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Original Research Article

Root yield and root flesh colour segregation of sweet potato seedlings developed from controlled pollinated sweet potato varieties in Umudike South Eastern Nigeria

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Controlled cross pollinated sweet potato botanical seeds from sweet potato breeding block was raised in the screen house and after 30 days, transplanted to the field at the Eastern experimental field of National Root Crops Research Institute Umudike, Umuahia- Abia State, Nigeria with the objectives to determine the number of roots per seedling, the weight of root yield potential per seedling, the dry matter content per family and the number of orange fleshed colour genotypes (due to its higher vitamin A content) per family and for further evaluation. The seedlings in the 27 families were laid out in a Randomized Complete Block Design (RCBD) with thirty seedlings per family per plot and replicated 3 times. Data collected were on number of storage roots per family per seedling, root fresh weight per family per seedling, root dry matter content per family and percentage colour segregation per family. The results indicated high significant ($P<0.01$) variability among the seedlings in terms of number of tuberous roots, root fresh weight, flesh colour variation and dry matter content per family. Out of 27 families, 11 (40.7%) are high yielding genotypes (ie.18-30t/ha) and 7 (25.9%) as moderately yielding genotypes (ie 11-17t/ha). These were selected for further evaluation.

Keyword: Controlled pollination, dry matter content, family, flesh colour segregation, root yield and sweet potato seedlings.

INTRODUCTION

Sweet potato is a perennial herb grown as an annual crop and a member of *convolvulaceae* family. It is a starchy staple food crop in the tropical, sub-tropical and frost-free temperate climatic zones of the world (Onwueme and Sinha, 1991). It ranks fifth as the most important food crop after rice, wheat, maize and cassava in developing countries (Som, 2007). Several cultivars exist with trailing or twinning stems of about 0.9 to 4.5cm in length. Latex occurs in all the tissues of the leaves, vines and roots. Roots of sweet potato are extensive, fibrous and adventitious arising from either the stem, or the nodes. Stems can be in contact with the soil, prostrate or ascending and sometimes twinning with about 3 - 10mm in diameter. The vines are light green to purple coloration with inter-node lengths of 2 - 10cm. The root structure is often complex. It can attain a shape ranging from fusiform to globular, smooth or rigid. Tuberous root surface skin colour could be white, yellow, orange, purple or brown. The flesh is white, yellow and sometimes orange, red or purple.

Leaves are variable, spirally arranged, simple and estipulate. Petiole is 5 - 30cm in length, the lamina mainly ovate, entire or deeply lobed. The tip is acute or obtuse. The leaf colour is from green to purple, while the vines are palmate. The flower stamens are five attached near the base of the corolla. The ovary is two- celled; style length is approximately 2cm, while the stigma is 2-lobed.

Cultivation indicated that sweet potato is grown at latitude of 40^0N and 32^0S and at an elevation of 2500m above sea level (Ngeve et al., 1993). The plant is tolerant to a wide range of soil conditions, but prefers a well drained sandy loam, with moderate clay subsoil. The pH value of 5.6 to 6.6 encourages growth and the crop requires a well distributed annual rainfall of about 750mm to 1250mm for normal growth and yield. Low humidity as the crop approaches maturity is beneficial for sweet potato crop. Sweet potato is and a short-day plant but sensitive to water logging. A photoperiod of less than 11 hours induces flowering. However, day length does not have any direct effect on root initiation and development, while flowers are not formed at day lengths of more than 13.5 hours. An average temperature of 24^0C to 26^0C is appropriate for flowering while good exposure to sunlight is essential for healthy growth.

