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The Influence of Dosing Cattle Manure and Organic Liquid Fertilizers Towards Growth and Crop Yield of Lettuce (*Lactuca sativa* L.) on Three Different Soil Types

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ABSTRACT

Lettuce cultivation on the lowlands with mineral soil was made one of the alternatives for increasing the production of lettuce. Mineral soils are less fertile if it will be planted with lettuce need to give organic ingredients. The purpose of this study is to knowing the influence and interaction between the doses of manure and liquid organic fertilizers towards growth and yield of lettuce plants on three different soil types. The methods used in this study was a Randomized Design Group (RDG), with three replicates. The treatment arranged in factorial. The treatments tested consists of two factors, namely the dose factors of cattle manure (PKS) consists of PKS0 (0 gr/plant), PKS1 (150 gr/plant), PKS2 (200 gr/plant), PKS3 (250 gr/plant) combined with three kinds of soil minerals. Then second factor is liquid organic fertilizer dose factor (POC) consisting of POC0 (0 ml/plant), POC1 (5 ml/plant), POC2 (10 ml/plant), POC3 (15 ml/plant) combined with three kinds of soil minerals. The experiment consists of 16 units of treatment combinations and each treatment was repeated three times so that the required 48 polybag/plants experiment. Observation of growth of lettuce and variable components of crops as well as the varibel supporters. The collected data were analyzed with the analysis Variant (yout range) according to the experimental design was used. If there is a real interaction influence against the observed variable is then continued with a different test studies on average use the Duncan Multiple Range Test (DMRT) on levels 5% and if only a single factor in a real influence, then proceed with the average difference test with Least Significant Difirent (LSD) on level 5%. Based on the results of research that, granting cattle manure and liquid organic fertilizer can increase growth and curly lettuce crops. The real interaction happening against curly lettuce plant growth at treatment doses of manure of cows with a dose of liquid organic fertilizer. Cattle manure at doses of 250 gr/plant shows dosage optimum cattle manure with maximum results and a liquid organic fertilizer dose 15 ml/plant shows the optimum dose with maximum results. NCBA soil type is a type of land suitable for cultivation of curly lettuce on lowlands for dry climate or limited rain.



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INTRODUCTION

Plant Lettuce (*Lactuca sativa L.*) is one of the horticultural commodity vegetable leaves are much favored by the public because it tastes good, is easy to come by, and it has been not too difficult. Plant lettuce contain lots of vitamins and nutrition that is needed by the human body. Given the economic value and benefits for health, then it is reasonable in an effort to increase production of lettuce is continuously performed.

Plant lettuce is very apparent potential to be developed in the capital Dili because of the condition of the ik appropriate for this commodity lim. Cress can be grown on lowlands with good results with intensive maintenance performed and modification of lin kungan. Cultivation of lettuce in the lowlands in the capital Dili are still constrained because of the condition of the majority of the land is arid climate is dry land and mineral content of alkalis.

Soil type Aeroportu, NCBA and Cristo Rei including mineral soil types of alkalis. Based on the results of testing soil samples in the laboratory of agricultural research and Development Institutions of the land, plants, fertilizer and water in Lembang-Bandung West that, of the three types of the soil pH ranged from 7.6-8.7 has the level of essential nutrient elements are low, especially nutrient elements nitrogen (N), phosphorus (P), and potassium (K). With soil conditions as above, plant growth can be hampered if the nutrient is less available.

The use of organic matter not only add nutrient availability to plants, but also create conditions corresponding to the plant by improving aeration, make it easier to root penetration and improve the capacity of holding water. The shortage of water for plant growth phases of lettuce on the stadia cause a decrease in growth can be considerable results. In addition to this organic fertilizer is the result of the decomposition of the organic material is decomposed (overhauled) by microbes, the end result can provide the required plant nutrient for plant growth and development. Organic fertilizer is very important as a buffer properties of physical, chemical, and biological soil so that it can increase the efficiency of fertilizer and land productivity.

Organic fertilizers can improve the soil structure which was originally densely into the loose, sandy soil becomes more compact, clay soil and become loose. Organic fertilizers can also react with the metal ions to form complexes, and the metal ions which are poisoning plants and lower availability of nutrients in the soil such as Al, Fe, and Mn can be minimized. Besides organic manures can also spur the development of microorganisms in the soil, CO₂ gas produced microorganisms to be used for plant photosynthesis and produce growth hormones.

One strategy address this problem is to use cow dung manure and liquid organic fertilizer from cow manure and forage. An increase in crop yield of lettuce can be done in various ways, one of which is with the repair techniques of farming, among

others by fertilization. Fertilizing fertilizing is important because the role of holding is one of the ways to improve the level of soil fertility in improving crop production. One of the fertilization that is used is to use cow manure and liquid organic fertilizer. The fertilizer where both functions as a source of nutrients for plants. Increase the availability of nutrient elements in soils by using cow dung manure can overcome the influence of nutrient deficiency in plants. Cow dung manure was instrumental in adding nutrient elements and accelerate the availability of nutrient for the plant. Cow dung manure can improve aeration and reduce the density of the soil and add organic matter of the soil.

Liquid organic fertilizer will increase the availability of nutrients in the soil. In addition to indispensable nutrient availability in the soil structure and soil air air greatly affects the growth and development of plant roots. The development of a good plant rooting systems largely determine the plant's vegetative growth that will ultimately determine crop production.

