Performances of Riverine and Upland Accessions of Fluted Pumpkin in Awka Rain Forest Zone of Nigeria

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KEYWORDS

Accession,
Riverine,
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Weeks after planting(WAP)

ABSTRACT

An across geographical zone experiment was conducted to compare the performance of a riverine telferia accession with an upland land race in Awka. Both accessions seeds for planting were relatively of the same size and weight. At 21 days after planting, 77% of the riverine seeds emerged as against 72% of the local race. The Randomized Complete Block Design (RCBD) Experiment consisted of Upland and Riverine telferia accessions whole seeds as the treatments. They were each planted ten seeds on 4x1m beds (plots) and replicated five times. The riverine accession also produced more leaves, and longer vines at WAP1 and 2 before the two accessions leaf numbers and stem lengths became equal. The probable cause of its early start and better performance might be due to higher soil and environmental temperatures when compared with the relatively lower soil temperatures common in the riverine environment. The riverine accession also had the biggest vine girth and larger leaf area which accounted for its higher vine and leaf harvest at WAP 4 (213.70kg/ha) and WAP11 (4.00t/ha) as against upland accession WAP4 (77kg/kg) and WAP11 (2.68t/ha) harvests. Riverine accession started flowering early at 13 WAP (91 days), while upland accession started at 14 WAP (98days). Riverine accession also started fruiting at 16 WAP (112 days), while upland accession started fruiting at 23 WAP (161 days). Therefore, to achieve maximum production of telferia in Awka rainforest zone of Nigeria, riverine accession is recommended.

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INTRODUCTION

Telfairia occidentalis belongs to the Cucurbitaceae family, and its is an indigenous vegetable consumed by millions of people in Nigeria(Ifeoma *et al*., 2008).Fluted pumpkin is an important leaf and seed vegetable indigenous to Southern Nigeria and is grown in the forest zone of west and central Africa such as Nigeria, Ghana and Sierra Leone being the major producers (Chukwudi *et al*., 2017). It is an important vegetable crop that has high nutritional and commercial value (Schippers, 2000) The leaves are palatable, nutritious and are used in soups and porridges as the vegetative parts of the crop make an excellent vegetable which is very rich in vitamin and has 37.3% protein content on a dry weight basis (Schippers, 2002). The leaves of fluted pumpkin have medicinal values and are used for the treatment of anaemia and diabetes (Akanbi*et al.,* 2007,Odiaka*et al.,* 2008; Chukwudi and Agbo, 2014b). The seed contains 20% protein, 45% fat, 23% carbohydrate, 2.2% fibres and 1.8% total ash. The oil in the seeds is non-drying and it contains lactating properties which are of high demand by nursing mothers (Akanbi*et al.,* 2007). The *Telfairia occidentalis* ranks highest, in terms of net income (Chukwudi and Agbo, 2014b), among the notable and common tropical leafy vegetables (TLVs) grown in South-eastern Nigeria. Frequent cutting interval of *Telferia occidentalis* is used when leaf is the desired yield, while less cutting frequency is more adequate for higher fruit yield (Chukwudi and Agbo, 2014a).). The female plants are endowed with large succulent leaves while the male plants produce leaves that are scrawny, small and less attractive.High yield is the major objectives of breeders and growers over the recent decades (Wang and Li, 2008; Xing and Zhang, 2010). Yield is a complex character which is also a function of several component traits and their interaction with environment (Iqbal *et al.,* 2013). The prevailing global climate change is making a great impact on the world climatic conditions, and because of this effect, it is more difficult to predict weather condition for accurate and successful annual farming (Ibrahim *et al*., 2013; Carns*et al*., 2013; Olaoye and Rotimi, 2010,Lin *et al*., 2020). Soil and air temperatures have effects on many aspects of crop growth and development, such as leaf growth and expansion and are all correlated

