



Effect of Planting Media Composition And NPK Dosage on The Growth and Production of Shallots (*Allium Cepa L.*) Thailand Varieties

Ahmad Izzan Nabil Farid, Nunuk Helilusiatiningsih, Tri Handayani

Faculty of Agriculture, Kadiri Islamic University, Indonesia

ARTICLE INFO

Article History:

Received: 28 - 08 - 2022

Accepted: 03 - 09 - 2022

Published: 05 - 09 - 2022

Keyword:

Shallots;

Coffea;

Compost;

Husk charcoal;

Corresponding Author:

Nunuk Helilusiatiningsih

Faculty of Agriculture, Kadiri

Islamic university, Indonesia

*email: nunukhelilusi@gmail.com

ABSTRACT

The purpose of this research is to analyzed the interaction between the composition of the growing media and the dose of NPK on the growth and production of shallot (*Allium cepa L.*).The hypothesis put forward in this study is,It is suspected that there is an interaction between the composition of the growing media and the dose of NPK on the growth and production of shallot (*Allium cepa L.*). The benefits that can be obtained in this study are: 1. Gaining technical experience in onion cultivation with certain treatments, 2. As a material for providing final project evaluations, 3. As a reference for the community about onion cultivation with certain treatments.This research was conducted at the UNISKA Integrated Field Laboratory Greenhouse using polybags, located in Rejomulyo Village, Kediri City District, with an altitude of 67 meters above sea level, tropical climate with an average temperature of 30°C and has an average rainfall of 1,500–2,000 mm per year. Has a sandy loam soil type. This research was conducted using a completely randomized design (CRD) with 3×3 factorial pattern, with 9 combinations of 3 replications. Factor I is planting media, which consists of three types, and Factor II is NPK dose. From these two factors, 9 treatment combinations were obtained and repeated 3 times. There was no interaction between the composition of the growing media and the dose of NPK on the growth and production of shallots.There was a single effect, the composition of the growing media had a significant effect on the growth.

INTRODUCTION

Shallots (*Allium cepa L.*) are among the most widely consumed spices in the world (Harvey, 2018). Almost all processed household foods, restaurants and snacks use shallots. Therefore, Shallots are excellent with the delicacy of Indonesian cuisine. Indonesian shallot production is relatively balanced compared to domestic demand. However, the availability of shallots is still experiencing limited fluctuations. This is most often caused by consumer demand at the time of seasonal shallot harvest. This is the time lag between consumer demand and the availability of shallots. One of the efforts to increase the production of shallots can be done by improving the composition and fertilization of the growing media.

The development of shallots often creates problems, especially those related to the physical, chemical and biological properties of the soil. According to Agustina (2014), husk charcoal is a raw

material that is easy to obtain, the method of making it does not require a long time, and husk charcoal helps fertilize the soil and makes the soil structure crumbly. Therefore, the soil is difficult to compact. Husk charcoal also increases the ability to bind and release water and acts as a source of nitrogen, phosphorus and potassium. In addition to using husk charcoal, there are other growing media, namely compost and cocopit. The three ingredients have their respective roles, while the onion growth process requires micro and macro nutrients.

METHODS

Location and Time

The implementation of this research began in December 2021 at the UNISKA Integrated Field Laboratory, Rejomulyo village, Kediri City District, with an altitude of 67 meters above sea level, has a daily temperature of 30°C with an average rainfall of 1,500-2,000 mm per year, tropical climate with types sandy loam soil.

Tools and Materials

The tools used in this research are ruler, stationery, camera, hoe, bucket, gembor and digital scale. The materials used in this study were Thai varieties of shallot seeds, NPK Fertilizer, Kokopit, Husk Charcoal, and Compost, polybags (15x30). These materials are obtained by buying at the farm shop and for the shallot seeds are certified.

Research Method

The current study used a Completely Randomized Design (CRD) consisting of 2 factors and 3 replications.

