IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 13, Issue 6 Ser. I (June 2020), PP 41-46
www.iosrjournals.org

Influences of Organomineral and NPK 15-15-15 Fertilisers on the Yield of Maize and Weed Infestation

Akinrinola, T.B.* and Fagbola, O.
Department of Agronomy, University of Ibadan, Ibadan, Nigeria

Abstract:
Background: *Use of organomineralfertiliser (OF) is becoming handy for ameliorating soil deficiencies for sustainable crop production. This has necessitated the establishment of commercially produced organomineralfertiliser to meet farmers need. However, reports have shown that fertilisers influence weed infestation thereby affecting the expected crop yield. Consequently, application rates of commercially produced OF on maize performance and their influence on weed infestation were evaluated.*
Materials and Methods: *Using 30 kg pots in completely randomised design with three replications, influences of OF(0, 50, 100, 150 kg/ha of N) and NPK 15-15-15 (400 kg/ha) were investigated in two cropping cycles. Treatments residual effects were also evaluated on maize dry matter yield.*
Results: *Maize dry shoot weight increased with increasing level of OF application. Dry shoot weight was highest at 150 kg/ha of N. The 100 kg/ha of N OF and NPK treatments gave significantly higher maize grain yields (57.06and 54.35 g/pot) compared to the control (35.50 g/pot). However, maize grain yields under other treatments were not significantly different compared to the control. Total dry weed biomass ranged from 23.21 g/pot (control) to 30.58 g/pot (NPK 15-15-15) with no significant difference observed among treatments.Residual effects of OF application improved maize dry shoot weight with no significant difference observed among treatments.*
Conclusion:*Applying 100 kg/ha of N OF improved maize performance without appreciably increasing weed biomass.*
Key words:*Organomineral fertiliser, Dry shoot weight,Maize grain yield, Dry weed biomass, Residual effects*

Date of Submission: 21-05-2020 Date of Acceptance: 08-06-2020

I. Introduction

Maize (Zea mays L.) is rank third in production, after wheat and rice throughout the world (Ranum et al., 2014). It is extensively cultivated in various countries of the world (tropical,subtropical and temperate areas). In Nigeria, maize is grown in nearly every agro-ecological region of the country (Adiaha, 2018),and according to FAOSTAT (2018), an average of8.7 million tonnes is produced annually. Maize production in Nigeriawas 10.06 million tonnes in 2014, 10.56 million tonnes in 2015and10.41 million tonnes in 2016(FAOSTAT, 2018). Hence, therehas been inconsistency in maize yield over the years despite the consistent increase in land area for production.

These inconsistencies in yield were as a result ofminimal adoption of complementary inputs such as fertiliser (and other practices relating to soil fertility improvement) and improveweed management practices (Týr, 2015; Reetz, 2016; Zerihun, 2017). The average local farmers maize yield in Nigeria ranges from 1.12-2.2t ha^{-1}(Ammani, 2015). This, according to the FAO statistics was below the expected maize yield range of 1.5-6.0 t ha^{-1}based on recommended agronomic practices in Nigeria (FAOSTAT, 2018).

Maize ishigh nutrient demandingwith and the resulting nutrient-extraction ability limiting yields and therebyinadequate production in many areas (Ten Berge et al., 2019).Umeh and Mbah (2010) reported that the degree of soil nutrient mining due to intensification of agricultural production results in serious land degradation and large shortages for nitrogen, potassium and magnesium. Sustainability of agriculture is threatened when adequate restoration of soil fertility is not matched with agricultural intensification (FAO, 2003). Therefore, a sustainable approach to preserving soil fertility and continuous crop production is essential. Applications of soil amendments such as manures, chemical fertiliser, biochar and mycorrhizal inoculation to improve the productivity of tropical soil have been reported (Fagbola and Dare, 2003; Faloye et al., 2017).

