

## Original Research

# Effect of Super-Gro on Nutrient Contents of Fluted Pumpkin (*Telfairia occidentalis L.*) and Fresh Leaf Yield

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Received 2 April 2023; Accepted 22 May 2023

**ABSTRACT:** The research work was conducted in the early cropping season of 2020 at the Teaching and Research Farm of Imo State University, Owerri to ascertain the effects of Super-Gro liquid fertilizer on leaf nutrient and yield of fluted pumpkin. Randomized Complete Block Design was used with six treatments thus: 0ml, 10ml, 15ml, 20ml, 25ml and 30ml of Super-Gro per 5 litres of water. Super-Gro was bought from GNLD agent in Owerri, while fluted pumpkin seeds were obtained from Teaching and Research Farm of Imo State University. Data were collected on proximate components, mineral, vitamin contents and fresh leaf yield. The results revealed that Super-Gro treatments had significant effect ( $P < 0.05$ ) on proximate components, mineral and vitamin contents of the leaves when compared with the control and 10ml of Super-Gro. 15ml of Super-Gro and 20ml of Super-Gro per 5 litres of water gave the best result in terms of proximate components, vitamins and mineral contents. In the same vein, the highest fresh leaf yield of 2978.00kg/ha was obtained from the plants that received 15ml of Super-Gro, while the least yield of 2004.60kg/ha was recorded the 0ml of Super-Gro, that is the control. Therefore, Super-Gro liquid fertilizer level of 15ml and 20ml per 5 litres of water are necessary to improve nutrient contents of fluted pumpkin leaf and higher yield in the study area.

**Keywords:** Fluted pumpkin, Super-Gro, mineral, vitamin and leaf yield

Citation: Christo, I. E., Onuh, M. O., and Ogbuehi H. C. (2023). Effect of Super-Gro on Nutrient Contents of Fluted Pumpkin (*Telfairia occidentalis L.*) and Fresh Leaf Yield. Direct Res. J. Agric. Food Sci. Vol. 11(5), Pp. 126-132. <https://doi.org/10.26765/DRJAFS17816277>

## INTRODUCTION

Fluted pumpkin (*Telfairia occidentalis L.*) which belongs to the family of *Cucurbitaceae* is a tropical vine. The Fluted pumpkin leaf has a high nutritional and medicinal value as it contains 29% protein, 18% fat and 20% minerals and vitamins (Olaniyi and Odedere, 2009). In the recent time, Fluted pumpkin had gained medical recognition. It has been discovered to be blood purifiers (Obeagu *et al.*, 2014) and could therefore useful in maintenance of good health. The leaves of Fluted pumpkin are potentially useful as food supplement because of their content of mineral nutrients such as Magnesium, Zinc, Iron, Potassium, Carotene and Vitamin A, C and K (Obeagu *et al.*, 2014).

According to Surge *et al.* (2011), organic manure significantly enhances growth and yield of crops. Application of poultry manure improves the soil physical properties and helped to maintain soil organic matter contentS all of which positively affect plant productivity as reported by (Nweke and Nsoanya, 2013). Also poultry manure normally supplies enough nitrogen and phosphorus to crops than other organic matters and it contains important nutrients necessary for high photosynthetic activities which promote roots and growth (Garg and Bahla, 2008). Moreover, the average tuber yield of cassava was nearly the same in the organic and inorganic fertilizer treatments, whereas the yield is

