GROWTH AND TUBER YIELD PERFORMANCE OF SWEET POTATO CULTIVARS *(IPOMOEA BATATAS* L.*)* SOUTHERN AND NORTHERN GUINEA SAVANNA OF TARABA STATE

Balogun K, A.S Adeyeye, C.P Shinggu, M. Gani

Department of Crop Production and Protection, Federal University Wukari, Taraba State, Nigeria
Corresponding Author: Balogun k, (kerimubalogun@gmail.com)

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Abstract: *Two field experiments were conducted in 2021* at Teaching and Research Farm of both the Federal University Wukari and Taraba State University Teaching and Research Farm Jalingo to determine the growth and tuber yield attributes using seven varieties of sweet potato. The experiment was a randomized complete block design with three replications. The sweet potato varieties were planted and allowed to grow and develop to maturity during which their growth and development were monitored. Data collected were subjected to analysis of variance where significant means were separated using Duncan multiple rang test at 5% probability level. Proximate analysis was used to determine the quality and nutrient of each variety. The varieties used are; Donga white local (V1), Tropical Ipomoea Selection (TIS-91/198 (V2), TIS-008164 (V3), TIS-91/62 (V4), TIS-87/0087 (V5), Jalingo local (V6) and Donga purple local (V7) for 2021 cropping season. *Varietal difference were observed* in both wukari and jalingo yield performance of sweet potato varieties were V1(16.77 t/ha and 14.40t/ha) significantly had the highest yield value compare with other varieties used in the study, followed by V6 (16.73 t/ha and 14.30t/ha) and the lowest value was observed for V7 (13 t/ha and 12.80t/ha) respectively, while the best patronal variety that had highest value in all the yield characters measured was observed in Jalingo local, Donga white local and TIS-91/198 respectively at both wukari and Jalingo experimental trials and the three varieties are recommended based on the tuber yield and qualities of the varieties. However, more research should be done under rainfed season at different locations to ascertain the authenticity of the claim.

Key word: Agronomy characters, sweet potato, cultivars, location of studies.

Introduction

Sweet potato (*Ipomoea batatas* (L)) is commonly called morning glory and it is widely grown in tropical, subtropical and warm temperate regions of the world (Xi and Waana, 2022). It originated in Central America to the North West of Latin America, it is widely grown throughout the tropics and temperate region. Sweet potato is an important root crop serving as food, feed and raw material globally (Peter and Michael, 2023).

Sweet potato is an important food security crop grown in many of the poorest regions of the world mainly by women for household consumption and as source of family cash income (Scott *et al*., 2000; Aritua and Gibson, 2002; Adeyonu *et al*. (2017)). Its role as a cash crop is significantly increasing due to the crop's high yield potential and ability to grow in a wide range of environments (Chiona, 2009; Wang *et al*., 2011***).*** It is considered as a poor man's crop because of its low input requirement, ease of production and ability to produce under adverse weather and marginal soil condition (Aritua and Gibson, 2002). Most small-scale farmers in Africa and Asia use sweet potato, both the vegetative and storage roots as source of carbohydrate, protein, iron, fibre and vitamin A and C, for human food and livestock feed (Scott *et al.*, 2000).

Growers of sweet potato in Nigeria are faced with a number of problems in trying to improve the yield and quality of the sweet potato (Balogun *et al*., 2021). Although the National Root Crop Research Institute (NRCRI) Umudike, had released improved cultivars of sweet potato, it has been observed that the few Nigerian farmers who engage in small scale sweet potato cultivation in some selected areas in the country face a myriad of problems such as cultivar selection, low soil fertility, areas suitable for each cultivar and low tuber yield per land area on which the crop is grown (Nyiawung *et al.,* 2010; Balogun *et al*., 2021). This problem is further compounded by the accelerated increase in human population, which creates pressure. Enhancing its production efficiency can contribute significantly to food security and economic stability in many developing countries (Kana *et al*., 2012).
This study has the potential to provide valuable insights that can significantly impact food security and economic stability in sweet potato-growing regions. Therefore, the study aimed to assess the most suitable sweet potato cultivar for optimal growth and tuber yield in the Southern and Northern Guinea Savanna regions with the following specific objective.

Main Objective of the study:

To assess and compare the yield potential, growth performance, and locational effects on sweet potato vaieties across Jalingo (Northern Guinea Savanna) and Wukari (Southern Guinea Savanna) regions in Taraba State, Nigeria.

