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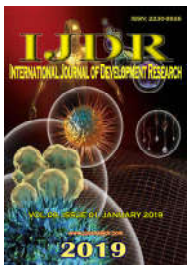

ORIGINAL RESEARCH ARTICLE OPEN ACCESS

THE INFLUENCE OF DIFFERENT TYPES OF MANURE AND PLANTING DISTANCE TOWARDS THE GROWTH AND DEVELOPMENT OF PLANTS WHITE MUSTARD *(BRASSICA JUNCEA* L.*)*

[1,*]Francelino Cardoso, [2]Domingos C.B.B. Gomes and [3]Edmundo Viegas.

[1]Master of Agriculture at Universidade da Paz, Timor-Leste
[2]Professor in Graduate Program for Master in Agriculture Science (M.Agr), Universidade da Paz, Timor-Leste
[3]Professor in Graduate Program for Master in Agriculture Science (M.Agr), Universidade da Paz, Timor-Leste and Director of Research Center, Ministry of Agriculture and Fisheries Department, Timor-Leste

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ABSTRACT

Mustard plant is one of a potentially great horticultural crops are to be developed. Although generally cultivated mustard plants on the plateau, but there are varieties that can adapt, developed and high production in the lowlands as long as the grant of the right fertilizer. The purpose of this research was: 1) to know the influence of the type of fertilizer and planting distance towards the growth and development of plant mustard greens. 2) to know the influence of the interaction of different types of fertilizers and planting distance towards the growth and development of plant mustard greens. The research of using Random Design Group (RDG) factorial two-factor, a type of manure (P) consisting of four levels with a symbol (P); P0 = control, P1 = Goat Manure P2 = Cattle Manure, P3= Chicken Manure. The second factor is the distance of planting that consists of four levels with the symbol (J): J0 = control, J1= planting Distance 15 cm x 15 cm, J2 = Planting Distance 20 cm x 20 cm, J3 = 30 cm x 30 cm Planting Distance. So retrieved 16 treatment plots experiment and every treatment on repeated 3 times so that retrieved 48 swath of experiment. Observation of variable plant growth and yield components of mustard plants as well as the supporting variables. The collected data were analyzed with the Analysis of Variant (Anova) 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 an average using multiple distance test Duncan (DMRT) on levels 5% and if only a single factor in a real influence, then proceed with the average difference test with test LSD on level 5%. Based on the results of research that, kind of chicken manure treatment combined with a 30 cm x 30 cm planting distance with the treatment code (P3J3) can enhance plant growth and development, white mustard. The real interaction occurs towards the growth and development of plant mustard greens at the treatment this type of manure treatment with trunks. At the treatment this type of chicken manure is the best fertilizer type with maximum results and trunks 30 cm x 30 cm planting distance is swath/ideal results with maximum mustard crop production.

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INTRODUCTION

Mustard (*Brassica Juncea* L.) is a vegetable with a sub-tropical climate, but is able to adapt well in a tropical climate. Sawi was generally a lot of cultivated lowland, but may also be on high. Mustard plant that belongs to the tolerant of high temperatures or hot. Currently, the demand for increasing the longer the mustard along with the increase in human population and the benefits of consuming for health.

Corresponding author: **Francelino Cardoso,**
Master of Agriculture at Universidade da Paz, Timor-Leste.

Mustard Greens have a high economic value after crop of cabbage, cauliflower and broccoli. As vegetables, mustard greens or mustard greens with known to contain various benefits for health. The content contained on the mustard greens are protein, fat, carbohydrates, Ca, P, Fe, Vitamin A, Vitamin B, and Vitamin c. In addition to having high economic value of mustard has many benefits, which is very good for relieving the itching in the throat in sufferers cough headache, the healer, blood purifier, improve kidney function, as well as repair and facilitate digestion (Margiyanto 2008 *in* Moh 2013). Mustard plant is one of a potentially great horticultural crops are to be developed.

Although generally cultivated mustard plants on the plateau, but there are varieties that can adapt, developed and high production in the lowlands (anonymous, 2007). Plant mustard greens can be grown in the Highlands or lowlands. Mustard plants including vegetables that are resistant to rain so he can be at the plant over the years, provided at the time of the dry season to provide enough water to flush. But the State of the soil that is extremely preferred by plant mustard greens, loose soil that contain humus as well as good drainage with degrees of acidity reaches (pH) 6-7 (anonymous, 2007). Mustard is not a native to Indonesia, but the natural state of Indonesia with the climate, weather as well as the circumstances and the nature of the soil makes it possible to well developed. Plant mustard greens can be grown in places with hot or cold, but it can grow well with the climate that dried at a temperature of 15-20oC and a height of 5-1200 m above sea level. Good soil for planting mustard greens are the loose soil, many contain humus and rich in organic matter, soil type andosol and regosol, has good water disposal with the degree of acidity (pH) the optimum soil for growth ranged between 6 -7 (Nurhayati*et al*., 1984). This plant requires a cool Eve would grow better planted on humid atmosphere, these plants don't like water that is pooled. Trunks is good to plant mustard greens are 20 x 20 cm (Haryanto, 2003). Increased crop production can be done with the awarding of the fertilizer.These efforts due to lack of nutrient elements in the availability of the media grows plants, where production of optimum can only be obtained if there is a balance of nutrients or nutrient adequacy for plant. The balance or the adequacy of nutrient in the awarding of good fertilizer from fertilizer inorganic or organic (Kusuma 2002 *in*Retno, 2013). The production of mustard greens can be enhanced through the cultivation of the good, i.e. maintenance and proper fertilization. Fertilizing with manure (droppings of chickens, cow dung and goat droppings) is very good for the growth of Chinese cabbage with good quality and can increase the production of mustard greens (Lingga, 1991).