significantly lower in the unfertilized treatments. Growth promoting substances like enzymes and hormones present in organic manure make them useful for improvement of soil fertility and productively (Singh *et al.*, 2008). Sanwal *et al.* (2007) also asserted that organic manures increase can enhance the nutrient status of fruits. Super-Gro is a 100% organic fertilizer which is made from poultry droppings, and sea bird guano. Being made from organic rather with absolutely no chemical added to it, it is 100% safe to use on any vegetables (GNLD, 2017, www.gnld.com). Super-Gro is a non-toxic, non-caustic and non-flammable making it safe and easy to handle and use (GNLD, 2017). It is very concentrated and economical, mixed with water in a dilution of 1:1000 (GNLD, 2017). Super-Gro is a very wonderful natural liquid fertilizer which has now been brought to your doorstep to ensure the enhancement of your crops and agricultural productivity both in quality and quantity (GNLD, 2017). It is a natural fertilizer that will increase agricultural yield more than three times of what can be obtained from that of synthetic or chemical fertilizer. Super-Gro is a product of GNLD, a company that specializes on natural and nutritional health products for human and plants. However, despite the importance of fluted pumpkin in Nigerian diets, farmers are facing a lot of challenges in its production, especially on the soils of South Eastern Agricultural zone. Rapid depletion of soil nutrients and poor physical condition of the soils which constitute strong limitations to crop. Also chemical fertilizer alone generate several deleterious effects to the environment and human health and they should be replenished in every cultivation. This is because; the synthetic fertilizer is rapidly lost by either evaporation or by leaching in drainage water and it causes dangerous environmental pollution. Therefore, these soils must be supplemented with adequate macronutrients in other to keep them productive. Super-Gro is meant to improve the quality and quantity of water as required by the crops for wonderful growth and yield by adding the essential nutrients they require for that purpose. However, particularly in the study area, little or no study has assessed the effect of Super-Gro on the performance and quality of fluted pumpkin and soil properties. Empirical evidence is relatively scanty, isolated of un-depth analysis of the study. It is on these backdrops that the study was systematically carried out. Therefore, the objective of the research was to ascertain the effect of Super-Gro on nutrient contents of the fluted pumpkin and fresh leaf yield.

## METHODOLOGY

### Study area

The field experiment was conducted at Teaching and Research Farm of Imo State, University, Owerri during

the early cropping season of 2020. Owerri lies between latitude 5<sup>0</sup>10'N and 6<sup>0</sup>0'N and longitude 6<sup>0</sup>10'E and 7<sup>0</sup>0'E with altitude 91.0m. The climatic data indicate that the average annual rainfall, relative humidity and temperature are 2500mm, 75% and 27% respectively (NIMET, 2016).

### Land preparation /experimental design

The experimental field with an area of 7m x 11m (77m<sup>2</sup>) was used. The deep ploughing was done by tractor and finally the field was leveled with a leveler. Drainage of excess water during channels made for proper drainage of excess water during rains to avoid water logging. The experimental design was Randomized Complete Block Design (RCBD) with three replicates. Each replicate contained four beds each having an area of 1m x 1m. The total beds were twelve.

### Soil sample collection

Soil sample was collected randomly from the experimental site to the depth of 0-15cm using soil auger. Collected soil samples were dried and sieved using 2mm diameter sieve and was analyzed in the laboratory for some physical and chemical properties of the soil.

### Experimental materials

The seeds of fluted pumpkin were collected from the Imo State Teaching and Research Farm of Faculty of Agriculture and Veterinary Medicine while Super-Gro was bought from GNLD outlet in Owerri.

### Sowing of the test crop

The seeds of fluted pumpkin were sown on bed at the rate of one seed per hole, using plant spacing of 1m x 1m at a depth on 5cm.

### Treatment applications

Treatments were applied at 3 weeks interval, one week after seedling emergence for a period of 3 months. The treatments which were applied on the fluted pumpkin field were as follows:

0ml of Super-Gro per 5 litres of water  
 10ml of Super-Gro per 5 litres of water  
 15ml of Super-Gro per 5 litres of water  
 20ml of Super-Gro per 5 litres of water  
 25ml of Super-Gro per 5 litres of water  
 30ml of Super-Gro per 5 litres of water

### Weeding

The field was weeded four times to avoid the negative

effect of weeds on the crop.

### Staking

The crop was staked to enable the crop absorb sufficient light from the sun for maximum photosynthetic activities.

### Leaf yield per hectare

This was done by converting the leaf weight into yield per hectare.

### Proximate analysis

Moisture content, crude protein, total ash, fibre, crude fat and carbohydrate contents of the harvested leaves were determined according to AOAC, (2000) standard procedures. All the determination was done in triplicate and the results were expressed as an average value.

