NIGERIAN AGRICULTURAL JOURNAL
ISSN: 0300-368X
Volume 49 Number 2, October 2018. Pp. 114-121
Available online at: http://www.ajol.info/index.php/naj

EFFECT OF COMPOUNDED COMPOSTS ON THE GROWTH OF MAIZE (*Zea mays* L)

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ABSTRACT
A field trial was conducted to evaluate potentials of locally manufactured organic fertilizers –compounded composts made from vegetal matter of six legumes (Centrosema pubescens, Mucuna bracteata, Calopogonium mucunoides, Mucuna pruriens, Lablab purpureus, and Stylosanthes capitata) respectively composted with rice husk, poultry waste and swine waste in a ratio 5:4:4:4 dry weigh - in maize crop production at Umudike, Nigeria. The eight treatment growth media were topsoil mixed with each of the 6 fertilizers respectively; top soil mixed with NPK 15:15:15 fertilizer; and Topsoil only (Control). A sample size of 4 maize plants made up 32 plants per block, and a total 96 plants use for the experiment arranged in a Randomized Complete Block Design in 3 replications. The experiment was monitored for 9weeks after planting (WAP). Plant height (cm), girth and number of leaves were measured weekly while leaf area (cm^2) was measured only at 7 weeks after planting (7WAP). Data collected were subjected to statistical analysis of variance using SPSS 12. Significant means were separated by Duncan Multiple Range Test at $P \leq 0.05$. The result shows significant differences in the height, girth and leaf area in the organic fertilizers treated crops than in the NPK and control treatments. Highest values were recorded in L. purpureus organic fertilizer treatment and C. pubescence fertilizer treatments while the control treatment recorded least values. The organic fertilizers, especially the Lablab purpureus organic fertilizer, also improved soil physico-chemical properties than the NPK treatment. These indicate that the use of locally manufactured fertilizers have potentials for improving crop productivity in Nigeria.

Keywords: Organic fertilizers, maize, plant growth, organic fertilizers, and agricultural productivity

Introduction

Soil fertility defines the status of soil with regards to its ability to supply nutrient elements essential for healthy plant growth. It deals with the nutrient content in the soils, their supplying power and availability (Osedeke, 2017). Thus, it is indicative of soil capacity to support population of plants and animals above and below ground (FAO and ITPS, 2015). Decline in soil fertility is a major constraint to crop production in Nigeria, and it is becoming increasingly critical to ensure sustainable soil productivity. Low growth and yield have been attributed to low nutrient status of soils resulting from deforestation and intensification of crop production which causes soil erosion and excessive leaching of the soil nutrients (*Vanlauwe et al.*, 2000; Nwosu *et al.*, 2011). Agricultural and forest soils are also impoverished in mineral nutrients by the crops and therefore require regular application of fertilizers for sustainable crop production (Roy *et al.*, 2006; Adeniyan *et al.*, 2011; FAO and ITPS, 2015). Managing soil fertility therefore requires attention as the nutrient source, quality, timing, rate and nutrient placement or application (Hubbe *et al.*, 2010; Hochmuth *et al.*, 2013).

Though inorganic fertilizers are important and quickest way of nutrient supply to soil, there are serious challenges posed by the continuous use of inorganic fertilizers which cannot be overlooked (Nwosu *et al.*, 2011, Adeniyan *et al.*, 2011; Uka *et al.*, 2013), and some of these can worsen with climate change (FAO, 2012). Use of conventional organic fertilizers such as cow dung has its own challenges such as not being sufficiently available at the recommended rates (5 -10 Mg ha^{-1}), it is bulky and labour intensive for transportation and application, and often of poor quality (Okalebo *et al.*, 2006; Ngome *et al.*, 2011). Nevertheless, the application of organic manure is increasing preferable to inorganic fertilizers because it not only replenishes lost nutrients but also improves the physical, chemical and biological properties of such soils (Omotayo and

Chukwuka, 2009), though the effect of each manure on soil properties and crop yield depends upon its chemical composition (Tejada *et al*., 2008). Augmenting soil nutrient status with legumes is also becoming popular in sustainable cropping practices, as they fix atmospheric nitrogen directly to soil or through mineralization of their residues (Okalebo *et al*., 2006; Tejada *et al.*, 2008; Ngome *et al*., 2011; Nwosu *et al.,* 2011). Thus, legumes matter composted with other organic nutrient sources have prospects as good substitute for inorganic fertilizers in crop production systems.

