment was given to the husk charcoal growing medium with the frizzy lettuce variety (M2V1) resulting in the heaviest canopy dry weight of 9.20 g, while the lighest one was on M1V1, namely 7.33 g. (Table 3).

Root fresh weight (g)

The planting medium had a significant effect on root fresh weight. The highest yield was obtained with husk charcoal (M2) media, namely 17.77 g, and the lightest one was on V1, which was 13.58 g. Lettuce varieties had no significant effect on root fresh weight. The combination between the use of growing media and lettuce varieties showed a very significant effect on root fresh weight. The best combination treatment was given to the husk charcoal growing medium with the frizzy lettuce variety (M2V1) to produce the heaviest fresh weight of 20.93 g, while the lightest one was on M1V1, namely 11.47 g (Table 4).

Root oven dry weight (g)

Growing media and varieties had no significant effect on the oven dry weight of roots. The combination of growing media with lettuce varieties showed a significant effect on oven dry weight of the crown. The best combination treatment was given to the husk charcoal planting medium with the frizzy lettuce variety (M2V1) resulting in the heaviest root oven dry weight of 0.77 g, while the lightest one was on M3V2, namely 0.40 g (Table 5).

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

Total fresh weight (g)

Growing media had no significant effect on total fresh weight. Lettuce varieties had no significant effect on total fresh weight. The combination between the use of growing media and lettuce varieties showed a very significant effect on the total fresh weight. The best combination treatment was given to the husk charcoal growing medium with the frizzy lettuce variety (M2V1) resulting in the heaviest fresh weight of 211.83 g, while the lightest one was on M1V1, namely 162.67 g (Table 7).

Total oven dry weight (g)

The planting medium has a very significant effect on the total oven dry weight. The heaviest yield was obtained by husk charcoal media (M2), namely 8.57 g, while M1 and M3 gave the same one, namely 7.62 g (Table 6). Lettuce varieties significantly affected the total oven dry weight. The heaviest yield was obtained by the type of frizzy lettuce (V1), which was 8.49 g, while the lowest one was on V2, whisc was 7.38 g (Table 6). The combination between the use of growing media and lettuce varieties showed a very significant effect on the total oven dry weight (Table 8). The best combination treatment was given to the husk charcoal growing medium with the frizzy lettuce variety (M2V1) resulting in the heaviest total oven dry weight of 9.93 g, while the lightest one was on M1V1, namely 7.20 g (Table 8).

Growing media had no significant effect on leaf area. Lettuce varieties have a very significant effect on leaf area. The widest leaf area was obtained in the frizzy lettuce variety (V1), namely 26.47 cm^2, and the smallest one was on frizzy variety (V2) which was 22.57 cm2 (Table 6). The combination between the use of growing media and lettuce varieties showed no significant effect on leaf area.

Root volume (ml^3)

The planting medium had no significant effect on root volume. Lettuce varieties had no significant effect on root volume. The combination between the use of growing media and lettuce varieties showed a very significant effect on root volume. The best treatment combination was given to the husk charcoal growing media with the frizzy lettuce variety (M2V1) resulting in the highest root volume of 55.00 ml^3, while the smallest one were on M2 V2 and M3V1 which was 38.00 ml^3 (Table 9).

Discussion

The results of the analysis of variance showed that the use of different growing media had a very significant effect on the total oven dry weight, and had a significant effect on the wet weight of the roots. It had no significant effect on the parameters of plant length, number of leaves, shoot

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

wet weight, oven dry weight of shoots, total wet weight, root oven dry weight, leaf area, root volume, economic fresh weight and leaf-root ratio.

The results showed that the treatment of husk charcoal media (M2) gave the heaviest total dry weight of the oven, namely 8.57 g (Table 6). This is because the husk charcoal is an organic material that still contains nutrients, these nutrients can be used by plants in hydroponic systems. Husk charcoal is the rest of the rice bran that is burned with special characteristics, besides that there are chemical compounds in the roasted husks, including SiO2 with 52% content and 31% C, Fe2O3, K2O3, MgO3, CaO3, MnO3 and Cu in small amounts as well as other organic materials (Supriati & Herliana, 2011).

Media is an inseparable part of plant roots, a foothold for roots and support for nutrient absorption and nutrient media so that media with different types and characteristics have different effects on root growth and development (Harjoko, 2009). Higher amount of total soluble solids (TSS) related to coco peat + perlite treatment that has not any significant difference with date-palm peat + perlite, perlite and date-palm peat treatments on element uptake of soilless culture of tomato (Ghehsareh et al., 2011).