Factor 1 By Using Plant Media With 3 Combinations:

1. Husk Charcoal And Coffete
2. Husk Charcoal And Compost
3. Copy and Compost

Factor 2 by Using NPK Fertilizer with 3 Combinations:

1. 30 Gram NPK Fertilizer/ Plant
2. 40 Gram NPK Fertilizer/Plant
3. FertilizerNPK 50 Gram/ Plant

Observation Variables

Vegetative observations included measurements of plant height (cm), number of leaves in the cluster, generative observations included the number of tubers in the cluster, and wet tuber weight in the cluster (g). Measurement of plant height starting from the surface of the media to the tip of the highest leaf. Measurements started at the age of 14 days, 28 days, 42 days, with observations every two weeks. Number of clumps leaves observations were made at the age of 14 days, 28 days, 42 days. Leaves that are counted are leaves that have grown to perfection. The number of tubers was counted at harvest, tubers were counted based on the number of clumps and counted from each plot. Wet tuber weight was calculated at the time of harvesting, tubers were calculated based on the number of clumps and counted from each plot.

Data Analysis

This study was conducted using a completely randomized design (CRD) with 3×3 factorial pattern, with 9 combinations and 3 replications. Factor I is planting media, which consists of three types, and Factor II is NPK dose. From these two factors, 9 treatment combinations were obtained and repeated 3 times

The data obtained from the observations on each F-test with the variable method are entered in the table to be carried out for F-testing with the Variety Test (ANOVA) method with the test criteria. If the calculated F value is greater than F table 5%, the treatment is significantly different. On the other hand, if the calculated F value is smaller than the F table 5%, the treatment is not significantly different. In the factorial RAL analysis, it can be seen that the calculated F value of the treatment is smaller than the F table 5% so that it can be concluded that the treatment is not significantly different. If there is a significant difference, then a further test is carried out using the Ducan Multiple Range Test (DMRT) at a 5% confidence level, whereas if the results of the F test are statistically not significantly different or not significant then further tests do not need to be carried out and if there is an effect A single test was carried out for further LSD Testing at the 5% level.

RESULTS AND DISCUSSIONS

Plant Height

Based on Table 1, the average results of the M2 treatment (husk charcoal and compost) showed higher average results compared to other media treatments with the highest average value of 32.06 cm at 35 DAP. The average plant height is in accordance with the description in Appendix III, which is between 26.4 - 40 cm. The treatment of M2 media (husk charcoal and compost) at the age of 42 DAP showed significantly different results based on the 5% LSD Test, and the results were not significantly different at 14 DAP and 35 DAP. This is due to the treatment of M2 (husk charcoal and compost) which is a porous, light, non-dirty medium and is sufficiently water-resistant. Husk charcoal contains SiO₂ (52%), C (31%), K (0.3%), N (0.18%), F (0.08%), and calcium (0.14%). This is in accordance with the statement of Islami and Utomo (1995) that the structure of the substrate affects plant growth through the development of plant roots. The content of organic matter in the planting substrate can increase the intake of nutrients, water and respiration of O₂ and CO₂ in the planting area. Compost media improves soil structure, strengthens the binding capacity of aggregates (nutrients) on sandy soils, increases durability and water absorption, improves drainage and soil pores, and adds and activates nutrients (Susetya, 2016).

Based on Table 1, there was no significant effect on the dose of NPK fertilizer on each observation variable with the highest average value of 30.10 cm at 42 dap (*day after planting*), the average result was the same as the description but lower than the planting media treatment so that there was no significant effect on the dose observation variable. This is because there are internal and external factors that can affect plant growth, internal factors are factors contained in seeds, seedlings, or the plant itself. Good seeds should go through a treatment process, including the provision of fungicides that can prevent seedlings from fusarium wilt.

Fusarium wilt disease or moler is a very dangerous disease that attacks bulbous plants. The cause of moler disease is the presence of the pathogen *Fusarium oxysporumf.sp. cepae*. This disease often attacks shallots, especially during the rainy season, when rainfall is high and the environment is humid. According to Indriani (2005), nutrients N is absorbed by plants in the form of ammonium ions, and the remaining ammonium is converted into nitrite which can be directly absorbed by plants. Lingga and

Marsono (2013) also explained that the effect of N supplementation was mainly to stimulate growth in the soil and give green color to plant leaves, which is very useful in the process of photosynthesis.

