



The Effectiveness of Organic Fertilizer Granules For Increasing Sweet Corn Production on Acid Dryland In Bogor District

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ABSTRACT

Acid dry land generally has limiting factors of higher acidity and low nutrients availability, so that has low productivity. However, the appropriate inputs have productivity to be better. Research on effectiveness of granular organic fertilizers (GOF) to increase sweet corn production has been carried out on dry land in Bogor Regency. The purpose research was to determine the effect GOF of plant growth and enhancement production of sweet corns in acid dry land. This study used a Completely Randomized Block Design with ten treatments and three replications. The results showed that the application of GOF dose 200 kg/ha could increasing soil pH. This improvement in soil chemical properties was followed by increased growth and production of sweet corn. Besides increase the plant growth, GOF made more efficiency 25% of anorganic fertilizer usage. The combination treatment of granular organomineral fertilizers dose 600 kg/ha and NPK recommendation 75% fertilizers increase plant growth such as plant height (124,52%), number of leaves (49%), and plant stem diameter (84,3%). The combination treatment of granular organomineral fertilizers dose 200 – 400 kg/ha and NPK recommendation 75% fertilizers increase sweet corn production such fresh cobs production (345%) and dry corn stover (345%). RAE value is >100% in each GOF treatment, which is the fertilizer effective to increase the sweet corn crops. The optimum yield of maize is 17,45 ton/ha could be obtained with the application of granular organomineral fertilizers dose 275 kg/ha.

INTRODUCTION

Dry land is land that can be used for crop cultivation and is never developed or waterlogged most of the time of the year. Dry land in Indonesia is converted into yards, dry fields/gardens/fields, grasslands, plantations, and uncultivated land. Dryland resource management is a way of managing the environment to get welfare for humans (Marwanto and Idjudin, 2008). Dry land has soil fertility and low organic matter content, high photorespiration resulting in relatively low biomass products. A dry

land is a suboptimal form of land because it has a diminishing area of land for plant cultivation that can be developed and has a low to acidic soil pH, so most of the dry land in Indonesia is acid dry land, one of which is in Bogor Regency, West Java. Heryani, 2014). Organic matter is generally given quite large because the nutrients in organic matter are relatively low. The addition of materials can be in the form of solid or organic fertilizers or return crop residues after harvest. West Java Province is known to be one of the centers of agricultural production in Indonesia.

Agricultural land in West Java covers an area of 2,477,790 hectares of which 1,535,379 hectares (61.97%) are dry land. The dry land has great potential for agricultural production, including food crops, horticulture, plantations, and livestock. The Food Crops, Horticulture and Plantation Office of Bogor Regency stated that the area of land use in Bogor Regency in 2019 covered 93,118 hectares of rice fields and 129,753 hectares of non-rice fields including dry land. Sweet corn (*Zea mays saccharate* Sturt) has a sweet taste with a sugar content of 5-6% more than ordinary corn with a sugar content of 2-3%. Cultivation of sweet corn can increase income because the demand is quite high. Sweet corn has a short production life of 70-80 days so it is very profitable (Marvelia et al., 2006). Corn production in Bogor Regency in 2019 reached 1,260 tons and in 2020 experienced a large increase to 1,675 tons (BPS Bogor District, 2021). Corn plants in dry land require a high input of fertilizer to achieve optimum production.

Most of the farmers still apply an intensive farming system using high doses of inorganic fertilizers. Organic fertilizers are generally needed as a complement to inorganic fertilizers. Based on the Ministry of Agriculture Number 01 of 2019 organic fertilizer is a fertilizer derived from dead plants, animal waste and/or animal parts and/or other organic waste that has gone through an engineering process, in solid or liquid form, can be enriched with mineral and/or microbial materials that useful for increasing the content of nutrients and organic matter, as well as improving the physical, chemical, and biological properties of the soil. In dry land, organic matter is very important because it can trigger the growth of microorganisms that function to break down and help the process of nutrient absorption in plants. One of the advantages of organic fertilizer is that it contains C-Organic as an energy source for soil microbes, contains more complete macronutrients even in small amounts, contains growth regulators, and improves soil physical properties.

