



Effect of Organic Liquid Fertilizertamsil On The Growth and Resultskale Crop Land (*Ipomoea Reptans Poir*)

Bambang Wicaksono Hariyadi¹Mahrus Ali¹Yeni Ika Pratiwi¹

¹Faculty of Agriculture, Merdeka University Surabaya,

E-mail: wicaksonounmer@gmail.com

ABSTRACT

Liquid organic fertilizer Tamsil is a complete liquid organic fertilizer, which is formulated to meet the needs and challenges of the farmers or entrepreneurs in agriculture and plantations in order to get results or harvest prime. Where the liquid organic fertilizer contains a complete nutrient, both elements of macro and micro elements essential for soil fertility and plant growth. A liquid that can be absorbed by plants through leaf stomata or mouth. Functioning as a stimulator and is very safe for human and animal health as well as a very friendly environment (Anonymous, 2017). The purpose of this study to determine the extent of the effect of the use of urea fertilizer on the growth and yield of Green Spinach (*Amaranthus tricolor*L.). Research conducted at the Faculty of Agriculture Experimental Station Freedom Surabaya, on the road Ketintang Madya VII-2 Surabaya. This study uses a randomized block design (RAK) consists of six (6) treatment without liquid organic fertilizer (control) and liquid organic fertilizer dose 2,5cc; 5,0cc; 7,5cc; 10,0cc; 12,5cc per liter of water with three (3) replicates and two (2) samples of plants. The results of the study are as follows: a. There is a very real effect on the observation variables plant height, leaf number and fresh weight per plant and plant fresh weight per polybag. b. The treatment dosing liquid organic fertilizer Tamsil 12.5 cc per liter of water to produce growth and yields the highest (maximum dose) kale crop land, although it was not statistically significantly different from the dosage of liquid organic fertilizer Tamsil 10.0 cc per liter of water (Dose The optimum or effective dose).

Keywords: Watercress Army, Dosing of Liquid Organic Fertilizer, Tamsil

1. INTRODUCTION

In Indonesia, kale plants are planted in Java, especially in West Java and East Java. In Irian Jaya, in the District Muting, Merauke, plant kale is a barn of everyday life, but in the District Darussalam, Aceh Besar, plant kale land planted many residents for family consumption and for sale to the market (Zaelani Kadir, 2003) , Water spinach(*Ipomoeaspp.*)Can be planted begin the lowlands to highlands, where the altitude can affect the quality of the results. Kale is a leaf vegetable crops, belong to the family *Convolvulaceae*.Kale leaves long, whitish green sources of vitamin pro vitamin A. According to the site, kale can be divided into two kinds, namely: Watercress land, living in a dry place or moor, and Kale water, lively place that was watery and wet (Syafri Edy and Ahmad Yusri, 2009).



Kale land a plant that grows fast and is one of the vegetables typical of tropical regions. This plant is a source of nutrition that is relatively easy maintenance and quickly taken advantage (Triana Kartika Santi, 2007). Despite the relatively cheap price of vegetables kale, but when cultivated intensively and oriented towards agribusiness will provide a sizable profit for farmers. Kale marketing opportunities more widely, because not only can be sold at local markets area, but also has many ordered by supermarkets. The entry of vegetable kale-supermarket outlets would raise the price of this vegetable (Susila, 2006).

The growing demand for vegetable kale, of course, need to be offset by increased production. One factor that is important in the production of intensive cultivation is a matter of manure and fertilizer. The low efficiency of nutrient uptake by plants in fertilizer Nitrogen and Calcium ranging between 30-40%, and 15-20% for phosphorus fertilizer (Sri Adiningsih, 1995). The need for vegetable kale tends to increase with increasing public awareness of the importance of the nutritional value and the number of restaurants serving vegetable kale as one of their menus. Kale production in Indonesia can reach 500000-600000 kg per hectare (Sutanto, 2002).

