Growth and Yield Performance of Melon (*Citrullus colocynthis* (L.) Schrad as Influenced by Organic Manures

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Abstract
Citrullus colocynthis (L.) Schrad is an important herb known for its edible seeds rich in fat and protein. The plant is also used traditionally for the treatment of a number of ailments. Field experiments were conducted from October to December, 2015 to investigate the effects of different organic manures on the growth and yield performance of Melon at the experimental site of the Department of Plant Science and Biotechnology, Faculty of Science, Ekiti State University, Ado-Ekiti, Nigeria. The experimental design was a 3×4 plot factorial with treatments arranged in a Randomized Complete Block Design (RCBD) with three replications. There were thus twelve treatment combinations plus a control. The treatments were Poultry manure (PM), Cowdung (CD) and Goat manure (GM) applied 0.6, 1.2, 1.8 and 2.4 t ha^{-1}. Plots without manure treatments were used as the control. The results obtained from the studies indicated that the vine length and the number of leaves of the plant increased proportionally with time. PM produced the maximum length at 8 weeks after planting (174.00cm at 1.8 t ha^{-1}), which was statistically similar to those produced by CD (166.73cm at 1.2t ha^{-1}). Also, the highest mean number of leaves plant-^{1} was observed in PM-treated plant (93.00cm at 1.8t ha^{-1}) which was similar to those of GM (85.33cm at 2.4 t ha^{-1}). Application of GM at 1.8t ha^{-1} also promoted early flowering by two days. PM outperformed the other treatments in terms of yield and yield components.

Keywords: Poultry manure, growth, yield, melon

Performances de Croissance et de Rendement de Pastèque (*Citrulus Collocynthis (L.) Schrad* Influencé Par des Fumures Organiques

Résumé
Citrullus colocynthis (L.) Schrad est une herbe importante connue pour ses graines comestibles riches en graisses et en graines comestibles riches en protéines. La plante est également utilisée traditionnellement pour le traitement de nombreux maux. Des expériences sur le terrain ont été menées d'octobre à décembre 2015 pour étudier les effets de différents fumures organiques sur la croissance et la performance de pastèque sur le site expérimental du département de phytotechnie et de biotechnologie de la faculté des sciences de l'Université d'État d'Ekiti, Ado-Ekiti, Nigéria. La conception expérimentale consistait en une factorielle en parcelles 3 × 4 avec des traitements disposés selon une conception en blocs complets randomisés (RCBD) avec trois répétitions. Il y avait donc douze combinaisons de traitement plus un contrôle. Les traitements étaient Fumier de volaille (FV), Bouse de vache (BV) et fumier de chèvre appliqué avec 0,6, 1,2,

1,8 et 2,4 t ha^{-1}. Des parcelles sans traitement au fumier ont été utilisées comme contrôle. Les résultats obtenus à partir des études indiquent que la longueur de la vigne et le nombre de feuilles de la plante augmentent proportionnellement avec le temps. Les FV ont produit la longueur maximale à 8 semaines après la plantation (174,00 cm à 1,8 t ha^{-1}), ce qui était statistiquement similaire à celles produites par BV (166,73 cm à 1,2 t ha^{-1}). En outre, le nombre moyen le plus élevé de feuilles^{-1} a été observé chez les plantes traitées aux particules (93,00 cm à 1,8 t ha^{-1}), ce qui était similaire à celui de GM (85,33 cm à 2,4 t ha-1). L'application de GM à 1,8 t ha^{-1} a également favorisé une floraison précoce de deux jours. Les FV ont surperformé les autres traitements en termes de rendement et de composants de rendement.

Mots clés: Fumier de volaille, croissance, rendement, pastèque

Introduction

Citrullus colocynthis, an annual herb with creeping or lingering stems with tendrils, is a melon of the *Curcubitaceae* family. The edible seeds are rich in fat and proteins with high amount of arginine, treptophan and sulphur containing amino acids (Ajuru and Okoli, 2013).

Citrullus colocynthis is also used in traditional medicine in the treatment of constipation, diabetes, oedema, fever jaundice, leukaemia, heart attack, kidney failure, cancer and bacterial infections (Huseini *et al*., 2009).

