Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

Annals of Biological Research, 2011, 2 (3) : 271-275
(http://scholarsresearchlibrary.com/archive.html)

ISSN 0976-1233
CODEN (USA): ABRNBW

Associated variations in sexuality and vegetative trait growth of *Telfairia Occidentalis* using organo-mineral fertilizer regimes

Aremu C. O., Akanbi W. B. and Adewale[1] B. D.

**Department of Agronomy, Ladoke Akintola University of Technology (LAUTECH) Ogbomoso*
[1]Department of Plant Breeding and Seed Technology, University of Agriculture, Abeokuta

---

ABSTRACT

Field experiments were carried out to determine the associated variations in sexuality and vegetative trait growth of Telfairia Occidentalis using organo- mineral fertilizer regimes. Ten treatments comprising of three inorganic fertilizer levels of 0.17kg/ha (T_1) NPK, 0.20kg/ha (T_2) NPK and 0.23kg/ha (T_3) NPK; three organic fertilizer levels of pacesetter (0.83kg/ha (T_4), 1.0kg/ha (T_5), 1.17kg/ha (T_6) and Titonia source, 1.18kg/ha (T_7), 1.42kg/ha (T_8) and 1.67kg/ha (T_9). Telfairia plants grown without any fertilizer application served as control (T_{10}). Plant stands fertilized with Titonia and Pacesetter organic materials at 1.18kgha^{-1} and 1.17kgha^{-1} regimes, grew luxuriantly with wider and thicker telfairia stems, showing high vigor index and more established plants compared to the inorganic fertilizer source of NPK at 150kg/ha. The sex proportion for Telfairia crops under Titonia and pacesetter fertilizer levels of 1.18kg/ha and 1.17kg/ha were 2 female to 1 male type. These sex proportions were evident in the luxuriant vegetables with high vigor index performance of the Telfairia crops under the organic fertilizer regimes. Based on consumer preference of the luxuriant vegetables at groceries and the non residual chemical effect of the organic materials, 1.18kg/ha and 1.17kg/ha Titonia and pacesetter sources were considered optimal for Telfairia vegetable production.

Key words: organominerals, treatments, sex ratio, vegetable yield, variations.

INTRODUCTION

Telfairia Occidentalis is a dioecious plant with irregular flowering pattern belonging to the cucurbitacea family. The fruit is the largest in the family (1). The long vine is tendril and climbing, reaching an average length of 250cm for both male and female at flowering, which is about 180 days from date of sowing (2). The vegetable has high dietary value. The vegetative

part is rich in potassium and iron (3) and good sources of protein, fibre and carbohydrate. The vegetable crop ratoons in well drained soil slightly shaded and mulched even though the degree varies with field culture and growth conditions (4;5). As the cultivation of Telfaria expands, the growers face problems of vegetable yield expansion and seed productivity (12) and those problems could be overcome partially or completely by using mineral nutrients and growth promoters. Optimal doses of mineral nutrient in telfairia varies with length of growing season, soil fertility status, soil type, agro-ecology etc (6;7). According to (2; 8), increase in vegetable and pod yield is associated with incremental application of NPK fertilizer rates, and that 150kg NPK produces optimal vegetable yield in Telfairia. The findings of (9) suggested fertilizer usage and good agronomic practice to improve cherry yields respectively.

Even though NPK fertilizer at 150kg/ha increases telfairia yield, reports have proved that organic nutrients enhances better vegetable yield production as well as improve soil nutrient availability leaving the cropping soil intact without chemical pollution (10;11). Better still,(12), provided insight into dosage rate of organic fertilizer applicable to improve vegetable amaranth and rice yields respectively. Furthermore, (12), reported improvement in nutrient content quality of vegetable Roselle plant using different organo-mineral fertilizer levels.

Field established telfairia plants show variation in the male to female proportions (4).Telfairia vegetable is preferred at groceries because of its succulent growth. Research effort therefore, should focus on increasing the female plant stand on the field and still maintain the male proportion despite the sharp decline in natural soil fertility level. The soil fertility problem in growing telfairia vegetable for commercial purpose calls for breeders attention in developing strategies towards sustaining high vegetable yield, as well as maintain soil fertility status. Researchers have formulated NPK fertilizer dosage for optimal Telfairia vegetable production. There is dearth of information on recommendable organic fertilizer type and quantity for Telfairia vegetable improvement. This work therefore, used different fertilizer regimes of both organic and inorganic types to evaluate the variations in vegetable yield and sex proportions in *Telfairia occidentalis*.