Organic fertilizers has an important function in comparison with inorganic fertilizers that is able to destruction the soil surface layer (topsoil), increasing the population remains miniscule, enhancing the absorption and power save water, which as a whole can improving soil fertility. (Sutejo, 2002). Plant collards require manure by as much as 10 tons/ha. From the explanation above, need to do research on the influence of granting some kind of organic fertilizer against growth and crop mustard greens. (Haryanto, 2003). Timor-Leste is a region consisting of the mountains and the hills, lowlands and Highlands are also wetlands and dry land. However in General a lot of the hilly area and is mostly dry land. It is therefore difficult to make Community plantation agriculture in the dry. But some people do business of planting vegetables such as mustard greens, plant (Brassica Juncea l.) is a vegetable which grows in area heat as well as cool. This plant can be grown on land with a height of 100 metres to 1500 metres above sea level. But to get the best results usually farmers planted at an altitude of 100 to 500 meters above sea level. Mustard plants used by the people in General as a vegetable in the needs of all home tanga. Plant mustard greens can be consumed raw or cooked mustard greens are usually fried, also used by the community in the city as well as to the village. This makes all people interested by the presence of mustard as food specials throughout Timor-Leste as well as the world at large.To improve the results the addition of mustard crop production needed extra food as organic fertilizer enclosure because of the nature of manure can bind water also activate the micro biological land and establish a better soil structure also contains the macro as well as micro fertilizers that can stimulatethe mustard plant growth (Kusuma, 2002 in Retno, 2013). Timor-Leste in Post administrative Dom Aleixo, Municipality Dili solution specifically conceived Village Comoro, society generally use plant mustard greens for eating cooked or fried vegetable raw besides that can be sold.But plant mustard greens earlier still laboured with small scale, where the soil type on Village Comoro is a sandy loam and contains much less nutrient elements, the State of the soil texture is very hard so it's difficult to penetrate the mustard plant rooting ground to obtain nutrient elements for its growth. The physical state of the ground before either because the land was being processed manually and without using chemical fertilizers or chemicals so excellent mustard plant growth when compared with now. But the current crop production began to decline due to mustard density very hard soil, lack of soil organic materials engineering, lack of tillage, crop planting mustard system still uses the system spread and are not using trunks which is good. (Agricultural Info Timor-Leste).

Besides communities in cultivating a plant Chinese cabbage is still not use manure to help plant growth process of mustard to the maximum, so the results of production still decreased. mustard planting Influence the granting of manure are not directly makes it easy for the soil to absorb water. The use of cow manure can increase permeability and organic substances in the soil and can shrink the erodobilitas land that ultimately improve the resilience of the soil against erosion. Chicken manure can contribute to nutrient that is capable of sufficient plant growth, because the chicken manure contain higher nutrient and manure more so the use of manure is the key to the success of fertilization on the system of sustainable agriculture (Ingram et al., 2004). Fertilizer is one important component in increasing crop production. Nowadays the use of fertilizers began to shift from being organic chemistry especially in horticultural crops. This shift is one of the reasons is the use of organic fertilizer in the long term can increase the productivity of the land and can prevent land degradation (Kloepper,1993). Organic fertilizers has an important function in comparison with inorganic fertilizers that is able to mash the soil surface layer (topsoil), increase of population remains miniscule, enhancing the absorption and power save overall water can improving soil fertility (Sutejo, 2002). In organic farming activities mostly farmers using manure as goats, horses, chickens, cows, buffaloes and pigs, where manure contains elements N, P and K. The third element is very much needed by the plant. The third element is very needed by plants with different functions. In addition, the manure may form loose, fertile land becomes and easily processed. Sometimes a grain of dirt this goat is difficult to break or destroyed physically so very influential towards the decomposition process and the process of provision of nutrition. So the goat manure will be more in then composted process in advance of their use. Goat manure nutrient levels contain potassium relative higher than manure derived from cow manure or nutrient content of caw when compared to manure the chickens, pigs and horses (Lingga, 1991 *in* Dora, 2009). Cow and chicken manure has an effect on the fertility of the soil good enough because it contains a complete nutrient elements (macro and micro) as well as micro-organisms that exist in it are able to decipher the peat became more peat as P is easily available for the plant, thus manure will fix the

physical condition of soils and soil fertility (Sutejo, 2002 in Dora, 2009). The production of mustard greens can be enhanced through the cultivation of the good, i.e. maintenance and proper fertilization. Fertilizing with manure (droppings of chickens, cow dung and goat droppings) is very good for the growth of Chinese cabbage with good quality and can increase the production of mustard (Lingga, 1991). Increased crop production can be done with the awarding of the fertilizer. The effort has been hampered less the availability of nutrient elements in the media to grow the plant, where production is optimum can only be obtained if there is a balance of nutrients or nutrient adequacy for the plant. The balance or the adequacy of nutrient in the awarding of good fertilizer from fertilizer inorganic or organic (Kusuma, 2002). One of the obstacles faced in cultivating the plant mustard greens organic soil material content is low so less support plant growth. In addition to those problems is often occur range water. In the physiology of the plant requires a lot of water but do not require standing water. This problem requires service-oriented cultivation techniques on improving the power of land as well as support for controlling water loss due to evaporation. The awarding of the organic fertilizer is expected to improve the physical properties of the soil and ground water saving ability. The purpose of this research was: 1) to know the influence of the type of fertilizer and planting distance towards the growth and development of plant mustard greens. 2) to know the influence of the interaction of different types of fertilizers and planting distance towards the growth and development of plant mustard greens.