One of the major problems facing plant growth and development is soil nutrient depletion as a result of continuous cropping of farmlands due to increased human population. Infrastructural activities such as building of schools, stadia and hospitals have caused deforestation resulting in soil erosion and loss of soil nutrients and these have reduced food production (Quinton *et al.,* 2010**).**

Soil fertility can be restored through application of either organic or inorganic fertilizers. Synthetic fertilizers have been reported to improve crop yields but they can be harmful to the environment and their cost cannot make economic and profitable agricultural products (Bobade *et al*., 1992). Bahadur *et al*. (2006) noted that the increased use of chemicals under intensive cultivation has not only contaminated the ground and surface water but negatively affected the harmony existing among the soil plant and microbial population.

Conversely, organic fertilizers are derived from natural sources (plants and animals) with optimum nitrogen, phosphorus and potassium composition. Agbede *et al*. (2008) reported that organic manure increases the plant calcium and magnesium status in the soil. Organic fertilizer includes poultry manure, cowdung and other animal wastes (Dauda *et al*., 2008). Enujeke *et al.* (2013) and Mangila *et al.* (2007) reported that poultry manure is the richest known organic manure. According to Bhat *et al*. (2013), organic manure increases the availability of nitrogen and phosphorus and enhances biological nitrogen. Addiscot *et al.* (1991) reported than that animal manure may improve the organic fertilizers are also cheaper, readily available and environmentally friendly (Ogunlade *et al*., 2006 and Olatunji *et al*., 2006).

The yield of *Citrullus collocynthis* is usually low due to poor soil fertility. The objective of the research was therefore, to evaluate the effect of organic manure on the growth and yield of the crop

Materials and Methods.

Study Area

The experiment was carried out in the experimental farm of the Department of Plant Science and Biotechnology, Faculty of Science, Ekiti State University, Ado-Ekiti, Nigeria from October, 2015 to December, 2015. Ado-Ekiti is located at Latitude of 7˚ 40'N and Longitude 5˚ 15'E in the tropical region of South-western Nigeria with average annual rainfall of 1,400 mm and mean ambient temperature of about 25 - 35°C (Arowosegbe, 2016**)**.

Experimental Design and Layout

The experiment design was a 3×4 factorial with treatments arranged in a Randomized Complete Block Design (RCBD) with three replications. There were thus twelve treatment combinations plus a control. The treatments were Poultry manure (PM), Cowdung (CD) and Goat manure (GM) applied 0.6, 1.2, 1.8, 2.4 t ha^{-1}.

Tetteh

The plot used for these experiments were cultivated to maize and tomatoes in the 2013 and 2014 planting seasons respectively. The experimental plot was cleared, ploughed and harrowed with tractor and stubbles were subsequently removed. Soil samples were randomly collected from the plot at a depth of 0-20 cm to determine its physico-chemical properties. The total doses of the respective organic wastes were later applied once after land preparation two weeks before seed sowing. Three seeds of *C. colocynthis* were sown per hill on 23rd October, 2015. Normal husbandry practices such as thinning and weeding were carried out.

Data collection and analysis

Data were collected on the following parameters; days to 50% emergence, number of leaves per plant, vine length, days to 50% flowering, number of fruits per plant, fruit diameter and total fruit weight at harvest on 24th December, 2015. Soil samples collected from 0 -20 cm soil depth prior to application of organic manures were analyses for soil physical and chemical properties like soil pH, soil texture, organic matter (OM), total nitrogen (N), Magnesium (Mg), Calcium (Ca), Manganese (Mn) and Iron (Fe). Samples of the organic manures (PM, GM, and CD) were also analysed for pH, N, P, K, Na, Mg, Ca, Mn, and Fe. Analyses were carried out following standard methods.

Analysis of variance was used to analyse all data using the (SAS, 1999) package. The Duncan Multiple Range Test (DMRT) at 5% probability was used to compare the means.

Analyses of Soil and Organic manures (PM, GM and CD)

Soil samples collected from 0-20 cm soil depth prior to application of organic manures were analysed for soil physical and chemical properties like soil pH, soil texture, organic matter (OM), total nitrogen (N), Magnesium (Mg), Calcium (Ca), Manganese (Mn) and Iron (Fe). Samples of the organic manures (PM, GM, and CD) were also analysed for pH, N, P, K Na, Mg, Ca, Mn, and Fe. Analyses were carried out following standard methods.

Results

Physicochemical properties of the soil and composition of the manures

Routine analysis of the physicochemical properties of the soil of the study area and composition of the manures (Table 1) revealed that the soil has less than the three organic manures except in Manganese and iron where it has values of 0.70 and 20.20mg/g respectively.

