

ORIGINAL RESEARCH ARTICLE

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EFFECT OF TYPES AND LEAF DOSAGE OF LEUCAENA, GAMAL, AND ORGANIC FERTILIZER ON BRASSICAJUNCEA GROWTH

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ABSTRACT

Various dishes that use mustard as a raw material are used as a mixture of vegetables such as lodeh, capcay, and boiled noodles and as a complement to the food mixture. The method used in this study is Randomized Block Design with 3 replications, and arranged factorially consisting of doses of green leaf doses of Laeucanea, and Gamal leaf. The results of the study showed that among the four parameters observed in the growth of Caisin green mustard plants, it was indicated that the effect of Leucaena leaf green manure, and Gamal leaf on plant height parameters at week 2 and week 4 of MST. Likewise, the influence of chicken manure can affect the growth of tall green mustard greens in weeks 2,4,6, and 8 WAC. The combination of Leucaena leaf green manure, Gamal leaf, and chicken manure can also influence the growth of mustard plant height at weeks 2.4 and 6 WAC and 8 MST.



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INTRODUCTION

Cassim green mustard plant (*Brassicajuncea* L) has been known by the East Timorese people. This plant is a horticultural commodity that is much favored by the community starting from the upper class to the lower classes. Because it has the most delicious taste compared to other mustard types. Various dishes that use mustard as a raw material are used as a mixture of vegetables such as lodeh, capcay, boiled noodles, and as a complement (mixed meatball food).

Mustard is an annual herb that is easy to grow. Apogee germination, when young grows weak (easily collapsed), but after the third leaf and so on it will form a half rosette with a stick that is thick enough, but not woody. Elliptical mustard leaves, with usually blunt ends. The color is fresh green, usually not hairy. Towards flowering the nature of the rosette disappears (the growth of leaves does not originate from the root rosette), revealing the stem. Small mustard flowers are composed of various compounds. The crown of mustard flowers is yellow, numbering 4 (typical of *Brassicaceae*). The mustard stamens number 6, surround one pistil. The fruit resembles pods but has two fruit leaves and is called a clique. (Setiadi, 1993). Rukmana (1995) mustard plants are one type of leaf vegetable commonly

consumed by the community. Green mustard is very potential as a provider of essential mineral elements needed by the body because of its high nutritional value. Mustard plants are rich in sources of vitamin A, so effective to overcome the problem of vitamin A deficiency or myopic disease until now a problem among children under five. In the past only known three types of chicory, mustard greens, and mustard. Nowadays people are more familiar with Caisin aka mustard meatballs, besides that, there are still types of curry mustard, mustard, and mustard monument.

The main nutrients needed by vegetable plants are N, P, and K. Nitrogen is the most dynamic nutrient in nature. According to Prihantoro. (2003) that, N elements are easily lost from the soil through volatilization or percolation of groundwater, are easily deformed, and are easily absorbed by plants. Plants absorb N elements in the form of ammonium (NH₄⁺) and nitrate (NO₃⁻). The presence of NH₄⁺ is very dynamic because it is easily deformed to NO₃⁻ due to the nitrification process. Phosphorus is a nutrient that is not easily moved (immobile) in the soil. Hara P in the soil is available in sufficient quantities for plants, but lack of P causes plant growth to be hampered due to disruption of cell and root plant development, carbohydrate metabolism, and energy transfer (Widarawati and Harjoso, 2011). According to Sarief (1989) potassium, as an essential nutrient is rather a car like N. Although only a small portion of