### Mineral contents analysis

The mineral contents analysis of the fluted pumpkin leaves were determined according to AOAC, (2000), standard procedure. Sodium and potassium contents were determined using the standard flame emission photometer. Phosphorus was determined calorimetrically by randomly belate procedure. Calcium, Iron, Copper and Zinc contents were determined by atomic absorption spectrophotometer.

### Vitamin contents analysis

Ascorbic acid, thiamin, riboflavin and niacin of the fluted pumpkin leaves were determined according to AOAC, (2000).

## RESULTS

### Physical and chemical properties of soil before planting

Prior to planting, the percentage sand was 80.00%, silt was 6.00% and clay was 14.00%. The pH of water stood at 5.92, and the total nitrogen in percentage was 0.096%. Organic carbon and organic matter were 1.11% and 1.92% respectively (Table 1).

Total exchangeable acid was 1.20mol/kg soil, the  $Al^{3+}$  was 0.80mol/kg and  $H^+$  was 0.40mol/kg soil.  $Ca^{2+}$  content was valued at 2.01mol/kg with also  $Mg^{2+}$  and  $K^+$  values were 2.00mol/kg and 0.14mol/kg respectively. The  $Na^+$  and CEC obtained value of 0.11mol/kg and 6.25mol/kg respectively. The percentage base saturation was 80.8% with available phosphorus obtained was 3.63mg/kg and a textural class of sandy loam.

**Table 1:** Soil physical and chemical properties before planting.

Soil Properties	Status
Sand (%)	80.00
Silt (%)	6.00
Clay (%)	14.00
Texture class	Sandy loam
pH (H <sub>2</sub> O)	5.92
T.N (%)	0.096
OC (%)	1.11
OM (%)	1.92
TEA (mol/kg) soil	1.20
$Al^{3+}$ (mol/kg) soil	0.80
$H^+$ (mol/kg) soil	0.40
$Ca^{2+}$ (mol/kg) soil	2.01
$Mg^{2+}$ (mol/kg)	2.00
$K^+$ (mol/kg) soil	0.14
$Na^{2+}$ (mol/kg) soil	0.11
CEC (mol/kg) soil	6.25
B.S (%)	80.8
Available phosphorous (mg/kg)	3.63

### Proximate analysis of fluted pumpkin

The effect of different levels of Super-Gro on proximate analysis is shown in Table 2. The highest moisture content value of 9.86% was gotten from 10ml of Super-Gro treated plants ( $P \leq 0.05$ ) while the lowest value of 8.70% was obtained from the plants that received 30ml of Super-Gro but there was no significant difference between the treatment means. The highest value of dry matter was recorded from 20ml of Super-Gro (90.50%) and the lowest was gotten from 30ml of Super-Gro (69.10%), both treatments were significantly different ( $P \leq 0.05$ ). But there was no significant difference between the 0ml treatment (60.20%) and 30ml (60.10%) (Table 2).

In crude fibre, there was significant difference between 0ml treatment (6.01%) and 30ml treatment (7.50%) at ( $P \leq 0.05$ ). The plants that received 20ml of Super-Gro had the highest value of 15.10% which was statistically similar to the values 12.09% and 14.20% obtained from 10ml and 15ml of Super-Gro respectively. There was no significant difference between the treatment levels ( $P \leq 0.05$ ) for crude fat but the highest mean was recorded from 20ml (12.66%) while the lowest value was recorded from 30ml (9.96%) (Table 2).