Days to 50% seedling emergence

The results shown in Table 2 revealed that application of organic manure irrespective of type and rate of application had no significant effect ($P \leq 0.05$) on days to 50% seedling emergence of *C. colocynthis.*

Table 1: Physico-chemical properties of the soil of the study area and the chemical composition of organic manures

Mineral composition	Soil sample	Poultry manure	Goat manure	Cow dung
% N	0.30 ± 0.00	2.50 ± 0.00	2.30 ± 0.00	2.19 ± 0.00
P(mg/kg)	6.15 ± 0.01	7.71 ± 0.00	4.36 ± 0.01	3.48 ± 0.01
K(mg/kg)	0.48 ± 0.00	6.73± 0.01	3.53 ± 0.00	6.36 ± 0.00
Na(mg/kg)	0.34±0.00	2.85 ± 0.00	1.11 ± 0.00	2.15 ± 0.00
Mg(mg/kg)	0.41±0.01	1.99 ± 0.01	0.98 ± 0.01	0.99 ± 0.01
Ca(mg/kg)	1.05±0.07	4.83 ± 0.00	2.38 ± 0.01	2.16 ± 0.00
Mn(mg/kg)	0.70±0.00	0.19 ± 0.00	0.22 ± 0.00	0.17 ± 0.00
Fe(mg/kg)	20.50±0.00	0.89 ± 0.00	0.89 ± 0.00	0.94 ± 0.00
pH	5.53±0.01	7.52 ± 0.00	7. 54± 0.00	8.20 ± 0.00
% OM	1.85±0.01	-	-	-
% OC	1.07±0.01	-	-	-
ECEC	2.22±0.30	-	-	-
% Sand	60.85±0.07	-	-	-
% Clay	27.15±0.07	-	-	-
% Loam	12.00±0.00	-	-	-

OM= Organic matter, OC= Organic carbon, ECEC = Effective Cation Exchange

Vinelength

Plants treated with 0.6 t ha^{-1} of cowdung (CD) was found to have the maximum vine length (4.10cm), while the least was recorded in plants with 1.2 t ha^{-1} of poultry manure (PM) which was 2.97cm at 2 weeks after planting (2 WAP) (Table 3). The control had a mean value of 3.20 cm which was similar to 1.8t ha^{-1} of CD and 1.2 t ha^{-1} of goat manure (GM). However, at 8 WAP, plants treated with 1.8 t ha^{-1} had the maximum vine length of 174.10 cm, while the plants treated with 1.8 t ha^{-1} of GM recorded the least value of 126.60 cm. There were significant differences between plants treated with 1.8 t ha^{-1} of PM and those treated with 0.6 and 1.8 t ha^{-1} of GM but these were not different from the control.

Number of leaves per plant

Both type of organic manure and rate of application had no significant effects ($P \leq 0.05$) on the number leaves per plant at 2 WAP (Table 4). However, significant effects were observed on the plants at 4, 6, and 8WAP. Plants treated with 1.8 t ha^{-1} of PM had the maximum number of leaves at 4WAP (30.33), 6WAP (69.00) and 8WAP (93.00). This was followed by 2.4 t ha^{-1} of PM, with average number of leaves of 30.00, 67.00 and 90.33 at 4, 6 and 8 WAP respectively. Other treatments were not significantly different from the control in most cases.

Table 2: Effects of organic fertilizers on days to 50% seedling emergence of *Citrullus collocynthis*

Treatments (t ha^{-1})	Days to 50% Emergence
Control	6.67± 0.58^{a}
CD 0.6	7.00± 1.00^{a}
CD 1.2	6.33± 0.58^{a}
CD 1.8	6.67± 0.58^{a}
CD 2.4	7.33± 1.53^{a}
PM 0.6	7.00± 0.00^{a}
PM 1.2	7.00± 0.00^{a}
PM 1.8	7.00± 0.00^{a}
PM 2.4	6.67± 0.58^{a}
GM 0.6	6.67± 0.58^{a}
GM 1.2	7.00± 0.00^{a}
GM 1.8	7.00± 0.00^{a}
GM 2.4	7.00± 0.00^{a}

Mean followed by the same letter within columns are not significantly different at P≤0.05
CD = Cow dung, PM = Poultry manure, GM = Goat manure

First flowering and 50% flowering

Application of GM at the rate of 1.8t ha^{-1} promoted flowering at 29 days after planting which is two days earlier than the other treatments (Table 5). A similar trend was recorded in days to 50% flowering where it was two days earlier (30 days after planting) in plants treated with 1.8 t ha^{-1} GM.

