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FIELD EVALUATION OF SWEET POTATO (Ipomoea batatas L.) VARIETIES FOR YIELD AND YIELD COMPONENTS IN EHA-AMUFU SOUTH EASTERN NIGERIA

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Abstract

Sweet potato (***Ipomoea batatas*** L.) is an important root crop that contributes significantly to food security, nutrition, and income generation in Nigeria. However, the productivity of sweet potato in many farming communities remains low due to the continued cultivation of low-yielding local cultivars and inadequate information on the adaptability of improved varieties under specific agro-ecological conditions. This study evaluated the growth, yield, and yield-related characteristics of three improved sweet potato cultivars and one local cultivar to identify suitable varieties for sustainable production in Eha-Amufu, southeastern Nigeria.The experiment was conducted during the 2019 cropping season at the Teaching and Research Farm of the Federal College of Education, Eha-Amufu, Enugu State, Nigeria. Four cultivars (Solo Gold, TIS 087, Mother's Delight, and a local cultivar used as control) were evaluated in a Randomized Complete Block Design (RCBD) with four replications. Data were collected on phenological, growth, yield, and pest-related traits and subjected to analysis of variance (ANOVA). Treatment means were separated using Fisher's Least Significant Difference (LSD) test at 5% probability level, while Pearson correlation analysis was used to determine relationships among traits. Significant ($P \leq 0.05$) differences were observed among the cultivars for days to 50% flowering, number of flowers per plant, days to harvest, peduncle length, fresh tuber weight per plot, and fresh tuber yield. Solo Gold flowered earliest (69.50 days), whereas the local cultivar flowered latest (93.25 days). The local cultivar recorded the highest survival rate (81.20%), vine length (20.40 cm), fresh tuber weight per plot (15.80 kg), and fresh tuber yield (266.00 t ha^{-1}). Mother's Delight produced the highest number of tubers per plant (8.36), while TIS 087 recorded the highest number of flowers per plant (18.28) and the lowest pest infestation score (2.00). Correlation analysis revealed significant positive associations between tuber yield and days to 50% flowering ($r = 0.60$), leaf area ($r = 0.53$), and days to harvest ($r = 0.54$). The local cultivar exhibited superior yield performance under the environmental conditions of Eha-Amufu and is therefore recommended for cultivation in the study area. Leaf area, flowering time, and maturity period were identified as important traits associated with yield and may serve as useful selection

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criteria in sweet potato improvement programmes. Mother's Delight and TIS 087 also possess desirable characteristics that could be exploited in future breeding efforts aimed at improving productivity and pest tolerance.

Keywords: *Ipomoea batatas*, sweet potato cultivars, yield performance, genotype

INTRODUCTION

Sweet potato (Ipomoea batatas L.) is one of the most important root and tuber crops cultivated worldwide and ranks among the leading food crops in terms of production and consumption. The crop is valued for its high carbohydrate content, adaptability to diverse agro-ecological conditions, short growth cycle, and ability to produce reasonable yields under marginal soil fertility and moisture conditions. Sweet potato contributes significantly to food security, poverty alleviation, and income generation, particularly among smallholder farmers in developing countries (FAO, 2024).

Globally, sweet potato has gained increasing attention due to its resilience to climate variability and its role in sustainable agricultural systems. Compared with many staple crops, sweet potato requires relatively fewer external inputs and can tolerate drought conditions, making it a suitable crop for climate-smart agriculture. The crop is cultivated extensively across Asia, Africa, and Latin America, with sub-Saharan Africa accounting for a substantial proportion of global production (International Potato Center [CIP], 2023).

Beyond its agronomic advantages, sweet potato possesses considerable nutritional value. The storage roots are rich in carbohydrates, dietary fibre, vitamins, minerals, and antioxidants. Orange-fleshed sweet potato (OFSP) varieties are particularly important because they contain high concentrations of β-carotene, a precursor of vitamin A. The promotion of OFSP has been identified as one of the most effective food-based strategies for combating vitamin A deficiency among children and women in developing countries (Low et al., 2017; Neela & Fanta, 2019). Regular consumption of orange-fleshed sweet potato has been shown to improve vitamin A status and contribute to the reduction of micronutrient malnutrition, often referred to as “hidden hunger” (Mulwa et al., 2023).

Nigeria is among the leading producers of sweet potato in Africa and the crop has become increasingly important in addressing food and nutritional challenges. Despite its importance, productivity remains below attainable yield levels due to factors such as poor soil fertility, pest and disease infestation, inadequate agronomic management, and the continued cultivation of low-yielding local varieties. The use of improved cultivars has been recommended as a practical approach for increasing productivity and improving farmers’ income (NRCRI, 2024).