MATERIALS AND METHODS

Nine fertilizer regimes of organic and organic types were used. These were three inorganic fertilizer sources of 0.17kg/ha (T_1) NPK, 0.20kg/ha (T_2) NPK and 0.23kg/ha (T_3) NPK;. three organic fertilizer levels of pacesetter (0.83kg/ha (T_4), 1.0kg/ha (T_5), 1.17kg/ha (T_6) and Titonia source, 1.18kg/ha (T_7), 1.42kg/ha (T_8) and 1.67kg/ha (T_9). Telfairia plants grown without any fertilizer application served as control (T_{10}). The study was carried out at the experimental farm of the Department of Agronomy, Ladoke Akintola University of Technology (LAUTECH) Ogbomoso ($8^0$10'N, $40^0$10'E, 390m.a.s.l.) in Nigeria in 2008 and 2009 cropping seasons. Bimodal rainfall pattern with March to July; September to November was observed as the wettest months. Minimum and maximum mean temperature of this cropping area was 21^0C – 34^0C. The different fertilizer regimes and formulations were sourced from the organic compost shed of the Department of Agronomy, LAUTECH, and Ogbomoso. The Telfairia seed pods were sourced from the local markets in Ogbomoso.

Nursery Operations

Two experiments were conducted. One was a nursery, sited behind the Department of Agronomy Laboratory using 36 wooden boxes of 75 x 50 cm diameter each. Three large sized fluted pumpkin fruits were sourced from one of the local markets in Ogbomoso. The fruits were cut linearly at both ends of the stigmatic scar and stalk joint .Seeds were carefully removed from the fruits and sown in the wooden boxes filled with top soil. Three replications were used. The seeds germinated and grew in the nursery for 28 days following transfer to the field.

Fields operations

Seedlings in the nursery were transplanted on the twenty eighth day after sowing (28DAS) to beds each measuring 7m x 2m with 1m spacing between beds. Randomised complete block design with three replications were used. A seedling was placed per hole to give 16 plant stands per plot. A total of 576 plant stands were on the field prior to data collection. Plant irrigation and other cultural practices were carried out when necessary. At 110 days after seed sowing, growth, flowering and sex data were noted and collected on the established plant stands. Field data included date to 50% flowering, number of branch per plant, vine length (cm) vine width (cm), number of foliage and foliage width (cm).

Data Analysis

Analysis of variance test was performed us (13). Genotypic and phenotypic coefficients of variation were calculated following the methods outlined by (15).

Seedling length

At two weeks after transplanting (2WAT) seedling data were collected following the method of (14); (15) ; and seedling vigor index calculated as follows:

Seedling vigor index (SVI) = SL x Emergence%

Where SL = seedling length (cm)

$$\% \text{ Emergence} = \left[\frac{\text{number of seedling emergent x100}}{\text{number of seeds sown}} \right]$$

% emergence were calculated only for seeds with radicles emerging through the testa and greater than 2mm (>2mm)

RESULTS AND DISCUSSION

Vegetative and shoot traits

The vegetative taints were significantly affected by the different fertilizer regimes (Table 1). The seedling height at two weeks after transplanting was significant following the different fertilizer levels. Mean shoot trait of telfairia plants under each fertilizer regime showed organic fertilizer consisting of 1.0kg per ha pacesetter (150kgN/ha); 1.23kg per ha Titonia (150kgN/ha) and 1.42kg per ha Titonia (175kgN/ha) to have flowered much later than those under the inorganic treatment levels (Table 2). This may be attributed to the fact that the fertilizer / regimes provided sufficient photosynthate accumulate towards luxuriant leaf growth and not initiate flowering. These same fertilizer regimes produced higher mean performance of 123cm, 109cm and 117cm

for vine and leaf traits respectively. However, the use of Titonia compost as organic fertilizer at the rate of 1.23kg/ha produced widest and highest leaf number (4.9cm and 124 leaves). This was followed by Telfairia plants having pacesetter organic manure of 0.83kg/ha. These findings run contrary to the reports of(2); (16) and (8) that nitrogen fertilizer at the rate of 150 kg NPK/ ha effectively improved the quality and quantity of telfiria and tomato yields respectively.

Even though, Inorganic fertilizer of NPK at 0.20kg/ha (150kgNPK) produced more leaf number with thick lines, when compared with the no fertilizer source, the organic fertilizers of Titonia and pacesetter crop residues produced more shoot and leaf number traits. The comparative use of organic fertilizer of Titonia and pacesetter at dosage regimes equivalent to the inorganic fertilizer dosage produced more shoot yield with no chemical residual effect on soil physico-chemical properties. The dual advantage of producing more shoot yield and still conserve soil nutrient makes the use of Titonia and pacesetter organic fertilizer sources effective and a worthwhile effort in increasing the vegetative yield of telfairia. (12), reported a combination of 150kg/ha NPK and 22.2t/ha cassava peel compost (CPC) to produce highest calyx yield in Roselle. .

