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EFFECT OF THE PREPARED COMPOSTED ORGANIC FERTILIZERS ON THE GROWTH AND YIELD OF CORN (*ZEA MAYS* L.) AND SOIL FERTILITY

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Abstract

In the present investigation, the effects of composted organic fertilizers (COF) on the growth and yield of corn and soil fertility were studied. Therefore, a field experiment was carried out to evaluate the effects of the composted organic fertilizers in a silty clay loam soil and laid out in Randomized Complete Block (RCB) design with six treatments and four replications, grown with corn (*Zea mays* L.) in Einkyitaw village, Mahlaing Township, Mandalay Region. In this research work, the composted organic fertilizers were prepared by five different weight ratios (30 kg: 20 kg : 10 kg: 5L) (cow dung: corn stalk: kokko leaves: EM) for COF-1, (30 kg : 30 kg : 5 L) (cow dung : corn stalk : EM) for COF-2, (60 kg : 5L) (cow dung : EM) for COF-3, (30 kg : 10 kg : 20 kg : 5 L) (cow dung : corn stalk : kokko leaves : EM) for COF-4, (20 kg : 20 kg : 20 kg : 5L) (cow dung : corn stalk : kokko leaves : EM) for COF-5, respectively. The treatments were: six kinds-T1 (control without fertilizer), T2 (COF 1, 14 t/ha), T3 (COF 2, 14 t/ha), T4 (COF 3, 14 t/ha), T5 (COF 4,14t/ha) and T6 (COF 5, 14t/ha). In all treatments, these fertilizers with same amount were used in growing corn (*Z.mays*). After that, during cultivation, determination of plant height and after harvesting, the yield components such as number of ear per plot, number of kernels per ear, and weight of thousand grains were measured and grain yield were estimated. Field studies showed that the yield of corn, T1 (749.30 kg/ha), T2 (950.84 kg/ha), T3 (1030.46 kg/ha), T4 (1181.93 kg/ha), T5 (1227.80 kg/ha) and T6 (1146.44 kg/ha) were obtained from treated soils and control without fertilizer. Among these treatments, T5 (COF 4, 14 t/ha) was able to produce the highest percentage yield of corn 1227.80 kg/ha compared with control without fertilizer, the lowest percentage yield of corn 749.30 kg/ha. The nutritional values of corn grains such as moisture, ash, protein contents and elemental contents such as phosphorus, potassium, calcium were also determined. These nutritional values of corn grains were not significantly different in each treatment. Then, comparison for all fertilizers treatment before growing corn and after harvesting corn were made with respect to physicochemical compositions of the treated soil samples. Physicochemical properties of soil (texture,

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moisture, pH, EC, organic carbon, humus, total N, available P, available K_2O, exchangeable cations (Ca^{2+}, Mg^{2+}) and CEC) were determined. This application of composted organic fertilizers not only produced the highest and sustainable crop yield but also improved the soil fertility and productivity of land.

Keywords: Composted Organic fertilizer, corn, growth, yield and soil properties

Introduction

As well known, application of plant residues and compost to agricultural soil enhances organic matter content, increases crop production, improves soil physical structure, decreases the need for inorganic fertilizer and sustains the agriculture system. Moreover, it is important in supplying nutrients, stabilizing chemical conditions (pH, EC, CEC, etc.) and trapping phytotoxic metals. Besides, development of technology is needed for the fulfillment of plant nutrients through organic resources and their application in a balanced way for maintaining soil productivity. Organic farming proves many advantages for soil as well as it improves plant and animal health. It also recycles and regenerate the waste into wealth and can wipe out the use of chemicals in the form of fertilizers or pesticides and help to build the balanced sustainable model for ecofriendly environment.

Organic fertilizers are all forms of organic soil amendments that originate from both livestock waste and crop residues, with the nutrients in them being mineralized by soil microbes and slowly making them available to plants over a long period of time (Lampkin, 2000; FSSA, 2003). Organic fertilizers contain mineral nutrients in the form of complex organic molecules and the levels of nutrients are much lower than inorganic fertilizers. Organic fertilizers also have a longer residual effect than inorganic fertilizers. Inorganic fertilizers are specially made to provide essential nutrients faster even during unfavourable conditions such as autumn and spring. In other words, inorganic fertilizers do not depend on the activity of microbes to release nutrients. Therefore, inorganic fertilizers are required in smaller amounts and they are easy to store as well as to apply to the soil compared to organic fertilizers. Inorganic fertilizers do not supply humus to the soil, so the nutrient and water holding capacity of the soil may be less than that of organic fertilized soil. This lower capacity as well as high solubility of inorganic fertilizer leads to faster leaching of nutrients (nitrogen) from the soil (Taiz and Zeiger, 1991; Lampkin, 2000; Rembialkowska, 2003).