Number of fruits, fruit diameter and total fruit weight

The lowest number of fruits per plant (5.33) was recorded in plants treated with 0.6 t ha^{-1} CD while the highest was found in the control (9.33) (Table 6). However, they were not significantly different from each other and from other treatments. The best fruit diameter (10.10 cm) was recorded in plants treated with 1.8 t ha^{-1} PM while the least (7.83cm) was found in plants treated with 1.8 t ha^{-1} of GM. The highest total fruit weight (2.37kg) was also recorded in plants treated with 1.8 t ha^{-1}

Table 3: Effect of organic fertilizer on the vine length of *Citrullus collocynthis*

Treatments (t ha^{-1})	Weeks after planting (WAP)			
	2	4	6	8
Control	3.20± 0.58^{ab}	60.60± 3.79^{e}	111.37± 4.36^{bcd}	144.77±3.51^{abc}
CD 0.6	4.10± 0.58^{a}	65.93± 1.00^{cde}	113.10± 5.00^{bcd}	146.03±5.51^{abc}
CD 1.2	3.53± 0.00^{ab}	78.60± 3.21^{abcde}	132.43± 9.02^{ab}	166.73±10.07^{ab}
CD 1.8	3.20± 0.58^{ab}	74.37± 2.08^{abcde}	116.17±5.51^{abcd}	146.33±8.74^{abc}
CD 2.4	3.17± 0.58^{ab}	81.30± 3.21^{abcd}	124.67±6.66^{abcd}	156.23±6.08^{abc}
PM 0.6	3.43± 0.58^{ab}	79.03± 2.65^{abcde}	130.00± 3.51^{ab}	167.43±2.00^{ab}
PM 1.2	2.97± 0.58^{b}	87.60± 2.00^{ab}	125.93±4.93^{abc}	171.10±5.13^{ab}
PM 1.8	3.80±0.00^{ab}	88.03± 0.00^{ab}	139.60± 1.00^{a}	174.10±0.00^{a}
PM 2.4	3.10± 0.00^{b}	91.00± 2.89^{a}	128.43±5.29^{ab}	158.83±3.21^{abc}
GM 0.6	3.67± 0.00^{ab}	62.83± 3.46^{de}	102.03±4.62^{cd}	129.33±6.11^{c}
GM 1.2	3.20± 0.58^{ab}	69.67± 0.58^{bcde}	110.00±2.52^{bcd}	137.83±4.58^{bc}
GM 1.8	3.73±0.00^{ab}	65.77± 1.73^{cde}	100.77±3.06^{dc}	126.60±2.89^{c}
GM 2.4	3.73± 0.00^{ab}	84.13± 3.00^{abc}	122.10±8.02^{abcd}	156.20±7.64^{abc}

Mean followed by the same letter within columns are not significantly different at P≤0.05
CD = Cow dung, PM = Poultry manure, GM = Goat manure

Table 4: Effects of organic fertilizers on the number of leaves per plant of *Citrullus collocynthis* at 2, 4, 6 and 8 WAP.

Treatment ($t\ ha^{-1}$)	Weeks after planting (WAP)			
	2	4	6	8
Control	4.67± 0.44^{a}	20.67±9.25^{de}	51.00±14.00^{ef}	76.67±18.87^{cd}
CD 0.6^{cd}	4.67± 0.56^{a}	24.00±7.43^{bcdcd}	56.00±10.34^{defcd}	79.67±8.73^{cd}
CD 1.2^{cd}	5.00± 0.47^{a}	23.33±8.64^{bcdcd}	49.33±14.59^{ef}	75.67±22.66^{cd}
CD 1.8^{cd}	4.67± 0.26^{a}	21.67 ±7.00^{cdecd}	50.33±9.28^{ef}	75.67±16.65^{cd}
CD 2.4	4.33± 0.61^{a}	25.67±4.08^{abcbcd}	58.67±6.91^{bcde}	82.00±6.27^{bcd}
PM 0.6^{cd}	4.33± 0.70^{a}	23.00±9.56^{cdcd}	57.33±13.08^{cdef}	79.00±19.46^{cd}
PM 1.2^{ab}	4.67± 0.97^{a}	28.00±15.88^{abab}	65.67±15.40^{abc}	89.67±23.01^{ab}
PM 1.8^{a}	5.00± 0.53^{a}	30.00±9.11^{aa}	69.00±11.11^{a}	93.00±12.72^{a}
PM 2.4^{ab}	5.00± 0.30^{a}	30.33±11.79^{aab}	67.00±13.60^{ab}	90.33±19.37^{ab}
GM 0.6^{d}	4.33± 0.60^{a}	18.00± 18.95^{ed}	48.33±18.16^{f}	74.67±23.68^{d}
GM 1.2^{d}	4.33± 0.35^{a}	19.33± 8.28^{ded}	47.67±17.80^{f}	74.00±24.25^{d}
GM 1.8^{d}	5.00± 0.60^{a}	20.00± 4.52^{ded}	48.67±8.08^{f}	73.67±13.95^{d}
GM 2.4	5.00± 0.47^{a}	26.00± 9.25^{abc}	61.33±9.18^{abcd}	85.33±10.85^{abc}