The crude protein content of 0ml recorded the lowest mean (5.01%), while the highest value came from 20ml (16.19%). There was significant difference between the highest mean and the lowest ( $P \leq 0.05$ ). Also, there was significant difference between the 0ml treatment and value obtained from other values ( $P \leq 0.05$ ). The mean value of 14.88% and 16.19% obtained from 15ml and 20ml respectively were statistically similar but differed

**Table 2:** Effect of Super-Gro on proximate analysis of fluted pumpkin leaves

Treatments	M.C (%)	D.M (%)	C.F (%)	E.E (%)	C.P (%)	Ash (%)	CHO (%)	Calorific value (Kg <sup>1</sup> g <sup>-1</sup> )
0ml of Super-Gro per 5 litres of water	9.01 <sup>a</sup>	60.2 <sup>c</sup>	6.01 <sup>c</sup>	10.10 <sup>a</sup>	5.01 <sup>c</sup>	8.75 <sup>b</sup>	20.40 <sup>c</sup>	207.33 <sup>c</sup>
10ml of Super-Gro per 5 litres of water	9.86 <sup>a</sup>	89.20 <sup>a</sup>	12.09 <sup>a</sup>	10.11 <sup>a</sup>	8.63 <sup>b</sup>	9.46 <sup>a</sup>	26.10 <sup>b</sup>	302.16 <sup>a</sup>
15ml of Super-Gro per 5 litres of water	9.64 <sup>a</sup>	90.36 <sup>a</sup>	14.70 <sup>a</sup>	12.50 <sup>a</sup>	14.88 <sup>a</sup>	14.36 <sup>a</sup>	34.92 <sup>a</sup>	311.70 <sup>a</sup>
20ml of Super-Gro per 5 litres of water	9.50 <sup>a</sup>	90.50 <sup>a</sup>	15.10 <sup>a</sup>	12.66 <sup>a</sup>	16.19 <sup>a</sup>	13.40 <sup>a</sup>	33.15 <sup>a</sup>	311.50 <sup>a</sup>
25ml of Super-Gro per 5 litres of water	9.45 <sup>a</sup>	72.30 <sup>b</sup>	8.45 <sup>b</sup>	10.40 <sup>a</sup>	6.99 <sup>b</sup>	8.65 <sup>b</sup>	19.20 <sup>c</sup>	257.20 <sup>b</sup>
30ml of Super-Gro per 5 litres of water	8.70 <sup>a</sup>	69.10 <sup>c</sup>	7.50 <sup>b</sup>	9.96 <sup>a</sup>	7.00 <sup>b</sup>	9.00 <sup>b</sup>	20.65 <sup>c</sup>	260.40 <sup>b</sup>

Means in the same column with the same letter(s) are not significantly different ( $P \leq 0.05$ ) according to LSD.

Key:

MC=Moisture content; Ash=Ash content  
DM=Dry matter; CHO=Carbohydrate  
CF=Crude fibre; Calorific=Energy  
EE=Crude fat; CP=Crude protein  
CP=Crude protein

significantly from other values.

The ash content of 25ml (8.65%) recorded the lowest value whereas the 15ml treatment gave the highest value of 14.36% and are statistically different ( $P \leq 0.05$ ). Also, there was no significant difference between the 0ml treatment (8.75%) and 30ml treatment (9.00%) at ( $P \leq 0.05$ ) (Table 2).

The carbohydrate content of the highest value was obtained from 15ml treatment (34.92%) with the lowest value obtained from 25ml treatment (19.20%) are significantly different ( $P \leq 0.05$ ) from each other. The values obtained from 0ml, 25ml and 30ml were statistically similar ( $P \leq 0.05$ ).

Calorific value of 15ml treatment recorded the highest value of 311.70kg<sup>-1</sup> and the lowest was obtained from 0ml treatment (207.33kg<sup>-1</sup>). Both treatment levels showed significant difference ( $P \leq 0.05$ ) (Table 2).

### Mineral contents of fluted pumpkin leaves

Mineral contents of fluted pumpkin leaves were affected significantly ( $P \leq 0.05$ ) by Super-Gro liquid fertilizer (Table 3). The Nitrogen content of highest value of 3.88% was obtained from 15ml of treatment and the lowest value of 1.45% was obtained from 0ml treatment. Both treatments were significantly different statistically ( $P \leq 0.05$ ) (Table 3). The statistical analysis on phosphorus content showed that 25ml treatment gave the lowest value of 0.28% but the highest value of 1.29% was recorded from 15ml treatment. The values were significantly different.

Also, the values obtained from 0ml, 20ml, 25ml and 30ml treated plants were statistically similar.