Sweet potato cultivation in tropical developing countries vary, although three basic systems are used mainly mono cropping, intercropping and crop rotation. Variation in cultivation exists within these cropping systems due to topograph, soil fertility, climate, farmers' preferences and the local cropping systems. Vine cuttings are the most frequently used for sweet potato propagation, which are usually left in a shaded, humid place for 1 to 2 days before planting (Aldrich, 1988). Vine lengths of 25cm to 40cm are obtained from the terminal buds, giving higher yields than those of either the basal or mid-stem cuttings. Cuttings nodes of 6 - 7 are preferred with about half that length dipped into the soil. Cutting density of 20000 to 30000 per hectare could be obtained while propagation by tuberous roots are rare in the tropics. The preferable time of planting is between May and July. Cultivation is usually on ridges or mounds of 45cm high and 75cm apart or 100cm apart and 30cm within ridges with cuttings inserted 29 - 30cm apart on the ridge. This will give a plant population of 25000 to 125000 or 33333 per hectare depending on the scale of production and usage. Irrigation is rare, since cultivation is either at the beginning or during the rains. If irrigation is needed to improve soil moisture, furrow irrigation could be used but should be stopped 2 - 3 weeks before harvest so as to prevent root sprouting and root rot.

The crop responds well to organic manure. Though increased levels of nitrogenous fertilizers encourage vegetative growth and decrease tuberous root formation. Compound fertilizers could be applied to boost growth. Most cultivars mature 80 to 90 days from planting depending on the rate of development. At maturity, leaves become yellow and fall off. Yields of 4 to 5 roots per plant weighing 1kg and 15 - 20 tons/ha could be obtained. Average yield is between 8 -12 tons per hectare. Care should be taken during harvest to avoid mechanical injuries on the roots if necessary, spray roots with 0.5% concentration of hydrazine two weeks after harvest to avoid root sprout.

Sweet potato (*Ipomoea batatas* (L.) Lam), is consumed in more than one hundred countries in the World. The crop is known as a highly tolerant tuberous root crop to high temperatures, poor soils, floods and exhibits some resistance to pests and diseases. The potential of sweet potato to guarantee food security is under-estimated as its use is often limited to a substitute food in African countries. Sweet potato is valued for its roots which are boiled, fried, baked or roasted for humans or boiled and fed to livestock as a source of energy. The roots can also be processed into flour for bread making, starch for noodles as well as used as raw material for industrial starch and alcohol (Ukom et al., 2009). The flour is utilized also in sweetening local beverages like Kunu-zaki, burukutu, and for fortifying baby foods and fufu/pounded yam in Nigeria (Tewe et al., 2003). The leaves are used as vegetables in yam and cocoyam porridge and are rich in proteins, vitamins and various minerals. Sweet potato roots are rich in vitamins A, B, and C; and minerals such as K, Na, Cl, P and Ca (Onwueme & Sinha, 1991). Sweet potatoes can be put into many uses and value additions to various food forms. However, there is need to develop varieties that are high yielding, highly nutritious, high dry matter and with attractive flesh colour. Existing varieties are degenerating as a result of pests and diseases problem. Climate change is also affecting the performance of existing varieties. The natural way of developing new varieties for the perpetuation of sweet potato varieties is by hybridization. Hybridization is one of the ways to generate variability in sweet potatoes and according to Nwankwo et al., (2012), it is one of the revolutionary tools which tend to create genetic novelty. Hybridization generates raw materials for selection. It is one of the methods used to improve on the existing local varieties and other cultivars in the germplasm. At the intra-specific level, hybridization is referred to as inter-varietal crossing (Sharma, 1980). According to Sharma (1980), hybridization is generally resorted to when introduction and/or clonal selection fails to attain a tangible crop improvement. In developing a new variety one of the parents which should be the female parent is preferably the local best variety. This will confer the requisite adaptive capacity on the new variety to immediately acquire adaptation to the local environment. The second parent which is supposed to be the desired male parent may be imported or obtained from the germplasm. The required attribute(s) of the male to be transferred should be possessed in their intense form. After hybridization, that attribute(s) can be concentrated by backcrossing to the desired male variety. The offspring so obtained would be adaptive to the local environment having combined the qualities of both parents. Sweet potato botanical seeds obtained either by controlled hand crosses or by open pollination are not used for sweet potato root production; however, they are mainly used for genetic studies while the vines are used for sweet potato tuberous roots production.