Mean followed by the same letter within columns are not significantly different at $P \leq 0.05$
WAP = weeks after planting, CD = Cow dung, PM = Poultry manure , GM = Goat manure

Table 5: Effects of organic fertilizers on days to first and 50% flowering of *Citrullus collocynthis*

Treatment ($t\ ha^{-1}$)	Days to first flowering	Days to 50% flowering
Control	31.33±0.58^{ab}	32.00± 0.00^{abc}
CD 0.6^{cd}	31.00± 1.00^{ab}	32.33± 0.58^{abc}
CD 1.2^{cd}	32.33± 0.58^{a}	32.67± 1.15^{ab}
CD 1.8^{cd}	31.33± 0.58^{ab}	32.67± 0.58^{ab}
CD 2.4	31.67± 0.53^{a}	32.33± 0.58^{abc}
PM 0.6^{cd}	32.00± 1.00^{a}	32.33± 1.52^{abc}
PM 1.2^{ab}	32.33± 0.53^{a}	32.67± 1.15^{ab}
PM 1.8^{a}	31.67± 0.53^{a}	32.67± 1.15^{ab}
PM 2.4^{ab}	30.33± 1.15^{ab}	31.33± 0.58^{bcd}
GM 0.6^{d}	31.67± 0.58^{a}	33.67± 2.08^{a}
GM 1.2^{d}	31.67± 0.58^{a}	31.67± 0.58^{bcd}
GM 1.8^{d}	29.33± 1.53^{b}	30.00± 1.00^{d}
GM 2.4	30.33± 1.53^{ab}	30.67 1.15^{cd}

Mean followed by the same letter within columns are not significantly different at $P \leq 0.05$.
CD = Cow dung, PM = Poultry manure
GM = Goat manure

PM, while the least (0.77kg) was recorded in plants treated with 0.6 $t\ ha^{-1}$ of GM.

Discussion

The growth and yield performance of *Citrullus colocynthis* as affected by the three organic manures at various concentrations showed increased growth in all the parameters studied. The results are consistent with the work of John *et al*. (2004) who reported significant influence of organic manure on water melon. They reported that the manure may contain essential nutrients which could have resulted in high photosynthetic activities and vegetative growth of the plants.

The soil treated with poultry manure produced the best vine lengths, number of leaves and fruit diameter. This could be due to a higher percentage of nitrogen released to the soil from poultry manure which may have resulted in an increase in vegetative growth of the plant. This corroborated with the work of

Table 6: Effects of organic manures on the number of fruit and fruit diameter of *Citrullus collocynthis* at harvest.

Treatment (t ha^{-1})	Number of fruits / plant	Fruit diameter (cm) / plant	Total fruit weight (Kg)
Control	9.33± 1.15^{a}	8.37 ± 0.64^{ab}	0.77± 0.25^{b}
CD 0.6^{cd}	5.33± 0.58^{a}	8.60± 0.87^{ab}	0.87± 0.35^{ab}
CD 1.2^{cd}	6.00± 3.00^{a}	8.93± 0.29^{ab}	1.23± 0.23^{ab}
CD 1.8^{cd}	7.00± 1.00^{a}	8.80 ± 2.15^{ab}	1.77± 0.93^{ab}
CD 2.4	5.33± 2.52^{a}	8.90 ± 0.10^{ab}	0.90±0.53^{ab}
PM 0.6^{cd}	7.33± 1.53^{a}	9.50± 0.53^{ab}	1.43± 0.21^{ab}
PM 1.2^{ab}	6.00± 2.65^{a}	8.40± 0.72^{ab}	0.97± 0.47^{ab}
PM 1.8^{a}	8.67± 3.51^{a}	10.10± 0.26^{a}	2.37± 1.58^{a}
PM 2.4^{ab}	8.67± 1.53^{a}	9.47± 0.57^{ab}	1.63± 0.29^{ab}
GM 0.6^{d}	6.67± 2.52^{a}	8.23± 0.58^{ab}	1.10± 0.2^{ab}
GM 1.2^{d}	8.33± 4.04^{a}	8.23±1.91^{ab}	1.50± 1.30^{ab}
GM 1.8^{d}	6.67± 1.53^{a}	7.83± 1.25^{b}	0.73± 0.46^{b}
GM 2.4	7.00± 2.65^{a}	8.87± 1.56^{ab}	1.43± 1.01^{ab}