MATERIALS AND METHODS

This research was conducted in June 2018 until June 2018 in Sub-Village Malinamuk, Village Comoro, Post Administrative Dom Aleixo, Municipality of Dili site (NCBA), with height 82.95 meter above sea level (ASL). The research of using Random Design Group (RDG) factorial two-factor, a type of manure (P) consisting of four levels with a symbol (P); P0 = Control, P1= Goat Manure, P2= Cattle Manure, P3= Chicken Manure. The second factor is the distance of planting that consists of four levels with the symbol (J): J0= control J1= planting Distance 15 cm x 15 cm, J2 = Planting Distance 20 cm x 20 cm, J3= 30 cm x 30 cm Planting Distance. So retrieved 16 treatment plots the experiment and any treatment in the repeated 3 times so that the retrieved 48 swath of experiment. The materials used such as Cow Manure, goat manure, chicken manure, the stem of banana leaf, wooden pegs and pesticides. Tools used such as hoe, fork, crowbars, shovels, rollers meters, knife, raffia rope, wooden pegs paper carton, hoses, gembor, caliper, pH test a soil temperature, thermometer, scissors, ruler, paper, wood, white scales, analytical balances, plastic bags, markers and a knife. Observation of variable plant growth and yield components of mustard plants as well as the supporting variables. The collected data were analyzed with the Analysis of Variant (Anova) 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 an average using multiple distance test Duncan (DMRT) on levels 5% and if only a single factor in a real influence, then proceed with the average difference test with test LSD on level 5%.

RESULTS AND DISCUSSION

The number of Leaf Mustard Plant (strands): The results of the analysis of the multiform prints (Anova) against the number of leaves of chicory plants showed that fertilization by manure type (P) gives a very real influence ($P<0.01$) on the number of leaves of mustard plants age 1, 2, 3, 4, 5 and 6 WAP. Planting distance treatment (J) gives a very real influence ($P<0.01$) in the amount of plant leaf mustard age 2, 3, 4, 5 and 6 WAP. But planting distance treatment influence different real ($P<0.05$) on the number of leaves 1 WAP. The interaction of different types of manure and planting distance gives a very real effect ($P<0.01$) in the amount of plant leaf mustardage 2, 3, 4, 5 and 6 WAP. But the interaction of different types of manure and planting distance treatment influence different real ($P<0.05$) on the number of leaves 1 WAP. For more details can be seen in table 1 DMRT 5% test results as follows:

Based on the results of the research are listed in table 1. on top of that treatment combination of chicken manure with a planting distance of 30 cm x 30 cm with the treatment code (P3J3) is the best treatment against other treatments. At the end of observation, the amount of plant leaf mustard ranging between 15.03 strands-23.07 strands. This is because plants that have leaves most will catch most rays. Because the organ is the site of leaf photosynthesis and other metabolic processes. The greater number of leaves will be getting many carbohydrates are produced. The carbohydrates that will be used by the plant in support of growth and development. According to Dora (2009) States that, the nitrogen needed to form compounds such as chlorophyll, nucleic acids, and enzymes while the micro nutrient elements functioned primarily in the formation of leaves and chlorophyll in the leaves. When the formation of the leaves is disturbed then the process of photosynthesis will be disturbed and disrupted plant growth and if there is a shortage of nitrogen, plants will grow slowly and stunted. Aspects of the use of such trunks provide implications towards the results of the Union but also towards the average. Trunks turned regularly so that plants obtain a uniform growing space, and maintenance easier and make it easier to do weeding. Planting distance very effect on plant growth and establishment of crop, setting the distance certain trunks can maintain the temperature and humidity.

Value added components of growth or the growth of vegetative plants were heavily influenced by the plant itself, in addition to environmental factors (Lakitan,1993). Added by Pangaribuan (2010) that the rate of decomposition of chicken manure faster when compared with cow dung and goat manure so that nutrient elements can be quickly available to plants. The rate of decomposition of good will may provide nutrient elements in the soil, especially N, P, K and other nutrient elements, and improved soil structure. Thus rooting plants will thrive and roots can absorb more nutrient elements, especially nutrient N which increases the formation of chlorophyll photosynthetic activity so that it can be improved and can increase height plant.

Long Leaf Mustard Plant (cm): The results of the analysis of the multiform prints (Anova) against the length of the chicory plant leaves showed that fertilization by manure type (P) gives a very real influence ($P< 0.01$) on long leaf mustard plant age 2, 3, 4, 5 and 6 WAP. But the treatment of different types of manure gives a real influence ($P<0.05$) on the length of the leaf crops mustard age 1 WAP. Planting distance treatment (J) gives a very real influence ($P<0.01$) on long leaf mustard plant

age 2, 3, 4, 5 and 6 WAP. But planting distance treatment influence different real (P<0.05) on the length of the leaf mustard age 1 WAP. The interaction of different types of manure and planting distance gives a very real effect (P<0.01) on long leaf mustard plant age 2, 3, 5 and 6 WAP. But the interaction of different types of manure and planting distance treatment influence different real (P<0.05) on the amount of leaf mustard age 1 and 4 WAP. For more details can be seen in table 2 results of test DMRT 5% as follows:

Description: a number that is followed by the same letter in every different column not reality test DMRT 5%. Based on the results of the research are listed in table 2. on top of that treatment combination of chicken manure with a planting distance of 30 cm x 30 cm with the treatment code (P3J3) is the best treatment against other treatments. At the end of the plant's leaves long observation, chicory ranging between 24.36 cm-32.08 cm. According to Lakitan (1993), the main function that leaves for the plant is as an organ of photosynthesis. When compared to other plant organs that are green and also carry out the process of photosynthesis, leaf has a greater capability for this activity. Therefore, a direct role in the leaf provides backup energy that serves to support the growth of the plant mustard greens. Effects of chicken manure fertilizer also will, for chicken manure contains a lot of elements N, P and K, as well as chicken manure can improve soil structure arrangement be better, then it is easily absorbed by the rooting plants quickly. Adil*et al*., (2006), which explained that the fertilizer comes from chicken manure is better than cow dung (easy to decompose in the soil so that it can be more easily absorbed by plants vegetables tomato, okra and spinach). This is supposedly because the chicken manure nitrogen content higher than cow manure and compost, nitrogen more optimum support vegetative parts growth compared to generative and important part to plant vegetables the header section is consumed.Granting of nitrogen in sufficient amounts, can produce a crop vigor and the size of the large leaves.

