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The Influence of Local Microorganism Liquid Fertilizer Concentration From Banana Stumps and NPK Fertilizer Dosage Against Kangkung or Kale Growth (Ipomoea Reptans), Conducted at NCBA

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ABSTRACT

The Kangkung or Kale plant is a member of the family Convolvulaceae. can be classified as vegetable plants. Banana humps are wastes that pollute the air because they cause unpleasant smell and reduce the beauty of the environment. But in essence organic waste such as banana weevils can be used as organic fertilizer because it provides nutrients for plants. Banana humps contain nutrients and microbes needed by plants.
The purpose of this study was to determine the effect of the concentration of local microorganism liquid fertilizer from banana weevil (MOLBH) and NPK fertilizer dosage on the growth and production of land water kangkung . The research method was carried out using factorial randomized block design (RBD) with two factors. The first factor is the concentration of liquid fertilizer from banana weevil (MOLBH) which consists of: without fertilizer (MOLBH0) 0 ml / l water, with a concentration of liquid fertilizer (MOLBH1), from 5 ml / l water, liquid fertilizer concentration (MOLBH2) 10 ml / l water and liquid fertilizer concentration (MOLBH3) 15 ml / l water. The second factor consisted of: without fertilizer dosage (NPK0) 0 gram, with fertilizer dose (NPK1) 7.5 gram, dose (NPK2) 15 gram and (NPK3) 22.5 gram dose. Each treatment combination was repeated three times.
The results showed that the use of MOLBH fertilizers showed significant or significant and very significant differences for the average number of leaves at 42 days after harvest, with a number of leaves of 20 strands, for plant height at 42 days, with an average height of 19 cm, and for stem diameter at 42 days after harvest, with the largest average of 4.11 mm, while for fresh harvest weight at 42 days after harvest, with an average of 16 grams per plant. NPK also shows the same response at different ages. However, the interaction of MOLBH NPK fertilizer did not show a significant response to the fresh weight of the Kangkung or Kale , at the age of 42 days after harvest.

INTRODUCTION

Kangkung or kale is a member of the family Convolvulaceae. Water kangkung plants can be classified as vegetable plants. Water kangkung consists of several types, including water kangkung (Ipomoea aquatic Forsk), Kangkung or kale (Ipomoea reptans), and forest kale (Ipomoea crassiculatus.), Suratman et al., (2000). Land kale (Ipomoea reptans) is a vegetable that has economic value and its distribution is expanding rapidly in the Southeast Asian region.
Some countries that pioneered intensively and commercially cultivated water kangkung crops were Taiwan, Thailand, the Philippines, and Indonesia. Kangkung or Kale is generally consumed by the people of Indonesia and can be one of the menus in restaurants, (Rukmana 1994). Land kale is a plant that is relatively drought-resistant and has extensive adaptability to various plant environmental conditions, is easy to maintain, and has a short harvest period, (Suratman et al 2000).
In Timor-Leste, generally water kangkung plants are only planted in the yard and a small portion is intensively planted in dry land, so optimization of kangkung production is still lacking. Water kangkung has a complete nutritional content, including protein, fat, carbohydrates, fibber, calcium, phosphorus, iron, sodium, potassium, vitamins A, B, C, and

carotene, Poly (2009), as well as minerals, especially iron which is useful for body growth and health. In addition, water kangkung plants function as medicinal plants to cure constipation, calm nerves, and cure haemorrhoids, Sawasemariai (2012). The most important part of the kangkung plant is the young stem and shoots as vegetable ingredients.
Technology with local wisdom is utilizing microorganisms that are widely found in crops or agricultural products themselves. Microorganisms are managed so that they become a balancing factor in plant growth and growth. The group of microorganisms can be useful in improving soil conditions, suppress microbial growth that causes disease and improve the efficiency of the use of organic materials by plants. The technology was developed to support the development of environmentally friendly agriculture suppressing the use of chemical fertilizers and pesticides that can ultimately increase soil productivity, reduce production costs and produce food that is free of chemicals so that it is clean and healthy for consumption. The use of local materials as applied and environmentally friendly technology will be able to improve
Agricultural production and creating a good environment. Banana humps are wastes that pollute the air because they cause unpleasant smell and reduce the beauty of the environment. But in essence organic waste such as banana weevils can be used as organic fertilizer because it provides nutrients for plants. Banana humps contain nutrients and microbes needed by plants. According to the Nutrition Directorate of the Republic of Indonesia (1981), in Rukmana (2001), states that the nutrients contained in banana humps are calories 43.00 calorie, protein 0.36 g, carbohydrates 11.60 g, calcium 15.00 mg, phosphorus 60 , 00 mg, iron 0.50 mg, vitamin B1 12.00 mg, vitamin C 86.00 mg, water 86.00 mg, parts that can be eaten 100%. The nutritional content in banana humps also has the potential to be used as a source of local microorganisms because the nutrient content in banana humps can be used as a food source so that microbes develop well. Microbes produced from banana weevils are: Azospirillium sp. Whose function is to repair roots so as to affect nutrient absorption, Aspergillus nigger, Azotobacter sp (Trubuz, 2012).
In Timor Leste the banana hump is quite potential, especially at the researchers' location, namely Balibar village, East Dili sub-district, Dili district, but the level of knowledge and skills of farmers in using banana humps as material for other needs is still lacking, because so far what farmers need is only the fruit and the heart of the rice, besides that it is not needed especially the hump.

RESEARCH METHODOLOGY

This research was conducted using factorial randomized block design (RBD) with two factors, namely the first factor concentrating the spraying of local microorganisms (MOL) from banana humps, and the second factor concentration of NPK fertilizer administration, with four treatments and three replications, where each combination the treatment is:

A. The first factor of the concentration of Local Microorganisms (MOL) from banana humps includes:

MOL0: 0 ml / l of water. MOL1: MOLBH concentration, 5 ml / l of water. MOL2: MOLBH concentration, 10 ml / l of water. MOL3: MOLBH concentration, 15 ml / l of water.

