The Effect of Natural Bioactivators on Growth and Nutrient Content of Taiwan Grass *(Pennisetum purpureum schumach)* in Marginal Soil

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Abstract- The aim of this study is to know the effect of natural bioactivator of noni fruit in liquid organic fertilizer in different level. Parameters of this research are fresh content, tiller number, plant height, dry weight, organic matter, water content, crude protein, crude fat, extract material without nitrogen, nitrogen, and ash of Taiwan grass (*Pennisetum purpureum schumach*) with 4 treatments i.e T-1, T-2, T-3 and T-4 and three groups of liquid organic fertilizer level i.e 5 ml; 10 ml; 15 ml and 20 ml. The results showed that the treatment had not significantly affected (P> 0,05) on the production and nutrient content of *Pennisetum purpureum schumach* in range of 5 ml to 20 ml. However, organic liquid fertilizer with the addition of natural bioactivator of noni fruit has better nutrient content than other fruit that is N = 1,84% P_2O_5 = 2,29%, K_2O = 2,5% and pH = 5,04.

Keywords: Bioactivator, Growth, Marginal Soil, Nutrition Content

I. INTRODUCTION

The role of fertilizer in productivity of agricultural land is alternative because fertilizer is important substance (nutrient elements) that must be given to the plant in order to grow and produce as well as other living things. Hasan et al (2016) revealed that plants need to provide maximum biomass production and reduce susceptibility to plant diseases.

On the other hand, development of ruminant livestock industry should be supported by the availability of forage in terms of quality, quantity and continuity throughout all year. Basically, the availability of forage feed comes from the 3rd to 8th land levels soil with poor nutrients and marginal soil (Hasan, 2015). Therefore we need to solve those problems by providing high production with high quality and palatability. One of the appropriate solutions is chemical fertilizer (inorganic) or organic fertilizer. Fertilizers, especially chemical fertilizers, are undoubtedly useful to increase the production/biomass of forage If used continually Goenadi, 2006; Hasan and Natsir, 2012). It was further reported that The use of N-fertilizer leads to soil hardening and glueing effect of urea compounds, As a result recently chemical fertilizer has been changed into organic fertilizer.

There are several ways to utilize liquid organic fertilizer, one of which is using natural bioactivator derived from abundant waste noni fruit, tomato, pineapple and banana, However**,** there is not enough study that provides how far the effects of these waste in forage production. Amlording to Noor (2003), bioactivators are Mixture of compounds that can stimulate bacteria to decompose hydrocarbons. Several studies report that bioactivator from cow urine that is fermented anerobally for 7 days has significantly affected growth and production of elephant grass biomass rather than other fertilizers (Singh and Amberger, 1997).

II. RESEARCH METHODS

A. Material Research

The bioactivator matter in this study were collected by pinapple, noni fruit, tomato and banana waste which is obtained from the waste of Lakessi Market of Pare-Pare the amount of 200 kg/day waste fruit. Each type of the waste is collected separately.

B. Sample Preparation and Collection

Each bioactivator matter was put into prepared fermented tube bucket (volume of 15 litres). 400 millilitres of molasses and 10 litre cattle urine were added and homogenized anaerobically. After that, all matters were fermented for 1 week. Add 1 litre of H_2O into the liquid fertilizer produced before being sprayed to experimental plants.

C. Site Description

Field research was conducted in Field Laboratory at Muhammadiyah University of Pare-Pare on marginal soil. Land used is 5000 m^2 In large which was that divided by 12 plots sized 10 x5 meter/plot. The land was processed by hoe, that was rested for 1 week before planting so that with the aim that the mineralization process of organic materials could work quickly. The type of grass used to test liquid organic fertilizer is *Pennisetum purpureum schumach*. Plant material used is 3 segments of cuttings, 20 cuttings were planted on each plot each plot planted 20 cuttings with spacing of 50 x 50 cm.