Mustard Plant height (cm): The results of the analysis of the multiform prints (Anova) against high crop chicory showed that fertilization by manure type (P) gives a very real influence (P<0.01) at the height of the crop mustard aged 2, 4, 5 and 6 WAP. But the treatment of different types of manure exert influence are not real (P≥0,05) at the height of the crop mustard age 1 and 3 WAP. Planting distance treatment (J) gives a very real influence (P<0.01) on the length of the leaf mustard plants aged 2, 5 and 6 WAP. But planting distance treatment influence different real (P<0.05) at the height of the plant mustard at 3 WAP. Planting distance treatment but exert influence are not real (P≥0,05) at the height of the crop chicory at age 1 and 4 WAP. The interaction of different types of manure and planting distance gives a very real effect (P<0,01) at the height of the crop mustard 5 WAP. But the interaction of different types of manure and planting distance treatment influence different real (P<0.05) at the height of the plant mustard age 3 and 6 WAP. But the interaction of different types of manure and planting distances giving the treatment effect is not real (P≥0.05) at the height of the plant mustard age 1, 2 and 4 WAP. For more details can be seen in table 3 DMRT 5% test results as follows:

Description: a number that is followed by the same letter in every different column not reality test DMRT 5%. Based on the results of the research are listed in table 3. on top of that treatment combination of chicken manure with a planting distance of 30 cm x 30 cm with the treatment code (P3J3) is the best treatment against other treatments. At the end of high plant observations, chicory ranging between 27.06 cm-39.08 cm Pangaribuan (2010) that the rate of decomposition of chicken manure faster when compared with cow dung and goat manure so that nutrient elements can be quickly available to plant. The rate of decomposition of good will may provide nutrient elements in the soil, especially N, P, K and other nutrient elements, and improved soil structure. Thus rooting plants will thrive and roots can absorb more nutrient elements, especially nutrient N which increases the formation of chlorophyll photosynthetic activity so that it can be improved and can increase height plant. In line with the opinion of the Sajimin et al., (2011) that the content of chicken manure fertilizer N its higher so that stimulates the growth of the vegetation of plants more quickly.Plant height is the measurement of the plant that is often observed, both as an indicator of growth or as a parameter that is used to measure the influence of the environment or the treatments applied. It is based the fact that height is the measurement of plant growth that are most easily seen (judge, 2009). This showed that chicken manure and cow manure contains elements of macro nutrients (NPK) as the best food for plant growth especially on organs the organs of plants for the development of high plants collards. manure is a source of nitrogen that delivers the fastest and measurably influence on plant colonisation than other elements.

Broad Leaf (cm): The results of the analysis of the multiform prints (Anova) against broad leaf chicory plants showed that fertilization by manure type (P) gives a very real influence (P < 0.01) on broad leaf crops mustard 6 WAP. Planting distance treatment (J) gives a very real influence (P < 0.01) on broad leaf crops mustard 6 WAP. The interaction of different types of manure and planting distance gives a very real effect (P < 0.01) on broad leaf crops mustard 6 WAP. For more details can be seen in table 4 DMRT 5% test results as follows:

Description: based on yout effect, the effect of the interaction of different types of fertilizers and Planting Distances. Average followed a similar letter on a line (a, b, c) and columns (A, B, C) of the same is no different of BNT assay based on levels 5%. P = The Type Of Manure, J = Trunks

Table 4 that, type of application of manure combined with planting distances of 30 cm x 30 cm with the treatment code (P3J3) provides broad leaf plant mustard greens, largest i.e. 36.08 cm, when compared with the broad leaves of the mustard plant obtained at the treatment without organic fertilizer that is 18, 06 cm (P0J0). Improved Broad leaves affected by chicken manure and cow manure. Because the content of nutrient elements NPK there perfectly on chicken manure. So that the process of concentration of NPK in soil solubility can fertilize the soil so that rooting can take food properly for the growth of broad leaves. Munawar (2009) suggests that manure is able to provide nutrient elements, such as: N, P, K, S, Ca, Mg, Na, Fe, Cu and Mo, although in small numbers but are unable to support plant growth. Salisbury and Ross (1992) stated that broad leaf plant is one of the factors that determine the amount of solar energy that can be absorbed by the leaves and will determine the magnitude of the resulting fotosintat. With the granting of manure as organic materials provider of nutrient elements and arrange the planting distance such that light can be used as efficiently as possible it will be

retrieved results of photosynthesis which gets bigger. The results largely determine Fotosintat seeds because most fotosintat hoarded in the seeds. During this period of improved seed filling accumulation of dry ingredients and nutrient deficiency in this period will cause the seeds did not develop fully. The availability of sufficient nutrient along the growth of plants, in this case with the awarding of the plant gives the possibility of manure stockpiling more dry ingredients. In this research it turns out with chicken manure gave the growth and development of maize plants showed the best results that eventually resulted best selling decent cob weight, this is due to the content of a nutrient contained in chicken manure is high enough. The greater number of leaves, then the place to do the process of photosynthesis and as a result more and more as well. Position the stem caisim on main shaft spread evenly. Therefore the optimum number of leaves allows the distribution/Division of light between the leaves more evenly. granting of chicken manure fertilizer through the leaves give the plant growth and better results than through the soil (Rizqiani, 2006).