The best growing media is husk charcoal (M2) compared to the use of rockwool and cocopeat where this medium has light and coarse characteristics so that air circulation is high, the ability to hold water is high, is black so it can absorb sunlight well. The pH of the husk charcoal is quite high, between 8.5 and 9.0, so it is very well used to increase the pH of acidic soils. Burnt husk or husk charcoal also has good porosity properties and good water absorption ability (BPP Lembang, 2018). Rice husk charcoal has a potential to reduce the acidity of the soil, increased the saturated hydraulic conductivity, saturated water content, plant available water and field capacity but decreased the bulk density of soil. Soil biological fertility is declining due to the low use of organic matter. The way to restore soil fertility is to use organic biofertilizers (Misra et al., 2017; Purba et al., 2018). Rice husked based growing substrates can be used for growing lettuce cv. 'Legacy' in aggregate soilless system in the tropics (Rahman et al., 2019).

The results of the analysis of variety showed that the use of different varieties of lettuce had a very significant effect on plant length at 23 dast, 30 dast and leaf area (Table 3), and had a significant effect on the number of leaves aged 30 dast and the total oven dry weight. Lettuce varieties had no significant effect on plant length at 9 days, 16 days after planting, number of leaves at 9 days, 16 days, 23 days, shoot wet weight, oven dry weight of crowns, economic fresh weight, leaf root ratio (Table 3). The study showed that the use of frizzy lettuce varieties gave the highest yield of plant length, namely 40.62 cm and gave the widest leaf area of 26.47 cm (Table 8).

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science

AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

This is because the frizzy lettuce is able to adapt well to the hydroponic wick system media with an altitude of 39 masl (meters above sea level).

The results of the analysis of variety showed that the interaction between the use of growing media and different varieties of lettuce had a very significant effect on root wet weight, total wet weight, total oven dry weight and root volume. The combination of the use of growing media and lettuce varieties significantly affected the leaf area of 30 days after planting, crown oven dry weight, and root oven dry weight. The combination of the use of growing media and lettuce varieties did not significantly affect all parameters of plant length, number of leaves at age 9, 16, 23, shoot wet weight, leaf area, economic fresh weight, and leaf root ratio (Table 3).

The combination of the treatment of husk charcoal growing media with frizzy lettuce varieties (M2V1) is a combination of treatments that can have a very significant effect on several observed variables, namely root wet weight (20.93 g), total wet weight (211.83 g), total oven dry weight (9.93 g) and root volume (55.00 cm3).

Growing media is influential in providing the nutrient needs of lettuce. Growing media has two functions, namely as a place to grow and supply food for plant growth and development, the ability of the growing media to bind nutrient solutions will affect the amount of elements absorbed. An experiment to study the effect of husk charcoal hydroponic substrate waste for asparagus seedling substrate as compared to huskand husk-charcoal waste and their interaction effect with compost added at three different rates for substrate amendment. The results showed that seedling grown on husk-charcoal waste substrate possessed higher seedling and crown weight (Onggo, 2020).

4. CONCLUSIONS

In cultivation of lettuce with hydroponic system, husk charcoal media is better than rockwool and cocopeat media. The frizzy lettuce varieties are better than the red lettuce varieties. The combination of husk charcoal media and frizzy lettuce varieties gives the best growth and yield.

REFERENCES

Ali, M., Nisak, F., & Ika Pratiwi, Y. (2020). Pemanfaatan Limbah Cair Ikan Tuna terhadap Pertumbuhan Tanaman Pakchoy dengan Wick System Hydroponics. *Agro Bali: Agricultural Journal*, *3*(2), 186–193. https://doi.org/10.37637/ab.v3i2.616

BPP Lembang. (2018). *Media Hidroponik dari Arang Sekam. [Indonesian]*. http://www.bbpplembang.info/index.php/arsip/artikel/artikel-pertanian/503-media-tanaman-hidroponikdari-arang-sekam.

Dalastra, C., Filho, M. C. M. T., & Vargas, P. F. (2020). Periodicity of exposure of hydroponic lettuce plants to nutrient solution. *Rev. Caatinga*, *33*(1).

https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1983-21252020000100081

Ghehsareh, A. M., Borji, H., & Jafarpour, M. (2011). Effect of some culture substrates (date-palm peat, cocopeat and perlite) on some growing indices and nutrient elements uptake in greenhouse tomato. *African Journal of Microbiology Research*, *5*(12), 1437–1442.

Harjoko, D. (2009). Studi Macam Media dan Debit Aliran Terhadap Sawi (Brassica juncea L.) Secara Hidroponik NFT. *Jurnal Agrosains*, *11*(2), 58–62.

