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Effect of Manure and Fertilizer Nitrogen Doses on Growth and Crop Kale Army *(Ipomeae Reptan Poir)*

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ABSTRACT

This study aims to determine how far a combination of manure and urea fertilizer influence on the growth and yield of kale land. Percobahan do in the garden percobahan Merdeka University Faculty of Agriculture, Surabaya, in the village of the District Karah Jambangan Surabaya. This research method using Randomized Trial group (RAK) factorial arranged, composed of two factors, namely: manure with 3 levels of treatment and the provision of nitrogen fertilizer (urea) with three levels of treatment. Maing each treatment was repeated 3 times and each combination treatment consisting of two plants. The results show there is no interaction on manure and nitrogen fertilizer dosage in all parameters of both observation plant leaf number, plant height and fresh weight pertanaman.begitu also manure does not provide real pengarruh against all plant nitrogen fertilizer dosing significant effect on parameter above the number of leaves, plant height, fresh weight per plant.

Keywords: Watercress Army, Manure, Nitrogen Fertilizers, RAK.

1. INTRODUCTION

Indonesia require residential land. Excessive use of housing land agricultural lands Reduces environmental changes will impact surrounding area. Limitations of use of agricultural land due to the construction of housing in need of good quality soil in increasing food production (Mahrus, Abrams, Cholil & Wiwoho, 2017). Kale plants(Ipomoea*reptans*Poir)is a vegetable that has economic value and spread quite wide area of Southeast Asia. Some countries that pioneered the commercial cultivation of intensive and is Taiwan, Thailand, Philippines and Indonesia. Kale land, generally consumed by the people of Indonesia becomes one of the menus in diners (Rukmana, 2005).

Kale plant is a plant that is relatively resistant to drought and has a broad adaptability to a variety of environmental conditions to grow, easy maintenance and has a short harvest period. Generally, kale plants planted in the ground only a fraction yards and intensively grown on dry land, so as to optimize the production of watercress is still lacking. Kale vegetable needs tend to increase in line with increased awareness of the importance of nutrition and the many restaurants serving vegetable kale as one of their menus. Kale production in Indonesia can reach 500000-600000 kg per hectare(Marsusi,2010).

Although kale vegetable prices are relatively cheap, but when cultivated intensively and oriented towards agribusiness will provide a sizable profit for farmers. Kale crop

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marketing opportunities more widely, because not only can be sold at local markets area, but also has many ordered by supermarkets. The entry of kale vegetables to supermarkets to raise prices of these vegetables (Susila, 2006).

Cultivation of kale ground is very easy, because this vegetable crop cycle quickly and relatively resistant to pests. Therefore, the price is relatively cheap compared to the market kale other vegetables. To increase the value added, we can do organically cultivated land kale. Price kale organic land is relatively higher. Technical information regarding kale plants as a source of vegetable crops vitamins and minerals and plant cultivation opportunities such as an additional source of income of farmers in Indonesia, have been developed by researchers at the Research Institute of Vegetable Crops in the form of monographs.

Recognizing the limited cultivation of technical information and research on kale plants in Indonesia, then this article is based on the theories written compared with the results of direct practice. It is expected that this paper will inspire readers especially groups of people who will grow crops or farmers to be able to cultivate crops of kale on a limited land area (in polybags) on a commercial scale as a source of income (Ali, 2015). The use of nitrogen fertilizer is very bergaruh against kale crop production, where the use of nitrogen fertilizers in a manner in tungal around kale plants.

Eligibility plant occurs during the plant canopy and perakkaran plants touch each other, but at the beginning of the growth of competences has not happened yet because it is still sufficient space for plant growth. Competence will occur earlier if a high plant population level, but on a population level that is lower when the plant will be slower competence so that better crop growth.

In planting kale, fertilizer needed two types of organic manure and chemical fertilizers. Organic fertilizer or manure is given before planting, uses in 1 hectare requires one ton. While chemical fertilizers in the form of nitrogen (urea) 150-200 kg / ha. (Chaimatul Azmi, 2007).

