International Journal of Multidisciplinary Research and Publications
ISSN (Online): 2581-6187

Growth and Yield Performance of Corn (Zea mays) as Affected by the Application of Different Organic Fertilizers

Alejandro A. Jalil[1], Romil L. Alejandro[2]
[1]College of Agriculture and Fisheries, Basilan State College, Lamitan City, Philippines
[2]Agricultural Technology Department, Western Mindanao State University, External Studies, Siay, Zamboanga Sibugay, Philippines

Abstract— *The focus of the study was on the growth and yield performance of corn (Zea mays) was tested using different organic fertilizers, with; treatment 1 (control or zero fertilizer), Treatment 2 (100 grams of Carbonized Chicken Dung), Treatment 3 (100 grams Carabao/Cattle manure), Treatment 4 (100 grams vermicast application). All four treatments were distributed equally in three blocking, following the Randomized Complete Block Design (RCBD). All treatment was established directly in a seed bed. Due to the time constraint, the study last for 2-3 months only, which comprises 5 weeks of gathering data as to the number of leaves and height of corn, and weight of corn-ear, excluding the preparation of the site for planting and germination time. Table 1.1. The average number of leaves of corn (Zea mays) per block applied with the different organic fertilizer, reveals that treatment 4 get the highest number of leaves (6.83) same number of treatment 2(6.83), followed by treatment 3(6.5) while treatment 1(5.83) get the lowest average mean in terms of the number of leaves. Table 2.1. The average height of corn (Zea mays) in cm per block applied with the different organic fertilizers, reveals that treatment 4 get the tallest among the four treatments(65.58cm) followed by treatment 3(58.33 cm), treatment 2(56.75cm) and treatment 1 get the shortest in terms of height (52.92 cm). Table 3.1. The average weight of corn (Zea mays) in grams per block applied with the different organic fertilizers treatment 4(62.67 g) get the heaviest among the four treatments followed by treatment 3(55.42g), treatment 2(54.37g) and treatment 1(52.22g) get the lightest weight, As to the result, it was clearly stated and revealed in the ANOVA table that most of the treatment showed the same performance or non-significant as to the dependent variables. Hence, as to the height of corn (Zea mays) we observed, that despite the result that is not significant the treatment is form part of the improvement or growth and development of the corn. The result shown in table 2.1, reveals that Treatment 4 (vermicast application) has a good performance for the development of the height of corn.*

Keywords— *Anova, RCBD, Germination Vermicast, Treatment.*

I. INTRODUCTION

Corn is a monoecious, androgynous factory. Its root system is stringy, characteristic of monocotyledonous shops. Grounded on their origin, roots are distributed into three groups side roots, nodular (crown) roots, and brace (steadying) roots. Its root system is important, and developed; it penetrates into the soil to 200 cm in depth and to 100- 150 cm indirectly. The brace roots play important part in steady of the shops and hardening its stalk.

sludge or sludge is also an important beast feed both as silage and as crop residue, grain and is also used industrially for bounce and oil painting birth. It's an important source of carbohydrates, protein, iron, vitamin B, and minerals. Kenyans consume sludge in a wide variety of ways (ugali, porridge, and beer). Green sludge, fresh on the cob, is eaten roasted or boiled independently or mixed with legumes.

In relation to the said situation, Organic husbandry can be a kind of practice for the growers to avoid the use of chemical inputs in crop product. This will help the growers in feting the profitable and environmentally friendly husbandry practices that could conceivably be developed and ameliorate their chops in promoting soil health that would lead to the high and nonstop product of goods and insure the stability of the terrain.

On the other hand, numerous consider composting as a way to control ménage waste while minimizing waste. It can delight in scores of other gratuities by exercising nutrient-rich compost to ameliorate soil composition, therefore, maintaining soil fertility and bringing about effective nutrient cycling. Humus is the end- product of natural action on organic matter. therefore, vermin- cast is produced by the feeding action of compost worms. The worm ingests organic matter, riving and grinding it into applicable worm casting, which is high in Nitrogen, Potassium, Calcium, and trace rudiments. These nutrients can be used as a natural organic toxin in auditoriums, pot shops, hydroponics, and stations. Vermi-cast contains billions of micro-organisms that continue to work by breaking down organic matter into a factory-available form, giving lush healthy growth. (Edwards and Burrows, 1998.)