Maize (*Zea mays* L) is an annual cereal crop which belongs to the family Poaceae, originated from Central America. It is an important cereal crop that provides staple food to large number of human population in the world. Most maize species grow well where the annual rainfall ranges from 400cm-900cm and temperature of 20^0 C to a height of 4.5m (Solomon *et al*., 2012). It is relatively a short duration crop capable of utilizing inputs more efficiently and producing large quantity of food grains per unit area. Maize has great nutritional value. It has been reported to contain about 72% starch, 10% proteins, 4.8% oil, 8.5% fiber, 3% sugar and 1.7% ash (Solomon *et al*., 2012). It has the highest amount of oil of all cereals with its grain containing an appreciable quantity of calcium and iron, and ranks third following wheat and rice in world production (Solomon *et al*., 2012). Widely grown in the humid tropics and sub-Saharan Africa, the crop serves for food and livelihood for millions of people today. Each plant usually bears seed on cobs which may be 15-25cm in length with the grains golden yellow, dull yellow, red or white in colour. Maize is consumed roasted, baked, fried, boiled or fermented in Nigeria. Usually they are grounded into fine flour called corn flour and also as powdered starch. Maize has been described as an exhausting crop because of its heavy requirement of fertilizers for maintaining high yield (Solomon *et al*., 2012). Consequently, the production of this important food crop is hampered by declining soil fertility (Ngome *et al.*, 2011). This research is to evaluate the effect of a locally manufactured fertilizer on the growth of maize.

Materials and Methods

Study Area

The experiment was carried out at the Nursery Unit of the Department of Forestry and Environmental Management, Michael Okpara University of Agriculture Umudike, Abia State. Umudike is situated within 5^0 30’N and 7^0 31’E on the lowland rain forest of Nigeria, at an elevation of 122 meters above sea level (Nwosu *et al.*, 2011). Annual rainfall ranges from 1800mm to 2200mm with the intensity reaching up to 100mmhr^{-1}. Temperature is high throughout the year with a range of 330C -350C as the maximum and 28^0C to 29^0C (Nwosu *et al.*, 2011), while relative humidity varies from 51% to 87%. The soil is acid sandy loam in the ultisol group (Omenihu *et al*., 2011).

Seeds: Maize seeds (variety- SAMMAZ 26) were purchased from the National root Crop Research Institute (NRCRI), Umudike.

Fertilizers: Fertilizers used for the study were NPK 15:15:15 and organic fertilizers produced from composting a mixture of vegetal matters of *Centrosema pubescens*, *Mucuna bracteata*, *Calopogonium mucunoides*, *Mucuna pruriens*, *Lablab purpureus, and Stylosanthes capitata* respectively with rice husk, poultry manure and swine dung in the ratio 5:4:4:4. The mineral element composition of the various organic fertilizers has been determined *ab initio* and is known.

Top soil and poly pots: Top soils collected from a fallow farm land besides the nursery unit of the FOREM was bulked, properly mixed and sieved to remove large particles, roots and debris. The composite soil sample was analyzed for physico-chemical properties at the Soil Laboratory of the National root Crop Research Institute (NRCRI), Umudike, and analyzed using standard methods of soil analysis described by Udo *et al.* 2001). Ten grams (10g) of the soil was collected into poly pots measuring 35cm × 30cm for the experiment. A total of ninety eight (98) poly pots measuring 35cm × 30cm were used for planting for the experiment

Experimental Layout: The experimental site was cleared manually. Poly pots containing appropriate treatment growth media were subsequently arranged on the plot in a Randomized Complete Block Design in three replications (Plate 1). The poly pots containing the composite soils were treated to 10t/ha of the respective organic fertilizers before the maize seed were planted. For the NPK 15:15:15 treatments, poly pots containing top soil were treated to 800kg/ha NPK 15:15:15 fertilization and the maize planted after two weeks. Two seeds were planted per pot and was thinned down to one seedling after two weeks. The different treatments of the experiment are as indicated in Table 1.