The results of the study indicate that to increase the productivity of acid dry land can be done with balanced fertilization, namely organic and inorganic fertilizers (Mulyani, et al., 2010). Balanced fertilization adheres to the concept of Liebig's Law where the main inhibiting factors that determine agricultural productivity must be corrected first (Balittanah, 2015). Balanced fertilization can be interpreted as complete fertilization (Urea, Sp-36/TSP, KCl) by taking into account the needs of micro nutrients. There are four principles of balanced fertilization, namely the right dose, the right time, the right method, and the right type/form. Plant productivity is highly dependent on the availability of nutrients, limited by the minimum availability of nutrients in the soil. The addition of nutrients that have less effect on the availability of other nutrients. If the main nutrient is lacking, the production will be lower. Nitrogen (N) nutrients are needed, P and K nutrients depend on their nutrient status (Balittanah, 2015). The use of unbalanced fertilizers can cause productivity and yield quality to decrease (Yahya, 2018).

Granular organic soil improver based on chicken manure plus and cow manure plus has almost the same effectiveness as lime in increasing the growth and yield of mung bean plants, so these two ameliorant formulas can be recommended as a substitute for lime in acid dry land (Subiksa, 2019). This study aims to determine the effect of granulated organomineral fertilizers on the chemical properties of dry soil acid soils that are poor in N and the effectiveness of increasing sweet corn production in acid dry lands. Organomineral fertilizers are expected to improve land conditions without disturbing the nutrient balance and effectively increase sweet corn production in acid dry land.

METHODS

The study was conducted in Bojong Village, Kemang District, Bogor Regency in October – December 2020. The study used a randomized block design with ten treatments (Table 1) and three replications using the sweet corn indicator plant hybrid variety Exotic Pertiwi. The control treatment was the treatment without the addition of fertilizer at all. NPK treatment was treatment with urea, SP-36, and KCl fertilization according to the respective recommended doses (324 g/plot, 180 g/plot, and 180 g/plot). GOF treatment is fertilizing with organic fertilizer at a dose of 360 g/plot, 720 g/plot, and 1,080 g/plot or equivalent to 200 kg/ha, 400 kg/ha, and 600 kg/ha. GOF was applied to the second tillage the day before planting and stirred evenly. A single 50% NPK inorganic fertilizer was applied one week after planting and 50% was applied 30 days after planting by means of an array of 10 cm from the row of plants, leveled in the array and backfilled with soil to avoid evaporation or being washed away by rainwater. Watering is required in the critical phase if there is not enough rainfall, although rainfall in the area has an average of 3,000-3500 mm/year. Corn plants were harvested and the biomass was 75 DAP and composite soil samples after harvest were analyzed to determine the chemical properties of the soil.

Table 1. Treatments and fertilizer dosage

No	Treatments	Fertilizer dosage (kg/ha)			
		GOF *	Urea	SP-36	KCL
1	Control	0	0	0	0
2	1 NPK	0	360	200	200
3	0 NPK + 2 GOF	400	0	0	0
4	1 NPK + 1 GOF	200	360	200	200
5	1 NPK + 2 GOF	400	360	200	200
6	1 NPK + 3 GOF	600	360	200	200
7	¾ NPK	0	270	150	150
8	¾ NPK + 1 GOF	200	270	150	150
9	¾ NPK + 2 GOF	400	270	150	150
10	¾ NPK + 3 GOF	600	270	150	150

Information: *) Granule organic fertilizer

Observations were made on the growth of plant height and number of leaves every two weeks four times until the plant was 8 WAP, and the stem diameter of the plant was once at the age of 8 WAP. Biomass harvest is done by harvesting stoves starting from approximately 30 cm from the soil surface and measuring the dry weight of biomass and cobs. The agronomic effectiveness of fertilizers is obtained from the Relative Agronomic Effectiveness (RAE) method with the following formula (Machay, et al., 1984 in Wijaya, et al., 2015).

$$RAE = \frac{\text{Tested fertilizer yield} - \text{control}}{\text{Standart fertiilzer yield} - \text{control}} \times 100\%$$

Note: RAE value 100% means that the tested fertilizer is effective compared to treatment standard.