Diameter (mm): The results of the analysis of the multiform prints (Anova) against the diameter of the stem of the plant shows that chicory fertilizing with manure type (P) gives a very real influence ($P < 0.01$) on a plant stem diameter mustard 6 WAP. Planting distance treatment (J) gives a very real influence ($P < 0.01$) on a plant stem diameter mustard 6 WAP. The interaction of different types of manure and planting distance gives a very real effect ($P < 0.01$) on a plant stem diameter mustard 6 WAP. For more details can be seen in table 5 DMRT 5% test results as follows:

Description: based on yout effect, the effect of the interaction of different types of fertilizers and Planting Distances. Average followed a similar letter on a line (a, b, c) and columns (A, B, C) of the same is no different of BNT assay based on levels 5%. P = The Type Of Manure, J = Trunks Table 5 that, type of application of manure combined with planting distances of 30 cm x 30 cm with the treatment code (P3J3) provides broad leaf plant mustard greens widest IE 1.25 mm, when compared with the broad leaves of the mustard plant obtained at the treatment without organic fertilizer that is 0, 11 mm (P3J0). This is caused by the type of chicken manure and cow manure. Because NPK content contained on these very cow manure gives reaction on the ground for the process of absorption burly by plant roots mustard greens for enlargement as well as the addition of stem growth of plant organs are mustard greens. Added by Pangaribuan (2010) that the rate of decomposition of chicken manure faster when compared with cow dung and goat manure so that nutrient elements can be quickly available to plants. The rate of decomposition of good will may provide nutrient elements in the soil, especially N, P, K and other nutrient elements, and improved soil structure. Thus rooting plants will thrive and roots can absorb more nutrient elements, especially nutrient N which increases the formation of chlorophyll photosynthetic activity so that it can be improved and can increase height plant. In line with the opinion of the Sajimin*et al*., (2011) that the content of chicken manure fertilizer N its higher so that stimulates the growth of the vegetation of plants more quickly. This is due to the ideal distance so that rooting trunks in the uptake of nutrient elements, good air circulation, ease of watering and not the case competition in making the soil nutrient elements. This is supposedly because the chicken manure nitrogen content higher than cow manure and compost, nitrogen more optimum support vegetative parts growth compared to generative and important part to plant vegetables the header section is consumed and wrote down that the granting of sufficient amounts of nitrogen, can produce a crop vigor and size of the great rod.

The weight of fresh and dried Mustard Plants Per swath (gr): The results of the analysis of the multiform prints (Anova) of biomass crops chicory showed that fertilization by manure type (P) gives a very real influence ($P<0.01$) on the weight of fresh mustard crop per hide. But the treatment types of fertilizers provide a real influence ($P<0.05$) on a dry weight of plant mustard greens per hide. Planting distance treatment (J) gives a real influence ($P<0.05$) on the weight of fresh mustard plants per hide. Planting distance treatment but exert influence are not real ($P\geq0.05$) on a dry weight of plant mustard greens per hide. The interaction of different types of manure and planting distances giving the effect that is not real ($P\geq0.05$) on a fresh weight and dry weight of the plant mustard per hide. For more details can be seen in table 6 DMRT 5% test results as follows:

Description: a number that is followed by the same letter in every different column not reality test DMRT 5%. Based on the results of the research are listed in table 6. on top of that treatment combination of chicken manure with a planting distance of 30 cm x 30 cm with the treatment code (P3J3) is the best treatment against other treatments. At the end of the observation, the weight of fresh mustard greens crop per average swath 619.77 gr-gr 673.82 and dry weight of the plant the mustard per average swath ranging from 42.54 gr- 31.11 gr. The establishment and development of the organs of the plant (leaves, roots, and stems) connected with process plant cells to enlarge. Plant cells will be increased along with the thicken and cell wall formation of cellulose in plants. other influences related to the availability of water for crop nutrient transport, in the form of land for the plant. Hara in the soil is transported through water that is absorbed by plants through the process of diffusion, osmosis occurs.

The better the absorbed nutrient by plants, then the availability of the material basis for the process of photosynthesis will be getting better anyway. The process of photosynthesis which takes place properly, will spur hoarding carbohydrates and proteins in the body organs of the plant mustard. Stockpiling of carbohydrates and protein as a result of accumulation of photosynthetic processes will affect the weight of the wet plant. Harjadi (1989) States that the factors that affect the growth of internal factors and external factors, internal factors comprising the rate of photosynthesis, respiration, differentiation and the influence of genes, while the external factors include light, temperature, water, organic matter and nutrient availability. So with these factors satisfy the process of photosynthesis can take place properly and produces fotosintat which will be used to process the next growth especially heavy added base. Dry weight is the weight of the plant after plant is dried in the oven, so that the water levels have gone and left only the chemical compounds contained in the plant. This condition is closely related with the size of the diameter of cuttings and nutrient elements on the media as well as absorption by the roots which ultimately have an effect on biomass. According to Dwijoseputro (1990), biomass plants indicates multiplicity of chemical compound contained in the plant, the higher the biomass then the chemical compounds contained in it more so increase the dry weight of the plant.

Table 1. Average number of Leaf mustard Plants due to the combination of different types of Manure (P) and Distance (J) on a couple of different Age

Treatment	The number of leaves (strands)					
	1 WAP	2 WAP	3 WAP	4 WAP	5 WAP	6 WAP
P0J0	4.05a	5.03a	6.69ab	8.38a	11.69ab	15.03a
P0J1	4.04a	5.37ab	6.39a	8.37a	11.38a	15.05a
P0J2	4.06a	5.38ab	6.40a	8.72abc	12.04abc	15.07a
P0J3	4.06a	5.70ab	6.40ab	8.40ab	11.38a	15.07a
P1J0	4.38ab	5.70ab	7.02abc	8.71abc	12.70bcd	15.08a
P1J1	4.39ab	5.71ab	7.03abc	9.05bcd	13.05cd	15.06a
P1J2	4.40abc	5.38ab	7.36bcd	9.39cde	13.05cd	15.07a
P1J3	4.41abc	5.72ab	7.37bcd	9.39cde	13.06cd	16.06b
P2J0	4.37ab	5.69ab	7.36bcd	9.05bcd	13.03cd	15.06a
P2J1	4.72abc	6.03bc	7.72cd	9.40cde	12.71bcd	16.06b
P2J2	5.22c	7.07d	9.41e	11.73f	15.73d	20.08d
P2J3	4.86bc	6.07bc	8.05d	10.04e	13.06cd	16.08b
P3J0	4.21ab	5.71ab	7.03abcd	9.39cde	13.36d	16.04b
P3J1	4.54abc	6.05bc	7.71cd	9.71de	13.06cd	16.06b
P3J2	4.88bc	6.74cd	7.74cd	9.75de	13.07cd	17.07c
P3J3	6.08d	8.41e	11.07f	13.75g	18.40e	23.07e