B. The second factor is the dose of NPK fertilizer (P), namely:

NPK0: Control without NPK 0 g / group fertilizer
NPK1: Fertilizing with 7.5 g NPK fertilizer dose
NPK2: Fertilizing with fertilizer dosage
NPK 15 g / NPK3 treatment:

C. The combination of the two treatment factors is:

MOLBH0P0	MOLBH1P0	MOLBH2P0	MOLBH3P0
MOLBH0P1	MOLBH1P1	MOLBH2P1	MOLBH3P1
MOLBH0P2	MOLBH1P2	MOLBH2P2	MOLBH3P2
MOLBH0P3	MOLBH1P3	MOLBH2P3	MOLBH3P3

Research Variables

In this study the growth of water kangkung plants includes; number of leaves, plant height, stem diameter and fresh weight. Implementation of Research Place Research This study was conducted in Comoro village, West Dili District, Dili District. Research Time The research time was carried out for one 2 months starting from the beginning of May to the beginning of July 2018. Tools and Materials: Kangkung or Kale seeds Banana humps Washing water rice Sugar sand Plastic buckets Soil Fertilizer cages Water ruler / meter Funnel length Polybag Scales Shovel 5 litter Hose Paper label Hatchery insulation Camera Stationery. Dosage fertilization Water kangkung seeds are removed from the media to grow carefully and watered before planting. Terestres kangkung seeds are put into polybags with a depth of 1 cm, then the holes are covered with soil and pressed slightly around the planting hole.

Manufacture of Local Microorganisms (MOL) from Banana Stumps: Tools and materials used in making MOLBH (Local Microorganisms from Banana Stumps) solutions, namely; 3 kg banana hump, 3 litters of coconut water, 3 litters of rice washing water, decomposing bacteria (EM4), Granulated sugar 3 teaspoons. Add Decomposer Bacteria (EM4), stir until evenly spread the bucket mouth with plastic that has been perforated as a place for the end of the hose. The end of the hose is glued to the hole in the plastic and then isolated, while the other end of the hose is connected with a platinum bottle or aqua bottle used by mineral water filled with water to maintain air pressure. Fermentation for 15 days until it smells of tape. After 15 days the MOLBH solution is ready to be applied. Spraying is carried out in the morning / evening with a concentration of 12.5 ml / litter of MOLBH water, at the age of 21 HST, 28 HST, 35 HST and 42 HST.

The group given treatment amounted to 4 with 3 repetitions each. The volume of solution given to each plant is 250 ml. Each treatment requires 4.1 litters of solution. A general comparison in the use of MOL according to Anonymous 2012, is 1: 15 which means 1 litter of MOL compared to 15 litters of water. This comparison is used as a normal benchmark for making concentration. To produce the banana humps are cut into small pieces and then crushed or thinly sliced and then put into a plastic bucket Soaked in mixing rice washing water and coconut water and sugar into a banana hump that has been crushed or thinly sliced. NPK fertilizer 22.5 g / treatment.

Implementation of Research. Preparation of Planting Media Includes: Media for nursery consists of growth between soil, cow manure, and sand with a ratio of 2: 1: 0.5 (2 kg soil, candles and 1 kg of fine sand 500 grams) for 2 pots of try.

Soil media that is filled in polybags consists of three types of soil, namely; land from Kristu Rei, land from Comoro and land from NCBA. Each type of soil is mixed with cow manure evenly and perfectly then put in a poly bag measuring 20 x 25 cm.

After that the media is left idle, but it needs to be watered so that the temperature remains moist until the transfer of seeds from the pot try into polybags After that the media is ready for planting and labelled or explained according to the treatment used.

Seed Preparation Includes: the preparation stage of this seed there are several types of activities carried out by researchers, among others: Terestres kangkung seeds soaked before planting Preparation of suitable containers and serves as a place for sowing seeds (pot try) Each hole is filled with 2 seeds, then the hole is closed thin with the ground, and watered twice a day morning and evening. The seeds used are seeds that are 2 weeks old with the same size. The stages of planting ground water kangkung seeds are as follows: Prepared seedlings to be planted in polybags containing planting media in the form of a mixture of soil and cow manure.

In this study using a ratio smaller than 1 litter of MOL compared to 15 litters of water, with a normal dose for each group of this study was 125 ml MOL: 1 litter of water. This explains that 125 ml of MOL is the minimum dose using MOL from banana humps to the growth of land water kangkung .

The treatment of watering with MOL solution was carried out 1 week after the planting period or 1 week after the Kangkung or Kale plant was moved into a polybag.

Observations were made on growth variables; height per lettuce plant and number of leaves per lettuce plant, yield component variable; economical fresh weight per plant, fresh weight of leaves per plant, root length per plant, stem diameter per plant, fresh stem weight per plant and total fresh weight per plant, and the supporting variable is measuring soil pH, on three different soil types.

Data collected was analysed by analysis of variance (variance) in accordance with the experimental design used. If there is a significant interaction effect on the observed variables, the assessment is followed by a mean difference test using the DMRT and BNT tests at the level of 5% (Gomez and Gomez, 2007).

RESULTS AND DISCUSSION

The results of analysis of variance (ANOVA) on the number of ground water kangkung leaves (appendix 7.b.) showed a significant effect on the treatment of MOLBH and NPK (attachment 4.b.), the 5% DMRT test result (attachment 1.e.) as stated in table 5.1. Showed that at age 21, 28, 35 and 42 HST, it showed that the highest average for leaf number was in the treatment of NPK2 MOLBH2 (21 days), MOLBH3 NPK0 and MOLBH2 NPK1 (28 days), MOLBH2 NPK3 (35 days) and MOLBH0 NPK1 (42 days).

Table Average number of leaf (strands) of Kangkung or Kale due to the treatment of a combination of MOLBH and NPK at different ages.