(QiJin and GuangSheng, 2012; Lamidi, 2009.The phenotype of an individual is determined by the effects of its genotypes, the environment, and the interaction between the genotype of the individual and the environment. Genotype x environmental interaction is a prerequisite for crop plant improvement and evaluates the improved genotypes across multiple environments (locations and years), before they are promoted for release and commercialization.The differential response of cultivars to diverse environments is referred to as a crossover interaction when cultivar ranks change from one environment to another. Therefore, the objectives of this study is to: Compare the agronomic and yield performances of Riverine and Upland accession of *Telferia occidentalis* in Awka and evaluate the returns of growing the two *Telferia occidentalis* accessions in Awka.

MATERIALS AND METHODS

Experimental site:

The experiment was conducted at the Teaching and Research Farm of Crop Science and Horticulture Nnamdi Azikiwe University, Awka, Anambra State Nigeria. Awka is characterized by tropical rain forest with temperature between 27^0C - 30^0C. The research farm lies on latitude 6.2497N and 7.1167E and annual seasonal rainfall of 1828mm.

The Experimental Materials

Upland telferia accession seeds (ụgụelụ ala) are the normal telferia that are grown in the Rain Forest Zone of Nigeria and were bought from Eke Awka Market, Awka, Anambra state. The leaves are relatively light green in colour and small in size, the fruits are plump in size. Riverine telferia accession seeds (ugụ ala mmiri) are the common land race telferia that are grown in the High Rain Forest and Swampy Zones of Nigeria and were bought from Rumuokoro Market, Obio/Akpor ,Rivers State.The leaves are relatively deep green in colour and large in size,the fruits are long and large in size.

Experimental Design

The Randomized Complete Block Design (RCBD) Experiment consisted of Upland and Riverine telferia accessions whole seeds as the treatments. They were each planted ten seeds on 4x1m beds (plots) and replicated five times. This gave ten plots and experimental field that measured 9 m x7 m including the walk ways.

Cultural practices*:* Land clearing was done manually using cutlass. A land area of 25m× 25m was mapped out for the field experiment. The seeds were planted at 1x1meter spacing on 1x3 meter beds. Wet poultry manure was used as source of soil nutrients and was applied at the rate of 1kg/hole. They were applied to the soil before seeds were sown. Staking were done using raised 1.5m high horizontal plate forms per bed. It was done on randomized complete block design (RCBD).

Data collection and analysis *:*The growth parameters measured were, plant height(cm), stem girth(cm^2), number of leaves, number of tendrils and leaf area(cm^2).vine length (cm) and number of branches. Data collected on yield include; number of fresh fruits, fruit size (cm^2), and weight of fresh fruits (g) .The growth data collection was done on a weekly basis while harvesting of leaves were done once every 21 days .All the data collected were subjected to analysis of variance (ANOVA) following the procedures for the experiment in Randomized complete block design (RCBD) using GENSTAT (2012) statistical software package. Mean separation was done by using least significant difference (LSD) at 5% probability level.

Results

The influence of location on the *Telferia* accessions seeds emergence (%).The result on table1 showed the weights of the Telferia seeds (g). Although the Riverine accessions seeds appeared bigger in size, they did not significantly differ from upland accession seeds. On the influence of location on the Telferia accessions seeds emergence (%) at 21 and 28 DAP. It was discovered that 77% Riverine accession seeds emerged at 21days while 72% upland accession emerged ,although both seeds emergence were not significantly different at 28 DAP (83%).

Table 1: The influence of location on the Telferia accessions seeds emergence (%)

	Weight per seed (g)	**Emergence%**			
Accession		DAP 21	%	DAP 28	%
Upland	16.40	13.00	72	15.00	83
Riverine	19.50	14.00	77	15.00	83
$LSD_{0.05}$	Ns	0.20		Ns	

NS: Non significant

Influence of location on the Telferia accessions number of leaves

Table2: Displayed the influence of location on *Telferia* accessions number of leaves, it was observed that the Riverine accession had more leaves at WAP1 (6.50), WAP 2 (7.75) and WAP 4(13.50). The leaf number later became the same until WAP10 during which the upland accession scored (24.50) as against Riverine accession (20.75).