K is available which can be utilized by plants, nutrient K is easy to move, leachate, and bound by the surface of colloidal soil. The deficiency of K affects the root system, buds, starch formation, and sugar translocation. Plants can absorb nutrients through roots and leaves. C and O elements are taken from plants in the form of CO₂ through leaf stomata in photosynthesis. The H element is taken from plants from groundwater (H₂O) through plant roots. Water is also absorbed by plants through leaves but in small amounts. Other elements are absorbed from plant roots from the soil such as macronutrients N, P, and K as well as micronutrients such as Ca, Mg, Cu, Fe, and others (Prihantoro, 2003). Organic fertilizer itself is a fertilizer that is composed of material living things, such as weathering of the rest of plants, animals, and humans. Organic fertilizers can be either solid or liquid and are used to improve the physical, chemical, and biological properties of the soil. Organic fertilizers contain a lot of organic matter rather than the price level. The source of organic material can be compost, green manure, manure, crop residues (straw, stover, corn cobs, sugarcane bagasse, and coconut fiber), livestock waste, industrial waste using agricultural materials, and municipal waste (garbage). (Maryam *et al.*, 2015). Elfrida (2016) states that the benefits of *Leucaena* are that the leaves can be used as a green manure which can fertilize plants because *Leucaena* leaves have a very high nitrogen content compared to other green leaves, besides that, *Leucaena* leaves also contain 0.2-0, 4% phosphorus, and 1.3-4.0% potassium. All nutrients contained are essential nutrients that are needed by plants in their growth and development. Besides that, this plant can also be used as a protective plant that can provide nutrients for nitrogen in the surrounding plants. Chicken manure is manure derived from chicken manure mixed with animal feed residue. Chicken manure usually has a nutrient content of 1% N, 0.8% P₂O₅, and 0.4% K₂O. Just like fertilizer, sometimes other chicken manure has a high C / N ratio of above 28, but after decomposition chicken manure has a C / N ratio between 10-20 (Riyawati, 2012). Based on the description above, it is necessary to do research on lettuce conditions in cultivation usually planted in wet climate highlands with fertile and loose soil which shows good results. For this reason, this study seeks to cultivate lettuce on dry land with dry climates using paragnet to manipulate microclimate so that green mustard plants can grow well which are carried out in the lowlands on three different types of soil with leaf green manure *Laeucaena*. Gamal leaf and chicken manure.

MATERIAL AND METHODS

This experiment was carried out on NCBA nursery land located in Malinamuk Hamlet, Suco Comoro, PostuAdministrativu Dom Aleixo, Municipio Dili. Based on the GeoPointOna Collection Data the location is located at a latitude: S 8o33'53 ". Longitude: E 125o31'50 ". Place height ± 82.95 m above sea level (asl) and accuracy of 4 m. The method used in this study is Randomized Block Design (RBD), with 3 replications. The treatment is arranged factorially. The treatments tested consisted of two factors, namely: Factor 1. Factor doses of leaf doses of green manure *Laeucaena*. Gamal leaf (PHDLG) consisting of PHDLG = 0 gr / plot, PHDLG1 = 1200 gr / plot, PHDLG2 = 2400 gr / plot, PHDLG = 3600 gr / plot. 2nd factor. Chicken Cage (PKA) fertilizer dosage consisting of: PKA0 = 0 gram / plot, PKA1 = 2400 gram / plot, PKA2 = 3400 gram / plot, PKA3 = 460gram / plot. The experiment consisted of 12 combination treatment units and each treatment was repeated three times so that 36 units of research plots were needed. The ingredients used in the experiment were curly lettuce seeds of

the Grand Rapids variety. the Red Arrow brand was obtained from Boaventura Shop, BidauAkadiru-Hun Village, Cristo Rei District, Dili District, as much as 200 kg of chicken manure were obtained from the NCBA Company Stall and *Leucaena* LEAF green fertilizer, Gamal leaves. The tools used include; plows, hoes, sickles, plastic buckets, flushes, shovels, measuring cups, sitting scales, analytical scales, ovens, meters, rulers, raffia ropes, plastic bags, handcounters, writing instruments, soil pH, digital cameras. High growth per green mustard plant, number of leaves per mustard greens, stem diameter of mustard greens, and economical fresh weight of green mustard plants. Data collected was analyzed by analysis of variance (ANOVA) in accordance with the experimental design used. if there is a real interaction effect on the observed variables, the assessment is continued with an average difference test using the dmrt and bnt test at the level of 5% (Gomez and Gomez, 2007).