Fertilisers are major factor whenconsidering crop production increment (Zerihun, 2017). Report has shown that improvements in soil fertility increase agricultural productivity, increased food security, and rural income (Adiaha, 2018). However, improved cultural and land management practices areequally necessary to improve crop yield. In every region of the world, sharp increase in the use of fertiliser is associated with crop-based agriculture intensification (Morris et al., 2007).

Crop productivity sustenance using chemical fertiliserhas not been effective on a long-term basis. It often leads to soil acidification,decline in soil organic matter and soil physical degradation (Geiseller and Scow, 2014). Also, the traditional farmers are financially poor to buy the scarce and costly inorganic fertiliser (Morris et al., 2005; Liverpool-Tasie et al., 2017). The benefits derivable from the use of organic materials areyetto be fully annexed in the humid tropics. This has been attributed tothe high cost of handling and transportation and the large quantities of fertiliserrequired to satisfy the nutritional needs of crops (Morris et al., 2005). Organomineral fertiliser was formulated as alternative to mitigate the problems associated with conventional inorganic fertiliser and thereby increasingthe frequency of land use to approach continuous crop production. The common problems associated with both chemical fertiliser and manure when used separately couldbe removed by integrating the materials to achieve better effects (Omueti et al., 2000; Gang et al., 2019). Integrated fertiliser management approaches are low cost because only small quantity of chemical fertiliser is required with animal manure (Reetz, 2016). The organomineralfertilisers used by many researchers were individually compounded, thereby making them unavailable to the farmers at required quantity. Reports havealso shown inconsistency in organomineral fertiliser recommendations to farmers (Makinde, 2007; Agba et al., 2012; Chukwuka et al., 2014; Kekere and Omoniyi, 2016). In order to overcome this problem, some commercial manufacturers in Nigeria have embarked on the production of organomineral fertiliser. However, there is the need to ascertain the level of application of these commercial organomineral fertilisers for optimum yield.

Furthermore, Farmers and researchers have recognized the effect of fertliser application on weed management in croplands (Sweeney et al., 2008; Efthimiadou et al., 2012). The interaction between fertilisers and weeds can be positively or negatively correlated with weed infestation (Liebman et al., 2004; Sweeney et al., 2008; Tyr, 2015). According to Bajwa et al. (2014), fertiliser use can influence weed emergence, weed persistence, weed growth and weed dispersion attributes. Weeds compete with cultivated crops for nutrients applied through fertiliser application; hence, contributing to the reduction in expected crop quality and yield (Efthimiadou et al., 2012; Mick, 2016; Shah et al., 2016). Therefore, the objective of this study was to determine the best rate of Pacesetter (commercial) organomineral fertiliser on weed incidence and the performance of maize.

II. Material and Methods

This study was conducted on research farm of the University of Ibadan (latitude 7°17′29.83″N and longitude 4°16′31.88″E) in Ayepe (Isokan LGA), Osun State, Nigeria. Composite samples of the topsoil (0-20 cm) were collected with auger from the experimental sites before starting each experiment. The soil samples were air-driedand passed through a 2 mm mesh sieve for physical and chemical analysis.The soil samples and pacesetter fertiliserwere analysed in the Department of Agronomy service laboratory as described in the IITA laboratory manual (IITA, 1982) forparticle size distribution and nutrients content.

The ideal organomineral fertiliser rate for maize was evaluated in 30 kg/pot of sieved topsoil. The treatments were control, organomineral fertiliser (50, 100 and 150 kg/ha of N) and NPK 15-15-15 (at 400 kg ha^{-1} as recommended by IITA (2007). The experiment was in completely randomized design with three replications in two cropping cycle.

Maize (Suwan-1 variety) was sown at 3 seeds/pot. The maize was later thinned to 2 plants/pot at 2 weeks after planting (WAP). Weeding operation was carried out when was necessary. The treatments described above were applied to the designated plastic pots containing 30 kg of sieved topsoil that was low in phosphorus.