The potassium content analysis showed that the highest value of 1.05% was obtained from 10ml of treatment while the lowest value of 0.04% was recorded from 0ml which was statistically smaller than all other values (Table 3).

The calcium content of 3.71% obtained from 10ml treatment was the highest but the lowest value of 1.30% was obtained from 0ml treatment. Both treatments were significantly different ( $P \leq 0.05$ ). There was significant difference between 0ml with the rest of the treatments ( $P \leq 0.05$ ).

Statistical analysis of data showed that Super-Gro liquid fertilizer had significant effect on sodium contents of the leaves. The sodium contents obtained from 0ml, 10ml, 15ml, 20ml, 25ml and 30ml of Super-Gro were 0.35%, 0.39%, 0.30%, 0.33%, 0.34% and 0.40% respectively and all the values were statistically similar (Table 3).

In terms of magnesium, the highest value of 1.02% was gotten from the plants that received 10ml of Super-Gro while the least value of 0.50% was obtained from 0ml treatment which was significantly lower than all other values (Table 3).

The Iron content showed no significant difference across the treatments ( $P \leq 0.05$ ). 30ml treatment recorded the highest mean value of 12.40mgkg<sup>-1</sup> while 20ml treatment recorded the lowest value of 8.69mgkg<sup>-1</sup>.

The analysis on Zinc revealed that 10ml treatment recorded the highest mean value of 1.89mgkg<sup>-1</sup> and 30ml

**Table 3:** Effect of Super-Gro on mineral content of fluted pumpkin leaves.

TREATMENTS	N (%)	P (%)	K (%)	Ca (%)	Mg (%)	Na (%)	Fe (%)	Zn (mgkg <sup>-1</sup> )	Cu (mgkg <sup>-1</sup> )	Pb (mgkg <sup>-1</sup> )	Co (mgkg <sup>-1</sup> )	Mn (mgkg <sup>-1</sup> )
0ml of Super-Gro per 5 litres of water	1.45 <sup>c</sup>	0.30 <sup>c</sup>	0.04 <sup>b</sup>	1.30 <sup>c</sup>	0.50 <sup>b</sup>	0.35 <sup>a</sup>	11.01 <sup>a</sup>	0.60 <sup>b</sup>	1.12 <sup>a</sup>	0.31 <sup>a</sup>	0.89 <sup>a</sup>	17.90 <sup>a</sup>
10ml of Super-Gro per 5 litres of water	3.29 <sup>a</sup>	0.85 <sup>b</sup>	1.05 <sup>b</sup>	3.71 <sup>a</sup>	1.02 <sup>a</sup>	0.39 <sup>a</sup>	11.35 <sup>a</sup>	1.89 <sup>a</sup>	1.26 <sup>a</sup>	0.37 <sup>a</sup>	0.90 <sup>a</sup>	16.25 <sup>b</sup>
15ml of Super-Gro per 5 litres of water	3.88 <sup>a</sup>	1.29 <sup>a</sup>	0.95 <sup>a</sup>	3.41 <sup>a</sup>	0.85 <sup>a</sup>	0.30 <sup>a</sup>	9.11 <sup>a</sup>	1.71 <sup>a</sup>	1.78 <sup>a</sup>	0.32 <sup>a</sup>	0.86 <sup>a</sup>	16.63 <sup>b</sup>
20ml of Super-Gro per 5 litres of water	2.59 <sup>b</sup>	0.39 <sup>c</sup>	0.98 <sup>a</sup>	2.63 <sup>b</sup>	0.97 <sup>a</sup>	0.33 <sup>a</sup>	8.69 <sup>a</sup>	0.91 <sup>b</sup>	1.10 <sup>a</sup>	0.31 <sup>a</sup>	0.86 <sup>a</sup>	16.65 <sup>b</sup>
25ml of Super-Gro per 5 litres of water	1.85 <sup>c</sup>	0.28 <sup>c</sup>	0.20 <sup>b</sup>	2.04 <sup>b</sup>	0.70 <sup>a</sup>	0.34 <sup>a</sup>	10.20 <sup>a</sup>	0.56 <sup>c</sup>	1.01 <sup>a</sup>	0.30 <sup>a</sup>	0.81 <sup>a</sup>	19.02 <sup>a</sup>
30ml of Super-Gro per 5 litres of water	1.74 <sup>c</sup>	0.31 <sup>c</sup>	0.09 <sup>b</sup>	1.95 <sup>c</sup>	0.65 <sup>a</sup>	0.40 <sup>a</sup>	12.40 <sup>a</sup>	0.50 <sup>c</sup>	1.02 <sup>a</sup>	0.31 <sup>a</sup>	0.79 <sup>a</sup>	20.45 <sup>a</sup>