Table 1. Average plant height on various plant age

Treatment	Average Plant Height (cm)		
	14 dap	35 dap	42 dap
D1	20.97	29.13	29.84
D2	19.78	27.99	28.84
D3	20.69	27.85	30,10
LSD5%	ns	ns	ns
M1	19.79a	29.96b	29.32b
M2	22.78b	30.76b	32.60c
M3	18.88a	24.24a	26.86a
LSD5%	0.98	1.08	1.04

Description : ns : non significant effects. Numbers followed by the same letter in the same column are not significantly different at the Least Significant Difference level at the 5% level (LSD Test 0.05)

The main role of N for plants is to stimulate overall growth, especially stems, branches and leaves. Another function is to form proteins, fats and various other organic compounds. Elemental P has a great influence on the growth and development of plant roots, stimulates root growth and development as a basic protein (ATP and ADP), assimilation and respiration, flowering and fruiting processes, seed maturation (Marsono and Sigit, 2004). Phosphate plays a role in promoting root growth, especially lateral and secondary root growth (Jumin, 2005). This role is closely related to phosphate as orthophosphate, which plays an important role in several phosphate-dependent enzyme reactions. Phosphate can stimulate the growth of roots and young plants because the nucleus is a part that plays an important role in cell division and the development of meristem tissue. (Supriyanto and Firdaus 2010). If the roots of the shallot plant rot, the absorption of NPK fertilizer is inhibited so that it does not have a significant effect on the variable height of the shallot plant.

Number of Leafs

In Table 2, the results of the 5% LSD Test for observing the number of leaves showed that the M2 treatment (husk charcoal and compost) was significantly different at the age of 35 DAP. M2 treatment (husk charcoal and compost) was the treatment with the highest average value of the number of leaves compared to other treatments. . The M2 treatment was the best treatment, which was 35.61 strands, this was due to the very loose nature of the compost so that plant roots could easily penetrate the planting medium and roots could easily absorb nutrients and nutrients available in the planting area. Nutrients dissolved in water are easily absorbed by plants (Widowati, 2005). This is in accordance with the statement of Wuryaningsih (1997). In addition, charcoal decomposes slowly, so it is slowly absorbed by shallot plants during the vegetative growth process. Plants that are well supplied with N form broad leaves with high chlorophyll content, allowing plants to produce carbohydrates in sufficient quantities, supporting plant growth during the vegetative and production stages (Wijaya, 2008).

Table 1. average number of leafs on various plant age

Treatment	Average number of leaves (strands)		
	14 dap	35 dap	42 dap
D1	26.78	36.39	29.75
D2	26.78	32.61	27.47
D3	25.47	28.89	28.36
LSD5%	ns	ns	ns
M1	27.28	35.61b	29.25
M2	26.81	34.78b	30.06
M3	24.94	27.50a	26.28
LSD5%	ns	1.39	ns

Description: ns : non significant effects. Numbers followed by the same letter in the same column are not significantly different at the Least Significant Difference level at the 5% level (LSD Test 0.05)

While the treatment of M1 (husk charcoal and cocoa) and M3 (coffee and compost) did not have a significant effect at all ages with the highest average value of 30.06 strands at 42 DAP. Coffee has several advantages as a growing medium. One of them is the ability to bind water (water holding capacity). According to the results of the analysis from the research of Irawan, A and Y. Kafiari (2015) the water content of cocopit media is higher than that of husk charcoal media. The absorption of N nutrients in M3 media is thought to be not optimal for shallot plants to absorb because the decomposition process in M3 media is not perfect which is influenced by temperature and humidity in the green house, so that the N nutrients needed by shallot plants are slow to be fulfilled at the vegetative phase which makes the number of leaves grow not maximally. In addition, high levels of rainfall and temperatures that are not optimal are factors for the occurrence of high humidity in the gheehouse

