Yield Potential of Sweet Corn Applied with Different Halal Organic Fertilizers for Food Security

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Abstract

Organic matter improves the soil structure and its physical condition thus maintaining the ecological balance of the environment.

The study was conducted to evaluate the yield potential of sweet corn (Zea mays L.) applied with different halal organic fertilizers under Sultan Kudarat, Maguindanao conditions from July to September 2017. A Randomized Complete Block Design was used in this study with five treatments replicated three times.

Results of the study revealed that there were significant differences in plant height, ear diameter, percentage of marketable ears, and ear weight of sweet corn while the number of days to flower was not significantly affected by the application of halal organic fertilizers.

Moreover, treatments applied with guano fertilizer obtained the tallest plant height, ear height, longer ear length, ear diameter, a high percentage of marketable ears, and the heaviest ear weight.

Using halal organic fertilizer will play a vital role in sustainable farming, is safe for human health, and is environment-friendly. For food safety standards, halal is considered a quality control system involving hygienic and permissible for consumption.

Keywords: organic, fertilizers, yield potential, halal

Introduction

Sweet corn (Zea mays L.) is a warm-season crop that can be grown easily in any garden with sufficient light, fertility, growing season and space. It is especially popular with home gardeners because it tastes appreciably better when it is harvested and eaten fresh from the garden. It is also called Indian corn, sugar corn and pole corn, a variety of maize with high sugar content. Sweet corn is the result of naturally occurring recessive mutation in the genes which control conversion of sugar to starch inside the endosperm of the corn kernel. Unlike field corn varieties which are harvested when the kernels are dry and mature, sweet corn is picked when immature (milk stage) and it will be prepared and eaten as a vegetable, rather than a grain.

Sweet corn is high in fiber, niacin, folate, and some vitamin A. It grows best in well-drained soil with a pH of 5.5 to 7.0. It is a fairly heavy feeder and proper soil fertility is critical for high yields and good growth. Once stunted by a lack of nutrients, sweet corn may never fully recover. Over the growing season, sweet corn needs approximately 50 to 60 lbs. of nitrogen per acre which is available at planting time.

Organic matter improves the physical condition of the soil for cultivation and improves soil structure thus maintaining the ecological balance of the environment.

Objectives of the Study:

This study aimed to evaluate the yield potential of sweet corn applied with different halal organic fertilizers for food security under Sultan Kudarat, Maguindanao condition.

Specifically, it aimed to determine which among the halal organic fertilizers will give an optimum yield of sweet corn in terms of plant height (cm), days to flower, ear length (cm), ear height (cm), ear diameter (cm), percentage of marketable ears and ear weight (tons/ha).

Time and Place of the Study:

This study was conducted at Rebuken, Sultan Kudarat, Maguindanao, Philippines from July to September 2017.

METHODOLOGY

Experimental Design:

The experimental area was carried out in Randomized Complete Block Design (RCBD) with five treatments replicated three times. The treatments were as follows:

T1 - Control
T2 – Vermicompost + (75-30-0)
T3 – Guano + (75-30-0)
T4 – Chicken Manure + (75-30-0)
T5 - (75-30-0)

Land Preparation:

The experimental area was prepared and cultivated thoroughly. It was plowed twice and harrowed alternately in order to pulverize the soil and to have easy germination of seeds.

Spacing and Depth:
Two seeds per hill were sown manually in 3-4 cm depth spaced at 30 cm apart in order to ensure good pollination and ear development.

Thinning:
Seedlings were thinned to one plant per hill at 12 days after emergence (DAE) to have good development.

Care:
Shallow cultivation was done to control weeds through hand weeding in order to maintain the complete cleanliness of the area. This was strictly observed during the entire duration of the study.

Fertilization:
The organic fertilizers were applied to the different plots according to each treatment. This was done 2 weeks before planting the seeds to have a proper decomposition and mix thoroughly with the soil. The inorganic fertilizer (75-30-0) was applied at planting time and the remaining half was side dressed 30 days after sowing (DAS) following the recommended dosage based on the soil analysis of the area.

Harvesting:
The corn was harvested when the silks turned brown and dry and the unhusked ears were formed. Harvesting was done manually by snapping off the ears by hand with a quick, firm, downward pushed twisted, and pulled.
Sweet corn ears were harvested when the kernels were fully formed but not fully mature. This was done in 20 days after the appearance of the first silk strands. The kernels were smooth and plump and the juice in the kernels appears milky when punctured with a thumbnail.

Data gathered:
Plant Height: (cm)
This was gathered by measuring from the base of the plant up to the longest leaf of the plant in centimeters. Ten sample plants per plot were randomly selected and this was done one week before harvest.

Days to Flower:
The number of days to flower was recorded when fifty percent (50%) of the plant population exhibits tassels.

Ear Length:
The ear length was measured in centimeters at harvesting. Ten samples per plot were picked at random which serves as a representative sample.

Ear Height (cm):
This was measured from the base of the corn plant up to the origin where ears grow in ten sample plants per plot.

Ear Diameter (cm):
The diameter of the corn ear was measured in centimeters at harvesting time.

Marketable Ears:
This was done by getting the percentage of marketable ears after harvest. Marketable ears are those which were filled of medium sizes and exhibited no damage, otherwise, those remaining corn ears were considered non-marketable.

Ear Weight (tons/ha):
This was done by weighing the ears of corn plants from the three middle rows per plot and this was converted into tons/ha.

Results And Discussions

Plant Height (cm)
Plant height (cm) of sweet corn applied with different halal organic fertilizers was presented in Table 1. Results show that the tallest height was observed in treatment 3 with a mean of 162.30 cm followed by treatments 2,4, and 5 with a means of 154.97 cm, 153.47 cm, and 151.50 cm, and the shortest plant height were observed in plots with no application of fertilizers with a mean of 127.83 cm.
Analysis of variance revealed a significant difference among treatment means used in the plant height of sweet corn at Sultan Kudarat, Maguindanao.