Materials and Methods

Experimental Site Description

The research was conducted in Wukari and Jalingo Local Government of Taraba State during the 2021 cropping season. Taraba State lies between latitude 6·30°N - 9.30°N of the equator and between longitude 9 60°E - 12· 90° E of the Greenwich meridian with a land mass of 54,426km². It shares boarders with Bauchi and Gombe State in the North, Adamawa State in the East and Cameroon Republic in the south west. The state has a tropical wet – dry climate, well drained alluvial soils and has both savannah and Rain forest vegetation. The rainfall ranges between1000mm to 2500mm per annum in the north with the driest and wettest season lasting from December to February and July to September respectively (Peel *et al*., 2007). Wukari is situated in the southern part of Taraba State (figure 1). It is about two hundred kilometers away from Jalingo the state capital. It lies between latitude 7.8^0 – 8.2ºN and longitude 9.3º – 10.5ºE with an average elevation of 200/masl. It is bounded in the south by Benue state, North by Gassol LGA, East by Donga LGA and West by Ibi LGA. Wukari agro-ecological zone is the southern guinea savanna and it is characterized by tropical hot/wet with distinct rainy and dry seasons as modified by (Peel *et al* 2007). Wukari has a land mass of about 4,308km^2 with a population of 241,546 (National Population Commission, NPC 2006) which makes it the second largest and most populated local government in the state. Wukari lies within the tropical hinterland climatic region. The region is characterized by bimodal type of rainfall distribution with about five months of dry season. The dry and wet season are controlled by the annual migration of the inter-tropical zone of convergence (ITZC). The dry season is characterized by the dry dust laden with harmattan winds coming across the Sahara Desert and occurring between November and February of every year. The wet season sets in by April and lasts around October. Jalingo is situated in the Northern part of Taraba State. The local government area lies between latitude 8.30^0 – 9.10ºN of the equator and longitude 10.58º – 11.30ºE of Greenwich meridian. The local government areas have a land mass of 3,268km^2 with a population of 56,921 Projected to 165,589 in 2016. The local government area shares a common boundary with Gassol to the west, karim lamido to the north and Bali LGA to the south. The climate of the area is marked by dry season between (November – March) and rainy season between (April – October). It has an average annual rainfall ranging between 800mm to 1525mm and temperature range between 20ºc to 30ºc. the local government is predominately agrarian in nature and rich alluvial track of soil found in most part of the local government area is conducive for growing of various food crops, majority of inhabitants of the local government area are engage in farming and rearing of animals as an occupation. The driest and wettest season lasting from December to March and June to September respectively (Peel *et al*., 2007; Aboki E *et al*., 2019).

Experimental Materials

The planting materials consist of seven different cultivars of sweet potato vine: Local cultivars which were purchased from local market in Jalingo and improved cultivars were collected from National Root Crop Research Institute (NRCRI) Umudike. The sweet potato cultivars used for the experiment are: Tropical Ipomoea selection: TIS 91/198, a white tuber flesh with light purple skin colour of sweet potato and low sugar content which have a yield of over 20.6t/ha, that matured in 120days, Cultivar TIS 91/62, a light orange skin with deep reddish flesh tuber that has good texture and taste nice, matured at 120days after planting with over 19.3t/ha in tuber yield, Cultivar TIS 87/0087 and Cultivar TIS 8164 which also has low sugar content but not as low as TIS-91/198, they have purple leaves with white flesh tubers and they both matured in 128days. The four cultivars are developed by the National Root Crop Research Institute (NRCRI), Umudike. The local cultivars are: white skin cultivar with white flesh tuber (Donga white local cultivar), purple tuber cultivar (Donga purple local) and Jalingo local (Creame skin cultivar with white flesh tuber) the three local cultivars have adaptation ability of the environment and matured in 120 days after planting, the three local cultivars did not achieve a significant tuber yield record.

Experimental Design and Treatments

The experiment was laid out in randomized complete block design (RCBD) with three replications. The treatments consist of three different local cultivars (Donga white local (White colour fresh cultivar), Jalingo local (Red skin leaf cultivar), and Donga purple (Light-purple tuber cultivar)) with four improved cultivars (TIS 91/198, TIS 91/62, TIS 87/0087 and TIS 08164*)*. The size of each plot was 4 m x 3 m = 12 m^2. There was 1m pathway between plots and 2m between replications. The total land area for the experiment was 36 m x 39 m = 1404 m$^{2.}$ There was total of 756 heaps.