Soil is a critical part of successful agriculture and is the original source of the nutrients that used to grow crops. The nutrients move from the soil into plants. The healthiest soils produce the healthiest and most abundant food supplies. Therefore, to build long-term health and fertility of soil, supplying organic fertilizers or contained organic materials are needed.

Adding fertilizer is one important way to keep agricultural production systems sustainable. In nature, plants use soil nutrients, and then they die and are decomposed by microorganisms. This returns the nutrients to the soil. In an agricultural setting, the crops take up nutrients, but then are removed from the field, so people and livestock can eat them and in turn get the nutrients. This removes nutrients from the field. In order to maintain nutrient levels in soil, it is important to apply fertilizer, whether from natural sources, such as manure, or human-made sources, such as ammonium salts. Growth promoting constituents like enzymes and hormones present in organic manures make them useful for improvement of soil fertility and productivity. According to Narkhede *et al.* (2010) the nutrient status of the compost obtained from municipal solid waste and sewage sludge was eminent. Due to increase in prices rate of fertilizers in developing countries, the poor farmers are getting highly affected.

Although the use of chemical fertilizers, herbicides and pesticides have enhanced the production of farming but there is growing concern over the adverse effects of the use of chemicals on soil productivity and environment quality. Use of chemical fertilizers for a long time has resulted in poor soil health, reduce production, and increase in incidences of pest and disease and environmental pollution (Ansari and Ismail 2001). The most important elements present in inorganic fertilizers are nitrogen, phosphorus and potassium which influence vegetative and reproductive phase of plant growth. Compared to inorganic fertilizers, the organic fertilizer having lowered the nutrient content, solubility, and nutrient release rates are typically low than inorganic fertilizers and therefore inorganic fertilizers are more preferred than organic fertilizers. However, this application of organic manures not only produced the highest and sustainable crop yield, but also improved the soil fertility and productivity of land (Sanwal *et al*., 2007). Organic farming relies on large-scale application of animal or farm yard manure (FYM), compost, crop rotation, residues, green manuring, vermicompost, biofertilizers and bio-pesticides.

Corn (*Z.mays*) is one the cereal crops having strategic and economic values as well as opportunity to be developed due to its position as the main source of carbohydrates and protein after rice. Almost all parts of the maize plant can be utilized for various purposes. Maize can be used as an alternative staple food because it has several advantages. According to Sugiyono *et al*. (2004), based on the nutritional value, maize has a higher protein content (9.5 %) compared to rice (7.4 %). In addition, mineral and vitamin contents between rice and maize are almost the same. The present paper aims to find the effects of composted organic fertilizers prepared from organic wastes on the growth and yield of corn and soil fertility.

Materials and Methods

Sample Collection and Preparation

Cow dung, corn stalk and kokko leaves were collected from Einkyitaw village, Mahlaing Township, Mandalay Region. Six composting piles (3 m length, 3 m width and 3 m height) were prepared by using all materials viz., raw materials (cow dung, corn stalk and kokko leaves). Firstly, a layer of raw materials was spread on the bottom of the pile. Then, EM solution (EM : molasses : water = 1:1:98 v/v) was sprinkled to attain adequate moisture content. The compost piles were covered with plastic sheet. After one month later, the pile was turned over. The pile was covered with plastic sheet. After another one month later, the pile was turned over again. Finally, after 75 days, the compost was ready to be used. The formation of composts step by step is shown in Figure 1. The various types of composted organic fertilizers are as follow:

- COF 1 ➡ Cow dung + Corn stalk + kokko leaves +EM (30 kg+20 kg+10 kg +5 L)
- COF 2 ➡ Cow dung + Corn Stalk + EM (30 kg+ 30 kg + 5L)
- COF 3 ➡ Cow dung + EM (60 kg + 5L)

- COF 4 ➡ Cow dung + Corn stalk + kokko leaves +EM (30 kg+10 kg +20 kg +5 L)
- COF 5 ➡ Cow dung + Corn stalk + kokko leaves +EM (20 kg+20 kg+20 kg +5 L)

Figure 1: Procedure for the Preparation of composted organic fertilizers

A field experiment was carried out at farm in Eainkyitaw village, Mahlaing Township, Mandalay Region from May to July 2017, grown corn (*Z. mays*) in that area. The experiment was laid out in Randomized Complete Block (RCB) design with six treatments and four replications. The size of each experiment plot area was 7.5´x15´= 112.5 sq ft for every treatment. The treatments were: six kinds-T1 (control without fertilizer), T2 (COF 1, 14t/ha), T3 (COF 2, 14t/ha), T4 (COF 3, 14t/ha), T5 (COF 4, 14t/ha) and T6 (COF 5, 14t/ha). In all treatments, these fertilizers with the same amount were used in growing corn (*Z.mays*). Before planting corn, soil pre-analysis was done in order to know the soil properties. Therefore, soil samples were collected from the field. Soil samples were taken about 20 cm depth from the surface in a zigzag manner, mixed thoroughly and dried in the shade before sieving (Jackon, 1967). Afterwards, stones, piece of macroorganic matter, gravel, roots, etc. were discarded. Then the soil samples were passed through the 250 mesh. The soil samples were stored in polythene bags and clearly labeled.