Table 2: **Influence of location on the Telferia accessions number of leaves**

	Weeks after Planting									
Accession	1	2	3	4	5	6	7	8	9	10
Upland	4.75	6.25	9.75	11.75	13.25	14.50	16.50	18.00	20.25	24.50
Riverine	6.50	7.75	11.50	13.50	14.00	15.00	18.75	18.00	19.50	20.75
$LSD_{0.05}$	0.93	0.90	ns	1.70	ns	ns	ns	ns	ns	3.30

Table 3 showed the influence of location on the *Telferia* accessions stem girth (cm^2). From the result, it was deduced that the two *Telferia* accessions stem girths were not significantly different till 7 WAP. The stem girths of the Riverine accessions were bigger from WAP7 (9.88 cm^2) up till 10 WAP when it was (13.00 cm^2) as against (10.00 cm^2) of upland accession.

Table 3: Influence of location the *Telferia* accessions on stem girth (cm^2).

	Weeks after planting						
Accession	4	5	6	7	8	9	10
Upland	6.00	6.50	7.08	7.50	8.25	8.50	10.00
Riverine	5.50	6.65	8.25	9.88	11.38	12.38	13.00
$LSD_{0.05}$	1.22	1.16	1.96	2.20	2.20	2.40	2.50

Influence of location on the *Telferia* accessions main stem length (cm)

After WAP 1and 2, it was observed that the riverine accession main stem length was significantly longer than that of the upland accession. At WAP 10 upland accession was (147.70cm) while the riverine accession was (164.70cm). (Table 4)

Table 4: Influence of location on the *Telferia* accessions main stem length (cm)

	Weeks after planting									
Accession	1	2	3	4	5	6	7	8	9	10
Upland	14.33	25.00	38.50	52.70	67.00	81.20	98.30	107.00	115.00	147.70
Riverine	14.67	25.00	44.30	80.00	98.80	118.80	123.00	135.70	152.00	164.70
$LSD_{0.05}$	2.00	3.72	5.66	10.45	10.83	8.60	8.34	8.75	11.18	13.00

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Influence of location on the *Telferia* accessions leaf area (cm^2)

Table 5,showed the influence of location on the *Telferia* accessions leaf area (cm^2) .The Riverine accession leaf area were observed to be larger than that of the upland accession throughout the course of the work like at WAP10,it was (425.00 cm^2) as against (312.00 cm^2) of the upland accession.

Table 5: Influence of location on the *Telferia* accessions leaf area (cm^2)

Accession	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Upland	37.50	55.50	89.50	112.90	136.00	212.00	238.00	256.00	308.00	312.00
Riverine	40.50	74.80	126.70	200.20	240.00	269.00	278.00	309.00	363.00	425.00
$LSD_{0.05}$	14.5	18.60	30.80	72.40	86.40	108.50	Ns (114)	100	84.3.00	115.70

Influence of location on the *Telferia* accessions marketable weights and harvest returns.

Table 6: showed the influence of location on the *Telferia* accessions marketable weights (leaves and stems)(g) at 4 and 11 WAP. The research showed that the first harvest was done at 4 WAP with the upland accession yielding (7.70 grams) per plant, that was an equivalent of 77 kg/ha and Riverine accession yielding (21.37 grams) per plant, that was an equivalent of 213.70 kg/ha. The second harvest at 11 WAP of riverine accession yielded an equivalent of 4.06 t/ha, which was significantly higher than that of upland accession (2.68 t/ha). Presently, a typical head of telferia (consists of leaves and stem unit for sale) in the market that weighs about 20grams costs ₦100:00 and so the upland accession yield of 77.00kg/ha would sold at ₦385,00:00 while that of Riverine accession at 213.70kg/ha would sold at ₦1,070,000:00.