Mean followed by the same letter within columns are not significantly different at P≤0.05.
CD = Cow dung, PM = Poultry manure, GM = Goat manures

Enujeke (2012) who reported an increase in the vine length, number of leaves, and number of branches of water melon following application of higher concentration of poultry manure. Also, Adekiya and Ojeniyi (2002) and Ewulo *et al*. (2008) had earlier asserted that higher rates of poultry manure could increases moisture availability leading to the release of more nutrients for increased plant growth. Dauda *et al*. (2008) and Agbede *et al*. (2008) attributed the vigorous growth of water melon to increased supply of nutrient elements from higher rates of poultry manure. Mangila *et al*. (2007) and Enujeke *et al*. (2013) had earlier noted that poultry manure is essential for establishing and maintaining the optimum soil physical condition for plant growth. Ayeni *et al*. (2010) observed similar increase in such growth parameters of tomato as plant height, number of leaves, leaf area and also higher contents of N, P and K of plants with increase in the level of poultry manure.

On the plant height (vine length), soil amended with poultry manure produced the longest plant followed by cow dung manure. This could be due to higher concentration of mineral elements that are released to the soil by decomposition of the organic material and mineralization of nutrients especially phosphorous and potassium. Tiamiyu *et al*. (2012) observed that okra plants treated with poultry manure were significantly taller than those treated with the other two sources of organic manure (cow dung, sheep manure). Enujeke (2013) observed that plant that received 30tha^{-1} of poultry manure grew taller than other plants possibly because more concentrated nutrients or minerals were made readily available and easily absorbable by the receiving plants leading to faster growth and

development. This supported the findings of Izunobi, (2002). Fagimi and Odebode (2007) also reported increased plant height of pepper resulting from application of higher rate of poultry manure.

Plants treated with poultry manure also had the highest mean number of leaves. This was in accordance with the work of Enujeke (2013) who reported that application of 30 t ha^{-1} of poultry manure was superior to other rates applied with respect to producing higher number of leaves of maize. This could be attributed to the fact that 30 t ha^{-1} improved the growing characteristics of the crop, drainage and slope of the land. DIPA (2006) and Mubondeni *et al*. (1999) recommended that manure should be applied at rates that are compatible with the nutrient requirements and growing characteristics of the crops for growth and yield enhancement.

Plants treated with goat manure produced flower 2 days early at 29 days after planting which was closely followed by soil amended with 2.4 t ha^{-1} of poultry manure and goat manure, and this could be attributed to sufficient supply of soil nutrients.

All the nutrient-treated plants and those of the control produced similar results of fruits per plant and fruit diameter. However, the highest fruit diameter (10.10 cm) was found in plants treated with poultry manure applied at 1.8 t ha^{-}

The better performance of plants treated with organic manure has been attributed to availability of micronutrients which are needed for biosynthesis of important hormones, chlorophyll, coenzymes and general metabolic activities (Anburani and Manivannan, 2002; Nehra *et al*. 2001). This may be due to improved physical and biological properties of the soil which resulted in better nutrient supply to the crop.
The increase in vine lengths and number of leaves by the application of organic manures may have resulted in improving the yield of *C. collocynthis* particularly the fruit diameter. Nweke *et al*. (2014) reported an increase in the number and length of fruits following application of poultry manure to some agricultural crops.

Conclusion

All the nutrient-applied treatments generally increased growth and yield of melon over the control treatment. Poultry manure out-performed the other treatments in most of the parameters measured.

Recommendation

Rates of application should be varied in multilocations in future studies

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