Treatment	Average			
	21 DAP	28 DAP	35 DAP	42 DAP
MOLBH1 NPK3	4,33a	6,67ab	8,33	14,67abc
MOLBH1 NPK2	4,67a	6,67cd	9,67	16,67e
MOLBH3 NPK2	5,00ab	7,00abc	9,00	15,67de
MOLBH0 NPK2	5,67ab	7,33abc	10,00	15,00bcd
MOLBH2 NPK0	5,67ab	7,67cd	8,33	15,00bcd
MOLBH3 NPK0	5,67ab	**8,33g**	10,33	13,00ab
MOLBH0 NPK0	6,00abc	6,67ab	9,33	16,67e
MOLBH3 NPK1	6,00abc	6,67ab	10,33	14,67abc
MOLBH1 NPK0	6,33abc	6,00a	10,00	10,67a
MOLBH1 NPK1	6,33abc	7,00abc	9,00	17,00ef
MOLBH2 NPK1	6,33abc	**8,33g**	10,00	19,00f
MOLBH0 NPK1	7,00cd	8,00 ef	9,00	**20,00g**
MOLBH0 NPK3	7,00cd	7,33abc	8,67	18,00ef
MOLBH2 NPK3	7,33de	6,67ab	**11,67**	13,67abc
MOLBH3 NPK3	7,33de	7,00abc	10,33	16,33e
MOLBH2 NPK2	**7,67f**	8,00ef	11,00	15,67de

Remarks: The number followed by the same letter in each column is different from the 5% DMRT test. DAP (Day After Plant)

The more age increases the more growth hormones needed by plants for the process of growth and development. It is seen that at the age of 21 days, the number of leaves increases more in the combination of MOLBH2 NPK2, which is significantly different from other combinations. At the age of the plant before 21 days because the plants are still small so the need for growing hormones for leaf growth is still in a relatively small amount. In combination. While the combination treatment for ages 28 and 35 days showed that hormones grow optimally so that the number of leaves increases.

The results of this study are supported by the theory of Salisbury and Ross (1995), that the excess and lack of growth hormone can cause inhibition of cell division and enlargement. In the combination treatment of MOLBH2 NPK2 for 21 days, there is a hormone overload resulting in an increase in the number of leaves. While at other concentrations and intervals there is a lack of hormones so that it results in inhibition of the growth of new shoots.

At the age of 28 days, water kangkung plants have started to grow so that the need for nutrients and other environmental factors continues to increase, it is seen that at that age leaf growth increases in the combination treatment of MOLBH3 NPK0 and MOLBH2 NPK1, which are significantly different from other treatments.

Plants absorb nutrients / nutrients in the form of organic matter in the form of liquid fertilizer from banana weevils and NPK fertilizers. Each effect of treatment due to factor MOLBH and NPK has shown that the higher the dose given, the more significant the growth of kale plants will be. land. The concentration of local microorganism liquid fertilizer dosage from banana weevil (MOLBH) was given to land water kangkung plants aged 28 and 42 days after planting. Can be seen in attachment 2.c. and 4.c. while for 35 days it cannot be tested further.

The results of analysis of variance (ANOVA) on the height of land water kangkung (attachment ..) showed a significant effect on the treatment of MOLBH and NPK (appendix 5.b.), the results of the 5% DMRT test (attachment 8.c.) as listed in the table as stated in the attachment; 5.c., 6.c., 7.c., and 8.c. showed that at age 21, 28, 35 and 42 HST, showed that the highest average for plant height was found in the treatment of MOLBH2 NPK2 (21 days), MOLBH2 NPK1 (28 days), MOLBH0 NPK1 (35 days) and MOLBH3 NPK2 (42 DAP). At the age of the plant before 21 days because the plants are still small so the need for growing hormones for leaf growth is still in a relatively small amount. In combination. While the combination treatment for ages 28 and 35 days showed that hormones grow optimally so that plant height increases.

Table of Average Plant Height (cm) of Kangkung or Kale due to the treatment of a combination of MOLBH and NPK at different ages.

Treatment	Average			
	21 DAP	28 DAP	35 DAP	42 DAP
MOLBH1 NPK2	5,33a	8,00abc	10,33cd	17,33c
MOLBH1 NPK3	5,67ab	7,33a	9,00a	17,67cd
MOLBH0 NPK3	5,80abc	9,33abc	10,00abc	18,67e
MOLBH0 NPK2	6,33bcd	9,00abc	10,00abc	16,67ab
MOLBH3 NPK0	6,50cde	8,33abc	10,67de	18,00e
MOLBH0 NPK0	6,67cde	8,67abc	10,00abc	13,33a
MOLBH1 NPK0	6,67cde	7,80ab	10,00abc	17,67cd
MOLBH3 NPK1	6,90cde	7,33a	10,33cd	18,67ef
MOLBH3 NPK1	8,00cde	7,33a	10,33cd	18,67ef
MOLBH3 NPK2	8,33ef	9,00abc	9,00a	**19,00g**
MOLBH0 NPK1	8,33ef	9,67bc	**11,67f**	14,00ab

MOLBH1 NPK1	8,33ef	10,00de	10,33cd	15,67ab
MOLBH3 NPK3	8,57ef	8,67abc	11,33de	17,33c
MOLBH2 NPK0	8,67ef	9,67bc	9,67ab	16,67ab
MOLBH2 NPK1	9,00fg	**10,33f**	11,00de	18,33e
MOLBH2 NPK2	**11,00h**	10,00de	11,00de	16,67ab

Remarks: the number followed by the same letter in each column is different from the 5% DMRT test

The more age increases the more growth hormones needed by plants for the process of growth and development. It can be seen that at the age of 21 days, the number of leaves increased more in the combination of MOLBH2 NPK2, which was significantly different from other combinations, age 35 days, increasing more in the treatment of MOLBH0 NPK1, and for the age of 42 days, more increased in the MOLBH3 treatment NPK2. The results of this study are supported by the theory of Salisbury and Ross (1995), that the excess and lack of growth hormone can cause inhibition of cell division and enlargement. In the combination treatment of NPK2 MOLBH2 for 21 days, there is an excess of hormones resulting in an increase in the number of leaves. While at other concentrations and intervals there is a lack of hormones so that it results in the inhibition of the growth of new shoots.

At the age of 28 days, water kangkung plants have started to grow so that the need for nutrient and other environmental factors continues to increase, it is seen that at that age leaf growth increases in the combination treatment of MOLBH2 NPK1 which is significantly different from other treatments.

Table Average Stem Diameter (mm) of Kangkung or Kale due to the treatment of a combination of MOLBH and NPK at different ages.

