



## Evaluating the Impact of Poultry Droppings and Cow Dung Manure on Yellow Pepper (*Capsicum frutescens*) Yield

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### Abstract

This study determined the effectiveness of two types of manures (poultry droppings and cow dung manure) on the yield of yellow pepper (*Capsicum frutescens*). The ratio of loamy soil to the manures was 3kg: 600g respectively for sowing twenty (20) seeds on each of the four baskets prepared for nursery. Five seedlings were later transplanted to each ridge and treated with 500g of manure except control experiment. The seedlings were allowed to grow for 12 weeks (3 months) during which the following records were obtained (i) percentage germination (ii) height in cm (iii) number of leaves (iv) number of branches (v) number of flowers (vi) number of fruits (vii) mean weight of yield of the pepper. The result of the study indicated that poultry and cow manures had the highest mean yield while the least yield was obtained from the control.

**Keywords:** *Capsicum frutescens*, Poultry droppings, Cow dung manure, Yellow pepper yield, *Capsicum frutescens*

### Introduction

*Capsicum frutescens* also known as hot pepper is an herbal plant that originated from South and Central America and is grown in other parts of the world including Nigeria. *C. frutescens* is a dicotyledonous crop and a member of chilli/ hot pepper solanaceous family (Ansa & Woke, 2018). They are perennial crops which complete their life span in more than one year. It is used as external therapy in painful muscle conditions (shoulder, arm and spine) and for treatment of arthritis, neuralgia (nerve pain), lumbago (low back pain) and child blains. *C. frutescens* is further used for the treatment of diabetes, blood pressure (high or low), bronchitis, burning feet, normalising blood circulation, reducing rheumatic pain, treating mouth sore and reducing blood clots (Ali, 2015). Moderate consumption of *C. frutescens* improves the poor condition of blood vessels and the heart (Adrija 2022). *C. frutescens* provides the best food flavour when ripped and is used as a spice for preparing stew, soup and pepper soup (Alabi, 2006). They are perishable fruits and can be stored for few days. *C. frutescens* are cash crops which are grown massively in the southeast Nigeria, particularly Nsukka. *C. frutescens* contributes significantly to the increase of the socio-economic status of the farmers and employs ever-increasing unemployed youths in Nsukka and nearby towns. The nutritive contents of a medium-sized *C. frutescens* are protein (1.18mg), fat (0.36mg), cholesterol (0.00mg), carbohydrate (7.28mg) and sugar (0.00mg). The fibre content is 2.4mg, sodium (2mg) and potassium (2.5mg).

The types of capsicum are yellow, red, orange, green, purple and black. *C. frutescens* is popularly called “ose Nsukka” in the east and “atawewe” in Yoruba. It thrives well in Nsukka because of well-drained soil(loamy soil), moderate temperature of about 18-27°C and rainfall of 600-1200mm. They don't survive in water-logged and acidic soil (Udoh et al., 2005). *C. frutescens* requires loamy soil with pH of 5-7. They serve dual purposes, one as food species and aesthetic plants especially when the fruits are ripe. They have fibrous roots which absorb poultry, sheep, cow, pig and goat manure and other forms of waste which serve as manure as well as soil erosion protective materials. The immense benefits include:

- It contributes to good eye health. It contains a high level of zeaxanthin and lutein vital for the retina.
- It helps to prevent anaemia because it contains a high level of iron.
- It helps to reduce anxiety. Vitamin b, magnesium and sodium contain in capsicum help to reduce anxiety. It helps in the proper regulation of the heartbeat too.

- Orange and capsicum help to reduce prostate cancer by up to 75% because of a lot of antioxidant and anti-inflammatory contributions.
- Improve immunity because of high levels of vitamin C., red bell pepper has the highest levels of vitamin C among vegetables and fruits. It aids the production of white blood cells
- Capsicum contains a high percentage of magnesium which helps to nourish and make our bones strong
- Collagen contained in capsicum helps to maintain the skin firm and protect the cells from any harm
- Vitamin C. frutescence contained in capsicum is a vital ingredient for healthy hair. Lack of vitamin C causes hair breaks, dry and split
- High-fiber vegetables and fruits are ideal for weight loss (Adrija, 2022).

Organic manures are well known to improve soil fertility and maintain high crop production for a relatively long period (National Agriculture and Research Institute, 2023). The organic manure reduces soil temperature, surfaces run-off and soil evaporation. Heavy applications of poultry manure for 5 years have resulted in improved soil structure. The applications of organic manure on each stand during transplanting helps pepper to grow faster and fruit earlier. *C. frutescence* grown with organic manure produces fruits with less water content, and more resistance to the invasion of diseases and obsession. The best organic manure that produces the highest yield of *C. frutescence* is poultry manure (Velez, 2023). The diseases of *C. frutescence* are grey mould, Phytophthora, blight, powdery mildew and southern blight. Powdery mildew infections cause shedding of leaves and fruit abortion. The bacteria disease is the leaf spot. Control is by the Use of seeds from disease-free areas and the spread of DDT to control the diseases. This study on the effectiveness of organic manure on *C. frutescence* was necessitated due expensive and soil degradation of inorganic fertilizer. The objectives/rationale of this study therefore was to determine how organic manures (poultry and cow manure) enhance the growth and yield of *C. frutescence*.