Growing media is one of the great factors that affect the growth performance of shops. In such a way this could also limit the growth of shops depending on the kind of operation it may be. The main part of this is to increase factory products. In addition, our country has a reach of coffers that can be used as a growing media. likewise, waste material can also be used as media for crop product, similar as Carabao or Cattle ordure, Carbonized Chicken soil, and indeed vermicast. A combination of soil media similar, as flaxen gault
or theater soil and numerous others is also part of growing media. This indispensable media is used to maintain frangibility, soil aeration, and drainage and also added nutrients to the shops which are used by the shops, specifically the sludge (Zea mays) for its growth and development (Yahumri, 2015). Hence the study aims to determine which among the different organic diseases affect the growth and yield of sludge (Zea

Alejandro A. Jalil and Romil L. Alejandro, "Growth and Yield Performance of Corn (Zea mays) as affected by the application of different organic fertilizers," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 5, Issue 9, pp. 74-77, 2023.

mays) and to determine the significant difference in the growth and yield of sludge(Zea mays) as affected by different organic diseases.

II. MATERIALS AND METHODS

Site selection and time of study

The study was conducted at Western Mindanao State University, College of Agriculture San Ramon, Zamboanga City, Philippines.

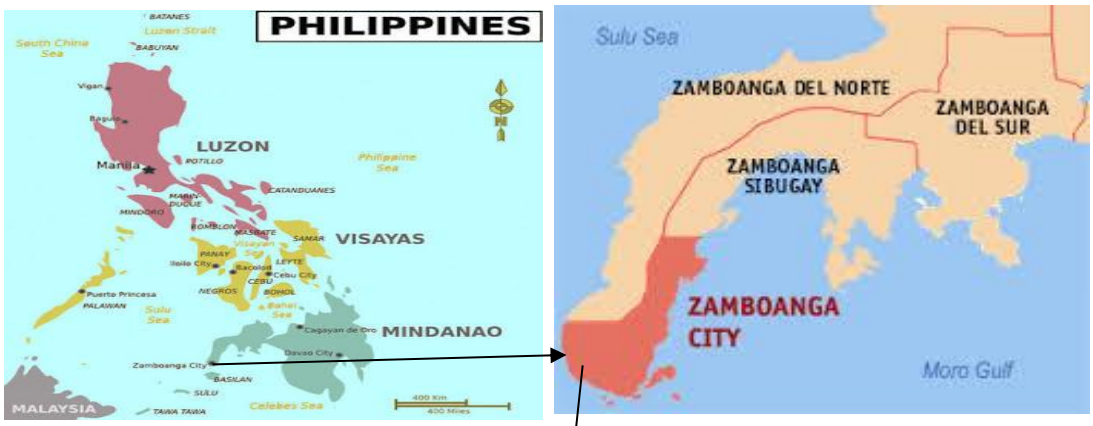
Methods

Experimental Design

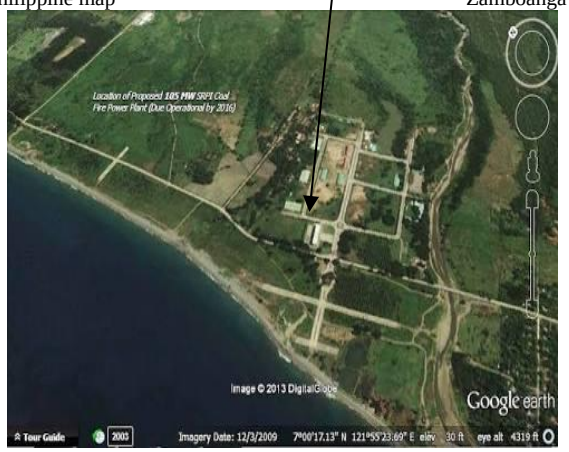
The experimental design used in this study was a Randomized Complete Block Design (RCBD) with three (4) treatments to be replicated three (3) times.