Treatment	Average			
	21 DAP	28 DAP	35 DAP	42 DAP
MOLBH0 NPK0	0,67a	0,89a	1,71bc	2,74a
MOLBH3 NPK0	1,04bc	1,13bc	1,67a	2,92bc
MOLBH0 NPK2	1,05bc	1,11bc	2,12cde	3,63bcde
MOLBH1 NPK3	1,07bc	1,36bc	2,58efg	3,99gh
MOLBH1 NPK2	1,09bc	1,48cd	1,99bcd	3,80def
MOLBH3 NPK1	1,09bc	1,51d	2,52ef	3,88efg
MOLBH3 NPK2	1,09bc	1,58de	1,73bcd	**4,11i**
MOLBH1 NPK0	1,10bc	**1,91h**	2,27cde	2,89b
MOLBH0 NPK1	1,25bc	1,52de	2,38cde	3,51bcd
MOLBH3 NPK3	1,27cd	1,55de	**2,90i**	3,83def
MOLBH2 NPK1	1,29cd	1,40cd	2,69gh	3,59bcde
MOLBH1 NPK1	1,34cd	1,54de	2,25cde	3,58bcde
MOLBH2 NPK2	1,35cd	1,75fg	2,84gh	3,72def
MOLBH2 NPK0	1,39cd	**1,91h**	2,05bcd	3,10bcde
MOLBH0 NPK3	1,44cd	1,61f	2,65efg	3,17bcde
MOLBH2 NPK3	**1,45 e**	1,68fg	2,81gh	3,29bcde

Remarks: the number followed by the same letter in each column is different from the 5% DMRT test

Based on the data analysis using ANOVA, the results showed that the administration of local microorganism liquid fertilizer from banana weevils (MOLBH) significantly affected the stem diameter of land water kangkung where F count> F table. From the results of the above research shows a significant difference in increasing stem diameter so that through the above treatment table it can be seen that in the treatment (MOLBH2 NPK3), (MOLBH1 NPK0) and (MOLBH2 NPK0), (MOLBH3 NPK3), and (MOLBH3 NPK2), significantly different from without treatment (MOLBH0 NPK0). This can be seen in all observation variables (21, 28, 35 and 42) hst.

In liquid fertilizer there are nutrients including nitrogen (N) which is needed for the formation or growth of vegetative parts of plants such as height, leaves, stems and roots of plants. In addition to N Phosphorus (F) content in plants helps in the growth of flowers, fruits, and seeds. If plants lack this element it usually causes smaller leaves and stems of plants (Hadithuwito, 2012). In accordance with what was stated by Sarief (1968) that the provision of fertilizers was adjusted to the needs of plants. If given in excessive amounts, it can cause plants to poison or even inhibit growth. While small doses cannot have a significant effect.

The results of the variance analysis showed that the treatment of MOL fertilizer concentration at various concentrations had a significant effect on leaf age at 21, 28, and 42 days after planting, but did not significantly affect 35 years old. For plant height, it was significantly affected at the age of 21 and 28 but did not significantly affect at age 35 and 42 dah. Whereas for stem diameter has a significant effect at age 28, and 42 days after birth, and has no significant effect at age 21 and 35 days.

The treatment of dosing NPK fertilizer at various sizes did not give a significant different effect on the number of leaves at the age of 21, 28 and 35, but gave a significant difference in effect at the age of 42 days. For plant height did not give a significant effect at age 21, 28 and 35, but gave a very significant influence at age 42 days after planting. And for stem diameter only affects at age 42 dah, but does not affect at age 21, 28 and 35 days. While the combination treatment of MOLBH liquid fertilizer concentration and NPK fertilizer dosage had a significant effect on the number of leaves at age 21, but no effect at 28, 35 and 42 days after planting. For plant height there was no significant effect at age 21 and 28, 35, but gave a very significant effect at the age of 42 days. And for the stem diameter does not have a significant effect at the age of 21 and 28 but gives a real and very significant influence at age 35 and 42 hst.

The effect of the treatment of various concentrations of local microorganism liquid fertilizer from banana weevil (MOLBH) and NPK fertilizer dosage on the growth of land water kangkung in three different soil types. For Kristu Rei soil types, the treatment of various concentrations of liquid fertilizer from MOLBH, can affect the number of leaves, did not give a significant effect at the age of 21, and 28 days after planting, but gave a very significant effect at the age of 35 and 42 days. For plant height gave a significant influence at age 21, 35 and 42, but did not significantly affect at the age of 28 days. While for stem diameter can affect at age 21, and 35 days, but did not give a significant effect at the age of 28 and 42 hst. With a texture of sandy clay with a base of 44% and 45% dust.

The effect of the treatment of dosing NPK fertilizer in various sizes, can not affect the number of leaves at the age of 21, and 28 and 42 days after birth, but can have a significant effect on the age of 35 days. And for plant height can have an influence at the age of 21 and 42 days after planting, but it does not have an effect on the age of 28 and 35 days. Whereas the stem diameter is the same as the plant height, which can affect at the age of 21 and 35 days but not significantly at 28 and 42 dah. For Aeroporto soil types, with the treatment of various concentrations of liquid fertilizer from MOLBH, it can affect the number of leaves, giving a significant influence at all ages 21, 28, 35 and 42 days after planting. Likewise for plant height, it has a significant influence at age 21, 35 and 42, but it has no significant effect at the age of 28 days. Whereas for stem diameter can affect at age 21, and 35 height and diameter of plant stems can have a significant effect on all ages after planting.

The effect of the treatment of dosing NPK fertilizer in various sizes, can not affect the number of leaves at the age of 21, and 28 days after birth, but can have a significant effect at the age

of 35 and 42 days after birth. And for plant height it can have an effect at the age of 21 and 35 days after planting, but does not have an effect on age 28 and 42 dah. While for stem diameter can affect at age 28 and 35, but not significantly at age 21 and 42 dah. With clay texture with 57% thickness and 31% dust. For NCBA soil types, the treatment of various concentrations of liquid fertilizer from MOLBH, can affect the number of leaves, at age 21, and 42 days after planting, but did not significantly affect age 28 and 35 days after planting. For plant height gave a significant influence at age 21, 28 and 42, but did not significantly affect at the age of 35 days. Whereas for stem diameter can affect at age 21, 28 and 42 days after birth, but it does not have a significant effect on the age of 35 days. With a texture of 30% sandy clay and 53% dust.