Residual experiment to assess the effects of fertiliser applications was carried out after the initial maize cropping.

The observations of weed dry matter were taken from each treatment at 4, 8 and 12 WAP. Maize plant samples were collected from each pot and dried in an oven at 70 °C to a constant weight to determine the shoot dry matter weight. Yield component such as number of seeds/cob, shelling percentage, cob weight/pot, and grain yield/pot (at 14% moisture content) were determined. Data on residual maize cropping was on maize dry shoot weight at 12 WAP.

Statistical analysis

Data collected were subjected to analysis of variance (ANOVA) using Statistical Analysis System, and the means separated using Least significant difference (LSD)at $P < 0.05$ level of significance, where F-ratio was significant.

III. Results and Discussion

The characteristics of the soil showed thatpH (H_2O) was 6.3 unit, while the organic carbon was 11.5 g/kg. The soil was found to be slightly acidic. The totalN was 0.78 g/kg, whileavailableP was 5.83 mg/kg. The respective values for K, Na, Mg and Ca in the soil were 195, 234, 936 and 2028mg/kg. The Exchangeable Cation Exchange Capacity was 9.1 cmol/kg and the exchangeable acidity was 0.5 cmol/kg. The sand fraction was dominant in the soil and had 844.0 g/kg. The silt fraction was 80.0 and the clay fraction 76.0 g/kg. The soils textural class (loamy sand) contains clay and silt in adequate proportion to hold enough water for good plant growth and to guard against short duration drought (Kekere and Omoniyi, 2016). Nitrogen, P and K showed the fertility status of the soils to be low when compared to maize critical levels recommended by Adeoye and Agboola (1985) for optimum production. The fertility status of the soil would not support optimum maize growth.

The organic matter content of the organomineral fertiliser (OF) was just adequate (Table 1). The N content in the material was higher than the normal N found in sole manures but still not adequate for organomineral fertiliser. However, the available P and exchangeable K were low. The C:N ratio of the organomineral fertiliser was 20.9.

Table 1: Nutrient compositions of the organomineral fertiliser used for the study

Properties (%)	Values
Nitrogen	1.88
Organic C	39.3
Phosphorus	0.23
Potassium	1.01
Calcium	0.64
Magnesium	0.23

The maize dry shoot weight increased with the increasing in OF application, including NPK (Table 2). The dry shoot weight showed significant effect of NPK and 150 kg/ha of N organomineral fertiliser application compared to the control. Other treatments were not significantly different from the control. The increase in yield component might be due to increasein availablenitrogen, which resulted in the increase dry shoot weight. The observationagreed withArijeet al. (2018) findings, who reported that higher application of fertiliser caused increased maize dry matter yield.

The cob yield had significantly higher values at 100 kg/ha of N OF and NPK compared to the control. The application of 50 and 150 kg/ha of N OF treatments gave 11.46% and 37.68%, respectively higheryield than the control but were not significant. Similar result was reported by Raja (2001) that 120 kg ha^{-1} N resulted in significantly higher cob yields than the control.

Table 2: Influence of fertiliser applications on yield components of maize

Treatments	Dry shoot weight (g/pot)	Cob yield (g/pot)	Number of seeds/pot	Shelling %	Grain yield (g/pot)
0 kg N	211.88	44.14	129.79	54.23	35.50
50 kg/ha of N OF	216.04	47.45	161.46	75.92	37.28
100 kg/ha of N OF	216.67	73.90	225.79	72.50	57.06
150 kg/ha of N OF	266.25	60.77	240.67	70.23	46.25
NPK 15-15-15	261.88	71.07	236.79	65.26	54.35
LSD	47.32	26.92	97.92	11.52	18.06

