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Studies on Evaluation of Cassava (*Manihot esculenta* Crantz) Genotypes for the Coastal Region of Karaikal

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ABSTRACT: Cassava (*Manihot esculenta* Crantz) is one of the most important crops in the tropics. There is no specific variety of cassava recommended for the cultivation in the Karaikal region. But there is a huge demand for cassava for culinary purpose. Hence, it is main challenge to identify two or three suitable varieties for coastal region of Karaikal. With this background a field experiment was carried out in the Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, U.T. of Puducherry to assess the *per se* performance of 33 genotypes of cassava for growth and yield.The experiment was laid out in a Randomised Block Design with three replications. Among the 33 genotypes, CO 3 was found to be the shortest with a plant height of 120.80 cm, while the tallest genotype was Sree Vishakam with 290.30 cm. Sree Jaya produced highest number of leaves plant^{-1} (213.50). The highest number of tubers plant^{-1} and individual tuber weight recorded in CO 3 (15.00 and 312.72 g, respectively). The genotype Sree Athulya recorded the highest dry matter content (46.14 g). CO 3 recorded the highest tuber yield plant^{-1} and ha^{-1} (2.48 kg and 44.09 t ha^{-1}, respectively) followed by Sree Rekha (2.43 kg and 43.20 t ha^{-1}, respectively) and Sree Prabha (2.32 kg and 41.24 t ha^{-1}, respectively). By popularization of these varieties there is a good scope for expansion of cassava varieties area through Department of Agriculture by Minikit or True Cassava Miniset Programme.

Keywords: Cassava, *per se* performance, growth, tuber yield.

INTRODUCTION

Around 12% of the world population suffer by hunger and live without quality and nutritional food. To achieve nutritional security of people, quantity and quality of the produce like tomato may be increased (Rathinavelu, 2021). The vegetables and fruits played a crucial role in the human diet being considered as protective foods (Bharathi, 2021). Cassava considered to be important food crop in developing countries and is the fourth most important dietary source of calories produced in the tropics, after rice, maize and sugarcane (Akinwale *et al.,* 2010). The roots and leaves are available all year round (Ntawuruhunga *et al.,* 2006), thus cassava is an important food security crop, especially in drought-prone area (Chavez *et al.,* 2005). Since there is lots of diversity is available in cassava genotype throughout the country, there is a possibility of assembling and evaluating the available genotypes and also to assess the performance of the genotype under Karaikal region. There is no research work carried out in cassava for the suitability of UT of Puducherry including Karaikal and there is no previous study also. Hence, this study has been proposed to make advantage of the best variety may be popularized. Keeping the above points in view, an experiment was conducted to evaluate the cassava genotypes for growth and yield in the coastal region of Karaikal.

MATERIAL AND METHODS

Investigation on the evaluation of cassava genotypes for growth and yield was carried out in the Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, U.T. of Puducherry. The 33 diverse genotypes were evaluated for *per se* performance for growth and yield (Table 1). All the genotypes were evaluated for various growth and yield. The experiment was laid out in a Randomised Block Design with three replications. Analysis of variance was worked out for all the characters by making use of means of replication, as suggested by Goulden (1959).

Table 1: List of cassava genotypes used for the study.

