The Pharma Innovation Journal 2022; SP-11(9): 3084-3086

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(9): 3084-3086

www.thepharmajournal.com
Received: 09-06-2022
Accepted: 13-07-2022

DS Kar
KVK, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

CM Panda
Department of Fruit Science, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

GS Sahu
Department of Vegetable Science, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

P Tripathy
Professor, Department of Vegetable Science, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

AK Das
Department of Vegetable Science, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

S Sahu
Department of Plant breeding & Genetics, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

A Mohanty
AICRP on Vegetable Crops, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

Gargi Gautami Padhiary
Phd Research Scholar, Department of vegetable science, OUAT, Bhubaneswar, Odisha, India

Subha Laxmi Mishra
PhD Research Scholar Department of Vegetable Science College of Agriculture, OUAT, Bhubaneswar, Odisha, India

Corresponding Author:
DS Kar
KVK, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

Evaluation of different sweet potato genotypes for various characters

DS Kar, CM Panda, GS Sahu, P Tripathy, AK Das, S Sahu, A Mohanty, Gargi Gautami Padhiary and Subha Laxmi Mishra

Abstract
The experiment was taken up to elicit the information on magnitude of genetic variability, heritability and to predict the gains realized through selection, character association, cause and effect relationship and divergence for the quantitative characters in sweet potato (*Ipomoea batatas* (L.) Lam.) genotypes. Fifteen genotypes of sweet potato were evaluated in RBD with three replications during kharif season of 2019 & 2020 at in the K.V.K Dhenkanal District. The study revealed significant differences among genotypes for different characters studied. Among all the genotypes studied, genotype Accession-22 recorded the highest root yield per hectare and found suitable to the local agro-climatic conditions. The genotypes ST-14 were also found to be elite for different characters. Among the characters studied, high PCV and GCV were observed for characters like vine length, vine internodal length, number of branches per plant, number of leaves per plant, total leaf area, number of roots per plant, root yield per plant, β-carotene content, starch content, total sugars, reducing sugars, non reducing sugars and total root yield per hectare content indicating high variability available in the germplasm for these characters for further improvement. High heritability coupled with high genetic advance as per cent of mean was observed for characters vine length, vine internodal length, number of branches per plant, length of leaf lobe, number of leaves per plant, total leaf area, root girth, root yield per plant, β-carotene content, starch content, total sugars, reducing sugars, non reducing sugars and total root yield per hectare indicated that these characters were least influenced by the environmental effects, and these characters were governed by additive genes and selection will be rewarding for improvement of such traits. The total root yield per hectare (t/ha) had significant positive correlation with traits like number of branches per plant, number of roots per plant, root girth, root yield per plant and β-carotene content suggesting the importance of these traits in selection for yield and can be identified as yield attributing characters for the genetic improvement of yield in sweet potato. The total root yield per hectare (t/ha) was result of direct effect of number of branches per plant, number of roots per plant, root length, root yield per plant, starch content and reducing sugars. The high direct effect of these traits appeared to be the main factor for their strong association with total root yield per hectare. Analysis for divergence using D^2 statistic revealed highly significant differences for different traits, grouping the 15 genotypes into 6 clusters. Cluster II had the maximum number of genotypes (8) followed by cluster I (7). Maximum inter cluster distance was observed between clusters III and VI while the intra cluster distance was maximum in cluster II and VI. Highest percent contribution to divergence came from β-carotene content, starch content, total sugar, total leaf area, root dry matter content, number of leaves per plant, root yield per plant, petiole length, root girth, vine length and reducing sugar suggested that selection of one or two elite genotypes from divergent (II & VI) and (III & VI) clusters based on the above characters and crossing would result in more heterosis and novel hybrid.