OF, Organomineral fertiliser

In some related studies,Arije et al. (2018) reported an increase in cob and ear weight of maize treated with organomineral fertiliser.The number of seeds/plant ranged from 129.79 to 240.67 in the control and 150 kg/ha of N, respectively. The number of seed/pot increased with increasing organomineral fertiliser application, with significances observed at 150 kg/ha of N and NPK compared to the control. However, there were no significant differences between the effects of 100 and 150 kg/ha of N levels on the number of seeds/plant, this wasconsistent with the report ofNgosong et al. (2019). Similarly, Agba et al. (2012) reported that the interaction between poultry manure at 10t ha^{-1} and 600kg ha^{-1} NPK fertiliser gave the highest number of grains/cob. The order of increase in maize number of seeds/pot are 150 kg/ha of N OF>NPK>100 kg/ha of N OF>50 kg/ha of N OF>0 kg N.

The highest shelling percentage was observed at 50 kg/ha of N, whiles the lowest was observed in the control. The values were significantly different. Similarly, 100 and 150 kg/ha of N gave significantly higher shelling percentages than the control. The application of NPK did not significantly improved shelling percentage of maize compared to the control. This is in line with the observation ofMakinde (2007) report that organomineral fertiliser application increased maize shelling percentage than the control. Similarly, the application of fertiliser improved shelling percentage in maize (Yusuf et al., 2019).

The grain yield result of a crop is the output effect of all the complex morphological and physical processes that occur throughout the growth and development of a crop. Hence, the importance of yield results in crop experiments. The application of organomineral fertiliser is expected to enhance soil productivity, increase soil organic matter content, soil flora and fauna, improve soil crumb structure and the nutrient status of the soil consequently attaining sustainably high yields(Morris et al., 2007). The increase in organomineral fertiliserapplication significantly increased maize grain yield at 100 kg/ha of N. However, there was slight grain reduction at 150 kg/ha of N compared to the 100 kg/ha of N. According to the Liebig law of minimum, yield is increased to maximum with addition of any nutrients to a level, then it tends to be decreased to minimum with removal of that nutrient (Shiyam et al., 2014). The application of 100 kg/ha of N and NPK significantly increased maize grain yields compared to the control. Inorganicfertilisers have been reported to release their nutrients rather fast for the plants to utilize (Reetz, 2016). This accounts for the observed high value of maize grain yield in the inorganic fertiliser treatment than organomineral fertiliser (except 100 kg/ha of N) or the control. Application of the other organomineral fertiliser levels did not significantly improved grain yield in maize compared to the control. Ahmed et al. (2007) also support this finding in maizeon sorghum. This may have resulted from the availabilityofNrequiredfor improved plantgrowth and development, whichtranslatedto increased grain yield. Agba et al. (2012) reported that 5 and 10t ha^{-1} poultry manure improved maize yield by 42% and 101% respectively, over the control. Each increment in NPK rates significantly increased grain yield up to the 400 kg ha^{-1} rate but yield was reduced by 14% at the 600kg ha^{-1} NPK rate. Report by Dada andEwulo(2015) showed that 5 poultry manure and 100 urea+30 SSPenhanced maize production.Arijeet al. (2018) also reported higher application of fertiliser caused increased grain yield in maize. The order of the influence by treatments on maize grain yield were NPK>100 kg/ha of N>150 kg/ha of N>50 kg/ha of N>0 kg N. However,Arijeet al. (2018) reported that increasing nitrogen fertiliser application at higher rate increased yield and yield components in maize.