Sr. No.	Name of the genotypes	Source / place of collection
1.	CO 1	TNAU, Coimbatore
2.	CO 2	Thiruvarur, Tamil Nadu
3.	CO 3	TNAU, Coimbatore
4.	CO 4	TNAU, Coimbatore
5.	MVD-1	Salem, Tamil Nadu
6.	M4	CTCRI, Sreekariyam, Kerala
7.	H 97	CTCRI, Sreekariyam, Kerala
8.	H 165	CTCRI, Sreekariyam, Kerala
9.	H 226	CTCRI, Sreekariyam, Kerala
10.	Sree Sahya	CTCRI, Sreekariyam, Kerala
11.	Sree Visakham	CTCRI, Sreekariyam, Kerala
12.	Sree Prakash	CTCRI, Sreekariyam, Kerala
13.	Sree Harsha	CTCRI, Sreekariyam, Kerala
14.	Sree Jaya	CTCRI, Sreekariyam, Kerala
15.	Sree Vijaya	CTCRI, Sreekariyam, Kerala
16.	Sree Rekha	CTCRI, Sreekariyam, Kerala
17.	Sree Prabha	CTCRI, Sreekariyam, Kerala
18.	Sree Padmanabha	CTCRI, Sreekariyam, Kerala
19.	Sree Athulya	CTCRI, Sreekariyam, Kerala
20.	Sree Apoorva	CTCRI, Sreekariyam, Kerala
21.	9S-127	CTCRI, Sreekariyam, Kerala
22.	CI-800	CTCRI, Sreekariyam, Kerala
23.	CR-43-2	CTCRI, Sreekariyam, Kerala
24.	CR-24-4	CTCRI, Sreekariyam, Kerala
25.	CR-43-7	CTCRI, Sreekariyam, Kerala
26.	Kalpaka	CTCRI, Sreekariyam, Kerala
27.	Malabar Local	Palakkad, Kerala
28.	CTRL	Ranni, Kerala
29.	Vellayani Hraswa	KAU, Vellayani, Kerala
30.	Kozhikode Local	Calicut, Kerala
31.	Pathanamthitta Local	Pathanamthitta, Kerala
32.	Red Mixture	Kottayam, Kerala
33.	Black Mixture	Kottayam, Kerala

The recommended cultural practices were followed uniformly and observations were recorded on different growth and yield parameters *viz.*, plant height, number of leaves plant^{-1}, length of petiole, inter nodal length, number of tuber plant^{-1}, individual tuber weight, dry matter content of tubers, tuber length, tuber girth, length diameter ratio, tuber yield plant^{-1} and estimated tuber yield. The mean data from selected plants in each replication were subjected to analysis of variance (Panse and Sukhatme, 1957).

RESULT AND DISCUSSION

A. Growth parameters

Analysis of variance revealed that the presence of significant differences among the genotypes for all the growth and yield characters. The potentiality of a variety may be judged based on their *per se* performance to have parental choice. Hence the clones chosen for the study were assessed for their *per se* performance (Table 2 to 4). The genotype CO 3 was found to be the shortest with a plant height of 120.80 cm, while the tallest genotype was Sree Vishakam with 290.30 cm. The genotype Sree Vishakam recorded the maximum plant height but produced moderate tuber yield while the less plant height produced by the genotype CO 3 registered highest tuber yield plant^{-1}. This may be attributed to differential ability of clones for the synthesis of phytohormones such as gibberellin and cytokinin observed by (Shilpa, 2015). These findings were in corroboration with the earlier worker of (Benti and Degefa, 2017) supports the present findings in cassava.

Among 33 genotypes, Sree Jaya produced maximum numbers of leaves plant^{-1} (213.50). The lowest number of leaves plant^{-1} was noticed in Pathanamthitta Local with 45.00. The number of leaves plant^{-1} was highest in the genotype Pathanamthitta Local which significantly recorded moderate tuber yield. However, the genotype CO 3 significantly produced more number of leaves plant^{-1} and recorded the higher tuber yield. This was in line with the findings of (Shilpa, 2015). The length of petiole varied significantly among the genotypes. Red Mixture recorded longest petiole length of 34.90 cm, while the shortest petiole length was in CO 3 (13.90 cm). The length of petiole is an important character which decides the orientation of the leaves towards sunlight for higher physiological returns. This resulted in a better orientation as adduced by uniform leaf area at all stages of growth of cassava.

The genotype Red Mixture recorded the highest petiole length which is significantly recorded higher tuber yield. Hence the petiole length could be taken as an index to measure leaf area for large number of genetic stocks as suggested by Ramanujam, (1982). The clone H-165 recorded highest inter nodal length of 4.30 cm, while the shortest inter nodal length was recorded in Sree Prakash (1.46 cm). Paramaguru (1987) reported that in cassava, the genotype ME-120, had highest intermodal length with maximum plant height at eight-month stage and this is supporting the present findings in cassava.