Cow dung manure dose and dosage of liquid organic fertilizer will be applied can give the maximum results because the cow dung manure and liquid organic fertilizer dose given nutrient needs of crops of lettuce curly mainly from the needs of nitrogen. With the ever increasing doses of cow dung manure and liquid organic fertilizer dose given would be increasing production plant lettuce. In addition the use of cow dung manure that is eco-friendly and organic liquid fertilizers can help the sustainability of agricultural land, so that it can support sustainable agriculture.

Based on the above description, then it needs to be done because the research in cultivating lettuce na usually in planting in temperate wet plateau with fertile soil and loose pointing right good results. For it is attempting to do research of cultivating lettuce crops on dry land in dry climates by using the paranet for manipulating the climate in order to be able to grow lettuce well done on the conducted in the lowlands on the three types of soil the unrestricted cow manure and liquid organic fertilizer.

RESEARCH METHODS

This experiment was carried out in the plant nursery located in the hamlet of NCBA Malinamuk, village Comoro, Post Administrative Dom Aleixo, Municipality Dili. Based on Data Collection, the location of the GeoPoint Ona is located at latitude: 8o33 ' 53 "S. Longitude: E 125o31 ' 50 ". Height ± 82.95 m above sea level (a.s.l.) and precision 4 m. the land is low-lying land dry climate. The experiment was carried out on 25 April 2018 until 14 June 2018. The results of the analysis of the soil before the experiment the pH of the Alkalis, N - total of lace and organic C-low.

The design used in this experiment is a Random Design Group (RDG), with 3 times repeats inceptisol soil type (use of three different locations i.e. the land of Cristo Rei, Airport Nicolau Lobato and the land of Malinamuk (location NCBA) of the soil type 3 made of deuteronomy. The treatment arranged in

factorial. The treatments tested consists of two factors, namely: 1. the dose factors of cattle manure (PKS) consists of PKS0 : 0 gr/plant, PKS1: 150 Gr./plant, PKS2: 200 gr./plant, PKS3: 250 gr./plant 2. Liquid organic fertilizer dose factor (POC) consisting of: POC0: 0 ml/plant, POC1: 5 ml/plant, POC2: 10 ml/plant, POC3: 15 ml/plant. The experiment consists of 16 units of treatment. The combination of each treatment was repeated three times so that the required 48 polybeg multiplied by 3 types of soil from a different location then the in need 144 polybeg experiment.

The materials used in the experiment was curly lettuce seed varieties of Grand Rapids. Red Arrow branding retrieved from the store, the village of Boaventura Bidau Akadiru-Hun, Subdistrict Cristo Rei, District of Dili, cow dung manure by as much as 43.20 kg is obtained from the company's Coop NCBA and liquid organic fertilizer from cow manure and forage as much as 150 litre made by researchers. The tools used include; plow, hoe, sickle, a plastic bucket, a flush (gembor), shovels, measuring cup, scales, analytical scales, ovens, meter, a ruler, a rope, a plastic pouch of raphia, handcounter, stationery writing, soil pH, a digital camera.

Observation of variable growth; high per plant lettuce and number of leaves per plant lettuce, the variable component of the result; fresh heavy economical per plant, fresh weight of leaves per plant, root length per plant, stem diameter, plant fresh weight per stem per plant fresh weight and total per plant, and supporting variables is measuring soil ph, on three types of soil different.

The collected data were analyzed by analysis of variants (ANOVA) in accordance with the experimental design was used. If there is a real interaction influence against the observed variable is then continued with a study of average difference test using test DMRT and LSD on levels 5% (Gomez and Gomez, 2007).

RESULTS AND DISCUSSION

High Per Plant Lettuce (cm)

The results of the analysis of variants (Anova) to the height plant lettuce showed that fertilization with doses of cattle manure (PKS) gives a very real influence on plant lettuce age 14, 28 and 35 days after planting, except high plant age 21 days after planting does not give a real influence.

Fertilization with Organic Manures dosage of liquid (POC) gives a very real influence on plant age 14 and 35 days after planting. But it gives a real influence on plant lettuce age 28 days after planting, except at the height of the plant age 21 days after planting does give influence. Interaction of bovine manure dose and dosage of liquid organic fertilizer (PKS x POC) gives a real influence on plant lettuce age 21 days after planting. But exert influence are not real good plant height against the age 14, 28 and 35 days after planting. DMRT 5% test results as shown in table 1 below:

Table 1.

The average height of plant seed lettuce (cm), due to a combination of cattle manure (PKS) and organic fertilizers liquid (POC) on several different Age

Treatment	14 DAP	21 DAP	28 DAP	35 DAP
PKS0 POC0	6.00a	10.00a	14.83a	18.75a
PKS0 POC1	6.17ab	11.50bc	16.42bcd	20.58b
PKS0 POC2	6.33abc	12.08c	16.83bcde	22.00bc
PKS0 POC3	6.92bcde	12.33c	17.00bcde	23.17cd
PKS1 POC0	6.00ab	11.17abc	16.17bcd	20.58b
PKS1 POC1	6.00ab	11.50bc	15.67ab	23.33cde
PKS1 POC2	6.33abcd	10.33ab	15.75ab	23.75de
PKS1 POC3	6.83abcde	11.92c	16.08bc	24.67defg
PKS2 POC0	6.33abcd	11.33bc	16.83bcde	23.33cde
PKS2 POC1	6.58abcde	11.00abc	16.83bcde	23.58cde
PKS2 POC2	6.75abcde	11.83c	17.33cdef	24.58defg
PKS2 POC3	7.33de	11.00abc	17.50def	25.00efgh
PKS3 POC0	6.75abcde	12.00c	17.00bcdef	24.17def
PKS3 POC1	7.08cde	12.00c	17.33cdef	25.92fgh
PKS3 POC2	7.17cde	11.67bc	17.83ef	26.42gh
PKS3 POC3	7.42e	12.25c	18.33f	26.67h

Description: a number that is followed by the same letter in every different column not reality test DMRT 5%.