Cultural Practices

Vine cuttings from topmost apical sections and other actively growing sections were used for planting. All open leaves were detached from mature vines, the removal of leaves was done to reduce transpiration and ensure good vine establishment. It was direct planting, where two-thirds of each erect vine (with 2-3 nodes) was bury into the soil at an angle leaving one-third above the soil at one vine per /stand at a spacing of 1 m x 50 m. Each experimental plot contained twenty-four (24) plants stands within each plot area. The plot size was 4m x 3m which laid with beds, each measuring about 50cm high. The beds were manually constructed with a hoe. Sweet potato vine cutting was planted on the bed of 1m x 50m which was 24 plants per plot.

Weeds were control in both field experiments at 4 weeks after planting and as when necessary using cutlass and hand hoeing method before close of the canopy and to reduce competition with crops. Subsequent weed control was by hand pulling and reshaping of beds. The plants were allowed to grow, develop till maturity.

Data Collection

Growth Parameters

Five plants from each plot were randomly selected and tagged for collection of data during crop growth. Measurement of some growth parameters was made at three weeks intervals.

Length of the Primary Vines (cm)

Length of primary vines were determined by measuring the length from the base directly above the ground to the terminal bud of the tagged plants using measuring tape. The primary vine lengths were added and divided by five for the average. This was determined at 3, 6, 9 and 12 weeks after planting (WAP)

Number of Leaves per Plant

Numbers of leaves per plant were determined by counting the number of green leaves on each of the tagged plants. The total number of five plants leaves were added and divided by five for the average. This was determined at 3, 6, 9 and 12 WAP

Number of Secondary Vine per Plant

Number of secondary vines per plant was determined by counting the number of secondary branches on tagged plants. The total of five plants was divided by five for the average. This was determined at 3, 6, 9 and 12 WAP

Number of Nodes per Plant

Numbers of nodes per plant were determined by counting the number of nods on tagged plants. The total of five plants was divided by five for the average. This was determined at 3, 6, 9 and 12 WAP.

Leaf Area (cm); Leaf area per plant was estimated by measuring the five sampled plants on each plot using measuring tape.

Leaf Area index (cm); Leaf area per plant was estimated by measuring the five sampled plants on each plot using measuring tape and later divided by the area of land used.

Yield Components Parameters

Number of Tuber per Plant; The number of mature tubers was counted from five randomly tagged plants in each of the plot and the mean were recorded.

***Weight of Tuber per Plant* (kg);** Each of the five tagged plants tubers per plot was weighed using the weighing scale and the average were recorded.

Length of Tuber per Plant (cm); Five plants were selected randomly from each of the plot at harvest. The tubers were measured using measuring tape and ruler, after which the total measurements of the five tubers were summed up and divided by five for the average.

Tuber Size (girth) per Plant (cm); Five plants were selected randomly from each of the plot at harvest. The tubers were measured using callipers, after which the total measurements of the five tubers were summed up and divided by five for the average.

Weight of Tuber per Net Plot (kg); Five plants were selected randomly from each of the net plot at harvest. The tubers were weighed using Metler Toledo SB16001 electronic digital weighing scale after which the total weights of the five tubers were summed up and divided by five for the average.

Weight of Tuber per Hectare (t ha^{-1}); All the tubers from each net plot were harvested and weighed using Metler Toledo SB16001 electronic digital weighing scale. The total weight was then converted to tonnes per hectare and recorded.

Data Analysis

The Data collected were subjected to analysis of variance (ANOVA) appropriate for randomized complete block design. Statistical analysis system (SAS) was used to determine the significance of the F- test and the treatment means were separated using Duncan Multiple Range Test (DMRT) at 5% probability level.

Results and Discussion

The effects of sweet potato varieties on the growth parameters at 3weeks after planting is presented in table 1. Showed the significant differences were observed for the trait such as length of primary vine, number of nodes, and number of leaves per plant with the exception of number of secondary vines. Variety TIS-87/0087 had the highest significant length of primary vine (27.70) followed by the variety TIS-91/198 (27.50) and Donga white local (25.80), while Donga purple recorded the least value (11.0). Furthermore, variety TIS-87/0087 recorded the highest value for the number of nodes (14.61) followed by TIS-91/198 having the mean value (13.72) and Donga white local (13.32) while Donga purple recorded the least value (9.46). Significant differences were observed for the trait such as length of primary vine, number of nodes, and number of leaves per plant with the exception of number of secondary vines and leaf area. Variety TIS-91/198 had the longer length of primary vine (58.10 cm) followed by the variety Donga white local (57.10 cm) and TIS-91/62 (51.90 cm), while Donga purple recorded the least value (28.80 cm). Furthermore, variety TIS-87/0087 recorded the highest value for the number of leaves (18.60) followed by Donga white local having the mean value (17.57). While TIS-008164 recorded the least value (12.91). In terms of number of secondary vines, leaf area and number of nodes, there were no significant difference among the varieties (table1).