The effect of the treatment of dosing NPK fertilizer in various sizes, can not affect the number of leaves at the age of 21, and 28 days after birth, but can have a significant effect at the age of 35 and 42 days after birth. And for plant height did not have a significant effect at age 21, 28 and 35 days after planting, but gave a significant effect at the age of 42 days. While for stem diameter can affect all ages, namely 21, 28, 35 and 42 hst.

Relationship Between Types of Soil With Concentration of Liquid Organic Fertilizer MOLBH Against the Fresh Weight of Harvest of Water Spinach Plants.

The graph of the relationship between the concentration of MOLBH liquid organic fertilizer with 3 different types of soil to the fresh weight of harvested land water kangkung is presented in (Figure 5.8). liquid 15 ml / plant can produce fresh crop weight of (58.00 gram), the optimal dosage of liquid organic fertilizer on Aeroporto soil types is obtained on 15 ml / plant liquid organic fertilizer with a total fresh weight per plant of (46 grams). Likewise the optimal dosage of liquid organic fertilizer on Cristo Rei soil types was obtained at 15 ml / plant liquid organic fertilizer dose with a total fresh weight per plant of (59 grams). This means that the concentration of MOLBH liquid organic fertilizer from 0 ml / plant to 15 ml / plant on three different soil types can increase the total fresh weight per different plants.

Agustina (2004) states that, nutrients and minerals available and available to plants, especially N have the most prominent influence on plant growth and development because they can increase cytokinine fitohormones, whereas cytokines play a role to increase available N uptake so that it can affect shape and size leaf. Phosphorus and Potassium have important roles in plant metabolism. Phosphorus causes the metabolism to run well and smoothly which results in cell division, cell enlargement, and cell differentiation, running smoothly. Likewise Potassium acts as an activator of various important enzymes in the reaction of photosynthesis and respiration, so that it can regulate and maintain osmotic potential and water extraction which has a positive influence on stomata closure and development (Gardner et al, 1991). Novizan (2005) states that the availability of nutrients that can be absorbed by plants is one of the factors that can affect the level of plant growth and development.

Relationship Between Soil Type and NPK Fertilizer Dosage Against the Fresh Weight of Kangkung or Kale Harvest.

The graph of the relationship between the dosage of NPK fertilizer and 3 different types of soil to the fresh weight of harvested land water kangkung plants is presented in (Figure 5.9). The results of the analysis showed that the optimal dose of NPK fertilizer on Kristu Rei soil type obtained at 15 grams of liquid organic fertilizer / plant could produce fresh crop weight of (64.00 gram), administration of NPK doses in the optimal type of Aeroporto soil was obtained. If the dosage of 15 grams of liquid organic fertilizer / plant with a fresh weight of harvest (48 grams). Likewise the optimal dosage of liquid organic fertilizer on NCBA soil types was obtained at 15 grams of liquid organic fertilizer / plant with a total fresh weight per plant of (56 grams). This means that the administration of NPK fertilizer from 0 ml / plant to 15 ml / plant in three different soil types can increase the total fresh weight per different plants.

Soil organic materials, adding nutrients both macro and micro in the soil, besides that can enhance humus, improve soil structure and encourage the absorption of microorganisms in the soil. Giving organic material in the form of cow manure will improve the quality of soil that will be absorbed by lettuce plants.

Discussion of Number of Leaves

The results of the variance analysis on the number of leaves showed that the treatment of liquid fertilizer from MOL Banana humps at various concentrations had a very significant effect on observations aged 21, 28 and 42 dah. The treatment of administering NPK doses at various doses only gave a significant effect on the observation of age 42 hst. While the combination of treatment between the concentration of MOL liquid banana fertilizer administration and NPK fertilizer dosage had a significant effect on all ages of observations 21 days after planting. Observation of the number of leaves at the age of 21 dah showed a very significant effect on the single factor, namely the administration of liquid fertilizer from MOL Banana weed. The average number of leaves at the age of 21 days after birth, which was influenced by a single factor of liquid fertilizer from MOL Bananas and NPK fertilizer at various doses.

Average Table The number of leaves (strands) affected by the administration of MOLBH at various concentrations and doses of NPK fertilizer.

	NPK Fertilizer Dosage (gram)			
LFCLBM (gr / litters of water) **42 DAP**	0 gr (NPK0)	7,5 gr (NPK1)	15 gr (NPK2)	22,5 gr (NPK3)
0 ml (MOLBH0)	14,33a A	16,67a A	16,33a A	16,67a A
5 ml (MOLBH1)	15,00a A	18,00a A	16,67a A	16,00a A
10 ml (MOLBH2)	15,33a A	18,33a A	17,00a A	16,67a A
15 ml (MOLBH3)	15,67a A	20,00a A	17,00a A	19,00a A
BNT 5%	**4,21**			

Description: -Based on the effect of variance, the interaction effects of MOLBH liquid fertilizer and NPK fertilizer dosages have been proven to be effective. Values followed by the same lowercase letters in the vertical and capital letters that are the same horizontally are not different based on the LSD test at the level of 5%. LFCLBM (Liquid Fertilizer Concentration of Local Bacterial Microorganisms) (gr / litters of water)

The average number of leaves aged 21 kangkung which is influenced by the administration of liquid fertilizer from MOL banana weevil at various concentrations shows that the administration of MOL banana fertilizer with a dose of 10 ml / l water (MOLBH2) tends to provide the highest average number of leaves at 21 HST, compared to other doses, showed that administration of a dose of 22.5 grams of NPK fertilizer (NPK3) tended to give the highest average number of leaves at age 21, 28 and 42 days after birth, and a 15 gram dose (NPK2) gave an average the highest number of leaves at the age of 35 and 42 days, while the dose of 7.5 grams (NPK1) gave the highest

average number of leaves at age 21, 28 and 42 days after compared to other doses.

The absence of a significant effect on plant height is thought to be due to the influence of environmental factors on the availability of nutrients and not optimal absorption of nutrients by plants. Gardner et al. (1991), states that the growth and yield of a plant is influenced by the condition of the growing environment.