RESULTS AND DISCUSSIONS

GOF is an organic fertilizer produced in the form of granules measuring 2-4.75 mm. The GOF tested had characteristics, including:

Table 2. Characteristic of Granule Organic Fertilizer

C _{-organic} (%)	N (%)	C/N	Water Content (%)	pH H ₂ O	P ₂ O ₅ (%)	K ₂ O (%)	Pathogenic microbial contamination (MPN/g)
22.99	1.69	14	9.9	8.5	6.69	3.52	<30

According to research from Sari, et al., (2021) stated that the bacteria *Escherichia coli* and *Salmonella sp.* is a pathogenic bacteria in solid waste RPH (Slaughterhouse) can cause the spread of germs. Both of these pathogens have a negative impact on health if they are on the verge of environmental limits. According to Agus, et al. (2014) in his research stated that *Escherichia coli* bacteria can cause digestive disorders resulting in diarrhea and *Salmonella sp.* can cause typhoid. The lower the content of these two bacteria, the better the quality of organic fertilizer because it does not contaminate land, plants, and food products so that environmental health is better. The application of higher organic fertilizers can have a long-term effect so that it improves soil quality physically, chemically, biologically and corn productivity.

Characteristic of Soil Chemistry

Characteristic of soil chemistry was shown in table 3. According to Hadi, et al (2019), the soil of the Inceptisols order generally has relatively low fertility and chemical properties but can be improved with proper handling and technology. This is in accordance with the characteristics of the chemical properties at the research site, which has a very acidic soil pH, very low nutrient content and very low KB and is classified as an area of high rainfall.

Table 3. Characteristic of soil chemistry

Observation Variable	Characteristic
Texture	Silty Clay Loam
pH H ₂ O	4.4
pH KCl	3.6
C _{-organic}	1.81%
N	0.15%
C/N	11
P ₂ O ₅	25%
P ₂ O ₅ (Bray 1)	396 mg/100g
K ₂ O	7 mg/100g
KTK	19.57 cmol(+)/kg
Base saturation	17%
Al ³⁺	3.5 cmol (+)/kg
H ⁺	0.89 cmol (+)/kg

Al Saturation

82.94%

The dry acid soil at the study site has a pH of 4.4 with a dusty clay-clay texture and is classified as a slightly fine-textured soil. According to Hakim, et al. (1986) in Meli, et al. (2018) stated that a good soil texture is a soil that is fine and somewhat fine-textured because it allows the soil to be better able to hold nutrients and fertilizers have a higher capacity to supply the available nutrients. The research location has often been planted with seasonal crops, such as corn and vegetables, with alternating intensive fertilization, both organic and inorganic fertilizers, with high doses for many years so that there is a process of accumulation of P nutrients which results in total P and available P being classified as very high. P nutrients are not easily lost in the soil through evaporation or leaching but can be lost due to erosion.

According to Kasno (2019) there is a correlation between C-Organic and N-total because most of the N-organic comes from the decomposition of organic matter. The low C-Organic content is due to improper soil management, the use of organic matter has never been carried out and organic matter from crop residues is not returned to the soil. The rate of decomposition of organic matter in the tropics is relatively fast due to high rainfall and temperature. Research from Flatain, et al. (2020) states that in soils that have low soil N and C-Organic content, N fertilizers will play a greater role in nutrient absorption by plants than N nutrients from soil because of the nature of urea which dissolves quickly and becomes available to plants more quickly. However, mineralization of organic matter in the soil contributed more N than fertilizer N by 54-78% of the total N of sweet corn plants, so the application of organic matter should not be ruled out. Nutrient N has volatile properties, meaning that N nutrients are very volatile. The lower N nutrients in the soil showed that the application of GOF had a significant effect on increasing the productivity of sweet corn because it was maximally absorbed by plants in acid dry land but still did not balance the N nutrients at one time of planting. The main reason for corn plants is less efficient in the use of N fertilizer according to Cassman, et al. (2002) in Syarifuddin (2015) as much as less than 50% of the total N given is the loss of N from the plant system to the soil through leaching, runoff, erosion, denitrification, NH₃ evaporation or N₂O gas emissions. Fertilization must be done at the right time so that sweet corn plants can directly absorb the given N nutrient input and consider 5 (five) appropriate fertilizations.

High Al saturation can inhibit the growth of plant roots that are able to absorb nutrients. P nutrients are fixed by Al so they are not available to plants. Giving GOF can release P nutrients in the soil so that it becomes available to plants. The provision of GOF is carried out to increase land and plant productivity and increase soil pH (Kasno, 2019). The results of soil analysis showed that K nutrients were very low after GOF was applied, indicating that sweet corn plants absorbed the given K nutrients, K nutrients were absorbed by clay so that it provided potassium for longer in the soil, and K nutrients were leached due to rainwater.

