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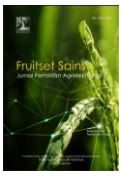

EFFECT OF GIVING BOKASHI COW MANURE AND TEMPE INDUSTRY LIQUID WASTE ON GROWTH AND PRODUCTION OF CORN (*Zea mays* L.)

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Abstract

Corn plants have a positive impact on human life, which can be used as raw material and can be fed to cattle. The purpose of this study is to identify the growth and production responses of the Maize (Zea mays L.) plant due to the delivery of the bokashi of cattle dirt and the liquid waste of the tempe industry. This research was carried out in February 2017 to June 2017 in the People's Farmland of Man Unidirectional Road, Klippa Town Village, Sei Tuan Percut District, Tembung Field. The scheme used is a factorial group random scheme (RAK) with 3 repetitions and consists of 2 factors. The results of the study show that the use of bokashi of cattle dirt gives a real effect on the high observation parameters, leaf length as well as stick weight on corn crops that have been observed and is not real on the observation of the number of leaves, the leaf area, the weight of dry seeds per plot. For use of liquid waste industry tempe gives a tangible influence on the length of leaf parameters at the age of 6 weeks after planting and the stick / plant weight per plot but has no tangible effect on observations of the plant height, leaves number, sheet width, dry seed weight for each plot.

Keywords: Corn, Bokashi, Industrial Liquid Waste Tempe

Abstrak

Tanaman jagung memberikan dampak positif bagi kehidupan manusia, yang dimana dapat dijadikan sebagai bahan pokok serta dapat dijadikan pakan ternak. Tujuan dari penelitian ini Untuk megetahui respon pertumbuhan dan produksi tanaman Jagung (Zea mays L.) akibat pemberian bokashi kotoran sapi dan limbah cair industri tempe. Penelitian ini dilaksanakan pada bulan Februari 2017 sampai bulan Juni 2017 di Lahan Perkebunan Rakyat Jalan Manunggal Ujung, Desa Bandar Klippa, Kecamatan Percut Sei Tuan, Medan Tembung. Rancangan yang digunakan adalah Rancangan Acak Kelompok (RAK) faktorial dengan 3 ulangan dan terdiri dari 2 faktor. Hasil penelitian menunjukkan bahwa penggunaan bokashi kotoran sapi memberikan pengaruh nyata terhadap parameter pengamatan tinggi , panjang daun serta berat tongkol pada tanaman jagung yang telah di amati dan tidak nyata terhadap pengamatan jumlah daun, luas daun, berat biji kering per plot. Untuk Penggunaan limbah cair industri tempe memberikan pengaruh nyata terhadap parameter panjang daun pada umur 6 minggu setelah tanam dan berat tongkol / tanaman per plot tetapi berpengaruh tidak nyata terhadap pengamatan tinggi tanaman, jumlah daun, luas daun, berat biji kering per plot. (9 pt).

Kata Kunci: Jagung, Bokashi, Limbah Industri Cair Tempe

1. INTRODUCTION

Corn (*Zea mays* L.) is one of the main food crop commodities which has a significant strategic role in improving the Indonesian economy. This commodity has many benefits, both for direct consumption and as the main raw material in the feed and food industry. It is also used as a bioenergy raw material in a number of countries (Ramayana et al., 2022) .

One of the agricultural subsectors that is still a priority for agricultural sector development is the food crop subsector, namely corn. Corn (*Zea mays* L) is a strategic food crop that contributes to Gross Regional Domestic Product (GRDP). Apart from that, corn is a food commodity that is the second source of carbohydrates after rice, which has a strategic role in the national economy. Its position as the main food source has a fairly high opportunity to be developed as a raw material for the food processing industry (Indra Setiawan, 2020) .

To meet the increasing demand for corn crops, crop productivity must be increased significantly so that the crop can meet demand for both consumption and export. Efforts to

increase corn productivity continue to be made by implementing appropriate cultivation technology in several locations. The use of superior varieties that are suitable for the growing environment is one technology that can be used to increase corn productivity (Nazirah et al., 2022) .

