

EFFECT OF PIG AND COW MANURE ON THE GROWTH AND YIELD OF YELLOW PEPPER (CAPSICUM FRUTESCENCE, L) IN NSUKKA, ENUGU STATE, NIGERIA

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Abstract

This study addressed the effect of pig and cow manure on the growth and yield of yellow pepper (*Capsicum Frutescence*) in Nsukka East Development Centre of Enugu State, Nigeria. The genus *Capsicum* belongs to Chili pepper which is massively cultivated in Nsukka area of South- East Nigeria. To raise the seedlings, three baskets were plaited and labeled “A”, “B” and “C”. The first basket labeled “A” was filled with mixture of pig manure and loamy soil in the ratio of 1kg: 2kg, the Second basket “B” was filled with mixture of Cow manure and loamy soil in the same ratio as “A”. However, the “C” which was the control experiment was filled with only loamy soil (3kg). Furthermore, ten seeds of *C. frutescence* were sown on each basket to raise seedlings for planting. The germination Started on 8th Day and lasted for three weeks in which the ratio of germination of 8:9:6 was recorded as concerns baskets (A, B &C). During transplanting of the seedlings from the nursery to three ridges cultivated, 500g of pig manure were applied to the five stands on ridges “A” and cow manure applied to five stands on ridge “B” while “C” was not treated with any manure. After transplanting, the plants were allowed to grow for 12 weeks (3 months) during which the following records were kept (i) Percentage of germination (ii) Height in cm (iii) Number of leaves (iv) Number of branches (v) Number of Flowers (vi) Number of fruits (vii) Mean weight yield of *C. frutescence*. The best yield in grams of *C. frutescence* was the ridge treated with cow manure followed by ridge treated with pig manure. The control “C” had the least yield.

Keywords: *Capsicum frutescence*, organic manure, soil types, growth and yield of *c. frutescence*

Introduction

Capsicum frutescence is one of the best fruits of the world which is wildly consumed throughout the world. It is ranked second after tomatoes as the world best fruit. It is significantly required as spices and for health purposes hence the study was considered significant because it addressed the effect of pig and cow manures on the growth and yield of *capsicum frutescence*, known as “Ose” Nsukka. Previous studies concentrated on the effect of inorganic manure (fertilizer) and poultry manure on the yield of *C. frutescence*. It is therefore pertinent that other kind of manures such as cow and pig manure be applied to determine their efficacy on the growth and yield of *C. frutescence*. It is a dicotyledonous crop which is associated with solannace family. It originated from central and South America (Mexico) as it was dispersed by birds. It is a perennial crop which grows very well in south East Nigeria. The two genera of *Capsicum* are :(i) *Capsicum annum* (sweet pepper) and they include long red, California ruby, King and wonder and *Capsicum frutescence* (hot or Chili pepper), which include *C. pubescence*, *C. baccatum*, Thai pepper, *C.Chinese*, buthut, Tolokia, Cayenne and rare giant. *C. frutescence* has been ranked as second-best fruit

of the world after tomatoes (Olaniyi & Ojetayo, 2010). The C. frutescence is nutritious and contains the following nutrients as shown on the table below:

S/N	Types of Nutrients in C. frutescence	Their values in percentage
i	Protein	4%
ii	carbohydrate	5-10 %
iii	water	82-92 %
iv	fiber	Contained high antioxidant
v	Fats	1-3 %
vi	Minerals	1-3%

Source: <https://www.bitannica.com/plant/capsicum-annum>.