The application of GOF did not significantly change the chemical properties of acid dry land in the short term/one planting period. The soil that was applied with granulated organomineral fertilizer had a higher soil pH than before, which was classified as very acidic to acidic, but corn plants could still grow well and tolerate low pH. According to Tabri, et al (2020) acid dry land has a characteristic pH value of <5 and generally has low soil fertility. In accordance with this, the acidic dry land soil at the study site experienced an increase in pH value after the application of GOF with a maximum increase in soil pH of 0.3 units, from pH 4.4 to 4.7, meaning that the addition of GOF could increase soil pH even though the amount was small. affect the availability of nutrients in the soil as well as soluble toxic elements. Acid dry land needs organic matter to help improve soil fertility and quality so as to improve the physical, chemical, and biological properties of the soil. The strategy for environmental

sustainability in the use of fertilizers is to combine organic and inorganic fertilizers by applying the concept of balanced fertilization.

Treatment of Growth and Components of Sweet Corn Yield

Treatment of Growth and Components of Sweet Corn Yield One of the actions on dry land that cultivates sweet corn plants is soil amelioration using organic fertilizer. The use of organic fertilizers in plants is not to replace inorganic fertilizers, but as a complement to increase soil and plant productivity in a sustainable manner (Murnita and Taher, 2021), so that a combination of organic fertilizers and inorganic fertilizers is carried out in this study. Growth parameters that affect the treatment given include plant height, number of leaves, and plant stem diameter. The vegetative to generative phases of sweet corn increased, both plant height and number of leaves.

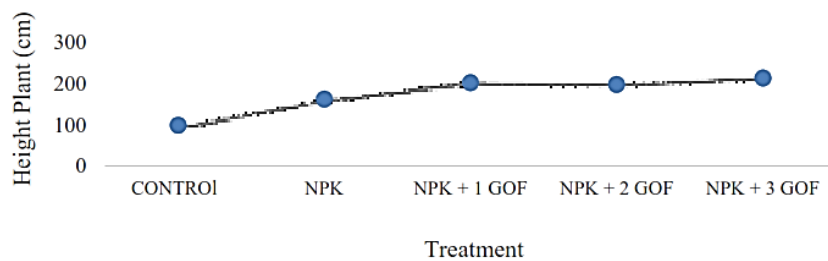


Figure 1. The difference of plant height after giving granular organomineral fertilizer

Table 4 shows that the application of GOF doses of 200 – 600 kg/ha and inorganic fertilizer doses of 75% – 100% had a significant effect on increasing the height growth of sweet corn. Plant height showed that the combination of GOF with NPK recommendations 100% and 75% had a significant effect compared to each recommended NPK treatment.

Table 4. The average difference of height, number of leaves, plant stem diameter of sweet corn and the weight of dry corn stover that applied granular organomineral fertilizers

Treatment	Plant Height 8 WAP (cm)	Number of Leaf 8 WAP (sheet)	Diameter of Stem 8 WAP (cm)	Dry stove (ton/ha)
Control	100.07 a	10.13 a	1.34 a	1.24 a
1 NPK	163.33 c	12.23 b	2.06 c	5.42 c
0 NPK + 2 GOF	204.48 def	14.80 e	2.20 cd	4.61 bc
1 NPK + 1 GOF	203.38 de	13.37 c	2.22 cde	5.53 c
1 NPK + 2 GOF	199.13 d	13.77 cd	2.26 cde	5.82 c
1 NPK + 3 GOF	214.80 efg	14.73 e	2.44 de	4.78 bc
¾ NPK	144.68 b	11.67 b	1.73 b	3.57 b
¾ NPK + 1 GOF	216.45 efg	14.27 de	2.32 de	5.39 c
¾ NPK + 2 GOF	217.40 fg	14.37 de	2.32 de	5.52 c
¾ NPK + 3 GOF	224.68 g	15.10 e	2.47 e	4.53 bc

Note: The values in the column followed by the same letter do not show a significant difference based on Duncan's multiple-range further test at 5% significance level

The combination of GOF at a dose of 600 kg/ha with a recommended NPK of 75% had a significant effect on the growth of corn height which increased by 124.52% compared to the control. It is known that GOF can increase soil pH even though it is small but significantly increases the height of corn plants. Thus, GOF can be considered as an ameliorant in balanced fertilization and an alternative to inorganic fertilizers for sweet corn cultivation in acid dry land.