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The performance of sweet potato cultivars is influenced by genetic characteristics and environmental conditions. Consequently, varieties that perform well in one location may not necessarily exhibit similar performance in another environment due to genotype × environment interactions. Several studies have reported significant differences among sweet potato genotypes in growth, yield, adaptability, and pest resistance across agro-ecological zones (Yada et al., 2021; Wube et al., 2025). Therefore, evaluating improved cultivars under local environmental conditions is essential for identifying suitable varieties that can maximize productivity and ensure sustainable production.

In Eha-Amufu, sweet potato cultivation constitutes an important component of the farming system, providing food, income, and employment opportunities for rural households. However, information regarding the comparative performance of improved sweet potato cultivars and locally cultivated varieties under the agro-ecological conditions of the area is limited. Such information is necessary for making informed recommendations to farmers and agricultural extension agencies.

Therefore, this study was conducted to evaluate the growth, yield, and yield-related characteristics of four sweet potato cultivars in Eha-Amufu, southeastern Nigeria. The specific objectives were to compare the agronomic performance of improved and local cultivars and identify the most suitable varieties for sustainable sweet potato production in the study area.

MATERIALS AND METHODS

Study Area

The experiment was conducted during the 2019 cropping season at the Teaching and Research Farm of the Department of Agricultural Education, Federal College of Education, Eha-Amufu, Enugu State, Nigeria. Eha-Amufu is located in Isi-Uzo Local Government Area within the Southern Guinea Savanna agro-ecological zone of southeastern Nigeria. The area lies approximately between latitude 6°52′N and longitude 7°24′E, at an altitude of about 113 m above sea level. The climate of the area is characterized by a distinct wet and dry season with an average annual rainfall ranging from 1,700 to 2,000 mm. Rainfall distribution is bimodal, with peaks occurring between June and September. The mean annual temperature ranges between 25 and 32°C, while relative humidity is generally high during the rainy season. The soils of the area are predominantly clay loam to clay and are suitable for the cultivation of root and tuber crops.

Experimental Materials

Four sweet potato (Ipomoea batatas L.) cultivars were used for the study. These included: Tropical Ipomoea Species (TIS 087), Solo Gold (Umupos 4), Mother's Delight and Local cultivar (control).

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The improved cultivars were obtained from the National Root Crops Research Institute (NRCRI), Umudike, Abia State, Nigeria, while the local cultivar was sourced from farmers in Eha-Amufu.

Experimental Design and Field Layout

The experiment was laid out in a Randomized Complete Block Design (RCBD) consisting of four treatments replicated four times. The total experimental area measured 168 m² and was divided into sixteen plots, each measuring 10.5 m². Each plot consisted of four ridges spaced 0.75 m apart. The sweet potato cultivars constituted the treatments and were randomly assigned to the plots within each replication to minimize experimental error.

Land Preparation and Planting

The experimental field was manually cleared, ploughed, and ridged before planting. Healthy vine cuttings measuring approximately 25–30 cm in length were selected and planted on the crest of the ridges. Planting was carried out at an intra-row spacing of 30 cm and an inter-row spacing of 75 cm, giving an adequate plant population for optimum growth and yield.

Fertilizer Application and Crop Management

NPK fertilizer (20:10:10) was applied at the recommended rate for sweet potato production. Fertilizer was applied using the side-placement method immediately after planting and a second application was carried out at six weeks after planting. Weeding was done manually using hoes whenever necessary to ensure a weed-free environment throughout the growing season. Other routine agronomic practices were carried out uniformly across all experimental plots.

Harvesting

Harvesting was carried out at physiological maturity, approximately sixteen weeks after planting. The maturity stage was identified by yellowing, drying, and shedding of leaves, which are common indicators of storage root maturity in sweet potato.

Data Collection

Data were collected from randomly selected plants within each plot on the following parameters:

Phenological Traits

Days to 50% flowering

Days to harvest

Growth Traits

Vine length (cm)

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Number of branches per plant
Number of nodes per plant
Number of flowers per plant
Peduncle length (cm)
Leaf area (cm^2)

Yield and Yield Components

Survival count (%)
Number of tubers per plant
Number of tubers per plot
Fresh tuber weight per plant (kg)
Fresh tuber weight per plot (kg)
Tuber yield (t ha^{-1})

Pest Assessment

Pest infestation was evaluated using a five-point rating scale:
1 = No visible damage
2 = Moderately attacked
3 = Highly attacked
4 = Severely attacked
5 = Completely destroyed

Statistical Analysis

Data collected were subjected to Analysis of Variance (ANOVA) using GenStat Statistical Software (17th Edition). Treatment means were separated using Fisher's Least Significant Difference (LSD) test at a 5% level of probability. Pearson's correlation analysis was also performed to determine the relationships among growth, phenological, yield, and yield-related traits. Statistical significance was declared at $P \leq 0.05$.