The soil samples were subjected to physical and chemical analyses using conventional and modern techniques. Standard methods of analyses were followed. Some part of this research work was done in the Laboratory of Analysis Department, Land Use and Seed Division, Ministry of Agriculture and Irrigation.

Methods

Soil's physical and chemical parameters like texture, pH, moisture, electrical conductivity, organic carbon, nitrogen, available phosphorus, available potassium, exchangeable calcium and magnesium, exchangeable potassium and cation exchange capacity (CEC) were determined. Texture was determined by pipette method. Measurement of pH was carried out by a pH meter (Digital pH Meter), moisture content was determined by oven drying method and organic carbon content was determined by ignition method. Nitrogen content was determined by Kjeldahl's method. Phosphorous content was determined by UV-Visible Spectrophotometric technique and potassium content was determined by Flame photometric technique. Electrical conductivity contents of farm soil were determined by Conductivity meter. Exchangeable Ca^{2+} and Mg^{2+} were determined by atomic absorption spectrophotometer. Cation exchange capacity (CEC) was determined by Kappen's method. In the analytical procedures of the experiments, recommended methods and techniques were applied (Vogel, 1968; AOAC, 1984).

Plant heights of corn were measured on 25, 50 and 75 days after sowing. Then, ear length, diameter of ear, kernel/ear, kernel row/ ear, length of kernel row, kernel/row, weight of thousand grains and grain yield were determined. Moisture and ash content of corn grain were determined by oven drying method and furnance. The protein content of corn grain was estimated by Kjeldahl's method and potassium, phosphorus, calcium contents were also determined by atomic absorption spectrophotometer.

Results and Discussion

This research is mainly concerned with the effects of composted organic fertilizers on the growth and yield of corn (*Z. mays*) and soil fertility. To study the effects of composted organic fertilizers on corn, the external factors affecting plant growth are air, heat (temperature), light, mechanical support, nutrients and water. In the field experiment, these external factors except nutrients supplying to soil were same condition for all treated soils and control plot. During cultivation, monthly determination of plant height, the most important agronomic characters of the cultivation was carried out. In this work, T4 treated with COF-3, cow dung + EM (60 kg+ 5L) showed the maximum mean height of 200.00 cm. Data obtained from these treatments are presented in Table 1. The effects of prepared composted organic fertilizers on plant height at 25, 50 and 75 days after emergence (DAE) are shown in Figures 2, 3 and 4.

Table 1: Effect of Composted Organic Fertilizers on Corn Plant Height

Treatments	Mean Plant Height of Corn (in cm)		
	25 days	50 days	75 days
T1	27.00	123.33	183.75
T2	30.37	151.00	190.33
T3	23.80	130.33	190.13
T4	30.67	151.67	200.00
T5	23.67	106.67	177.50
T6	30.30	123.33	175.13

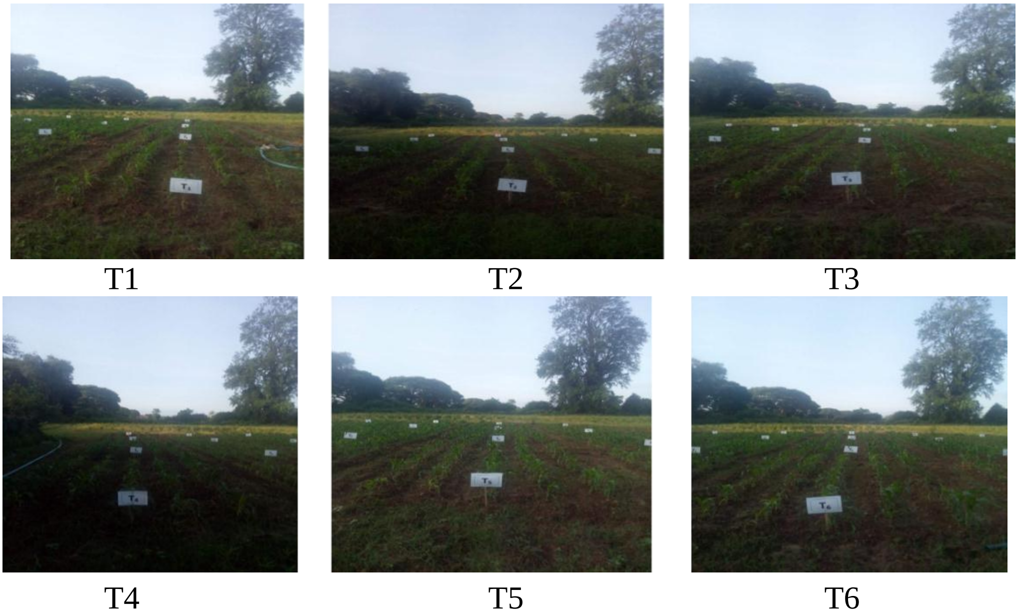


Figure 2: Corn grown in the field applied with composts and without compost at 25 days after emergence