Nutrient N lost in maize cultivation is assumed to be several, which is about 11-48% due to evaporation, about 0.8-1.2% due to denitrification, about 0.9-1.7% of the dose of N-urea given in plants into N₂O emissions, and 15% of the N fertilizer will be leached in the form of NO₃ (Syarifuddin, 2015). The absorption of nitrate ions by plants will undergo a series of denitrification reactions in the form of ammonium which requires ATP energy so that it can increase NO₂ emissions more quickly. If the absorption of N nutrients by plants is slower than the nitrification process, some of the N nutrients will evaporate so that they can use fertilizers that release slower nutrients (slow release) which can regulate the release of nutrients for plants. The denitrification process occurs under anaerobic conditions or in the absence of oxygen. One of the things that can reduce N₂O emissions is the use of organic fertilizers and the placement of fertilizers in the soil is recommended close to the root zone. N-Organic in organic fertilizers can provide nutrients slowly can reduce the use of inorganic N fertilizers thereby reducing N₂O emissions.

The combination treatment of GOF with NPK recommendations of 100% and 75% had a significant effect with each recommended NPK treatment in increasing the number of leaves. The combination treatment of GOF dose of 600 kg/ha with the recommended NPK of 75% had a significant effect on the number of leaves by 49% compared to the control. This showed that the combination of GOF and inorganic fertilizer significantly increased the number of leaves but was not significantly different from the GOF treatment alone. The combination treatment of 75% NPK and GOF dose of 400 kg/ha significantly affected the dry weight of corn plant by 4.28 tons/ha compared to the control at 345.1% which showed the best results, but had no significant effect on the 100% recommended NPK treatment. . Thus, GOF can be considered as an alternative to inorganic fertilizers for sweet corn cultivation in acid dry land. Low maize nutrient uptake occurs at the beginning of growth and then increases rapidly from the vegetative phase to the generative phase, then nutrient absorption decreases during the ripening phase of seeds (Syarifuddin, 2015).

The combination treatment of GOF with inorganic fertilizer had a significant effect with each recommended NPK treatment in increasing the length of plant stem diameter. GOF treatment at a dose of 600 kg/ha with a recommended NPK of 75% had a significant effect of 84.3% compared to the control. This proves that GOF has a significant effect in increasing the length of plant stem diameter compared to the recommended NPK, but the combination of GOF with the recommended 75% NPK has a significant effect compared to GOF alone. This increasing condition shows that the combination of fertilizers applied can meet the availability of nutrients in the soil and is utilized by plants for the growth of sweet corn on the stems of plants. The availability of nutrients in the soil is supported by an increase in soil pH and the addition of organic matter which makes plants absorb nutrients for the growth of sweet corn. Thus, GOF can be recommended as an ameliorant in balanced fertilization and as an alternative to inorganic fertilizers for maize in acid dry land.

Table 5 explains that the combination of NPK 75% and GOF at a dose of 200 kg/ha had a significant effect on the weight of corn yield components in the form of cobs and dry beans by 2.92 tons/ha to 4.08 tons/ha compared to control of 251.7% which show the best results. The combination treatment of 100% NPK and GOF at a dose of 600 kg/ha had a significant effect on the production of fresh cobs weighing 18.20 tons/ha compared to the control at 345% which showed the best results but had no significant effect with the recommended treatment of 75% NPK and GOF dose of 400. kg/ha.

Table 5. The effect of granular organomineral fertilizers application to the average of sweet315 corn wet and dry crops and the average of length corn and corn diameter

Treatment	Fresh Cob Production (ton/ha)	Dry Cob+Seeds (ton/ha)	Cob Length (cm)	Cob Diameter (cm)
Control	4.09 a	1.16 a	12.4 a	3.1 a
1 NPK	12.42 b	3.26 b	20.1 b	4.6 b
0 NPK + 2 GOF	15.95bc	2.84 b	19.7 b	5.1 c
1 NPK + 1 GOF	17.57 c	3.29 b	20.6 b	4.8 bc
1 NPK + 2 GOF	17.19 c	3.80 b	20.3 b	5.0 c
1 NPK + 3 GOF	18.20 c	23.27 b	20.1 b	4.8 b
¾ NPK	11.60 b	2.78 b	20.8 b	5.0 c
¾ NPK + 1 GOF	17.03 c	4.08 b	17.9 b	4.1 b
¾ NPK + 2 GOF	17.44 c	3.96 b	20.3 b	5.0 c
¾ NPK + 3 GOF	17.16 c	4.01 b	20.4 b	5.1 c