The seeds so obtained by controlled (hand) crosses offer greater variability within the sweet potato families which can be expressed in contrasting environments (Oleghe, 1998). According to Luka (2012), breeding is a process for adapting a crop to human needs. An important component of breeding is the selection of new varieties. The selection of better varieties requires a good understanding of what is needed by farmers, consumers, industrialists, the societies in general, and it requires good biological and statistical knowledge. A variety is always characterized by several traits. A better variety must have good performance over all existing traits and at least in one important trait it must be clearly superior to all other varieties, which are so far available in a region. This work was carried out to investigate the number of roots per seedling, the weight of the root yield potential per seedling, to determine the dry matter content per family and to determine root flesh colour segregation per family for selection for further evaluation.

MATERIALS AND METHODS

Screen house

The seeds were soaked in solution of water containing Omo detergent. This allowed all bad and light floating seeds to be discarded by pouring off part of the solution. The seeds that settled at the bottom of the plastic container were collected and sown immediately into the filled black polybags measuring 4cm by 6cm. The polybags were laid out in a completely randomized design in three replications. Thirty days after sowing, the seedlings were transplanted to the field for field evaluation.

Field layout and evaluation

The seedlings were transplanted to the field 30 days after sowing in the screen house. The area for the experiment was slashed, ploughed, harrowed and ridged. The ridges were spaced 1.0m apart. Planting was on the crest of the ridges at 1.0 x 0.3m apart in a plot size of 9.0m^2. The seedlings in the 27 families were laid out in a Randomized Complete Block Design (RCBD) with 30 seedlings per family per plot, 810 seedlings per block and replicated 3 times resulting to 2,430 seedlings that were evaluated in the field. Fertilizer application was N P K 15: 15:15, applied 6 weeks after being transplanted and 9cm round the base of each seedling in the field. The whole plots were kept weed-free throughout the growth of the sweet potato seedlings with hand-hoe. Hand rouging was done toward harvesting which took place at 16 weeks after transplanting.

Data Collection

At harvest which took place 120 days after planting in the screen house, the following data were collected in the field on root yield: (a) Number of seedlings without storage roots, Number of plants with 1-2 storage roots per seedling, Number of plants with 3-4 storage roots per seedling, Number of plants with 5-6 storage roots per seedling, Number of plants with 7-8 storage roots per seedling and number of plants with 9-10 storage roots per seedling and per family. Data were also collected on weight of roots per plot and per seedling. Flesh root samples of randomly selected 15 plants from each family were collected to estimate the dry matter content of the families. The fresh flesh root samples were sliced and dried in the oven at a temperature of 65°C until a constant weight was obtained. Also percentage number of plants with various types of flesh colour such as: white, cream, yellow, orange and purple were recorded. Data were statistically analyzed using Analysis of Variance and means were separated using standard error of difference means.

RESULT

Field establishment

The sweet potato seedlings in all the families had high significant ($P<0.01$) variability in seedling field establishment. The highest field establishment (100%) was obtained from most of the families while the least 88.7% was from the family of NR107 x NR383 (Table 1). However, the field establishment from all the families was very high with overall mean percentage of 98.82% (Table 1).

Number of storage roots

The results of the analysis of variance on the number of storage roots of the sweet potato seedlings are presented in Table 1. The result reveals high significant ($P<0.01$) variation in the number of storage roots of sweet potato seedlings per plot. The number of roots per plot ranged from 9 roots for the family of 440293 x TIS87/0087 to 68 roots for the family of Local x NR418 with grand mean of 38.15 roots. Also, there was high significant ($P<0.01$) variation in the mean number of storage roots per stand of sweet potato seedling in each family. The number of roots per seedling ranged from 0.45 roots per seedling (equivalent to 0.45 roots per seedling per 1000 per hectare) in the family of 440293 x TIS87/0087 to 3.4 roots per seedling (equivalent to 3.4 roots per seedling per 1000 per hectare) for the family of Local x NR418 with grand mean of 1.96 roots ((equivalent to 1.96 roots per seedling per 1000 per hectare). The coefficient of variation for the number of roots per seedling was 3.42% which indicated a very low variation in the number of roots of the sweet potato seedlings from various families (Table 1).