There was also varietal difference in number of nodes per plant as revealed in table 2. In addition, there was no significant difference in the number of secondary vine, leaf area and leaf area index among the varieties but variety TIS-91/198 had the higher mean values (1.99) when compared to other varieties used in the study. Donga white local variety had the highest significant value for primary vine (103.00 cm) followed by TIS-87/0087 (95.30 cm), and Jalingo local (94.40 cm) while the lowest value was recorded for Donga purple local (60.20 cm). In terms of number of secondary vine, donga white local had the highest value (4.51) follow by TIS-87/0087 (3.43) and the least record was for TIS-008164 (2.74). Furthermore, varietal difference was observed in the number of leaves per plant, with Donga white local recording the highest value at 6 weeks after planting (33.80) followed by TIS-87/0087 (30.80) and TIS-91/198 (30.50) while the least significant leaf number was recorded for TIS-008164 (22.70). There was no significant different in the leaf area and leaf area index in the study (table2).

The results recorded at 9 weeks after planting indicated that variety TIS-87/0087 had the highest length for primary vine (64.20 cm) followed by TIS-91/198 (63.40 cm) and Donga white local (61.60 cm) while Donga purple recorded the least value (39.10 cm). Significant difference was observed for the number of nodes per plant, TIS87/0087 had the highest number of nodes followed by TIS-91/198 (160.90) and Donga white local (160.00), while variety Donga Purple local recorded the least value (139.90). However, there was no significant difference observed in number of secondary vines, leaf area and leaf area index among the varieties used. The results recorded at 9 weeks after planting, Donga white local variety had the highest length for primary vine (145.10 cm) followed by TIS-91/62 (118.50 cm) and TIS-91/198 (118.40 cm), while Donga purple recorded the least value (60.20 cm). Significant difference was observed for the number of secondary vines per plant, Donga white local had the highest number of secondary vine (10.02) followed by Jalingo local (7.06), while variety TIS-008164 recorded the least value (3.93). The Donga white local variety recorded the highest significant value for Number of nodes (227.90) followed by the variety TIS-87/0087 (218.60) and Jalingo local (209.00). The lowest value was recorded for TIS-008164 (184.00). In teams of leaf area and leaf area index, Jalingo local had the highest leaf area followed by TIS-91/62, TIS-91/198 and Donga purple local, and the least was for TIS-008164. However, there was no significant difference observed in leaf number among the varieties used at 9 weeks after planting (table 3).

The results in table 4, which is 12WAP showed that variety TIS-91/198 had the highest significant value for primary vine (82.00) followed by Donga white local (76.50), TIS-87/0087 (75.90) and TIS-008164 (75.40) while the lowest value was recorded for Jalingo local (40.80). The number of nodes recorded indicated that variety TIS-91/198 gave the highest significant value for nodes number (70.40) followed by variety Donga white local (163.50) and TIS-87/0087 (160.80) respectively while the least value was recorded for Donga Purple local (140.10). Furthermore, varietal difference was observed in the number of leaves per plant, with Donga white local recording the highest value at 12 weeks after planting (377.60) followed by TIS-91/198 (355.10), TIS-91/62 (333.30) and TIS-008164 (311.30) while the least significant leaf number was recorded for TIS-87/0087 (288.00). However, there was no significant difference in leaf area and number of secondary vines among the varieties used at 12 weeks after planting. At jalingo in table 4 showed that variety TIS-91/62 had the highest significant value for primary vine (169.20) followed by TIS-91/198 (166.00) and TIS-87/0087 (158.80) while the lowest value was recorded for Donga purple local (139.60). Number of secondary vine was significantly higher in donga white local follow by TIS-87/0087, TIS-91/198 and Jalingo local respectively with the least value recorded in TIS-91/62. The number of nodes recorded indicated that Jalingo local variety gave the highest significant value for nodes number (128.70) followed by TIS-87/0087 (117.50) and Donga white local (111.50) respectively while the least value was recorded for Donga Purple local (106.60). Furthermore, varietal difference was observed in the number of leaves per plant, with TIS-008164 recording the highest value at 12 weeks after planting (364.00) followed by TIS-87/0087 (359.70) and the least with Donga purple (347.00). There was no significant different for leaf area and leaf area index in the study.

