

## Effect of Liquid Organic Fertilizer of Cow Manure on Growth and Production of Kangkung Darat (*Ipomea reptans*)

Dahlan<sup>1</sup>, Kaharuddin<sup>1</sup>, Ismaya NR Parawansa<sup>1\*</sup>, Syaifuddin<sup>1</sup>,  
Ummu Aimanah<sup>1</sup>, and Yulius RS<sup>2</sup>

<sup>1</sup>Gowa Agricultural Extension College (Sekolah Tinggi Penyuluhan Pertanian Gowa),  
South Sulawesi, Indonesia

<sup>2</sup>BP4K District of Konawe Southeast Sulawesi, Indonesia

**Abstract:** This research aims to determine the effect of liquid organic fertilizer of cow manure at various dosage on the growth and production of *kangkung darat* (*Ipomea reptans*). This research was conducted in Samata Village, District of Somba Opu, Gowa Regency from May until June 2014. This research was arranged according to randomized block design, which consists of 3 replications and 5 treatments i.e.: P0 (0 L ha<sup>-1</sup>), P1 (8.33 L ha<sup>-1</sup>), P2 (11,11 L ha<sup>-1</sup>), P3 (13,89 L ha<sup>-1</sup>), and P4 (16.66 L ha<sup>-1</sup>). Parameters was measured are: height of plant, number of leaves, and production. Data was analysed by using analysis of variance followed by LSD test. Result of the research showed that liquid organic fertilizer of cow manure have significant effect on height of plant and number of leaves at 3 and 4 weeks after planting. P2 (11,11 L ha<sup>-1</sup>) is better than other dosage caused have positive response to using of liquid organic fertilizer of cow manure on growth and yield of *kangkung darat* (*Ipomea reptans*).

**Keywords:** Liquid organic fertilizer, cow manure, kangkung darat (*Ipomea reptans*).

### Introduction

Using of synthetic chemical fertilizers in Indonesia, which has been increasing since 1975 until now. Simanungkalit(2001)<sup>1</sup> revealed that for approximately the past 20 years an increase in using of chemical fertilizers almost every year continues to increased. While the production of food crops by using of fertilizers is only increased 50%. This shows that using of inorganic fertilizers is very inefficient and even tends lead to a decline in land productivity due to declining soil organic matter content. Nugroho(2000)<sup>2</sup> states that areas of critical land which is currently spread in Indonesia is expected to grow each year covering 43 million hectares, as an indication that efforts towards the preservation of agricultural land has not been carried out correctly.

Recognizing this, has strived forms of alternative technologies to suppress the excessive use of chemical fertilizers, one of them by utilizing cow manure waste to be used as a liquid organic fertilizer. Liquid organic fertilizer is one of the inorganic fertilizers that are environmentally friendly and easy to making and easy to obtain because the raw materials are all around the environment farmers farming on the other hand is expected to reduce the dependence of farmers on chemical fertilizers

Consequently, can only be realized now has been a decline in soil fertility. The emergence of pests and plant diseases due to damage to the biological balance by using of synthetic pesticides, and endangerment of the environmental and human health damage as a result of residual agricultural chemicals. As a result of the land tillage that do not pay attention to the conservation principles, although by reason to increase productivity and food needs.

Junaedi(2005)<sup>3</sup> suggests that organic agriculture in Indonesia could be an alternative choice of food needs in Indonesia in the long term. Short-term goals of organic farming system is public awareness and farmers will need to preserve the land and protecting the environment by reducing the use of synthetic chemicals such as chemical fertilizers and pesticides, and try his best utilize natural materials around them. For the long term, the potential for organic products in the world market wide open for Indonesia.

Given an increase from year to year due to increasing population needs. The possibility to implement organic farming in South Sulawesi has a huge potential to be developed as it is supported by the potential of natural resources. Raw materials for liquid organic fertilizer from cow manure sufficiently available and even abundant in South Sulawesi. Fabrication of liquid organic fertilizer of cow manure can be developed in South Sulawesi as supported by cow population which is quite a lot which is about 1.070.000 cows. For Gowa regency has 88.832 cows consists of 54 dairy cows and 88.778 beef cows. Particularly in Samata village has 175 cows could supply manure as organic fertilizer raw materials as much as 23.59 kg day<sup>-1</sup> or 4,128 tonnes day<sup>-1</sup>.

## Materials and Methods

This research was conducted from April until May 2014, in Samata Village, District of Somba Opu, Gowa Regency. The research was arranged according to randomized block design, which consists of 3 replications and 5 treatments i.e.: P0 (0 L ha<sup>-1</sup>), P1 (8.33 L ha<sup>-1</sup>), P2 (11,11 L ha<sup>-1</sup>), P3 (13,89 L ha<sup>-1</sup>), and P4 (16.66 L ha<sup>-1</sup>). Parameters was measured were: height of plant, number of leaves, and production. The data were analyzed using analysis of variance followed LSD test for determine the effect of treatment on the growth and production for all parameters were measured.

