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Assessment of Growth and Yield Components of Introduced Sweet Melon (*Cucumis melo L.*) Using Organic Amendments in an Ultisols of Port Harcourt, Nigeria

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A potted experiment was conducted at the Rivers State University Teaching and Research Farm to assess the yield and growth components of Sweet Melon introduced in an ultisols of Port Harcourt, Rivers State. The amendments used are organic liquid fertilizer (O.L.F), poultry droppings (P.D), Pig Manure (P.M) and the control (C). Results showed that all the amendments used appreciably improved the growth components. At Seven days after planting (7DAP), the control (C) had the highest % emergence (80 %) and the least % emergence (50%) was observed in plot treated with organic liquid fertilizer (OLF). Poultry dropping (PD) had the highest vine length (196.80 cm) and the least vine length was obtained in the control (138.50cm). Pig manure (PM) had the highest leaf area (169.00 cm) and the control plots (121.60cm) had the least leaf area at 8WAP. The highest fresh fruits weight (1.841 kg) was obtained in the organic liquid fertilizer (OLF) treated plot and the control had the least fruits yield (1.555kg). Generally, the results indicated that the amendments had a significant effect on the growth parameters of sweet melon and therefore, there is need for further research using organic amendments for the growth of other crops of interest. Thus the results indicated that the amendments had significant effect ($p<0.05$) on the growth parameters of sweet melon

Keywords: Assessment, amendments, growth components, sweet melon, Port Harcourt, ultisols

INTRODUCTION

Ultisols are mostly sandy and acidic soils with low organic matter that makes it unproductive if not managed properly (Douglas and Peter, 2015). Ultisols are ultimate weathered soils with inherent low fertility problems as a result of excessive leaching. They are characterized by low activity clay and organic matter contents. Thus, is need to improve their productive capacity by using different rate of amendment materials. According to Sabo *et al.* (2013) and Adeyeye *et al*, (2017), Sweet melons (*Cucumis melo* L.) originates from South West Asia, and over time, have traveled from Africa and Asia to Europe and North America. Sweet melon belongs to the family *Cucurbitaceae* (*Maynard et al., 2001)* and they are also known as Golden langkawiin Malaysia as a result of the golden yellow colour of the epicap when ripe and white flesh. It is also an important commercial crop in many countries and mostly cultivated in the temperate region of the world due to its adaptability to temperate soils and climate (*Zulkarami et al, 2010*).

In Nigeria, sweet melon is mostly grown in the Northern part of the country where it is popular and widely cultivated (*Villanueva et al, 2004*). The fruit is rich in bioactive compound such as phenolics, flavonoids and vitamins as well as carbohydrate and minerals especially potassium with low fat and large amount of dietary fiber (*Shafer et al, 2005, Tamer et al 2010*). The fruit also has some fascinating health benefits such as good eyesight, improvement of skin health, immunity, blood pressure regulation, accelerate digestion processes and enhanced libido in men. The fruits are well known for its nourishing fruit vegetable with high water content and significant amount of sugar, vitamins A, B and C. The cultivation of sweet melon especially the variety called honeydew is alien to the Niger Delta environment despites their

nutritional value for both humans and animals. This is due to a number of factors that such as climatic condition and the acidic nature of the soils of the study area with low organic matter (low fertility status) that makes it unproductive. Arable crops cultivation in the area are mostly done using synthetic fertilizers despite the acidic nature of the soils. The use of organic fertilization (organic amendments) that can enhance soil conservation and management and are environmentally friendly is not widely practiced in the area to improve the fertility status of soils. Therefore, this study is aimed at assessing the yield and growth components of honeydew variety of sweet melon (*Cucumis melo L.)* using amendment materials in an ultisols of Port Harcourt, Nigeria.

MATERIALS AND METHODS

Experimental site

The experiment was conducted at the Rivers State University Teaching and Research Farm, Nkpolu-Oroworukwo, Port Harcourt. It lies between latitude 04.80388N and longitude 006.97698E and an elevation of 21m above sea level. The climate of the study area is humid tropical and located in the rainforest region of the Southern Nigeria with mean annual rainfall of about 2000mm to 3000mm (FAO, 1984) and Peter and Agbogun, (2022), Mean annual temperature varies between 23^{o}C and 29^{o}C with relative humidity of 80 - 83% depending on the season of the year (Ikati and Peter 2019 and Aaron and Peter, 2019). The dominant parent materials in the study area are weathered sedimentary rocks (coastal plain sand) and alluvium and udic moisture regime as shown in figure 1.

