PLANT BREEDERS ASSOCIATION OF NIGERIA
HYBRID ANNUAL CONFERENCE, MAKURDI 2023
(ISSN: 3027-088X)

ASSESSMENT OF THREE VARIETIES OF SWEET PEPPER (CAPSICUM ANNUUM L) AS INFLUENCE BY ORGANIC AND INORGANIC MANURE UNDER CONTROLLED IN ENVIRONMENT IN MAKURDI, BENUE STATE

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Abstract
The experiment was carried out at Research farm in the Federal University of Agriculture Makurdi during the wet and dry season of 2020/2021, to assess three varieties of sweet pepper as influenced by organic and inorganic manure under controlled environment. The experimental design was Randomized Complete Block Design.(RCBD) in a 3 x 4 factorial arrangement with 4 treatment and 3 replications. Treatments were cattle dung at the rates of 10tones/hectare (T_1), 5tones/hectare (T_2), NPK 20:10:10 at the rate of 100kg/hectare and control. Varieties used were King Arthur (V_1), X3R Red Knight (V_2) and Poivron Yolo Wonder (V_3). The result showed that, King Arthur had the highest plant height in both trials (41.72cm and 28.42) followed by Poivron yolo wonder (39.90 and 22.25) X3R Red knight (39.12 and 21.04). It was observed that King Arthur had the highest leave area of (83.00cm^2 and 56.5cm^2), X3R Red knight (79.10cm^2 and 40.20cm^2) Poivron yolo wonder (67.70cm^2 and 33.9cm^2) For number of leaves Poivron yolo wonder had) 47.30 and 19.83) King Arthur (41.10 and 31.46), X3R Red knight (40.40 and 20.79) at 6WAT. The result obtained also showed that, yolo wonder had the highest number of branches (5.29) followed by King Arthur (4.96) andX3R Red knight (4.29). For yield parameter, King Arthur had the highest across all trials (7.63 an3.29) followed by X3R Red knight (6.54 and 2.92) and then yolo wonder (5.6and 2.75). The result indicated that, King Arthur had the highest yield in both trials (2,608kg and1,712kg) followed by X3R Red knight (2,378kg and 1,400kg), yolo wonder (1,860kg and 1.100kg). The interaction between cattle dung, variety and NPK showed that cattle dung had more effect on the growth and yield parameter compare to NPK fertilizer and control. From the study is therefore recommended that farmers should adopt the use of cattle dung at the rates of 10tones and 5 tones/hectare in Makurdi.

Key words: Sweet pepper, cow dung, NPK, screen house, growth and yield.

Introduction
Sweet pepper belongs to the genus *Capsicum* and family Solanaceae and can be grown throughout the year (Kabura *et al*., 2008). The crop is ranked third most important vegetable crop after tomato and onion in the world (Islam *et al*., 2011; Belel *et al*., 2011). (Khan *et al*., 2010). Juroszek and Tsai (2009) reported that sweet pepper fruits are good sources of many essential nutrients, including vitamins A, C, and E, carotenoids, minerals (*e.g.*, calcium and iron), and other secondary plant compounds. The crop responds to both organic and inorganic fertilizers and has been shown to respond positively to nitrogen and phosphorus fertilizers (Aliyu, 2002). The use of organic and inorganic fertilizers has shown a great significance in recent years in vegetable production for two reasons. Firstly, the need for enhanced sustainable increase in production; and per hectare yield of vegetables requires an increased amount of nutrients. Secondly, the results of many experiments on organic and chemical fertilizers managed in many countries detect that inorganic fertilizer alone cannot sustain productivity of soils (Khan *et al*., 2010).

Uses of intensive artificial fertilizers in agriculture have been identified with many health problems and environmental pollution.

Research also shows that organic manure application is more beneficial compared with the use of chemical fertilization in tropical crop production, sustainability and soil fertility management (Ansa and Woke, 2018).

According to FAOSTAT (2012), the average world's fresh chili and sweet pepper production in 2010 was 27.6 million tons, to which West Africa contributed 888 tons, or 3.2% with Nigeria and Ghana ranked 8th as the biggest West African contributors respectively. It is one of the highly remunerative vegetable cultivated in most parts of the world. Its cultivation under protected conditions is becoming popular in recent years due to increased productivity and high quality produce (K. V. Malshe, *et al*, 2016) In terms of total production, the share of pepper is high as compared with other vegetables such as lettuce, tomatoes, head cabbage, onion, and others. (FAOSTAT, 2017).