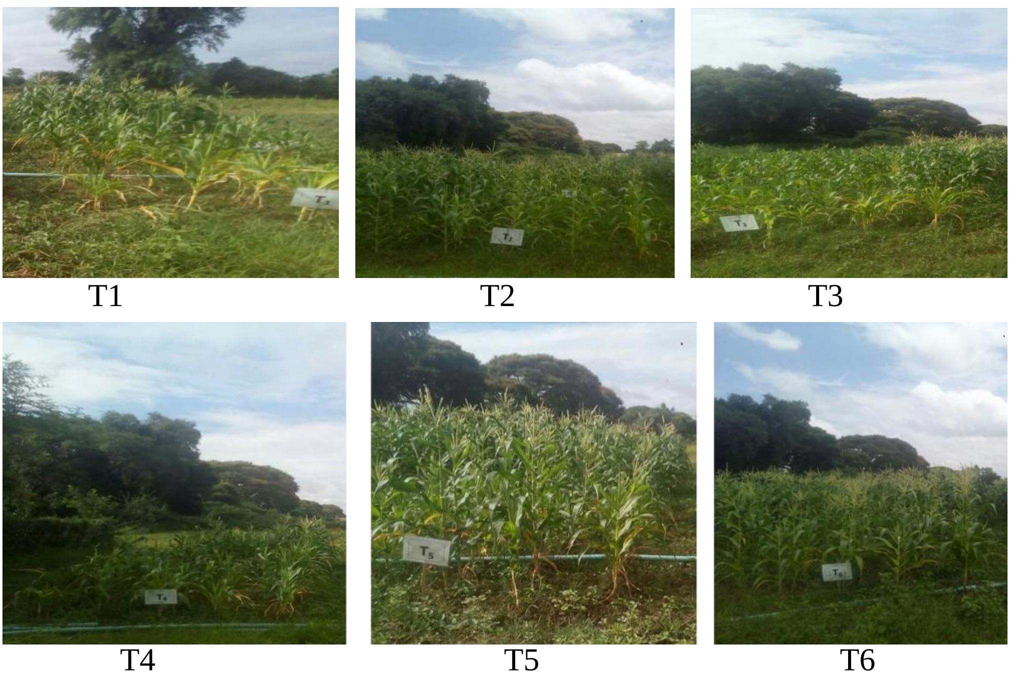


Figure 3: Corn grown in the field applied with composts and without compost at 50 days after emergence