The consumers of C. Frutescence derives a lot of health benefits such as (i)Brightening of the mouth, (ii) it prevent the development of cancer cells, (iii) Moderate consumption of C. Frutescence make our skin and hair very healthy, (iv) it boost the immune system of human being(v) it enhances the production of erythrocytes (red blood cells), (vi) it lower the excess storage of sugar in the body, (vii) it makes our eyes to be healthy and sharp (viii) Moderate consumption of C. frutescence promote healthy breathing ([https://chtrouble .com>health-benefits-of-Chili peppers](https://chtrouble.com>health-benefits-of-Chili-peppers)). In addition, too much consumption of C. frutescence results in the following poor health conditions, (i) Intensive stomach burnt (ii) Stomach irritation and vomiting in Ulcer patients, Diarrhea (v) acute headache and swelling of the body due to excessive consumption of C. frutescence. C. frutescence grows to the height of 120-150cm which depends on the fertility of soil (Ozioko, 1992). It starts fruiting between 4-5 months. It is significantly used as species for preparing stew, soup and pepper soup due to it's flavour especially when ripped (Alabi, 2006). C. Frutescence survives in tropic (South- East Nigeria) with rainfall range of 600-1200mm and temperature range of 18-27°C (Abulbaki, 2009). It doesn't tolerate waterlogged soil and swampy area because of poor oxygen content of the soil.

The cultivation, weeding and harvesting provides employment to youth in Nsukka East Development Centre as they are weeded three times a year. C. Frutescence thrives well in well drained loamy soil because of easy percolation of water and high nutrient contents. The soil PH of 6-7 is an ideal for the growth and yield of C. Frutescence, (Wikipedia. In>Vegetables-1>protected). Waterlogged areas cause poor rate of carbon- fixation and nutrients deficiency which eventually result in poor growth and yield of C. frutescence. As regard manure, there are two main categories of manure required for C. frutescence which include inorganic (artificial) and organic manure. The organic manure includes poultry, sheep, goat, cow, pig, rabbit and farmyard manure. The contributory factors of each of the manures to the fertility of the soil depend on the chemical contents of the manure. However, the scope of this study is limited to the effectiveness of pig and cow dung on the growth and yield of yellow pepper. The nutrients contained in the pig manure include nitrogen, phosphorus, potassium, calcium, magnesium, sulphure, manganese, copper, zinc, chlorine, boron, iron, and molybdenum. In addition, the magnitude of chemicals in pig manure are high and consist of chemicals like potassium, copper, magnesium, Aluminum, zinc and iron. The percentages of nutrients in cow manure are:

Nutrients present in cow manure	Percentage per nutrient
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i Nitrogen	3%
ii potassium	1%
iii Phosphorus	2%

Source:(www.home.biogas.com>blog).

Cow dung contain the following chemical contents (Nitrogen, Ash, Carbon, Cellulose, hemicelluloses, Manganese, Magnesium, Calcium, Zinc and Trace elements such as copper, molybdenum and boron. The smell emanating from pig and cow manure is as result of bacteria action. These manures and other farm waste were used as mulch to lower soil temperature, surface run-off and evaporation. Despite extensive research on the growth and yield of *C. frutescence* using poultry, sheep and goat manure, no attention has been paid to effectiveness of pig manure and cow dung on the growth and yield of *Frutescence*. This gap was achieved by conducting research on the growth and yield of *C. frutescence* in Nsukka East development Centre of Enugu State using pig and cow manure.

Methods

The first approach toward raising the *C. frutescence* in nursery was to construct strong ban measuring 300cm by 270cm with stick, bamboo and palm frond to protect the seedlings from the attack of insects, rodents and extensive sunshine. Prior to the construction of the ban, *C. frutescence* seeds were extracted from fifty ripped fruits and were sundried in preparation for the nursery. Bad seeds were carefully separated from the good seeds and ten seeds were sown on each of the basket A, B and C bearing pig manure, cow dung and loamy soil (control). The baskets measured 35cm in diameter and 6cm deep. Basket A and B were treated with pig manure and cow manure respectively in the ratio of 2kg of sand: 1kg of pig manure and cow dung. The control “C” had 3kg of loamy soil only. The baskets were later put on the stand of 90cm high. Watering of the seeds was done with local broom in the morning and evening to avoid water logging. The germination of some of the seeds started on the 8th day and stopped after five weeks. From the record kept, the ratio of germination was 8:9:6 as concern basket A, B and C. The seedlings matured after one month and were transplanted to the three ridges measuring 430cm by 200cm. Furthermore, the first ridge was treated with pig manure and the second ridge was treated with cow dung while the third ridge was not treated with any manure (control). Each of the three ridges had five stands of *C. frutescence* seedlings. The space between the stands was 85cm. Additional records were kept on height, number of leaves, branches, flowers and fruits. The fruits matured and ripped after twenty-eight days. Additionally, 10g each of pig manure and cow manure were added to the stands after weeding to allow the development adventitious roots which provided strong support.