RESULTS AND DISCUSSION

Research Results: In this study planting experiments did not experience interference, both pests, mammary diseases and other disorders. The results of the statistical analysis showed that the administration of *Leucaena* Gamal (PHDLG) leaf leaves and chicken manure (PKA) had a very significant effect ($P < 0, 01$) on all variables observed for plant height at the age of observation 2 and 4 weeks after planting. (2WAC). While for the 6th week administration of leaf green doses of *Laeucaena*. Gamal (6MST) did not give a significant effect, while for observations at the age of 8 weeks after planting (8WAC) there was no interaction between administration of green manure leaves *Laeucaena*. Gamal leaf (PHDLG). To observe the number of leaves at the age of 2 weeks after planting the administration of leaf green doses of *Laeucaena*. Gamal (PHDLG) had a very significant effect ($P < 0.01$), while for observations on the number of leaves at 4 weeks after planting (4MST), giving chicken manure dosage had a very significant effect ($P < 0.01$), but for application of leaf green doses of *Laeucaena*. Gamal (PHDLG) did not have a significant effect ($P \geq 0.05$) besides that there was also no interaction between concentration of green leaf doses of *Laeucaena*. Gamal (PHDLG) and concentration of chicken manure doses (PKA). As for the observation of the number of leaves at the age of 6 weeks after planting (6WAC), administration of *Laeucaena*. Gamal (PHDLG) leaf green manure did not have a significant effect ($P \geq 0.05$), but for giving chicken manure doses (PKA) the effect was very significant ($P < 0.01$), as well as the interaction between the administration of leaf green doses of *Laeucaena*. Gamal (PHDLG) and administration of chicken manure doses (PKA) had a very significant effect ($P < 0.01$). To observe the number of leaves at 8 weeks after planting (8MST), concentration of *Laeucaena*. Gamal (PHDLG) leaf green fertilizer gave a significant effect ($P < 0.05$), while the administration of chicken manure doses (PKA) had an effect very significant ($P < 0.01$), and also for the interaction between the concentration of leaf green doses of *Laeucaena*. Gamal (PHDLG) and administration of chicken manure doses (PKA) had a very significant effect ($P < 0.01$). For observations of stem diameter and economical fresh weight at 8 weeks after planting (8MST), administration of green leaf doses of *Laeucaena*. Gamal (PHDLG) by administering chicken manure doses (PKA) did not have a significant effect ($P \geq 0.05$), as well as the interaction between administration of green leaf doses of *Laeucaena*. Gamal (PHDLG) and administration of chicken manure doses (PKA) did not have a significant effect ($P \geq 0.05$).

DISCUSSION

Tall Mustard Plant (cm) 5.2.1. Tall Mustard Plant (cm) From the results of analysis of variance (Anova) on mustard plant height (Appendix 1.a.) Showed that the administration of Green Leaves of *Laeucanea*. Gamal (PHDLG) and concentration of Chicken Cages (PKA) gave a very significant effect ($P > 0.01$) on the mustard plant age of 2MST, except for plant height at the age of 4MST the concentration of chicken manure doses (PKA) had a very significant effect ($P > 0.01$), but for concentration of green manure doses of *Laeucanea*. Gamal (PHDLG) only had an effect real ($P > 0.05$), as well as the interaction only gave a significant effect ($P > 0.05$). For observations on plant height at 6 weeks after planting (MST) the administration of chicken manure doses (PKA) had a very significant effect ($P > 0.01$), while interactions between administration of green manure doses of *Laeucanea*. Gamal (PHDLG) and dosing chicken manure (PKA) only had a significant effect ($P > 0.01$), while for the dose administration of *Laeucanea*. Gamal (PHDLG) leaf fertilizer did not have a significant effect ($P < 0.05$) of plants at 8 weeks after planting (MST), administration of green leaf doses of *Laeucanea*. Gamal (PHDLG) and the interaction between administration of green leaf doses of *Laeucanea*. Gamal (PHDLG) and administration of chicken manure doses (PKA) did not give a significant effect ($P > 0.05$), but for fertilizer doses Chicken coops (PKA) have a very significant effect ($P > 0.01$). From the results of analysis of variance (Anova) on the number of leaves of mustard plants (Appendix 2.a.) showed that, to observe the number of leaves of mustard plants at the age of 2 weeks after planting (MST), administration of green manure leaves *Laeucanea*. Gamal (PHDLG), and the interaction between administration of green leaf doses of *Laeucanea*. Gamal (PHDLG), and concentration of chicken manure doses (PKA) gave a significant effect ($P > 0.05$), but for giving doses of chicken manure (PKA) gave a very real ($P > 0.01$), for observing the number of leaves at the age of 4 weeks after planting (MST), administering green leaf doses of *Laeucanea*. Gamal (PHDLG), and interacting between administration of green fertilizer doses of *Laeucanea*. Gamal (PHDLG), and the administration of chicken manure doses (PKA) did not have a significant effect ($P < 0.05$), but the administration of chicken manure doses (PKA) had a very significant effect ($P > 0.01$).