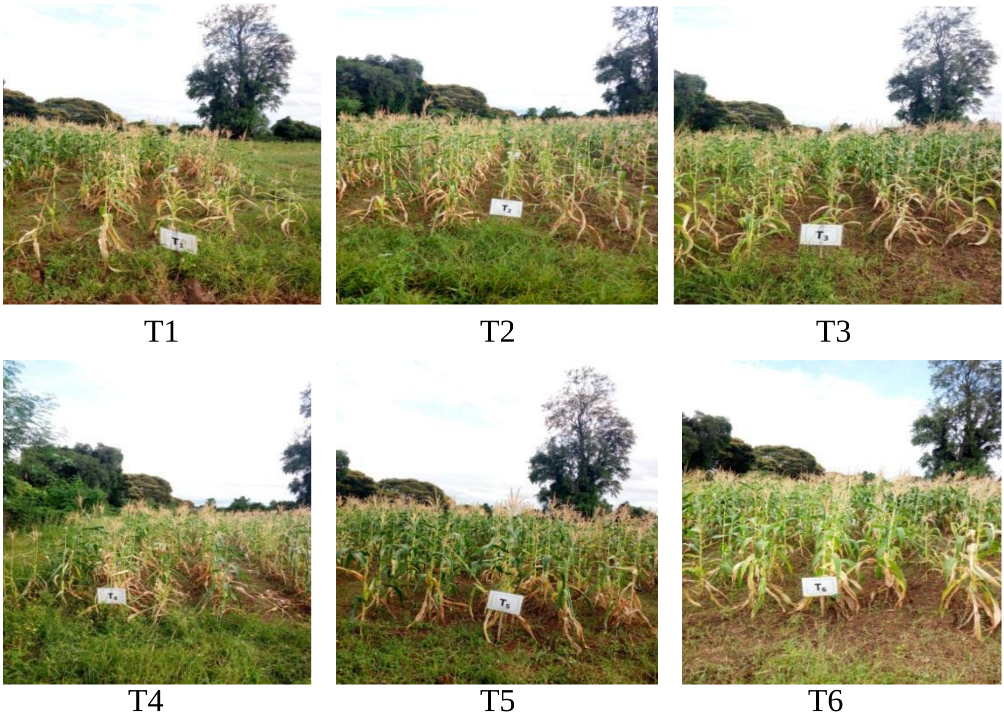


Figure 4: Corn grown in the field applied with composts and without compost at 75 days after emergence

Effect of Composted Organic Fertilizers on Yield and Quality of Corn

After harvesting, the yield components such as number of ear per plot, number of kernels per ear, and weight of thousand grains were measured and grain yield were estimated. The data obtained were subjected to descriptive statistics and means were compared for significant level. Moreover, ear length, diameter of ear, kernel row length, kernel per ear, kernel row per ear, and kernel per row were also measured to compare the characteristics of ears. Means for these characteristics are shown in Table 2.

In the case of yield components, the grain develops in the ears, or cobs, often one on each stalk. Normally, each ear has about 300 to 1000 kernels, weighing between 190 g and 300 g per 1000 kernels, in a variable number of rows (12 to16). Weight depends on genetic, environmental and cultural practices. The maximum grain yield of about 1227.80 kg/ha was obtained by treatment T5 used COF-4, cow dung+ corn stalk + kokko leaves+ EM (30 kg+ 10 kg +20 kg+ 5 L).

This variability is of great value in improving the productivity of the plant specific organic components of the grain. The main yield components include number and weight of grains. These yield components were determined by quantitative genetic effect that can be selected relatively easily. The number of grains depends on the ear and was determined by the number of rows and the number of kernels per row. The size and shape of the kernel determined its weight in the presence of other constant factor such as grain texture and grain density.

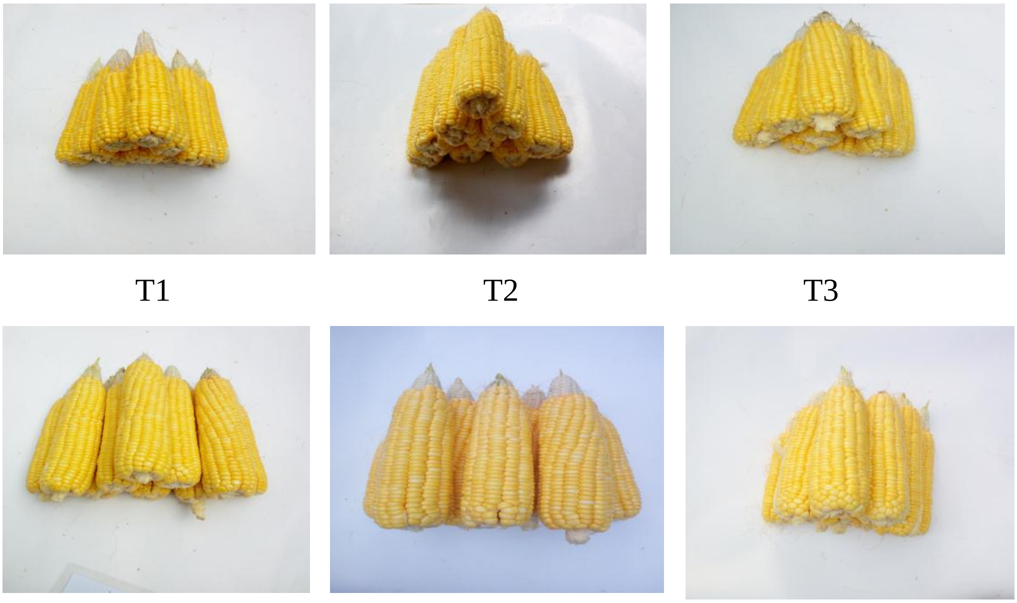
The maximum weight of 310.89 grams per thousand grains was observed and the recommended thousand grains weight of 190 and 300 g per 1000 grains. So, the crop quality in terms of thousand grain weight has been significantly improved. However, the weight of thousand grains was not significantly observed among each treatment.

This trial also pointed out, the treatment T5 gave a grain yield of about 1227.80 kg/ha, treatment T4 (1181.93 kg/ha), treatment T6 (1146.44 kg/ha), treatment T3 (1030.46 kg/ha), and treatment T2 (950.84 kg/ha), respectively. However, when compared with control which has a grain yield of 749.30 kg /ha, treatment (T5), COF-4, cow dung+ corn stalk + kokko leaves+ EM (30 kg + 10 kg +20 kg+ 5L) application resulted higher grain yield. So, it can be reported that the productivity of maize, in terms grain yield was increased to an extent using composted organic fertilizers prepared with organic wastes. The ears of corn after harvesting are shown in Figure 5.