RESULTS AND DISCUSSION

The growth and reproductive performance of the four sweet potato genotypes are presented in Table 1. Significant differences ($P \leq 0.05$) were observed among the genotypes for days to 50% flowering, number of flowers per plant, days to harvest, and peduncle length, as indicated by the LSD values. Solo Gold flowered earliest (69.50 days), while the Control genotype exhibited the latest flowering (93.25 days). Early flowering is often associated with genotype-specific adaptation and may indicate differences in resource allocation between vegetative and reproductive growth (Low et al., 2020).

The highest survival rate was recorded in the Control genotype (81.20%), whereas TIS 087 recorded the lowest survival rate (65.60%). Although differences in survival percentage were

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not statistically significant, the relatively high survival rates across all genotypes suggest good adaptation to the prevailing environmental conditions. Similar findings have been reported by Woolfe (1992), who noted that sweet potato genotypes differ in their establishment and survival ability depending on environmental conditions.

The Control genotype produced the longest vines (20.40 cm), while Mother Delight had the shortest vines (4.00 cm). Mother Delight, however, exhibited the largest leaf area (132.00 cm²), indicating greater photosynthetic surface area. Larger leaf areas generally contribute to enhanced light interception and assimilate production, which may positively influence storage root development and yield (Lebot, 2009). TIS 087 recorded the highest number of flowers per plant (18.28), demonstrating superior reproductive performance compared with the other genotypes.

Days to harvest ranged from 144.75 days in Solo Gold to 182.75 days in the Control genotype. The earlier maturity of Solo Gold may offer advantages where shorter growing seasons are desirable. The Control genotype also recorded the highest number of nodes per plant (140.78), indicating vigorous vegetative growth.

Table 1; Growth and Reproductive Performance of Four Varieties of Sweet Potatoes

Genotypes	Days to bloom (50%)	SR (%)	VL/P (cm)	NB/P	NF/P	LA (cm)	DH	NN/P	PL/P (cm)
Solo gold	69.50	75.00	13.60	2.93	13.95	49.00	144.75	99.25	22.20
TIS 087	81.00	65.60	8.40	3.38	18.28	59.00	155.00	102.10	15.23
Mother delight	76.00	71.90	4.00	3.40	7.65	132.00	152.25	62.18	13.50
Control	93.25	81.20	20.40	3.40	7.92	85.00	182.75	140.78	16.03
Mean	79.94	73.40	11.60	3.28	11.95	81.00	158.69	101.10	16.81
LSD (0.05)	4.86	23.33	14.27	0.55	3.25	64.30	4.98	35.92	3.03

SR-Survival rate, VL/P-Vine length per plant, NB/P-Number of branches per plant, NF/P-Number of flower per plant, LA-Leaf area, DH-Days to harvest, NN/P-Number of per plant, PL/P-Peduncle length per plant.

The yield performance of the four sweet potato genotypes is shown in Table 2. Significant differences ($P \leq 0.05$) were observed among genotypes for fresh tuber weight per plot and fresh tuber yield. The Control genotype produced the highest fresh tuber weight per plot (15.80 kg) and the highest fresh tuber yield (266.00 t ha^{-1}), followed by Mother Delight (218.00 t ha^{-1}) and TIS 087 (193.00 t ha^{-1}). Solo Gold recorded the lowest yield (97.00 t ha^{-1}).

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The superior yield performance of the Control genotype may be attributed to its vigorous vegetative growth, greater survival rate, and higher number of nodes, which collectively enhanced assimilate production and partitioning to storage roots.

Mother Delight produced the highest number of tubers per plant (8.36), suggesting that tuber number alone does not necessarily determine total yield. The Control genotype produced fewer tubers than Mother Delight but achieved a higher fresh tuber weight per plant (2.40 kg), indicating that tuber size and weight contributed substantially to overall yield. Similar observations have been reported by Mwanga et al. (2017), who emphasized that storage root size is often a more important determinant of marketable yield than tuber number alone.

Pest infestation scores ranged from 2.00 in TIS 087 to 3.25 in Solo Gold and Mother Delight. Lower pest scores indicate greater tolerance or resistance to pest attack. TIS 087 therefore demonstrated relatively better pest tolerance, although this did not translate into the highest yield performance.