Number of Tubers

In Table 3, the results of the 5% LSD Test on the observation of the number of tubers in the cluster showed that the M2 treatment (husk charcoal and compost) was significantly different, while the M1 and M3 treatments showed no significant difference. The M2 treatment (husk charcoal and compost) was the treatment with the highest average number of leaves compared to other treatments. The M2 treatment was the best treatment, namely 12.67 cluster bulbs, compared to other treatments, namely M1 10.31 and M3 10.38 cluster bulbs, This is in accordance with the description that the average number of tubers ranges from 5-15 perumbun tubers. More number of leaves will indirectly affect the yield of shallots. Seen from the number of tubers produced in the treatment.

The mixture of husk charcoal and compost is thought to have N element which can increase the number of leaves so that it can help the formation of chlorophyll in the leaves perfectly which is useful for absorbing sunlight energy in the photosynthesis process. In the process of photosynthesis it produces photosynthate which is useful for plant growth and is stored in the form of onion bulbs. In accordance with the opinion of Samadi and Cahyo (2005), tuber formation increases in suitable environmental conditions where lateral shoots then form new discs that form tubers. Suwardjo and Dariah (1995) stated that a good compost structure makes roots develop well, so that the wider the absorption area for

nutrients. This shows that there is a more effective absorption of nutrients and greater photosynthate formation in the compost treatment. This condition resulted in better dry tuber weight compared to other treatments. Media conditions are quite supportive for nutrient absorption, causing easy absorption of nutrients, one of these nutrients is phosphorus. According to Wibowo (1992) Phosphorus is very important for the formation and development of tubers. The element of potassium also plays a role in influencing the quality of tubers. That is, increase the variety of tubers and increase the wet weight of tubers. In addition, husk charcoal media is the best type of plant. Increasing the number of shallot bulbs can support the growth of shallot bulbs through good physical properties of the medium. Wuryaningsih (1997) argues that husk charcoal has a light weight (specific gravity 0.2 kg/l) with high air circulation, high water holding capacity, blackish color so that it can absorb sunlight effectively, besides husk charcoal contains 0.32 N. %, PO 15%, KO 31%, Ca 0.95%, Fe 180 ppm, Mn 80 ppm, Zn 14.1 ppm and PH 6.8. According to Prihantoro and Indriani (2003), husk charcoal has the properties of being easy to bind water, not easy to clot, light, sterile and has good porosity.

Table 3. Average number of tubers in a clump

Treatment	Average number of tubers in a clump
D1	11.61
D2	11.06
D3	11.14
LSD5%	ns
M1	10.31a
M2	12.67b
M3	10.83a
LSD5%	0.86

Description: tn : non significant. Numbers followed by the same letter in the same column are not significantly different at the Least Significant Difference level at the 5% level (LSD Test 0.05)

In the treatment of NPK fertilizer doses, there was no significant effect on the average number of tubers in the cluster at a dose of D1 11.61 D2 11.06 and D3 11.14 cluster bulbs, this is presumably because the absorption of the nutrient content of N in NPK fertilizer is not optimal for absorption by shallot plants because the decomposition process in fertilizer does not occur perfectly and the distance of fertilization is too close so that Nutrient N needed by shallot plants is slow to be fulfilled in the vegetative phase, and at the time of entering the tiller formation phase which makes the number of tillers grow less than optimally. This is in line with Anisyah (2014) which states that the N element affects the formation of the number of tillers and the tillers themselves which will develop into shallot bulbs.

Wet Tuber Weight

In Table 4, the results of the 5% LSD Test on the observation of the number of clumps of tubers showed that the M2 treatment (husk charcoal and compost) was significantly different in the M2 treatment (husk charcoal and compost) which was the treatment with the average weight of the clump wet tubers, while the M1 treatment and M3 showed that the results were not significantly different. M2 treatment was the best treatment, namely 34.75 g for clumps, compared to other treatments, namely M1 21.28 g and M3 22.22 g clumps, this was not in accordance with the description, although there were some that matched the average tuber weight ranging from 32.5 g - 68.4 g clumps.