Nutritional analysis such as moisture, ash, protein, potassium, phosphorus and calcium of grains of corn was also determined. The results are shown in Table 3. Ash and protein contents of treatment T2 are higher than the other treatments. Moisture, potassium, phosphorus and calcium contents of each treatment compared with control without fertilizer are not significantly different. The largest chemical component of the kernel is protein. Not only maize grains can be considered as a source of energy but also they can provide significant amount of protein.

Table 2: Comparison of the Characteristics of Ears of Corn from Treated Soils

Parameters	Treatments					
	T1	T2	T3	T4	T5	T6
Ear Length (cm)	17.00	19.68	18.63	20.20	20.00	19.13
Diameter of Ear (cm)	15.63	15.95	16.00	16.50	16.13	15.75
Kernel/Ear	401.0	461.5	494.0	509.5	490.5	518.0
Kernel Row/Ear	13	13	13	14	13	14
Length of Kernel Row (cm)	13.50	15.88	15.20	17.00	17.10	16.38
Kernel/Row	31.00	36.75	36.50	37.50	36.75	38.00
Weight of Thousand Grains (g)	300.00	301.38	305.13	305.40	310.89	303.51
Grain Yield (kg/ha)	749.30	950.84	1030.46	1181.93	1227.80	1146.44



T1 T2 T3

T4 T5 T6

Figure 5: Ears of corn after harvesting

Table 3: Nutritional Analysis Data of Corn Grain obtained from Treated Plots

Constituents (%)	Treatments					
	T1	T2	T3	T4	T5	T6
Moisture	15.68	15.40	16.74	14.34	16.15	13.87
Ash	1.30	1.64	1.53	1.42	1.47	1.34
Protein	13.125	15.531	14.656	12.690	13.565	12.250
Potassium	1.385	1.428	1.596	1.343	1.523	1.470
Phosphorus	0.326	0.330	0.327	0.245	0.252	0.248
Calcium	0.321	0.342	0.240	0.320	0.251	0.240

Analysis of the Farm Soil Media Treated with the Composted Organic Fertilizers

Table 4 shows the physical parameters and chemical compositions (in terms of N, P, K, Ca and Mg) of farm soil media before transplanting of the plant, corn (*Z.mays*). These soils were subjected treatment by using prepared composted organic fertilizers and also the soil, without any fertilizer treatment, which was kept as control. The farm soil (before transplanting) shows having sand 15.05 %, silt 44.00 % and clay 39.90 %. The category of this type of soil falls in the silty clay loam soil. The pH of the farm soil was about 8.0, it can be considered as a moderately alkaline type of soil.

Chemical compositions of the prepared soil were organic carbon, humus, total nitrogen, available phosphorus and available potassium together exchangeable calcium and magnesium. These elements are macronutrients for plant growth. The organic carbon content in the farm soil was 3.39 % and humus content was 5.84 %. The content of nitrogen in the farm soil was 0.11 %. The available phosphorus and potassium in the farm soil were 5.73 ppm and 27.04 mg/100 g, respectively. The amounts of exchangeable Ca and Mg were about 27.95 mmol/ 100 g and 1.40 mmol/100 g, respectively. On the context of what has been described above, the farm soil has the appropriate nutrients particularly for the plants. However, by adding composted organic fertilizers to farm soil before planting, growth promoting constituents like enzymes and hormones present in organic manures make useful for improvement of soil fertility and productivity.

According to Table 4, the texture of soil did not change much in the fertilizer treated plots since all plots were in the same area. The added composted organic fertilizers only enhanced the soil fertility. The pH values of the fertilizer treated soils were found to be slightly increased than that of the original control soil. The pH values of treated soils were found to be in the range of 8.13-8.26. The pH of soil is important because it can alter the availability of nutrients to the plants, thereby affecting the activity of the roots and microbes. The electrical conductivity values of treated soils and control without fertilizer were found to be in the range of 0.13 µS/cm to 2.76 µS/cm. The values of electrical conductivity of the treated soils were higher than that of the original free soil treatment T1 (control without fertilizer). Electrical conductivity of soil informs the ionic nature of the soluble compound to supply the needs of plants. Hence, the fertilizer treated soils would have more pronounced effect on the plant growth. The organic carbon content increased from 3.39 % to 3.8 % and the humus content increased from 5.84 % to 6.55 %. Humus contains every element absorbed by growing plants but not in the same proportions as in plant. The microbes become a part of the soil humus along with materials that have partially or entirely resisted the process of decomposition. The continuing slow release of plant nutrients from decomposing humus is a very important part of the ability of the soil to supply the needs to plant.