Table 2: *Per se* performance of cassava genotypes for growth contributing traits.

Name of genotypes	Plant height (cm)	Number of leaves plant^{-1}	Length of petiole (cm)	Inter nodal length (cm)
CO 1	153.92**	105.20	14.95**	2.85
CO 2	122.50**	88.70	17.45**	1.55**
CO 3	120.80**	188.30**	13.90**	2.65
CO 4	147.00**	201.60**	23.75	3.15
MVD-1	274.00	137.70**	24.16	2.60
M4	263.60	127.10**	20.80**	3.90
H 97	202.80	122.50**	27.60	3.00
H 165	188.50	106.20	25.70	**4.30**
H 226	184.50**	76.80	25.00	1.70**
Sree Sahya	264.10	92.50	28.80	3.30
Sree Vishakam	**290.30**	103.00	26.30	1.75**
Sree Prakash	158.50**	82.10	25.60	1.46**
Sree Harsha	185.40**	74.40	25.00	3.10
Sree Jaya	171.50**	**213.50****	16.00**	4.10
Sree Vijaya	124.70**	111.00	13.91**	3.10
Sree Rekha	208.10	49.50	22.80	2.90
Sree Prabha	164.00**	45.80	19.80**	2.35
Sree Padmanabha	146.30**	91.50	14.20**	2.60
Sree Athulya	178.10**	47.00	23.60	2.40
Sree Apoorva	161.50**	49.10	21.30*	2.11*
9S-127	165.80**	127.00**	16.80**	2.05**
CI-800	172.80**	77.20	22.30	2.65
CR-43-2	174.20**	58.70	21.50*	2.15*
CR-24-4	196.30	66.00	26.10	2.25
CR-43-7	173.80**	74.50	21.10**	2.35
Kalpaka	156.30**	57.00	25.90	2.10*
Malabar Local	164.10**	53.80	28.00	2.20*
CTRL	152.30**	73.50	20.80**	1.65**
VellayaniHraswa	153.80**	79.50	24.10	2.05**
Kozhikode local	165.20**	113.30	24.60	1.95**
Pathanamthitta Local	256.30	45.00	32.80	3.30
Red Mixture	278.10	106.70	**34.90**	2.90
Black Mixture	272.00	69.20	28.10	2.45
Mean	187.61	94.3879	22.95	2.57
Range	120.80 - 290.30	45.00 - 213.50	13.90 - 34.90	1.46 - 4.30
SEd	2.52	10.50	0.64	0.17
CD(0.05)	5.14	21.39	1.30	0.35
CD (0.01)	6.91	28.76	1.75	0.47
CV (per cent)	1.35	11.13	2.79	6.81

** Significant at 1 per cent level * Significant at 5 per cent level
Bold values indicates the highest mean value and underlined values are the least mean values.

B. Yield parameters

The number of tubers plant^{-1}, a major yield attribute, exhibited a significant and positive relation with tuber yield.

In the present study, highest number of tubers plant^{-1} recorded in CO 3 (15.00) followed by Sree Rekha (12.70) and Sree Prabha (12.00) which ultimately increase the yield of cassava. A similar finding was proposed by Madhava Rao *et al.,* (1987) based on their study conducted in clone H-226 in cassava. Among 33 genotypes, CO 3 recorded highest individual tuber weight of 312.72 g. The lowest tuber weight was observed in the genotype CI 800 (125.00 g).

The number and weight of tubers are dependent primarily on foliage characters such as length of vine; weight of foliage and number of branches in sweet potato (Purewal, 1958) and invariably vigorous abundant foliage contributes to the tuber yield which support the present results in cassava. The genotype Sree Athulya recorded the highest dry matter content of 46.14 g followed by CO 3 with a tuber weight of 44.48 g while the genotype Kalpaka exhibited the least dry matter content of 16.45 g. The total dry matter production and efficiency of allocation of dry matter towards roots is an important factor that determines storage root yield. Although the leaf surface is usually considered as a source of assimilates, the relative growth rates of shoot and tuber could also be considered as an expression of this system as 'sinks' for assimilates thus contributing to increasing yield. These findings were in corroboration with the earlier worker of Sobuto, (2001) supports the present findings in

cassava. The tuber length exhibited high magnitude of variations among the genotypes. The tuber length was the highest with 32.14 cm in CO 3. The genotype CI 800 recorded the lowest tuber length of 13.40 cm.