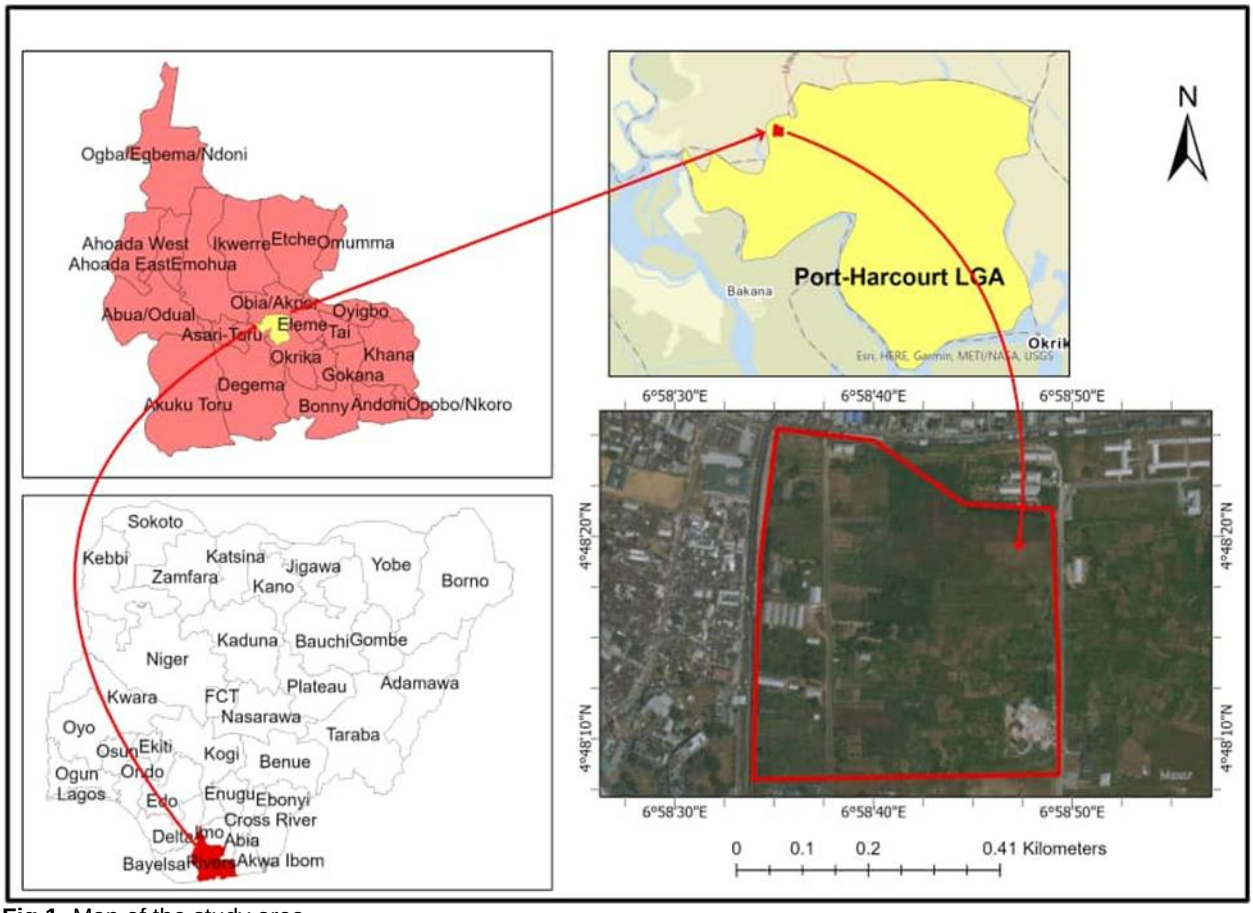

Fig 1: Map of the study area

Treatments and experimental design

Three amendment materials such as organic liquid fertilizer (OLF), pig manure (PM) and poultry dropping (PD) were used. Four treatments (organic liquid fertilizer (OLF), pig manure (PM), poultry dropping (PD) and control (No amendment) were

the treatments administered and replicated three times given a total of twelve (12) replicates. The size of the experimental plot was 14 x 8m given a total land area of 112 m^s in complete randomized block design**.**

Rate of Application

20 l of OLF were applied to the soils before and after planting; while 10kg of PD, PM were also applied before and after planting respectively except the control plots

Data Collection

The following plant growth parameters were taken at two, four, six and eight weeks, after planting (2WAP, 4WAP, 6WAP and 8WAP)

Percentage Emergence

Percentage emergence was taken by counting the number of seeds that emerged divided by the total number of seeds planted and multiply by one hundred

Vine Length

Vine length of the plant was taken at 2 to 12 weeks. The vine length was measured using measuring tape from the base (soil line) of each plant to the tip of the plant (last leaf).

Leaf Area

Leaf area measurement was taken from week 2, 4, 6 and 8 weeks using planimeter. \

Fruits yield

Yield parameters was taken to the end of the 12 weeks. Fruits yield was determined by weighing the fresh mature harvested fruit in gram/kg using portable sensitive weighing balance.