## Results

Result of LSD test for the effect of liquid organic fertilizer of cow manure on height of plant, number of leaves, water content of plant, and production showed at Table 1, 2, and 3.

Based on data from Tables 1 and 2 indicated that the liquid organic fertilizer of cow manure just have significant effect at week 3 and 4 after planting on plant height and number of leaves. Whereas for crop production, liquid organic fertilizer cow manure does not have significant effect (Table 3). LSD test results revealed that P2 is the best treatment because have significant different from the other treatments on plant height and number of leaves, whereas in production, P2 have the highest result although have not significant different from other treatments.

**Table 1. Effect of liquid organic fertilizer of cow manure on height of plant**

Treatment	Height of plant (cm) at 1-4 weeks after planting			
	1	2	3	4
P0	7,267	13,200	21,067 a	33,467 a
P1	7,200	14,067	26,067 a	38,667 ab
P2	8,067	16,533	33,600 b	48,733 b
P3	6,667	13,933	27,800 ab	38,867 ab
P4	7,533	14,533	29,867 ab	42,400 ab
LSD 0,05	tn	tn	7,366	10,388
CV (%)	7,489	13,602	14,134	13,785

Note: Values followed by different letters in each column represent significant difference according to LSD 0,05.

**Table 2. Effect of liquid organic fertilizer of cow manure on number of leaves**

Treatment	Number of leaves (sheets) at 1-4 weeks after planting			
	I	II	III	IV
P0	2,800	6,000	8,333 <i>a</i>	11,000 <i>a</i>
P1	2,933	6,200	9,333 <i>a</i>	12,733 <i>b</i>
P2	2,733	6,467	10,667 <i>b</i>	13,467 <i>b</i>
P3	2,933	6,000	9,600 <i>ab</i>	12,200 <i>ab</i>
P4	2,667	6,333	9,800 <i>ab</i>	12,400 <i>ab</i>
LSD 0,05	tn	tn	1,287	1,322
CV (%)	7,841	4,693	7,161	5,679

Note: Values followed by different letters in each column represent significant difference according to LSD 0,05.

**Table 3. Effect of liquid organic fertilizer of cow manure on production**

Treatment	Production (g)	Productivity (kg ha <sup>-1</sup> )
P0	653,31	3629,500
P1	746,69	4148,280
P2	956,65	5314,940
P3	653,31	3629,500
P4	863,31	4796,170
LSD 0,05	tn	tn
CV (%)	19,797	

## Discussion

Using of liquid organic fertilizer cow manure on growth of height of plant with various dosage as shown in Table 1, shows high growth of plants in each treatment. Results of analysis shows that P2 can provide the best possible impact of the other dosage. This condition is caused by the availability of nutrients in the soil so that plant growth is uneven (P2) is better than other treatments caused generally, organic fertilizer is a material that improves soil properties the most well compared to other. The value of organic fertilizers, especially contained macro nutrients as nitrogen (N), phosphorus (P), and potassium (K) is low, but organic fertilizer also contains other essential micro nutrients<sup>4</sup>.

Increase of height of plant at each treatment allegedly caused by an increased supply of nutrients derived from organic fertilizer liquid cow manure. While the effects of other treatments allegedly associated with nutrient concentrations uneven due to the dilution of organic fertilizer treatment was not optimal<sup>5</sup>. While the difference in treatment is influenced trends shown by *kangkung darat* suspected to be caused by differences in the nature of plant physiology related to the ratio between the nutrients in the solution around the roots of plants, crop nutrient needs, as well as the capacity of absorption<sup>6</sup>. The use of liquid organic fertilizer cow manure is generally able to increase the number of leaves. A significant increase in the number of leaves that occur in P2 at 3 and 4 weeks after planting. This is because the organic fertilizer in addition to containing macro and micro nutrients, are also able to improve soil moisture and improve soil drainage<sup>7</sup>.

Along with the growth of height of plant always followed the development of the number of leaves, will continue to form, is always followed by the formation of leaf primordium. The process of leaf formation begins with the emergence of a network of small protrusions (primordium leaves) on the side of a tip meristem buds. At the time of the end of the growing buds, new leaves start primordium formed according to a typical pattern for each type of plant. Leaves continue to grow at a rate of one leaf every 3-4 days during the early stages of growth.

Based on productivity, P2 have 5314,94 kg ha<sup>-1</sup> more higher than other dosage. The high productivity is due besides the nutrients contained in the soil, are also supported by following liquid organic fertilizer containing macro and micro nutrients that are essential for plants. Production capabilities greatly influenced by the rate of plant growth is directly influenced by the availability of nutrients in the soil<sup>8</sup>.

## Conclusion

Following of liquid organic fertilizer of cow manure at 11.111 L ha<sup>-1</sup> (P2) have significant effect on height of plant, number of leaves at 3 and 4 weeks after planting and better than other dosage.

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