According to the table 1 in above, application dosage of cattle manure (PKS) combined with a dose of liquid organic fertilizer (POC) gives a good result against high plant lettuce on all treatments except treatment without organic fertilization. Growing old is more and more growing hormone needed to process value and the development of the plant. It is seen that the lettuce plant height at the age of 14 DAP, 21 DAP, 28 DAP, and 35 DAP. Average plant height was higher on a combination treatment (PKS3 POC3) real and distinct treatment without organic fertilization (PKS0 POC0). The results showed that giving doses of cattle manure 250 gr/plant combined with liquid organic fertilizer dose 15 ml/plant gives the highest height plant lettuce that is 26.67 cm or increased by 6.10%. The awarding of the organic fertilizer is able to add the nutrient elements in soils, so plant growth increased with the availability of nutrient elements. This is supported by the theory of Lakitan (1996), there is a synchronization between the availability of nutrient needs of the plants so that it can help the speed of growing plants. It is also supported by Sarief (1992), which states that the organic fertilizer which is inserted into the ground will be decomposed by microorganisms and nutrient elements released from the decomposition becomes available and are absorbed by plants, thus rooting growth the plant will increase especially tall plants.

The number of Plant Leaf Lettuce (strands)

The results of the analysis of variants (Anova) to the amount of leaf lettuce plants showed that fertilization with doses of cattle manure (PKS) gives a very real influence on the number of leaves per plant lettuce, aged 14, 21, 28 and 35 DAP. Fertilization with organic manures dosage of liquid (POC) gives a very real influence on the amount of plant leaf age 14, 21, 28 and 35 DAP. Interaction of bovine manure dose and

dosage of liquid organic fertilizer (PKS x POC) effect is not real on the number of leaves per plant lettuce, aged 14, 21, 28 and 35 DAP. DMRT 5% test results as shown in table 2 below:

Table 2.

Average number of Leaf Lettuce plant seed due to a combination of cattle manure (PKS) and organic fertilizers liquid (POC) on several different Age

Treatment	14 DAP	21 DAP	28 DAP	35 DAP
PKS0 POC0	2.33a	3.67a	5.33a	6.33a
PKS0 POC1	3.00b	4.00ab	6.00abc	6.67ab
PKS0 POC2	3.00bc	4.00ab	6.33bcd	7.00ab
PKS0 POC3	3.33bcd	4.33abc	6.33bcd	7.33bc
PKS1 POC0	3.33bcd	4.33abc	5.67ab	7.33bc
PKS1 POC1	2.67ab	4.00ab	6.00abc	8.00cd
PKS1 POC2	4.00de	5.00cd	6.67cde	8.00cd
PKS1 POC3	4.00de	5.00cd	7.00def	8.33de
PKS2 POC0	3.33bcd	4.33abc	6.00abc	8.00cd
PKS2 POC1	3.67cd	4.67bc	6.33bcd	8.00cd
PKS2 POC2	4.00de	5.00cd	6.33bcd	8.33de
PKS2 POC3	4.00de	5.00cd	7.33efg	8.33de
PKS3 POC0	3.33bcd	4.33abc	7.00def	8.33de
PKS3 POC1	4.00de	5.00cd	7.33efg	8.33de
PKS3 POC2	4.67ef	5.67de	7.67fg	8.67ef
PKS3 POC3	5.00f	6.00e	8.00g	9.33f

Description: a number that is followed by the same letter in every different column not reality test DMRT 5%.

According to the table 2 in above, the application of the dose of cattle manure (PKS) combined with a dose of liquid organic fertilizer (POC) gives good results against a number of leaf lettuce plants in all treatments except treatment not give fertilization. It is seen that the number of leaves per plant lettuce at the age of 14 DAP, 21 DAP, 28 DAP and 35 DAP. Average number of leaves per plant more lettuce found on combination treatment (PKS3 POC3) real and distinct treatment without organic fertilization (PKS0 POC0). The results showed that giving doses of cattle manure 250 gr/plant combined with liquid organic fertilizer dose 15 ml/plant gives the number of leaves per plant lettuce that is 9.33 strands or increased by 8.05%. This is because the grant was able to add organic fertilizer nutrient elements in soils, so plant growth increased with the availability of nutrient elements. Plants that met the needs of the the elements of nutrient, will be able to stimulate the growth of new leaves. The number of leaves is correlated positively with plant height, the higher plant the many number of leaves. Rising high plant will cause the number of sections and increased so that the amount of leaves will also be increased, this is because the section and the book is where the sticking leaves. This is supported by the theory of the Sitompul and Guritno (1995) stated that the stem is composed of sections and books a spot sticking leaves. Reinforced by Rinsema (1986) stated that, the elements of N are highly instrumental towards the formation of a leaf because with the availability of N then the process of photosynthesis will increase and the resulting fotosintat could be utilized by the plant for the formation of the leaves.