Table 1: Experimental treatments

Treatment	Description
1.	10t/ha *Centrosema pubescens* fertilizer treatment
2.	10t/ha *Mucuna bracteata* fertilizer treatment
3.	10t/ha *Calopogonium mucunoides* fertilizer treatment
4.	10t/ha *Mucuna pruriens* fertilizer treatment
5.	10t/ha *Lablab purpureus* fertilizer treatment
6.	10t/ha *Stylosanthes capitata* fertilizer treatment
7.	800kg/ha NPK15:15:15 treatment
8.	Top Soil only (Control)

Planting: Three maize seeds were planted per poly pot at 2-3cm depth and 5cm apart, which were thinned to one seedling at 14 days after planting (DAP).

Cultural Practices: Watering was done once, in the evenings, daily. Weeds were hand-picked from the pots, while the space between the blocks and treatments were weeded with hoe.

Germination Count: Seeds were considered germinated when the plumule emerged above the soil surface. Germination counts were taken daily up to six days after planting (DAP). Germination percentage was determined as follows:

$$\text{Germination Percentage} = \frac{\text{Number of Seed Sprouted}}{\text{Total Seeds Planted}} \times 100.$$

Data Collection: Data on growth parameters such as height, collar diameter, and leaf area were collected weekly during the period of the experiment. Plants heights (cm) were measured using measuring tape from soil level in the poly pot to the apex of the plant. Plants collar diameter (cm) was determined using veneer caliper at the collar region. Leaf areas (cm^2) were determined using methods of Elings (2000) as leaf length multiplied by its maximum width multiplied by 0.75 (maize leaf calibration factor). Plants biomass production was determined at 7WAP**.** Two seedlings were randomly selected and uprooted from each treatment. The samples were oven-dried 70^0c until a constant weight was recorded after subsequent drying of plants.

Data Analysis: Data collected were analyzed using Analyses of Variance (ANOVA) at 0.05 probability level. Significant differences were separated using DMIR