Note: The values in the column followed by the same letter do not show a significant difference based on Duncan's multiple-range further test at 5% significance level

The NPK was given in an array with a depth of 2.5 cm and covered again with soil so that the fertilizer was not easily eroded by water. Giving inorganic fertilizers gradually is better than giving it all at once because it will be more effectively absorbed by plants. According to Flatian, et al. (2020) explained that the application of two-stage fertilizer is better than the application of three to four stages of fertilizer because it can reduce the cost of fertilization with relatively the same productivity. The treatment of NPK and GOF significantly increased the length of the highest cob by 20.8 cm. The treatment of NPK 75% and GOF dose of 600 kg/ha did not significantly affect the GOF treatment at a dose of 400 kg/ha alone on the diameter of the cob which was 5.1 cm, however, both had a significant effect on the control by 64.5%. However, the treatment of 75% NPK and 400 kg/ha GOF had a significant effect on 100% NPK and 600 kg/ha GOF treatment. In this study it has been proven that the application of two-stage fertilizer has provided maximum productivity. Thus, GOF and its combination with inorganic fertilizers can be recommended as ameliorants in balanced fertilization and alternative substitutes for inorganic fertilizers for acid dry land. P nutrients at lower pH, plants absorb more primary orthophosphate ions (H_2PO_4^-).

Soil P compounds in the form of orthophosphates are not easily leached which causes P to be fixed strongly enough by Al, Fe, or organic acids to make P-element unavailable to plants. The application of organic fertilizers containing P-organic from the decomposition of organic matter is very influential in the early period of plant growth in the primordia phase and the formation of plant reproductive parts (Hanafiah, 2014). P fertilizer has properties that are difficult to dissolve so it needs to be applied at the beginning of corn plant growth, while N fertilizer is given according to the stages of plant development.

Giving GOF first before giving water-soluble P fertilizer such as SP-36 proved to be more effective in increasing corn productivity in acid dry land. The combination of GOF with inorganic fertilizer had a significant effect on the production of fresh cobs compared to the recommended NPK, but had no significant effect on GOF at a dose of 400 kg/ha. In this study, it was proven that the combination had a significant effect on the production of fresh cobs in dry land up to 18.20 tons/ha or 345%. This was due to an increase in pH in increasing the availability of P nutrients that were released

from P that was fixed due to GOF so as to encourage increased corn growth. In accordance with the research of Anetor, et al. (2014) in Subiksa and Husnain (2019) that organomineral fertilizers (PO) are effective in releasing P nutrients to increase corn growth on acid soils because fertilizers containing bases can be exchanged and are able to encourage an increase in pH. In addition, it can improve land quality and increase soil microbial activity. Furthermore, organomineral soil enhancers (OM) were effective in increasing soil pH and decreasing Al solubility and increasing dry shelled corn yields to 15.7%. Regarding this matter, OM soil repairer can be used as an alternative to lime (Subiksa and Husnain, 2019). The K nutrient is in the adsorption complex with Al and antagonism occurs which cancel each other out (Kasno, 2019). According to Winarso, et al. (2020) explained that the increase in plant nutrient uptake in P elements was higher than N and K elements due to the availability of P nutrients after biochar was applied, thereby increasing the efficiency of NPK nutrient uptake by plants and plant production. In addition to improving OM planting, the addition of biochar has the potential to increase soil fertility, especially on acid soils.

Effectivity of Granule Organic Fertilizer

The RAE value for the application of GOF in each treatment is presented in Table 6. The RAE value for GOF at all doses is > 100%, only the 75% recommended NPK treatment has an RAE value < 100%. The combination of GOF at a dose of 400 kg/ha with a recommendation of 75% NPK fertilizer gave a higher RAE value than the combination of GOF with a 100% recommendation of NPK fertilizer. The highest RAE value was 169.38% in the combination treatment of GOF dose of 600 kg/ha with 100% inorganic fertilizer, then followed by a combination of GOF dose of 400 kg/ha with NPK fertilizer recommended 75% to obtain an RAE value of 160.35%. This shows that the application of GOF is effective in increasing corn production, but it will be even more effective when combined with inorganic fertilizers, both at the recommended dose of 75% and 100%. The application of GOF was effective in increasing maize production from doses of 200 to 600 kg/ha.