The tuber yield and its component at harvest in Table 5, showed that there was a significant relationship between varieties used in the study. It was revealed that Jalingo Local variety had the highest significant value for the number of tubers per plant (3.77) followed by TIS-008164 (3.51), TIS-91/62 (2.88), and Donga white local (2.74). While Donga purple recorded the least value (2.36). Number of tubers per net plot was significantly higher also in Jalingo local (9.56) followed by TIS-008164 (8.88), and TIS-87/0087 (8.79). The least value was recorded by Donga Purple (6.84). Significant differences were also observed for the weight of tuber per plant, with variety TIS-87/0087 (1.73kg) and TIS-008164 (1.72kg) had the highest value while Variety TIS-91/62 and Donga purple recorded the lowest weight. The weight of tuber per net plot recorded indicated that varieties, TIS-008164 (3.63kg), Donga white local (3.53kg) and Jalingo local (3.29kg) produced the highest significant values compared to other varieties used in the experiment, while variety TIS-91/198 had the least significant value (1.41kg).

However, Donga white local, TIS-87/0087 and Jalingo local had significantly produced the higher length of tubers and tuber size (9.58cm, 8.56cm and 7.92cm. and 10.44cm, 10.35cm and 9.96cm respectively) compared to other varieties used and the lowest tuber length and size was for Donga purple local (6.62cm and 7.53cm respectively). Tuber yield was significantly higher in Donga white local (16.77t/ha) and Jalingo local (16.73t/ha) varieties respectively while the least tuber yield was recorded for Donga purple (13.15t/ha).

The results obtained for sweet potato varieties on tuber yield and its component at harves**t** in jalingo showed that there was a significant relationship between varieties used in the study. It was revealed that Donga white local variety had the highest significant value for the number of tubers per plant (4.82) followed by TIS-87/0087 (4.60), Jalingo local variety (4.37), and TIS-008164 (4.02). While Donga purple recorded the least value (3.23). Number of tubers per net plot was significantly higher also in Jalingo local (16.56) followed by TIS-87/0087 (15.79) and TIS008164 (14.88). The least value was recorded by Donga Purple (10.84). Significant differences were also observed for the weight of tuber per plant, with Donga white local variety (3.07 kg) and Jalingo local (2.97 kg) had the highest value follow by TIS-87/0087 (2.64 kg) and TIS-91/62 (2.53 kg) respectively while Donga purple Variety recorded the lowest weight. The weight of tuber per net plot recorded indicated that Donga white local varieties (7.70 kg/netplot), Jalingo local (7.40 kg/netplot), TIS-87/0087(6.60 kg/ kg/netplot) and TIS-91/62 (6.30 kg/netplot) respectively produced the highest significant values compared to other varieties used in the experiment, while Donga purple variety had the least significant value (4.60 kg/netplot).

Furthermore, Donga white local, TIS-91/198, Jalingo local and TIS-87/0087 had significantly produced the longer length of tubers and tuber sizes compared to other varieties used. Tuber yield was significantly higher in Donga white local (14.40t/ha) and Jalingo local (14.30t/ha), follow by TIS-87/0087 (13.90t/ha) and TIS-91/62 (13.70t/ha) respectively while the least tuber yield was recorded for Donga purple (12.80t/ha) and TIS-91/198 (12.90t/ha) (Table 10).

Discussion

The results obtained from the growth attributes of varieties, showed that differences existed between varieties for most of the growth parameters such as length of primary vine, number of secondary vines, leaf area and number of leaves in both field experiments and that, they were highly influenced for donga local having the highest growth parameter. This observation maybe due to the inherent genetic ability in different variety which gave genetic superiority over each other. The observation is in conformity with Amajor *et al*., (2011) who reported that, factors which affect quality and growth parameters of sweet potato are variety selection, type of varieties used, plant population and rainfall. Also, in line with the report of Nedunchezhiyan *et al.*, (2012) who reported that varietal effect on growth parameters of sweet potatoes was significant different across environment