The plant is not enough just to rely on nutrients from the soil only. Therefore, the plants need to be given additional nutrients from the outside, namely in the form of fertilizers (Prihantoro, 2001). Efforts to improve fertilizer use efficiency can be reached through the principle of the right dosage, the right way, timely and impartial application according to crop needs (Syafuddin et al, 2009).

Further Wahyono (2012) explained that the fertilizer is a material and nutrients are supplied or added to plants with the intention of nutrients for the soil to grow. Lack of knowledge of farmers on the type and amount of fertilizers needed by plants, an issue that will also result in a lower increase crop production per unit area (Lingga and Marsono, 2007).

According Hadisuwito (2007), based on the origin of fertilizer can be grouped into inorganic fertilizer and organic fertilizer. Inorganic fertilizer is a fertilizer that is derived from a mineral material has been changed through the production process so that a compound that is easily absorbed though the plant, while the organic fertilizer made from organic materials and living organisms that died, and having undergone a process of decomposition by microorganisms, so it will decompose and can be used by plants.

Based on the source, the fertilizer divided or there are twotypes, namely organic fertilizers and inorganicfertilizers. Fertilizers can be either pad at and liquid and can be given directly to the soil or to plants. Fertilizer lang sung, generally in liquid form and is



commonly called foliar fertilizer, for use directly sprayed on plantleaves. Organic fertilizers not only in solid form, but can also be dimake in the form of asolution. Liquid organic fertilizer lebih easily utilized plants, because of the elements contained in a form available to plants. Advantages menggunakan adalliquid organic fertilizerah faster process than the use of fertilizer in solidform. Nevertheless calr organic fertilizers have drawbacks, namely skali evaporate easily and can damage the leaf tissue as well as the absorpction depends on the surface layer of leaves, the feathers and the cuticle layer (Lingga, 2003).

Tambsil liquid organic fertilizer is a complete liquid organic fertilizer, which is formulated to meet the needs and challenges of the farmers or entrepreneurs in agriculture and plantations in order to get results or harvest prime (Mahrus, Bambang Wicaksono, Nurlina, Cholil, & Sri Wiwoho, 2017). Where the liquid organic fertilizer contains a complete nutrient, both elements of macro and micro elements essential for soil fertility and plant growth. A liquid that can be absorbed by plants through leaf stomata or mouth. Functioning as a stimulator and sangataman to the health of humans and animals and are environmentally friendly.

Benefits of liquid organic fertilizer Tambsil, which fostered the growth of the plant, accelerating the formation of buds and flowers as ovary, overcome nutrient deficiency in plants can result in plant growth is interrupted or death, increases plant resistance to disease, especially fungi or fungi, is able to overcome the shortage of use fertilizer base, speed up the harvest, extend the life of plants and expanding the number of excerpts for a year and annual plant species, as well as excellent for growing plants on less fertile land or marginal land.

The composition of the material forming the (abortion) Tambsil liquid organic fertilizer, among others, ie 19.60% N; 2.48% P₂O₅; K₂O 2.18%; 2.26% Ca; 0.05% Mg; 0.05% Al; 0.03% Fe; 21,64ppm Zn; 7,12ppm Mn; 0,47ppm S; 0,57ppm Mo; 4.25 Co; 4.72 Cu with a pH of 8.2. Produced by PT. Prosindo Citrani True, Jakarta, Indonesia. How to use the whisk first liquid organic fertilizer Tambsil before use. Can be administered directly into the ground sprinkled with the solution or sprayed on the surface of the top and bottom of leaves, twigs, stems until evenly moist. Solution mixture in the form of two (2) cc or ml for 1 (one) liter of water or a 4 (four) lid for 1 (one) sprayer tank of 14 liters, in which the dose of the lid 8 cc or ml. Dosing for higher plants (coffee, cocoa, mango, rambutan, Pepper, Oil, Orange, Apple, cloves and others) dose of 4-5 liters / ha by spraying 7 days 4 times and repeated every 3 (three) months. For crops (rice, soybean, tomato, pepper, nuts group and tuber crops group) at a dose of 1 liter / hectare and sprayed on the plant was 15-30-45-60 days after planting. For vegetables (leafy vegetable) dose is 1 liter / ha sprayed 3 times when



the plant was 7-14-21 days after planting. For ornamental plants (orchids, Ros, Lili, Carnation, Tuberose malem Leads and others) dose 1 liter / ha and spray every 1 or 2 weeks. Tambsil liquid organic fertilizer is very good for tea plant, mulberry, Tobacco and Sugarcane.