For protected cultivation, different structures are being used depending upon the local environmental conditions. The local environmental conditions, season, type of protected structures used for capsicum cultivation may require different crop management practices. This crop is not only advanced but an increase in the yield is also obtained due to extending cropping period than their traditional method of crop production (Kumar *et al.* 2005). The scenario of insect pests under protected cultivation is vastly different compared to the pest problems under open field (Jhansi *et al.* 2001). Though many studies have been conducted on the complementary effects of using poultry manure and chemical fertilizer in sweet pepper production, there is paucity of information on the effect of cow dung and NPK fertilizers on sweet pepper production in the Southern Guinea Savannah Region of Nigeria. This study therefore, was carried out to determine the effects of using cattle dung and NPK 20:10:10: fertilizer in sweet pepper production and also to determine the effect of variety on growth and yield of sweet pepper in Makurdi.

Materials and methods

The experiment was carried out at the Teaching and Research farm of Joseph Sarwuan Tarka University Makurdi located at the Southern Guinea Savannah, Nigeria during the wet and dry season of 2020/2021. A 3x4 factorial arrangement laid as Randomized Complete Block Design (RCBD) replicated three times. . The experimental unit measured 5m x 3m with 0.5m pathway as block boundaries and 0.5m as alleyway between the plots. Treatment consisted of four (4) Fertilizer rates-10t/ha (T_1), 5t/ha (T_2), NPK 20:10:10(T_3) and no fertilizer control (T_4). A sample of fertilizers and soil around the experimental plot was collected and sieved using 2 mm mesh sieve and analyzed for physicochemical properties before planting. Nursery was established on nursery trays (28 by 38cm and 45 by 26cm) for 5 weeks before transplanting in pots. Transplanting was carried out at 5 weeks after Nursery, and was planted in polypropylene sacks (32 by 50cm) made of virgin material, master batch and UV coating, filled with 15 kg of sand/loam soil. Growth parameters were assessed through sampling of two plants from each plot that were later tagged. Observation and measurement of growth characters were done at weekly intervals beginning from1 WAT and terminated 6WAT.

Parameters measured were; plant height, number of leave per plant, number of branches, leave area, stem diameter, number of fruits per plant, fruit weight, fruit diameter and fruit length. Data collected were subjected to analysis of variance (ANOVA) using GENSTAT statistical software 17.1 Discovering Edition (2015), and where significant differences existed means were separated using Fishers' least significant difference (F-LSD) at 5 % level of probability.

Screen house before Transplanting

Screen house After Transplanting

4.0 Results

4.1 Soil Physical and Chemical Properties of the Experimental Site and Nutrient Content of Inorganic and organic Manure used for the Trials.

Some soil physico-chemical properties of the experimental site showed that Sand constituted the major particle size fraction in the soil followed by clay and silt. The soil therefore has sandy clay texture. (Table1) with low levels of nitrogen, potassium, organic matter and low level of available phosphorus.

The pH of the soil revealed that the soil was slightly acidic (6.13). The essential nutrients in the soil are as follows nitrogen (0.11%), phosphorus (4.80ppm) and potassium (0.29Cmol/kg) which are lower than the cattle dung manure and NPK fertilizer nutrient content. Hence the application has the capability to enhance the nutrient status of the soil.

The results of the pre-sowing composite soil sample laboratory analyses indicated that the soil textural class of experimental site was 69.80% sand, 16.20% clay and 14% silt (Table 1). Thus, the texture of the soil was sandy loamy according to textural classification system. The texture indicates the degree of weathering, nutrient, and water holding capacity of the soil. Furthermore, the sandy clay soil texture was suitable for sweet pepper and other major crops production due to its good ability to retain nutrients and available water. However, clay soil has a high proportion of clay particles. The pH of the soil was almost slightly acidic (6.13). This value falls in the pH range that was very conducive for sweet pepper production as normal optimum soil pH for production is from 5.2 - 6.5. The Cation Exchange Capacity (CEC) of the soil was (7.37cmolkg^{-1}). The total soil nitrogen content of experimental soil was 0.11%. The available phosphorus content of the soil was medium (4.80 ppm) Sweet pepper needs a good supply of readily available phosphorus since the root system is not extensive and does not readily utilize less available P forms.