2. METHODS

This experiment using Random Design Group (RAK), arranged in a factorial consisted of two factors: manure with 3 levels of treatment and administration of Nitrogen fertilizer (Urea) dengn 3 Level treatment. Each treatment was repeated 3 times and each combination treatment consisting of two plants. Factor I: Dose Manure K1: 5 tonnes / ha (25 g / polybag), K2: 10 ton / ha (50 g / polybag), K3: 15 ton / ha (75 g / polybag). Factor II:

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Nitrogen Fertilizer Dosage N1: 50 kg / ha (0.25 gr / polybag), N2: 100 kg / ha (0.50 gr / polybag), N3: 150 kg / ha (0.75 gr / polybag) ,

3. RESULTS AND DISCUSSION

3.1 High

Cropson plant height variance analysis showed no interaction between treatment doses of manure at a dose of nitrogen fertilizer at all ages. Likewise dosage of manure did not significantly affect plant height at all ages. While the dosage of nitrogen fertilizer significant effect on plant height at the age of 17, 24 and 31 (HST). The observation of high dose treatment plant as a result of manure and nitrogen fertilizer dosage at present in Table 1 as follows:

Table 1. Average High Plant Kale Various Observations on the Treatment Dose and Dose Manure Nitrogen Fertilizer

Treatment	High AvgPlant (Age)			
manure	10	17	24	31
manure				
K_1	5,29	13,96	26,36	26,36
K_2	5,80	14,18	27,12	27,12
K	5,93	13,86	26,73	26,73
BTN 5%	tn	tn	tn	tn
Nitrogen Fertilizer				
N_1	5.32	13,89ab	26.03 a	35, 87 a
N_2	5.70	14.60 b	27.12 b	37.06 b
N_3	6.00	13.50 a	27.06 b	36.87 b
BTN 5%	tn	0.78	0.76	0.99

Description: the numbers followed by the same letter in the same column are not significantly different at LSD 5%

in (table 1.), munujukkan that the highest average plant height was obtained on treatment ($N_{2),}$plant age of 17, 24, and 31 days after planting. Growth on the plant kale many judged on the basis of plant height and number of leaves were the highest, based amsumsi that plant height and number of leaves is closely related to the production of crops in general, the higher the plant the greater the number of leaves, but in a phase of vegetative relation plant height, leaf number and fresh heavy cropping in certain periods are not always tightly, it can be caused by wilting plant growth speed is not constant during the vegetative phase. Changes withered plant growth caused by genetic factors and tangapan crop plants against environmental factors such as light, temperature and the availability of certain nutrient elements in the soil (Gunadi and buana 1985).

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Increasing applications of nitrogen fertilizer were followed by manure will increase the length of plant development and plant growth such as cell division, and cell pemanjagan cell formation and the establishment of new networks requires carbohydrates which syntheses carbohydrates heavily influenced by nitrogen. If the rate of growth and elongation of cells and tissue formation running fast, then the growth of stems, leaves and roots will run faster anyway (Dwidjoseputro, 1978).

According Rissema (1983), the nitrogen in the manure can be provided to the plant after nitrifikaasi process, a process of oxidation of ammonia menjaadi Nitri made by the bacteria nitrosomonas, then from Nitri which is converted to nitrate with the help nitrobakteri.

3.2. Number of Leaves

Results analysis of variance on the number of leaves does not address the interaction between the dosage of manure with a dose of nitrogen fertilizer at all ages observations. Separately dosage of manure was also no effect on the number of leaves at the age of 10, 17, 24, and 31 days after planting. While the dosage of nitrogen fertilizer significant effect on the number of leaves at the age of 24 and 31 days after tanam.Nilai average number of leaves due to observations dose treatment of manure and nitrogen fertilizer dosage served pada.tabel 2.

Table 2. Average Number Plant leaf kale Various Observations on the treatment dose and dose manure Nitrogen Fertilizer

treatment	average Number of leaves (Age)			
manure	10	17	24	31
manure				
K_1	2:03	4.88	8.87	9.06
K_2	2.02	4.94	9.10	9.54
K_3	2.09	4.61	9.09	9.26
BTN 5%	tn	tn	tn	tn
Nitrogen Fertilizer				
N_1	2.01	4.70	8.87 a	8.89 a
N_2	2.07	4, 91	8.86 a	9.52 b
N_3	2.07	4.82	9.33 b	9.44 b
BTN 5%	tn	tn	0.39	0.53

Description: the numbers followed by letters samapada column the same was not significantly different at LSD 5%

in table 2 shows that the highest number of leaves on the treatment dose of nitrogen fertilizer, N_2 (9.52) while the fewest amount of leaf that is at N_1 (8.89). Improving manure application also followed miningkatnya number of leaves. It is suspected that the dose given

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sangup manure improves soil structure, making it easier absorption of nutrients by plants in the form provided. According Lingga & Marsono (2007) of manure in addition to providing the nutrients plants can also improve the physical, chemical and biological soil.

