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IDENTIFICATION OF K-EFFICIENT CASSAVA LINES SUITABLE FOR COASTAL ZONE OF ANDHRA PRADESH, INDIA

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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. It has wider adaptability to poor soil conditions, tolerance to drought, pest and diseases. Ten K-efficient cassava lines (TCa14-1, TCa14-2, TCa14-3, TCa14-4, TCa14-5, TCa14-6, TCa14-7, TCa14-8, Sree Athulya and Local) were evaluated under AICRP on Tuber Crops at Dr. YSRHU - Horticultural Research Station, Peddapuram in Randomized Block Design (RBD) with three replications during the period of 2014-15 to 2020-21 (IET, URT and MLT) with an objective of to identify the suitable K-efficient cassava variety for Coastal zone of Andhra Pradesh. The multi locational trail was conducted in four locations with five genotypes (TCa14-3, TCa14-5, TCa14-6, Sree Athulya and Local) for three years from 2018-19 to 2020-21. The results revealed that there are significant differences were observed between the genotypes for all studied parameters. At Research station level, the average maximum tuber yield per hectare was recorded in TCa14-5 (44.67 t/ha) followed by Sree Athulya (42.66 t/ha), while, over locations the average pooled tuber yield per hectare was highest in Sree Athulya (41.77 t/ha) followed by TCa14-3 (38.70 t/ha) and TCa14-5 (37.61 t/ha). Among all five genotypes, the utilization of available K_20 by TCa14-5 was very less (18.08 kg/ha) compared to Sree Athulya (35.81 kg/ha) and TCa14-3 (51.22 kg/ha). So that, the genotype TCa14-5 was best K-efficient cassava line suitable for coastal Andhra Pradesh.
Keywords: Cassava, short duration genotype, average tuber yield.

Introduction

Cassava (*Manihot esculenta* Crantz) has been used as a staple food of many nations. It is also known as manioc, yucca and tapioca. It is originally a perennial, woody shrub and belongs to the family Euphorbiaceae. 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. 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. In India, this crop is cultivated in Tamil Nadu, Kerala, Andhra Pradesh, Karnataka, Maharastra and Assam. In Andhra Pradesh, its cultivation is largely restricted to Kakinada, Alluri Seetharamaraju districts (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). Among the tropical tuber crops, cassava is the most important with respect to the area under cultivation, productivity, ability to thrive under marginal soil and environmental conditions, tolerance to pests and diseases and 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) and also grown in varied agro ecological environments and production systems ranging from highland densely populated regions to lowland drier areas prone to droughts or floods (Ugwu *et al.*, 2019).

Cassava has high requirement of potassium and when the potassium level is low, the response of crop to nitrogen or phosphate fertilizers is poor. Among the major nutrients, potassium (K) is considered as the 'key nutrient' with respect to its significant role in increasing tuber yield and improving tuber quality through reduction in cyanogenic glucosides responsible for bitterness in cassava tubers and enhancing the tuber starch content through its role in influencing the starch synthetase enzyme responsible for starch production (Susan John *et al.* 2010). K deficiency reduces the plant height with narrow and fewer lobes (Onwnueme and Charles, 1994). The package of practices (PoP) recommendation of K for cassava is 60 kg K_2O/ha. The source of K usually used is muriate of potash (MOP) having 60% K_2O. MOP is an imported chemical fertilizer, its price for unit of K is high and sometimes, it is not available at times of need. The K efficient genotypes can mobilize the fixed soil K for plant uptake so that the external application of K can be reduced. Therefore, the present investigation was carried out with a view to evaluate the K efficient cassava genotypes to identify the suitable K efficient cassava genotype for coastal zone of Andhra Pradesh in terms of tuber yield, starch content and K use efficiency in order to reduce the external application of K.

Material and Methods

Eight K-efficient cassava lines (TCa14-1, TCa14-2, TCa14-3, TCa14-4, TCa14-5, TCa14-6, TCa14-7, TCa14-8) and two checks (Sree Athulya and Local) were evaluated under Initial Evaluation Trail (IET) of AICRP on Tuber Crops at Dr. YSRHU - Horticultural Research Station, V.R. Gudem in Randomized Block Design (RBD) with three replications during 2014-15 to 2015-16. Based on the pooled data of IET, the CMD tolerant best performing Five K-efficient cassava accessions (TCa14-1, TCa14-3, TCa14-4, TCa14-5, TCa14-6) and two checks (Sree Athulya and Local) were evaluated under Uniform Regional Trail (URT) of AICRP on Tuber Crops at Dr. YSRHU - Horticultural Research Station, Peddapuram in Randomized Block Design (RBD) with three replications during 2016-17 to 2017-18. Based on the pooled results of URT, the best performing three accessions (TCa14-3, TCa14-5, TCa14-6) and two checks (Sree Athulya and Local) were evaluated under Multi Locational Trail (MLT) of AICRP on Tuber Crops at Dr. YSRHU - Horticultural Research Station, Peddapuram along with another three locations (R.B.Patnam, Jaggampeta and Pandirimamidi) during 2018-19 to 2020-21 to know the suitability for Coastal zone of Andhra Pradesh.