Nitrogen helps plants make the proteins they need to produce new tissues. After adding composted organic fertilizers, COF-3, the highest value of nitrogen percentage was recorded as (1.39 %), and the lowest value was observed in the untreated control (0.11 %).

Table 4: Analysis Data of the Different Farm Soils before Transplanting

No	Items	Different Farm Soils					
		T1	**T2**	**T3**	**T4**	**T5**	**T6**
1	Texture-Sand (%)	15.05	14.8	15.7	13.2	15.5	13.35
	Silt (%)	44	57.2	51.5	55.25	51.6	48.05
	Clay (%)	39.9	26.5	32.4	29.9	32.5	35.8
	Total (%)	98.95	98.5	99.6	98.35	99.6	97.2
2	pH	8.00	8.26	8.21	8.13	8.2	8.16

No	Items	Different Farm Soils					
		T1	T2	T3	T4	T5	T6
3	Moisture (%)	4.55	4.88	4.59	5.36	5.21	4.51
4	Electrical Conductivity (µS/cm)	0.13	2.09	1.75	2.76	1.84	1.56
5	Organic Carbon (%)	3.39	3.62	3.63	3.42	3.53	3.8
6	Humus (%)	5.84	6.24	6.26	5.89	6.09	6.55
7	Total N (%)	0.11	1.21	0.965	1.39	0.95	1.02
8	Available P_2O_5 (ppm)	5.73	12.14	11.102	14.434	12.68	11.087
9	Available K_2O (mg/100 g)	27.04	46.82	40.84	44.91	44.53	38.74
10	Exchangeable Ca^{++} (mmol/100 g)	27.95	31.81	27.99	31.21	31.2	28.95
11	Exchangeable Mg^{++} (mmol/100 g)	1.4	4.9	5.58	4.22	2.1	5.59
12	Exchangeable K^{+} (meq/100 g)	0.58	1.55	2.24	2.33	2.34	2.2
13	Cation exchange capacity (meq/100 g)	32.16	39.84	37.52	37.76	37.56	38.59

In nature, nitrogen is often in short supply so plants have evolved to take up as much nitrogen as possible, even if it means not taking up other necessary elements. If too much nitrogen is available, the plant may grow abundant foliage but not produce fruit or flowers. Growth may actually be stunted because the plant is not absorbing enough of the other elements it needs.

Phosphorus contents after adding composted organic fertilizers were increased compared with the untreated control (T1). The highest value of phosphorus (14.434 ppm) were found in soil treatment (T2) treated with COF-1. However, when comparing T2, T3, T4, T5 and T6 treated composted organic fertilizers, each treatment was not different. Phosphorus stimulates root growth, helps the plant set buds and flowers, improves vitality and increases seed size. It does this by helping transfer energy from one part of the plant to another. Organic matter and the activity of soil organisms also increase the availability of phosphorus.

Composted organic fertilizers increased potassium percentage (27.04 mg/100 g – 46.82 mg/100 g) compared with untreated control. The highest value of potassium percentage was recorded in treatment (T2). Potassium improves overall vigor of the plant. It helps the plants make carbohydrates and provides disease resistance. It also helps regulate metabolic activities. Calcium is used by plants in cell membranes, at their growing points and to neutralize toxic materials. In addition, calcium improves soil structure and helps bind organic and inorganic particles together. The exchangeable calcium content of T3, T6 and original control soil (T1) has no significant differences. However, the exchangeable calcium contents of treated soils T2, T4 and T5 were slightly increased than the original soil. The exchangeable magnesium contents of T2, T3, T4, T5 and T6 were higher than that of the original control soil. Magnesium is the only metallic component of chlorophyll. Without it, plants cannot process sunlight. The cation exchange capacity (CEC) and sum of exchangeable cations are an essential measurement in agronomy and soil science to estimate the physicochemical state of a soil, which may be a good indicator of soil quality and productivity. Cation exchange capacity (CEC) also increased in all treatments compared with the original control soil. The treatment T2 gave the highest value of CEC (39.84 meq/100 g) and the lowest value was recorded in the untreated control (32.16 meq/100 g). Therefore, CEC is important for maintaining adequate quantities of plant available calcium (Ca^{2+}), magnesium (Mg^{2+}) and potassium (K^{+}) in soils.

The added organic fertilizers increased the proportion of organic carbon in the soil surface, indicating the increase of organic matter which has a significant impact in plant nutrition (Nelson *et al*., 1996).

Analysis of the Farm Soil Media Used after Harvesting Corn (*Zea mays* L.)