Table 4. Average wet tuber weight (g)

Treatment	Average wet tuber weight (g)
D1	29.75
D2	23.64
D3	24.86
LSD 5%	ns
M1	21.28a
M2	34.75b
M3	22.22a
LSD 5%	1.6

Description: tn : non significant. Numbers followed by the same letter in the same column are not significantly different at the Least Significant Difference level at the 5% level (LSD Test 0.05)

According to research conducted by Azmi (2011), onion plants are included in long-day plants, the process of forming tubers requires a longer number of days when compared to short-day plants. The highest average value can be seen in table 4, showing that the husk charcoal and compost media produced the highest wet weight of tubers, namely 34.75 g. Sufficient water and mineral nutrients in the growing media affect the high and low weight of tubers, low wet weight of tubers can be caused by water content and nutrient content in plant tissue cells (Rahayu, 2008). Jasmin (2013) explained that the increase in net weight of tubers was influenced by the amount of water absorption and photosynthesis results in the leaves to be translocated for tuber formation. The low wet weight of tubers can be caused by water content and nutrient content in plant tissue cells (Rahayu, 2008). Jasmin (2013) explained that the increase in net weight of tubers was influenced by the amount of water absorption and photosynthesis results in the leaves to be translocated for tuber formation. The low wet weight of tubers can be caused by water content and nutrient content in plant tissue cells (Rahayu, 2008). Jasmin (2013) explained that the increase in the net weight of tubers was influenced by the amount of water absorption and photosynthesis results in the leaves to be translocated for tuber formation.

In the treatment dose of NPK fertilizer, there was no significant effect on the observed variable wet tuber weight of the clump with the highest average of 29.75 g, vegetative growth was believed to be more dominant and reproductive growth was slower because the N element given was a little too high and the C/N ratio was low. According to Harris and Veronica (2014), the excess N given can interfere with the flowering process and inhibit the absorption of K which is important in fruit formation and elongation. The addition of excess N elements tends to produce shorter and smaller fruits (Salli et al., 2015). Inhibition of K absorption caused by excess N affects the reduction of fruit diameter, fruit length, and fruit size of planted fruit. In addition, according to Umami et al. (2012), stated that too high water content in the soil can inhibit the formation of tubers, so that tuber weight tends to be low. Shallots are more sensitive to water stress during tuber formation and enlargement than during the vegetative stage (Khokhar 2017). However, the wet weight and dry weight of the tubers will increase with the reduced frequency of watering (Ariska and Rachmawati 2017). There are other things that cause tuber enlargement, namely reduced leaves due to caterpillar pests. The caterpillar eats some of the leaves which results in a reduced number of leaves causing less sunlight reception so that the photosynthesis process is disrupted. However, the wet weight and dry weight of the tubers will increase with the reduced

frequency of watering (Ariska and Rachmawati 2017). There are other things that cause tuber enlargement, namely reduced leaves due to caterpillar pests. The caterpillar eats some of the leaves which results in a reduced number of leaves causing less sunlight reception so that the photosynthesis process is disrupted. However, the wet weight and dry weight of the tubers will increase with the reduced frequency of watering (Ariska and Rachmawati 2017). There are other things that cause tuber enlargement, namely reduced leaves due to caterpillar attacks. The caterpillar eats some of the leaves which results in a reduced number of leaves causing less sunlight reception so that the photosynthesis process is disrupted.

CONCLUSIONS

Based on the results of observations of the effect of planting media composition and NPK fertilizer dose on the growth and production of Thai varieties of shallot (*Allium cepa* L.), it can be concluded that:

1. There was no interaction between the composition of the growing media and the dose of NPK on the growth and production of shallots.
2. There was a single effect, the composition of the growing media had a significant effect on the growth.

