

# Effect of Livestock Urine on the Performance of Pumpkin (*Telfairia Occidentalis* Hook. F.) in Southern Nigeria

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## ABSTRACT

This research was carried out in the Research and Teaching Farm of Faculty of Agriculture in Delta State University of Science and Technology, Ozoro in southern Nigeria to evaluate the effect of livestock urine on the performance of pumpkin (*Telfairia occidentalis* Hook. F.) Two different livestock sources (goat and cow) were used. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. The parameters assessed were number of leaves, number of branches, vine length, plant girth, leaf area, leaf area index and leaf yield. Data collected were subjected to analysis of variance (LSD = 0.05) and means were separated using Tukey's HSD. The result shows that pumpkin treated with goat urine performed better with significant difference at 5% level of probability in terms of number of leaves, number of branches, vine of length, plant girth, leaf area, leaf area index and leaf yield. Goat urine is therefore recommended for farmer in the study area to boost production.

**Keywords:** Livestock, urine, pumpkin and performance

## INTRODUCTION

Fluted pumpkin (*Telfairia occidentalis* Hook. F.) belongs to the family of cucurbitacea (Ndukwe et al., 2009). It is a vegetable that is commonly eaten in the eastern Nigeria (Akwaowo et al., 2000). However, because of its nutritional value, it is now generally accepted by all the country. (Tijan-Eniola, 2022). The plant had a lot of vitamins and minerals. The leaves contain oleic acid which improve sperm count in men (Okokoh et al., 2009).

It also has antioxidant properties which helps to regulate and reduce sugar level (Iyagba et al., 2013). Moreover, it is used for the treatment of liver and that is because it contains antioxidant, it serves as blood tonic to replace lost blood in women that gave birth (Eseyin et al., 2005 and Alada, 2000).

Despite the health value of this crop, little or no attention has been paid on it to improve the fertility status of the soil and full cultivation of this wonderful crop (*Telfairia's occidentalis* Hook. L.) since pumpkin does not perform well on a poor soil.

*Telfairia* is nutrient demanding hence most farmer recently have formed the habit of using material of organic origin for soil amendment (Akanbi et al., 2000; Adeniran, et al., 2003; Ojetayo, et al., 2011) as a way of improving soil productivity in order to get optimal yield from *Telfairia* and other cultivated crops.

The application of organic manure either in its solid or liquid state to the soil improves the fertility status of soil, plant quality and productivity, are environmentally friendly, contain a lot of NPK which are released on a gradual basis, improves the physical, chemical and biological properties of the soil and are not hazardous to man (Indabo and Abukaka, 2020). Liquid organic manure is easily absorbed by the plant and it has essential macro nutrient (NPK) needed by plant for photosynthetic activities.

Kolawole and Agbosanlo (2018) reported that cucumber dressed with 400kg/h goat manure + Nitrogen gave the highest vine length of 8.40 cm as against 52.70 cm, 56.57, 70.30 and 74.10 cm for control, 100, 200 and 300 kg/h respectively. However, they reported that there was significant difference among the treatments and control. Number of leaves follows the same trend of goat manure at 400kg/h + Nitrogen giving the highest number of leaves. However, there were significant differences among all the treatments at 5% level of probability.

Kolawole and Agbosanlo, (2018), further reported that the vine girth, number of branches of cucumber dressed with goat manure of 400 kg/h + Nitrogen gave the highest. They also added that for the yield and yield component of cucumber which include fruit length, fruit girth, number of fruit and fruit yield gave the highest in cucumber dressed with goat manure 400 kg/h + Nitrogen. This finding is in agreement with Hamma et al., (2012), who observed highest number of leaves in cucumber dressed with 12t/h of goat manure while the least was recorded in the control. This revealed that goat manure had good quality of plant nutrient. This is in line with Moral et al., (2005), who stated that organic manure is as good as inorganic because it contains organic carbon which is nutrient storage of plant, on mineralization releases nutrient to the soils.

Organic carbon also improves the soil physical, biological and chemical properties of the soil which in turn helps for the proper development and growth of the plant (Mgbagwu and Ekwealor, 1990)

Moreso, organic carbon has been reported to increase soil pH (Uliah, et al., 2008). Jokopurnomo and Andrian (2021), stated that goat manure + 350 kgN/h gave the highest number of leaves. However, there was no significant difference at 7 – 28 DAP but there was significant difference at 35 – 49 DAP. In addition, for leaf area of tomato dressed with 300 kg of goat manure + Nitrogen gave the highest leaf area. However, there was significant difference among all the treatments. Fruit weight also followed the same trend of goat manure 400 kg/h + Nitrogen having the highest fruit weight.

There was significant difference among the treatments (Jokopurnomo and Andrian, 2021). Kolawole and Agbosanlo (2019), reported that goat manure has nitrogen content of 1.5%, 8.04% carbon, organic of 26 – 30% and CN ratio of 16:86.

So, it becomes necessary for goat manure to improve the soil and plant quality.