Table 5 shows the texture, moisture percent, electrical conductivity, organic carbon content, humus percent, total nitrogen content, available phosphorous and potassium, exchangeable calcium, potassium, cation exchange capacity (CEC) and pH values of soil after harvesting corn (*Z. mays*).

A variety of treated soils was compared with the control soil after harvesting stage. Moreover, it can be observed that the pH of the soil before transplanting and after harvesting stages lie between 8.0 and 8.61. These results showed the alkaline nature of soil. As for the total nitrogen, available phosphorus and potassium contents in the treatment soils T2, T3, T4, T5 and T6, they were not significantly changed under cultivation although most of them were removed from the soil permanently by the crop produced. In general, the nutrients in organic fertilizers are not water soluble and are released to the plants slowly over a period of months or even years.

With regard to the nature of the soil after the harvesting stage which has undergone different treatments can be interpreted as follows. Comparison for all cases is made with respect to the physicochemical composition of the farm soil samples. In all cases, the variations in the silt and clay content were comparable to that of the farm soil sample before harvesting. On reviewing the results of the data presented in Table 5, even after the harvesting stage nitrogen, phosphorus, potassium, and as well as the organic carbon and humus were observed to maintain and sustain the soil fertility

Table 5: Analysis Data of the Different Farm Soils after Harvesting Corn (*Zea mays* L.)

No	Items	Different Farm Soils					
		T1	**T2**	**T3**	**T4**	**T5**	**T6**
1	Texture-Sand (%)	14.2	13.8	15.7	13.25	14.5	13.35
	Silt (%)	55.2	58.25	52.5	54.25	51.7	49.05
	Clay (%)	29.3	26.6	30.4	30.9	32.6	35.8
	Total (%)	98.7	98.65	98.6	98.4	98.8	98.2
2	pH	8.44	8.26	8.59	8.6	8.51	8.61
3	Moisture (%)	4.84	4.78	4.39	5.39	5.01	4.61
4	Electrical Conductivity (µS/cm)	0.12	0.14	0.15	0.14	0.15	0.14
5	Organic Carbon (%)	3.36	3.59	3.58	3.39	3.52	3.76
6	Humus (%)	5.79	6.19	6.17	5.85	6.07	6.49
7	Total N (%)	0.1	0.12	0.11	0.13	0.14	0.11
8	Available P_2O_5 (ppm)	5.4	11.66	10.66	13.84	12.26	10.62
9	Available K_2O (mg/100 g)	32.14	45.37	39.54	43.76	43.62	37.73
10	Exchangeable Ca^{++} (mmol/100 g)	28.01	30.81	27.89	31.01	30.2	28.65

No	Items	Different Farm Soils					
		T1	T2	T3	T4	T5	T6
11	Exchangeable Mg^{++} (mmol/100 g)	0.7	3.5	4.18	2.82	0.7	4.19
12	Exchangeable K^{+} (meq/100 g)	0.68	0.97	0.84	0.93	0.93	0.8
13	Cation exchange capacity (meq/100 g)	31.68	36.85	34.62	36.55	33.76	35.49

Conclusion

The field experiments were conducted at the farm suited in Eainkyitaw village, Mahlaing Township, Mandalay Region. Corn (*Z.mays*) was cultivated in this field experiment. The fertilizers used in this experiment were COF-1, cow dung + corn stalk+ kokko leaves+ EM (30 kg+20 kg+10 kg+5 L), COF-2, cow dung+ corn stalk+ EM (30 kg+30 kg+5 L), COF-3, cow dung + EM (60 kg+ 5 L), COF-4, cow dung+ corn stalk+ kokko leaves + EM (30 kg+ 10 kg+ 20 kg+5 L) and COF-5, cow dung + corn stalk + kokko leaves + EM (20 kg + 20 kg+ 20 kg+ 5 L).

Field studies showed that the COF-4 was able to produce the highest percentage yield of corn (1227.80 kg/ha) and the lowest percentage yield of corn 749.30 kg/ha in control treatment T1 without fertilizer. The nutritional values such as moisture, ash, protein and elemental contents such as phosphorus, potassium, calcium of corn grains were also determined. It was found that the nutritional values of corn grains were not significantly different in each treatment.

This research also indicated that the soil before the plantation should be analyzed as regard to its texture, pH, organic carbon and mineral contents. This assay of the soil showed that farm soil was silty clay loam which was an important factor for the cultivation of the corn. When comparing before planting and after harvesting soil, it was silty clay loam in texture, high in pH and EC, organic carbon and CEC, total N, available phosphorus and available K_2O are not significantly changed. Thus, from the results obtained it can be concluded that composted organic fertilizers enhance the yield of corn compared to control without fertilizers and remain nutrients in soil. Besides, applying composted organic fertilizers is organic farming. Organic farming is an effective option for agricultural fields in cropping and helps to maintain fertility of soil for a longer period.

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