Preliminary Study of Cucumber (*Cucumis sativus* L.)Yield Attributes and Yield to Organic Mineral Fertilizer Application at Samaru

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Abstract
One of the efforts to increase the production of Cucumber is by using fertilizer in the cultivation area with low fertility soils.A field trial was conducted at Institute for Agricultural Research, Samaru during the 2017 wet season to study the response of cucumber yield attributes and yield to organomineral fertilization. The treatments consisted of six (6) levels of fertilizer (0, 100, 200, 300, 400 kg ha^{-1} organomineral fertilizer and 300 kg ha^{-1}recommended NPK fertilizer) laid in randomized complete block design (RCBD). The treatments were replicated four times. The result indicated that fruit length significantly increases with increased application of organomineral fertilizer. However, higher rate of organomineral 400 kg ha^{-1} had similar fruit length with recommended rate NPK fertilizer. A similar trend was observed in fruit weight plant^{-1} and fruit yield ha^{-1}. From the findings it can be concludedthat application of 300 kg ha^{-1} of Organomineral fertilizer was found to produced similar yield when compared with recommended NPK fertilizer rate

Keywords: Cucumber, Organomineral fertilizer, yield

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is a vegetable crop that provides huge nutritional benefits with low in *calories* but high in many important vitamins and minerals. It supplies daily fiber and vitamin C. They also "provide small amounts of vitamin K, vitamin C, magnesium, potassium, manganese and vitamin(Murad and Nyc, 2016).It is well known fact that application of organic combined with or without inorganic fertilizer to soil is considered as a good management practices in any agricultural production system because it improves plant quality and soil fertility. The scarcity and high cost inorganic fertilizer coupled with soil degradationeffect posed a great concern to agricultural production while on the other hand organic manures are alternative source of nutrients to vegetable production but has its own limitations such as availability, bulkiness and transportation.The need for renewable forms of energy and reduced addition of inorganic fertilizer to crops, have revivedthe use of organic manures worldwide (Ayoola and Adeniran, 2006). Improvement in environmental conditions and public health are important reasons for advocating increased use of organic materials (Ojeniyi, 2000; Maritus and Vleic, 2001). Organomineral fertilizer is defined as a fertilizer obtained by blending, chemical reaction, granulation, or dissolution in water of inorganic fertilizers having a declarable content of one or more primary nutrients with organic fertilizers or soil improver (Anon, 2012).

The organomineral fertilizers used by many researchers were individual and manually compounded and this may lead to nutrient imbalance. The use of bio solids-based

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organomineral fertilizers addresses an important issue of nutrient cycling in the agricultural ecosystems. The use of such products represents a technological advancement compared with ways that sewage sludge has been traditionally recycled in agriculture, and it appears to be in line with the current environmental and regulatory frameworks Antille (2011). Recently National Research Institute for Chemical Technology (NARICT) has embarked the production of organomineral fertilizers (organic waste and inorganic fertilizers). Enhanced quality of organic-basedfertilizer materials can provide an opportunity to improvecrop profit margins by means of reduced input costs offertilizers while delivering some of the environmental benefitsassociated with recycling.Little research has been conducted on the response of vegetables to organomineral fertilizers.The objective of this study was to determine response ofcucumberto organomineral fertilizer derived from neem based nutrient-enriched biosolids granules.