Means in the same column with the same letter(s) are not significantly different ( $P \leq 0.05$ ) according to LSD.

Key:

N=Nitrogen; Na=Sodium; Mn=Manganese

P=Phosphorus; Fe=Iron; Mg=Magnesium

K=Potassium; Cu=Copper; Co=Cobalt

Ca=Calcium; Pb=Lead

**Table 4:** Effect of Super-Gro on vitamin contents of fluted pumpkin leaves

Treatments	Vitamin (mg100g <sup>-1</sup> )	Riboflavin (mg100g <sup>-1</sup> )	Niacin (mg100g <sup>-1</sup> )	Thiamin (mg100g <sup>-1</sup> )	B-Carotene (mg100g <sup>-1</sup> )	Vit. K (mg100g <sup>-1</sup> )	Chlorophyll Mkg <sup>-1</sup> (a)	Chlorophyll Mkg <sup>-1</sup> (b)
0ml of Super-Gro per 5 litres of water	12.40 <sup>a</sup>	0.04 <sup>a</sup>	0.24 <sup>b</sup>	0.02 <sup>b</sup>	16.20 <sup>a</sup>	56.70 <sup>a</sup>	1.56 <sup>b</sup>	1.08 <sup>b</sup>
10ml of Super-Gro per 5 litres of water	21.60 <sup>b</sup>	0.17 <sup>a</sup>	0.58 <sup>a</sup>	0.10 <sup>a</sup>	39.80 <sup>a</sup>	70.15 <sup>a</sup>	2.30 <sup>a</sup>	2.09 <sup>a</sup>
15ml of Super-Gro per 5 litres of water	24.86 <sup>b</sup>	0.18 <sup>a</sup>	0.62 <sup>a</sup>	0.14 <sup>a</sup>	45.80 <sup>a</sup>	71.67 <sup>a</sup>	2.64 <sup>a</sup>	2.51 <sup>a</sup>
20ml of Super-Gro per 5 litres of water	25.14 <sup>a</sup>	0.18 <sup>a</sup>	0.51 <sup>a</sup>	0.14 <sup>a</sup>	29.10 <sup>b</sup>	71.52 <sup>a</sup>	2.01 <sup>a</sup>	1.12 <sup>b</sup>
25ml of Super-Gro per 5 litres of water	29.11 <sup>a</sup>	0.11 <sup>a</sup>	0.61 <sup>a</sup>	0.10 <sup>a</sup>	28.10 <sup>b</sup>	61.70 <sup>a</sup>	1.82 <sup>b</sup>	1.08 <sup>b</sup>
30ml of Super-Gro per 5 litres of water	18.80 <sup>a</sup>	0.12 <sup>a</sup>	0.50 <sup>a</sup>	0.04 <sup>b</sup>	20.45 <sup>c</sup>	58.10 <sup>a</sup>	1.85 <sup>b</sup>	1.70 <sup>b</sup>

Means in the same column with the same letter(s) are not significantly different ( $P \leq 0.05$ ) according to LSD.

recorded the lowest mean value of 0.50mgkg<sup>-1</sup>. There was significant difference between the highest and lowest mean values ( $P \leq 0.05$ ).

There was no significant difference between the treatment means on copper analysis ( $P \leq 0.05$ ). However, the highest mean value of 1.48mgkg<sup>-1</sup> was obtained from 15ml treatment whereas the lowest came from 25ml treatment (1.01mgkg<sup>-1</sup>).