Table 1: Telfairia traits mean values

Source of variation	**df**	**Seeding vigour index**	**No of branches**	**Days of 50% flower**	**Vine length (cm)**	**Vine weight(g)**	**No of foliage**	**Leaf width(cm)**
Replication	2	6.42	1.72	8490.6	3228.5	0.8*	493.7	0.31
Treatment	8	9.80*	6.81*	9875.3*	5673.4*	1.2*	8846.1	4.3

**= significant at 0.01 probability level; no = number; cm = centimeter; g = gramme*

Table 2: Mean shoot trait performance across the fertilizer doses at 10WAT

Treatment	No of branches	Days to 50% flower	Vine length (cm)	Vine width (cm)	No of foliage	Leaf width (cm)
T1 (0.17kgNPK^{-1})	5	87	95	2.4	73	4.0
T2 0.20kgNPK^{-1}	8	89	123	2.9	112	4.9
T3 0.23 kgNPK^{-1}	6	82	94	1.7	69	4.2
T4 0.83 kgNPK^{-1}	7	85	89	2.0	78	3.8
T5 1.0kg PCt^{-1}	6	91	91	2.2	131	3.7
T6 1.17kg PCt^{-1}	7	90	125	1.9	104	3.1
T7 1.18kg Tit^{-1}	8	94	87	1.8	115	4.2
T8 1.18kg Tit-1	9	99	134	3.1	124	4.9
T9 1.42kg Tit^{-1}	6	93	117	2.6	118	4.0
T10 O fertilizer	5	80	88	2.4	75	3.9

Cm = centimeter, 10WAT = 10 weeks after transplanting

Morphological attributes are used to determine sex proportions in Telfairia. Female to male plant ratio increased under the organic fertilizer regimes of 1.42kg/ha and 1.17kg/ha using Titonia and pacesetter sources respectively. According to Akoroda (1990), sex proportion in established telfairia field plot under natural condition is in the ratio of 1:1. The nutrient released by Titonia and pacesetter organic fertilizers at 1.42kg/ha and 1.17kg/ha appropriately increased female plant establishment on the field. That more female plant were established using the organic fertilizer regimes is justified in the rate of vigor growth shown by the Telfairia plant under the Titonia and pacesetter organic fertilizer levels.

In conclusion, the use of organic fertilizer compared favorably with inorganic fertilizer regimes. Better still, Titonia and pacesetter organic fertilizers produced vigorous leaf and vine yield in Telfairia. Specific rate of 1.42kg/ha Titonia and 1.17kg/ha pacesetter organic fertilizers can be used to increase the establishment of female telfairia cropping field. Research work on going to further determine fruit set pattern in relation to sex ratio distribution within seeds and the nutritive quality of both the vegetable and seed yield of Telfaira using the different organo-mineral regimes.

Table 3: Sex ratio distribution in plants of ten fertilizer regimes of Telfairia occidentalis

Established plants					
Treatment	Not of plants	Male	Female	Male: Female	Calculated% female
T1	40	19	21	1 : 1	53
T2	45	18	27	1 : 2	60
T3	46	27	22	1 : 1	49
T4	48	25	23	1:1	48
T5	45	29	16	2 : 1	36
T6	40	12	28	1:2	68
T7	47	22	25	1:1	53
T8	46	19	27	1: 2	59
T9	40	15	28	1:2	70
T10	42	22	20	1: 1	50

REFERENCES

[1] Akoroda, M.O. *Economic Botany* **1990**, 44(1); 29 – 39.
[2] Obiagwu, C.J. and Odiaka, N.I. *Indian Journal of Agricultural Sc*., **1995** 62(2): 98 – 101.
[3] Schipper, R.R. *Chatham* U.K., **2000,** 342pp.
[4] Akoroda, M.O. and Adejoro, M.A. **1990**. *Tropic Agric.* 67(3): 243 – 247.
[5] Das, B.C. and Das, T.K. *Orissa journal of Horticulture*, **1995,** 23: 87 – 91.
[6] Aiyelaagbe, I.O.O. and Kintomo, A.A. *Journal of nutrient cycling in agro-ecosystems* **2004,** (64)3: 231-235.
[7] Akanbi, W.B. and Togun, A.O. *Scienctia Horticulture,* **2002** 93. 1- 8.
[8] Ogar, E. A. *Agro-Science* **2005** 4, 1: 66-69.
[9] Stefano, P., Dris, R. and Rapparini, F. *Journal Food Agric and Environment,* **2004** 2: 307 – 309.
[10] NIHORT Guide to the production of Telfairi Occidentalis. National Horticultural Reserch Institute Ibadan, Nigeria. **1986** 9pp.
[11] Smith, S.J., Hall, J.E. and Hadley, P. *Acta Horticulture* (**1992**), 203 – 215.
[12] Akanbi, W.B., Olaniyan, A.B.; Olaniran, O.A., Ojo, M.A; Adeyeye, A.S. and Ilupeju E.A. **2010** *Crop Res.* 39 (1-3) 166 – 172.
[13] SAS Institute Inc. SAS / STAT (a) User's Guide, Version 6, forth edition, volume 1, cary N.C. USA (**2002**)
[14] Ellis, R.H and Roberts, E.H. *Towards a rational basis for testing seed quality in: seed production*, London, Butterworths (**1980**) 635pp.
[15] Kharb, R.P; Lather, B.P and Deswal, D.P. *Seed science and Technology* (**1994**) *(22); 461-466.*
[16] Joubes, A.D. and Chevalier, L. *J. Plant Nutrition,* **2000,** 18; 29-37.