RESULTS AND DISCUSSION

Effect of Amendment Materials on % Emergence of Sweet Melon 7 DAP

The effect of amendment materials on % emergence of sweet melon 7 DAP is presented in Fig.2. The results revealed that the control (C) had the highest % emergence of 80 %, followed by poultry dropping and pig manure (70%). The least

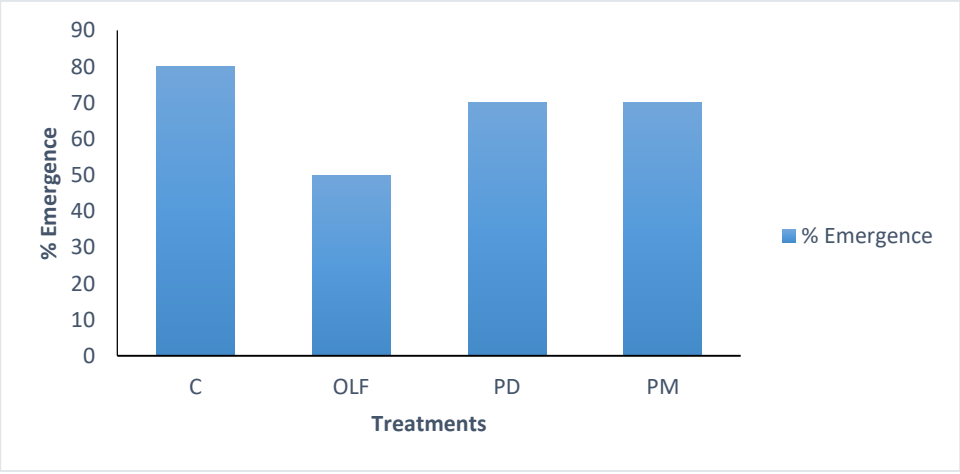

Fig 2: Effect of amendment materials on % Emergence of sweet melon 7DAP. Key: C = control, OLF = Organic liquid fertilizer, PD = Poultry droppings, PM = Pig manure, 7DAP = 7 days after planting**.**

% emergence (50%) was observed in plot treated with organic liquid fertilizer (OLF), the highest % emergence (80 % was observed in the control. This could be attributed to the fact that, the amendment materials applied to the soils did not decomposed and mineralized to release nutrients before germination. It could be as a result of the heat released during process of decomposition of amendment materials. This might have increased the soil temperature leading to poor germination due to the fragile nature of sweet melon seed. This corroborated the findings of Clifford *et al* (2004), who reported that, high soils temperature (> 40 ^{o}C) was not suitable for seed germination.

Effect of amendment materials on sweet melon vine length (cm) 2, 4, 6, and 8 WAP

The effect of organic amendments on sweet melon vine length 2, 4, 6, and 8 WAP are presented in Table 1. At 2 WAP, OLF had the highest vine length (92.46cm), followed by PM (87.46cm) and PD (86.78 cm) respectively. The least vine

Table 1: Effect of Amendment Materials on Sweet Melon Vine Length (cm) at 2, 4, 6 and 8 WAP

Treatments	2WAP	4WAP	6WAP	8WAP
C	68.80^{a}	111.20^{b}	112.40^{a}	138.50^{a}
OLF	92.46^{c}	101.50^{a}	173.40^{b}	179.60^{b}
PD	86.78^{b}	132.80^{c}	193.40^{d}	196.80^{c}
PM	87.46^{b}	141.90^{d}	178.80^{c}	191.70^{c}

Mean with the same letters in the column are not significantly different from one another at 5 % level of Probability using Duncan Multiple Range Test.

length was observed in the control plots (68.80cm). The result also shows that at 4WAP, PM had the highest vine length (141.90cm), followed by PD treated plot (132.80 cm) and the control (111.20 cm).The least vine length was observed in the plot treated with OLF (101.50 cm). It was also observed that, at 6 WAP, PD (193.40 cm) had the highest vine length, followed by PM (178.80 cm) and OLF (173.40 cm) in that order. The least vine length was observed in the control (112.40 cm). At 8 WAP, PD had the highest vine length (196.80 cm). This was followed by PM (191.70 cm) and OLF (179.60 cm) respectively. The control had the least vine length (138.50cm). The amendment materials decomposed and mineralized into simple dissolvable and absorbable form that improved the nutrient status of the soils, resulting in an increase in vine length of sweet melon. This is similar to the report of *Peter and Ayolagha (2012).* Poultry droppings as amendment had significant effect on all the growth parameters of sweet melon. This also confirmed the assertion of Abana *et al* (2021) who reported that, plant responded differently to changing in soil fertility and environmental condition as evident in the vine length. The increase in vine length was also attributed to the vital role of organic amendments in the promotion of vegetative growth in plant (Abana *et al*, 2021).