Similarly, there was no significant difference on the Lead content of pumpkin leaves at ( $P \leq 0.05$ ) across the treatment levels. The lowest value of 0.30mgkg<sup>-1</sup> was recorded from 25ml treatment with other treatment levels 0ml, 10ml, 15ml, 20ml and 30ml recorded closely related values of 0.31mgkg<sup>-1</sup>, 0.37mgkg<sup>-1</sup>, 0.32mgkg<sup>-1</sup>, 0.31mgkg<sup>-1</sup>, 0.31mgkg<sup>-1</sup> respectively.

In terms of Cobalt content, the highest value of 0.90mgkg<sup>-1</sup> was obtained from 10ml treatment and the lowest value of 0.79mgkg<sup>-1</sup> was gotten from 30ml treatment. All the values were statistically similar ( $P \leq 0.05$ ).

The highest manganese content (20.45mgkg<sup>-1</sup>) of the leaves was gotten from the plants that received 30ml of Super-Gro, while the least value of 16.25 mgkg<sup>-1</sup> was obtained from 10ml of Super-Gro.

### Vitamin analysis of fluted pumpkin

The summary of the effect of Super-Gro on vitamin contents of fluted pumpkin leaves is shown in (Table 4). The highest mean value of 29.11mg100g<sup>-1</sup> was recorded from 25ml treatment while the lowest mean value of

12.40mg100g<sup>-1</sup> was recorded from 0ml treatment. Both treatment levels were significantly different ( $P \leq 0.05$ ) (Table 4). The vitamin, contents obtained from 15ml, 20ml, 25ml and 30ml were statistically similar ( $P \leq 0.05$ ). Result on the riboflavin content showed that there was significant difference ( $P \leq 0.05$ ). The analysis showed that 0ml treatment recorded the lowest mean value of 0.04mg100g<sup>-1</sup> and was significantly different from the highest mean value of 0.78mg100g<sup>-1</sup> which was recorded from 15ml and 20ml.

The highest Niacin mean value of 0.62mg100g<sup>-1</sup> was obtained from 15ml treatment which was significantly different from the lowest mean value of 0.24mg100g<sup>-1</sup> obtained from 0ml treatment ( $P \leq 0.05$ ).

The other treatments recorded 0.58mg100g<sup>-1</sup>, 0.51mg100g<sup>-1</sup>, 0.61mg100g<sup>-1</sup>, 0.50mg100g<sup>-1</sup> from 10ml, 20ml, 25ml and 30ml respectively and they were statistically similar ( $P \leq 0.05$ ) (Table 4).

Thiamin content of 0.14mg100g<sup>-1</sup>, the highest mean value obtained from 15ml and 20ml treatments was statistically similar ( $P \leq 0.05$ ) to the values obtained from 10ml and 25ml treatment levels. The lowest mean value of 0.02mg100g<sup>-1</sup> was obtained from 0ml and was statistically similar to 0.04% obtained from 30ml treatment.

The highest B-carotene mean value of 45.80mg100g<sup>-1</sup> was obtained from 15ml treatment while the lowest mean value was obtained from 0ml treatment. Both treatments showed a significant difference ( $P \leq 0.05$ ). 20ml and 25ml were statistically similar with mean values of 29.10mg100g<sup>-1</sup> and 28.10mg100g<sup>-1</sup> respectively Table 4.

**Table 5:** Effect of Super-Gro on the fresh leaf yield of fluted pumpkin.

Treatments	Leaf Yield (Kg/ha)
0ml of Super-Gro per 5 litres of water	2004.60 <sup>d</sup>
10ml of Super-Gro per 5 litres of water	2635.80 <sup>b</sup>
15ml of Super-Gro per 5 litres of water	2978.00 <sup>a</sup>
20ml of Super-Gro per 5 litres of water	2614.00 <sup>b</sup>
25ml of Super-Gro per 5 litres of water	2156.40 <sup>c</sup>
30ml of Super-Gro per 5 litres of water	2193.30 <sup>c</sup>

Means in the same column with the same letter(s) are not significantly different ( $P \leq 0.05$ ) according to LSD.