Table 6: Influence of location on the *Telferia* accessions marketable weights and harvest returns.

Accession	WAP 4 (g/plant)	WAP 11 (g/plant)	Average (kg/ha)	Yield per hectare (t/ha)	WAP 4 hst (stem and leaves) returns
Upland	7.70	268.00	77.00	2.68	₦385,000
Riverine	21.37	406.00	213.70	4.06	₦1,070,000
$LSD_{0.05}$	8.01	70.40			

DISCUSSION

The experiment was conducted to compare the performance of a riverine telferia accession with an upland land race in Awka. Environmental factors that affect plant growth include light, temperature, water, humidity, and nutrition. It is important to understand how these factors affect plant growth and development (Geiger and Todhunter (2003).Both accessions seeds for planting were relatively of the same size and weight. The riverine accession also produced more leaves, and longer stems at WAP1 and 2 before the two accessions leaf number became equal. The probable cause of its early start and better performance might be due to high soil and environmental temperatures' especially as the nutrient supply were the same for the accessions. Temperature influences most plant processes, including photosynthesis, transpiration, respiration, germination, and flowering (Geiger and Todhunter (2003).As temperature increases (up to a point), photosynthesis, transpiration, and respiration increase. When combined with day-length, temperature also affects the change from vegetative (leafy) to reproductive (flowering) growth (Nwankwo and Oguguru,2012). It should also be noted that riverine accession also had the biggest stem girth and larger leaf area throughout the course of the work and this was the reason for its higher stem and leaf harvest at WAP 4 (213.70kg/ha) and WAP11(4.00t/ha) as against upland accession WAP4(77kg/kg) and WAP11(2.68t/ha)harvests. Presently, a typical head of telferia (consists of leaves and stem unit for sale) in the market that weighs about 20grams costs ₦100:00 and so the upland accession yield of 77.00kg/ha would sold at ₦385,00:00 while that of Riverine accession at 213.70kg/ha would sold at ₦1,070,000:00.

The leaf area (cm^2) of *Telferia occidentalis* is very important, as it acts as an indicator when it comes to photosynthetic capacity.This is in accord with the findings of Ojeifo*et al., (*2006)that cultivation of *Telferia occidentalis* for its leaf or fruit, or both, is a profitable enterprise.Chukwudi and Agbo, (2014b) also stated that the higher number of leaves per plant was pivotal to high leaves and fruit quality and quantity as more photosynthetic activities took place on the leaf surface resulting in more translocation of photosynthates to the leaves, fruits and other storage organs. The leaves of *Telferia occidentalis* is very nutritional, consumers always desires to get the ones with good number of leaves, and is more marketable (Odiaka*et al.,* 2008;) It is very clear that the more the stem of fluted pumpkin, the more leaves that will be generated as well, and this is in conformity with the findings of (Odiyi *et al.,* 2014) who indicated that number of stem, can as well influence number of leaves which is very important in determining the marketable leaf yield of fluted pumpkinFlowering in fluted pumpkin is very essential, and that will usher in the fruit development. According to Odiaka and Akoroda (2009) female plants commenced flowering from 105 to 141 days after sowing. AlsoAkoroda and Adejoro (1990) recorded as well that female and male plants took about 150 and 129 days, respectively to flower. The Riverine accession performed better than the upland accession in most of the tested parameters .The experiment indicated that the Riverine accession produced a good number of leaves and long stems, bigger stem girth and leaf area and also had early flowering and fruiting potentials.(Porfirio *et al.,* 2018).So there is need to check the productivity of local crops accessions across different geographical locations to ascertain their adaptability and productivity. Therefore, to achieve maximum production of *Telferia occidentalis* inAwka rainforest zone of Nigeria, Riverine accession is recommended.

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