Days to Flower
Results show that the earliest treatments to bear flowers was observed from treatment 3 (guano + 75-30-0) with a mean of 46 days followed by treatment 2 with a mean of 46.33 days and treatment 5 and 6 with a means of 46.67 days and 46.76 days respectively with the control plots were the later treatments to bear flowers with a mean of 47days.

Analysis of variance revealed a non-significant difference among treatments used. The result implies that the application of halal organic fertilizers has not significantly affected the number of days to flower sweet corn under Sultan Kudarat, Maguindanao.

Ear Length (cm)

Ear length of sweet corn applied with different halal organic fertilizers was presented in Table III. Results show that treatment 3 obtained the longest ears with a mean of 27.1 cm, followed by treatment 4 with a mean of 24.6 then treatment 5 and 2 with a means of 23.9 cm and 23.4 cm. the shortest ears were observed in treatments with no application of fertilizer with a mean of 19.5 cm.

Analysis of variance revealed a significant difference among treatments used in the ear length of sweet corn. The result confirmed the report of **ITAPOLLINA** 2009 as he mentioned that guano fertilizers meet the essential elements of the plants which contain enzymes that make it easier to be taken by plants breaking down the proteins, fats, and starch in the plant cell wall.

Ear Height (cm)

The ear height of sweet corn applied with different halal organic fertilizers was presented in Table VI. Results show that treatment 3 (guano +75-30-0) got the highest mean of 78.57cm, followed by treatment 2 (Vermicompost +75-30-0) with a mean of 75.17 cm followed by treatments 5 and 4 with a means of 75.1 cm and 73.17 cm, while treatment 1 control obtained the shortest ear height (cm) with a mean of 67.03 cm.

Analysis of variance revealed a highly significant difference among treatments used in the ear height of sweet corn at Sultan Kudarat, Maguindanao. This conformed with the study of **Kesi Liu and Pawel Wiatrak, 2011** mentioned that plant characteristics included the measurement of plant height, ear height, relative chlorophyll content, and normalized difference vegetation index increased significantly with N rates.

Ear Diameter (cm)

The ear diameter of sweet corn applied with different halal organic fertilizers was presented in Table V. Result show that treatment 3 (guano + 75-30-0) got the highest mean of 10.27 cm, followed by treatments 4, 2, and 5 with a means of 9.43 cm, 9.27 cm, and 9.14 cm respectively. Plots with no application of fertilizers obtained the lowest ear diameter with a mean of only 8.27cm.

Analysis of variance revealed a highly significant difference among treatments used in the ear diameter of sweet corn. This implies that the application of halal organic fertilizers had significantly affected the ear diameter of sweet corn under Sultan Kudarat, Maguindanao.

Marketable Ears (%)

Marketable ears of sweet corn applied with different halal organic fertilizers were presented in Table VII. Results in a mean of 0.87 tons/ha. Treatments 5 and 4 got the mean of 0.78 tons/ha and 0.77 tons/ha. Treatment 1 control obtained the lightest ear weight of 0.50 tons/ha.

Analysis of variance revealed a highly significant difference among treatments used in the marketable ears of sweet corn. Results further revealed that different halal organic fertilizers used had significantly affected the ear weight (tons/ha) of sweet corn at Sultan Kudarat, Maguindanao.

Table 1. Summary of Agronomic and yield parameters of sweet corn applied with different halal Organic Fertilizers.

	Plant Height	Days to Flower	Ear Length (cm)	Ear Height (cm)	Ear Diameter (cm)	Marketable Ears (%)	Ear Weight (tons/ha)
T1-Control	27.83^{c}	47.00^{ns}	19.00^{b}	67.30^{b}	8.27^{c}	.75^{c}	0.50^{d}
T2-Vermicompost	154.97^{b}	46.33^{ns}	23.40^{bc}	75.17^{a}	9.27^{b}	56.67^{b}	0.87^{b}
T3-Guano	162.30^{a}	46.00^{ns}	27.10^{bc}	78.57^{a}	10.27^{a}	70.00^{a}	1.05^{a}
T4-Chicken Manure	153.47^{b}	46.76^{ns}	24.60^{b}	73.17^{ab}	9.43^{b}	53.33^{bc}	0.77^{c}
T5-(75-30-0)	151.5^{b}	46.67^{ns}	23.93^{bc}	75.10^{a}	9.10^{b}	53.33^{bc}	0.78^{c}

**-Significant at 5% levels – Not Significant

Conclusion And Recommendations

The study was conducted to evaluate the yield potential of sweet corn applied with different halal organic fertilizers for food security at Rebuken, Sultan Kudarat, Maguindanao from July to September 2017. A Randomized Complete Block Design was used in this study with five treatments replicated three times.

Planting of sweet corn applied with different halal organic fertilizers revealed a significant difference in plant height, ear height, ear diameter, percentage of marketable ears, and ear weight of sweet corn while the number of days to flower was not significantly affected by the application of halal organic fertilizers.

Moreover, treatments applied with guano fertilizer obtained the tallest plant height, ear height, longer ear length, ear diameter, a high percentage of marketable ears, and the heaviest ear weight. Results attributed that guano fertilizer contains enzymes that make it easier absorbed by the plants and provides faster seed germination with rapid growth and development (URGUB, 2010).

Therefore, this investigation suggests that another study should be conducted at different places to further justify and verify the results.

Furthermore, using halal organic fertilizers will play a vital role in sustainable farming, safe for human health, environment-friendly, and readily available. For food safety standards, halal is considered a quality control system involving hygienic and permissible for consumption.

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