Effect of Amendment Materials on Sweet Melon Leaf Area (cm) at 2, 4, 6 and 8 WAP

Table 2 showed the effect of organic amendments on sweet melon leaf area at 2, 4, 6, and 8 WAP. It was observed that, at 2WAP, PM had the highest leaf area (45.66cm), followed by PD (41.98cm), OLF (41.68 cm) and the least leaf area was observed in the control (40.63 cm). At 4 WAP, the same trend was observed. PM had the highest leaf area (74.90 cm), followed by PD (69.90 cm), OLF (67.97 cm) and control (61.43 cm). The results also showed that, at 6WAP, leaf area increased in PM (131.80cm) followed by PD (117.90cm), and OLF (114.50cm) the least was observed in the control plot (111.60 cm). Similar trend was also observed at 8WAP where PM recorded the highest leaf area (169.00 cm), followed by PD (133.40 cm) and OLF (124.70cm) in that order and the least leaf area was observed in the control plot (121.60cm).

Table 2: Effect of Amendment Materials on Sweet Melon Leaf Area (cm) at 2, 4, 6 and 8 WAP

Treatments	**2WAP**	**4WAP**	**6WAP**	**8WAP**
C	40.63^{a}	61.43^{a}	111.60^{a}	121.60^{a}
OLF	41.68^{a}	67.97^{b}	114.50^{ab}	124.70^{a}
PD	41.98^{a}	69.90^{b}	117.90^{b}	133.40^{b}
PM	45.66^{b}	74.90^{c}	131.80^{c}	169.00^{c}

Mean with the same letters in the column are not significantly different from one another at 5 % level of Probability using Duncan Multiple Range Test

Effect of amendment materials on fruit yield (kg/ha) of sweet melon

The results of the effect of organic amendments on sweet melon yield are presented in Fig. 3. The figure (3) showed that, OLF had the maximum fruit yield (1.841 kg), followed by PD (1.699 kg) and PM (1.686 kg), while the control plots also had the least fruits yield (1.555kg). The highest fruit yield in OLF treated plot indicated that their nutrients contents were easily released into the soil for sweet melon utilization as they were in liquid form. This also corroborated the findings of Adeyeye et al (2017). The result indicated that the effectiveness of the amendment materials was improved through the solubilizing effect as described by *Peter and Ayolagha (2012).*

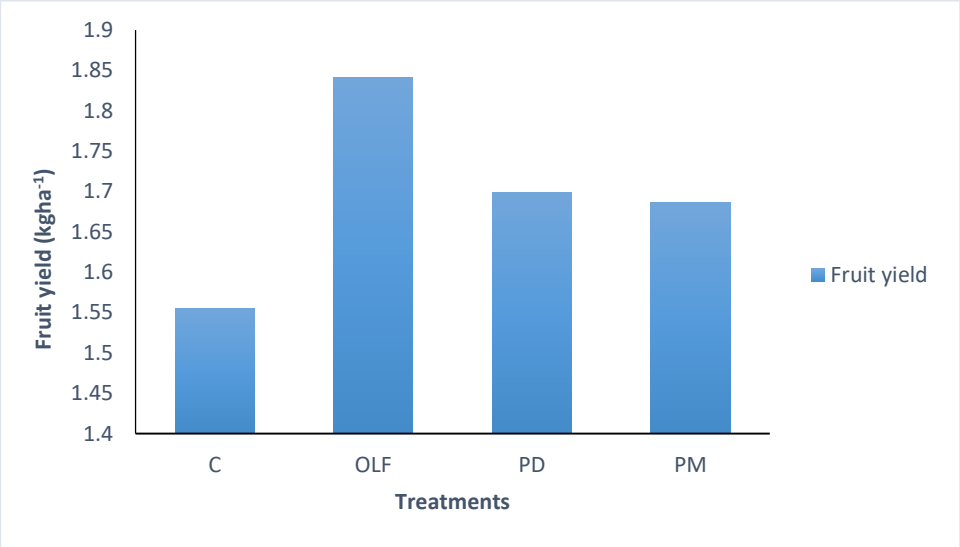

Fig 3: Effect of amendment materials on fruit yield (kgha^{-1}) of sweet melon
Key: kgha^{-1} = Kilogram per hectare, C = control, OLF = Organic liquid fertilizer, PD = Poultry droppings, PM = Pig manure.

CONCLUSION

The various organic amendments improved growth parameters and yield component of sweet melon introduced into an ultisols. The results also showed that, the different organic amendment materials effectively impacted on the soils. Therefore, with the application of organic amendments, in spite of the acidic nature of ultisols, sweet melon can be grown even on commercial basis.

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