The treatments are as follows:

Treatment 1 (T1): Control (zero fertilizer)
Treatment 2 (T2): 100 grams of Carbonized Chicken dung
Treatment 3 (T3): 100 grams of Carabao/Cattle manure
Treatment 4 (T4): 100 grams of Vermicast application



Philippine map Zamboanga City map



WMSU C.A. MAP

Experimental Field Layout

Block -1	Block-2	Block-3
T_4	T_1	T_3
T_2	T_4	T_1
T_1	T_3	T_2
T_3	T_2	T_4

Figure 2. Field layout showing the three (4) treatments replicated three (3) times Arranged in Randomized Complete Block Design (RCBD).

Alejandro A. Jalil and Romil L. Alejandro, "Growth and Yield Performance of Corn (Zea mays) as affected by the application of different organic fertilizers," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 5, Issue 9, pp. 74-77, 2023.

Materials

The materials used in this study were the seed of corn, garden loam soil, Organic fertilizer (Vermicast), Carbonized Chicken Dung, Carabao/Cattle manure, measuring tape, record notes, a pencil or ball pen, and cardboard.

Equipment

Shovel, bolo, hoe, rakes, flows and string, plastic bottle, sticks or pegs, weighing scale and cutting knife in conducting the study.

Procedures:

Land Preparation

The experimental area was cleared of weeds and unwanted materials. It was plowed and harrowed until the soil will be pulverized and leveled. The area was divided into blocks (there were 3 blocks in the study) wherein there were four (4) sub-plots each. The measurement of each sub-plot is 1m x 1m (one meter by one meter). The spacing of each block was one (1) meter apart and sub-plots were meters. All treatments were assigned randomly.

Sowing Procedure

Corn (Zea mays) is easy to grow the crop. Direct seeding was applied in the study. Digging or holing is about 1 inch-deep. The sowing spacing is up to 4-6 inches apart is recommended by experts in the field of agriculture.

Watering

The plants were watered every morning at 7 am and late afternoon at 5 pm to maintain soil moisture. Watering was done throughout the duration of the study except on rainy days.

Weeding

Hand weeding and shallow cultivation were done once a week; to ensure weed-free experimental areas/pots and to avoid the competition of soil nutrients between plants and weeds.

Harvesting

The Corn (Zea mays) was harvested manually, pulling its ear immediately, and gathering it into the basket to measure its weight. Because of the time constraints, the harvesting time was done 2-3 months after planting.

Gathering of Data

The first collection of data was done two (2) weeks after planting then followed by once every two (2) weeks. The data was collected in terms of the number of leaves per treatment and block, the height of plants per treatment and block, and also the weight of corn ears per treatment and block.

Data Analysis

The data collected was done by tabulating and was analyzed using an appropriate tool which is the Analysis of Variance (ANOVA) to identify and determine the growth and yield performance of corn (Zea mays) as affected by both the application of different organic fertilizers

III. RESULTS

The below table reveals that out of the four treatments, treatments two (2) and four (4) have the highest mean in terms of the number of leaves.

TABLE 1.1. The average number of leaves of corn (*Zea mays*) per block applied with the different organic fertilizers.

Treatments	Block-1	Block-2	Block-3	Treatment total	Treatment Mean
Treatment 1 (T_1)	6	6.5	5	17.5	5.83
Treatment 2 (T_2)	7	6	6	19	6.83
Treatment 3 (T_3)	7	6	6.5	19.5	6.5
Treatment 4 (T_4)	8	6.5	6	20.5	6.83
Block total	28	25	23.5	76.5	25.49
Block mean	7	6.25	5.88	19.13	6.37

TABLE 1.2. The Analysis of Variance of computed of the average number of leaves of corn (*Zea mays*) per block applied with the different organic fertilizer.