Dry weed biomass was significantly higher in pots treated with NPK 15-15-15 compared with the control at 4 and 8 WAP (Table 3). This was in support of Sweeney et al. (2008) report that N application influenced the germination, emergence and competitiveness of different weeds positively.However, application of Pacesetter organomineral fertiliserwas not significantly different from the control at 4 WAP. At 12 WAP, significantly higher weed biomass was observed in the control compared to the other treatments. With respect to cumulative weed biomass, no significant difference was observed among the treatments. However, application of NPK 15-15-15 fertiliser produced the highest weed biomass, while the lowest was observed in the control. This was in line with Mick (2016) and Shah et al. (2016) thatfertiliser application improves crop performance and increased weed occurrence. According to Adigun et al. (2018) report on tomato, increase of cumulative weed biomass observed could be attributed to higher N level increased crop competitiveness for available resources hence, it enhanced better dry matter accumulation at the detriment of competing weed species.The higher increase in weed biomass from NPK treated pots over organomineralfertiliser were attributed to the fact that inorganic fertiliser remains on the surface of the soil thereby providing more nutrient to the weedswhich resulted in their increase in biomass (Corrêa et al., 2016; Knight, 2017).Similarly, increasing the rate of application enhanced weed biomass as was reported by Baker et al. (2018). However, the increased of Pacesetter organomineral fertiliser application improved cumulative weed biomass with no significant influence in suppressing maize yield. The relative reduction incumulative weed biomass observed in the OF treated pot compared to the NPK fertiliser may be attributed to the possibility of the microorganisms in the OF in tying up the nitrogen in the residue thereby making it readily unavailable for weed uptake (Sweeney et al., 2008). The reduction in weed biomass with subsequent readings over the period of observation may be attributed to the reduction in seed bank of weeds through weeding operations (Buhler, 1999; Prithwiraj et al., 2018**;** Maqsood et al., 2018).

Table 3: The effects of fertiliser applications on the weed biomass at different weeks after planting

	Weeks after planting			cumulative
	4	8	12	weed biomass
0 kg N	10.83b	0b	3.33a	14.16a
50 kg/ha of N OF	14.84ab	2.26a	0.56b	17.66a
100 kg/ha of N OF	14.73ab	0.78ab	0.48b	15.99a
150 kg/ha of N OF	14.78ab	1.72ab	0.41b	16.91a
NPK 15-15-15	19.78a	1.9a	0.71b	22.39a
LSD	7.91	1.87	2.08	ns

OF, Organomineral fertiliser

Residual effect of organomineral fertiliser application improved maize dry weight with increase in the level of application (Table 4). Similarly, residual effect of NPK fertiliser improved maize dry weight compared to the control. The residual effects of organomineral fertiliser or NPK fertiliser did not result in significantly greater maize dry weight than the control. However, the order of maize dry weight increase was 150 kg/ha of N>100 kg/ha of N>50 kg/ha of N>NPK>control. The increase in maize dry weight resulting from residual effect of organomineralfertiliser over the NPK or the control is in line with the works ofOshunsanya and Akinrinola (2013) and Loks et al. (2014). Similarly, effectsof farmyard manureor poultry manure combined with urea fertiliserwas reported to increase hybrid maize than the single application of poultry manure or urea (Khaliq et al., 2008). This was attributed to the increase in organic matter in the organomineral fertiliser which seems have contributed enough N to the soil which created the difference.Arije et al. (2018) also reported that the residual effect of NPK was not as prominent as those of farmyard manure or poultry manure combined with NPK were not significant.

Table 4: Effects of residual application fertiliser on dry shoot weight (g/pot) in maize

Treatments	Maize Biomass
0 kg N	17.37
50 kg/ha of N OF	19.02
100 kg/ha of N OF	20.68
150 kg/ha of N OF	21.70
NPK 15-15-15	18.58
LSD	ns

OF, Organomineral fertiliser

This was reported to bea characteristic nature of organomineral fertiliser(Roy et al., 2006). The applied N was, therefore, not made totally available to the crops and so, plants under organomineral fertiliser had higher values than observed from the inorganic or control.

IV. Conclusion

The observed significant performance in growth and yield parameters with the application of 100 kg/ha of Norganomineralfertiliser could be regarded as being the adequate level for best maize grain yield in the location of the study. The increase in the level of organomineral fertiliser (150 kg/ha of N) application resulted in the increase in maize dry shoot weight and decreased in maize grain yield. Application of Pacesetter organomineral fertiliser did not increase weed incidence to a detrimental level for maize production.