Table 1: Soil Physio-Chemical Analysis of sampled soil

Sample identity	Soil	Cattle dung	N P K 20:10:10
Physical Properties			
% Clay	**16.20**		
% Silt	**14.0**		
% Sand	**69.80**		
Textural Class	**Sandy loamy**		
Chemical Properties			
Ph	**6.13**	**8.02**	
% Organic Carbon	**0.96**	**2.11**	
% Organic Matter	**1.66**	**3.65**	
% Total Nitrogen	**0.11**	**1.82**	**13.72**
Available P p_{pm}	**4.80**	**1.68**	**10.75**
Potassium Cmol/kg	**0.29**	**1.26**	**9.70**
Calcium Cmol/kg	**3.0**	**2.24**	
Magnesium Cmol/kg	**2.70**	**2.24**	
Sodium Cmol/kg	**0.26**		
CEC Cmol/kg	**7.37**		
EB Cmol/kg	**6.25**		
EA Cmol/kg	**1.12**		
%BS	**84.80**		
Fe p_{pm}		**1.68**	

4.2 .1 Plant Height (cm)

Table 2 shows plant height of the three sweet pepper varieties as influenced by NPK 20:10:10 and cattledung manure during 2020/2021 wet/dry season. The three varieties produced statistically similar plant heights at both trials throughout the sampling period. Poivron Yolo Wonder had the highest plant height at week one and 2 while King Arthur showed highest height at 3 to 6 WAT King Arthur showed highest plant height though significant different was observed only at week 1 and 3 in the first planting. Also in the second trial same trends follow among the varieties. From the result obtained statistically significant difference was observed in 1WAT in the first trial and 2 to 6 WAT in the second trial among varieties.

Pepper grown without manure or fertilizer application had the shortest height with mean value of 33.0 and 22.61cm. Application of cattle dung at the rate of 10tons /ha resulted in substantial increase in plant height (43.51 and 26.39cm) giving the tallest plant, followed by NPK 20:10:10 at the 100kg/ha (42.36cm). The superiority in plant height of pepper based on nutrient sources was cattle dung at 10tons/ha. Likewise application of cattle dung manure at 10tons/ha significantly influenced plant height at 3 WAT in the first trial.

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Table 2: Main Effect of Variety and Fertilizer Treatments on the plant Height, No of leaves, branches and stem diameter of Sweet Pepper in Makurdi

	6weeks after transplanting							
	Plant height		No of leaves		No of branches		SD	
VAR	1	2	1	2	1	2	1	2
V1	41.72	28.42	41.10	31.46	4.96	3.12	2.70	2.31
V2	39.12	21.04	40.40	20.79	4.29	1.54	2.68	2.06
V3	39.90	22.25	47.30	19.83	5.29	1.87	2.85	1.90
F-LSD (P≤0.05)	NS	3.16	9.04	5.08	NS	1.14	NS	0.23
F.pr	0.493	0.001	0.239	0.001	0.344	0.02	0.206	0.006
FERT.								
T1	43.51	26.39	52.00	27.17	6.17	2.67	3.04	2.30
T2	42.12	23.56	50.10	24.83	6.00	2.50	2.96	2.22
T3	42.36	23.06	40.10	22.22	4.39	1.61	2.80	1.99
T4	33.00	22.61	29.60	21.89	2.83	1.94	2.17	1.86
F-LSD (P≤0.05)	5.23	NS	10.43	NS	1.63	NS	0.24	0.30
F.pr	0.001	0.163	0.001	0.235	0.001	0.338	0.001	0.011

VAR – Variety; FERT. TRT – Fertilizer Treatments; NS – Not Significant, V1-King Arthur, V2-X3R Red Knight, V3-Poivron Yolo Wonder, T1-Cattle dung 10tones/ha, T2-Cattle dung 5tones/ha T3 NPK 20:10:10, T4 control, SD-stem diameter, 1-first trial, 2- second trial.

4.2.2 Number of Leaves

The main effect of variety and fertilizer treatments on the number of leaves of sweet pepper in Makurdi shows that V_3 has the highest number of leaves from 1WAT to 6WAT from the first planting. There was significant effect at 1WAT, then 3,4,5 and 6WAT. In the second trial V_1 showed higher number of leaves, significant different were observed at 2to 6WAT. Meanwhile among the treatment T_2 showed high effect at 1 to 3WAT in the first trial and at 1to 4WAT in the second trial. But at 3to 6WAT T_1 shows more effect in the first trial and also at 5and 6WAT in the second trial. Significant effect were obtained at 3, 5 and 6WAT among the treatments in the first trial and in the second trial significant different was observed only at 2, 3 and 4 WAT.