Based on Table 5.5. in observing plant age 42 days, the treatment of liquid fertilizer from MOL Banana weed at a concentration of 5 ml / l water (MOLBH1), 10 ml / l water (MOLBH2) and 15 ml / l water (MOLBH3) differed significantly at the age of 42 hst , while the concentration of 5 grams at the age of 35 days, was not significantly different from the concentration of 15 grams of treatment (MOLBH3). But the three treatments were significantly different from the treatment without liquid fertilizer from MOL Banana weed (MOLBH0). The administration of liquid fertilizer from MOL of banana weevil concentration of 15 ml / l water (MOLBH3) tends to produce the best number of leaves with an average of 18.04 strands.

Hanolo (1997), suggested that the nutrient elements of nitrogen in organic fertilizers spur plants in the formation of amino acids into proteins. The proteins formed are used to form growth hormones, namely the hormones auxin, gibberellins, and cytokines. Auxin hormones affect the synthesis of structural proteins to perfect the structure of the cell wall as before after stretching. Gibberellone hormone stimulates plant growth. Cytokinin hormones play a role in cell division at the end of the stem.

These three hormones play a role in supporting the increase in the number of plant leaves and the presence of potassium elements that function as enzyme activators causing biosynthetic reactions of hormones and other proteins can take place quickly so that plant buds can grow quickly. Based on Table 5.5. above, in the 21st observation, NPK dosage of 5 grams (NPK1) and dosage of 22.5 grams (NPK3) were significantly different from 15 grams (NPK2) and also significantly different from without fertilizer (NPK0). Observations 28, 35 and 42hst showed that administration of NPK fertilizers with a dose of 22.5 grams (NPK3), 15 grams (NPK2) and 7.5 grams (NPK1) differed significantly, and the three treatments were significantly different from those without fertilizer (NPK0) .

The administration of 5 gram NPK fertilizer (NPK1) tends to produce the best number of leaves with an average of 16.67 strands (42 days). The results showed that administration of NPK at a dose of 7.5 grams actually increased the growth of plant leaves compared with doses of sizes 15 and 22.5 grams at 42 days after planting. Nitrogen is absorbed in the soil, then in plants reacts with carbon to form amino acids, then changes to protein. Nitrogen is the most needed element by plants because 16-18% of the protein consists of nitrogen. Rinsema (1993) explains that the nitrogen element in plants is a very important element for leaf formation. Leaves are very important in photosynthesis.

Leaves are one of the main factors taken into account in measuring their production levels. This is reinforced by the opinion of Hardjowigeno (1997) which states that plants taken from the leaves need more nitrogen than other elements, so that the leaves can develop properly. The nitrogen element plays a role in promoting leaf formation, because nitrogen has an important role in forming new cells in plants. Photosynthesis can produce carbohydrates from CO2 and H2O, but this process cannot continue until the production of proteins and amino acids.

Plant height

The results of the variance analysis on plant height showed that the treatment of liquid fertilizer from banana weevil MOL at various concentrations had a significant effect on the observation of age 42 dah. The treatment of NPK fertilizer at various doses had a significant effect on the observation of age 42 days, while the interaction between the concentration of MOL banana fertilizer administration and NPK fertilizer dose significantly affected the age of observation 28 and 42 days after planting.

Table of Average Plant Height (cm) affected by the administration of MOLBH at various concentrations and doses of NPK fertilizer.

	NPK Fertilizer Dosage (gram)			
LFCLBM (gr / litters of water) **42 DAP**	0 gr (NPK0)	7,5 gr (NPK1)	15 gr (NPK2)	22,5 gr (NPK3)
0 ml (MOLBH0)	15,67a A	16,33a A	16,67a A	16,67a A
5 ml (MOLBH1)	17,33a A	16,67a A	17,67a A	18,00a A
10 ml (MOLBH2)	18,00a A	17,00a A	17,67a A	19,00a A
15 ml (MOLBH3)	18,67a A	17,67a A	18,33a A	21,00b A
BNT 5%	**3,18**			

Description: Based on the effect of variance, the interaction effects of humb bananas liquid fertilizer and NPK fertilizer dosages have been proven to be effective. Values followed by the same lowercase letters in the vertical and capital letters that are the same horizontally are not different based on the LSD test at the level of 5%.

Observations on plant height aged 21 and 28 days showed that the application of MOLBH fertilizer at various doses had no significant effect, while administering NPK fertilizer doses at various doses also had no significant effect at age 21, 28 and 35 days. The average plant height is influenced by each single factor. Average Plant Height aged 21 days after kangkung was influenced by liquid fertilizer from MOL Banana at various concentrations. showed that the administration of banana weed MOL fertilizer with a dose of 15 ml / l of water (MOLBH3) tended to give the highest average plant height compared to other doses, also showed that administration of NPK fertilizer at 22.5 g (NPK3) tended to give a high average plants are the highest compared to other doses In this case the plants need lots of carbohydrates, as explained by Harjadi (1984), carbohydrates are needed for extension and cell division because the cell walls are cellulose and protoplasm made of sugar.

Based on Table 5.6. above, on observations 28, 35 and 42 days after showing that the concentration of liquid fertilizer with a concentration of 5 ml / liter of water (humb bananas 1) and 10 ml / litter of water (humb bananas 2) was significantly different, but not significantly different from the concentration of humb bananas liquid fertilizer 5 ml / liter of water without the application of liquid fertilizer (humb bananas 0), whereas between the administration of 15 ml / liter of MOLBP liquid fertilizer (humb bananas 3) and without humb bananas liquid fertilizer (humb bananas 0) administration was significantly different. Giving humb bananas liquid fertilizer (humb bananas 3) tends to produce leaves that only have an average of 4.5 strands.

The results of the DMRT test on plant height influenced by the treatment of NPK fertilizer at various doses on observations of plant age 28.35 and 42 days are presented in Table 5.6.

Based on the table above, 42 observations showed that administration of NPK fertilizer at a dose of 22.5 g (NPK3) and a dose of 15 g (NPK2) was significantly different from a dose of 7.5 g (NPK1) and was significantly different from without fertilizer (NPK0), and between administration of NPK fertilizer dose of 7.5 g (NPK1) and without fertilizer dosage (NPK0) were also significantly different.