Application of fertilizer derived from organic liquid fertilizer is still much to do. Moreover, to determine the manner, time and dose efficient (profitable) and effective (appropriate) from the use of such fertilizers on crops of vegetables, including kale crop land. For that we need to be explored further use of the liquid organic fertilizer.

2. METHODOLOGY

The research was conducted at the Faculty of Agriculture Experimental Station Merdeka University Surabaya, on the road Ketintang Madya VII-2 Surabaya, East Java This study uses a randomized block design (RAK) simple consisting of six (6) treatment with three (3) replicates and for observation, each treatment represented by two (2) samples of plants, then to the placement of the treatment in the randomized trial plots.

To determine the influence of Liquid Organic fertilizer on growth and yield Tambsil Kale Plant Army, then used the F test with a level of 5%, ie Fingerprint Analysis Test Car (ASR). If the results of Test F 5% there is a real effect, then continued with t test (Test Least Significant Difference) with a level of 5% in order to know the difference between the dose of fertilizer treatment Liquid Organic Tambsil, so it can be a treatment that is appropriate (effective dose) and profitable (efficient dose).

3. RESULTS AND DISCUSSION

3.1. Plant height

variance analysis results showed that the treatment dosing liquid organic fertilizer Tambsil very significant effect on ground observations kale plant height, when the plant life of 10 days, 20 days and 30 days after planting (Appendix Table 1). This proves that the elements of macro and micro nutrients contained in a liquid organic fertilizer helpful Tambsil as well as assist in the growth of kale plants ashore. Tambsil liquid organic fertilizer will increase the availability of nitrogen into the soil large enough, so that in the process of formation of proteins which would then be used in the process of preparing and division of cells, tissues and organs will take place sooner. The function of nitrogen as a fertilizer is to



improve the vegetative growth of plants and assist in the formation of proteins (Hardjowigeno, 2003).

According to the Linga and Marsono (2004), that the liquid organic fertilizer containing macro nutrients and nutrients mikro essential (N, P, K, S, Ca, Mg, B, Mo, Cu, Fe, Mn, organic matter). Liquid organic fertilizer has several benefits such as to encourage and enhance the formation of chlorophyll, thus enhancing the ability of plant photosynthesis and the absorption of nitrogen from the air, can increase plant vigor so that the plants become solid and strong, improve plants resistant to drought, weather stress and attack disease-causing pathogens, stimulate the growth of branches of production, as well as increasing the formation of flowers and ovaries, as well as reduce gugumya leaves, flowers and ovaries.

Table 1. Average High Kale Plant Due Army Effect of

Tamsil Organic Fertilizer in Different Age Dose and Observation

Dose Treatment of Liquid Organic Fertilizer Tamsil	High Average Crop Kale Army (cm)		
	10 days	20 days	30 days
D0 = Without Fertilizer Tamsil (control)	of 7.83 a	14.83 a	24.17 a
D1 = Fertilizer Tamsil 2.5 cc per liter of water	9.33 b	18.00 b	29.33 b
D2 = Fertilizer Tamsil 5.0 cc per liter of water	9, 83 bc	19.17 b	31.00 b
D3 = Fertilizer Tamsil 7.5 cc per liter of water	10.33 c	21.67 c	33.33 c
D4 = Fertilizer Tamsil 10.0 cc per liter of water	11.67 d	23 83 d	35.67 d
D5 = Fertilizer Tamsil 12.5 cc per liter of water	at 12.17 d	24.17 d	36.83 d
BNT 5%	0.73	1.61	1.97

Description: the numbers dida mpingi letter the same in column

thesameare not significantly different at Test BNT 5%

Table 1 shows that with increasing doses of Liquid Organic fertilizer Tamsil will be followed by an increase in plant height over land kale plant growth. Kale plant achieved the highest ground treatment dosing liquid organic fertilizer Tamsil 12.5 cc per liter of water (36.83 cm), although not statistically significantly different from the treatment dosing liquid organic fertilizer Tamsil 10.0 cc per liter of water (35, 67 cm). Kale crop land shortest (smallest) indicated treatment without liquid organic fertilizer Tamsil (24.17 cm) and the treatment was statistically significantly different with other treatments.