Weight of Storage roots

High significant ($P<0.01$) variability exist in the storage root weight per plot of the sweetpotato seedlings evaluated. The fresh storage root weight per plot ranged from 1.1kg

Table 1. Storage root number and Weight of sampled 27 sweetpotato seedlings from each family

Names of Families (Crosses)	% Stand count at harvest	Number Storage root per plot	Number of storage roots per stand	Storage root weight (kg) per plot	Weight of storage roots per stand	Root yield in t/ha per family	% Dry matter content
local x NR/807	98.7	53	2.65	12.65	0.51	11.39	36.0
Local x NR/712	100	40	2.00	10.23	0.63	9.21	33.0
Local x NR/934	100	39	1.95	7.20	0.36	6.48	32.0
Local x NR/834	100	45	2.25	10.25	0.51	9.23	35.0
Local x NR/419	100	42	2.10	10.10	0.51	9.09	33.0
Local x NR/226	100	35	1.75	11.03	0.55	9.93	34.0
NR/107 X NR/934	100	20	2.0	1.10	0.06	0.99	31.0
Local x NR/533	100	58	2.9	18.54	0.93	16.69	28.0
NR/107 x NR/685	100	48	2.4	21.42	1.07	19.28	34.0
NR/107 x NR/418	100	34	1.7	20.06	1.00	18.05	23.0
Local x NR/118	97.8	44	2.2	16.09	0.80	14.48	32.0
Local x NR/031	100	59	3.0	36.40	1.82	32.76	35.0
NR/116 x NR/226	100	57	2.9	32.50	1.63	29.25	21.0
TIS8164 X TIS87/0087	100	32	1.6	19.65	0.98	17.69	27.0
Local x NR/418	96.7	68	3.4	35.45	1.77	31.91	28.0
NR/107 x NR/383	88.6	54	2.7	44.42	2.22	39.98	29.0
NR/107 x NR/772	100	47	2.4	22.31	1.16	20.08	31.0
Local x NR/810	100	62	3.1	42.64	2.13	38.38	26.0
NR/107 x NR/063	100	19	0.95	15.35	0.77	13.82	28.0
NR/107 x NR/031	100	18	0.9	13.56	0.68	12.20	33.0
Local x NR/929	100	33	1.7	42.52	2.13	38.27	38.0
NR/107 x NR/736	100	15	0.8	13.40	0.67	12.06	34.0
Local x NR/514	100	23	1.2	9.65	0.48	8.69	33.0
Local x NR/063	97.8	34	1.7	27.80	1.39	25.02	30.0
Local x NR/712	88.6	28	1.4	36.84	1.84	33.15	34.0
NR/196 x NR/183	100	14	0.7	7.58	0.38	6.82	32.0
440293 xTIS87/0087	100	9	0.45	5.45	0.27	4.91	24.0
Total	2668.2	38.15	1.96	20.16	1.01	18.14	30.9
Mean	98.82	17.5	3.42	18.41	6.91	-	
Sig. level	P<0.01	P<0.01	P<0.01	P<0.01	P<0.01	P<0.01	P<0.01

per plot in the family of NR107 x NR934 to as high as 44.42kg in the family of NR107 x NR383 per plot with grand mean of 20.16kg. However, the mean storage root weight per sweet potato seedling ranged from 0.06kg equivalent to 0.99t/ha obtained from the family of NR107 x NR934 to as high as 2.22kg per seedling equivalent to 39.98t/ha obtained from the family of NR107 x NR383 with grand mean of 1.01kg equivalent to 18.14t/ha. Seedlings with storage root weight yield above the grand mean of 1.01kg should be selected for further evaluation. High storage root weight is an indication of high root yield in fresh form. The coefficient of variation was 6.91% indicated low variability in storage root weight (Table 1).