## **MATERIALS AND METHODS**

### **Experimental Site**

The experiment was carried out in the Research and Teaching Farm of Faculty of Agriculture in Delta State University of Science and Technology, Ozoro in Isoko North Local Government Area of Delta State, Nigeria. Ozoro is located between Latitude; 6° 30'N and 6° 45'N of the Equator and Longitude: 5° 45'E and 6° 13'E of the Greenwich Meridian. Ozoro has annual rainfall of 2500 – 3000 mm and mean annual temperature ranging from 28 – 30°C.

### **Sources of Planting Materials**

Pumpkin pods were purchased from pumpkin farmers in Ozoro.

## Source of Livestock urine

Goat urine was purchased from goat farmers while cow urine was obtained from cattle rearers in Ozoro.

## Experimental Design

The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications.

## Soil and Urine Analysis

The soil sample of the experimental site were collected at 20 cm depth. The soil samples and livestock urine were taken to the laboratory for analysis of the chemical properties of the soils and the nutritive composition of the urine samples.

## Data Collection and Data Analysis

Number of leaves were determine by counting, number of branches by counting, vine length were measured using meter rule from the base to the apical bud, plant girth was obtained by using Vernier caliper, leaf area. The average leaf area in (cm<sup>2</sup>) was calculated thus:

$$\text{Leaf Area} = \frac{(L1 \times W1) + (L2 \times W2) + (L3 \times W3)}{3}$$

Where: L1 – 3 = length for the three readings

W1 – 3 = width for the three readings

(Silva et al., 1998)

$$\text{Leaf Area Index} = \frac{\text{Leaf Area}}{\text{Spacing}} = \frac{L.A}{.5 \times .6} \text{ OR } \frac{LA}{50 \times 60 \text{ cm}}$$

Leaf yield was obtained by using sensitive scale to weigh which was in (grams)

Data collected were subjected to analysis of variance and means were separated using Tukey's HSD.

## RESULTS

### Chemical properties of the soil of the study area.

Table (1) revealed the chemical properties of the soils of the study area. The result shows that the pH value of the soil was 4.33, 1.2 H<sub>2</sub>O. Organic carbon was 0.47% while organic matter was 1.32%.

Nitrogen, phosphorous and potassium were measured in (mg/kg) units. Nitrogen value was 0.10 mk/kg, phosphorous value was 4.67 mg/kg, potassium (K) value was 0.41 mg/kg. The element sodium (Na), Calcium (Ca), Magnesium (Mg), Iron (Fe) had the following values, 0.40 moikg, 2.10 moikg, 1.00 moikg and 0.19 moikg respectively. Lead (pb) value was 0.03 ppm, Zinc (Zn) value was 0.24 ppm while cupper (cu) value was 0.24 ppm.

Table 1: Chemical properties of the soil of the study area.

Chemical Properties	Values
pH 1.2 (H <sub>2</sub> O)	4.33
Oc (5%)	0.77
Om (%)	1.32
N (mg/kg)	0.10
P (mg/kg)	4.67
K (mg/kg)	0.41
Na (moi/kg)	0.40
Cm (moi/kg)	2.10
Mg (moi/kg)	1.00
Fe (ppm)	0.19
Zn (ppm)	0.24
Cu (ppm)	0.24
Pb (ppm)	0.03

**The composition of livestock urine,** Table (2): revealed the composition of goat and cow urine used for the experiment. The result show that total nitrogen (TN) ranges between 0.33 and 0.55. potasium (k) the value 11.31 and 14.04. Phosphorous values ranged between 7.53 and 8.84. Magnesium value ranged between 0.86 and 1.02. Sodium ranged between 5.56 and 7.46. Calcium values ranged between 1.62 and 2.14 Magnesium value way 0.10 for both goat and cow urine. Iron value ranged between 0.16 – 0.20. Lead value ranged between 0.01 and 0.02 while the value of zinc ranged between 0.23 and 0.25 and cupper value ranged between 0.17 and 0.20.

Table 2: Composition of goat and cow urine

Parameters	Goat Urine	Cow Urine
Nitrogen %	0.33	0.55
Potassium %	14.04	11.31
Phosphorous %	8.84	7.53
Magnesium	1.02	0.86
Sodium	7.46	5.56
Calcium	2.14	1.62
Maganess	0.10	0.10
Iron	0.20	0.16
Lead	9.02	0.01
Zinc	0.25	0.23
Cupper	0.17	0.20

**Number of leaves of pumpkin at 6 – 14 WATA,** The result shown in the table revealed that livestock urine had significant effect on the number of leaves. The result ranged between 13.78 – 45.33. The highest (45.33) was recorded in goat urine application while the least (13.78) was recorded in the control. There was significant difference among the treatments at 5% level of probability.