It is alleged that the administration of liquid fertilizer Tamsil on plant kale land turned out to help increase the availability of nitrogen in the soil, so that when nitrogen is



needed by plants to form a tissue or organ growth, the nitrogen element are in a condition available and sufficient, but if the dosage of liquid organic fertilizer Tambasil lowered, then the level of availability of nitrogen also decreased. Liquid organic fertilizer Tambasil excessive or the dose increased, it does not guarantee that the nitrogen nutrient is taken or can be absorbed entirely by the plants, so the rate of increase is not significant growth (real).

According Sutejo (2002), that the function of nitrogen (N) for leaf vegetable crops, especially vegetables, which is a constituent of protein to nourish the growth of plant shoots and vegetative growth. Giving much nitrogen will cause a tremendous lasting vegetative growth and leaves become dark green color, if the excess slows down the ripening process. Plant fibers that excess nitrogen will weaken the fibers, whereas for grain crops will cause a fall crop. If the plant nitrogen deficiency usually causes a depressed plant growth and the leaves become dry. Chlorosis symptoms first emerged on the older leaves, while the young leaves remain green.

Furthermore Lakitan (1996) and Salisbury and Ross (1995) describes that nitrogen, which is contained in a liquid organic fertilizer, serve as building blocks of protein, while phosphorus and calcium play a role in spurring pembelafian meristem tissue and stimulate root growth and leafdevelopment. Potassium regulates the activities of opening and closing of stomata. Stomata optimal settings will control plant transpiration and improves the reduction karbondioxide is converted into carbohydrates So, general seacara macro nutrients contained in the liquid organic fertilizer will increase AktiVitas photosynthesis in plants, thereby increasing carbohydrate produced as foodreserves.

Tambasil liquid organic fertilizer is a complete liquid organic fertilizer, which is formulated to meet the needs and challenges of the farmers or entrepreneurs in agriculture and plantations in order to get results or harvest prime. Where the liquid organic fertilizer contains complete nutrients, both macro and micro elements essential for soil fertility and plant growth. A liquid that can be absorbed by plants through leaf stomata or mouth. Functioning as a stimulator and sangatanaman to the health of humans and animals and are environmentally friendly.

3.2. Number of Leaves

Results of analysis of variance showed that the treatment dosing liquid organic fertilizer Tambasil very significant effect on the observation of the number of terrestrial plant leaf spinach, when the plant life of 10 days, 20 days and 30 days after planting (Appendix Table 2). This situation shows that Tambasil liquid organic fertilizer can improve the



availability and uptake of nutrients by plants, so as to improve the growth and yield. Nutrients contained in the liquid organic fertilizer can increase the yield of the land kale plant growth, due to the role of organic fertilizer not only improves the physical and biological properties of the soil, but also soil chemical properties. Hara available from liquid organic fertilizer plant will be used to spur the process of photosynthesis, photosynthesis proceeds will be translocated to all parts of the plant to spur the development of vegetative and generative plant. Nutrient contained in a liquid organic fertilizer is micro-nutrients and macro nutrients.

According Prihmantoro *in* Gerald (2014) macro nutrient contained in a liquid organic fertilizer tersebut is N, P, K, Ca, Mg, and S. macro nutrient is a nutrient required in large quantities. The advantage of liquid organic fertilizer adalah proses h faster than the use of fertilizer in solid form. Liquid organic fertilizer has its drawbacks, namely volatile, can damage the leaf tissue and absorption depend on the surface layer of leaves, the feathers and the cuticle layer (Lingga, 2003).