4.2.3 Stem Diameter (cm)

The main effect of variety and fertilizer treatments on the stem Diameter (cm) of sweet pepper in Makurdi. From the result variety 3 has higher stem diameter significant different was observed only in 1WAT in the first trial, the second trial, 1WAT no significant different but significant different was observed at 2 to 6WAT with variety one having higher stem diameter. In the treatment effect cattle dung at the rate of 10tones per hectare has more influence at 1,2,5 and 6WAT and 1 to 6WAT in the second planting. Significant different were obtained at 1, 3,5 and 6WAT in the first planting while in the second planting significant effect was observed at 1,3 to 6 WAT.

4.2.4 Number of Branches

Application of T_1 resulted in substantial increase in the number of branches from 4WAT (2.28) and (6.17) in the first trial, same trends followed at second trial 5WAT (0.72) and 6WAT (2.67), though significant difference was obtained only in the first trial

in terms of fertilizer rates. V_3 gave the highest number of branches (5.29), followed by V_1 (4.96), in the second trial V_1 gave the highest number of branches (3.12) followed by V_3 (1.87). Significant difference was observed at 4and 5 WAT in the first trial, then 5 and 6WAT in the second trials in terms of varieties.

4.3.0 Yield parameters

4.3.1 Fruit Length (cm)

The main effect of variety and fertilizer treatments on the yield parameters of sweet pepper in Makurdi for both trials. Among the varieties, King Arthur has longest fruit length followed by X3R Red Knight in the first trial, same trends followed in the second trial no significant effect was observed in both trial among varieties. Significant effect were obtained on fruit length among treatments in the first trial, T_1 gave the highest fruit length followed by T_2 and the least was T_4 Same trends followed in the second trial.

4.3.2 Fruit Diameter.

Fruit Diameter as influenced by organic and inorganic manure and control, V_1 had highest fruit Diameter followed by V_3 in the first trial, same trends followed in the second trial. No Significant difference were observed in both trials among the varieties on fruit Diameter, mean while there was a significant different among fertilizer treatments which T_1 gave the highest effect and the least was control (no fertilizer. Also significant effects were obtained in both trials.

4.3.3 Fruit weight (kg)

Fruit weight of the three varieties as affected by organic and inorganic fertilizers during the first and second trials in presented in table 12. Statistically the three varieties showed significant different in both trials, mean whileV_1 had the highest fruit weight followed by V_2 and the least was control.

4.3.4 Number of Fruit/Plant

The number of fruits/plant of the three varieties as affected organic and inorganic manure in the first and second trials. Significant effect was observed among the varieties with V_1 having the highest number of fruits followed by V_2 the least was V_3 .Same trends followed the second trials.

Table 3: Main Effect of Variety and Fertilizer Treatments on the Yield Parameters of pepper in Makurdi

	1st Trial				2nd Trial			
TREATMENTS	**Yield Parameters**				**Yield Parameters**			
VAR	**Fruit Length (cm)**	**Fruit Diameter (cm)**	**Fruit Weight (kg/ha)**	**No of Fruits/ Plant**	**Fruit Length (cm)**	**Fruit Diameter (cm)**	**Fruit Weight (kg/ha)**	**No of Fruits/Plant**
V1	7.2	16.7	246.7	8.0	5.6	12.6	66.7	3.3
V2	6.6	16.3	193.3	6.5	5.5	11.9	53.3	2.9
V3	6.6	16.5	186.7	5.7	5.4	12.0	40.0	2.8
F-LSD (P≤0.05)	NS	NS	0.01	0.7	NS	NS	0.01	0.3
F.pr	0.098	0.488	0.001	0.001	0.906	0.82	0.001	0.003
FERT. TRT								
T1	7.5	17.9	386.7	11.0	6.4	14.7	100.0	5.0
T2	7.0	17.3	206.7	7.7	6.2	13.8	66.7	3.1
T3	6.5	16.5	193.3	5.8	5.6	12.3	40.0	2.8
T4	6.2	14.3	53.3	2.5	3.8	7.9	13.3	1.1
F-LSD (P≤0.05)	0.6	0.7	0.01	0.9	0.9	2.4	0.01	0.3
F.pr	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001

WAT- Weeks after transplanting; VAR – Variety; FERT. TRT – Fertilizer Treatments; F-LSD – Fishers' least significant difference at 5% level of probability; NS – Not Significant; F.pr – Probability value, V1-King Arthur, V2-X3R Red Knight, V3-Poivron Yolo Wonder, T1-Cattle dung 10tones/ha, T2-Cattle dung 5tones/ha T3 NPK 15:15:15, T4 control.