Table 6. RAE value effectivity of granular organomineral fertilizers in acid dry land

Perlakuan	RAE (%)
1 NPK	100
0 NPK + 2 GOF	142
1 NPK + 1 GOF	162
1 NPK + 2 GOF	157
1 NPK + 3 GOF	169
$\frac{3}{4}$ NPK	90
$\frac{3}{4}$ NPK + 1 GOF	155
$\frac{3}{4}$ NPK + 2 GOF	160
$\frac{3}{4}$ NPK + 3 GOF	157

Corn productivity tends to increase with the effect of giving GOF from a dose of 200 kg/ha, meaning that the administration of GOF is effective in increasing the productivity of sweet corn in sour dry land. Based on the linear quadratic equation, the maximum yield can reach corn productivity of 18.37 tons/ha with GOF dose of 450 kg/ha. The optimum yield achieved is 95% of the maximum yield of corn productivity, which is 17.45 tons/ha requiring a dose of GOF at 275 kg/ha. Research from Syarifuddin (2015) states that soils with low C-Organic content can achieve the target yield of 9-13 tons/ha with a

dose of 160-260 kg/ha of N fertilizer. In accordance with the conditions in the research area and the dose of N fertilizer which was not much different, the combination of GOF with NPK gave a maximum corn productivity of 18.37 tons/ha. The application of GOF on sour dry land has an effective RAE value to increase sweet corn productivity by 40-70% and can be an alternative to using inorganic fertilizers for sweet corn cultivation.

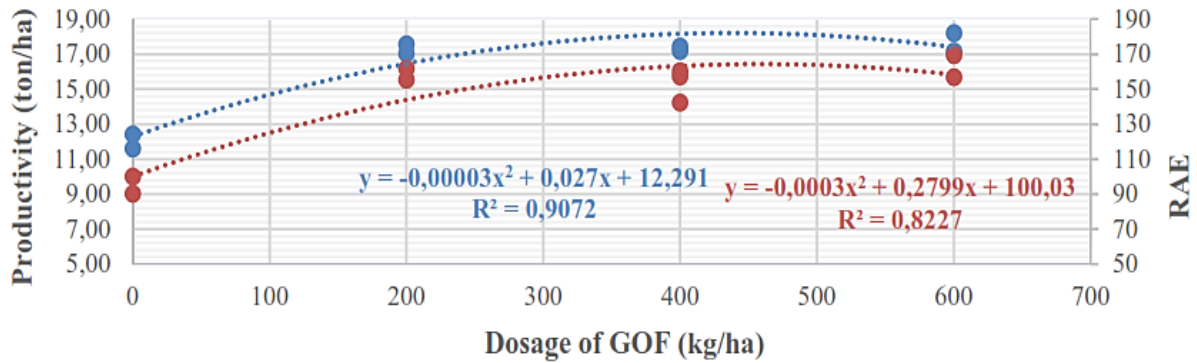


Figure 2. The effect of granular organomineral fertilizer application to the productivity of sweet corn crops and RAE value

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CONCLUSIONS

GOF has 100% RAE at all doses so it is effective in increasing crop productivity in an acid dry land. In this regard, GOF can be recommended as an ameliorant in balanced fertilization and as an alternative to inorganic fertilizer for sweet corn cultivation in an acid dry land. In an acid dry land, giving GOF can improve soil chemical properties, namely increasing soil pH which has an impact on soil health which triggers soil microbial activity due to the addition of organic matter to the land. Application of GOF with a minimum dose of 200 kg/ha can improve soil chemical properties because high organic matter can increase soil pH and play a role in providing nutrients in the soil. GOF treatment with a dose of 600 kg/ha with a recommendation of 75% NPK can increase plant height (124.52%), number of leaves (49%), and plant stem diameter (84.3%). The combination of GOF doses of 200 – 400 kg/ha with the recommended NPK 75% can increase the production of fresh cobs (345%) and dry stover (345%) obtained from the treatment. Optimum maize yields based on the curve of the relationship between GOF dose and maize productivity can be obtained by application of GOF at an optimum dose of 275 kg/ha.

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