Plate 1: Experimental Plot/Layout

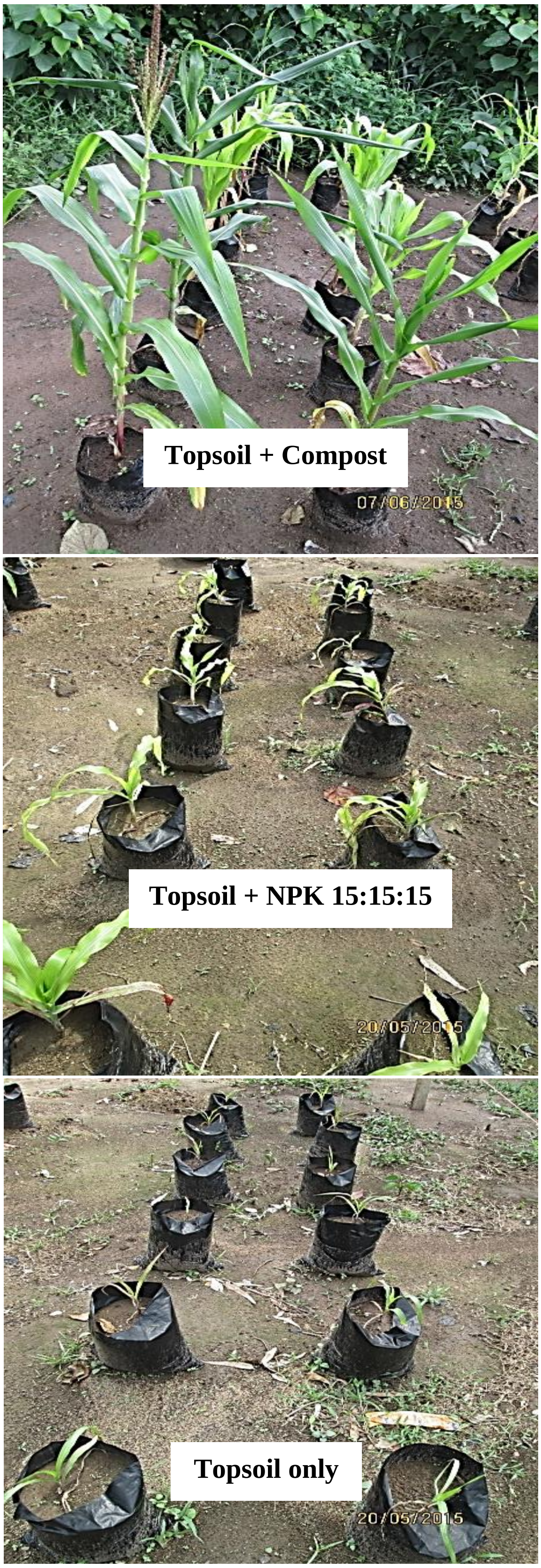

Plate 2: Effects of different fertilizers on maize growth at 7WAP

Results and Discussion

Physicochemical properties of soil used for the experiment

Table 1 show that the experimental soil is acidic. Organic matter content and nitrogen levels were low. The soil exchangeable cations were low. Available P and K were low. The soil is sandy/clay and its physico-chemical properties agree with the reported low fertility and acidic nature of soils in Southeast Nigeria (Omotayo and Chukwuka, 2009; Nwosu *et al.*, 2011; Omenihu *et al*., 2011; Osedeke, 2017).

Mineral composition of the organic fertilizers

The organic fertilizers are rich in the plant nutrients (Table 2). Their nitrogen, phosphorus and potassium contents were high. The fertilizers are also rich in organic matter and organic carbon.

It agrees with several authors that composts contain high amount of nutrients that enhances crop growth (Roy *et al*., 2006; Hubbe *et al*., 2010; Louisa and Taguiling, 2013; Adamu *et al.*, 2014). However, the nutrient composition of the organic fertilizers varied with legume species used in the production. Fertilizers made with *L. purpureus* contained the highest amount of nitrogen (33.60 g/kg). It is followed by fertilizer made with *M. pruriens* (32.20 g/kg) and *C. pubescens* (30.80 g/kg). The nitrogen content of the organic fertilizer made with *S. capitata contained* least N (2.310%), followed by *M. bracteater* (2.870%). The result supported Ngome *et al*. (2011) and Nwosu *et al*. (2011) who reported differential capacity of leguminous crops to enhance soil fertility and crop productivity. This could be due to differences in the decomposition rates of the legume materials (Mathews, 1998), and suggests that *L. purpureus* decomposed faster while *S. capitata* and *M. bracteater* decomposes slowly than the other legumes. Thus, the result agree with Mathews (1998) who reported that *M. bracteata* litter decomposes slowly. The findings support Rao and Mathuva (2000) who reported that soils in which legumes and farm yard manure (FYM) are either grown or incorporated contain enough suitable nitrogen, phosphoric acid, potash and lime. The high organic matter and mineral elements contents of the compounded composts also supported Hubbe *et al.* (2010) that suitably prepared compost can provide multiple benefits to soils.

Effect of fertilizers on germination percentage of maize

Table 3 shows that all experimental treatment recorded over 50% germination within 4-9 DAP. The highest germination percentage (95.8%,) was recorded in the *L. purpureus* fettilizer treatment, followed by *C. pubescens* fertilizer treatment (85.5%). The least germination (83.3%) was recorded in the control. Although mineral nutrient is not a basic requirement for seed germination, soil properties play significant role in terms of water availability aeration and temperature which are critical requirements for seed germination. The organic fertilizers treatment may have enhanced the germination of the maize crop through improving the soil properties. This is in agreement with Louisa and Taguiling (2013) who noted that organic fertilizers improve soil physical and chemical properties.