The planting was taken up during third week of June and the harvesting was done during the 1st week of March. The setts of 20 cm length were prepared and 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 of 7-8 days old were transplanted to well prepared main field at a spacing of 90 cm x 90 cm. The recommended dose of FYM @ 12.5 tonnes / ha and fertilizers of N & P @ 60:60 kg/ha in the form of urea and single super phosphate respectively and 50% dose of K (30 kg/ha) in the form of murate of potash was applied as the initial available K is < 220 kg/ha. 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 (t/ha), Cassava Mosaic Disease (CMD) score, starch content (%), dry matter content (%), fibre content (%) and HCN (ppm). The data on various yield and quality parameters were analyzed by adopting the statistical methods of Panse and Sukhatme (1985). 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 60^0C. 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). The hydrogen cyanide content (HCN) in tubers was estimated by the method given by Indira and Sinha (1969) and expressed in ppm. The fibre (%) was calculated as per the procedure given by AOAC (1975).

Results and Discussion

The pooled performance of K-efficient cassava genotypes under Initial Evaluation Trail (IET) was presented in table 1. The data revealed that there are significant differences between the entries for all studied characters. The observed data shown as the highest plant height in Sree Athulya with 4.02 m (on par with Local and TCa14-2), highest stem girth in Sree Athulya with 13.10 cm (on par with Local and TCa14-3), maximum number of tubers per plant in Local with 10.60 (on par with TCa14-3, TCa14-1, TCa14-4, TCa14-5 and Sree Athulya), maximum tuber length in TCA14-1 with 41.30 cm (on par with Local, Sree Athulya, TCa14-4, TCa14-7, TCa14-3) and maximum tuber girth in TCa14-2 with 21.80 cm (on par with TCa14-8, Sree Athulya). The tuber yield was highest in TCa14-8 with 47.30 t/ha which was on par with TCa14-3 (43.30 t/ha), Sree Athulya (41.30 t/ha). The highest starch content was recorded in Sree Athulya with 28.70 per cent which was on par with TCa14-2 (27.70 %) and Local (27.60 %). The HCN content was highest in TCa14-2 (237.60 ppm) followed by Local (174.60 ppm) and TCa14-8 (169 ppm). Among ten genotypes studied, only four genotypes TCa14-1, TCa14-4, TCa14-5, Sree Athulya have exhibited CMD (Cassava mosaic disease) tolerance and TCa14-3 has recorded very low incidence (5.6 %).

Pooled Performance of K-efficient cassava genotypes under Uniform Regional Trail (URT) was presented in table 2. The data revealed that there are significant differences between the entries for all studied characters except for plant height and stem girth. The plant height (3.38 m and 3.15 m) and stem girth (10.64 cm and 10.61 cm) were highest in TCa14-3 followed by Sree Athulya respectively. The genotype TCa14-5 has recorded the maximum number of tubers per plant (10.64) which was on par with TCa14-4 (10.28) and Sree Athulya (10.27). The tuber length was maximum in TCa14-1 (43.40 cm) which was on par with TCa14-3 (43.04 cm). Whereas, the tuber girth was highest in Sree Athulya (19.73 cm) followed by Local with 17.01 cm. The tuber yield was highest in Sree Athulya (47.45 t/ha) which was on par with TCa14-5 (43.92 t/ha), Local (41.83 t/ha) and TCa14-3 (39.79 t/ha). As per CMD scale, the data on cassava mosaic disease (CMD) revealed that all entries have showed tolerance to CMD with lowest CMD score except Local check. The starch content was maximum in Sree Athulya (27.67 %) which was on par with TCa14-6 (26.17 %) and Local (26.48%). The highest dry matter content was registered in TCa14-5 (45.66 %) which was on par with TCa14-6 (44.99 %) and TCa14-4 (44.66 %). The fibre content was lowest in TCa14-5 (0.92 %), TCa14-6 (0.93 %) and the HCN content the highest in Local (193.59 ppm) which was on par with TCa14-4 (187.25 ppm). Among all seven genotypes, the utilization of available K_20 by TCa14-5 was very low (12.90 kg/ha) which was preceded by Local (28.57 kg/ha), Sree Athulya (32.9 kg/ha) and TCa14-3 (34.54 kg/ha).

