



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2022; SP-11(9): 408-411  
© 2022 TPI

[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 22-06-2022

Accepted: 26-07-2022

## M Janaki

AICRP on Tuber Crops,  
Horticultural Research Station,  
Dr. YSRHU, Peddapuram,  
Andhra Pradesh, India

## A Pavani Priyanka

AICRP on Tuber Crops,  
Horticultural Research Station,  
Dr. YSRHU, Peddapuram,  
Andhra Pradesh, India

## P Ashok

Horticultural Research Station,  
Dr. YSRHU,  
Venkataramannagudem, Andhra  
Pradesh, India

## Evaluation of short duration cassava genotypes under coastal zone of Andhra Pradesh

M Janaki, A Pavani Priyanka and P Ashok

### Abstract

Cassava or tapioca (*Manihot esculenta* Crantz) is one of the most important tuber crops and widely grown as staple food in many countries due to its edible roots. Three short duration cassava genotypes along with two checks *viz.* Sree Jaya and Local were evaluated under five locations of East Godavari district during 2016-17 and 2017-18 with an objective of to identify the suitable short duration cassava variety for Andhra Pradesh. The results revealed that there are significant differences were observed between the genotypes for all the studied parameters. The genotype 'TCa 12-9' has recorded maximum yield in three locations whereas the check Sree Jaya has registered maximum yield in two locations. The maximum average pooled tuber yield per hectare was recorded in TCa 12-9 (35.05 t/ha) followed by Sree Jaya (31.09 t/ha). The results of the experiment revealed that the genotype 'TCa 12-9' was found to be promising and suitable for coastal Andhra Pradesh.

**Keywords:** Cassava, short duration genotype, average tuber yield

### Introduction

Cassava (*Manihot esculenta* Crantz) is originally a perennial, woody shrub and belongs to the family Euphorbiaceae. This crop is widely grown as staple food and animal feed in the countries of tropical and sub tropical Africa, Asia and Latin America for its edible roots. It is also called as Tapioca, Manioc (French) and Mandioca (Portuguese). It is the only species of *Manihot* under cultivation. It is one of the most important staple foods in the human diet in the tropics and ranked as the sixth most important source of calories in the human diet worldwide. Cassava has moved from being a subsistence crop to a fully commercial crop, due to its income generating capacity and enormous potential for industry, animal feed and human consumption. Its storage roots have the high starch content and can form the major source of various intermediate products including flour, starch and dextrin for food, feed, confectionery, wood, pharmaceutical, adhesives, explosives and other industrial uses. Cassava cultivation is largely restricted to East Godavari (sago and flour), agency areas of Srikakulam, Vishakhapatnam and Vizianagaram Districts (edible). This crop can be cultivated both in irrigated and rainfed conditions (Pugalendhi and Velmurugan, 2021)<sup>[11]</sup>. It can grow in poor soil and can also withstand drought condition and it is an important famine reserve crop in countries with unreliable rainfall (Singh *et al.*, 2017)<sup>[14]</sup>.

The duration of the cassava is varied from 6-7 months (short duration) to 10-11 months (long duration) depends upon the variety. By cultivating long duration varieties, the farmers have yielded only one crop per year with increased cost of cultivation in order to crop maintenance *viz.*, regular fertilizer application, irrigation, weeding and other plant protection measures (Pugalendhi and Velmurugan, 2021)<sup>[11]</sup>. According to Suja *et al.* (2010)<sup>[15]</sup> the short duration cassava varieties are best suited for marginal farmers and also reported that the short duration cassava varieties can be grown in rice based cropping system for crop diversification, intensification and profit maximization. Therefore, the present investigation was carried out with a view to evaluate the short duration cassava genotypes along with available short duration variety and local as checks to identify the suitable short duration cassava variety for coastal zone of Andhra Pradesh in terms of tuber yield and starch content.