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	1.5625	3	0.5208333	1.66666667	0.27185402	4.75706266
Columns	2.625	2	1.3125	4.2	0.07233796	5.14325285
Error	1.875	6	0.3125			
Total	6.0625	11				

ns= not significant

The ANOVA table above revealed that the P-value of 0.27 at rows and 0.07 at columns is higher than 0.05 meaning both are not significant. And the same result as to the F-critical which revealed not significant also because the stated value is still higher than 0.01 or 1%.

Table 2.1. shows that among the four treatments utilized in the study, treatment four (4) got the highest mean in terms of the height of the corn (Zea mays).

TABLE 2.1. The average height of corn (Zea mays) in cm per block applied with the different organic fertilizers.

Treatments	Block-1	Block-2	Block-3	Treatment total	Treatment Mean
Treatment 1 (T_1)	49.5	56	53.25	158.75	52.92
Treatment 2 (T_2)	71.5	58.75	40	170.25	56.75
Treatment 3 (T_3)	67	56	52	175	58.33
Treatment 4 (T_4)	77.75	51	68	196.75	65.58
Block total	265.75	221.75	213.25	700.75	233.58
Block mean	66.44	55.44	53.31	175.19	58.396

TABLE 2.2. The Analysis of Variance of computed average height of corn (*Zea mays*) in cm per block applied with the different organic fertilizer.

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	253.1822917	3	84.39400972	0.825258	0.526162	4.757066
Columns	397.0416667	2	198.5208333	1.941260	0.223795	5.143252
Error	613.5833333	6	102.2638889			
Total	1263.807292	11				

ns= not significant

It is shown in table 2.2 that the P-value of both rows (0.526) and columns (0.223) is higher than 5% or 0.05, meaning both

Alejandro A. Jalil and Romil L. Alejandro, "Growth and Yield Performance of Corn (Zea mays) as affected by the application of different organic fertilizers," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 5, Issue 9, pp. 74-77, 2023.

are not significant. In F-critical also revealed not significant. Because the value at rows and columns in F-critical is higher than the 0.01 or 1% level of significance.

The table below (Table 3.1.) shows that out of the four treatments used in the study, treatment one (1) or the control (no or zero application of fertilizer) has the highest mean in terms of the weight of the corn (*Zea mays*).

TABLE 3.1. The average weight of corn (*Zea mays*) in grams per block applied with the different organic fertilizers.

Treatments	Block-1	Block-2	Block-3	Treatment total	Treatment Mean
Treatment 1 (T_1)	60	58.33	38.33	156.66	52.22
Treatment 2 (T_2)	51.43	70	41.67	163.1	54.37
Treatment 3 (T_3)	78.5	25	62.5	166.25	55.42
Treatment 4 (T_4)	83	55	50	188	62.67
Block total	27.18	208.33	192.5	674.01	224.68
Block means	68.30	52.08	48.13	168.50	56.17

TABLE 3.2. The Analysis of Variance of the computed average weight of corn (*Zea mays*) in grams per block applied with the different organic fertilizers.

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	184.886025	3	61.628675	0.06615 54	0.97588 63	4.75706 27
Columns	1768.03115	2	884.01557	0.94894 73	0.43844 97	5.14325 28
Error	5589.45025	6	931.57504			
Total	7542.367425	11				

ns= not significant

It is revealed in the ANOVA table shown above that the P-value of 0.97 at rows and 0.438 is higher than the 5% level of significance (0.05) it only means that there is no significant difference in the treatment and block used in the study. The same result was observed in F-critical because the value of 4.75 at rows and 5.14 at columns show no significance because both are higher than a 1% level of significance.

IV. Conclusion and Recommendation

Although the study reveals non-significant in terms of the different organic fertilizers used in the study as to the growth and yield performance of corn (Zea mays) in terms of the number of leaves, height, and weight gain of the corn-ear, the researcher still wants to recommend the used of 100 grams vermicast application as an organic fertilizer because aside from it is environmentally friendly and very affordable, it is also effective media in improving the height of the corn.

Furthermore, the researcher also recommends further study in improving the growth and yield rate of corn.

