

IMPACT OF DIFFERENT SOURCES OF ORGANIC MANURE ON THE GROWTH AND DEVELOPMENT OF PAW PAW (*Carica papaya* L.) IN MUBI NORTH, ADAMAWA STATE -NIGERIA

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**ABSTRACT**

*Pawpaw seedling growth and development is subject to the micro climatic conditions in the growth environment and the availability of plant nutrients in such environment. Study was conducted at the screen house of the Department of Horticultural Technology, Federal Polytechnic Mubi in September, 2018. The objectives of the study were to evaluate the effect of different sources of organic manure on the emergence and growth of Pawpaw seedlings and also to determine the most effective growth medium for propagating Pawpaw seedlings. The design used for conducting the study was Completely Randomized Design (CRD) comprising of four (4) treatments replicated three (3) times. The treatments used were Compost manure (T<sub>1</sub>), Cow dung (T<sub>2</sub>), Goat droppings (T<sub>3</sub>) at twenty-five (25Kg) each and Top soil (T<sub>4</sub>) to serve as control. The respective Organic manures were mixed with top soil and river sand at a ratio of 2:1:1 and filled in a total of One hundred and twenty (120) polythene bags with five (5) polythene bags sown with healthy and diseased free pawpaw seeds representing a treatment. Data were collected on Emergence count (%) at 3 WAS, Plant height, Stem girth and Number of leaves at 4, 6, 8 and 10 WAS. Results obtained revealed that T<sub>1</sub> had the highest emergence count of 85% followed by T<sub>2</sub> with 60.00% while the lowest emergence count of 40.20% was recorded with T<sub>4</sub>. Result on plant height showed that T<sub>1</sub> recorded the highest plant height of 80.20cm at 12 WAS, followed by T<sub>2</sub> with 70.20cm while T<sub>4</sub> had the least plant height of 48.30cm. Furthermore, results on stem girth indicated that T<sub>1</sub> had the largest stem girth of 49.69mm, followed by T<sub>2</sub> with 28.33mm with T<sub>4</sub> obtaining the lowest stem girth of 14.84mm at 10 WAS. On number of leaves per plant, results revealed that the same T<sub>2</sub> recorded higher number of leaves (9) followed by T<sub>2</sub> and T<sub>3</sub> with 8 while the least number of 7 leaves was recorded on T<sub>4</sub> at 10 WAS. This study has therefore demonstrated that pawpaw seedlings raised with 20Kg of compost manure performed better than the other soils mixture on pawpaw seedlings growth and development in the study area.*

**Keywords:** Pawpaw, Seedlings, Organic manure, Screen house, Performance.

**INTRODUCTION**

Commercial and subsistence Pawpaw (*Carica papaya* L.) production in the tropics to supply the nutritional requirements of people in those areas has called for the need to ensure a steady supply of vigorous and healthy seedlings to sustain increase productivity. Pawpaw is not just an important fruit but the whole plant parts are also known to have some medicinal properties. It is an excellent source of ascorbic acid, good source of carotene, thiamin, niacin, pantethenic acid, vitamin B-6 and vitamin K (Snake and Desmond, 2019). Extracts from different parts of the

plant have being shown to have some pharmaceutical properties such as anti-microbial, anti-oxidant, anti-malarial, anti-ulcer, anti-HIV, anti-inflammatory, anti-cancer, anti-hypertensive, anti-fertility, anti-fungal and anti-diabetic (Vishal *et al.*, 2014). The plant is propagated by seeds for economic reasons by resource poor farmers or individuals in their backyards or locally established nurseries (Griesbach, 1992; Olusegun *et al.*, 2016). Production of seedlings in the nursery requires growing them on suitable growth medium as they have been adjudged to be the most critical factor determining seedling quality (Baiye and Mbah, 2006) and acting as a reservoir for nutrients and moisture (Grover, 1987). A growth medium is a composition of organic material formulated to achieve desirable chemical and physical needs required by the seedling to attain its potential growth and development (Osaigboro *et al.*, 2010). Khan *et al.*, (2008), observed that a good potting medium management is essential to the production of good quality fruit tree seedlings, since vigorous growth is one of the characteristics needed to challenge the fluctuating seasonal hazard encountered on the field.

There are many sources of organic materials ranging from compost manure, farm yard manure, green manure, municipal sewage sludge, chicken manure etc that are used as soil amendments either in nurseries as a component of a soil mixture or in the field. Organic manures as source of fertilizer have important functions that cannot be gained by synthetic inorganic fertilizers when used for seedlings production as they increase soil organic matter, improve soil physical structure, increase nutrients and water holding capacity, total pore space, aggregate stability, temperature insulation (Heerandra *et al.*, 2017). This study was to study the effects of some organic manure on some growth parameters of pawpaw seedlings.