Effect of fertilizers on maize plant height

Table 4 show that maize plants of NPK and Control treatments recorded significantly least plant height among the treatments throughout the period of the experiment. The control has the least height all through the period with values of 18.90±0.86, 23.87±0.55, 28.47±1.60, 52.78±1.69 and 57.30±2.03 while *L. purpureus* has highest heights for all the weeks with values of 23.33±1.11, 39.55±1.85, 54.35±1.31, 71.27±2.13, and 81.37±2.55 respectively. The NPK treatments grew significantly taller than the control treatments 5WAP. At 7WAP, plant height of *L. purpureus* fertilizer treatment was significantly higher than all other treatments. It is followed by *C. pubescens fertilizer* treatment with a value of 75.47±1.44 which was significantly higher than *M. bracteata (*63.45±2.21), *C. mucunoides (*62.80±2.29), *M. pruriens (*57.42±1.90) *and S. capitata* (54.93±2.75) fertilizer treatments. The organic fertilizer treated plots recorded significantly greater plant height than the NPK and control treatments at 7WAP. The findings agree with Basso and Ritchie (2005), Akanbi *et al. (*2010), Quattara *et al*. (2008), Louisa and Taguiling (2013) and Chukwuka *et al.* (2014) that organic fertilizers supply the essential plant nutrients that enhance growth, development and optimum productivity of crops. It also supported Roy *et al*. (2006) who noted that concentrated organic manures are comparatively richer in NPK

Effect of fertilizers on maize plant girth

Table 5 show that maize plant girth was least in the control throughout the period of the experiment with values of 0.96±0.18, 1.13±0.05, 1.31±0.04, 1.43±0.05 and 1.53±0.05, while the *L. purpureus* compost treatment has the highest values of 2.39^{a}±0.06, 4.11^{a}±0.05, 4.11^{a}±0.05, 5.08^{a}±0.07, 5.78^{a}±0.13, 5.88^{a}±0.11 at 3,4,5,6 and 7WAP respectively. There was no significant difference in plant girth of the NPK and control treatments at 3WAP only. Whereas amongst the organic fertilizer treatments at 3WAP, only C. *pubescens (*2.16±0.10) was not significantly different in girth with *L. purpureus (*2.39±0.06). At 7WAP however, L. *purpureus* recorded plant girth value of 5.88±0.11 which was significantly higher than all other treatments. It was followed by *C. pubescens* with a value of 5.20±0.15, which was significantly higher than *M. bracteata (*4.64±0.11), *M. pruriens (*4.72±0.06), and *S. capitata (*4.68±0.16). At 7WAP, the legumes compost treatments recorded significantly greater plant girth than NPK and control treatments. This also agrees with Basso and Ritchie (2005), Akanbi *et al.* (2010), Quattara *et al*. (2008), Louisa and Taguiling (2013), and Ibrahim and Fadni (2013) that organic fertilizers supply the essential plant nutrients that enhances growth, development and optimum productivity of crops.

Effects of fertilizers on leaf area of maize plant

Table 6 show that leaf area of maize plants of the control treatment has the least values at 3, 4, 5, 6, and 7WAP with values of 18.90^{f}±0.86, 23.87^{e}±0.55, 28.47^{f}±1.60, 52.78^{e}±1.69, and 57.30^{e}±2.03 respectively. The *L. purpureus* fertilizer treatment recorded the highest values of 94.91±1.52, 218.34±2.03, 380.58±5.75, 432.45±13.87, and 356.97±11.94 for the corresponding periods respectively and they were significantly higher than values recorded with maize plants in all other treatments for the corresponding periods. Maize plants treated with the organic fertilizers have significantly greater leaf area than those of the NPK and control treatments at 3WAP. At 7WAP, the leaf area of all the compost was significantly higher than that of the NPK and control treatments. The result agrees with several authors who have reported better crop growth with organic fertilizers (Choudhary *et al.*, 1996; Quattara *et al*., 2008; Louisa and Taguiling, 2013; Ibrahim and Fadni, 2013 and Chukwuka *et al.*, 2014) and supported Adamu *et al.* **(**2014) who noted that legume compost has rich nutrient composition.