REFERENCES

- Agustin DA, Riniarti M, Duryat, 2014. Utilization of Sawdust Waste and Husk Charcoal as Weaning Media for Yellow Cempaka (*Michelia Champaca*). *Sylva Lestari Journal* 2 (3): 49-58
- Anisha. 2014. Growth And Production Of Shallots By Giving. Various Organic Fertilizers. USU Faculty of Agriculture. Medan. *Agrotechnology Online Journal*.
- Ariska N, Rachmawati D. 2017. Effect of Different Availability of Water on Growth and Yield of Three Shallot Cultivars (*Allium Cepa* L.). *Sustainable Agrotech*. 4(2):42–50.
- Azmi, C. IM Hidayat, G Wiguna. 2011. [The Effect of Varieties and Size of Bulbs on Shallot Productivity](#). *Journal of Horticulture*. 21(3):281-286.
- Balitsa. 2020. Pests and diseases that attack shallots: accessed 15 – 02 – 2022 from. <https://balitsa.litbang.pertanian.go.id/>
- Fajri, M. 2014. Effect of Manure And Potassium Dosage on Growth and Yield of Shallots (*Allium Ascalonicum* L.). Thesis. Agrotechnology Study Program. Faculty of Agriculture. Teuku Umar University Meulaboh. West Aceh.
- Haris, A. And Veronica Krestiani. 2014. Study of Potassium Fertilization on Growth and Yield of Sweet Corn (*Zea Mays Saccharata* Sturt) Super Bee Variety. *Scientific Journal of the Faculty of Agriculture, Muria Kudus University*. ISSN : 1979-6870.
- Havey MJ, 2018. Onion Breeding. *Plant Breed. Rev.* 42, 39–85.
- Indriani, H. 2005. Making Compost Quickly. Self-Help Spreader. Jakarta.
- Irawan A, Kafiar Y. 2015. Utilization of Cocopeat and Rice Husk Charcoal as Media for Planting Wasian Cempaka Seeds (*Elmerrilia Ovalis*). *Pros Sem Nas Masy Biodiv Indonesia* 1: 805-808
- Islami, T. And WH Utomo, 1995. The Relationship of Soil, Water and Plants. Semarang Press, Semarang.
- Jasmi, S. Endang, I. Didik. 2013. Effect of Vernalization of Bulbs on Growth, Yield, and Flowering of Shallots (*Allium Cepa* L. *Aggregatum* Group) in the Lowlands. *Agricultural Sciences* 16 (1): 42 – 57.
- Friday, HB2005. *Agroecology*. King Grafindo Persada. Jakarta.