The administration of NPK fertilizer at a dose of 22.5 g (NPK3) tended to produce higher plants with an average of 18.67 cm (42 days). The increase in plant height will also be followed by the addition of leaves and leaf area. Rinsema (1993) explains that the nitrogen element in plants is a very important element for leaf formation. Nitrogen is absorbed in the soil in the form of nitrate or ammonium ions. Then, in plants react with carbon to form amino acids, then turn into proteins. Nitrogen is one of the elements most needed by plants because 16-18% of the protein consists of nitrogen.

Stem Diameter

The results of the analysis of variance on stem diameter showed that the treatment of humb bananas (Local Microorganism from Banana Hump) liquid fertilizer at various concentrations had a very significant effect on observations aged 28, 35 and 42 hst. The treatment of NPK fertilizer at various doses had a very significant effect on the observations of age 28, 35 and 42 days, while the interaction between the concentration of MOL banana fertilizer and NPK fertilizer administration had no significant effect on all ages of observations.

Observations on stem diameter at age 21 hst showed no significant effect on both factors, namely the administration of MOLBH (Local Microorganism from Banana Hump) and NPK fertilizer at various doses. The average stem diameter at the age of 21 days was influenced by the factors of MOLBH (Local Microorganisms from Banana Bumps) and NPK fertilizer at various doses and NPK fertilizers at various doses. The average diameter of stems aged 21 days after kangkung was influenced by the administration of liquid fertilizer from MOL Banana at various concentrations.

The average diameter of stems aged 21 days after water kangkung was influenced by the dose of NPK fertilizer at various concentrations. showed that the administration of banana weed MOL fertilizer with a dose of 15 ml / l of water (humb bananas 3) tended to provide the highest average stem diameter compared to other concentrations, indicating that administration of NPK fertilizer at a dose of 22.5 g (NPK3) tended to give an average stem diameter the highest compared to other doses. The development of a plant during growth is influenced by external factors and internal factors, including genetic factors and environmental factors. Many environmental factors influence the development of a plant.

Table 5.7. The average stem diameter (mm) is affected by the administration of MOLBH (Local Microorganism from Banana Borer) liquid fertilizer at various concentrations, and NPK fertilizer doses.

	NPK Fertilizer Dosage (gram)			
LFCLBM (gr / litters of water) **42 DAP**	0 gr (NPK0)	7,5 gr (NPK1)	15 gr (NPK2)	22,5 gr (NPK3)
0 ml (MOLBH0)	2.74a A	2.92a A	3.30a B	3.30a B
5 ml (MOLBH1)	3.47b A	3.55b A	4.11d C	3.50a A
10 ml (MOLBH2)	3.51b A	3.50b A	3.59a A	3.58a A
15 ml (MOLBH3)	3.72c A	3.80c A	3.67b A	3.63b A
BNT 5%	**0,29**			

Description: Based on the effect of variance, the interaction effects of MOLBH liquid fertilizer and NPK fertilizer dosages have been proven to be effective. Values followed by the same lowercase letters in the vertical and capital letters that are the same horizontally are not different based on the BNT test level of 5%

Based on Table 5.7. above, at 28 days of observation showed that the administration of MOLBH (Local Microorganism from Banana Hump) liquid fertilizer at a concentration of 15 ml / l water (MOLBH3) was not significantly different from the concentration of 10 ml / l water (MOLBH2), but significantly different from 5 ml / l water (MOLBH1) and without MOLBH (Local Microorganism from Banana Bark) liquid fertilizer (MOLBH0), while between concentrations of 10 ml / l water (MOLBH2), 5 ml / l water (MOLBH1) and without MOL banana fertilizer (MOLBH0)) different is not real.

Observations of 35 days showed that giving MOL banana fertilizer at a concentration of 15 ml / l water (MOLBH3) was significantly different from the concentration of 10 ml / l of water (MOLBH2), 5 ml / l of water (MOLBH1) and without MOL Bananas (MOLBH0) , whereas between a concentration of 10 ml / l of water (MOLBH2), 5 ml / l of water (MOLBH1) and without MOLBH (Local Microorganism from Banana Hump) liquid fertilizer (MOLBH0) differed not significantly. Observations of 42 days showed that the administration of MOLBH (Local Microorganism from Banana Hump) liquid fertilizer at a concentration of 15 ml / l water (MOLBH3) was significantly different from the concentration of 10 ml / l water (MOLBH2), 5 ml / l water (MOLBH1) and without fertilizer MOL Banana hump (MOLBH0). The administration of MOL banana fertilizer at a concentration of 10 ml / l water (MOLBH2) was not significantly different from the concentration of 5 ml / l water (MOLBH1), but was significantly different from the treatment without banana MOL fertilizer (MOLBH0), while the concentration of 5 ml / l water (MOLBH1) and without MOL Bananas (MOLBH0) fertilizer is not significantly different.

The administration of MOLBH (Local Microorganism from Banana Hump) liquid fertilizer with a concentration of 10 ml / l of water (MOLBH2) tended to produce the best stem diameter with an average of 3.10 mm. According to Raihan and Nurtitayani (2002), the role of organic materials is direct to plants, but most of them affect plants through changes in the nature and characteristics of the soil. The effect of fertilizing with organic fertilizers is closely related to the supply of nutrients, both macro nutrients and micro nutrients needed by plants. Duncan's multiple distance test results on stem diameter which are influenced by the treatment of NPK fertilizer at various doses on observations of plant ages 21, 28, 35 and 42 days are presented in Table 5.7.

The results of the DMRT test (Table 5.8.), Showed that at 28 days of observation showed that the administration of NPK doses of 22.5 g (NPK3), 15 g (NPK2) and 7.5 g (NPK1) differed from each other not real, but all three treatments this was significantly different from without NPK fertilizer (NPK0).

Observations of 35 and 42 days showed that NPK fertilizer dosage of 22.5 g (NPK3) was not significantly different from the 15 g dose (NPK2), but was significantly different from 7.5 g (NPK1) and without NPK fertilizer (NPK0). The administration of 15 g NPK fertilizer (NPK2) was not significantly different with a dose of 7.5 g (NPK1), but it was significantly different from without ZA fertilizer (P0), whereas between ZA fertilizer dose 7.5 g (P1) and without fertilizer NPK (NPK0) is also significantly different. The administration of NPK fertilizer at a dose of 22.5 g (NPK3) tended to produce the

best stem diameter with an average of 3.63 mm (42 days). According to Novizan (2001) with the increasing number of proteins in plants, the energy produced will increase, with increasing energy in plants, especially stems causing photosynthetic activity in plants to run well so that the initial growth, especially stems will increase. Nitrogen is also needed in a large amount of positivity at each stage of plant growth, especially at the vegetative growth stage, such as the development of stems and leaves.