Effects of organic fertilizers on fresh and dry weight of maize plant

Table 8 show that the fresh and dry weights of the organic fertilizer treatments were significantly different from the NPK and control treatments. Highest fresh weights were recorded in the *L. purpureus* fertilizer treatment (237.49^{a}±2.08) followed by the *C. pubescens* treatment (225.15^{a}±1.05), and these were significantly different from values recorded with the *C. mucunoides (*160.48^{bc}±3.06) and *M. pruriens (*161.46^{bc}±1.08) fertilizer treatments. Dry weights of *L. purpureus* fertilizer treatment (61.35±2.01) was also significantly different from values of *M. bracteata* fertilizer treatment *(*45.27^{b}±1.08), *C. mucunoides (*36.79^{c}±2.03), and *M. pruriens* (44.05^{b}±1.02) fertilizer treatments. The findings also agree with Choudhary *et al.* (1996), Quattara *et al*. (2008), Louisa and Taguiling (2013), Ibrahim and Fadni (2013) and Chukwuka *et al.* (2014) who reported that crops grow better with organic fertilizers. Moreover, as legumes are a major component of the organic fertilizers, it also supported Ngome *et al*. (2011) and Nwosu *et al*. (2011) who reported differential capacity of leguminous crops to enhance soil fertility and crop productivity.

Conclusion

Crop production in Southeast Nigeria is characterized by low productivity due to the poor soil fertility and this has been a major concern to farmers. There is growing disinterest in the use of inorganic fertilizers due to its environmental consequences which also could be worsened by the global climate change phenomenon. The locally manufactured organic fertilizers demonstrated potential as better alternative to inorganic fertilizers. The blend and balance of nutrients from a range of selected nutrient-rich organic materials translated into efficient and adequate supply of the nutrient requirements of the maize crops. The organic fertilizers improved maize growth thereby demonstrating potentials to improve agricultural crop productivity and enhance resilience of the sector to climate change. The locally manufactured organic fertilizer should be recommended in agricultural crop production. However, further research is also neededed.

Acknowledgements

The authors are grateful to the Tertiary Education Trust Fund (TETFUND) and Michael Okpara University of Agriculture, Umudike (MOUAU) for providing funding for the project on Producing Organic Fertilizers Using Locally Available Legumes for Forest Nursery Nutritional Management.

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Table 2: Physiochemical properties of soil used in the experiment

Parameters	**Value**
pH	5.40
Organic Carbon (OC) %	1.88
Total Nitrogen (TN) %	0.16
Organic Matter (OM) %	1.84
Calcium (Ca) cmolkg^{-1}	2.60
Magnesium (Mg) cmolkg^{-1}	1.00
Potassium (K) cmolkg^{-1}	0.08
Sodium (Na) cmolkg^{-1}	0.23
Phosphorus (P) mgkg^{-1}	16.80
Sand %	46.40
Clay %	34.20
Silt %	19.40
Texture	Sand Clay

Table 3: Mineral compositions of the organic fertilizers (g/Kg)

Legumes compost	**N**	**P**	**K**	**Ca**	**Mg**	**Na**	**Org C**	**Org M**
C. pubescens	29.40	9.99	7.75	32.10	10.34	3.25	306.0	527.5
M. bracteata	32.20	11.70	4.25	40.20	17.60	1.75	306.0	528.0
C. mucunoides	30.80	10.30	8.00	38.20	10.94	3.50	347.7	590.9
M. pruriens	23.10	8.81	7.00	24.10	12.20	2.76	265.2	457.2
L. purpureus	33.60	11.20	4.50	30.10	12.20	4.00	289.7	499.4
S. capitata	28.70	10.50	4.00	28.10	11.60	3.25	240.7	415.0