Table 2. The average length of a Leaf Mustard Plants due to the combination of different types of Manure (P) and Distance (J) on a couple of different Age

Treatment	Leaf length (cm)					
	1 WAP	2 WAP	3 WAP	4 WAP	5 WAP	6 WAP
P0J0	7.04a	11.70ab	13.38abc	17.04a	21.71a	24.36a
P0J1	7.04a	11.70ab	14.03abcd	17.04a	22.04a	24.69ab
P0J2	7.03a	12.05ab	14.72cd	18.06abcd	22.05a	24.72ab
P0J3	7.04a	12.04ab	14.38bcd	17.72abc	22.39a	24.72ab
P1J0	7.05a	10.69ab	12.39a	17.41ab	22.03a	24.71ab
P1J1	7.03a	9.70a	12.71ab	18.37abcd	23.03ab	25.36bc
P1J2	7.05a	11.39ab	14.05abcd	18.73bcd	23.37abc	25.72cd
P1J3	7.05a	11.03ab	14.70cd	19.40cde	23.40abc	26.40de
P2J0	7.05a	10.72ab	13.05abc	18.72bcd	21.36a	25.03abc
P2J1	7.03a	10.05ab	13.72abc	18.05abcd	22.04a	25.03abc
P2J2	7.07a	16.08c	17.74e	20.74e	26.08de	29.09f
P2J3	7.07a	12.40b	15.39d	19.37cde	23.07abc	27.07e
P3J0	7.03a	9.71a	14.38bcd	19.03bcde	22.38a	25.70c
P3J1	7.06a	11.73ab	14.39bcd	19.73de	24.72bcd	26.72e
P3J2	7.05a	12.04ab	15.38d	20.72e	25.06cd	27.05e
P3J3	7.73b	17.07c	19.41e	23.41f	28.09e	32.08g

Table 3.Average high Crop Mustard due to combination of Manure (P) and Trunks (J) on a couple of different Age

Treatment	Plant Height (cm)					
	1 WAP	2 WAP	3 WAP	4 WAP	5 WAP	6 WAP
P0J0	8.36a	8.71a	14.74abc	19.4a	21.73a	27.40a
P0J1	9.37a	8.72a	16.4bc	18.73a	22.72ab	27.06a
P0J2	9.36a	9.07ab	15.39abc	21.05ab	22.73ab	28.41ab
P0J3	8.71a	9.05ab	15.06abc	19.42a	23.07bc	29.44abc
P1J0	8.37a	9.38ab	13.06a	20.03ab	23.03bc	29.05abc
P1J1	8.37a	9.72ab	14.05ab	20.38ab	23.04bc	31.74cde
P1J2	8.71a	10.05abc	14.39ab	19.71ab	24.07cd	31.73cde
P1J3	8.71a	10.05abc	15.71abc	18.71a	24.06cd	32.39de
P2J0	8.38a	9.05ab	14.05ab	20.41ab	23.06bc	30.73bcd
P2J1	8.71a	10.06abc	14.71abc	23.06abc	23.04bc	32.39de
P2J2	9.74a	12.07cd	17.74cd	26.4cd	29.06g	36.41fg
P2J3	9.07a	11.04bcd	15.74abc	23.06abc	25.07de	32.74de
P3J0	8.71a	9.74ab	15.06abc	23.38abc	25.03de	31.73cde
P3J1	8.71a	10.06abc	14.72abc	24.07b	25.72e	32.4de
P3J2	8.72a	11.04bcd	14.71abc	25.73cd	27.05f	34.73ef
P3J3	10.12a	13.08d	19.74d	29.08d	32.07h	39.08g

Table 4.The value of Different of LSD Assay Results and 5% against a Broad Leaf Mustard Plants at the age of 6 weeks After Planting (cm) on each Factor

Treatment	Planting Distance (cm/plot)			
Type of Manure Fertiliser (gr/plot)	J0	J1	J2	J3
	----------cm----------			
6 MST				
P0	18.06a	21.73b	19.37a	21.04b
	A	B	A	B
P1	19.71ab	20.07ab	21.73b	21.38b
	AB	Ab	B	B
P2	21.72b	20.71b	34.08d	25.38c
	B	B	D	C
P3	22.38c	25.06c	28.07c	36.08d
	C	C	C	D
BNT 5%	2.45			

Table 5. The value of Different of LSD Assay Results and 5% Against the plant's Stem Diameter of Mustard at the age of 6 weeks After Planting (mm) on each Factor

Treatment	Planting Distance (cm/plot)			
Type of Manure Fertiliser (gr/plot)	J0	J1	J2	J3
	----------mm----------			
6 MST				
P0	0.22a	0.37a	0.23a	0.40a
	A	A	A	A
P1	0.47a	0.28a	0.65b	0.47a
	A	A	B	A
P2	0.28a	0.47ab	1.21c	0.47a
	A	AB	C	A
P3	0.11a	0.60b	0.55b	1.25b
	A	B	B	B
BNT 5%		0.41		

Table 6. The average Fresh Weight and dry weight of the plant due to the combination of Mustard Manure (P) and Distance (J)

Treatment	Biomass Plant (gr)	
	Fresh Weight (gr)	Dry Weight (gr)
P0J0	623.45ab	31.78a
P0J1	619.77a	31.47a
P0J2	623.78abc	32.13a
P0J3	629.79abcd	32.12a
P1J0	640.46bcde	31.11a
P1J1	640.47bcde	33.15a
P1J2	650.79def	31.80a
P1J3	653.82efg	31.80a
P2J0	653.81efg	31.14a
P2J1	657.15efg	32.15a
P2J2	671.14fg	35.21a
P2J3	657.12efg	32.47a
P3J0	643.80cde	31.46a
P3J1	653.82efg	34.46a
P3J2	660.47efg	34.46a
P3J3	673.82g	42.54b