The effect of variety on the growth parameters were significant. TIS-91/198 variety consistently recorded the longest length of primary vine in all sampling periods for pot experiment followed by Donga white local, TIS-87/0087and Jalingo local. While for field experiment, Donga white local variety consistently recorded the highest growth parameter in all sampling periods followed by TIS-91/198, TIS-87/0087 and Jalingo local. The differences in growth parameters could be attributed by variety selection, genetic characters of the variety and ability of the crop to produce in diverse environment. For example, farmers select cultivars with longer vine length, due to the fact that, the longer the vine, the higher the number of leaves and bigger the leaf area which made available for photosynthesis that results in high tuber yield. This result is in total agreement to the findings reported by Amarullah (2020) and Adetunji *et al*., (2011) on cassava crops, they reported that due to the inherent genetic ability in different variety which gave genetic superiority over each other. Also, Nedunchezhiyan *et al.*, (2012) reported that varietal effect on growth parameters of sweet potatoes was significant different across environment.

The Donga white local, TIS-91/198, Jalingo local and TIS-87/0087 at all sampling periods had the highest growth parameters such as length of primary vine, number of secondary vines, number of leaves, leaf area and leaf area index. The differences in length of primary vine and leaf area index could be attributed to genetic effect of individual genetic makeup. This is in conformity with the report of (Magani and Kuchinda, 2009; Amarullah 2020 and Adetunji *et al*., 2011) who's findings on cassava crops, they reported that due to the inherent genetic ability in different variety which gave genetic superiority over each other.

The higher number of secondary vine, number of leaves, leaf area and other superior yield attributes exhibited by TIS-91/198, Donga white local, Jalingo local and TIS-87/0087 over other varieties may be due to genetic factors, but are equally highly influenced by the environmental factors, this is in line with (Vanaja & Babu, 2006; Yadeta *et al*., 2011; Narasimhulu *et al*., 2012) found that the response of sweet potato depended highly on genotypic and environmental variations.

The number of tubers, weight of tuber, length of tuber, size of tuber and tuber yield per hectare were significantly different. The tuber yield performance of Jalingo local, Donga white local, TIS-87/0087 and TIS-91/198 over other varieties used in the experiment could be attributed to longer primary vine, higher number of secondary vine and more number of leaves. This conforms to the findings of Brady and Weil (1999) that crop yield is dependent on the amount of foliage present on the plant.

The yield positive response shown for Jalingo local, Donga white local, TIS-87/0087 and TIS-91/198 over other varieties used in the experiment by yield characters to different variety could also be linked to the well-developed photosynthesis surfaces (length of primary vine, number of secondary vine, number of leaves, leaf area and its position on vine) increased physiological activities leading to more assimilates being produced and subsequently translocated and utilized in rapid tuber development and production. This is in line with the report of Magani *et al*., (2009) who pointed out that differences in growth and tuber yield parameters could be attributed to genetic effect of individual genotype.

Table 1: Effect of varieties on the growth parameters of sweet potato at 3weeks after planting. 2021 cropping season

	WUKARI					**JALINGO**				
Variety	**LPV/P**	**NSV/P**	**NN/P**	**NL/P**	**LA/P**	**LPV/P**	**NSV/P**	**NN/P**	**NL/P**	**LA/P**
Donga white	25.80a	1.09a	13.32ab	10.44ab	97.68a	57.10a	2.01a	28.60a	17.57a	88.31a
TIS-91/198	27.50a	0.93a	13.72a	11.33a	98.05a	58.10a	2.18a	27.70a	15.92ab	85.41a
TIS-008164	22.60ab	0.73a	10.59b	6.68b	98.80a	33.90b	1.99a	20.50a	12.91b	90.04a
TIS-91/62	17.80ab	0.97a	10.62b	8.89b	98.10a	51.90ab	2.11a	20.90a	14.94b	100.89a
TIS-87/0087	27.70a	0.60a	14.61a	9.23b	97.80a	47.70ab	2.69a	26.60a	18.60a	73.68a
DongaPurple	11.00b	0.72a	9.46b	8.08b	97.65a	28.80b	2.09a	20.80a	13.76b	98.05a
Jalingo local	15.00b	0.73a	10.58b	7.97b	97.89a	45.60ab	1.96a	21.10a	16.18ab	86.44a
Means	18.65	0.72	11.85	8.04	98.44	18.20	1.09	19.14	4.33	31.09