### Material and Methods

Three short duration cassava accessions *viz.* TCa 12-5, TCa 12-6, TCa 12-9 were evaluated along with Sree Jaya (national check) and Local at Horticultural Research Station, Peddapuram in RBD with four replications along with another four multi locations (J. Thimmapuram, Rangampeta, Jaggampeta and Pandirimamidi) during 2016-17 and 2017-18.

### Corresponding Author:

#### M Janaki

AICRP on Tuber Crops,  
Horticultural Research Station,  
Dr. YSRHU, Peddapuram,  
Andhra Pradesh, India

The planting was taken up during second week of June and the harvesting was done during the first week of March. The setts of 20 cm length were prepared for studied cassava genotypes (TCa 12-5, TCa 12-6, TCa 12-9, Sree Jaya and Local) and the setts were treated with chemical solution of 2 ml of Dimethoate and 3 g Mancozeb for 5 min. and planted in raised nursery beds in side by side and watered regularly. The well rooted and sprouted setts were transplanted to well prepared main field after 7-8 days of planting at a spacing of 90 cm x 90 cm. The recommended dose of FYM @ 12.5 tonnes/ha and fertilizers of NPK @ 60:60:60 kg /ha in the form of urea, single super phosphate and murate of potash respectively were applied. Entire dose of P was applied as basal while N and K were applied in three equal splits @ 30, 60 and 90 DAP and the crop was raised as per the recommended package of practices. Randomly selected three plants from each entry were tagged in each replication and recorded the data for growth, yield, CMD and quality characters and the mean values were calculated. The observations studied viz. plant height (cm), stem girth (cm), no. of tubers per plant, tuber length (cm), tuber girth (cm), tuber yield per plant (kg), tuber yield (t/ha), CMD score, starch content (%), dry matter content (%), fibre content (%), HCN (ppm) and organoleptic score. The data on various yield

and quality parameters were analyzed by adopting the statistical methods of Panse and Sukhatme (1985) [10]. To calculate the dry matter content, the tubers were washed, peeled, sliced into pieces. 100 g of fresh slices was weighed and kept in hot air oven at a temperature of 60°C. The dried samples were weighed until constant weight was obtained. The dry matter percentage is calculated using the following formulae

$$\text{Dry matter (\%)} = \frac{\text{Dry weight}}{\text{Fresh weight}} \times 100$$

The percentage of starch content was calculated by using the method outlined by Moorthy, S.N. and Padmaja, G. (2002) [7]. The hydrogen cyanide content (HCN) in tubers was estimated by the method given by Indira and Sinha (1969) [4] and expressed in ppm. The fibre (%) was calculated as per the procedure given by AOAC (1975) [1].

The organoleptic score (9-point Hedonic Scale) was done based on the quality parameters viz. tuber appearance, flavor, fibrousness, sweetness, texture, moisture and total acceptability as suggested by Lim (2011) [6] and described below.

The organoleptic score (9-point Hedonic Scale)

Organoleptic score	Scale
9	Liked extremely
8	Liked very much
7	Liked moderately
6	Liked slightly
5	Neither liked nor disliked
4	Disliked slightly
3	Disliked moderately
2	Disliked very much
1	Disliked extremely

The values given by the each of the trained judges (10) should be averaged for statistical analysis

## Results and Discussion

The pooled data on growth and yield characters revealed that there are significant differences between the entries for all studied characters (Table 1) except for tuber girth. The pooled plant height and pooled stem girth were highest in Sree Jaya (331.79 cm, 10.91 cm) which were on par with TCa 12-6 (311.79 cm, 10.40 cm) and TCa 12-9 (309.29 cm, 10.90 cm) respectively. The entry TCa 12-5 has recorded the maximum pooled number of tubers per plant (10.52) which was on par with Sree Jaya (10.27). Similar findings were also noticed by Jayakumar *et al.* (2019) [5].