References

[1]. Adeoye OA, Agboola AA. 1985. Critical level of soil plant available P, K, Zn, Mg, Cu and Mn on maize leaf content in sedimentary soils of southwestern Nigeria. Fert Res. 6:60-71.

[2]. Adiaha MS. 2018. Economic value of Maize (*Zea mays* L.) in Nigeria and its impacts on the global food production.Inter J Sci World6(1):27-30.

[3]. Adiguna JA, Daramola OS, Adeyemi OR, Olorunmaiye PM, Osipitan OA. 2018. Nitrogen and weed management in transplanted tomato in the Nigerian forest-savanna transition zone. Annals of Agrarian Science 16:281-285

[4]. Agba OA, Ubi BE, Abam P, Ogbechi J, Akeh M, Odey S, Ogar N. 2012. Evaluation of agronomic performance of maize (*Zea mays L.*) under different rates of poultry manure application in an Ultisol of Obubra, Cross River State, Nigeria. Inter J Agric For. 2(4):138-144.

[5]. AhmedAUH, Qadir I,Mahmood N.2007.Effect of integrated use oforganicand inorganic fertiliser on fodder yield of sorghum(*Sorghum bicolor*L.). Pak J AgricSci. 44:415-421.

[6]. Ammani AA. 2015. Trend analysis of maize production and productivity in Nigeria. J Basic Appl Res Inter. 2(3):95-103.

[7]. Arije DN, Akinseye FM, Ewulo BS. 2018. Response of maize (*Zea mays* L.) growth and yield to different fertilizer application in Rainforest agroecological zone of Nigeria Evaluation of CERES-maize crop model. Net J Agric Sci. 6(4):70-76.

[8]. Bajwa AA, Anjum SA, Nafees W, Tanveer M, Saeed HS. 2014. Impact of fertilizer use on weed management in Conservation agriculture - A review. Pakistan J. Agric. Res. 27(1):69-78.

[9]. Baker C, Madakadze IC, Swanepoel CM, Mavunganidze Z. 2018. Weed species composition and density under conservation agriculture with varying fertiliser rate, South African Journal of Plant and Soil, 35(5):329-336

[10]. Buhler DD. 1999. Weed population responses to weed control practices. I. Seed bank, weed populations, and crop yields.*Weed Science*47(4):416-422

[11]. Chukwuka KS, Ogunsumi IA, Obiakara MC,Ojo OM, Uka UN. 2014. Effects of decaying leaf litter and inorganic fertilizer on growth and development of maize (*Zea mays* L.). J Agric Sci. 59(2):117-127.

[12]. Corrêa JC, Grohskopf MA, Nicoloso RS, Lourenço KS, Martini R. 2016. Organic, organomineral, and mineral fertilizers with urease and nitrification inhibitors for wheat and corn under no-tillage. Pesq. agropec. bras., Brasília 51(8):916-924.

[13]. Dada BF, Ewulo BS. 2015. Economic returns of integrated use of poultry manure and inorganic fertilizers on maize yield in Akure, Nigeria. Inter J Agric Innov Res. 3:1540-1543

[14]. Efthimiadou A, Froud-Williams RJ, Eleftherohorinos I, Karkanis A, Bilalis DJ. 2012. Effects of organic and inorganic amendments on weed management in sweet maize. International Journal of Plant Production 6(3):291-307.

[15]. Fagbola O, Dare MO. 2003. Performance of pepper on simulated degraded and non-degraded soil as affected by mycorrhiza inoculation and organomineral fertilizer. Nig J Hort Sci.8:11-14.