According Samekto (2006), that the other benefits of a liquid organic fertilizer to add nutrients (N and P), so as to increase crop production. Liquid organic fertilizer through the leaves, the gift will be more evenly distributed, so that it can cope with rapid nutrient deficiency. Foliar fertilizer plant tissues able to strengthen and accelerate the growth and the growth run better (Musnamar, 2003).

Table 2. Average Number of Plants Kale Leaf Land Due Effect
Fertilizer on Different Dose and Age Observation

Dose Treatment of Liquid Organic Fertilizer Tamsil	Average Number of Plants Leaf Kale Army		
	10 days	20 days	30 days
D0 = Without Tamsil Fertilizer (Control)	4.33 a	9.00 a	14.50 a
D1 = Fertilizer Tamsil 2.5 cc per liter of water	of 6.83 b	14.83 b	20.17 b
D2 = Fertilizer Tamsil 5.0 cc per liter of water	of 7.17 b	15.33 b	21.33 b
D3 = Fertilizer Tamsil 7.5 cc per liter of water	8.00 c	17.17 c	22.67 c
D4 = Fertilizer Tamsil 10.0 cc per liter of water	of 8.67 d	17.67 cd	23.67 d
D5 = Fertilizer Tamsil 12.5 cc per liter of water	8.83 d	18.17 d	23.83 d
BNT 5%	0.45	0.67	0.81

Remarks: the figures are accompanied by the same letter column

the same are not significantly different at Test BNT 5%



Table 2 shows that with increasing doses of liquid organic fertilizer Tambsil will be followed by an increase in the number of leaves during plant growth Kale Army. The smallest number of leaves tend indicated treatment without liquid organic fertilizer Tambsil (14,50 strands) and statistically significantly different from the treatment always dosing of liquid organic fertilizer more Tambsil. The number of leaves most tend achieved treatment dosing liquid organic fertilizer Tambsil 12.5 cc per liter of water (23.83 strands), and statistically (test T-table 5%) did not differ significantly with treatment dosing liquid organic fertilizer Tambsil 10, 0 cc per liter of water (23.67 strands).

This shows that the treatment dosing liquid organic fertilizer Tambsil already reached the optimum dose (appropriate), whereby with increasing addition of liquid organic fertilizer dosing Tambsil 12.5 cc per liter of water, an increase in the number of leaves are less significant (real) is not statistically significantly different to the treatment dosing liquid organic fertilizer Tambsil 10.0 cc per liter of water, so peningkatann the dose does not need to do more to make it more profitable (efficient).

Excess nitrogen fertilizer use will result in damaged crops. In general, many farmers use nitrogen fertilizer on crops of vegetables, such as kale, spinach and others in an amount more than other fertilizers because nitrogen fertilizers are relatively cheap compared to other fertilizers. Nitrogen fertilizer with a dose of 250 kg / ha gives the best growth in plant height, leaf number and production at the plant kale, spinach and mustard greens (Subagyo, 2007).

Benefits of liquid organic fertilizer Tambsil, which fostered the growth of the plant, accelerating the formation of buds and flowers as ovary, overcome nutrient deficiency in plants can result in plant growth is interrupted or death, increases plant resistance to disease, especially fungi or fungi, is able to overcome the shortage of use fertilizer base, speed up the harvest, extend the life of plants and expanding the number of excerpts for a year and annual plant species, as well as excellent for growing plants on less fertile land or marginal land (Anonymous, 2017).

3.3. Wet Weight Wet Weight per Plant and Crop per polybag.

Results of analysis of variance showed that the treatment of urea dosing real effect on the results of observations of variables fresh weight per plant and fresh weight per polybag plants (10 plants / polybag) Kale Plant Ecosystems (Appendix Table 3).