Tuber length and girth is maximum for the genotype CO 3 followed by Sree Rekha and Sree Prabha which significantly recorded higher tuber yield. Lowe *et al.*, (1982) reported that the tuber development was due to continued production of storage tissue with increase in tuber width but not the length. Balashanmugham *et al.*, (1980) also reported that the tuber girth could be one of the most reliable indices for plant selection in cassava supports the present finding. Among 33 genotypes, CI 800 recorded the highest tuber length diameter ratio of 5.26. The genotype CO 3 exhibited the least tuber diameter of 2.65. Paramaguru (1987) found that there is no significant difference between stages of crop growth with respect to length diameter ratio of the tuber. This implied that the rate of increase of tuber length was same as that of tuber girth and both these traits contributed to the increase in size of the tuber. The 33 genotypes showed significant difference in tuber yield plant^{-1}. The genotype CO 3 recorded the highest tuber yield of 2.48 kg. The genotype CI 800 recorded the lowest tuber yield per plant of 1.18 kg. The genotype CO 3 recorded the highest tuber yield of 44.09 t ha^{-1}. The genotype CI 800 recorded the lowest tuber yield of 20.98 t ha^{-1}. (Abaca *et al.*, 2021) also observed yield variation amongst cassava genotypes andpointed that these variations could be attributed to both genetic and environmental factors. A similar finding was proposed by (Madhava Noerwijatia and Budiono 2015) based on their study conducted in cassava.

Table 3: *Per se* performance of cassava genotypes for yield contributing traits.

Name of genotypes	Number of tuber plant^{-1}	Individual tuber weight (g)	Dry matter content of tubers (per cent)	Tuber length (cm)
CO 1	5.50	221.55	32.60	21.42
CO 2	4.70	241.39**	30.06	23.95
CO 3	**15.00****	**312.72****	44.48**	**32.14****
CO 4	10.00**	282.09**	30.94	27.65*
MVD-1	7.00	170.10	37.50**	16.53
M4	7.00	216.50	43.57**	21.01
H 97	7.90	189.73	30.67	19.08
H 165	6.00	231.89**	34.90	22.72
H 226	5.40	160.17	34.25	15.85
Sree Sahya	7.80	210.16	40.54**	20.71
Sree Vishakam	7.00	280.88**	29.08	26.84*
Sree Prakash	6.60	236.83**	34.95	23.43
Sree Harsha	7.70	256.67**	35.39	25.20
Sree Jaya	9.70**	175.50	40.58**	17.29
Sree Vijaya	10.80**	150.72	40.00**	15.41
Sree Rekha	12.70**	291.69**	25.28	30.20**
Sree Prabha	12.00**	287.07**	27.95	28.75**
Sree Padmanabha	6.60	246.66**	34.02	24.05
Sree Athulya	6.40	266.22**	**46.14**	25.60
Sree Apoorva	5.20	277.44**	23.76	26.12
9S-127	5.63	144.73	36.18	15.05
CI-800	4.80	125.00	32.72	13.40
CR-43-2	6.90	140.36	30.25	14.78
CR-24-4	5.60	139.67	34.22	14.37
CR-43-7	7.50	162.62	36.50*	25.70
Kalpaka	6.30	207.33	16.45	20.05
Malabar Local	6.00	179.49	41.06**	17.95
CTRL	5.20	167.27	42.93**	16.10
Vellayani Hraswa	5.80	157.38	30.25	15.75
Kozhikode local	4.90	185.00	37.50**	18.50
Pathanamthitta Local	5.50	197.18	36.00	19.85
Red Mixture	6.10	229.08*	37.00**	22.50
Black Mixture	5.10	226.51*	37.85**	22.30
Mean	7.16	211.13	34.71	16.45
Range	4.80 - 12.70	125.00 - 312.72	16.45 - 46.14	13.40 - 32.14
SEd	0.9299	6.43	0.83	0.72
CD(0.05)	1.89	13.11	1.69	1.48
CD (0.01)	2.54	17.63	2.27	1.99
CV (per cent)	12.98	3.05	2.39	3.43

** Significant at 1 per cent level * Significant at 5 per cent level

Bold values indicates the highest mean value and underlined values are the least mean values

Table 4: *Per se* performance of cassava genotypes for yield contributing traits.