[16]. Faloye OT, Alatise MO, Ajayi AE, Ewulo BS. 2017. Synergistic effects of biochar and inorganic fertiliser on maize (*Zeamays*) yield in an alfisol under drip irrigation.Soil Tillage Res. 174:214-220

[17]. FAO (Food and Agriculture Organisation of the United Nations). 2003. Scaling soil nutrient balances. Lesscher, J. P., Asiamah, R. D., Gicheru, P, Kante, S., Stroovogel, J.J, Smailing, EMA, Eds. Rome. 149 p.

[18]. FAOSTAT (Food and Agriculture Organisation of the United Nations Statistics) 2018. Food and Agriculture Organization of the United Nations Statistics Division.{Accessed 2019 September 03}; Available from http://www.fao.org/faostat/en/#data/QC

[19]. Geiseller D, Scow KM. 2014. Long-term effects of mineral fertilizers on soil microorganisms-A review. Soil Biology and Biochemistry 75:54-63

[20]. Geng Y, Cao G, Wang L, Wang S 2019. Effects of equal chemical fertilizer substitutions with organic manure on yield, dry matter, and nitrogen uptake of spring maize and soil nitrogen distribution. PLoS ONE 14(7): e0219512. https://doi.org/10.1371/journal.pone.0219512

[21]. IITA (International Institute of Tropical Agriculture). 1982. Selected methods for soil and plant analysis. IITA Manual Series, No. 7. International Institute of Tropical Agriculture, Ibadan, Nigeria.

[22]. IITA (International Institute of Tropical Agriculture). 2007. Doubling maize production in Nigeria in two years: Project description.Accessed 2017 September 5; Available from http://www.iita.org/cms/details/agric_health_project_details.aspx?newsid=266rid=66511pg=oactivity=Agriculture%20and%20healthmainzoneid=64

[23]. Kekere O, OmoniyiPA. 2016. Soil conditioner enhanced the potential of organic and inorganic fertiliser on growth and yield improvement in streak-resistant white variety of *Zea mays* L.Am-Eur JAgric Environ Sci.16(1):133-139.

[24]. Khaliq T, Ahmad A, Hussain A, Ranjha AM, Ali MA. 2008. Impact of nitrogen rates on growth, yield, and radiation use efficiency of maize under varying environments. Pak J Agric Sci. 45(3):1-7.

[25]. Liebman M, Menalled FD, Buhler DD, Richard TL, Sundberg DN, Cambardella CA,KohlerKA. 2004. Impacts ofcomposted swine manure onweed and corn nutrient uptake,growth, and seed production.Weed Sci. 52:365-375.

[26]. Liverpool-TasieLSO, Omonona BT, Sanou A, Ogunleye WO. 2017. Is increasing inorganic fertilizer use for maize production in SSA a profitable proposition? Evidence from Nigeria. Food Policy 67:41–51.

[27]. Loks NA, Manggoel W, Daar JW, Mamzing D, Seltim BW. 2014. The effects of fertilizer residues in soils and crop performance in northern Nigeria: A review. InterResJAgricSci Soil Sci. 4(9):180-184.

[28]. Makinde EA. 2007.Effectsofanorganomineral fertilizer application on the growth and yield of maize. J ApplSciRes.3:1152-1155.

[29]. Maqsood Q, Abbas, RN., Khaliq A, Zahir ZA. 2018. Weed seed bank dynamics: weed seed bank modulation through tillage and weed management. Planta daninha; 36:1-8:e018166706

[30]. Mick ABL. 2016. Response of weeds and crops to fertilization alone or in combination with herbicides: A review. Am J Plant Nut Fert Tech. 6:1-7.

[31]. Morris M, Kelly VA, Kopicki RJ, Byerlee D. 2007. Fertilizer use in African agriculture: Lessons learned and good practice guidelines. Directions in Development - Agriculture and Rural Development. The International Bank for Reconstruction and Development/The World Bank. Washington DC.