Fresh heavy Economical Per Plant Lettuce (gr)

The results of the analysis of variants (Anova) against fresh economic weight per plant lettuce showed that fertilization with doses of cattle manure (PKS) gives a very real influence on the fresh weight per plant economically lettuce. So is fertilizing with a dose of liquid organic fertilizer (POC) gives a very real influence on the fresh weight per plant economically lettuce. But the interaction of bovine manure dose and dosage of liquid organic fertilizer (PKS x POC) influential are not real heavy on fresh lettuce plants per economically. Test results of LSD 5% as shown in table 3 below:

Table 3.

The average fresh weight per plant economically lettuce (gr) given doses of cattle manure and organic liquid fertilizer dose.

Treatment	Liquid organic fertilizer dose (ml/plant)			
	(0 ml) POC0	(5 ml) POC1	(10 ml) POC2	(15 ml) POC3
Cattle manure (gr/plant)	-----gr-----			
(0 gr) PKS0	1.75a A	2.33a A	3.00b A	3.67c A
(150 gr) PKS1	2.83a B	3.42b B	4.00b B	5.00c B
(200 gr) PKS2	3.75a C	4.17fb C	4.33b C	5.00c B
(250 gr) PKS3	3.75a C	4.25b C	4.83b D	5.67c C
LSD 5%	0.67			

Description: based on you effect, the effect of the interaction of Cattle Manure and Organic Liquid Fertilizer proven to meaningfully. Average followed a similar letter on a line (a, b, c) and columns (A, B, C) of the same is no different of LSD based on levels 5%.

Base on table 3 in above, the application of cattle manure doses of 250 gr/plant combined with organic fertilizer liquid 15 ml/plant (PKS3 POC3) provides economical fresh weight per plant lettuce heaviest that is 5.67 grams, compared to fresh economic weight per the plants obtained on treatment without organic fertilizer that is 1, 75 grams (PKS0 POC0).

Results of the fresh weight of the economical plant lettuce that is seen from the weight of the leaves and the stem weight is the weight of the wet lettuce plants above the ground. From the results of this research can be said that the treatment of cattle manure dose and dosage of liquid organic fertilizers have the highest economic value, where data is supported by the treatment dose and dose cattle manure organic liquid fertilizers generate the number of leaves and the diameter of the shaft so that the highest dose treatment of cow manure and a dose of liquid organic fertilizers have heavy economical fresh lettuce plants the highest per anyway. This is caused by the element N on cow manure and liquid organic fertilizer that is high, where N is the element that is needed for the development of plant stems and leaves. This is supported by the theory of Sarief (1992), when the plant gets enough N, then the leaves will grow bigger and expands its surface. The broad leaf surface allows to absorb sunlight more so that the process of photosynthesis takes place more quickly, as a result the photosynthesis that is formed will accumulate on the weight of the plant that is the result of

economical plant lettuce. It is also supported by Marsono and Sigit (2001) which States that N is required in large quantities at each stage of plant growth, particularly the formation of buds, growth of stems and leaves.

Fresh weight of Leaves Per Plant Lettuce (gr)

The results of the analysis of variants (Anova) against fresh weight of leaves per plant lettuce showed that fertilization with doses of cattle manure (PKS) gives a very real influence on the fresh weight of leaves per plant lettuce. So is fertilizing with a dose of liquid organic fertilizer (POC) gives a very real influence on the fresh weight of leaves per plant lettuce. Interaction of bovine manure dose and dosage of liquid organic fertilizer (PKS x POC) influential are not real fresh leaves on the weight per plant lettuce. Test results of LSD 5% as shown in table 4 below:

Table 4.

The average Fresh weight of Leaves Per Plant Lettuce (gr) given doses of cattle manure and a dose of liquid organic fertilizer

Treatment Cattle manure (gr/plant)	Liquid organic fertilizer dose (ml/plant)			
	(0 ml) POC0	(5 ml) POC1	(10 ml) POC2	(15 ml) POC3
(0 gr) PKS0	1.42a A	1.75ab A	2.08bcd B	2.50defgh B
(150 gr) PKS1	1.75ab A	2.25bcde AB	2.67efgh BC	3.00hi BC
(200 gr) PKS2	1.83abc AB	2.42defg B	2.58defgh BC	3.33i C
(250 gr) PKS3	2.33cdef B	2.83fghi B	2.92ghi C	3.25i C
LSD 5%	0.57			

Description: based on yout effect, the effect of the interaction of Cattle Manure and Organic Liquid Fertilizer proven to meaningfully. Average followed a similar letter on a line (a, b, c) and columns (A, B) of the same is no different of LSD based on levels 5%.

According to the table 4 in above, the application of cattle manure dose 200 gr/plant combined with organic fertilizer liquid 15 ml/plant gives fresh weight of leaves per plant is the heaviest lettuce that is 3.33 grams (PKS2 POC3), when compared with the fresh weight of the economical per plant obtained at the treatment without organic fertilizer that is 1, 42 grams of (PKS0 POC0). Cress is a plant leaf vegetables, because it leaves a major part that is consumed fresh weight of leaves then is crucial in its growth. Fresh weight of leaf lettuce plants closely related to the amount of leaves of plants because when the plant has leaves that much, then it will generate a high leaf weight as well. This is supported by the theory of Sarwono (2010), the plant gets enough nitrogen in the soil will grow greener.