Table 7. The average Fresh Weight and dry weight of weeds Weeds on crops Mustard due to a combination of different types of Manure (P) and Distance (J)

Treatment	Weed plant (gr)	
	Fresh Weight Of Weeds (gr)	Dry Weight Of Weeds (gr)
P0J0	15.41a	5.03a
P0J1	22.08a	5.02a
P0J2	29.07a	5.04a
P0J3	35.74a	5.07a
P1J0	27.40a	5.02a
P1J1	24.41a	5.03a
P1J2	36.39a	5.04a
P1J3	45.40a	5.06a
P2J0	26.72a	5.02a
P2J1	27.05a	5.04a
P2J2	21.40a	6.17b
P2J3	26.39a	6.06b
P3J0	22.75a	5.04a
P3J1	21.08a	5.02a
P3J2	29.40a	6.08b
P3J3	36.05a	7.40c

Table 8.The average Test LSD 5% on what kind of manure and Distance against soil pH

Treatment	Planting Distance (cm/plot)			
Type of Manure Fertiliser (gr/plot)	J0	J1	J2	J3
	----------pH----------			
P0	6.25a	6.33a	6.35a	6.36a
	A	A	A	A
P1	6.61ab	6.56ab	6.60ab	6.65ab
	A	AB	AB	AB
P2	6.86b	6.88b	6.89b	6.90b
	B	B	B	B
P3	6.94b	6.97b	6.92b	6.98b
	B	B	B	B
BNT 5%		0,49		

The magnitude of the value of the dry weight of the plant depends very much of the process of photosynthesis. The process of photosynthesis is the process of cooking food in the leaves that requires basic ingredients in the form of materials macro and micro nutrient elements, water and sunlight. The availability of nutrient elements and the water is very dependent on the ability of the land to provide both the material composition of the growing medium, each has different capabilities in providing nutrient and water for plant growth. According to Dartius (1990) if the photosynthesis takes place properly, then the plants will grow well followed by the dry weight of the plants that reflect the status of plant nutrients, because the plant dry weight depending on the activity of the cells, the size of the cells and plant cell quality.

Weed plant (gr): The results of the analysis of the multiform prints (Anova) against weed biomass crops chicory showed that fertilization by manure type (P) gives a very real influence ($P<0.01$) on a dry weight of weeds crop mustard per hide. But the treatment this type of fertilizer is not real influence ($P\geq0.05$) on the weight of fresh weed plants collards per hide. Planting distance treatment (J) gives a real influence ($P<0.01$) on a fresh weight and dry weight of weeds crop mustard per hide. The interaction of different types of manure and planting distance gives a very real effect ($P<0.01$) on the weight of mustard crop weed kerig per hide. But the interaction of different types of fertilizers and planting distances giving the influence of unreal ($P\geq0.05$) on the weight of fresh weed plants collards per hide. For more details can be seen in table 7 DMRT 5% test results as follows:

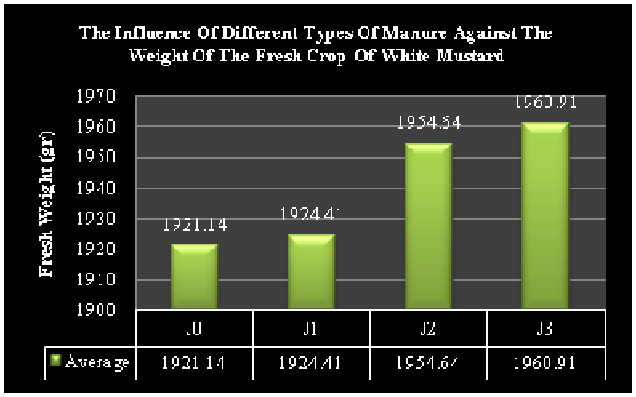
Description: a number that is followed by the same letter in every different column not reality test DMRT 5%. Based on the results of the research are listed in table 7. on top of that treatment combination of chicken manure with a planting distance of 30 cm x 30 cm with the treatment code (P3J3) is the best treatment against other treatments. At the end of the observation, the weight of fresh weed plants collards per average swath 15.61gr-45.40 gr and plant the mustard weed dry weight per average swath ranging from 5.02 gr-7.40 gr. it is influenced by the distance of planting increasingly tenuous or getting the width then more weed growth. While on manure in manure goats continues to cow manure and then the chicken manure. This is because animals such as goats and cows to consumption leaves, flowers and fruits so much weed growth is rising because of animal droppings. Beside that, the more tightly the plant then the volume grows weeds declining because trunks closer then competition weeds to grow distressed and covered by the staple crops. The use of manure to consider, because manure can cause the development of weed on cultivated land. Note that the existence of weeds that are left to grow at an per plant can lower the yield of 20% to 80%. One effort that can be done to suppress it is to use the right type of manure. There is a weed in the manure are strongly influenced by the wisdom of farmers while shepherd their cattle. Because of the different shepherd environment, then weed eaten cattle are also different (Zarwan*et al*., 1994).