Table 4: Effect of fertilizers on germination percentage of maize

Treatment	No. of seeds planted	Germination period	Number of germinations	% Germination
C. pubescens	24	4-7 days	21	87.5
M. bracteata	24	4-8 days	20	83.3
C. mucunoides	24	4-8 days	21	87.5
M. pruriens	24	4-7 days	21	87.5
L. purpureus	24	4-7 days	23	95.8
S. capitata	24	4-7 days	20	83.3
NPK 15:15:15	24	4-9 days	20	83.3
Control (T8)	24	4-8 days	20	83.3

Table 5: Effect of fertilizers on growth in height of maize plant

TREATMENTS	3WAP	4WAP	5WAP	6WAP	7WAP
C. pubescens	$23.08^{a}\pm0.72$	$37.18^{ab}\pm1.27$	$52.78^{ab}\pm2.41$	$67.28^{a}\pm0.85$	$75.47^{b}\pm1.44$
M. bracteata	$22.60^{ab}\pm0.73$	$34.15^{bc}\pm1.65$	$49.60^{bc}\pm1.77$	$56.29^{b}\pm0.92$	$63.45^{c}\pm2.21$
C. mucunoides	$20.81^{abc}\pm0.39$	$30.25^{c}\pm1.37$	$45.58^{cd}\pm0.84$	$52.45^{bc}\pm0.90$	$62.80^{cd}\pm2.29$
M. pruriens	$19.53^{c}\pm0.25$	$33.30^{bc}\pm1.08$	$41.08^{e}\pm1.91$	$56.32^{b}\pm0.81$	$57.42^{de}\pm1.90$
L. purpureus	$23.33^{a}\pm1.11$	$39.55^{a}\pm1.85$	$54.35^{a}\pm1.31$	$71.27^{a}\pm2.13$	$81.37^{a}\pm2.55$
S. capitata	$20.01^{bc}\pm1.92$	$30.80^{c}\pm1.77$	$42.25^{de}\pm1.37$	$50.82^{c}\pm2.67$	$54.93^{e}\pm2.75$
NPK 15:15:15	$12.18^{d}\pm0.63$	$14.89^{d}\pm0.77$	$22.89^{f}\pm0.94$	$25.26^{d}\pm1.28$	$23.26^{f}\pm0.90$
Control	$11.82^{d}\pm0.47$	$13.22^{d}\pm0.22$	$13.56^{g}\pm0.25$	$16.63^{e}\pm0.63$	$17.00^{g}\pm0.61$

[abcde] Means ± SE with similar superscripts in the same column are not significantly different (P > 0.05)

Table 6: Effect of fertilizers on maize plant girth

TREATMENTS	3WAP	4WAP	5WAP	6WAP	7WAP
C. pubescens	$2.16^{ab}\pm0.10$	$3.55^{b}\pm0.07$	$4.30^{b}\pm0.08$	$5.01^{b}\pm0.08$	$5.20^{b}\pm0.15$
M. bracteata	$1.96^{bc}\pm0.11$	$3.39^{b}\pm0.07$	$4.07^{c}\pm0.08$	$4.69^{c}\pm0.13$	$4.64^{c}\pm0.11$
C. mucunoides	$1.96^{bc}\pm0.05$	$3.12^{c}\pm0.04$	$4.00^{c}\pm0.08$	$4.71^{c}\pm0.14$	$4.94^{b}\pm0.07$
M. pruriens	$2.02^{bc}\pm0.03$	$3.10^{c}\pm0.03$	$3.98^{c}\pm0.07$	$4.58^{cd}\pm0.06$	$4.72^{c}\pm0.06$
L. purpureus	$2.39^{a}\pm0.06$	$4.11^{a}\pm0.05$	$5.08^{a}\pm0.07$	$5.78^{a}\pm0.13$	$5.88^{a}\pm0.11$
S. capitata	$1.67^{c}\pm0.06$	$3.19^{c}\pm0.07$	$3.52^{d}\pm0.05$	$4.35^{d}\pm0.09$	$4.68^{c}\pm0.16$
NPK 15:15:15	$1.26^{d}\pm0.19$	$1.74^{d}\pm0.11$	$1.94^{e}\pm0.12$	$2.29^{e}\pm0.06$	$2.43^{d}\pm0.05$
Control	$0.96^{d}\pm0.18$	$1.13^{e}\pm0.05$	$1.31^{f}\pm0.04$	$1.43^{f}\pm0.05$	$1.53^{e}\pm0.05$