The addition of nitrogen in plants can encourage the growth of the organs related to photosynthesis like leaves. The plant gets enough supply of nitrogen will form leaves that have a wider leaves with higher chlorophyll content, so that plants are

capable of producing carbohydrates/ assimilation in a high amount to prop up growth vegetative. Reinforced by Gardner at al., (1991) States that the result of assimilation, the Division is very important at this phase of the vegetative growth will determine the broad leaf, root development and branching. The investment results of the assimilation in plant growth during the period of vegetative determining productivity at the next level of development. The results of the assimilation can be distributed from the leaves or the leaves and not the re mobilization of the results of the assimilation of the backup. Proportion of the results of the assimilation comes from each source depending on the genitif and the environment. So high yields are obtained the plant should be producing broad leaves index quickly enough to absorb most of the light to achieve maximum dry weight production and after that the plant should be able to absorb the light and be able to share the results of the assimilation in large quantities to organs that have economic value, without affecting the quality of the results that can be harvested.

The length of Roots Per Plant Lettuce (cm)

The results of the analysis of variants (Anova) against length of roots per plant lettuce showed that fertilization with doses of cattle manure (PKS) gives no real influence on the length of roots per plant lettuce. But fertilizing with a dose of liquid organic fertilizer (POC) gives a very real influence on the length of roots per plant lettuce. Interaction of bovine manure dose and dosage of liquid organic fertilizer (PKS x POC) influential are not real on the length of roots per plant lettuce. Test results of LSD 5% as shown in table 5 below:

Table 5.

The average length of Roots Per Plant Lettuce (cm) given doses of Cattle Manure and a dose of liquid organic fertilizer

Treatment Cattle manure (gr/plant)	Liquid organic fertilizer dose (ml/plant)			
	(0 ml) POC0	(5 ml) POC1	(10 ml) POC2	(15 ml) POC3
(0 gr) PKS0	7.42a A	9.50bcdef B	10.08cdefg B	10.92fgh B
(150 gr) PKS1	8.08ab A	9.50bcdef B	10.58defgh B	11.33gh B
(200 gr) PKS2	8.17ab A	8.83abc AB	9.17bcde B	11.58h B
(250 gr) PKS3	8.75ab c	9.00abcd AB	9.75bcdefg B	10.83efgh B
LSD 5%	1.67			

Description: based on yout effect, the effect of the interaction of Cattle Manure and Organic Liquid Fertilizer proven to meaningfully. Average followed a similar letter on a line (a, b, c) and columns (A, B) of the same is no different of LSD based on levels 5%.

Base on table 5 in above, the application of cattle manure dose 200 gr/plant combined with organic fertilizer liquid 15 ml/plant

gives the longest root growth. This is due to dosing cattle manure and a dose of liquid organic fertilizer can increase the content of nutrient elements in the soil so that it can increase the length of the roots of the plant in absorbing nutrient elements, moreover can also rehabilitate fertility ground. According to Yuwono (2005) one of the functions of organic fertilizer is fix the structure of the soil.

Good soil is a soil that has good air layout so that the flow of air and water can enter that rooting plants will grow better. According to Sarwono (2010), organic material can fix the nature of the physical, chemical and biological soil. The physical properties of the soil causes the development of rooting for the better so it can be absorbing by the plant nutrient elements.

Diameter of Stem Per Plant Lettuce (mm)

The results of the analysis of variants (Anova) against Rod diameters per plant lettuce showed that fertilization with doses of cattle manure (PKS) gives a very real influence on the diameter of the stem per plant lettuce. So is fertilizing with a dose of liquid organic fertilizer (POC) gives a very real influence on the diameter of the stem per plant lettuce. But the interaction of bovine manure dose and dosage of liquid organic fertilizer (PKS x POC) are not real effect on stem diameter per plant lettuce. Test results of LSD 5% as shown in table 6 below:

Table 6.

The average Diameter of the stem Per Plant Lettuce (mm) given doses of Cattle Manure and a dose of Liquid Organic Fertilizer

Treatment	Liquid organic fertilizer dose (ml/plant)			
	(0 ml) POC0	(5 ml) POC1	(10 ml) POC2	(15 ml) POC3
(0 gr) PKS0	0.83a	1.00ab	1.83de	2.67gh
(150 gr) PKS1	1.33bc	1.17ab	1.83de	2.50fg
(200 gr) PKS2	1.17ab	1.67cde	2.08ef	2.50fg
(250 gr) PKS3	1.42bcd	1.83de	2.33fg	3.00h
LSD 5%	0.49			

Description: based on yout effect, the effect of the interaction of Cattle Manure and Organic Liquid Fertilizer proven to meaningfully. Average followed a similar letter on a line (a, b, c) and columns (A, B, C) of the same is no different of LSD based on levels 5%.

According to the table 6 in above, the application of cattle manure doses of 250 gr/plant combined with organic fertilizer liquid 15 ml/plant gives the diameter of the largest lettuce plants per stem that is 3.00 mm, when compared to the diameter of the stem per plant obtained at treatment without organic fertilizer that is 0, 83 mm. This is because the development of the plant was greatly influenced by macro and micro nutrient elements that are present in cow manure and liquid organic fertilizer.

This was confirmed by Soeroto (1985) States, among other nutrient elements required to enable a number of enzymes that function in mitotic Division and elongation of cells; cell division; the synthesis of protein and carbohydrate trasnlokasi. Added by Nyakpa et al.(1985) the growth rate between the root of the tree (trunk, branch, heading) physiologically there is basically a balance, so that the supply of nutrients will suit your needs.