D. Statistical Analysis

The fieldwork was designed by using a randomized block design (RBD), four (4) treatments, T-1, T-2, T-3 and T-4 with three (3) groups with liquid organic fertilizer levels; are 5 ml; 10 ml; 15 ml and 20 ml and was assessed by using SPPS 16

E. Research Parameters

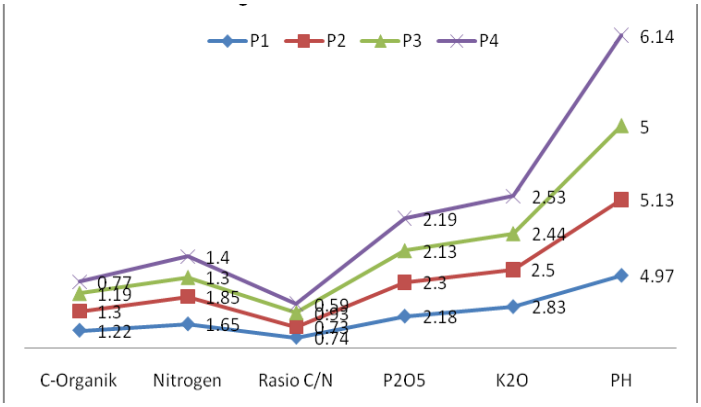
Fresh weight, number of tillers, plant height, dry weight, organic matter, water content, crude protein, crude fat, extract material without nitrogen, nitrogen, ash, Ca and P

III. RESULTS AND DISCUSSION

A. Nutrients of Natural Bioactivator

The average nutrient content of each natural bioactivator extraction is presented in figure 1.

Figure 1. The average nutrient content of of natural bioactivators



Description: The Influence is very significant (P <0.01).

P1 = Tomato + Cow urine. P2 = Noni + Cow urine.

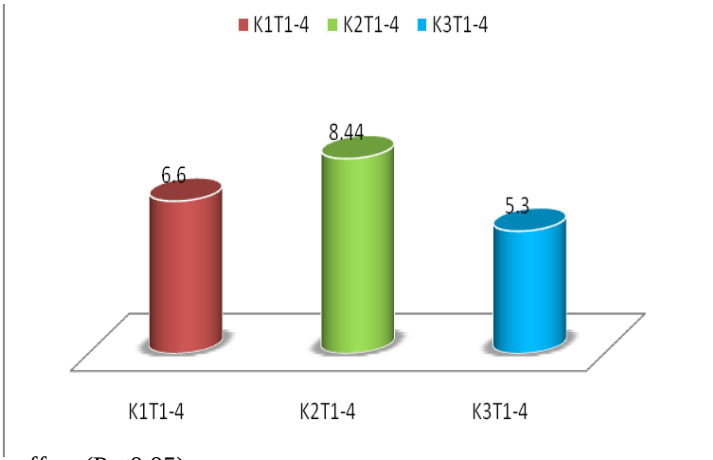
P3 = Pineapple + Cow urine. P4 = Banana peel + Cow urine

Analysis of variance indicated that the type of natural biactivator had significantly affected (P <0.01) on C-Organic, Nitrogen, C/N, P_2O_5, K_2O, and pH. The best nutrient content (Figure 1) is presented in the treatment of P2 among all treatments. This is caused by material contained in the fruit used as the bioactivator, in which the Noni fruit contains nutrients and high nutritional value two of which are nitrogen and protein. Waites et al revealed that (2001) biactivators contain scopoletin, routine, polysamlharide, ascorbic acid, β-carotene, I-arginine, proxironin, proxeroninase, iridoid, asperolusid, antidiable iridoid, fatty acids, calcium, vitamin B, amino acids, glycosides and glucose. In addition, Potterat and Hamburger (2007) stated that the extract of noni fruit contains calcium, sodium, potassium, nitrogen, protein, fat, carbohydrate and high calories.