Table 2; Yield Performance of four varieties of sweet potatoes

Genotypes	NT/plot	NT/plant	FTW/plot (kg)	FTW/plant (kg)	Pest score	FTY (t/ha)
Solo gold	45.20	7.68	5.20	0.87	3.25	97.00
TIS 087	29.20	5.62	9.00	1.74	2.00	193.00
Mother delight	46.50	8.36	10.80	1.96	3.25	218.00
Control	50.50	7.68	15.80	2.40	2.25	266.00
Mean	42.90	7.34	10.20	1.74	2.81	194.00
LSD (0.05)	20.60	3.43	7.09	1.16	0.67	129.10

NT/plot-Number of tubers per plot, NT/plant-Number of tubers per plant, FTW/plot-Fresh tuber weight/plot, FTW/plant-Fresh tuber weight per plant, FTY-Fresh tuber yield.

The correlation analysis (Table 3) revealed important relationships among growth and yield traits. Fresh tuber yield showed significant positive correlations with days to 50% flowering ($r = 0.60^*$), leaf area ($r = 0.53^*$), and days to harvest ($r = 0.54^*$). These results suggest that genotypes with larger leaf areas and longer growth durations tended to produce higher yields. The strong positive correlation between days to harvest and days to 50% flowering ($r = 0.93^{**}$) indicates that late-flowering genotypes generally required longer periods to reach maturity.

Leaf area exhibited a positive relationship with yield, confirming the importance of photosynthetic capacity in sweet potato productivity. Larger leaf areas increase radiation interception and carbohydrate accumulation, thereby supporting storage root development

(Lebot, 2009). Yield also showed a weak negative correlation with pest score (r = -0.35), suggesting that increased pest pressure may reduce productivity.

Overall, the results indicate that the Control genotype demonstrated superior yield performance, while Mother Delight showed desirable characteristics for tuber production. TIS 087 exhibited strong flowering ability and lower pest susceptibility. The positive associations between leaf area, flowering time, maturity period, and yield suggest that these traits could serve as useful selection criteria in sweet potato breeding programs aimed at improving productivity.

Table 3: Correlation coefficient of fifteen plant traits of four varieties of sweet potatoes

	Bloom (50%)	NoFP	NoBP	PEDL	Vine length	Leaf Area	NoN/plt	D2HVT	Survival count (%)	Tuber wt/ plt	Yld (t/ha)	Pest score
Pest score	-0.39	-0.48	-0.14	0.25	0.34	0.05	-0.39	-0.15	0.05	0.14	-0.35	1
Yield (t/ha)	0.60*	-0.28	0.41	-0.46	0.12	0.53*	0.27	0.54*	-0.02	0.10**	1	
Tuber w t/ha/plt	0.60*	-0.28	0.41	-0.46	0.12	0.53*	0.27	0.54*	-0.02	1		
Survival %	0.29	-0.23	0.10	0.06	0.11	-0.11	0.22	0.29	1			
D2HVT	0.93**	-0.41	0.27	-0.38	0.47	0.08	0.58*	1				
Non/plt	0.61*	0.00	0.05	0.21	0.42	-0.24	1					
Leaf Area	0.08	-0.51	0.09	-0.38	-0.27	1						
Vine lgth	0.28	-0.15	-0.16	0.17	1							
Ped-lgth	-0.44	0.20	-0.48	1								
NoB/plt	0.25	-0.20	1									
Nof/plt	-0.24	1										
D50%fl	1											

*= Correlation is significant at 1% probability level

Conclusion

The study evaluated the growth, reproductive, and yield performance of four sweet potato genotypes: Solo Gold, TIS 087, Mother Delight, and the Control. The results revealed significant variation among the genotypes for several agronomic traits, indicating the influence of genetic factors on growth and yield performance.

The Control genotype exhibited superior yield performance, producing the highest fresh tuber weight per plot, fresh tuber weight per plant, and overall fresh tuber yield. This superior performance was associated with its high survival rate, vigorous vegetative growth, and greater number of nodes per plant. Mother Delight demonstrated a high number of tubers per plant and a large leaf area, making it a promising genotype for tuber production. TIS 087 showed good reproductive performance and the lowest pest score, suggesting greater tolerance to pest attack, while Solo Gold was characterized by early flowering and earlier maturity.

Correlation analysis revealed that fresh tuber yield was positively associated with leaf area, days to 50% flowering, and days to harvest. These findings indicate that genotypes with larger photosynthetic surfaces and longer growth durations tended to produce higher yields. Therefore, leaf area, flowering time, and maturity period may serve as useful selection criteria in sweet potato improvement programmes.