[32]. Ngosong C, Bongkisheri V, Tanyi CB, Nanganoa LT, Tening AS. 2019. Optimizing nitrogen fertilization regimes for sustainable maize (*Zea mays* L.) production on the volcanic soils of Buea Cameroon. Advances in Agriculture 4681825, 8 pages

[33]. Prithwiraj D, Tej P, Sudershan M, Pramit P. 2018. Weed seed bank in soil as affected by different weed management practices in spring sweet corn. Indian Journal of Weed Science50(3):269-272.

[34]. Omueti JAI, Sridhar MK, Adeoye GO, Bamiro O, Fadare DA. 2000. Organic fertilizer use in Nigeria: Our experience. In M. O. Akoroda, (Ed.) Agronomy in Nigeria. Ibadan, Nigeria. p. 208-214.

[35]. Oshunsanya SO, Akinrinola TB. 2013. Changes in soil physical properties under yam production on a degraded soil amended with organomineralfertiliser. Afr JAgric Res.8:4895-4901.

[36]. Raja V. 2001. Effect of nitrogen and plant population on yield and quality of super sweet corn (*Zea mays*). Ind JAgricSci. 46:246-249.

[37]. Ranum P, Pe˜na-Rosas JP, Garcia-CasalMN. 2014. Global maize production, utilization, and consumption. Annals of the New York Academy of Sciences 1312:105–112

[38]. Reetz HF Jr. 2016. Fertiliser and their Efficient Use. First edition, International Fertilizer Industry Association (IFA). Paris, France. p. 110.

[39]. Roy RN, Finck A, Blair GJ, Tandon HLS. 2006. Plant nutrition for food security. A guide for integrated nutrient management. FAO fertilizer and plant nutrition bulletin 16. 349 p.

[40]. Shah ST, Ghafoor F, Khan N, Sajid M, Amin N, Shah Z, Hussain Z, Bibi S, Ahmad T, Haq F. 2016. Organic fertiliseraffect the growth attributes of weeds and Swiss chard. Pak J Weed Sci Res. 22(3):463-470.

[41]. Shiyam JO, John NM, Ndaeyo NU, Binang WB. 2014. Effect of organo-mineral fertilizer on soil nutrient flux and maize (*Zea Mays* L.) productivity on an Ultisol in southern Nigeria. Inter J ResAgric Sci.1:2348-3997.

[42]. Sweeney AE, Renner KA, Laboski C, Davis A. 2008. Effect of fertilizer nitrogen on weed emergence and growth. Weed Sci. 56:714-721.

[43]. Ten-Berge HFM, Hijbeek R, van Loon MP, Rurinda J, Tesfaye K, Zingore S, Craufurd P, van Heerwaarden J, Brentrup F, Schröder JJ, Boogaard HL, deGroot HLE, van Ittersum MK. 2019. Maize crop nutrient input requirements for food security in sub-Saharan Africa. Global Food Security 23:9-21.

[44]. Týr, Š. 2015. Weed infestation maize in sustainable agricultural systems Research Journal of Agricultural Science, 47 (1):234-242.

[45]. Umeh SI, Mbah BN. 2010. Intercrop performance of different varieties of soybean (*Glycine Max*. (L) Merril) in a cassava (*Manihot esculenta*Crantz) based cropping system within the derived savannah zone. Afr J Biotech.9(50):8636-8642.

[46]. Yusuf MJ, Musa UT, Ifeoluwa AO. 2019. Evaluation of maize varieties under varying fertilizer application rates in Owode-Egba area of Ogun State Nigeria. IOSR J Agric Vet Sci. 12:25-32.

[47]. Zerihun T. 2017. Raising crop productivity in Africa through intensification. Agron.7(22):30 p. https://doi.org/10.3390/agronomy7010022[Accessed 2019 September 17].

Akinrinola, T.B.and Fagbola, O. "Influences of Organomineral and NPK 15-15-15 Fertiliser on the Yield of Maize and Weed Infestation."*IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 13(6), 2020, pp. 41-46.