B. Dry Matter Ingredients

Average contents of dry matter of *Pennisetum purpureum schumach* that were given Bioactivators is presented in figure 2:

Figure 2. Average contents of dry matter of Taiwan *Pennisetum purpureum schumach*



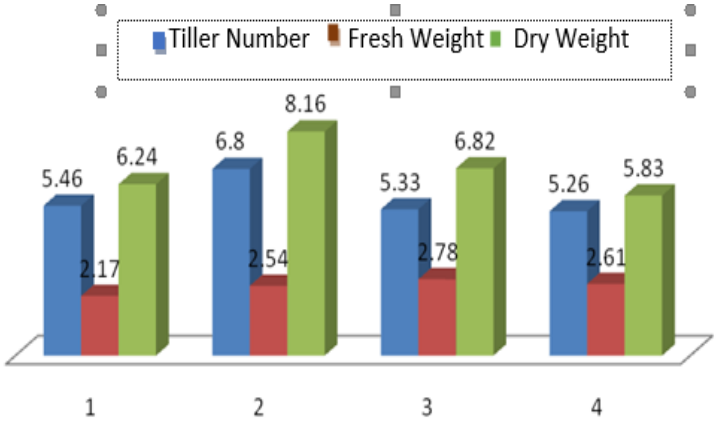
Description: Significant effect (P <0.05)
K1T1-4 = 95% *Pennisetum purpureum schumach* + 5% concentrate + Liquid organic fertilizer 5, 10, 15 and 20 ml
K2T1-4 = 90% *Pennisetum purpureum schumach* + 10% concentrate + Liquid organic fertilizer 5, 10, 15 and 20 ml
K3T1-4 = 85% *Pennisetum purpureum schumach* + 15% concentrate + Liquid organic fertilizer 5, 10, 15 and 20 ml

Analysis of variance showed that the use of bioactivator in *Pennisetum purpureum schumach* had significantly affected (P <0.05) content of dry matter of *Pennisetum purpureum schumach*. Figure 2 showed that the K2T1-4 treatment has the highest content of dry matter. K2T1-4 treatment has high content of dry matter because both the material used in bioactivator as liquid fertilizer and the content of dry matter of *Pennisetum purpureum schumach* have high dry matter content. A study conducted by Safatri (2015) indicates the same result, suggesting that There is an increase of dry matter in *Pennisetum purpureum schumach* that used liquid organic fertilizers, obtained at treatment level of 400 gr natural bioactivator of noni skin.

C. Forage Production

The average forage production given a natural bioactivator of noni fruit waste in liquid fertilizer to *Pennisetum purpureum schumach* production is presented in figure 3

Figure 3. Average number of Tillers, Fresh Weight and dry Weight of *Pennisetum purpureum schumach*



The effect is not significantly different due to the availability of N, P and K elements required by the plant for growth in nearly equal amounts (T1) 5 ml, (T2) 10 ml, (T3) 15 ml and (T4) 20 ml. Nutrient analysis contained in liquid fertilizer with natural bioactivator of noni fruit waste is 1.84% N total; 2.29% P2O5 and 2.5% K2O respectively. Applying the liquid fertilizer 2 times in seven days has not been able to increase *Pennisetum purpureum schumach*. While the availability of soil nutrients greatly affect the growth of *Pennisetum purpureum*. Kavanova and Glozer (2004) stated that the optimal supply of nutrients especially nitrogen (N), phosphorus (P), and potassium (K) in the soil for plants can increase crop production. The presence of N is enough to enlargement and prolongation of plant cells that affect the growth of plants while the phosphor is an element of preparation of cell nuclei and is very important in the process of cell division that will amlelerate plant growth.

Fresh grass-weight production of *Pennisetum purpureum schumach* had not significantly affected on each treatment level. It is known that the production is caused by the increase in plant height and number of seedlings in plant height and number of seedlings. The production of this plant is strongly influenced by the absorption of nutrients. Although not significantly different, the 5 ml (T3) treatment had the highest fresh weight production compared with T1, T2 and T4 treatments. This difference omlured because by the treatment of liquid fertilizer contains a number of nutritional elements that can be utilized by *Pennisetum purpureum schumach* o produce fresh weight. Onyeonagu and Asieghbu. (2012) stated that fertilization can increase the production of fresh weight of a plant because fertilization means adding food substances to plants that are useful for the growth of itself.