In terms of vitamin K, the highest mean value of 71.67mg100<sup>-1</sup> was obtained from 15ml and was significantly different from the least mean value of 56.70mg100g<sup>-1</sup> obtained from 0ml ( $P \leq 0.05$ ). Although, 0ml treatment recorded the least mean value but was statistically similar to the value obtained from 30ml treatments.

The chlorophyll contents of the fluted pumpkin leaves were significantly influenced by Super-Gro levels. The plants that received 15ml of Super-Gro contained the highest chlorophyll contents. The control plants contained the least chlorophyll content.

#### Fresh leaf yield of fluted pumpkin (kg/ha)

The plants that received 15ml of Super-Gro produced the highest fresh leaf yield of 2978.00kg/ha which was significantly higher than all the values obtained from other treatment (Table 5). The plants without any Super-Gro (0ml) gave the least yield and significantly lower than other values (Table 5).

#### DISCUSSION

The result of the study revealed that Super-Gro had significant effect on proximate analysis of the fluted pumpkin leaves. The highest proximate analysis values were gotten from 15ml and 20ml of Super-Gro per 5 litres of water. This implies that 15ml and 20ml of Super-Gro contained appropriate plant nutrients for the improvement of proximate analysis values of the fluted pumpkin leaves. This agrees with the findings of GNLD (2017), that Super-Gro has potentials to improve leaf quality.

The mineral contents of the leaves were affected significantly ( $P \leq 0.05$ ) by Super-Gro. The Super-Gro rates of 15ml and 20ml produced almost the highest values of the macro-elements. This showed that 15ml and 20ml of Super-Gro per 5 litres of water is more suitable in the macro-nutrient formation of the leaves than the other treatment levels. The result obtained is in conformity with the finding of GNLD, (2017), that Super-Gro at certain rates improves the nutrient content of the plants.

They also stated that lower or higher rates of the Super-Gro can hinder nutrients formation in the plant which was in agreement with the result of this research. In terms of trace elements, the values obtained from all the treatments were almost similar. This implies that the Super-Gro liquid fertilizer rates used had the same potential in formation of micro nutrients of the leaves. It also showed that mineral contents of the leaves were influenced by Super-Gro.

Vitamin contents of the leaves were affected by different levels of Super-Gro rates. The highest vitamin contents were obtained from the plant that received 15ml and 20ml of Super-Gro which showed that their nutrient concentration have potential to improve vitamin contents of the leaves. The control, that is the plants that received no Super-Gro had the least vitamin contents of the leaves which showed that the Super-Gro liquid fertilizer had effect on the vitamin formation on the leaves. In terms of fresh leaf yield of the fluted pumpkin the plants that received 15ml of Super-Gro produced the highest yield. This implies that its nutrient concentration was appropriate for better physiological and agronomical development which led to higher yield of the crops. Also, the least yield value was gotten from 0ml, that is control. This implies that Super-Gro had significant effect on the yield of the crop. This finding is in accordance with the result of Azawei and Howells (2022), who got the highest mean fresh pumpkin leaf yield from the plants that received 15ml of Super-Gro liquid fertilizer and the least from control using pot experiment.

#### Conclusion

The proximate analysis values, mineral contents and fresh leaf yield of the fluted pumpkin were significantly affected ( $P \leq 0.05$ ) by Super-Gro liquid fertilizer. The carbohydrate, nitrogen contents obtained from the plant that received 15ml of the Super-Gro were the highest values, while the control had almost the least values. Also the plants that received 20ml had high values when compared with other Super-Gro levels. In terms of fresh leaf yield, the plants with 15ml of the liquid fertilizer produced the highest fresh leaf yield while the least was

obtained from 0ml/ha, that is the control. Based on the findings, 15ml per 5 litres of water and 20ml per 5 litres of water are recommended for the improvement of leaf nutrients and high fresh leaf yield.

### Acknowledgment

My sincere gratitude goes to TETFUND for their financial support which made it possible for me to carry on the research work successfully.

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