Dry matter content

The percentage dry matter content of the tuberous root yield of the sweet potato seedlings ranged from 21.0% for seedlings in the family of NR116 x NR226 to 38.0% for the seedlings in the family of Local x NR929 with grand mean of 30.9% (Table 1). However, crosses with local female parents had high dry matter content of up to 35% (Table 1).

Root fleshed colour segregation

There was significant variability in the number of sweet potato seedlings with various flesh colour variation among the sweet potato seedlings. Out of the 27 families evaluated with 90 seedlings per plot of family which totaled 2430 seedlings evaluated, 220 seedlings which represented 9.0% were white fleshed root genotypes, 638 seedlings represented by 26.26% were cream fleshed root genotypes, 597 seedlings represented by 24.57% were yellow fleshed root genotypes, 967 seedlings represented by 39.8% were yellow fleshed root genotypes while 22 seedlings represented by 0.91% contain anthocyanin which is of purple fleshed colour (Table 2).

However, the colour segregation within the families as presented in Table 2 were as follows: the family NR107 x NR685 produced the highest number of white fleshed root

Table 2. Colour segregation of 27 sweetpotato seedlings evaluated

Families name	No of seedlings harvested	White Fleshed	% no with white fleshed	Cream fleshed	% no with Cream fleshed	Yellow fleshed	% no with Yellow fleshed	Orange fleshed	% no with Orange fleshed	Flesh colour mixed with purple	% No. with purple colour
local x NR/807	90	0	0.0	11	12.2	23	25.6	55	61.1	1	1.1
Local × NR/712	90	12	13.3	19	21.1	14	15.6	44	48.9	1	1.1
Local x NR/934	90	0	0.0	7	7.8	56	62.2	24	26.7	3	3.3
Local x NR/834	90	2	2.2	1	1.1	2	2.2	85	94.4	0	0.0
Local x NR/419	90	0	0.0	0	0.0	9	10.0	80	26.5	1	3.0
Local x NR/226	90	14	2.0	38	5.1	26	36.0	6	62.4	6	6.7
NR/107 X NR/934	90	24	27.0	11	12.2	21	23.3	34	38.0	0	0.0
Local x NR/533	90	7	7.8	14	15.6	15	16.7	50	55.6	4	4.4
NR/107 x NR/685	90	38	42.2	0	0.0	33	36.7	19	21.1	0	0.0
NR/107 x NR/418	90	0	0.0	41	45.6	22	23.4	27	30.0	0	0.0
Local x NR/118	90	2	2.2	32	35.6	7	7.8	47	52.2	2	2,2
Local x NR/031	90	3	3.3	5	5.6	32	35.6	49	54.4	1	1.1
NR/116 x NR/226	90	6	6.7	11	12.2	17	18.9	56	62.2	0	0.0
TIS8164 X TIS87/0087	90	8	8.9	18	20.0	22	24.4	42	46.7	0	0.0
Local x NR/418	90	1	1.1	41	45.6	31	34.4	14	15.6	3	3.3
NR/107 x NR/383	90	0	0.0	39	43.3	25	27.8	26	28.9	0	0.0
NR/107 x NR/772	90	12	13.3	13	14.4	21	23.3	44	48.9	0	0.0
Local x NR/810	90	3	3.3	44	48.9	41	45.6	2	2.2	0	0.0
NR/107 x NR/063	90	9	1.0	49	54.4	23	25.5	9	10.0	0	0.0
NR/107 x NR/031	90	35	38.9	24	26.7	15	16.7	16	17.8	0	0.0
Local x NR/929	90	0	0.0	48	53.3	27	30.0	15	16.7	0	0.0
NR/107 x NR/736	90	12	13.3	36	40.0	17	18.9	25	27.8	0	0.0
Local x NR/514	90	3	3.3	26	28.9	19	21.1	42	46.7	0	0.0
Local x NR/063	90	4	4.4	43	47.8	11	12.2	32	35.6	0	0.0
Local x NR/712	90	6	6.7	22	24.4	21	23.3	41	45.6	0	0.0
NR/196 x NR/183	90	19	21.1	17	18.9	15	16.7	39	43.3	0	0.0
440293 x TIS87/0087	90	1	1.1	28	31.1	17	18.9	44	48.9	0	0.0
Total	2430	220	9.05	638	26.26	597	24.57	967	39.8	22	0.91
Mean	90	8.15	9.05	23.63	0.97	22.11	0.91	35.81	1.47	0.81	0.03
Sig.level		P<0.01		P<0.01		P<0.01		P<0.01		P<0.01	