In intensive agricultural systems, fertilization is very important. Because plants absorb nutrients, the availability of nutrients in the soil will decrease. As a result, there is an imbalance between nutrient absorption and nutrient formation in the soil. The use of fertilizer, both artificial and natural, can increase soil nutrients. Good physical, biological and chemical properties of soil are environmental conditions that help the growth and yields of cultivated plants (Iswahyudi et al., 2020) .

Bokashi fertilizer is a fermentation product from various organic materials, such as husks, straw, sawdust, and animal waste, which can be made from cow dung waste. The ingredients are then fermented with the help of activator microorganisms which make the fermentation process faster. Effect microorganisms (EM) are a mixture of microorganisms used to speed up fermentation. EM not only speeds up the fermentation process but can also reduce the odor resulting from the decomposition of organic materials. Although the effects are only visible after years of use, bokashi fertilizer has also been proven to increase plant fertility and productivity (Aldy Bahaduri Indraloka, Eriko Romadian, Wifqi Izza Sulkhi, 2022) .

Liquid organic fertilizer (POC), which is a very fine solution containing nutrients, is very easily absorbed by plants. Most of the liquid waste from the tempe industry is discharged into the surrounding environment, especially into waters or rivers. The liquid waste from the tempe industry comes from the process of washing, soaking and boiling soybeans, which contains many important nutrients, especially nitrogen, which plants really need. Liquid waste from this process mainly consists of 99.9 % or more water and 0.1% in the form of solid objects consisting of organic and inorganic substances. If used properly it will reduce environmental pollution (Prasetio & Widyastuti, 2020) . The liquid waste content from the tempe industry can be used as organic fertilizer by farmers to optimize corn production. Therefore, the author conducted research which aimed to determine the effect of giving cow dung bokashi and tempeh industry waste on the growth and production of corn plants.

2. METHODS

This research was carried out at Jalan Manunggal Ujung People's Plantation Land , Bandar Klippa, Percut Sei Tuan District, Tembung Field. This research was carried out from January to May 2017 . The materials used in this research were corn seeds of the Pioneer 35 variety, cow dung, liquid waste from the tempe industry, EM4, Basmalang 498 EC herbicide, rice bran, rice husks and water. The tools used in this research were hoes, stakes, sticks, ropes, tape measures, sprayers, barrels, measuring cups, gembors, rulers, scales, stationery, buckets and other supporting tools.

This research used a Factorial Randomized Group Design (RAK) with two factors studied, namely: Factors for Giving Bokashi Cow Manure (B) with 4 levels, namely B_0 : Control, B_1 : 15 tons/ha, B_2 : 30 tons/ha, B_3 : 45 tons/ha. Tempe Industrial Liquid Waste Administration Factor (L) with 4 levels, namely: L_0 : Control, L_1 : 30 ml/l, L_2 : 60 ml/l, L

$_3$: 90 ml/l. The number of treatment combinations is 16 combinations, namely: B_0L_0 , B_1L_0, B_2L_0 , B_3L_0 , B_0L_1 , B_1L_1, B_2L_1 , B_3L_1 , B_0L_2 , B_1L_2, B_2L_2 , B_3L_2, B_0L_3 , B_1L_3, B_2L_3 , B_3L_3.

The data analysis model used in this research was a factorial Randomized Block Design (RAK) and continued with the *Duncan's Multiple Range Test* (DMRT) at a significant difference level of 5%. The parameters observed in this study were plant height, leaf length, ear / plant weight per plot .

3. RESULTS AND DISCUSSION

Based on the results of the analysis of variance (ANOVA) with a factorial Randomized Block Design (RAK), it showed that the Bokashi treatment had a significant effect on the observation of plant height, leaf length of corn aged 6 WAP and ear weight in plot plantings, while the tempe industry liquid waste treatment had a significant effect on leaf length. and cob weight. Difference test of treatment with *Duncan's Multiple Range Test (DMRT)* it can be seen in Table 1.