And for observations on the number of leaves at 6 weeks after planting (MST), administration of *Laeucanea*. Gamal (PHDLG) leaf green manure, did not have a significant effect ($P > 0.05$), but for administering chicken manure doses and interactions between administration *Laeucanea*. Gamal (PHDLG) leaf green doses, and chicken manure doses (PKA) gave a very significant effect ($P > 0.01$). As for the observation of the number of leaves at 8 weeks after planting (MST), administration of *Laeucanea*. Gamal (PHDLG) leaf green manure, only gave a significant effect ($P > 0.05$), while for giving chicken manure doses (PKA) and the interaction between administration of green leaf doses of *Laeucanea*. Gamal (PHDLG), and concentration of chicken manure doses (PKA) had a very significant effect ($P > 0.01$). While the results of analysis of variance (Anova) on stem diameter and economical fresh weight of mustard plants (Appendices 9.a. and 10.a.) indicate that, for observation of stem diameter and economical fresh weight at the age of 8 weeks after planting (MST), administration of *Laeucanea*. Gamal (PHDLG) leaf green manure and concentration of chicken manure doses (PKA) and their interactions between the two fertilizer combinations did not have a significant effect ($P < 0.05$). At the age of 2 MST mustard plants are still small so that mustard plants need hormones to grow for relatively small

amounts of apical meristem cell division activities. Application of *Laeucanea*. Gamal (PHDLG) leaf green manure (PHDLG) combined with chicken manure doses (PKA) gave good results on mustard plant height in all treatments except fertilizer without fertilization.

It is presumed that the treatment without fertilization could not meet the needs of these plants in the process of increasing plant height, because in the treatment without administration of green manure leaves *Laeucanea*. Gamal (PHDLG) and chicken manure (PKA), so that the nutrients needed by plants in phase the growth cannot be fulfilled, while the nutrients needed by plants are only supplied from the ground. Providing *Laeucanea*. Gamal (PHDLG) leaf green manure and chicken manure (PKA), into the soil for the better, because it can supply the availability of nutrients in the soil, so that nutrient requirements for mustard plants can be fulfilled in the vegetative growth phase. Increasing age, more and more growth hormones are needed for the process of growth and development of plants. It is seen that the mustard plant height at the age of 2 WAC, 4 WAC, 6WAC and 8 MST, the highest average found in the combination treatment (PHDLG1PKA3 and PHDLG2PKA2) showed significant differences. The results showed that administration of green leaf doses of *Laeucanea*. Gamal (PHDLG1), 1.20 kg / plot combined with 3.60kg / plot of chicken manure doses gave the highest yield on mustard plants namely 20-24 cm or 7.88%.

Number of Leaves of Green Mustard Plants (strands): Giving organic fertilizer can increase nutrients in the soil, so that plant growth increases with the availability of nutrients. This is supported by Lakitan's theory (1996), there is a synchronization between the availability of nutrients and the needs of plants so that they can help speed the growth of plants. This is also supported by Sarief (1992), who stated that organic fertilizers incorporated into the soil will be decomposed by microorganisms and nutrients released from decomposition into available and absorbed by plant roots, so that plant growth will increase, especially plant height. The results of analysis of variance (Anova) on the number of leaves of mustard plants (Appendix, 4.2.) Showed that administration of *Laeucanea*. Gamal (PHDLG) leaf green manure with chicken cage fertilizer dosage (PKA) had a significant effect ($P < 0.05$) and very significant ($P < 0.01$) on the number of leaves of mustard plants aged 2 MST, and at age 4 MST, administration of *Laeucanea*. Gamal (PHDLG) leaf green manure, did not have a significant effect ($P < 0.05$) as well as interactions, while to administer chicken manure doses (PKA) had a very significant effect ($P < 0.01$). at 6 weeks after planting 6 MST fertilizer dosing (PHDLG) did not have a significant effect ($P < 0.05$), but for the provision of doses of chicken manure (PKA) with interactions that had a very significant effect ($P < 0.01$). whereas for the age of 8 weeks after planting (MST) the administration of green leaf doses of *Laeucanea*. Gamal (PHDLG) gave a significant effect, but for the administration of chicken manure doses (PKA) and their interactions gave a very significant effect ($P < 0.01$). Stem diameter and economical fresh weight at 8 weeks after planting (MST), administration of *Laeucanea*. Gamal (PHDLG) leaf green doses and administration of chicken manure doses (PKA) and their interactions between the two fertilizer combinations did not have a significant effect ($P < 0.05$).