As per table 1, the pooled tuber length was maximum in TCa 12-9 (39.99 cm) which was on par with TCa 12-5 (38.84 cm) and TCa 12-6 (38.32 cm). Whereas, the pooled tuber girth was highest in Sree Jaya (17.14 cm) followed by TCa 12-9 with 16.59 cm. These results were in line with results of earlier findings of Nageswari *et al.* (1997) [9], Ruth & Ramaswamy (2001) [12], Singh *et al.* (2017) [14] and Jayakumar *et al.* (2019) [5].

The studied quality characters were recorded significant differences between the entries (Table 2). The starch content was maximum in Sree Jaya (27.49%) which was on par with Local (26.63%) and TCa 12-9 (26.11%). Similar kinds of results were also noticed by earlier findings of Singh *et al.*

(2017) [14], Babu rao *et al.* (2018) [2] and Pugalendhi & Velmurugan (2021) [11]. The highest dry matter content was registered in TCa 12-9 (35.75%) which was on par with TCa 12-5 with 32.90 per cent. The result was in conformity with earlier finding of Sen & Goswami (1992) [13] and Singh *et al.* (2017) [14]. The fibre content and HCN content were lowest in TCa 12-5 with 0.84% and 74.96 ppm respectively. Suja *et al.* (2010) [15] was also reported the same kinds of results. The maximum organoleptic score was recorded for Sree Jaya (6.87) followed by TCa 12-6 (6.07). Similar results were also reported by Jayakumar *et al.* (2019) [5].

The data on tuber yield (t/ha) at different locations is revealed that there is a significant differences between the entries for tuber yield (t/ha) (Table 3) and Cassava Mosaic Disease (CMD) (Table 4 and Fig 1). The highest pooled tuber yield was recorded in TCa 12-9 (35.05 t/ha) followed by Sree Jaya (31.09 t/ha). These results were in line with earlier findings of Hedge *et al.* (1993) [3], Singh *et al.* (2017) [14], Babu rao *et al.* (2018) [2], Jayakumar *et al.* (2019) [5] and Pugalendhi & Velmurugan (2021) [11].

The CMD score was minimum in TCa 12-9 (1.21) whereas the score was maximum in TCa 12-6 (2.88). Similar findings were noticed by Nageswari and Palaniswamy (2011) [8].

**Table 1:** Performance of short duration cassava entries for growth and yield characters

Treatment	Plant height (cm)			Stem girth (cm)			No. of Tubers / plant			Tuber length (cm)			Tuber girth (cm)		
	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled
Tca 12-5	237.11	276.00	255.12	9.07	9.85	9.46	7.96	13.08	10.52	39.06	38.63	38.84	14.00	14.27	14.14
Tca 12-6	296.11	333.50	311.79	10.08	10.71	10.40	7.00	9.08	8.04	35.44	41.20	38.32	13.94	15.00	14.47
Tca 12-9	302.11	322.50	309.29	10.28	11.52	10.90	6.74	10.42	8.58	40.67	39.31	39.99	17.56	15.63	16.59
Sree Jaya	316.22	355.50	331.79	10.57	11.25	10.91	9.11	11.42	10.27	30.06	36.78	33.42	16.44	17.84	17.14
Local	208.00	258.00	233.50	8.70	9.92	9.32	6.28	11.58	8.93	24.50	29.05	26.78	12.17	16.85	14.51
C.D. (P=0.05)	27.28	46.34	29.46	0.84	0.87	0.53	1.17	2.44	1.17	5.50	5.73	2.94	2.58	N/A	N/A
S.E(d)	11.65	21.03	13.37	0.36	0.39	0.24	0.50	1.11	0.53	2.35	2.60	1.33	1.10	2.00	1.13
C.V.	5.25	9.62	6.56	4.52	5.23	3.32	8.22	14.13	8.07	8.48	9.94	5.31	9.10	17.77	10.40