Name of genotypes	Tuber girth (cm)	Length diameter ratio	Tuber yield plant^{-1} (kg)	Estimated tuber yield (t ha^{-1})
CO 1	18.86	3.58	1.84	32.62
CO 2	20.77**	3.25	1.99	35.29
CO 3	**25.51****	2.65	**2.48****	**44.09****
CO 4	23.04**	2.93	2.27**	40.40**
MVD-1	15.13	4.47**	1.59	28.22
M4	18.29	3.70	1.83	32.53
H 97	16.31	4.16**	1.69	30.04
H 165	19.89**	3.40	1.92	34.04
H 226	14.94	4.52**	1.71	30.40
SreeSahya	20.56**	3.29	2.24**	39.73**
SreeVishakam	22.60**	2.99	2.08*	36.89*
Sree Prakash	20.06**	3.42	1.96	34.84
Sree Harsha	21.89**	3.14	2.07*	36.80*
Sree Jaya	15.18	4.45*	1.62	28.80
Sree Vijaya	14.29	4.73*	1.50	26.58
Sree Rekha	24.60**	2.75	2.43**	43.20**
Sree Prabha	23.46**	2.88	2.32**	41.24**
Sree Padmanabha	21.05**	3.21	2.02	35.87
Sree Athulya	22.03**	3.07	2.18**	38.67**
Sree Apoorva	22.44**	3.01	2.19**	38.98**
9S-127	14.05	4.81**	1.46	25.96
CI-800	12.85	**5.26****	1.18	20.98
CR-43-2	13.98	4.83**	1.45	25.69
CR-24-4	13.64	4.96**	1.42	25.28
CR-43-7	14.65	4.61**	1.60	28.36
Kalpaka	16.30	4.15**	1.75	31.07
Malabar Local	15.70	4.30**	1.66	29.56
CTRL	15.05	4.49**	1.59	28.30
Vellayani Hraswa	14.42	4.69**	1.54	27.40
Kozhikode local	15.89	4.25**	1.68	29.87
Pathanamthitta Local	16.50	4.10**	1.72	30.58
Red Mixture	19.63**	3.44	1.90	33.78
Black Mixture	19.08*	3.54	1.84	32.74
Mean	18.26	3.85	1.82	32.43
Range	12.85 - 25.51	2.65 - 5.26	1.18 - 2.48	20.98 - 44.09
SEd	0.39	0.09	0.1040	1.8565
CD(0.05)	0.7956	0.19	0.2119	3.7817
CD (0.01)	1.06	0.25	0.2848	5.0841
CV (per cent)	2.14	2.46	5.70	5.72

** Significant at 1 per cent level * Significant at 5 per cent level

Bold values indicates the highest mean value and underlined values are the least mean values

CONCLUSION

Analysis of variance revealed the presence of significant differences among the genotypes for all the characters. In the present investigation based on the *per se* performance of 33 genotypes, CO 3 recorded the highest tuber yield plant^{-1} and ha^{-1} (2.48 kg and 44.09 t ha^{-1}, respectively) followed by Sree Rekha (2.43 kg and 43.20 t ha^{-1}, respectively) and Sree Prabha (2.32 kg and 41.24 t ha^{-1}, respectively). These genotypes also significantly recorded higher mean performance in other growth and yield contributing traits *viz.,* number of leaves plant^{-1}, number of tubers plant^{-1}, individual tuber weight, dry matter content of the tubers, tuber length and tuber girth. These productive traits would have significantly contributed to the tuber yield plant^{-1}. By popularization of these varieties there is a good scope for expansion of cassava varieties area through Department of Agriculture by Minikit or True Cassava Miniset Programme.