References

[1]. Arpon, M,J. 2015. Yield Performance of Ampalaya (Momordicacharantia) as affected by different organic fertilizers. Unpublished Thesis. Western Mindanao State of University, College of Agriculture, San Ramon, Zamboanga City.

[2]. Brady, A.C., Weil, R.R. (2002). The Nature and Properties of Soils. 13th Edn. Prentice Hall, New jersey, USA

[3]. Boyham, George E., Darbie M. Granberry, and W. Terry Kelly. "Green Onions: Commercial Vegetable Production." N.P,. 2011. Web. 23 June 2016.

[4]. Edwards & Baroows, 1998 Ritival Organic Fertilizers, Compost and environmental Friendly Vermiculture. pp. 5-6.

[5]. F. Urbasek, V. Pizl, 2001 Activity of digestive enzymes in the gut of five earthworm species (Oligochaeta: Lumbricidae, Rev. Ecol. Biol. Sol 28 (1991) 461 –468.

[6]. Fernandez-Gomez MJ, Nogales R, Plante A, Plaza C, Fernandez JM. Applications of a set of complementary techniques to understand how varying the proportion of two wastes affects humic acids produced by vermicomposting. Waste Mange. 2 0 15 ;3 5 : 81–8.

[7]. Garg VK, Gupta R. Optimization of cow dung spiked pre-consumer processing vegetable waste for vermicomposting using Eisenia fetida . Ecotoxicol Environ Saf. 2011;74:19– 24.

[8]. Garg VK, Kaushik P. Vermistabilization of textile mill sludge spiked with poultry droppings by an epigeic earthworm Eisenia foetida. Bioresour Technol. 2005;96:1063– 71.

[9]. Gieguzynska E, Kocmit A, Gołezbiewska D. Studies on humic acids in eroded soils of Western Pomerania. In: Zaujec A, Bielek P, Gonet SS, editors. Humic substances in ecosystems. Nitra: Slovak Agricultural University; 1998. p. 35–41 .

[10]. Gomez-Brandon M, Lazcanoa C, Domíngueza J. The evaluation of stability and maturity during the composting of cattle manure. Chemosphere. 2008;70:436– 44

[11]. Haynes, R.J, 1999. Size and activity of the microbial biomass and N, S and P availability in EW casts derived from arable and pastoral soil and soil arable amended with pant residues. Ministry of Agriculture food and Rural affairs. Pedobiological, 43 (6), 568-573.

[12]. Hoitink H A J and Kultar G A, Effects of Compost in growth media on soil borne pathogens. In: Chen Y and Avnimelech Y (Eds), The role of organic matter in modern agriculture, Dordrecht, Netherlands, 1986, 289-30.

[13]. J. Domínguez, M.J.I. Briones, S. Mato, Effect of the diet on growth and reproduction of Eisenia andrei (Oligochaeta, Lum-bricidae), Pedobiologia (Jena) 41 (1997) 566 –577.

[14]. J. Domínguez, C.A. Edwards, M. Webster, Vermicomposting of sewage sludge: effect of bulking materials on the growth and reproduction of the earthworm Eisenia andrei , Pedobiologia (Jena) 44 (2000) 24–32.

[15]. M.B. Doube, G.G. Brown, Life in a complex community: func-tional interactions between earthworms, organic matter, micro-organisms, and plant growth, in: C.A. Edwards (Ed.), Earth-worm Ecology, St. Lucie Press, Boca Raton, 1998, pp. 179 –211.

[16]. Metzger, J. 2002 Retival Organic Fertilizers, Compost and Enviro Friendly Vermiculture. The Complete Technology Book on Vermiculture and Vermicompost, 2004. (http:/www.gardenpride.co.za/ProductsandServices

[17]. WormFertilizer/tabid/8334/language)

[18]. Zhang, X.Y., Sui, X.Y., Zhang, X.D., Meng, K., Herbert, S.J. (2007). Spatial variability of nutrient properties in black soil of northeast China. Pedosphere, 17: 19-29.