Fresh weight of Stems Per Plant Lettuce (gr)

The results of the analysis of variants (Anova) of the weight of fresh stems per plant lettuce showed that fertilization with doses of cattle manure (PKS) gives a very real influence on the weight of fresh stems per plant lettuce. So is fertilizing with a dose of liquid organic fertilizer (POC) gives a very real influence on the weight of fresh stems per plant lettuce. But the interaction of bovine manure dose and dosage of liquid organic fertilizer (PKS x POC) influential are not real heavy on fresh stems per plant lettuce. Test results of LSD 5% as shown in table 7:

Table 7.

The average weight of Fresh Stems Per Plant Lettuce (gr) given doses of Cattle Manure and a dose of Liquid Organic Fertilizer

Treatment	Liquid organic fertilizer dose (ml/plant)			
	(0 ml) POC0	(5 ml) POC1	(10 ml) POC2	(15 ml) POC3
(0 gr) PKS0	0.75a	1.17b	1.83e	2.25f
(150 gr) PKS1	0.87a	1.25bc	1.83e	2.25f
(200 gr) PKS2	1.17b	1.50d	1.90e	2.25f
(250 gr) PKS3	1.42cd	1.83e	2.25f	3.00g
LSD 5%	0.24			

Description: based on yout effect, the effect of the interaction of Cattle Manure and Organic Liquid Fertilizer proven to meaningfully. Average followed a similar letter on a line (a, b, c) and columns (A, B) of the same is no different of LSD based on levels 5%.

Trough the table 7 in above, the application of cattle manure doses of 250 gr/plant combined with organic fertilizer liquid 15 ml/plant gives fresh weight of stems per plant is the largest lettuce that is 3.00 grams, compared with the weight of fresh stems per plant is obtained at the treatment without organic fertilizer that is 0, 75 gr. expressed by Linga and Marsono (2006) that, if the required nutrient elements of plant available in sufficient amounts, then the results of the metabolism such as synthesis of biomolecules will be increased. This causes cell division, enlargement and adult the network is becoming more perfect and quick, so the added volume and weight of the more fast plant growth, which in turn for the better.

Fresh weight Per Plant Lettuce Total (gr)

The results of the analysis of variants (Anova) against fresh weight per plant lettuce total showed that fertilization with

doses of cattle manure (PKS) gives a very real influence on the weight of fresh total per plant lettuce. So is fertilizing with a dose of liquid organic fertilizer (POC) gives a very real influence on the weight of fresh total per plant lettuce. Interaction of bovine manure dose and dosage of liquid organic fertilizer (PKS x POC) influential are not real heavy on fresh lettuce plants total per. Test results of LSD 5% as shown in table 8 below:

Table 8.

The average weight of Fresh Lettuce Plants Total Per (gr) given doses of Cattle Manure and a dose of Liquid Organic Fertilizer

Treatment	Liquid organic fertilizer dose (ml/plant)			
	(0 ml) POC0	(5 ml) POC1	(10 ml) POC2	(15 ml) POC3
Cattle manure (gr/plant)	-----gr-----			
(0 gr) PKS0	2.58a A	3.00abc A	3.42bcd B	4.33efg C
(150 gr) PKS1	2.83ab A	3.42bcd AB	3.58cd B	4.08def C
(200 gr) PKS2	3.00abc A	4.08def B	4.33efg C	5.00gh D
(250 gr) PKS3	3.75de B	4.58fg B	5.33h D	6.25i E
LSD 5%	0.69			

Description: based on your effect, the effect of the interaction of Cattle Manure and Organic Liquid Fertilizer proven to be meaningful. Average followed a similar letter on a line (a, b, c) and columns (A, B) of the same is no different of LSD based on levels 5%.

The usual lettuce consumed in the form of fresh, so it's important to know the total fresh weight can be generated due to the treatment doses of cattle manure combined with liquid organic fertilizer is given. Table 8 that, the application of cattle manure doses of 250 gr/plant combined with organic fertilizer liquid 15 ml/plant gives fresh weight per plant is the largest lettuce total that is 6.25 grams, compared with the weight of fresh total per plant obtained at the treatment without organic fertilizer that is 2, 58 gr. As expressed by Jumin (2012), the solar energy captured by plants, used for photosynthesis, respiration, transpiration, and nutrient translocation assimilation and others.

The light energy is captured in the photosynthesis converted into potential energy. An increase in fresh weight yield total per plant because of nutrient elements in organic fertilizer is absorbed by plants that are capable of further use for growth and development. Soeroto (1985) stated that organic matter has the power to change all the factors of soil fertility in the sense of adding substances to food, heighten the humus, soil structure, improve and encourage remains miniscule.

Soil pH after research

The results of the analysis of variants (Anova) against pH three different soil type on combine it with doses of cow manure with liquid organic fertilizer dosage toward the growth and development of lettuce plants showed that fertilization with a dose of Fertilizer cattle manure (PKS) gives no real influence

on the pH of the three different types of soil. So is fertilizing with a dose of liquid organic fertilizer (POC) gives no real influence on the pH of the three different types of soil. Interaction of bovine manure dose and dosage of liquid organic fertilizer (PKS x POC) a very real effect on the pH of three different soil type. Test results of LSD 5% as shown in table 9:

Table 9.

Average soil pH Of 3 types of land which dose of Cattle Manure and a dose of Liquid Organic Fertilizer

Treatment	Liquid organic fertilizer dose (ml/plant)			
	(0 ml) POC0	(5 ml) POC1	(10 ml) POC2	(15 ml) POC3
Cattle manure (gr/plant)	-----pH-----			
(0 gr) PKS0	7.53b B	6.67a A	6.67a A	6.83a AB
(150 gr) PKS1	6.83a A	7.00a AB	7.00a AB	7.00a AB
(200 gr) PKS2	6.83a A	6.83a A	6.83a AB	7.00a AB
(250 gr) PKS3	6.83a A	7.00a AB	6.83a AB	7.00a AB
LSD 5%	0.33			

Description: based on your effect, the effect of the interaction of Cattle Manure and Organic Liquid Fertilizer proven to be meaningful. Average followed a similar letter on a line (a, b, c) and columns (A, B) of the same is no different of LSD based on levels 5%.