### Materials and methods

This study is targeted toward identifying the effectiveness of two types of manures (poultry and cow) manure on the growth and yield of *capsicum frutescence* in the south-east region of Nigeria. The study area was Enugu state (southeast region of Nigeria). The materials used for the study (planting of *C. frutescence*) include Four newly made baskets measuring 35cm in diameter and 6cm deep, poultry manure, cow manure and loamy soil. The manures and sand were collected and weighed with a weighing machine. Furthermore, materials like bamboo, rope, palm fronds and life sticks were gathered to construct a ban measuring 10m by 5m for raising the seeds in the nursery. *C. frutescence* has axil placentation from where seeds are extracted and sun-dried for preparing the nursery. The sand was mixed with manure in the following ratio:

- (i) 3kg of sand: 600g of poultry manure
- (ii) 3kg of sand: 600g of cow manure
- (iii) 3kg of loamy soil used for control

The sand and manure were thoroughly mixed and put into the baskets. A total of four hundred and fifty (450) healthy *C. frutescence* per basket were collected and sown (ninety (90). *C. frutescence* seeds were consistently watered morning and evening. The purpose of preparing the ban was to avoid the destruction of seedlings by domestic goats, fowls and pets such as crickets, playmates, grasshoppers and beetles. The seeds started germinating on the 8<sup>th</sup> day. The baskets were numbered "A" to "E" whereas "C" was the control experiment. From the record kept, sheep manure had the highest number of seeds germinated followed by cow manure and control had the least number of seeds that germinated. At the nursery, the pest suspected to be beetles attacked the seedlings and was checked through hand-picking of the beetles. However, the seedling matured after 35 days. The transplanting was done after the maturity of fifteen ridges measuring 400cm by 200 cm. Five seedlings were planted on each ridge with a spacing of 90cm between two seedlings. Each stand was treated with 500g of sheep and cow manure except for the control experiment. There were fifteen ridges five (5) treated sheep manure and another five (5) treated with cow manure given a total of ten (10) ridges treated with organic manures and five control experimental ridges. The height, branches, flowers and fruits of *C. frutescence* were counted and recorded. *C. frutescences* have an average height of 120cm and the fruits mature from 28 days. For maximum fruiting of *C. frutescence*, another treatment was done after three months. The weeding was done manually with a hoe and weeding knife three times to soften the soil and eliminate weeds. Each stand added soil at the base of the stem to enable new roots to emerge for more production of fruits. The harvest of fruits was done with research assistance using a sharp razor blade to avoid the destruction of the branches. Each harvest from the ridges of sheep, cows and control experiment was recorded for analysis.

## Results

The results of the effectiveness of organic manure on *Capsicum frutescens* are presented in the table below.

**Table 1: The mean weekly percentage of germination of *C. frutescens***

Treatment	2WR	3WR	4WR	5WR	Mean
Poultry Manure	18.89	55.72	75.40	150.01	60.01
Cow Manure	0.95	29.71	46.32	76.98	30.79
Control	14.93	43.79	41.02	58.73	31.69
Mean	11.59	43.07	54.25	95.24	

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he mean weekly percentage germination of *C. frutescens* was progressive indicating zero germination in the first week and wonderful germination in the fifth (5<sup>th</sup>) week. The basket with poultry manure had the highest mean germination while the control had the least.

**Table 2: The bi-weekly mean height in (cm) of *C. frutescens***

Treatment	2WR	4WR	6WR	8WR	10WR	12 WR	Mean
Poultry Manure	7.60	9.44	18.40	21.70	0.00	0.00	9.52
Cow Manure	7.40	8.88	14.60	22.00	0.00	0.00	8.81
Control	5.56	7.70	7.92	10.32	0.00	0.00	5.25
Mean	6.85	8.67	13.64	18.01	0.00	0.00	

As regards the bi-weekly means of height in centimetres of *C. frutescens*, those treated with poultry manure reached the peak of its height at the eighth (8<sup>th</sup>) week of recording and the least was the control experiment.

**Table 3: The bi-weekly mean number of leaves of *C. frutescens***

Treatment	2WR	4WR	6WR	8WR	10WR	12 WR	Mean
Poultry Manure	7.00	14.20	18.40	22.20	81.40	185.60	54.80
Cow Manure	5.80	13.00	18.00	21.40	41.00	97.60	32.80
Control	4.40	7.80	14.20	15.40	16.20	44.60	17.10
Mean	5.73	11.67	16.87	19.67	46.20	109.27	

The results of the bi-weekly mean number of leaves of *C. frutescens* depict progressive production of leaves up to the twelfth (12<sup>th</sup>) week, with poultry manures having the best production of leaves and control experiment with the least.