Indrawati, R., Indradewa, D., & Utami, S. N. I. (2012). Pengaruh Komposisi Media dan Kadar Nutrisi Hidroponik terhadap Pertumbuhan dan Hasil Tomat (Lycopersicon esculentum Mill.). *Vegetalika*, *1*(2), 109–119.

Jones, J. B. (2005). *Hydroponics: A Practical Guide For the Soilless Grower*. CRC Press.

Kristi, A. A. (2018). *Hidroponik Rumahan*. ANDI.

Madar, A. K., Rubóczki, T., & Hájos, M. T. (2019). Lettuce production in aquaponic and hydroponic systems. *Acta Universitatis Sapientiae, Agriculture and Environment*, *11*(1), 51–59.

Misra, A., Taing, K., Hall, M. W., & Shinogi, Y. (2017). Effects of Rice Husk and Rice Husk Charcoal on Soil Physicochemical Properties, Rice Growth and Yield. *Agricultural Sciences*, *8*(9). https://m.scirp.org/papers/79133

Muhit, & Qudriyah. (2016). Respon Beberapa Kultivar Mawar (Rosa hybrida L.) pada Media Hidroponik terhadap Pertumbuhan dan Produksi Bunga. *Buletin Teknik Pertanian*, *11*, 29–32.

Onggo, T. M. (2020). The use of hydroponic-substrate husk-charcoal waste for asparagus seedling substrate. *Acta Horticulturae*, *1301*, 133–138. https://doi.org/10.17660/ActaHortic.2020.1301.20

Purba, J. H., Parmila, I. P., & Sari, K. K. (2018). Pengaruh Pupuk Kandang Sapi dan Jarak Tanam Terhadap Pertumbuhan dan Hasil Kedelai (Glycine max L. Merrill) Varietas Edamame. *Agro Bali: Agricultural Journal*, *1*(2), 69–81. https://doi.org/10.37637/ab.v1i2.308

Purba, J. H., Wahyuni, P. S., & Febryan, I. (2019). Kajian Pemberian Pupuk Kandang Ayam Pedaging dan Pupuk Hayati terhadap Pertumbuhan dan Hasil Petsai (Brassica chinensis L.). *Agro Bali: Agricultural Journal*, *2*(2), 77–88. https://doi.org/10.37637/ab.v2i2.397

Purba, J. H., Wahyuni, P. S., Zulkarnaen, Sasmita, N., Yuniti, I. G. A. D., & Pandawani, N. P. (2020). Growth and yield response of shallot (Allium ascalonicum L. var. Tuktuk) from different source materials applied with liquid biofertilizers. *Nusantara Bioscience*, *12*(2), 127–133. https://doi.org/10.13057/nusbiosci/n120207

Rahman, M. J., Chawdhery, M. R. A., Begum, P., Quamruzzaman, Zakia, M. Z. Z., & Raihan, A. (2019). Growth and Yield of Hydroponic Lettuce as Influenced by Different Growing Substrates. *Azarian J. Agric*, *6*(1), 1–6.

Rosnina, R., & Mauliza, S. (2020). Optimization of AB-mix Fertilizer on Varieties of Hydroponic Lettuce (Lactuca sativa L.). *Journal of Tropical Horticulture*, *3*(2), 86–91.

Supriati, Y., & Herliana, E. (2011). *Bertanam 15 Sayuran Organik Dalam Pot*. Penebar Swadaya.

Wonning, P. R. (2018). *Gardeners' Guide Book Growing and Harvesting Lettuce: Lettuce - Mainstay of the Salad Garden (Gardener's Guide to Growing Your Vegetable Garden) Vol. 9* (1st ed.). CreateSpace Independent Publishing Platform.

Wuryaningsih, S., Muharam, A., & Rusyadi, I. (2003). Tanggapan Tiga Kultivar Mawar terhadap Media Tumbuh Tanpa Tanah. *Jurnal Hortikultura*, *13*(1), 28–40. https://doi.org/10.21082/jhort.v13n1.2003.p28-40