**Table 2:** Performance of short duration cassava entries for quality characters

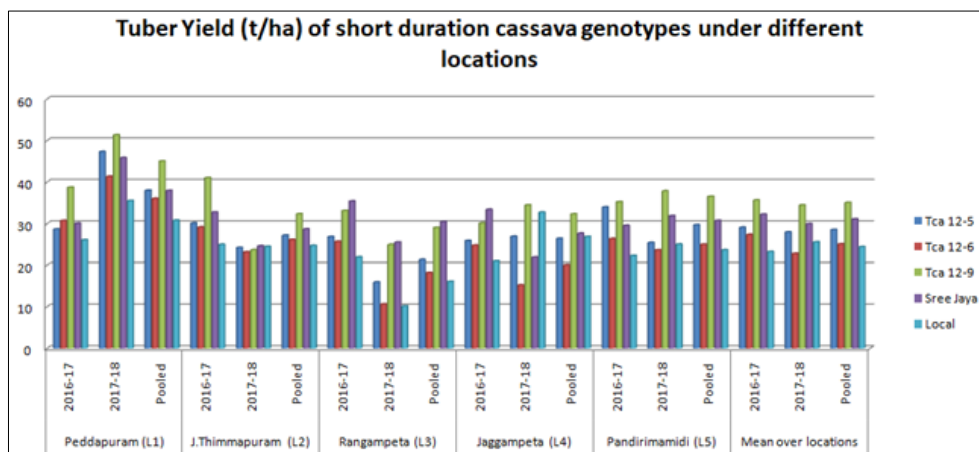
Treatment	Starch (%)	Dry matter (%)	Fibre (%)	HCN (ppm)	Organoleptic Score
Tca 12-5	23.08	32.90	0.84	74.96	5.48
Tca 12-6	23.72	31.50	4.12	153.22	6.07
Tca 12-9	26.11	35.75	1.29	143.56	4.58
Sree Jaya	27.49	28.00	2.95	82.11	6.87
Local	26.63	32.15	0.91	135.43	5.80
CD (P=0.05)	1.41	3.58	0.27	14.30	0.96
S.E(d)	0.64	1.67	0.12	6.11	0.45
C.V.	3.56	8.25	8.53	6.35	12.27

**Table 3:** Performance of short duration cassava entries for tuber yield (t/ha) at different locations

Treatment	Peddapuram (L1)			J. Thimmapuram (L2)			Rangampeta (L3)			Jaggampeta (L4)			Pandirimamidi (L5)			Mean over locations		
	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled
Tca 12-5	28.66	47.31	37.99	30.12	24.21	27.17	26.83	15.9	21.37	25.88	26.94	26.41	33.96	25.43	29.70	29.09	27.96	28.53
Tca 12-6	30.71	41.35	36.03	29.15	23.17	26.16	25.71	10.6	18.16	24.78	15.19	19.99	26.36	23.64	25.00	27.34	22.79	25.07
Tca 12-9	38.72	51.33	45.03	41.02	23.66	32.34	33.12	24.95	29.04	30.12	34.47	32.30	35.22	37.83	36.53	35.64	34.45	35.05
Sree Jaya	30.06	45.84	37.95	32.73	24.62	28.68	35.4	25.5	30.45	33.4	21.91	27.66	29.53	31.87	30.70	32.22	29.95	31.09
Local	26.07	35.5	30.79	24.96	24.46	24.71	21.95	10.11	16.03	20.99	32.72	26.86	22.28	25.01	23.65	23.25	25.56	24.41
C.D. (P=0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.66	6.55	3.37
S.E(d)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.71	3.06	1.58
C.V.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.18	17.21	8.64

**Table 4:** Performance of short duration cassava entries for Cassava Mosaic Incidence (CMD)

Entry	CMD Score					
	Peddapuram	J. Thimmapuram	Rangampeta	Jaggampeta	Pandirimamidi	Mean
TCa 12-5	1.25	1.46	1.40	1.39	1.31	1.36
TCa 12-6	3.01	2.45	3.38	2.36	3.21	2.88
TCa 12-9	1.23	1.19	1.33	1.19	1.13	1.21
Sree Jaya	1.54	1.57	1.48	1.63	1.33	1.51
Local	1.22	1.26	1.30	1.23	1.19	1.24
CD (P=0.05)	-	-	-	-	-	0.30
SE(d)	-	-	-	-	-	0.14
C.V.	-	-	-	-	-	13.59