Keywords: Sweet potato, genotypes, characters, evaluation

Introduction
The sweet potato (*Ipomoea batatas* (L.) Lam.) is an important starchy food crop grown throughout the tropical and sub-tropical parts of the world. It is originated from Central America. Sweet potato is a cross-pollinated, hexaploid vine (2n=6x=90) in nature (Jones, 1969) [3] It is a herbaceous, perennial vine cultivated as an annual and belongs to family convolvulaceae. Sweet potato yields high amount of energy per unit area per unit time and is expected to bridge the food shortages and malnutrition. The comparative short duration coupled with its innate power for tremendous dry matter production has enabled sweet potato to rank as the foremost tuber crop in respect of calorie value. In Odisha it is grown in both kharif and rabi season in ridges and furrow method. In some districts of Odisha it is also vineed by mounds and flat beds. It is preferable to vine sweet potato on mounds in areas experiencing problem of drainage. Ridges formed across the slope are recommended in sloppy lands to prevent soil erosion. Vineing is done by tubered vine cutting at a depth of 7-10 cm

deep. A close spacing is generally recommended for sweet potato to achieve maximum tuber yield.

Materials & Method

The experiment was conducted in the instructional farm of KVK, Dhenkanal. Fifteen accessions of Sweet potato was taken in a Randomized Block Design (RBD) experiment with three replications in kharif season, 2019 and 2020. The vines were planted in a Spacing: 60 cm x 30 cm. The planting material were obtained from CTCRI Regional Centre, ICAR, Bhubaneswar and local collection. They were: T_1: Pol-19-9-3, T_2: Pol-19-8-2, T_3: Gouri, T_4: Kaling, T_5: Kanchangad, T_6: Sourin, T_7: Bhu Sona, T_8: T_9: Sankar, T_{10}: Sree Vardhini, T_{11}: Sree Nandini, T_{12}: Pusa Safed, T_{13}: Goutam, T_{14}: Kamala, T_{15}: Kishan. Well matured healthy and disease free vine cuttings of previous season of each genotype were used as vineing material for the experiment. Cuttings were vineed in the plots obtained from the nursery at a spacing of 60×20 cm and 5-7cm depth. Standard recommended cultural practices were followed during the entire crop period.

Table 1: Mean performance of the quantitative characters among 15 genotypes of sweet potato (First & second year)

		First year						Second year					
Sl. No.	Genotype	Vine length (cm)	Avg. tuber length (cm)	Avg. tuber girth (cm)	Tuber yield/vine (g)	Tuber yield/plot (kg)	Tuber yield (t/ha)	Vine length (cm)	No. of branches/ vine	Avg. tuber length (cm)	Avg. tuber girth (cm)	Tuber yield/ vine (g)	Tuber yield/ plot (kg)
1	POL-19-9-3	133.20	12.0	11.40	224.36	7.69	10.67	114.40	3.77	12.6	11.10	206.64	7.21
2	POL-19-8-2	141.00	11.1	10.20	308.36	10.30	14.30	128.30	3.90	13.0	11.40	305.85	10.68
3	Gouri	140.20	16.2	13.40	452.63	15.45	21.44	131.70	5.89	18.3	14.20	425.46	14.88
4	Kalinga	136.40	12.9	10.60	247.24	8.68	12.04	140.90	3.15	11.1	9.20	297.69	10.40
5	Kanchangad	115.60	13.8	13.60	342.14	11.62	16.13	102.80	4.53	15.0	11.25	403.35	14.11
6	Sourin	118.50	14.6	13.20	379.45	13.10	18.18	138.90	4.10	16.4	14.95	349.14	12.22
7	Bhu Sona	120.60	17.8	13.80	414.69	14.25	19.78	125.03	5.98	20.0	17.68	425.07	14.88
8	Bhuja	124.50	13.4	11.80	345.87	12.10	16.97	118.30	3.98	11.4	10.15	360.82	12.63
9	Sankar	118.60	13.8	9.80	272.64	9.32	12.94	103.20	3.76	15.2	13.70	260.36	9.10
10	Sree Vardini	123.40	12.7	10.20	350.89	12.18	16.91	131.50	4.15	14.2	11.68	368.74	12.88
11	Sree Nandini	131.50	13.1	10.60	359.74	12.37	17.16	112.90	4.62	14.8	13.60	328.53	11.50
12	Pusa Safed	126.40	13.7	12.50	273.73	9.42	13.07	131.30	3.14	15.7	14.15	142.46	8.47
13	Goutam	123.50	12.0	10.60	341.46	11.73	16.27	103.80	3.97	12.2	9.82	395.13	13.82
14	Kamala Sundari	124.50	12.9	11.50	315.24	11.03	15.31	106.90	3.52	13.7	12.98	365.48	12.78
15	Kisan	118.60	12.5	11.40	265.85	9.12	12.65	128.60	3.17	13.7	11.78	243.16	8.51
	Mean	126.43	13.5	11.64	326.29	11.22	15.59	121.24	4.11	14.5	12.51	325.19	11.60
	SE (m) ±	9.185	1.162	0.583	16.056	0.539	0.582	8.638	0.410	0.920	0.874	13.859	0.497
	CV%	12.58	14.91	8.67	8.52	8.32	6.47	12.34	17.27	11.02	12.11	7.38	7.42
	CD(0.05)	26.605	3.366	1.687	46.506	1.561	1.686	25.020	1.187	2.664	2.532	40.141	1.440