These results indicate that the liquid organic fertilizer Tambsil can improve the availability and uptake of nutrients by plants, so as to improve the growth and yield. Nutrients contained in the liquid organic fertilizer can increase the yield of the land kale plant growth, due to the role of organic fertilizer not only improves the physical and



biological properties of the soil, but also soil chemical properties. Hara available from liquid organic fertilizer plant will be used to spur the process of photosynthesis, photosynthesis proceeds will be translocated to all parts of the plant to spur the development of vegetative and generative plant. According Hardjowigeno (2003), that the fertilizer containing nitrogen into the soil can increase nutrient availability of rapid and readily available to plants. In addition, other advantages, which saves time, labor and freight costs.

Table 3. Average Weight Wet Wet weight per plant and per polybagPlants
PlantsDue Army Kale Effect of DoseFertilizer

Treatment Dose Liquid Organic Fertilizer Tambsil	Average Kale Army Wet Weight (grams)	
	per plant	per polybag
D0 = Without Fertilizer Tambsil (control)	25.33 a	173.17 a
D1 = Fertilizer Tambsil 2.5 cc per liter of water	33.67b	268.77b
D2 = Fertilizer Tambsil 5.0 cc per liter of water	34.17b	272.63b
D3 = fertilizer Tambsil 7.5 cc per liter of water	37.83 c	314.17 c
D4 = 10.0 cc Tambsil fertilizer per liter of water	39.83d	335.50 d
fertilizer Tambsil D5 = 12.5 cc per liter of water	40.17 d	d341.43
BNT5%	2.11	18.17

Remarks: the figures are accompanied by the same letters in column
thesameare not significantly different at Test BNT 5%

in Table 3 shows that with increasing doses of liquid organic fertilizer Tambsil tend to be followed by an increase in the results of wet weight per plant and plant fresh weight per polybag plants Watercress Army. The results of wet weight per plant and plant fresh weight per polybag lows tend indicated treatment without liquid organic fertilizer Tambsil or control treatment (25.33 grams and 173.17 grams) and statistically significantly different with treatments dosing of liquid organic fertilizer Tambsil , The results of wet weight per plant and fresh weight per polybag plants tend achieved the highest dose treatment of liquid organic fertilizer Tambsil 12.5 cc per liter of water (40.17 grams and 341.43 grams), followed by treatment dosing liquid organic fertilizer Tambsil 10 , 0 cc per liter of water (39.83 grams and 335.50 grams), but statistically the two treatment doses of liquid organic fertilizer such Tambsil, not significantly different.

This proves that the liquid organic fertilizer Tambsil helpful enough and sufficient to meet the growth and yield of kale land. Liquid organic fertilizer has several benefits such as



to encourage and enhance the formation of chlorophyll of leaves, thus enhancing the ability of plant photosynthesis and the absorption of nitrogen from the air, can increase plant vigor so that the plants become solid and strong, improve plants resistant to drought, weather stress and attack disease-causing pathogens, stimulate the growth of branches of production, as well as increasing the formation of flowers and ovaries, as well as reduce gummy leaves, flowers and fruit will (Lingga and Marsono, 2004).

These results together with the results of Rizqiani *et al.* (2007) on bean plants, that the administration of a liquid organic fertilizer can increase the number of leaves, jumlah branches, fruit set, broad leaf age, leaf area index of age, root length, root volume, the number of polong, fresh weight of pods per plant and the fresh weight of pods per hectare. While the research results Hamdani (2008) showed that the liquid organic fertilizer Bio Amazing Growth can increase the production of cucumbers. Likewise in research Parman (2007), that of potato, use a liquid fertilizer organik Supra at a dose of 4 milliliter increase potato production.

4. CONCLUSION

There is a very real effect on the observation variables plant height, leaf number and fresh weight per plant and plant fresh weight per polybag. The treatment dosing liquid organic fertilizer Tambsil 12.5 cc per liter of water to produce growth and yields the highest (maximum dose) kale crop land, although it was not statistically significantly different from the dosage of liquid organic fertilizer Tambsil 10.0 cc per liter of water (Dose optimum). From the above conclusions, it is advisable to study more about how, when, the dosage of liquid organic fertilizer in climatic conditions, location and a different commodity. It is advisable, when making a kale plant cultivation land in Surabaya and its surrounding area, the dose of fertilizer liquid organic fertilizer Tambsil 10.0 cc per liter of water.