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Conflict of Interest. Nil.

REFERENCES

Abaca, A., Odama, E., Komakech, A., Asiku, B., Andrews, A. A., & Kassim, S. (2021). Evaluation of newly released

cassava varieties for yield performance, reactions to cassava diseases and farmers' preference in Adjumani district of Uganda. *Journal of Agricultural Science, 13*(4): 84-92.

Akinwale, M. G., Akinyele, B. O., Dixon, A. G. O., & Odiyi, A. C. (2010). Genetic variability among 43 cassava genotypes in three agro ecological zones of Nigeria. *Journal of Plant Breeding and Crop Science, 2*(5): 104-109.

Balashanmugham, P. V., Ramdoss, S., & Rajendran, P. (1980). Genetic variability and correlation studies in

Chavez, A.L., Sanchez, T., Jaramillo, G., Bedoya, J. M., Echeverry, J., Bolanos, E. A., Ceballos, H., & Iglesias, C. A. (2005). Variation of quality traits in cassava roots evaluated in landraces and improved clones. *Euphytica, 143*: 125-133.

Goulden, C. H. (1959). Methods of statistical analysis. John Wiley and Sons, Inc., New York.

Lowe, S. B., John, Travis, E., Hernandez, P., & Mahmood, M. (1982). Performance of 'Centennial' sweet potato mutants. *Horticulture Science, 13*(5): 579-580.

Madhava Rao, D., Satyanarayana, M., & Venkatsubba Reddy, K. (1987). Studies in performance of cassava (*Manihot esculenta*Crantz) hybrids in Andhra Pradesh. *In:* Proceedings of the National symposium on production and utilization of tropical tuber crops, CTCRI, Thiruvanthapuram, India, p. 29-31.

Noerwijatia, K., & Budiono, R. (2015). Yield and yield components evaluation of cassava (*Manihot esculenta* Crantz) clones in different altitudes. *Energy Procedia, 65*: 155-161.

Ntawuruhunga, P., Semakula, G., Onjulong, H., Bua, A., Pagama, P., Kanobe, C., & Whyte, J. (2006). Evaluation of cassava genotypes in Uganda. *African Crop Journal, 14*(1): 17-25.

tapioca (*Manihot esculenta* Crantz). Proc. National seminar on Tuber Crops Prod. Tech., Tamil Nadu Agricultural University, Coimbatore. pp. 8-12.

Benti, G., & Degefa, G. (2017). Performance evaluation and palatability taste of cassava varieties in Fedis Babile districts, Eastern Ethiopia. *International Journal of Current Research, 9*(4): 48570-48575.

Bharathi, R. (2021). Dietary and nutrient intakes of rural and urban women: a study from South India. *International Journal of Theoretical & Applied Sciences, 13*(1): 19-25.

Panse, V. G., & Sukhatme, P. V. (1957). Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi, p. 97.

Paramaguru, P. (1987). Studies on comparative performance of certain cassava (*Manihot esculenta*Crantz) clones for earliness yield and quality. M.Sc. (Hort.) Thesis, TamilNadu Agric. Univ., Coimbatore.

Purewal, S. S. (1958). Effect of sowing dates, fertilizers and spacing's on development and yield of sweet potato (*Ipomoea batatas* L.). *Agricultural Research Journal of Kerala, 14*(2): 153-159.

Ramanujam, T. (1982). Leaf area in relation to petiole length in cassava. *Abstract on Cassava, 32*(2): 212-213.

Rathinavelu, S. (2021). Effect of foliar application of vasicine on gas exchange parameters, proline content and sod activity in tomato (*Solanum lycopersicum* L.). *Biological Forum - An International Journal, 13*(2): 70-77.

Shilpa, R. (2015). Genetic evaluation of sweet potato (*Ipomea batatas* L.) varieties under coastal region of Karaikal. M.Sc. (Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore.

Sobuto, M. (2001). Growth and sink potential of sweet potato cultivars as influenced by potassium nutrition both under rain fed and irrigated conditions. *Hort. Science, 129*(1): 1141-1143.

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