Table 2: Mean performance of the quantitative characters among 15 genotypes of sweet potato (pooled)

Sl. No.	Genotype	Vine length (cm)	No. of branches/ vine	Avg. tuber length (cm)	Avg. tuber girth (cm)	Tuber yield/ vine (g)	Tuber yield/ plot (kg)
1	POL-19-9-3	123.80	3.54	12.3	11.25	215.50	7.45
2	POL-19-8-2	134.65	3.65	12.0	10.80	307.11	10.49
3	Gouri	135.95	6.00	17.2	13.80	439.05	15.16
4	Kalinga	138.65	3.41	12.0	9.90	272.47	9.54
5	Kanchangad	109.20	4.47	14.4	12.43	372.75	12.86
6	Sourin	128.70	4.18	15.5	14.08	364.30	12.66
7	Bhu Sona	122.82	5.60	18.9	15.74	419.88	14.56
8	Bhuja	121.40	4.10	12.4	10.98	353.35	12.36
9	Sankar	110.90	3.56	14.5	11.75	266.50	9.21
10	Sree Vardini	127.45	4.36	13.4	10.94	359.82	12.53
11	Sree Nandini	122.20	4.52	13.9	12.10	344.14	11.93
12	Pusa Safed	128.85	3.48	14.7	13.33	208.10	8.95
13	Goutam	113.65	4.04	12.1	10.21	368.30	12.77
14	Kamala Sundari	115.70	3.42	13.3	12.24	340.36	11.90
15	Kisan	123.60	3.50	13.1	11.59	254.51	8.81
	Mean	123.83	4.12	14.0	12.07	325.74	11.41
	SE(m) ±	4.495	0.204	0.763	0.535	12.148	0.345
	CV%	6.29	8.57	9.45	7.68	6.46	5.24
	CD (0.05)	13.020	0.591	2.210	1.550	35.187	1.001

Result and Discussion

From the pooled analysis, a wide range (12.0 cm to 18.9 cm) of variation was noticed for average tuber length with a mean of 14.0 cm from the pooled analysis. Highest average tuber length was recorded in Bhu Sona (18.9 cm) followed by Gouri (17.2 cm) and Sourin (15.5 cm).The lowest average tuber length was recorded in both POL-19-8-2 and Kalinga (12.0 cm). Variety Gouri (17.2 cm) was found statistically at par. A significant variation for average tuber girth (9.90 cm to 15.74 cm) was observed in the experiment with a mean of 12.07 cm from the pooled analysis of both years. Variety Bhu Sona recorded highest average tuber girth of 15.74 cm