Values with different letters along the columns are significantly different ($P<0.05$)
TIS = Tropical ipomoea selection, **LPV/P** = length of primary vine per plant, **NSV/P** = number of secondary vine per plant, **NN/P** = number of nods per plant, **NL/P** = number of leaf per plant

Table 2: Effect of varieties on the growth parameters of sweet potato at 6weeks after planting. 2021 cropping season

	WUKARI					JALINGO				
Variety	**LPV/P**	**NSV/P**	**NN/P**	**NL/P**	**LA/P**	**LPV/P**	**NSV/P**	**NN/P**	**NL/P**	**LA/P**
Donga white	41.10ab	1.66a	41.20ab	98.77a	121.74a	103.00a	4.51a	103.80a	33.80a	106.47b
TIS-91/198	46.60a	1.99a	47.90a	99.83a	122.58a	88.30ab	3.03b	74.60ab	30.50ab	125.44a
TIS-008164	39.60ab	1.43a	25.00b	96.01a	102.47a	64.70b	2.74b	53.90b	22.70b	121.74ab
TIS-91/62	34.60ab	1.54a	35.80ab	95.94a	129.31a	88.10ab	2.82b	74.90ab	25.80ab	122.58ab
TIS-87/0087	47.20a	1.64a	46.30a	64.36b	121.74a	95.30ab	3.43ab	99.80a	30.80ab	102.47b
DongaPurple	21.20b	1.41a	24.00b	63.99b	122.10a	60.20b	2.98b	69.60ab	24.90ab	124.33ab
Jalingo local	29.80b	1.34a	34.70ab	75.41ab	121.43a	94.40ab	3.27ab	84.80ab	28.00ab	123.11ab
Means	20.46	1.54	32.07	22.89	120.05	35.91	1.42	32.02	10.64	17.44

Values with different letters along the columns are significantly different (P<0.05)
TIS = Tropical ipomoea selection, **LPV/P** = length of primary vine per plant, **NSV/P** = number of secondary vine per plant, **NN/P** = number of nods per plant, **NL/P** = number of leaf per plant

Table 3: Effect of varieties on the growth parameters of sweet potato at 9weeks after planting. 2021 cropping season

	WUKARI					JALINGO				
Variety	**LPV/P**	**NSV/P**	**NN/P**	**NL/P**	**LA/P**	**LPV/P**	**NSV/P**	**NN/P**	**NL/P**	**LA/P**
Donga white	61.60a	2.06a	160.00ab	228.60ab	138.33a	145.10a	10.02a	227.900a	258.40a	124.05ab
TIS-91/198	63.40a	2.50a	160.90ab	331.20a	124.77a	118.40ab	4.60b	203.00ab	254.20a	126.94ab
TIS-008164	54.10ab	2.33a	143.90ab	227.50ab	129.25a	86.00b	3.93b	184.00b	262.70a	115.46b
TIS-91/62	54.70ab	2.11a	141.80b	227.90ab	137.18a	118.50ab	4.26b	196.50b	247.50a	128.59ab
TIS-87/0087	64.20a	2.19a	164.00a	222.50b	138.10a	97.80b	4.76b	218.60ab	254.80a	124.05ab
DongaPurple	39.10b	1.79a	139.90b	220..90b	124.44a	84.20b	4.43b	187.70b	243.50a	126.94ab
Jalingo local	44.00b	1.97a	149.40ab	226.70ab	128.22a	116.40ab	7.06ab	209.00ab	251.00a	133.76a
Means	18.42	0.91	20.31	7.11	19.22	30.04	3.43	25.74	19.44	15.56

Values with different letters along the columns are significantly different (P<0.05)
TIS = Tropical ipomoea selection, **LPV/P** = length of primary vine per plant, **NSV/P** = number of secondary vine per plant, **NN/P** = number of nods per plant, **NL/P** = number of leaf per plant

Table 4: Effect of varieties on the growth parameters of sweet potato at 12weeks after planting. 2021 cropping season