seedlings (38) represented by 42.2% while the families of Local x NR807, Local x NR419, NR 107x NR383 and Local x NR929 had no white fleshed root seedlings. The family NR107 x NR063 produced the highest number of cream fleshed sweet potato seedlings (49) represented by 54.4%while the families Local x NR419 and NR107 x NR685 had no cream fleshed root seedlings in their families.

The family of Local x NR934 produced the highest number of sweet potato seedlings (56) represented by 62.2% of yellow fleshed sweet potato roots while the family Local x NR226 had the least number of seedlings (2) with yellow fleshed roots represented by 2.2%.

The family with the highest number of seedlings with orange fleshed roots was Local x NR804 with 85 seedlings represented by 94.4%, while the least number of seedlings (2) represented by 2.2% was from the family of Local x NR810.

The family with the highest number of purple fleshed sweet potato seedlings was Local x NR226 with 6 seedlings represented by 6.7% of the population evaluated. However, 8 of the families produced varying numbers of 1 to 4 sweet potato seedlings with purple fleshed roots (Table 2).

DISCUSSION

The highly significant (P<0.01) variation in the number of roots of the sweet potato seedling indicated that variation exists in the number of roots produced by the sweet potato seedlings. The number of roots per seedling is a very crucial trait in selection of high yielding genotypes. Seedlings from the families with number of storage roots far below the grand mean of 1.96 per seedling, should not be selected for further evaluation since those seedlings might be low yielding genotypes. However, seedlings with number of roots above the grand mean (1.96) should be selected for further evaluation since they could be a prediction factor for high yielding genotypes. Since the coefficient of variation was as low as 3.42%, it indicated that the number of roots per stand would not vary much in any sweet potato root production environment. Seedlings in the families with high number of roots, weight of fresh roots and high percentage of dry matter content should be selected for further evaluation. Number of roots is also a function of yield (Nwankwo, 2012). High number of roots per plant per plot is an indication of high yielding genotypes. Number of storage roots per plant and per plot is the first indicator to a farmer of high yielding clones. This trait could be an indicator for selection for high yielding clones

The high tuber weight of the sweet potato seedlings indicated high yielding genotypes with high carbohydrate in fresh form. Sweet potato seedlings with storage root fresh weight above the grand mean of 1.01kg should be selected for further evaluation and since the coefficient of variation was very low (6.91%), it indicated that the storage root weight of the seedlings would not differ much. However, According to Wolfgang et al (2008) lowly heritable traits (traits which are strongly affected by the environment) such as yield, yield stability and adaptability, are evaluated in later stages, when more planting material is available, on the basis of plots, plot replications and information across several environments. Such a multistage selection program can take up to five years or more.

The weight of sweet potato storage root indicated the amount of carbohydrate accumulation in a fresh form. High yielding clones is an indication of superior performing genotypes. However, according to NARO (National Agricultural Research Organization) sweet potato yield classification criteria, genotypes were grouped into three root tuber yield classes: high yielding (18-30t/ha), moderate yielding (11-17t/ha) and low yielding genotypes (<11t/ha) (Wilson, *et al*., 1989) The seedlings in the family NR861 were in the top group (high yielding). Based on this result, the families could be selected and distinguished into genotypes. The result in Table 1 indicated that out of 27 families evaluated, 13 families representing 48.1% fall into the class of high yielding genotypes (ie. 18 -30t/ha), 6 families representing 22.2% were in the group of moderately yielding genotypes (ie. 11-17), while 8 families representing 29.6% were classified as low yielding genotypes (<11t/ha).