Table 3: Number of leaves of pumpkin at 6 – 14 WATA

Sources of Urine	6	8	10	12	
Cow	18.53a	28.14b	33.06ab	34.97b	39.94b
Goat	19.92a	35.58a	27.06a	41.19a	45,33a
Control	13.78d	20.41d	27.93c	27.52b	30.00d

Means in the column followed by the same letter(s) are not significantly different using Turkey HSD

**Number of branches of pumpkin at 6 – 14 WATA.** Table 4, revealed the result of pumpkin dressed with livestock urine at 6 – 14 WATA. The result ranges between 1.26 – 5.33. The highest (5.33) number of branches was recorded in goat urine treatment while the least (1.26) was recorded in the control. However, there was significant differences among the treatment at 5% level of probability.

Table 4: Number of branches of pumpkin at 6 – 14 WATA

Sources of Urine	6	8	10	12	
Cow	1.64a	1.69a	1.72b	3.86a	5.22a
Goat	1.69a	1.67a	2.92a	3.86a	5.33a
Control	1.26c	1.30c	1.48b	2.52c	2.52d

Means in the column followed by the same letter(s) are not significantly different using Turkey HSD

### Vine Length of Pumpkin at 6 – 14 WATA

The result in the table (5) ranges between 19.22 – 252.00. The longest (252.00) vine length was recorded in pumpkin dressed with goat urine at 14 week after treatment application while the least (19.22) vine length was observed in control. There was also significant differences among the treatment.

Table 5: Vine length of pumpkin at 6 – 14 WATA

Sources of Urine	6	8	10	12	14
Cow	154.81a	160.75a	170.03a	225.17b	228.81b
Goat	155.17a	158.61a	179.25a	247.75a	252.00a
Control	19.22d	107.63d	103.15d	147.04d	149.00d

Means in the column followed by the same letter(s) are not significantly different using Turkey HSD

### Plant girth of pumpkin at 6 – 14 WATA

Table 6, revealed the plant girth of pumpkin. The result ranges between 2.07-4.07. The highest (4.07) plant girth was recorded for pumpkin treated with goat urine while the least (2.07) plant girth was recorded in the control. However, there was significant differences among the treatments.

Table 6: Plant girth of pumpkin at 6 – 14 WATA

Sources of Urine	6	8	10	12	14
Cow	3.34a	2.74a	3.18a	3.44a	3.93ab
Goat	2.32b	2.20b	3.22a	3.50a	4.06a
Control	2.07c	2.21b	2.43a	2.99c	43.48c

Means in the column followed by the same letter(s) are not significantly different using Turkey HSD

### Yield Parameters of Pumpkin (*Telfairia occidentalis*)

Table (7) below revealed the yield parameters of pumpkin. The leaf area ranges between 922.53 – 3831.68 cm<sup>2</sup> and goat urine significantly had highest (3831.68) followed by cow urine (1187.76) and lastly control (922.53). There was also significant differences among the treatment.

The highest (12.74) leaf area index was observed in goat urine application while the least (3.08) was recorded in the control treatment. There was significant difference among the treatment at 5% level of

probability. For leaf yield (g). the highest (0.08) leaf yield was recorded in goat urine treatment while the least (0.31) was recorded in the control. There was significant difference among the treatment at 5% level of probability.

Table 7: Yield parameters of pumpkin (*Telfairia occidentalis*)

Sources of Urine	Leaf Area (cm <sup>2</sup> )	Leaf Area Index	Leaf Yield (g)
Cow	1187.76c	3.76c	0.73a
Goat	3831.68a	12.77a	0.88a
Control	922.58d	3.08d	0.31c

Means in the column followed by the same letter(s) are not significantly different using Turkey HSD

## DISCUSSION

The outstanding performance of pumpkin treated with goat urine was evident in the parameter such as number of leaves, number of branches, vine length, plant girth, leaf area, leaf index and leaf yield when compared with cow urine and control. There was significant difference at 5% level of probability.

This finding agreed with Kolawole and Agbosanlo (2019), who reported that cucumber dressed with 400kg/h goat manure + nitrogen gave the highest vine length, number of leaves and number of branches. They also added that for the yield and yield component such as fruit, fruit girth and fruit length gave the highest in cucumber dressed with goat manure of 400kg/h + nitrogen. This finding is also in line with (Hamma et al., 2012), who observed highest number of leaves in cucumber dressed with 12t/h of goat manure while the least was recorded in the control treatment.

This finding is also in agreement with Jokopurnomo and Andrani (2021), who stated that goat manure + 350 kgN/h gave the highest number of leaves. Jokopurnomo and Andrani (2021), who observed that tomato dressed with goat manure of 400 kg/h + nitrogen had the highest leaf area and fruit weight. This finding also agreed with Moral et al., (2005), who also reported that organic manure contain carbon which is nutrient storage of plant, on mineralization releases nutrient to the soil.

Organic carbon also improved the soil physical, biological and chemical properties of the soil which in turn helps in the proper growth and development of the crop.

## CONCLUSION

This study establishes a fact that application of livestock urine helps to improve the soil fertility. However, the highest number of leave, number of branches, vine length, plant girth, leaf area, leaf area index and leaf yield was recorded in pumpkin treated with goat urine. It is hereby recommended that farmers in the study area should use goat urine for the cultivation of pumpkin to boost profit margin of the farmers.

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