	WUKARI					JALINGO				
Variety	**LPV/P**	**NSV/P**	**NN/P**	**NL/P**	**LA/P**	**LPV/P**	**NSV/P**	**NN/P**	**NL/P**	**LA/P**
Donga white	76.50ab	8.99a	63.50ab	377.60a	128.40a	157.10ab	11.93a	111.50ab	356.40ab	133.65a
TIS-91/198	82.00a	7.21a	70.40a	355.10ab	120.89a	166.00a	11.70a	109.10ab	357.00ab	126.13a
TIS-008164	75.40ab	6.66a	43.30b	311.30b	114.78a	157.20ab	11.23ab	84.50b	364.00a	135.02a
TIS-91/62	52.50b	6.88a	53.80ab	333.30ab	120.45a	169.20a	10.04b	108.30ab	355.80ab	128.40a
TIS-87/0087	75.90ab	810a	60.80ab	288.00b	124.53a	158.80ab	11.80a	117.50a	359.70ab	120.89a
DongaPurple	53.50b	6.88a	40.10b	300.00b	115.91a	139.60b	11.29ab	106.60ab	347.00b	118.20a
Jalingo local	40.80b	6.66a	52.80ab	300.50b	117.10a	144.20b	11.49a	128.70a	356.70ab	138.11a
Means	55.79	6.01	44.02	39.06	17.16	22.72	0.90	30.46	11.87	19.22

Values with different letters along the columns are significantly different (P<0.05)

TIS = Tropical ipomoea selection, **LPV/P** = length of primary vine per plant, **NSV/P** = number of secondary vine per plant, **NN/P** = number of nods per plant, **NL/P** = number of leaf per plant

Table 5. Effect of varieties on yield and yield components of sweet potato at harvest 2021 cropping season Wukari.

Variety	Number of tubers PerPlant	Number of tubers Per Net plot	Weight of tuber Kg/ plant	Weight of tuber kg/net plot	Length of tuber /plant (cm)	Tuber size/plant (cm)	Tuber yield t/ha
Donga local white	2.74ab	8.08ab	0.48ab	3.53a	9.58a	10.44a	16.77a
TIS-91/198	2.66ab	8.12ab	0.46ab	1.41b	6.44b	8.41b	15.20ab
TIS-008164	3.51a	8.88ab	1.72a	3.63a	6.51b	8.26b	14.30ab
TIS-91/62	2.88ab	7.73b	0.44b	2.07ab	7.33b	9.63a	14.49ab
TIS-87/0087	2.52b	8.79ab	1.73a	2.29ab	8.56ab	10.35a	14.59ab
Jalingo local	3.77a	9.56a	0.50ab	3.29a	7.92ab	9.96a	16.73a
Donga purple	2.36b	6.84b	0.44b	1.42b	6.62b	7.53b	13.15b
Means	2.91	8.10	0.71	2.22	7.91	9.03	14.70

Values with different letters along the columns are significantly different using DMRT at 5% probability level. **TIS** = Tropical ipomoea selection

Table 10. Effect of varieties on tuber yield components of sweet potato at harvest in 2021 cropping season Jalingo.

Values with different letters along the columns are significantly different using DMRT at 5% probability level. **TIS** =

VARIETY	Number of tubers per plant	Number of tubers / net plot	Weight of tuber / plant (kg)	Weight of tuber / net plot (kg)	Length of tuber per plant(cm)	Tuber size per plant (cm)	Tuber yield (Tons/ha)
Donga White Local	4.82a	13.08ab	3.07a	7.70a	9.92a	9.04a	14.40a
TIS-91/62	3.82ab	13.12ab	1.94b	4.90b	7.99b	8.01b	12.90b
TIS-008164	4.02a	14.88a	2.17ab	5.40ab	7.68b	8.22b	13.30ab
TIS-91/198	3.62ab	12.73ab	2.53a	6.30ab	9.45ab	9.93a	13.70ab
TIS-87/0087	4.60a	15.79a	2.64a	6.60ab	9.33ab	9.55a	13.90ab
JalingoLocal	4.37a	16.56a	2.97a	7.40a	8.54ab	9.99a	14.30a
Donga purple	3.32b	10.84b	1,86b	4.60b	7.64b	8.55b	12.80b
Means	3.44	12.40	1.96	5.82	8.61	8.77	13.03

Tropical ipomoea selection

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Conclusion
In conclusion the main objective of this research was to evaluate the performance of the varieties, planting method and the type of fertilizer for the crop in southern and northern guinea savanna of Taraba State. It will give an opportunity for farmers to select the best variety suitable for their agronomic practices.

This research had identified Donga white local and Jalingo local as the highest in terms of growth and tuber yield performance respectively. Donga purple was the least in terms of growth and yield values.

Comparing the result of the southern and northern guinea savanna, it was observed that, southern guinea savanna performed better than the northern guinea savanna in the study.

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