## MATERIALS AND METHODS

This study was conducted at the Screen house of the Department of Horticultural Technology, Federal Polytechnic Mubi, Adamawa State. Mubi is located on latitude 9° 26 and 10° 10N and longitudes 13° 1 and 13° 1E (Adebayo, 2004). The design used for conducting the study was Completely Randomized Design (CRD) comprising of four (4) treatments replicated three (3) times. The treatments used were Compost manure (T<sub>1</sub>), Cow dung (T<sub>2</sub>), Goat droppings (T<sub>3</sub>) at twenty (20Kg) each and Top soil (T<sub>4</sub>) to serve as control. The respective organic manures were thoroughly mixed with ten (10) Kg of top soil and ten (10) Kg of river sand at a ratio of 2:1:1. The respective soil mixtures were later filled in a total of one hundred and twenty (120) polythene bags with ten (10) polythene bags representing a treatment. The set up were allowed to stand for two (2) weeks during which they were watered daily. Three (3) healthy and diseased free pawpaw seeds of variety Julian were sown on to the polythene bags containing the treatments which were later thinned to one (1). Regular watering and weeding by hand picking was adopted. Insect pests namely grasshoppers and aphids were controlled by spraying Cypermethrin (Cymbush) and Imidacloprid (Courage®) at the ratio of 20 ml. Data were collected during the study on the following parameters percentage emergence count at 2 WAS,

Plant height (cm) per plant, Stem girth (mm) per plant and Number of leaves per plant at 4, 6, 8 and 10 WAS. Data collected were later subjected to Analysis of Variance (ANOVA) LSD appropriate for CRD and means separation was done using Least Significant Differences at 5% level of significance (Gomez and Gomez, 1984).

## RESULTS

Results on the performance of different organic manure on percentage emergence count at 3 WAS and plant height at 4, 6, 8 and 10 WAS is presented in Table 1. The results revealed significant differences ( $P=0.05$ ) between the treatments with  $T_1$  giving the highest emergence count of 82% followed by  $T_2$  having 54.27% while the least emergence count of 39.13% was recorded against the control. Also on Table 1, results further indicated that there was significant difference ( $P=0.05$ ) amongst the treatment with a gradual increase in the heights of the seedlings from 4 to 10 WAS, Compost manure ( $T_1$ ) had consistently performed better than the other treatments by recording the highest plant heights of 20.73cm, 25.40cm, 30.59cm and 59.99cm at 4, 6, 8 and 10 WAS. This was followed by Cow dung ( $T_2$ ) with 17.46cm, 20.40cm and 38.33cm at 4, 6 and 10 WAS while the Control/Top soil ( $T_4$ ) had the lowest plant heights of 10.10cm, 14.96cm, 17.34cm and 28.56cm respectively.

Table 1: Means effect of Different Organic Manure on Emergence count (%) at 3 WAS

CM ( $T_1$ )	CD ( $T_2$ )	GD ( $T_3$ )	TS ( $T_4$ )	LSD (0.05 %)
80.00	60.00	41.24	40.20	15.40

Mean with the same letter (s) in each treatment group are not significantly different at 5% level probability using Duncan's Multiple Range Test (DMRT). Key: SE= Standard Error. \*\*\* Significant at 0.001%,  $T_1$  – Cow dung,  $T_2$  – Goat dropping,  $T_3$  – 25kg Top soil,  $T_4$  – Control

Table 2: Plant height (cm) of Pawpaw Seedlings at 4-10 WAS.

Treatments	CM ( $T_1$ )	CD ( $T_2$ )	GD ( $T_3$ )	TS ( $T_4$ )	LSD (0.05 %)
4	20.73 <sup>b</sup>	17.46 <sup>b</sup>	17.20 <sup>b</sup>	10.10	2.55
6	25.40 <sup>b</sup>	20.40	20.30	14.96	2.03
8	38.59	23.32	24.60	17.34	4.27
10	59.99 <sup>b</sup>	38.32	32.00	28.56	8.32

Mean with the same letter (s) in each treatment group are not significantly different at 5% level probability using Duncan's Multiple Range Test (DMRT). Key: SE= Standard Error. \*\*\* Significant at 0.001%,  $T_1$  – Cow dung,  $T_2$  – Goat dropping,  $T_3$  – 25kg Top soil,  $T_4$  – Control

Results on impact of different organic manure on stem diameter of pawpaw seedlings presented showed significant variation ( $P=0.05$ ) between the treatments with  $T_1$  recording the highest stem diameter of 10.50 mm at 4 WAS followed by  $T_2$  ha with 8.32 mm while least diameter of 6.00 mm was recorded on the control. Similarly, at 10 and 12 mm WAS,  $T_1$  obtained a significantly higher stem diameter of 30.36mm and 49.69mm, followed by  $T_2$  recording 19.72mm and 28.33mm while  $T_4$  had the least diameter of 10.19mm and 14.84mm respectively during the same period.