Overall, the Control genotype was identified as the best-performing variety under the conditions of this study due to its superior yield potential. However, Mother Delight and TIS 087 also exhibited desirable traits that could be exploited in breeding programmes aimed at improving sweet potato productivity, pest tolerance, and adaptation.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. The Control genotype should be recommended for cultivation in areas with environmental conditions similar to those of the study site because of its superior fresh tuber yield and overall agronomic performance.
2. Mother Delight should be considered for breeding and improvement programmes due to its high tuber number and large leaf area, which are important traits for enhancing productivity.
3. TIS 087 should be further evaluated and utilized in breeding programmes aimed at improving pest tolerance and reproductive efficiency, as it recorded the lowest pest score and highest flower production.
4. Farmers seeking early-maturing sweet potato varieties may consider Solo Gold because of its early flowering and relatively shorter harvest period.
5. Plant breeders should focus on traits such as leaf area, flowering time, and maturity duration, as these traits showed positive associations with tuber yield and may serve as effective selection indices.
6. The Control genotype should be recommended for cultivation in areas with environmental conditions similar to those of the study site because of its superior fresh tuber yield and overall agronomic performance.
7. Mother Delight should be considered for breeding and improvement programmes due to its high tuber number and large leaf area, which are important traits for enhancing productivity.
8. TIS 087 should be further evaluated and utilized in breeding programmes aimed at improving pest tolerance and reproductive efficiency, as it recorded the lowest pest score and highest flower production.

9. Farmers seeking early-maturing sweet potato varieties may consider Solo Gold because of its early flowering and relatively shorter harvest period.
10. Plant breeders should focus on traits such as leaf area, flowering time, and maturity duration, as these traits showed positive associations with tuber yield and may serve as effective selection indices.
11. Further multi-location and multi-season trials should be conducted to evaluate the stability and adaptability of the genotypes across different agroecological zones before large-scale recommendation.
12. Additional studies should investigate the nutritional quality, storage characteristics, and resistance to major pests and diseases of these genotypes to provide comprehensive information for variety selection and improvement.

References

Food and Agriculture Organization. (2024). ***FAOSTAT statistical database: Crops and livestock products***. Food and Agriculture Organization of the United Nations. Available at: https://www.fao.org/faostat/

International Potato Center. (2023). ***Sweetpotato agri-food systems program***. International Potato Center, Lima, Peru.

Lebot Vincent. (2009). ***Tropical root and tuber crops: Cassava, sweet potato, yams and aroids***. Wallingford, UK: CABI Publishing.

Low Jan W.., Nyongesa, M., Quinn, S., & Parker, M. (2017). ***Combating vitamin A deficiency through the promotion of orange-fleshed sweet potato in sub-Saharan Africa***. International Potato Center (CIP).

Lindqvist-Kreuze Hannele., Bonierbale, M., Grüneberg, W. J., Mendes, T., De Boeck, B., & Campos, H. (2024). Potato and sweetpotato breeding at the International Potato Center: Approaches, outcomes and the way forward. ***Theoretical and Applied Genetics, 137***(1), 12. https://doi.org/10.1007/s00122-023-04515-7

Mulwa Richard M.S.., et al. (2023). Orange-fleshed sweet potato for improved nutrition and food security in Africa. ***Food Security Journal***, 15, 1–15

Mwanga Robert O.M.., Odongo, B., Niringiye, C., Alajo, A., Abidin, P. E., Kapinga, R., & Tumwegamire, S. (2017). Sweetpotato breeding progress and challenges in sub-Saharan Africa. ***African Crop Science Journal, 25***(2), 123–142.

Neela Satheesh., & Fanta Solomon Workneh. (2019). Review on nutritional composition of orange-fleshed sweet potato and its role in combating vitamin A deficiency. ***Food Science and Nutrition***, 7(6), 1920–1945.

National Root Crops Research Institute. (2024). ***Improved sweet potato varieties for enhanced productivity in Nigeria***. Umudike, Abia State, Nigeria: National Root Crops Research Institute.

Woolfe John A.. (1992). ***Sweet potato: An untapped food resource***. Cambridge, United Kingdom: Cambridge University Press.

Wube Mekonnen., et al. (2025). Genotype × environment interaction and yield performance of sweet potato cultivars across diverse agroecological zones. ***African Journal of Agricultural Research***, 21(1), 45–58.

Yada Ben., Tukamuhabwa, P., Alajo, A., Mwanga, R. O. M., & Niringiye, C. (2021). Performance and stability of sweet potato genotypes across environments in East Africa. ***Euphytica, 217***(3), 1–15.