Plants absorb most of the nitrogen in the NH_4^+ and NO_3^- Whatever the form of nitrogen absorption by plant roots, but ended up in the body of the plant is converted into reduced form -NH_2 (Amida), which later merged with karbosida acid forming amino acids. Furthermore, the amino acids are the basic ingredients for the formation of proteins necessary for the construction of protoplasm. Therefore, nitrogen is an essential component for the sumua living material (Soeparno. 1992).

Nitrogen in the soil initially increase growth above ground and gives green on the part of the plant. In all crops, nitrogen memrupakan highly influential element in addition to calcium, fasfor and other elements (Leiwakabessy, 1985).

Nitrogen fertilizer needed for growth of plant roots, stems and leaves so green-forming material, karboidrat income (Rinsema, 1983). Nutrient elements N, Mg, Fe, P, and Mn directly in the process of photosynthesis and respiration. Carbohydrates, didefisiensinya will cause a decrease in photosynthetic capacity will further reduce the supply of energy for the absorption of nutrient elements. The mentioned above also occur in the nitrogen fertilizer according to Lingga and Marsonz. (2007) Nitrogen Fertilizer plants need for growth of roots, leaves, stems, and as the green leaves forming material as well as producing carbohydrates.

To gain efficiencies optimal fertilization fertilizer should be administered in an amount sufficient for the plants, not too much nor too little or less, when given too much fertilizer the soil solution will be too thick so that it can lead to toxicity in plants, but otherwise if diberika too little tangap plants to fertilization will not be Visible. Fertilizing in the right amounts can obtain optimal production (Setjamidjaya, 1986).

3.3. Fresh weight per

Cropsanalysis of variance of the fresh weight per plant, showed no interaction between treatment doses of manure at a dose of nitrogen fertilizer at planting fresh weight. Separately, a dose of manure treatment had no effect on plant fresh weight. While the dosage of nitrogen fertilizer (urea) give real effect.

The observation of the fresh weight of crop due to the dosage of manure and nitrogen fertilizer doses are presented in Table 3.

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Table 3. Average per plant fresh weight At the End of observation (31 days after planting) In Treatment Dose and Dose Manure Nitrogen Fertilizer

Treatment	stocking of Fresh weight average cropping
manure K_1 K_2 K_3	 15.54 16.24 16.22
5%BTN	tn
Nitrogen Fertilizer N_1 N_2 N_3	 14.66 a 16.65 b 16.69 b
BTN 5%	1, 70

Description: the numbers followed by the same letter in the column are significantly different samatidak on LSD 5%

table 3 shows that on average the highest fresh weight was obtained in treatment ($N_{3)}$yaitu16,69. While the average weight of the fresh crop of at least the treatment of $N_{1,}$ namely, (14.66). These results showed that increasing the fertilizer and nitrogen fertilizer will increase the fresh weight, total crop. It is suspected that at a certain limit (optimal), the rate of absorption of nutrient elements by plants also the optimum limit, sahingga if the dose of fertilizer will result in fresh weight plus increase. Fresh weight of crop is the result of the process of photosynthesis, which could take place when facto externalities menujang against the ongoing phase of photosynthesis tersebuut. According Harjadi (1999), photosynthesis is a process in which carbon dioxide and water under the influence of light is converted into organic compounds that contain carbon and energy-rich light energy into chemical change is the most prominent life process.

One special physiological properties owned by the plant is the ability to use of carbon from the air to be converted into organic materials as well as in the body tanaman.Peristiwa disimilasikan only take place if there is enough light, and therefore the assimilation of carbon is called photosynthesis. Photosynthesis or assimilation of carbon that a process in which inorganic substances by chlorophyll is converted into organic karboidrat with the help of light. Chemical changes into chemical energy and chemical energy into energy pegubahan work on respiratory events in the plant body is a series of life process (Dwidjoseputro, 1978).

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4. CONCLUSION

The study concluded there is no interaction at doses of manure and nitrogen fertilizer (urea) in all parameters of a good crop observations of plant height, leaf number and fresh weight of crop. Tidakberpengaruh manure application on the parameters plant height, leaf number and fresh weight per plant and dosing schedule of nitrogen fertilizer (urea), giving a real influence on the parameters plant height, leaf number and fresh weight per plant.

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