Fresh Weight

The results of the variance analysis on fresh weight showed that the treatment of humb bananas liquid fertilizer had a very significant effect and the treatment of NPK fertilizer also had a very significant effect, while the interaction between the concentration of humb bananas liquid fertilizer application and NPK fertilizer administration dose had no significant effect.

Based on Table 8 below, the results of the BNT test humb bananas fertilizer application on root volume showed that banana weed MOL fertilizer with a concentration of 15 ml / l water (humb bananas 3) was not significantly different from the concentration of 10 ml / l water (humb bananas 2), but significantly different from concentration of 5 ml / l of water (humb bananas 1) and without the administration of banana weed MOL fertilizer (humb bananas 0). The administration of banana weed MOL fertilizer with a concentration of 10 ml / l water (humb bananas 2) was not significantly different from the concentration of 5 ml / l water (humb bananas 1), but was significantly different without the administration of banana weed MOL fertilizer (humb bananas 0), while the concentration of banana weed MOL fertilizer 2 ml / l of water (humb bananas 1) and without humb bananas banana (MOLBH0) fertilizer application were not significantly different.

Table The average fresh weight of the crop (grams) is influenced by the administration of MOLBH (Local Microorganism from Banana Hump) liquid fertilizer at various concentrations, and NPK fertilizer doses.

LFCLBM (gr / litters of water) **42 DAP**	NPK Fertilizer Dosage (gram) 0 gr (NPK0)	7,5 gr (NPK1)	15 gr (NPK2)	22,5 gr (NPK3)
0 ml (MOLBH0)	5.67a A	11.33a B	12.33a C	11.67a B
5 ml (MOLBH1)	8.33a A	12.33a B	13.00a C	13.00a C
10 ml (MOLBH2)	8.67a A	13.33a C	15.00a D	13.33a C
15 ml (MOLBH3)	10.00b A	14.00a B	16.00b D	14.33a B
BNT 5%	**3,32**			

Description: Based on the effect of variance, the interaction effects of MOLBH liquid fertilizer and NPK fertilizer dosages have been proven to be effective. Values followed by the same lowercase letters in the vertical and capital letters that are the same horizontally are not different based on the BNT test level of 5%

Giving MOL banana fertilizer 15 ml / l water concentration (MOLBH3) tends to produce the best fresh weight with an average of 10 grams. Nutrient N is very necessary in the formation or growth of vegetative and generative parts of plants, such as leaves, stems, and roots and in the formation of fruit and seeds, so that high availability of nutrients will help in the process of growth and development of a plant. This is in line with Haryanto, (2002) saying that the use of organic material that is quite effective will have an effect on improving soil properties, chemistry, both physical and biological soil, so that it will affect the growth and development of plant roots.

Based on Table 5.8. above, showed that administration of 15 g NPK (NPK2) was not significantly different with a dose of 7.5 g (NPK1), but was significantly different from without NPK fertilizer application (NPK0), whereas between NPK fertilizer dose 7.5 g (NPK1)) and without NPK0 (NPK0) administration it is also significantly different. The administration of NPK fertilizer at a dose of 22.5 g (NPK3) tended to produce the best root volume with an average of 13.67 grams. Indranada (1994) states that nutrient N is very necessary in the formation or growth of vegetative and generative parts of plants, such as leaves, stems and roots and in the formation of fruit and seeds, so that high nutrient availability will help in the process of growth and development plant. The use of liquid organic fertilizer is a source of nutrients for plants. This is in line with Haryanto, (2002) saying that the use of organic material that is quite effective will have an effect on improving soil properties, chemistry, both physical and biological soil, so that it will affect the growth and development of plant roots.

CONCLUSION

Based on the results of data analysis and discussion of the response of MOLBH (Local Microorganisms from Banana Humph) liquid fertilizer and NPK fertilizer dosage to the growth of land water kangkung (Ipomoea reptans), it can be concluded that Giving a combination of Local Microorganism liquid fertilizer from Banana Humph and NPK fertilizer dosage at a concentration of 10 ml / l water (MOLBH2) and 15 gram fertilizer dose (NPK2), significantly affected the number of leaf plants at age 21, 15 ml / l water (MOLBH3) and 0 gram (NPK0) at age 28, 10 ml / l water (MOLBH2) and 22.5 grams (NPK3) at age 35, 0 ml / l water (MOLBH0) and 7.5 grams (NPK1) at the age of 42 days).

The treatment of a combination of Local Microorganism liquid fertilizer from Banana Humph and NPK fertilizer dose at a concentration of 10 ml / l water (MOLBH2) and 15 gram fertilizer dose (NPK2), significantly affected plant height at age 21, 10 ml / l water (MOLBH2) and 7.5 grams (NPK1) at age 28, 0 ml / l water (MOLBH0) and 7.5 grams (NPK1) at age 35, 15 ml / l water (MOLBH3) and 22.5 grams (NPK2) at age 42 days).

The treatment of a combination of Local Microorganism liquid fertilizer from Banana Humph and NPK fertilizer dosage at a concentration of 10 ml / l water (MOLBH2) and fertilizer dose of 22.5 grams (NPK3), had a significant effect on plant stem diameter at 21.5 ml / l water (MOLBH1) and 0 gram (NPK0) at age 28, 15 ml / l water (MOLBH3) and 22.5 grams (NPK3) at age 35, 15 ml / l water (MOLBH3) and 15 gram (NPK2) at age 42 dah) and for the fresh weight of the harvest there was a very significant effect on the combination of 15 ml / l water treatment (MOLBH3) and 15 gram NPK fertilizer (NPK2).

The interaction of giving MOLBH (Local Microorganism from Banana Hump) liquid fertilizer at various concentrations and fertilizer dosages of NPK at various doses had no significant effect on the growth of land water kangkung (Ipomoea reptans).

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