Table 2: Mean effect of Different Organic Manure on Stem Diameter (mm) of Pawpaw Seedlings at 4-10 WAS.

Treatments	W	A	S	10
	4	6	8	

CM (T <sub>1</sub> )	8.53 <sup>b</sup>	20.36 <sup>b</sup>	30.3	49.69
CD (T <sub>2</sub> )	6.22.	11.19	19.72	28.33
GD (T <sub>3</sub> )	6.10 <sup>b</sup>	9.33 <sup>b</sup>	15..72	19.44
TS (T <sub>4</sub> )	5.11	7.21	10.19	14.84
LSD (0.05%)	2.26	3.91	8.13	10.01

Mean with the same letter (s) in each treatment group are not significantly different at 5% level probability using Duncan's Multiple Range Test (DMRT). Key: SE= Standard Error. \*\*\* Significant at 0.001%, T<sub>1</sub> – Cow dung, T<sub>2</sub> – Goat dropping, T<sub>3</sub> – 25kg Top soil, T<sub>4</sub> - Control

Results on number of leaves per plant as influenced by the various treatments used in this study are presented in Table 3. It showed that T<sub>1</sub> recorded the highest number of leaves with 3.00 leaves at 4 WAS, 7.00 at 8 WAS and 9.00 leaves at 10 WAS. This was followed by T<sub>3</sub> having 5.00 leaves at 6 WAS and 7.00 at 8 WAS, while both T<sub>3</sub> and T<sub>3</sub> recorded 8.00 leaves per plant at 10 WAS respectively. Lesser number of leaves was observed on T<sub>4</sub> recording 2.00, 3.00, 5.00 and 7.00 leaves per seedling at 4, 6, 8 and 10 WAS.

Table 3: Means effect of Different Organic Manure on Number of leaves on Pawpaw Seedlings at 4-10 WAS.

Treatments	W	A	S	
	4	6	8	10
CM (T <sub>1</sub> )	3.00 <sup>b</sup>	5.00 <sup>b</sup>	7.00	9.00
CD (T <sub>2</sub> )	2.00.	4.00	6.00	8.00
GD (T <sub>3</sub> )	2.00 <sup>b</sup>	5.00	7.00	8.00
TS (T <sub>4</sub> )	2.00	3.00	5.00	6.00
LSD (0.05%)	1.16	2.45	2.65	1.01

Mean with the same letter (s) in each treatment group are not significantly different at 5% level probability using Duncan's Multiple Range Test (DMRT). Key: SE= Standard Error. \*\*\* Significant at 0.001%, T<sub>1</sub> – Cow dung, T<sub>2</sub> – Goat dropping, T<sub>3</sub> – 25kg Top soil, T<sub>4</sub> - Control

## DISCUSSION

Seedling vigour and its development is a function of the health status of the seeds used and the nutrients availability within its growth environment. In this study, pawpaw seedlings grown on compost manure (T<sub>1</sub>) were adjudged to give better performance on all the growth parameters measured than the other treatments. The significantly higher emergence count, plant height, stem diameter and number of leaves exhibited by T<sub>1</sub> at 10 WAS, may be attributed to health status of the seeds used although the same seeds were used on other treatments. Other reasons could be associated to the presence of available and absorbable nutrients in T<sub>1</sub>. Since compost manure is a product of many different organic sources which had decomposed overtime, this might have made the release of nutrients and its availability in absorbable form to the seedlings. Their high organic matter content improves the structure of the medium in terms of good aeration and high moisture retention within the seedling growth environment. This finding is in tandem with

Mathad and Nalwadi (1987) who reported that decomposed organic matter improves soil fertility by increasing soil aeration, water holding capacity and infiltration and also lowers surface crusting in growth medium. Bashir *et al* (2007) further assayed that incorporation of decomposed organic wastes in soil mixtures improved the root zone environment thereby resulting into increase in growth of aerial parts of jojoba cuttings. Olubode and Fawusi,(1993) had earlier also reported on the positive effect of organic manure on pawpaw growth and development that the application of poultry manure at an optimum rate of 20 tonnes/ha<sup>-1</sup> significantly increase pawpaw growth rate and fruit yield in an organic production system.

## CONCLUSION

This study has demonstrated the superiority of compost manure over the other treatments as a component of soil medium in raising pawpaw seedlings by recording the highest emergence percentage, highest plant height, stem girth and number of leaves during the period of study. It is therefore recommended that compost manure be used in raising pawpaw seedlings and that further studies should be carried out on the performance of compost manure on the growth and development of other seedlings in other locations.

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