Results

The mean Germination per week of *C. Frutescence*

Table 1: The mean weekly record of germination of *C. Frutescence* showed that the first week had no germination while week five had highest germination. Furthermore, control without any treatment had the highest mean germination followed by cow manure while the least mean germination was recorded on the basket with pig manure

Weekly Germination of *C. Frutescence*

Table 2, The Bi-weekly mean height in centimeter (cm).

Treatments	1WMG.	2WMG.	3	4WMG.	5WMG.	Total	Mean
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WMG.							
Pig manure	0.00	1.74	7.93	28.73	38.41	76.81	15.36
Cow dung	0.00	0.95	29.71	46.32	76.98	153.96	30.79
Control	0.00	14.93	43.79	41.02	89.73	189.47	37.89

Key: WMG=Weekly mean germination of C. Frutescence

The results of the bi-weekly mean height showed that the ridges treated with cow and pig manure had the highest mean heights of 8.81 and 6.67 respectively. From the records kept, the plants stopped growing from 10th - 12th weeks

Table 3; The Bi-weekly number of leaves

Treatment	2	4	6	8	10	12	Total	Mean
	BWMH	BWMH	BWMH	BWMH	BWMH	BWMH		
Pig manure	7.40cm	9.54cm	11.10cm	11.96cm	0.00cm	0.00cm	40.00cm	6.67
Cow dug	7.40cm	8.88cm	14.60cm	22.00cm	0.00cm	0.00cm	52.88cm	8.81
Control	5.56cm	7.70cm	7.92cm	10.32cm	0.00cm	0.00cm	31.50	5.25

Key. BWMH (Bi-Weekly Mean of height)

The results showed that the control experiment had the least bi-weekly mean number of leaves; probably due lack of manure and it was followed by pig manure. Cow dung had highest bi-weekly mean number of leaves.

Table 4; The Bi-weekly Mean Number of Branches

Treatments	2	4	6	8	10	12	Total	Mean
	BWMNL	BWMNL	BWMNL	BWMNL	BWMNL	BWMNL		
Pig manure	5.80	13.20	14.20	16.00	16.60	52.40	101.60	19.98
Cow dung	5.80	13.00	18.00	24.40	41.00	97.60	199.83	33.3
control	4.40	7.80	14.20	24.40	16.20	44.60	111.60	18.60

Key; BWMNL (Bi-weekly mean number of leaves)

The results below showed that the stands treated with cow dung and pig manure had the highest mean number of branches while the control had the lowest mean number of branches.

Table 5; The Bi-week mean number of flowers

Treatment	2WMN	4WMN	6WMN	8WMN	10WMN	12WMN	Total	Mean
s	B	B	B	B	B	B	l	n
Pig manure	0.00	0.00	0.00	0.40	1.60	14.40	16.40	2.73
Cow dung	0.00	0.00	0.00	7.20	15.60	68.60	91.40	15.23

control	0.00	0.00	0.00	0.00	0.00	17.40	17.40	2.90
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Keywords. BWMNB; (Bi-week number of branches)

The result of the showed that pig manure and control had the poorest production of flowers whereas ridge treated with cow manure had the highest number of flowers

Table 6; Bi-weekly mean number of fruits

Treatme nts	2WMN FL	4WMN FL	6WMN FL	8WMN FL	10WMN FL	12WMNF L	tot al	Mea n
Pig manure	0.00	0.00	0.00	0.00	0.80	19.00	19.80	3.30
Cow dung	0.00	0.00	0.00	4.60	11.40	68.00	84.00	24.00
control	0.00	0.00	0.00	0.00	1.40	2.80	4.20	0.70

Keywords. BWMNB; (Bi-week number of flowers)

As regard the fruiting of the C. frutescence, the result showed that the ridge treated with cow dung produced the highest number of fruits. It was closely followed by pig manure. The least was the ridge tagged control

Table 7; the mean yield weight of C. frutescence resulting from different treatments.