Measurement of the degree of acidity (pH) soil in organic fertilizer is given before and after the given organic fertilizer. PH measurement is performed to identify the difference between pH treatments.

Trough the table 9 in above, the application of cattle manure dose 150 gr/plant combined with liquid organic fertilizer 5-15 ml/plant can be soil pH down 6,67-7.00, compared the treatment without organic fertilizer pH amounted to 7.53. the pH (potential of hydrogen) of the soil is one of the factors that affect solubility of nutrient elements in soil.

According to Soemarno (2013), the availability of macro and micro nutrient elements in soils are strongly influenced by soil pH. On the ground was a bit surly to a bit of macro elements, the availability of alkalis and Mo increases (except P), while the hara P, Fe, Mn, Zn, Cu and Co being unavailable so that it can affect the growth of plants. In the land of wry, micro-nutrient (except for Mo and Bo) decline.

Soomro et al. (2012) mention the land that have high pH can cause problems so as to reduce P fixation nutrient availability to plants. According to Sarwono (2010), organic material can fix the nature of the physical, chemical and biological soil. The physical properties of the soil causes the development of rooting for the better so it can be absorption by the plant nutrient elements.

Granting of organic matter can also affect the chemical properties of the soil that is able to lower the pH of the soil. According to Buckman and Brady (1982), that soil pH can affect the availability of nutrient elements. three types of soil

pH before it conducted the research ranged from 7.6-8.7. That type of soil with pH 8.7 Aeroportu, soil type, pH 7.6 NCBA and soil type Cristo Rei pH 8.4.

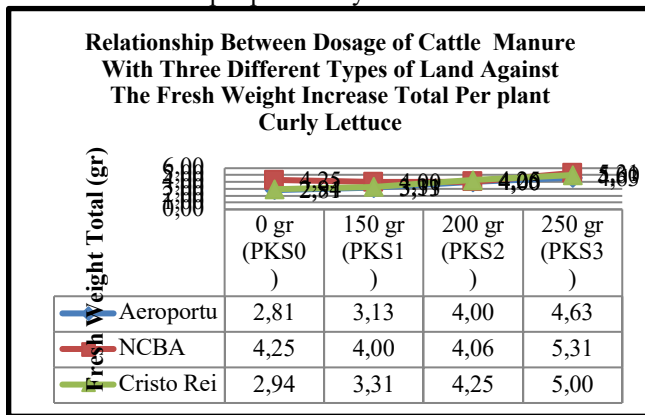
According to Supriati and Herliana (2011) Lettuce can grow well with a pH of 6.0-6.8 or 6.5 ideally. research done after soil pH can lower the pH of the soil so that the nature of the alkalis become down 6,67-7, 53. This means that the soil pH during the study classified according to lettuce plant growth and development so that the nutrient elements in the soil becomes available and can be absorbed by plants. Dosing cow manure combined with liquid organic fertilizer can also fix the nature of the physical, chemical and biological properties of the soil by increasing the activity of soil microorganisms.

Relationship Between Soil Type And Dose Of Cattle Manure The Fresh Weight Per Plant Of Curly Lettuce Total.

The graph of the relationship between dose of cattle manure with 3 different types of land against the weight of the fresh crop of curly lettuce total per served on (Figure 1) the results of the analysis showed that the dosing of cow manure on soil type Aeroportu which the optimal dose is obtained on cattle manure 250 gr/plant can produce fresh weight per plant of total (4.63 gr), dosing cattle manure on soil type optimal NCBA to see cattle manure at doses of 250 gr/plant with fresh weight per plant of total (5.31 gr). Similarly, dosing cattle manure on soil type Cristo Rei obtained at optimal doses of cow manure 250 gr./plant fresh weight per plant of total (5.00 grams). This means that the dosing of cattle manure from 0 gr/plant up to 250 gr/plant on three different soil types can increase the weight of fresh total per plant.

Figure 1.

Relationship between dosage of cow manure with three different types of land against the fresh weight increase total per plant curly lettuce.



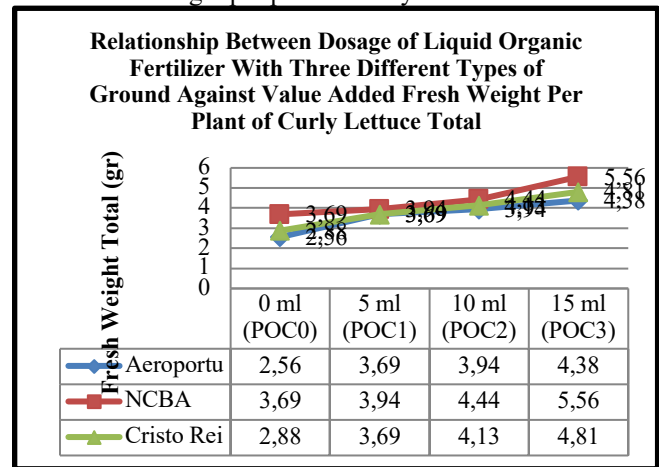
Granting cattle manure fertilizer to land in do to improve material organic soil, add a good macro nutrient elements in soils as well as micro, moreover, it can increase the humus, soil structure and fix encouraged the life remains miniscule in the soil. The awarding of the organic material in the form of cow manure will improve the quality of the land that will be absorbed by the plant lettuce.