The highly remarkable variation in the percentage of dry matter content indicated that variability existed among the seedlings in the families of the sweet potatoes evaluated. These variation suggested basis for selection (IBPGR 1991). Root dry matter yield per sweet potato seedling is a function of yield. High dry matter content is a positive attributes in the tuber fresh market. The watery texture of the low dry matter content of some genotypes could be acceptable to infants who may find its low dry matter content easier to digest than the drier textured varieties preferred by adults (Mcharo et al., 2001). Varieties with a low dry matter content but high fresh tuber yield may be used for other purposes. According to Carey et al. (1977), dry matter content above 27% in sweet potato (a root crop) is acceptable to most consumers. Higher tuber dry matter content is an indication of higher starch content of the genotypes. This variation in tuber dry matter led to the selection of higher yielding dry matter genotypes. The seedling genotypes selected as superior genotypes for high dry matter content were based on yield above the grand mean of 30.9%. The dry matter content of the roots of these genotypes was fairly high implying that they could be a good source of parental material when breeding for varieties with high amount of starch, the main carbohydrate in the roots of sweet potato and the production of roots for commercial and industrial usage. Ayenor (1995) noted that starch is the chief determinant factor in establishing the physico-chemical properties of the sweet potato food products. According to him, the total production of starch (carbohydrates) is directly linked to yield, and that average yield of any crop should be measured in their carbohydrate since carbohydrate sources are exploited for human consumption If yields of carbohydrate of crops are low, breeding and cultural efforts should be directed toward increasing yields.

Number of sweet potato seedlings with variation in flesh root colour per family showed that segregation took place during the artificial genetic hybridization. The orange fleshed genotypes are power store house for vitamin A, The yellow fleshed genotypes which also contain elevated amount of vitamin A and good carbohydrates. The seedling genotypes which contain anthocyanin were of purple colour. This variety is widely sort for since it contains anti-cancer fighting property, while the white fleshed and cream fleshed genotypes contain prestigious carbohydrates for making pounded fufu like yam fufu, reducing the pressure on cassava in garri processing and can be used in fries like in Irish potato.

CONCLUSION

The study indicated that variability could be generated through controlled crosses in sweet potato root improvement strategies and the considerable variation in the sweet potato families evaluated suggested that there is ample opportunity for selection of seedlings for further evaluation. The highly remarkable variation in the percentage of dry matter content per family, number of roots per seedling, weight of storage roots per plot and per seedling indicated that variability existed among the families and among the seedlings in the families of the sweet potato. These variation suggested basis for selection. The variation in the sweet potato seedling attributes could be utilized in the varied forms in the sweet potato improvement strategy. The high number of roots per stand and high fresh root weight are indicators for high yielding genotypes which could be selected for higher root yield. The dry matter content of the roots of these genotypes was fairly high implying that they could be a good source of parental material when breeding for varieties with high amount of starch, the main carbohydrate in the roots of sweet potato. The variation in flesh colour of the genotypes indicated that these genotypes could be put into various uses in terms of food forms, health improvement (orange and purple fleshed genotypes as sources of vitamin A) and for economic empowerment such as income generation and as parents for breeding for higher vitamin A content progenies. The study suggested that variability in the seedlings in the various families as regards the number of roots, weight of roots and high percentage of dry matter content should be selected for further evaluation to select progenies with increased dry matter and vitamin A content of sweetpotato roots. However, 13 families representing 48.1% as high yielding genotypes (ie.18-30t/ha) and 6 families representing 22.2% as moderately yielding genotypes (ie. 11-17) were selected for further evaluation to select superior yielding genotypes. The high number of roots per stand is an indication of high yielding genotypes which could be selected for high root yield.

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