MATERIALS AND METHODS

A field study was carried out in 2017 at the Institute for Agricultural Research (IAR) farm (11^0 11'N 07^0 38'E) 686 metres above sea level in the Northern Guinea Savanna of Nigeria. The treatment consisted of six (6) levels of fertilizer (0, 100, 200, 300, 400 kg ha^{-1} organomineral fertilizer and recommended NPK fertilizer 300 kg ha^{-1}) laid in randomized complete block design (RCBD). The treatments were replicated four times. The plot size for cucumber 4 x 5 m.Prior to the experiment, composite soil samples were collected from the field using a soil auger with diameter of 15 cm and subjected to routine analysis. Seed was chemically treated with Apron star at 3.0 gm per 5 kg of seed before planting. Butachlor 60EC was applied pre-emergence at rate of 3 kg a.i ha^{-1} using knapsack sprayer for weed control of early emerging weeds. Two seeds were planted and later thinned to one per hill at 3 weeks after planting. The trial received a split (½) dose of fertilizer at 3 weeks and second dose at 6 weeks after planting. Manual weeding was carried out at 3 and 5 weeks after planting. Insect pests were controlled with (Lamdacyahalothrin 2.5 EC) at 2L ha^{-1} biweekly intervals for effective insect control starting from 6 weeks after planting.The data collected include fruit length, fruit weight $plant^{-1}$ and fruit yield t ha^{-1}. All the data collected were subjected to analysis of variance (ANOVA) using general linear procedure with Statistical Analytic Software (SAS, 2009) and treatment means were compared using Duncan Multiple Range Test (DRMT).

RESULTS AND DISCUSSION

The results of the measured physical and chemical properties of the soil are summarized in Table 1.The results showed that the content of N = 1.09 g kg^{-1}, Available P = 10.1cmol kg^{-1}, Exchangeable K = 0.331cmol kg^{-1}, C-Org = 0.90 g kg^{-1} while soil slightly acidic. The soil texture was also characterized as loam. This explains that the N and organic carbon content were low. However, the values of N and K were below the critical values of thenutrients in the soil while available P adequate for cucumber production the area.

Table 2 showed the effect of treatment on fruit length, fruit weight per plant and fruit yield ha^{-1}. Fruit length significantly increases with increased application of organomineral fertilizer. However, higher rate of organomineral 400 kg ha^{-1} had similar fruit length with recommended rate NPK fertilizer. Application of organomineral fertilizer at 400 kg ha^{-1}

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significantly produced higher fruit weight per plant and yield t ha^{-1} than the control treatment. Application of 300-400 kg ha^{-1} of organomineral and recommended NPK fertilizer rate were similar in fruit weight per plant and yield t $ha.^{-1}$ The heavier fruit weight and fruit yield were obtained from NPK treatment may probably due to faster release of nutrient contents of NPK than organomineral fertilizer treatment. Similar reports have been made on faster nutrient release from inorganic fertilizers compared to organic nutrients sources when used for the production of vegetables, cereal and tree crops (Ainika *et al*., 2012; Adeoye *et al*., 2008).

Conclusion and Recommendation

It can be concluded that application of 400 kg ha^{-1} of Organomineral fertilizer was found to produce similar yield when compared with recommended NPK fertilizer rate. However it is recommended that higher rate of organomineral fertilizer beyond 400 kg ha^{-1} should be used to achieve optimum rate for cucumber production in the study area.

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Table 1.Physical and Chemical analysis of soil at Samaru 2017.

Physical Properties	**Value**
Sand (g kg^{-1})	440
Silt	300
Clay	260
Textural class	Loam
Chemical Properties	
pH (in 2: 1 water)	5.08
Organic carbon g kg^{-1}	0.90
Nitrogen g kg^{-1}	1.09
Ca^{++} mg kg^{-1}	8.80
Mg mg kg^{-1}	0.95
Available P cmol kg^{-1}	10.1
Exchangeable K cmol kg^{-1}	0.33

Source: Department of Agronomy Ahmadu Bello University, Zaria

Table 2: Response of Cucumber to Organomineral Fertilizer Application on fruit length (cm), fruit weight (kg) and Yield (t ha^{-1}) at Samaru

Treatment	Fruit length (cm)	Fruit weight (kg) $plant^{-1}$	Yield (t ha^{-1})
Fertilizer rate kg ha^{-1}			
0	9.07d	3.3b	5.1c
100	9.93d	4.7b	5.3c
200	10.3cd	4.7b	6.2bc
300	11.3bc	10.7ab	9.8ab
400	22.7a	11.7ab	9.9ab
NPK (Rec rate 300)	12.5ab	13.0a	11.0a
SE±	0.41	2.60	1.30

Means within a column with the same letter(s) do no differ significantly at 0.05 level of probability using New Duncan Multiple Range Test (NDMRT)

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