Relationship Between Soil Type And Dosage Of Organic Liquid Against The Weight Of The Fresh Crop Of Curly Lettuce Total Per.

The graph of the relationship between dose of liquid organic fertilizer with 3 different types of land against the weight of the fresh crop of curly lettuce total per served on (Figure 2) the results of the analysis showed that the dosing of liquid organic fertilizer on soil type Aeroportu which the optimum is obtained at a dose of 15 ml liquid organic fertilizer/crop could yield fresh weight per plant of total (4.38 gr), dosing of liquid organic fertilizer on soil type optimal NCBA to see on liquid organic fertilizer dose 15 ml/plant with fresh weight per plant of total (5.56 gr). So is the dosing of liquid organic fertilizer on soil type Cristo Rei obtained at optimal dosage of organic fertilizer liquid 15 ml/plant fresh weight per plant of total (4.81 grams). This means that the dosing of liquid organic fertilizer from 0 ml/plant up to 15 ml/plant on three different soil types can increase the weight of fresh total per plant.

Figure 2.

Relationship between dosage of liquid organic fertilizer with three different types of ground against value added fresh weight per plant of curly lettuce total



Agustina (2004) stated that, the nutrients and minerals that exists and is available for plants, especially N has the most prominent influence towards the growth and development of plants because it can increase Fitohormon Sitokinin, otherwise Sitokinin acts to increase the uptake of N was available so that it can influence the shape and size of the leaves. Phosphorus and potassium have a vital role in the metabolic processes of plants. The effect of phosphorus metabolism goes well and smoothly that results in cell division, enlargement of the cells, cell differentiation, and running smoothly. So are Potassium acts as a aktifator of various enzymes that are important in the reactions of photosynthesis and respiration, so that it can set up and maintain the osmotic potential and the taking of water that has a positive influence against the closure and pembuksan stomata (Gardner et al., 1991). Novizan (2005) States that the availability of nutrient elements that can be absorbed by the

plant is one of the factors that can affect the rate of growth and development of plants.

CONCLUSION

Based on the results of the study prove that:

Grant of cattle manure and liquid organic fertilizer can increase growth and curly lettuce crops planted in the hamlet of Malinamuk, Village Comoro, Post Administrative Dom Aleixo, Municipality of Dili.

The real interaction Happening against curly lettuce plant growth at treatment doses of cattle manure with a dose of liquid organic fertilizer.

Cattle manure at doses of 250 gr/plant shows dosage optimum cattle manure with maximum results and a liquid organic fertilizer dose 15 ml/plant shows the optimum dose with maximum results.

NCBA soil type is a type of land suitable for cultivation of curly lettuce on lowlands climate is dry.

BIBLIOGRAPHY

- Agustina, b., 2004. The Basics Of Plant Nutrients. Copyright Rineka, Jakarta
- Buckman, h. o. and n. c. Brady. 1982. Soil Science. (Translation Of Soegiman). Bharata Paper Revised, Jakarta.
- Gardner, F.P., Pearce, R.B., and Mitchell, Royally 1991. Physiology of crop Cultivation (translated by Herawati Susilo). UI Press, Jakarta.
- Gomez. K.a. and A.A. Gomez 1995. Statistical procedures for agricultural research. Interpreters: Syamsudin, e., Baharsyah, j. University of Indonesia.
- Jumin H.B. 2012. The Basics Of Agronomy. Pt. Raja Grafindo Persada. Jakarta.
- Lakitan, b. 1996. Plant Physiology and development of plants. PT Persada Indo-Aryan King of the graphics. Jakarta.
- Lingam and Marsono. 2006. Instructions Use Of Fertilizer. The Diffuser Is A Self-help
- Marsono and Sigit, p. 2001. Mulch the root type and application. The diffuser. Self help. Jakarta.
- Novizan. 2005. an effective Fertilization. Agromeia Library. Jakarta.
- Nyakpa, M.Y., A.M. Lubis, from Mamat, Amrah A.G., a., and n. Munawar judges. 1985. Soil fertility. USAID cooperation with University of Kentucky (WUAE Project).
- Rinsema, W.J. 1986. Fertilizers and Fertilizing Way. Bharata Paper Revised. Jakarta.
- Sarief, s. 1992. Fertility and cultivation of agricultural land. The Library World. Bandung.
- Sarwono Hardjowigeno. 2010. Soil Science. Akademika Name. Jakarta.
- Sitompul S.M. and b. Guritmo. 1995. Plant growth Analysis. Gadjah Mada University Press Publisher. Yogyakarta.
- Soeroto. 1985. The science of Fertilizing. Cv Yasaguna. Jakarta.
- Soomro, A., t. Shamsuddin, and c. o. Fateh. 2012. the Effect of Supplemental Inorganic NPK and Organic Residual Nutrients on Sugarcane Ratoon Crop. In ternational journal of Scientific Engineering & Research. 3 (1-0).
- Supriati, y. and Herlina E., 2010. Fifteen cultivation of vegetables in the Pot. The Diffuser Is Self-help. Bogor.
- Yuwono, n. w. 2005. Paddy Soil fertility and productivity. Material Supply Officer In The Field. Department Of Agriculture Province Of DIY, Yogyakarta