Table 1. Effect of Corn Plant Height at 6 WAP (cm) on Cow Manure Bokashi Treatment

B/L	L_0	L_1	L_2	L_3	Average
B_0	195.23	190.26	184.44	191.30	190.31c
B_1	189.93	190.81	194.27	185.73	190.19c
B_2	188.27	190.91	202.60	175.72	189.38c
B_3	201.27	191.56	196.79	204.06	198.42a
Average	193.68	190.88	194.53	189.20	192.07

Note: Numbers followed by letters that are not the same in the same column are significantly different according to the 5% DMRT Test

In Table 1 it can be seen that the highest corn plants were in the bokashi treatment B_3 (45 tons/ha), namely 198.42 cm, which was significantly different from the treatment B_0 (control) namely 190.31 cm and the same as the treatment B_1 (15 tons/ha).) namely 190.19 cm and treatment B_2 (30 tons/ha) namely 189.38 cm. This is caused by the high growth of corn plants with good fertilization, where fertilization with the right dose can cause the plants to grow well. According to opinion (Pamuji et al., 2018) which states that the nutrient N is closely related to increasing plant height with sufficient Nitrogen (N) content in the soil, which can stimulate overall plant growth.

Table 2. Effect of Leaf Length of Corn Plants Aged 6 WAP (cm) on Bokashi Treatment of Cow Manure and Tempe Industry Liquid Waste

B/L	L_0	L_1	L_2	L_3	Average
B_0	93.30	92.19	92.92	93.49	92.98a
B_1	93.07	92.50	92.66	92.97	92.80b
B_2	89.94	90.20	95.32	95.47	92.73b
B_3	94.01	92.36	97.40	100.88	96.16c
Average	92.58a	91.81b	94.58c	95.70c	93.67

Note: Numbers followed by letters that are not the same in the same column and row are significantly different according to the 5% DMRT Test

In Table 2, it can be seen that leaf length has a significant effect on the provision of bokashi from cow dung and liquid waste from the tempe industry , while the interaction between the two has no significant effect. The longest corn leaves when given bokashi were found in treatment B_3 (45 tons/ha), namely 96.16 cm, which was significantly different from treatment B_2 (30 tons/ha), namely 92.73 cm and the same as treatment B_0 (control), namely 92.98 cm and treatment B_1 (15 tons/ha) namely 92.80 cm. This is because the absorption of

nutrients in the soil is going well so that leaf growth is better, the nutrients in the soil can meet the needs of the corn plant. In accordance with the opinion of (Bay'ul Maryo Khan et al., 2021) which states that the application of cow manure has the ability to provide suitable conditions for roots to penetrate into the soil because manure provides nutrients, improves soil macro and micro pores and increases the soil's ability to retain moisture. Graph of leaf length of corn plants given cow dung bokashi.

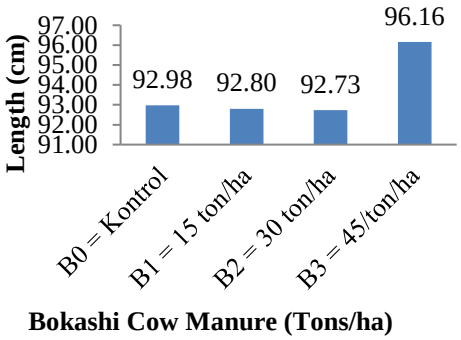

Figure 1. Graph Between Plant Leaf Length (cm) of Corn 6 WAP and Giving Cow Manure Bokashi

In table 2, it can be seen that the longest leaf length in the tempe industry liquid waste treatment was at L_3 (90ml/plant), namely 95.07 cm, not significantly different from L_2 (60ml/plant), namely 94.58 cm, and significantly different from the treatment L_0 (control) and L_1 (30ml/plant) namely 92.58 cm and 91.81 cm. This causes the liquid waste from the tempeh industry to contain elements that are very good for plant growth . In accordance with the opinion of (Sayow et al., 2020) which states the role of bacteria in tempeh waste liquid fertilizer can bind nitrogen (N), phosphorus (P), potassium (K) and other elements that can increase plant productivity. Graph of leaf length of corn plants given liquid waste from the tempe industry .