**Table 4: The bi-weekly mean number of branches of *C. frutescens***

Treatment	2 WR	4 WR	6 WR	8 WR	10 WR	12 WR
Poultry Manure	0.00	0.00	0.80	10.40	25.20	68.40
Cow Manure	0.00	0.00	0.00	7.20	15.60	56.60
Control Manure	0.00	0.00	0.00	0.00	0.00	17.40
Mean	0.00	0.00	0.26	4.87	13.60	

The result of the bi-weekly mean number of branches of *C. frutescens* showed that the stands treated with poultry manure started producing branches at 6<sup>th</sup> and equally with the highest mean.

**Table 5: The bi-weekly mean number of flowers of *C. frutescence***

Treatment	2 WR	4 WR	6 WR	8 WR	10 WR	12 WR	Mean
Poultry Manure	0.00	0.00	0.80	9.60	22.80	174.20	34.57
Cow Manure	0.00	0.00	0.00	4.60	11.40	68.00	14.00
Control Manure	0.00	0.00	0.00	0.00	1.40	2.80	0.70
Mean	0.00	0.00	0.27	4.73	11.87	81.67	

The result of the bi-weekly mean number of flowers of *C. frutescence* depicts that plants treated with poultry manure started flowering in the 16<sup>th</sup> week and all of them maximized flowering in the 12<sup>th</sup> week.

**Table 6: The bi-weekly mean number of fruits of *C. frutescence***

Treatment	2 WR	4 WR	6 WR	8 WR	10 WR	12 WR	Mean
Poultry Manure	0.00	0.00	0.00	0.00	1.80	84.20	14.33
Cow Manure	0.00	0.00	0.00	0.00	0.00	62.20	10.37
Control Manure	0.00	0.00	0.00	0.00	0.00	12.00	2.00
Mean	0.00	0.00	0.00	0.00	0.60	39.47	

The fruiting of *C. frutescence* started at the 10th week and the bi-weekly mean number of fruits of poultry manure was higher than that of cow manure and control.

**Table 7: The mean yield (weight) of *C. frutescence* fruits showing manure of different treatments**

Treatment	MYW1	MYW2	MYW3	Total	Mean
Poultry Manure	32.00	35.30	25.00	92.30	30.77
Cow Manure	24.50	28.00	18.20	70.70	23.57
Control	14.00	16.00	12.50	42.50	14.17
Mean	70.50	79.30	55.70	205.50	22.84

The mean yield of *C. frutescence* treated with poultry manure had the highest yield weight, followed by cow manure.

## Discussion

The study examined the effectiveness of two organic manures (poultry and cow) on the yield of *Capsicum frutescence*. The findings of the study depicted that poultry and cow manures were very effective for high yield of *C. frutescence* with mean yield weight of 30.77 and 23.57 respectively. The findings agree with that of Udoh et al (2005) who reported that organic manure can enhance soil chemical and physical properties which boost the growth, development and yield of *C. frutescence*. In addition, the National Agriculture and Research Institute (2023) reported that organic manures are well-known manures that improve soil fertility and maintain high crop production for a relatively long period. The mean weekly germination of *C. frutescence* was wonderful and progressive as it started from 0.00-95.24. The *C. frutescence* treated with poultry manure reached the bi-weekly mean height of 9.52 and that of cow manure 8.81 recorded. The leaves of *C. frutescence* which were broad and greenish had a bi-weekly mean of 185.60 for poultry manure 97.60 for cow manure and 44.60 for control recorded in the 12<sup>th</sup> week. The broad and greenish colour of *C. frutescenes* may be due to enough manure applied in the soil. Furthermore, at the 12<sup>th</sup> bi-weekly mean of leaves, the pepper had 68.50 for poultry manure 56.60 for cow manure and control 17.60. The pepper started developing flowers at the 6<sup>th</sup> week and maximized flowering at the 12<sup>th</sup> week. From the result, it can be deduced that the fruiting of the *C. frutescence* started very late. The total MYW of *C. frutescence* treated with poultry manure was higher than that of cow probably due to more production.

## Conclusion

From the result, one can conclude that organic manure produced enough fruits, preventing abscission and attack of disease due to less water content as compared to treatment with inorganic fertilizer which produces fruit with high water content. Organic manures (sheep and cows) are cheaper than organic fertilizer which is costly. Consequently, in agricultural practices, one can conveniently conclude that the application of organic manure maintains the chemical

and physical soil structure and boosts pepper production as well as growth. Finally, there is a global shift from inorganic fertilizer to organic manure due to less cost and efficacy in high-yield parameters.

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