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science

AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

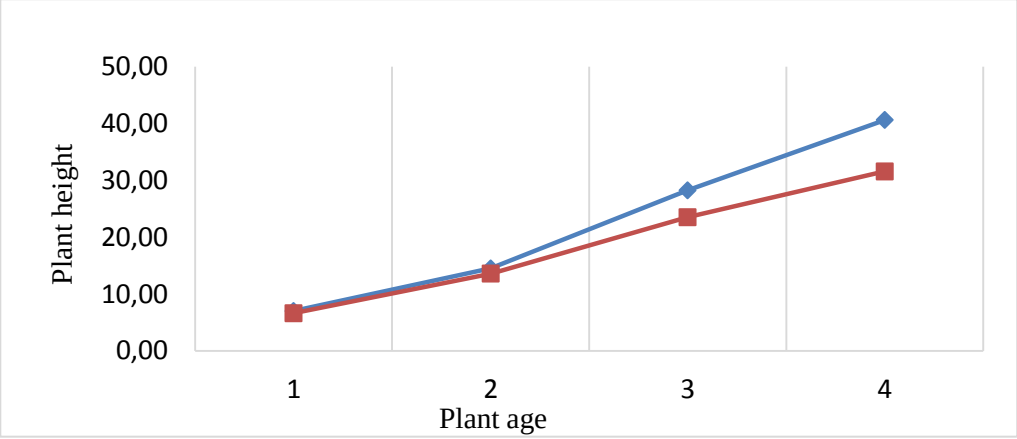

Figure 1: Length graph of frizzy lettuce (blue line) and red lettuce varieties (red line) at the age of 9,16,23 and 30 DAP

Table 1: Effect of planting medium (M) and varieties of lettuce (V) on plant length

Treatment	Plant length							
	9 DAP		16 DAP		23 DAP		30 DAP	
Varieties								
Frizzy (V1)	7.01		14.52		28.25	b	40.62	b
Red (V2)	6.63		13.58		23.52	a	31.59	a
LSD 5%	ns		ns		1.34		2.74	

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test.

Table 2: The combination of the influence of the planting medium with lettuce varieties on the number of leaves at the age of 30 DAPS.

Treatment	V1	V2	Mean M
M1	18.13 a	18.40 a	18.27 b
M2	19.60 b	17.67 a	18.63 b
M3	17.27 a	17.33 a	17.30 a
Mean V	18.33 b	17.80 a	

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test.

Table 3: The combination of the effect of growing media with lettuce varieties on oven dry weight of the shoot (g)

Treatment	V1	V2	Mean M
M1	7.33 a	740 a	8.02 ns
M2	9.20 b	8.70 a	8.30 ns
M3	7.70 a	7.73 a	7.72 ns
Mean V	8.08 ns	7.94 ns	

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science

AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test.

Table 4: The combination of the effect of growing media with lettuce varieties on root fresh weight (g)

Treatment	V1	V2	Mean M
M1	11.47 a	15.70 a	13.58 a
M2	20.93 b	14.60 a	17.77 b
M3	12.03 a	19.33 b	15.68 a
Mean V	14.81 ns	16.54 ns	

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test.

Table 5: Combination of treatment of growing media and varieties of lettuce to oven dry weight of roots (g)

Treatment	V1	V2	Mean M
M1	0.57 a	0.53 a	0.55 ns
M2	0.77 b	0.50 a	0.63 ns
M3	0.53 a	0.40 a	0.47 ns
Mean V	0.62 ns	0.48 ns	

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test.

Table 6: Effect of growing media and varieties of lettuce on total fresh weight and total oven dry weight, leaf area.

Treatment		Total oven dry weight (g) per plant (g)		Leaf area per plant (cm^2)	
Growing media (M)					
Rockwool (M1)		7.62	a	24.23	
Husk charcoal (M2)		8.57	b	24.53	
Cocopeat (M3)		7.62	a	24.79	
LSD 5%		0.76		ns	
Varieties (V)					
Frizzy (V1)		8.49	b	26.47	b
Red (V2)		7.38	a	22.57	a
LSD 5%		0.62		1.97	

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test..

Table 7: Combination of treatment of growing media and varieties of lettuce on total fresh weight (g)

Treatment	V1	V2	Mean M
M1	162.67 a	196.37 b	179.52 ns
M2	211.83 b	165.40 a	188.62 ns
M3	172.60 a	167.40 a	170.00 ns

ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science

AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
ISSN : 2597-8713 (Online) - 2598-5167 (Print)
Available on :
http://agriscience.scientific-work.org/index.php/agriscience

Mean V	182.37 ns	176.39 ns	

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test.

Table 8: The combination of growing media and lettuce varieties on total oven dry weight (g)

Treatment	V1	V2	Mean M
M1	7.60 a	7.63 a	7.62 a
M2	9.93 b	7.20 a	8.57 b
M3	7.93 a	7.30 a	7.62 a
Mean V	8.49 b	7.38 a	

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test.

Table 9: The combination of growing media and lettuce varieties on root volume (ml^3)

Treatment	V1	V2	Mean M
M1	42.00 a	41.20 a	13.87 ns
M2	55.00 b	38.00 a	15.50 ns
M3	38.00 a	48.00 b	14.33 ns
Mean V	15.00 ns	14.13 ns	

Note: Means followed by the same letter within column are not significantly different according to 5% LSD test.