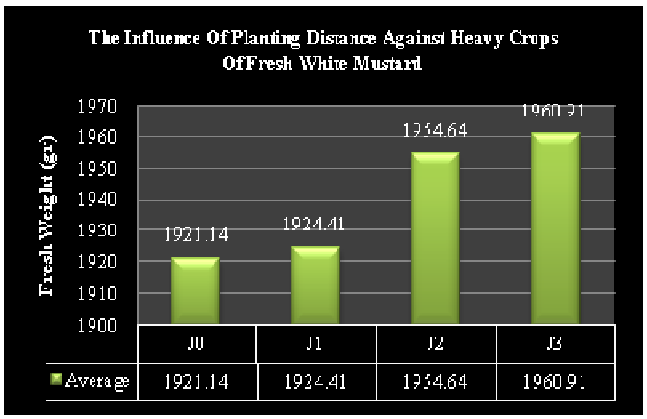
Soil pH: The results of the analysis of the multiform prints (Anova) of soil pH on plants chicory showed that fertilization by manure type (P) gives a very real influence ($P < 0.01$) at soil pH. Planting distance treatment (J) provide no real influence ($P>0.05$) at pH soil crops chicory per hide. The interaction of different types of manure and distance provide influential are not real ($P>0.05$) at pH soil crops mustard per hide. For more details can be seen in table 8 test results DMRT 5% as follows:

Description: based on yout effect, the effect of the interaction of different types of fertilizers and Planting Distances. Average followed a similar letter on a line (a, b, c) and columns (A, B, C) of the same is no different of BNT assay based on levels 5%. P = The Type Of Manure, J = Trunks. In the table above 5% LSD assay showed that the real difference occurs on these two factors as well as the treatment of soil pH, and tend to give the highest pH on treatment of chicken manure and planting distance of 30x30 cm (P3J3). Use of chicken manure to improve the structure and function of biological soil, raise the soil to water absorption. The awarding of the manure effect in raising soil pH, this is because the organic matter from manure can neutralize the source of the acidity land. Manure will also donate a certain amount of nutrient into land that can serve to support its growth and development, such as N, P, K (Djafaruddin, 1970). This will decrease the productivity of land-kan. Besides the addition of the organic material is an environmental improvement actions grow plants which among other things can improve the efficiency of fertilizer (Adiningsih and Rochayati, 1988). The results of the use of organic materials, such as the remains of the melapuk plants, compost, manure or organic liquid fertilizer showed that organic fertilizer can enhance produkti-vitas land and fertilizing efficiency as well as reduce the need fertilizers, especially fertilizer K.

The influence of different types of manure against heavy plant/plot fresh white mustard: In accordance with the table above indicates that the factor graph types of manure can give heavy wet on the terraced plants differently, where the weight of wet manure treatment on cow and chicken manure gives a wet weight values are not the same, but gives the highest wet weight at treatment cow manure by wet weight values (1979.41. While the weight of the wet chicken manure at the treatment of 1973.94. Wet weight on goat manure of 1939.15. as well as the lowest wet weight is present on the control or treatment of not fertilizer with the value of the weight of the wet, 1872.6. This is caused by the content of NPK and elements of existing micro nutrient in manure, chicken manure sapid an goat manure is good enough so that it is easily dissolved in the soil so that rooting plants are easily absorption by rooting plant mustard greens. It is agreed with by Pangaribuan Added (2010) that the rate of decomposition of chicken manure faster when compared with cow dung and goat manure so that nutrient elements can be quickly available to plants. The rate of decomposition of good will may provide nutrient elements in the soil, especially N, P, K and other nutrient elements, and improved soil structure. Thus rooting plants will thrive and roots can absorb more nutrient elements, especially nutrient N which increases the formation of chlorophyll photosynthetic activity so that it can be improved and can increase height plant. Similarly, in line with the opinion of the Sajimin*et al.,* (2011) that the content of chicken manure fertilizer N its higher so that stimulates the growth of vegetation plants faster

The influence of planting distance against heavy plant/plot fresh white mustard: On a chart table above indicates that the planting distance weight fresh white mustard found in the terraced crops treatment 30x30 cm trunks with a total wet weight (1960.91). High while wet weight the second found in the treatment of 20 x 20 cm planting distance with a total weight of wet (1954.64), then the following wet weight there is high on a 15 x 15 cm planting distance treatment as well as the weight of the smallest contained on the wet treatment planting





distance control with a wet weight of (1921.14). It is caused by a good planting distance can provide better plant growth because the trunks of good plant growth can give freely in the retrieval elements of a burly, taking light to affect the process of photosynthesis so the plant growth on the increase of the height, width the leaves, leaf length, number of leaves and the diameter of the rod. If all the above plant organs can grow properly then the weight of the wet plant by itself increases with absorb nutrient elements and minerals in the soil, so that it will gain weight for all plants. In accordance with the opinion of the Salisbury and Ross (1992) stated that broad leaf plant is one of the factors that determine the amount of solar energy that can be absorbed by the leaves and will determine the magnitude of the resulting fotosintat. With the granting of manure as organic materials provider of nutrient elements and arrange the planting distance such that light can be used as efficiently as possible.

When the distance is too close to the plants too docked so that retrieval competition occurring nutrient elements, as well as going on etiolasi and all the organs of plants small will also light the taking of difficult to do fososintesis on the leaves, then leaves, the number of extents the leaves, long leaf, small Rod will diameter. As for the good of the trunks that are too tightly, it will suppress the growth of weeds, besides it can result in heavy wet terraced will decrease and decreases. In a planting competition between plants often occur as well as between plants with weeds to get nutrient elements, water, sunlight or room to grow. One effort that can be done to overcome it is by planting distance settings. With a level of optimum density will then be retrieved ILD optimum with the formation of dry ingredients that is maximum. Dense planting distance will increase the competitiveness of the crop against a weed because the heading plants inhibit the glow to the surface of the land so that the growth of the weeds become obstructed, in addition also the rate of evaporation can be pressed (Dad Resiworo, 1992).

But at a distance of planting that is too narrow may crop cultivation will give you results that are relatively less due to competition between the plant itself. Therefore the optimum planting distance needed to obtain maximum results.

Conclusion

- Type of chicken manure Treatment combined with a planting distance of 30 cm x 30 cm with the treatment code (P3J3) can enhance plant growth and development, UN chicory grown in the Sub-village Malinamuk, Village Comoro, Post Administrative Dom Aleixo, Municipality Of Dili.
- The real interaction Occurs towards the growth and development of crops mustard on treatment with manure treatment type of trunks.
- In the treatment of this type of chicken manure with a type of fertilizer is best with maximum results and trunks 30 cm x 30 cm planting distance is ideal with maximum results.

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