REFERENCES

- Efrain Patola. (2008). Analysis of Effect of Dose Fertilizer and Plant Spacing on Productivity Hybrid P-21 Maize (*Zeamays L.*). BPP Gardens Jumapolo District of Jumapolo, Karanganyar.
- Hamdani, JS. (2008). Yield and quality of cucumber with the application of N-coated fertilizers and organic fertilizers *cairojournals Agrivigor* 8,15-23.
- Hendro Sunarjono. (2004). 30 Type Vegetable Planting. Publisher Sower Self Reliance. Jakarta. It 78-82.



- Hendro Sunaryono.(2004). Key to Plant Vegetables Grow important inIndonesia. Publisher Sinar Baru. Bandung.
- LakitanB. (1996). Physiology Plant Growth. Governmentalspreader. Jakarta.
- Phallus,P. (2003). Instructions for UseFertilizer. Governmentalspreader. Jakarta.
- Phallus and Marsono, (2004). Instructions The use of fertilizers. Publisher Sower Self Reliance. Jakarta. 149 Page.
- Marsusi, (2010). Cultivation ofkale. ECD West Kalimantan, Institute for Agricultural Technology. West Kalimantan.
- Mahrus, A., Bambang Wicaksono, H., Nurlina, Cholil, H., & Sri Wiwoho, M. (2017). Mapping of Biomass Production of Land Damage Assessment to Reduce Environmental Changes In East Java Probolinggo. In *MATEC Web of Conferences* (Vol. 138, p. 9004). EDP Sciences. <https://doi.org/10.1051/mateconf/201713809004>
- Munawar, A.,(2011). "Soil Fertility andNutriPlantsi," IPB Press, Bogor.
- Musnamar, EI 2003. "Organic fertilizers (liquid, solid and appsikasinya),"Sower Swadaya, Jakarta.
- Parman,S. (2007). Effect of organic liquid fertilizer on growth and production of potato (*Solanum tuerosum* L.) *Bulletin Anatomi and 'physio / Ogi* XV, 21-31. Herath translator Susilo. UI Press. Jakarta.
- Prihmantoro, (2001). Seasonal Vegetable Hydroponics. Publisher PT. Spreader Governmental Jakarta. 98 pages.
- Rahmat Boediono, (2009). Effect of Organic Fertilizer and Nitrogen on the Growth and Yield Plant KaleArmy. Institute for Agricultural Technology. East Java. Surabaya.
- Rahardi, 2000. Green Revolution Organic Farmingopponent. Publisher: PT. Sower Swadaya, Jakarta.
- Rizqiani,NF, Ambarwati, E., and Yuwono, N.W. (2007). Effect of dose and frequency of administration of organic fertilizer cair on growth and yield of beans (*Phaseolus vulgaris beta*) lowlands. *Journals Science of Soil andEnvironment*. 7.43 to 53.
- Roesmarkan and Sudarsono, (2002). Soil FertilityStudies. Publisher PT. Canisius, Yogyakarta. 58 pages.
- Rukmana, (2005). Planting chinese cabbage, kale andmustard. Publisher PT. Doubleday. Yogyakarta. 66 pages.
- Salisbury, BF andCCW. Ross. (1995). Growing Physiologyqn. Volume2. Publisher ITS Press.
- Sri Adiningsih, (1995). Integrated Nutrient Management for Food Production Achieving stable and familiar environment in Prosidina Technical Meeting of Soil



AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering

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

Available on :

<http://agris.cience.scientific-work.org/index.php/agris.cience>

This is Under CC BY SA Licence



Research Institute and Agroklimak. Land Research Center and Agroklimak.
Bogor.

Susila. (2006). Free Vegetable Cultivation. Department of Agronomy and
Horticulture. Bogor Agricultural Institute. Bogor. 66 p.

Sutanto. (2002). Application of Organic Agriculture. Publisher PT. Doubleday. Yogyakarta.