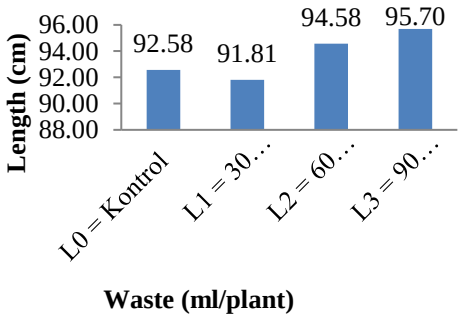

Figure 2. Graph between Plant Leaf Length (cm) of Corn 6 WAP and Tempeh Industry Liquid Waste

Table 3. Effect of Cob / Plant Weight per Plot (g) on the Bokashi Treatment of Cow Manure and Liquid Waste from the Tempe Industry

B/L	L_0	L_1	L_2	L_3	Average
B_0	183.39	213.86	219.76	220.75	209.44a
B_1	244.67	233.33	230.18	248.48	239.17b
B_2	224.44	233.92	264.82	237.04	240.06b
B_3	261.38	280.29	277.35	281.58	275.15c
Average	228.47a	240.35a	248.03b	246.96c	240.95 c

Note: Numbers followed by letters that are not the same in the same column and row are significantly different according to the 5% DMRT Test

In Table 3, it can be seen that the weight of cobs per plot plant has a significant effect on the provision of cow dung bokashi and liquid waste from the tempe industry , while the interaction between the two has no significant effect. The highest weight of corn cobs with bokashi treatment was in treatment B_3 (45 tons/ha), namely 275.15 cm, which was significantly different from treatment B_0 (control), namely 209.44 cm and the same as treatment B_1 (15 tons/ha), namely 239.17 cm and treatment B_2 (30 tons/ha) namely 240.06 cm. And the highest treatment of liquid waste from the tempe industry was in treatment L_2 (60 ml/l), namely 248.03 g, which was significantly different from treatment L_0 (control), namely 228.47 g and treatment L_1 (15 ml/l), namely 240.35 g and treatment L_3 90 (ml/l) which is 246.96 g. This is due to the availability of nutrients in the treatment given and the soil is able to provide the nutrients needed by plants, organic fertilizer contains micronutrients in sufficient quantities and is able to improve the physical, chemical and biological properties of the soil. This is in accordance with the opinion of (Nadeak et al., 2020) which states that making the soil looser and looser, the presence of organic material can improve the physical properties of the soil, increase aeration, and make it easier for plant roots to penetrate. Graph of the weight of sampled plant cobs treated with bokashi cow manure and liquid waste from the tempe industry .

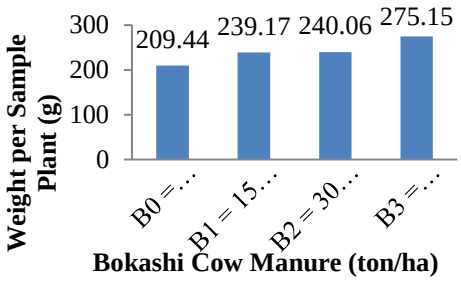

Figure 3 . Graph Between Weight of Cobs / Plants per Plot (g) 6 WAP with Bokashi Cow Manure

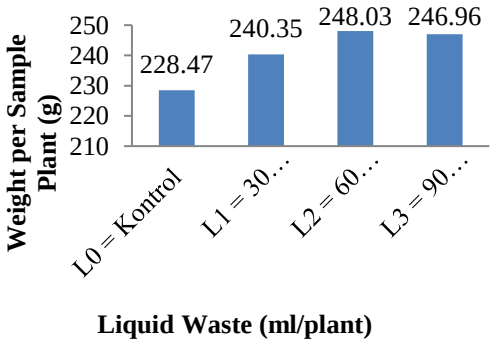

Figure 4. Graph Between Weight of Cobs / Plants per Plot (g) 6 WAP and Tempe Industry liquid waste

4. CONCLUSIONS

Giving cow dung bokashi affected plant height, leaf length, cob weight in treatment B $_3$ (45 tons/ha). The provision of liquid waste from the tempe industry affected the weight of the cobs in the L $_{2\,\text{treatment}}$ (60 m/l). There was an interaction between giving cow dung bokashi

and tempe industry liquid waste on plant height in treatments B $_3$ (45 tons/ha) and L $_3$ (90 m/l).

Further research needs to be done on how to add other cutting microorganisms to maximize the use of bovine dirt bokashi and liquid waste from the tempe industry, as well as research using different plants.

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5. Referensi

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