5.0 Discussion

5.1 Varietal Response as influenced by the organic and inorganic Fertilizer Treatments

From the observations , varieties had a considerable influence on growth and yield of pepper and the three varieties showed significant varietal difference on growth and yield component during the both trials with King Arthur having higher plant height in the trials(41.726WAT and28.42 6WAT) followed Poivron Yolo Wonder (39.90 and 22.25) then X3R Red Knight (39.12 and22.12), the plant height different in the first and second trial could be as a result of climatic changes which is in line with the findings of (Jovicich *et al*., 2004) The growth and size of sweet pepper fruits are normally affected by air temperature, daylight and relative humidity (RH) during anthesis, fruit set, development and maturation, as well as by plant growth.

Statistically, there exists significant difference (P<0.05) between pepper grown with fertilizer compared to control. This might be due to the availability of N required for plant growth and development. Pepper variety significantly (P<0.05) influenced plant height; with King Arthur being the tallest (41.72 and 28.42cm), followed by Poivron Yolo Wonder (39.90 and 22.25cm) and X3R Red knight being the shortest with the mean value (39.12 and 21.04cm) Increase in plant height with fertilizer application treatment resulted in retention of appreciable amount of assimilates in the stem for node and leaf production.

The height of plant is an important growth character directly linked with the productive potential of the plant. Saeed *et al* (2001) opined that plant height is positively connected with productivity of plant such as increased number of branches. This accounted for higher number of leaves in the treated plants. The result obtained showed that King Arthur has the highest leave area ($83.00cm^2$)followed by Poivron Yolo Wonder ($79.10cm^2$) and the least was X3R

Red knight (67.70cm^2) in the first trial, same trends was observed in the second trial with King Arthur having the (56.50cm^2), Poivron Yolo Wonder (40.20cm^2) and X3R Red knight (33.90cm^2)

From the investigation it was also observed that Poivron Yolo Wonder has more number of leaves (47.30) followed by King Arthur (41.10), the least was X3R Red knight (40.40) in the first trial different trends were obtained during the second trial, this could be as as result of the local variety having low resistance and adaptability the climatic changes which is in line with the findings of (Coertze and Kistner, 1994) Sweet peppers are likewise very sensitive to sunscald especially under higher temperatures. Shaked *et al*., (2004) also found that the optimum temperature favorable for growth of sweet pepper ranges between 20 and 25°C. When temperature falls below 15°C or exceeds 32°C, growth is usually retarded growth and yield decreases. In terms of stem diameter among the varieties Poivron Yolo Wonder has the larger stem diameter(2.85cm) followed by King Arthur (2.70cm) then X3R Red knight (2.68cm) in the first trial while in the second trial King Arthur has the larger (2.31cm) followed byX3R Red knight (2.06cm) then Poivron Yolo Wonder (1.90).

Pepper varieties responded positively to nutrient sources for number of harvested fruits and weight of fruits (Table 11). King Arthur produced 15.33 fruits being the highest, followed by X3R Red knight which recorded 9.17 and Poivron Yolo wonder produced the lowest number of fruits (8.50). Similar trend was observed with the fruit weight where King Arthur recorded the maximum weight (580kg\ha) and pepper fruits produced by Poivron Yolo Wonder had the lowest weight (286.67kg\ha). There was significant difference in weight of fruits harvested from all the varieties.

5.2 Response to cattle dung manure

Significant response of growth component such as plant height, leave area, number of leaves, stem diameter, and number of branches when cattle dung manure was applied might be as a result of improved nutrient supply, as well as positive manipulation of soil physical properties such as moisture retention, soil structure and aeration. Moreover, cattle dung manure contains essential nutrient element associated with high photosynthetic activities and thus promoted root and vegetative growth which in line with the finding of Mbah and Mbagwu (2006) that cattle dung increase uptake of K, Ca and Mg by maize on leptosol and also that animal wastes increase OM, N and cation exchange significantly, Similar result with respect to increase in vegetative growth in treatment that receives high cattle dung manure rates was reported by Ewulo *et al* (2007) who stated that cattle manure give higher plant height, leave number/plant, fruit number/plant yield(kg)/plant than inorganic fertilizer and control. This is in conflict with the findings of Alex and Eliakirqa (2014) who observed that N P K gave higher plant height, fruit number/ plant, fruit length, fruit yield (kg/plant) and fruit yield (t/ha) than organic fertilizers.