**Fig 1:** Performance of short duration cassava entries for tuber yield (t/ha) at different locations

## Conclusion

The investigation was carried out to identify the suitable short duration cassava variety for coastal zone of Andhra Pradesh in terms of tuber yield and starch content. Among the five genotypes studied, the genotype TCa 12-9 was recorded highest pooled tuber yield per hectare (35.05 t/ha) coupled with low incidence of Cassava Mosaic Disease (CMD) and also recorded maximum tuber length (39.99 cm) and dry matter content (35.75%). This genotype was also recorded the on par results for all the growth and yield parameters. Therefore, the genotype TCa 12-9 was the best suitable short duration cassava variety for cultivation under Coastal zone of Andhra Pradesh.

cassava genotypes for crop diversification in the humid tropics: Growth dynamics, biomass, yield and quality. J Sci. Food Agric. 2010;90:188-198.

## References

1. AOAC Official Methods of Analysis. Crude fibre (Horowitz, w. Ed.), Washington D.C.; c1975. p. 136.
2. Babu Rao B, Swami DV, Ashok P, Kalyana Babu B, Ramajayam D, Sasikala K. Estimation of Genetic Variability and Heritability for Yield and Its Related Components in Cassava (*Manihot esculenta* Crantz) Genotypes. Int. J Curr. Microbiol. App. Sci. 2018;7(6):287-297.
3. Hedge M, Kumar DP, Guruprasad TR, Badrinath. Evaluation of short duration lines of cassava under coastal acid soils of Karnataka. South Indian Horticulture. 1993;41(1):49-51.
4. Indira P, Sinha SK. Calorimetric method for determination of HCN in tubers and leaves of cassava. Indian Journal of Agricultural Science. 1969;39(11):1021-1023.
5. Jayakumar G, Bindhu JS, Rakhi R, Shajan VR, Rini CR. Kau uthama: A Short Duration Cassava Variety for Upper Kuttanad Region of Kerala. Journal of Root Crops. 2019;45(1):12-16.
6. Lim J. Hedonic scaling: A review of methods and theory. J Lim Food Quality and Preference. 2011;22:733-747.
7. Moorthy SN, Padmaja G. A rapid titrimetric method for the determination of starch content in cassava tubers. J Root Crops. 2002;28:30-37.
8. Nageswari K, Palaniswamy V. Correlation and Genetic variability studies in cassava (*Manihot esculenta* Crantz). NSCFT, CTCRI proceedings. 2011, 219-222.
9. Nageswari K, Pugalendhi L, Azhakiyamanavalan RS. Evaluation of cassava (*Manihot esculenta* Crantz) cultivars under Shevroy condition. South Indian Horticulture. 1997;45(1/2):19-21.
10. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. ICAR, New Delhi. 1985, 134-192.
11. Pugalendhi L, Velmurugan M. Performance of short duration cassava accessions for improved tuber yield and quality. The Pharma Innovation Journal. 2021;10(2):718-720.
12. Ruth Beulah Rani A, Ramaswamy N. Evaluation of open pollinated clones of cassava for growth and yield parameters. Progressive Horticulture. 2001;33(1):57-60.
13. Sen H, Goswami SB. Evaluation of some cassava entries in the Gangetic plains at early harvest. Indian Agriculturist. 1992;36(1):73-76.
14. Singh KJ, Devi AKB, Sulochanadevi L. Evaluation of Short duration cassava (*Manihot esculenta* Crantz) varieties under Manipur condition. Int. J Adv. Res. Sci. Eng. and Technol. 2017;4(7):4286-4289.
15. Suja G, John KS, Sreekumar J, Srinivas T. Short duration