- Khokhar KM. 2017. Environmental And Genotypic Effects On Bulb Development In Onion – A Review. J Hortic Science Biotechnol. 92(5):448–454. <https://dx.doi.org/10.1080/14620316.2017.1314199>.
- Laia, Y. 2017. Growth and Production Resonance of Shallots (*Allium Ascalonicum L.*) Against the Application of Liquid Organic Fertilizer (POC) Banana Weevil. Thesis. Medan University Area : Medan
- Linga, P. And Marsono. 2013. Instructions for Use of Fertilizers. Jakarta: Self-help spreader.
- Maharijaya, cloud. 2020. Description of Thai variety shallots: 15 – 02 – 2022 from <http://varitas.net/>
- Marsono and P. Sigit. 2005. Root Fertilizer. Self-Help Spreader. Jakarta. 96 p.m.
- Marsono And Sigit P. 2004. Root Fertilizer, Types and Applications. Jakarta: Spreader. Self-subsistent.
- Musnamar, EI 2007. Organic Fertilizer: Liquid And Solid, Manufacture, Application. Jakarta. Self-Help Spreader. 72 p.
- novice. 2007. Instructions for Effective Fertilization. Agromedia Library. Jakarta. 36 Pages
- Novizan.2005. Effective Fertilization Instructions. Agromedia Pustaka, Jakarta
- Permanasari, I., B. Solfan., AR Annisava. 2012. Fundamentals of Agronomy. Faculty of Agriculture and Animal Husbandry, Sultan Syarif Kasim State Islamic University, Riau. 146 Pg.
- Prayogi, F. 2019. Growth And Yield Of Shallots (*Allium Ascalonicum L.*) On Several Types Of Growing Medium With Verticulture Techniques. Faculty of Agriculture, University of Riau. Riau
- Prihmantoro and Indriani, 2003. The Effect of Media Types and Fertilization Intensity on Growth of Love Wave Anthurium (*Anthurium Plowmanii*) Seedlings. Faculty of Agriculture Eleven March. Surakarta.
- Rahayu M, Samanhudi and M. I Wicaksono. 2008. The Effect of Mycorrhizal And Organic Fertilizer On The Growth Of Garlic. Agricultural Journal, Sebelas Maret University, Surakarta
- Rambe, Good Syahputa. 2019. The Effect of Application of Npk Mutiara Fertilizer and Liquid Organic Gdm Fertilizer on the Growth and Production of Shallots (*Allium Ascalonicum L.*). Faculty of Agriculture, Asahan University. North Sumatra
- Salli, MK, YI Ismael, Dan Y. Lewar. 2015. Study of Apical Shoot Pruning and KNO₃ Fertilization on Tomato Plant Yield. Agricultural Journal of the Kupang State Agricultural Polytechnic. 4(2): 85-98.
- Samadi, B. And Cahyono, B., 2005. Shallots Intensifying Farming Business. Kanisius, Yogyakarta.
- Saputra, PE 2016. The Response of Shallots (*Allium Ascalonicum L.*) Due to Application of Biological Fertilizers and NPK Compound Fertilizers with Various Doses. Thesis. Faculty of Agriculture, University of Lampung. Bandar Lampung
- Sary, Irna Septia. 2014. *Effect of Compost and Npk Fertilizer Dosage on Growth and Yield of Shallots (Allium Ascolicum L.) Brebes Variety*. Thesis. Banda Aceh Faculty of Agriculture. Banda Aceh
- Septiani, D. 2012. Effect of Rice Husk Charcoal on Growth and Yield of Cayenne Pepper (*Capsicum Frutescens*). Seminar on Horticulture Study Program, Lampung State Polytechnic. Lampung
- Sugianto. 2021. The Effect of Planting Media Composition on the Growth and Yield of Shallots. Thesis. Faculty of Agriculture, University of Sintuwu Maroso. Central Sulawesi
- Supriyanto and Fidryaningsih. 2010. Utilization of Husk Charcoal to Improve Growth of Jabon (*Anthocephalus Cadamba (Roxb.) Miq*) Seedlings on Subsoil Media. Journal of TROPICAL SILVICULTURE Vol. 01 No. 01
- Susetya, D. 2016. Complete Guide to Making Organic Fertilizer for Plants. Agriculture and farming. New Press Library. Yogyakarta. 194 Pages
- Suardjo, H and A. Dariah. 1995. Conservation tillage techniques to support the development of sustainable dry land agriculture. Pros. National Seminar V : 8 – 13. Bandar Lampung. Pages 1-3

- Umami A, S. Darmanti, And S. Haryanti, "Growth And Productivity Of Shallots (*Allium Ascalonicum* L. Var.Tiron) With *Gracilaria Verrucosa* Treatment As A Water Absorber In Sand Soil," *Biome: Biology Periodic*, Vol. 13, No. 2, PP. 60-66, Mar. 2012.
- Wibowo, S. 1992. *Onion Cultivation: Garlic, Shallots, Onions*. Self-Help Spreader. Jakarta. 201 Pg.
- Widowati, L., R., Widati, S., Jaenudin, U., and Hartatik, W. 2005. Effect of Organic Fertilizer Compost Enriched with Minerals and Biofertilizers on Soil Properties, Nutrient Uptake and Organic Vegetable Production. Soil Research Project Report, FY 2005, 82 p.
- Wijaya, KA 2008. *Plant Nutrition*. Library Achievement. Jakarta.
- Wuryaningsih, S. 1997. Effect of Media on Cuttings Growth of Four Jasmine Cultivars. *Journal of Agricultural Research*. 5(3): 50-57.