Treatme nts	2WMN FR	4WMN FR	6WMN FR	8WMN FR	10WMN FR	12WM NFR	Total	Mea n
Pig manure	0.00	0.00	0.00	0.00	0.00	42.20	42.20	7.03
Cow dung	0.00	0.00	0.00	0.00	0.00	62.20	62.20	10.37
control	0.00	0.00	0.00	0.00	0.00	0.60	0.60	0.10

Keywords. BWMNFR; (Bi-week number of fruit)

The analysis of yield of ridge treated with pig manure, cow dung and control showed that cow dung had the highest yield followed by pig manure. The control experiment had the least yield of C. frutescence perhaps due to insufficient manure.

Treatments	Rep 1	Rep 2	Rep 3	Total	Mean
Pig manure	18.60	24.00	16.00	58.60	19.53
Cow Dung	24.50	28.00	18.20	70.70	23.57
Control	14.00	16.00	12.50	42.50	14.17

Discussion

The result of the study provided abundant information about important of C. frutescence worldwide and how to raise the crop for better yield. The study concentrated on the effect of pig manure and cow manure on the growth and yield of C. frutescence. The

findings of the study revealed that the growth and yield of *C. frutescence* was as a result of adequate application of pig manure and cow manure. The finding agrees with that of Botir et al (2019) who found out that the application of organic manure enhance the growth and yield of *C. frutescence*. The ridge treated with cow manure didn't only provide the best yield but prevented premature shading of leaves and fruits due treatment. The best yield may also be attributed to high nutritive and chemical contents of the cow manure. Furthermore, table 1, of the study revealed that control experiment had the highest germination. The result is amazing as the control experiment with only loamy soil had the highest number of seed germinated.

Furthermore, table 2 of the study showed that the ridge treated with cow dung had the highest mean height in centimeter (22.00cm). The result agrees with that of Mabuza (2019) who found out that the application of cow manure at high percentage result to higher production of fruits and height. Table 3 and 4 showed that the application of sufficient pig manure and cow manure at the rate of 500g per stand resulted to better production of leaves and branches of *C. frutescence*. Broad and greenish leaves are essential for photosynthesis which helps in the production of leaves. The finding agrees with that of Aliyu (2003) who affirmed that organic manure result to better leaves and branch production. Table 7, showed the analysis of mean yield of different treatments. From the results, the ridges treated with cow dung and pig manure had better yield than the control experiment. The result further demonstrated that nutrient and chemical content of cow dung and pig manure increased the fertility of soil which increased yield. The finding agrees with that of Abdulbaki (2019) who found out that application of organic manure contributed to comfortable increase in number of fruits per stand/yield.

Conclusion

Conclusively, this study has explored and analyzed various aspect of effect of pig and cow manures on the growth and yield of capsicum frutescence. The findings of the study were amazing as the control experiment which had only loamy soil produced the greatest number of germinated seeds. The maximum height of the *C. frutescence* was recorded on the 8th week of the growth (120 cm). In terms of leaves produced, control experiment and pig manure had the least number of leaves. The ridges bearing cow dung had the highest number of flowers. Fruiting occurred most on the ridge treated with cow dung. Further finding also revealed that the ridge treated with cow dung had the highest mean yield. It can therefore be deduced that cow dung was most effective in the growth and yield of *C. frutescence* among the manures used for the study. Farmers should therefore use organic manure especially cow dung for the maximum growth and yield of *C. frutescence*

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