followed by Sourin (14.08 cm) and Gouri (13.80 cm). The lowest average tuber girth of 9.90 cm was observed in variety Kalinga. No statistical parity was observed among the varieties. A significant range of variation from 208.10 g to 439.05 g was observed in case of tuber yield per plant with a mean of 325.74 g. The highest tuber yield was obtained in variety Gouri (439.05 g) followed by Bhu Sona (419.88 g) and Kanchangad (372.75 g). The lowest tuber yield per vine was recorded in Pusa Safed (208.10 g). The variety Bhu Sona (419.88) was statistically at par. A significant range of variation from 7.45 to 15.16 kg of tubers per plot was reported during the experiment with a mean of 11.41 kg. Highest yield per plot was recorded in Gouri (15.16 kg) followed by Bhu Sona (14.56 kg) and Kanchangad (12.86 kg). The lowest yield per plot was observed in POL-19-9-3(7.45 kg). Variety Bhu Sona (14.6 kg) was statistically at par.

It may be contemplated from the statistics of range and general mean values of the characters that there is a great deal of variability for characters under study. Similar to the present findings, investigations carried out earlier also revealed wide variations for various characters (Velmurugan *et al*., 1999; Binu*et al*, 2011; Pushpalata *et al.* 2011 and Bhadauriya *et al*, 2018) [7, 2, 5, 1].These statistics quite hopefully provide a strong impetus for selecting promising genotypes for specific objectives, because of the magnitude and wide to moderately wide spectrum of variations observed in each character among the genotypes under evaluation. Further, the coefficient of variation (C.V.) being less than 20% for all the characters studied as such indicates that good precision was maintained in conducting the experiment.

Among the genotypes (POL-19-9-3, POL-19-8-2, Gouri, Kalinga, Kanchangad, Sourin, Bhu Sona, Bhuja, Sankar, Sree Vardini, Sree Nandini, Pusa Safed, Goutam, Kamal Sundari and Kisan) evaluated, Varieties Gouri, Bhu Sona and Kanchangada performed better for yield in first year, second year and also in pooled analysis than the rest varieties suggesting suitability and better adaptability of these genotypes for cultivation at mid central table land zone of Odisha. Other researchers (Neiva *et al*, 2011; Richardson *et al*, 2012 and Bhadauriya *et al*, 2018) [4, 6, 1]. It had also indicated better suitability of some varieties over the rest. The study revealed significant differences among genotypes for different characters studied. Among all the genotypes studied variety Gouri recorded the highest tuber yield per hectare and found suitable to the local agro-climatic conditions followed by Bhu Sona. The varieties Kanchangada, Sourin, Bhuja and Sree Vardini were also found to be elite for different characters.

References

1. Bhadauriya PS, Deo C, Ram CN, Verma SK, Singh S. Studies on genetic variability, heritability, genetic advance, correlation coefficient and D2 analysis in sweet potato (*Ipomoea batatas* L.). Indian Journal of Hill Farming. 2018;31(1):207-213.
2. Binu H, Vimala B, Nambisan. Variability of carotenoid and dry matter content in orange fleshed Sweet potato during storage. Journal of root crops. 2011;37(2):182-185.
3. Jones A, Steinbauer CE, Pope DT. Quantitative inheritance of ten root traits in sweet potato. Journal of American Society for Horticultural Sciences. 1969;94:271-275
4. Neiva IP, Andrade Junior VC, de Viana DJS, Figueiredo JA, Mendonca Filho CV, Parrella RA, *et al*. Morphologic characterization of sweet potato accesses from the germplasm bank of the Universidade Federal dos Vales do Jequitinhonha e Mucuri, Brazil. Horticultura Brasileira. 2011;29(4):537-541.
5. Pushpalata Tirkey, Kavita Agrawal, Krishna Tandekar. Studies on orange fleshed Sweet potato for yield and quality traits. Agricultural and Biological Research. 2011;27(1):20-28.
6. Richardson VA. Tuber quality and yield of six sweet potato varieties evaluated during 2012. Gladstone Road Agricultural Centre Crop Research Report; 2012. p. 13.
7. Velmurugan K, Thambura S, Kannan M. Variability in the open pollinated progenies of sweet potato (*Ipomoea batatas* (L.) Lam) at three stage of harvest. South Indian Horticulture. 1999;47(1/6):220-221.