The application of *Laeucanea*. Gamal (PHDLG) leaf green manure (PHDLG) combined with chicken manure (PKA) doses gave good results to the number of mustard plant leaves in all treatments except treatment without fertilization. In general, the differences in the types of leaf green doses of *Laeucanea* Gamal

combined with doses of chicken manure significantly affected the vegetative growth of plants. From the average data from the results of the research, it can be seen that there is a tendency to increase plant growth by increasing the dose of organic fertilizer. With the increase in the amount of organic fertilizer given to the soil, the amount of nutrients also increases, so that the availability of nutrients in the soil needed for plants is fulfilled. In other words, plants that are fulfilled by their nutrient requirements can stimulate new leaf growth. Increasing age, more and more growth hormones are needed for the process of growth and development of plants. It is seen that the number of lettuce leaves at the age of 2MST, 4MST, 6MST and 8MST, the average number of leaves of the plant was more in combination treatment (PHDLG3PKA0) and different while the treatment without fertilization (PHDLG0 PKA0) showed no significant difference. The results showed that administration of green leaf doses of Laeucanea. Gamal (PHDLG3) 3.60gram / plot combined with chicken manure doses (PKA0) 0 gram / plot gave the highest number of leaves of mustard plants, 13 strands or increased by 6.67%. The results showed that the administration of organic fertilizer can increase nutrients in the soil, so that plant growth increases with the availability of nutrients. Plants that are fulfilled by their nutrient requirements will stimulate new leaf growth. The number of leaves is positively correlated with plant height, the higher the plant, the more the number of leaves. Increasing plant height will increase the number of segments and books so that the number of leaves will also increase, this is because the segments and books are where the leaves stick. This is supported by the theory of Sitompul and Guritno (1995) stating that the stem is composed of segments and books where the leaves are attached. Reinforced by Rinsema (1986) states that, the N element plays an important role in leaf formation because with N availability the photosynthesis process will increase and the photosynthate produced can be used by plants for leaf formation.

Conclusion

Based on the results of research on the influence of the types and doses of green manure leaves of Laeucanea. Gamal and chicken manure on growth and yield of mustard greens caisin (*Brassica Juncea L.*). The results of the study showed that among the four parameters observed in the growth of Caishin green mustard plants, it was indicated that the effect of Leucaena leaf green manure, Gamal leaf on plant height parameters at week 2 and week 4 of MST. Likewise, the influence of chicken manure can affect the growth of tall green mustard greens in the weeks 2,4,6 and 8 WAC. On the other hand, the combination of Leucaena leaf green manure, Gamal leaf and pp chicken manure can also influence the growth of mustard plant height at weeks 2.4 and 6 WAC. From the results of the research on the parameters of leaf number, it indicates that the influence of Leucaena leaf green fertilizer, Gamal leaf can affect the parameters of the number of leaves of green mustard plants in the 2nd and 8th weeks of MST. Likewise the influence of chicken manure can affect the growth of the number of leaves of the green mustard greens in the weeks 2,4,6 and 8 MST. In contrast, the combination of Leucaena leaf green manure, Gamal leaf and chicken manure can also affect the growth of the number of mustard plant leaves at weeks 2.6, and 8 of WAC.

While the administration of Leucaena leaf green manure, Gamal leaf did not affect the parameters of the green mustard plant at the 6th and 8th week and the combination of green leaf fertilizer from Laeucanea. Gamal leaf and chicken manure at the 8th week of WAC, while the parameters of the number of leaf plants

green mustard leaves of Leucaena green manure, Gamal leaf did not affect the growth of the number of leaves of mustard plants at the 4th and 6th weeks, as well as the combination of Leucaena leaf green manure, Gamal leaf and chicken manure could not affect the growth of the mustard leaves green at the 4th week. The effect of Leucaena leaf fertilizer, Gamal leaf and chicken manure did not have a significant effect on the stem diameter of green mustard plants in the 8th week of MST. Likewise on the economical fresh weight parameters of green mustard plants, the influence of Leucaena leaf green manure, Gamal leaf and combination with chicken manure did not affect the economical weight of fresh green mustard plants in the 8th week of WAC.

Suggestions

With the implementation of this study entitled "Effect of green manure dosages of Laeucanea. Gamal and chicken manure on growth and yield of green mustard caisin (*Brassica Juncea L.*).then researchers can suggest that: 1. From the results of this study, further research is needed to find out in detail the effect of the types and doses of Leucaena leaf green manure, Gamal leaf and chicken manure on the growth and maximum yield of green mustard plants in order to guarantee market needs. 2. Further research is needed to review the effect of the types and doses of Leucaena leaf green manure, Gamal leaf and chicken manure on the parameters of fresh root weight, fresh leaf weight, fresh weight of stem and total fresh berate in order to refine this study.

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