The response in yield parameter could be as a result cattle dung manure to supply N and K and gradually these nutrients slowly leading to longer period of supply, that induced sustained luxuriant growth. Better storage of large reserve of assimilate produced was enhanced.

The application of cattle dung can increase soil inorganic nutrients, this consistent with the results of Witt (2000), Wang Zhiming (2003), XielongLian *et al* (2004). This result probably due to large number of micro-organisms in cattle dung which play an essential role in decomposing organic matter, cycling nutrients and fertilizing the soil. The manure application rate become an important factor which affect soil microbial organism. Increase in soil chemical properties which are quite essential in crop growth and yield have also been associated with organic manures

(Adetunji, 1990). Cattle dung is high in nitrogen and potash which is good for root and tuber crops. Cattle dung is useful organic manure that can be utilized to supplement the quantity and quality of fertilizers needed for root and tuber crops production (Asawalam and Onwudike, 2011).

Also the ability of organic manure to improve the physical and chemical properties of the soil ensures stress free crop development hence high yields were recorded Dauda *et al*. (2005) and Anon (2007) who reported that nutrients in manures most especially nitrogen and other nutrients become available more slowly and a considerable amount is still available towards the latter part of the growing season. Ashannur *et al* (2012) also reported that cattle manure gave higher fruit number Number of fruits produced from pepper grown with manure/fertilizer in order of superiority was 10 t ha-^{1} cattle dung > 5 t ha-1cattle dung > 100kg NPK > control. Pepper that received 10 t ha-1 cattle dung recorded the heaviest fruit weight (0.58 t /ha), 5tha-^{1} (0.18 t /ha), 100kg ha-^{1} (0.14 t /ha) and pepper grown on plots that did not receive fertilizer application had the lowest pepper fruits weight (0.093 t /ha). Statistically, pepper that received fertilizer application recorded significantly different fruit weight compared to those that did not. From the investigation it was observed that cattle dung at the rates of 10tones and 5tones /hectare has more effect on the growth and yield parameters

5.3 Response to NPK fertilization

Nitrogen is very important for sweet pepper growth and reproduction (Khan *et al.,* 2010). In addition, the significant response of nitrogen fertilization in vegetative growth may be due to the role of nitrogen on synthesis of chlorophyll, enzymes and protein which increases the vegetative growth, in terms of varietal response especially for Poivron Yolo Wonder.

Pepper is a heavy feeder on NPK and therefore requires a liberal application (Berke *et al.*, 2005). The significant response of growth components such as plant height, stem diameter and number of leaves could be attributed to the fact that among various nutrients, nitrogen is very important for sweet pepper growth and reproduction. The plant height, number of leaves and stem diameter increased with increased application of NPK fertilizer. This could be attributed to the increase in nitrogen, phosphorus and potassium. Similar result was reported by Lawlor *et al.* (2001) and Calyle (1998).

The positive influence of nutrient sources on the growth of the crop might be due to the release of the balanced nutrient contained in the materials. The improved growth parameters due to nutrient sources could be related to the release of mineral elements such as N, P, K and exchangeable cations (Ca, Mg and Na) to the soil by the different fertilizers used which established and maintained optimum soil physical condition for plant growth. The variation in growth parameters due to nutrient sources was considered to be due to variation in the availability of major nutrients (Sanni *et al* 2015). The best growth and yield performances were observed from pepper that received organic manure compared to NPK. This may be attributed to increased, timely released and availability of nutrient elements.

6.1 Conclusion

Results obtained from the study showed that cattle dung at the rate of 10 tons/ha had superior performance on the three sweet pepper varieties followed by cattle dung at the rate of 5 tons/ha then NPK 20:10:10 100kg /ha and the least was control.

Among the varieties King Arthur produced heavier fruits Weight (580 kg /ha) followed by X3R Red knight (293 kg /ha) while the least was obtained from Poivron Yolo Wonder (287 kg /ha).

King Arthur is recommended as the best variety for farmers in Makurdi. The application of cattle dung at the rate of 10 tons per hectare is recommended

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