The dry weight of the plant is a reflection of the quality of the plant. No water is contaned in dry weight and there are only protein, fat and carbohydrates.. In Figure 1, there was no significant difference (P> 0.05) to dry matter content. Flores et al (2005) stated that *Pennisetum purpureum schumach* will grow well if desired conditions are met such as soil fertility, water sources and climate. However, it cannot be guaranteed that more doses given to the plant will further increase the growth of plant.

D. Nutrition Content

The data of natural bioactivator utilization of Noni fruit waste in liquid fertilizer to crude protein, crude fat, coarse fiber, extract material without nitrogen, and ash *Pennisetum purpureum schumach* is presented in Figure 4

Figure 4. The average of ash, crude protein, crude fat, crude fiber and extract material without nitrogen

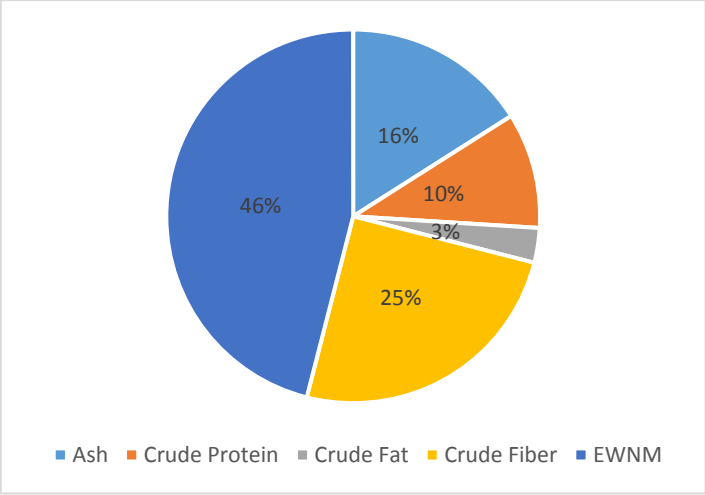


Figure 4 shows no significant difference Which is caused by the availability of elements N, P and K required by plants for growth in almost the same amount. One of the causes is the dose given in each treatment has not been able to produce optimal nutritional value. Lestienne et al (2006). stated that the provision of fertilizers containing N elements will increase vegetative growth of plants, which can also encourage metabolism of other elements such as P and K vice versa. Complete and balanced liquid fertilizers can increase plant growth and production activities well. Elements N, P and K are closely related to plant growth, since N, P and K serve to stimulate overall plant growth. The main role of nitrogen for plants is to stimulate overall plant growth, especially stems, branches and leaves. It also plays an important role in the formation of forages that are useful in the process of photosynthesis, forming proteins, fats, and various other organic compounds.

Rough protein content of *Pennisetum purpureum schumach* showed no difference (P> 0.05) from crude protein content. The average of grain protein content of *Pennisetum purpureum schumach* at each treatment ranged from 9.88% to 10.64% the lowest average is obtained in Taiwan grass treatment (T4) while the highest one is obtained in Taiwan treatment grass (T1) The difference omlured because the availability of nutrients given is still lacking so that the needs of the plants are not met properly. Amlording to Minson (1990), the content and composition of crude protein in forage is influenced by the availability of nitrogen in the soil, the result can inhibit the process of synthesis in plants. The content of N organic liquid fertilizer cannot be completely converted into amino acids to be assimilated into ammonium. The role of N for plants is very large because N is one of the elements of crude protein formation. Tisdale et al (1990) stated that the better the vegetative growth of a plant, the higher the production and nutrient content of the plant. The low nutrient element in the soil will cause less optimal plant growth.

IV. CONCLUSION

Adding biactivator of noni fruit in liquid fertilizer can improve nutrient content more than oter fruits until N = 1,84% P2O5 = 2,29%, K2O = 2,5% and pH = 5,04.

Giving liquid fertilizer in the range of 5 ml to 20 ml has not been able to give effect the production and nutritional content of *Pennisetum purpureum schumach***.**

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