[abcde] Means ± SE with similar superscripts in the same column are not significantly different (P > 0.05)

Table 7: Effects of fertilizers on maize plant leaf area (cm^2)

TREATMENTS	3WAP	4WAP	5WAP	6WAP	7WAP
C. pubescens	$85.56^{b}\pm2.61$	$181.33^{b}\pm6.96$	$334.92^{b}\pm13.63$	$374.25^{b}\pm17.96$	$312.12^{b}\pm10.50$
M. bracteata	$82.00^{bc}\pm1.85$	$167.15^{bc}\pm13.08$	$345.35^{b}\pm15.13$	$385.00^{b}\pm13.55$	$287.50^{bc}\pm10.06$
C. mucunoides	$78.44^{cd}\pm1.65$	$133.05^{d}\pm8.03$	$272.61^{c}\pm5.75$	$319.97^{c}\pm11.92$	$255.28^{c}\pm10.69$
M. pruriens	$67.68^{e}\pm2.37$	$153.44^{c}\pm1.76$	$230.60^{d}\pm6.66$	$299.08^{c}\pm17.99$	$267.22^{c}\pm16.26$
L. purpureus	$94.91^{a}\pm1.52$	$218.34^{a}\pm2.03$	$380.58^{a}\pm5.75$	$432.45^{a}\pm13.87$	$356.97^{a}\pm11.94$
S. capitata	$75.20^{d}\pm2.44$	$161.74^{bc}\pm7.21$	$294.91^{c}\pm4.94$	$323.23^{c}\pm7.08$	$291.42^{bc}\pm17.46$
NPK 15:15:15	$20.38^{f}\pm1.13$	$90.88^{d}\pm1.62$	$133.73^{e}\pm2.26$	$157.68^{d}\pm7.56$	$167.33^{d}\pm14.33$
Control	$18.90^{f}\pm0.86$	$23.87^{e}\pm0.55$	$28.47^{f}\pm1.60$	$52.78^{e}\pm1.69$	$57.30^{e}\pm2.03$

[abcde] Means ± SE with similar superscripts in the same column are not significantly different (P > 0.05)

Table 8: Effects of fertilizers on fresh and dry weight of maize plant at 7WAP

Treatment	Mean fresh weigh	Mean dry weight
C. pubescens	$225.15^{a}\pm1.05$	$56.05^{ab}\pm1.04$
M. bracteata	$172.31^{ab}\pm0.08$	$45.27^{b}\pm1.08$
C. mucunoides	$160.48^{bc}\pm3.06$	$36.79^{c}\pm2.03$
M. pruriens	$161.46^{bc}\pm1.08$	$44.05^{b}\pm1.02$
L. purpureus	$237.49^{a}\pm2.08$	$61.35^{a}\pm2.01$
S. capitata	$176.93^{ab}\pm3.08$	$53.85^{ab}\pm1.08$
NPK 15:15:15	$22.44^{d}\pm1.05$	$5.41^{d}\pm0.08$
Control	$13.43^{d}\pm0.08$	$3.31^{d}\pm$d0.06

[abcd] Means ± SE with similar superscripts in the same column are not significantly different (P > 0.05)