Pooled Performance of K-efficient cassava genotypes under Multi Locational Trail (MLT) was presented in table 3. The pooled data on growth, CMD, yield and quality characters revealed that there are significant differences between the entries for all studied characters except for tuber length and starch content. The highest plant height was recorded in Sree Athulya (2.96 m) which was on par with Local (2.95 m) and TCa14-3 (2.76 m). The maximim stem girth was highest in TCa14-3 (11.81 cm) which was on par with Sree Athulya (10.55 cm). The genotype TCa14-5 has recorded the maximum number of tubers per plant (13.26) which was on par with TCa14-3 (11.69) and Sree Athulya (11.35). The tuber length was highest in TCa14-3 (39.52 cm) followed by TCa14-6 (31.89 cm), TCa14-5 (31.04 cm) and the tuber girth were highest in Sree Athulya (18.40 cm) which was on par with TCa14-6 (18.10 cm) and Local (16.83 cm). The highest tuber yield (t/ha) was registered in Sree Athulya (41.77 t/ha) which was on par with TCa14-3 (38.70 t/ha), TCa14-5 (37.61 t/ha) and TCa14-6 (36.61 t/ha). As per CMD scale, the pooled data on cassava mosaic disease (CMD) revealed that all entries have showed tolerance to CMD with lowest CMD score except Local check (table 3). The starch content was maximum in TCa14-6 (26.08 %) followed by Sree Athulya (25.90 %) and TCa14-3 (25.21 %). The highest dry matter content was recorded in TCa14-6 (42.75 %) which was on par with TCa14-3 (42.42 %), TCa14-5 (40.83 %) and Sree Athulya (40.00 %). The highest sugars were observed in Local (2.64 %) which was on par with TCa14-5 (2.62 %), TCa14-3 (2.38 %) and Sree Athulya (2.26 %). The lowest fibre content was recorded in TCa14-5 (1.17 %), TCa14-6 (1.70 %) and Sree Athulya (1.70 %). The highest HCN content was recorded in TCa14-5 with 249.08 ppm which was followed by Sree Athulya (206.18 ppm). Among all five genotypes, the utilization of available K_20 by TCa14-5 was very low (18.08 kg/ha) which was preceded by Sree Athulya (35.81 kg/ha) and TCa14-3 (51.22 kg/ha).

K-efficient cassava lines having the particular root system (presence of more number of water and nutrient absorbing white roots) which can actively mobilize the fixed unavailable soil nutrients making them available for plant uptake and can be reduced the dependence on external application of potassium (Susan John *et al.*,

2020). Potassium plays an indirect role in the growth of plants and K deficiency reduces the plant height with narrow and fewer lobes. The results of growth parameters were in conformity with earlier findings of Nair and Aiyer (1986), Onwnueme and Charles (1994), Susan John *et al.* (2020) and Velmurugan *et al.* (2020).

K increases the capillary movement of water nearest to the plant roots there by the bulking of tuber will be favourably increased contributing to the highest tuber yield. Tuber bulking is positively correlated with applied potassium (Velmurugan *et al.,* 2020). Nair and Aiyer (1986) have recorded the maximum tuber yield by the application of 100 kg of K_2O ha-1. These findings were also in line with earlier reports of Takyi (1972) and Mandal (2006).

High K utilization is resulted large dry matter production and high harvest index, besides it plays a distinct role in the opening and closing of stomata which depend upon gain or loss of turgor in guard cells (Hsiao, 1976). K favourably affects sugar synthesis and translocation (Mengel, 1980) and proper utilization of K leads to decrease in HCN content of tuber. Adequate K is very important for starch synthesis and translocation and it increases the resistance of the plant to anthracnose (IFA, 1992). The role of K in the translocation of carbohydrates was demonstrated in cassava by Malavolta *et al*. (1955) where the tubers of K-defcient plants had lower starch content than those which were suffciently supplied with K. The osmotic effect of K supply, as well as the more specific effects of the K+ ions is involved in the translocation processes (Jansson, 1980). The present findings were in corroboration with the earlier reports of Muthusamy *et al.* (1974), Mohankumar *et al.* (1975), Mengel (1980), Lebot (2009), Susan John *et al.* (2020) and Velmurugan *et al.* (2020). The results of post-harvest soil sample analysis, among the five entries, the utilization of available K_2O by Sree Athulya was very less followed by TCa 14-5. Present findings were in corroboration with earlier results of Mohankumar *et al.* (1971), Lebot (2009) and Velmurugan *et al.* (2020).

Conclusion

The investigation was carried out to identify best K-efficient cassava genotype suitable for coastal zone of Andhra Pradesh in terms of tuber yield and starch content without or low quantity of external application of Potassium. Based on the data of Multi Locational trail, the genotype TCa14-5 was the best K-efficient cassava line suitable for cultivation in Coastal zone of Andhra Pradesh which recorded on par tuber yield with Sree Athulya by utilizing minimum amount of available 'K' from the soil.

Table 1: Pooled Performance of K-efficient cassava genotypes under Initial Evaluation Trail (IET) for growth, yield and CMD characters during 2014-15 to 2015-16.

S.No	Entry/ Variety	Plant Height (cm)	Stem Girth (cm)	No. of Tubers/ plant	Tuber length (cm)	Tuber Girth (cm)	Tuber Yield (t/ha)	Starch (%)	CN (ppm)	CMD (%)
1	TCa14-1	306.30	10.50	9.20	41.30	16.10	29.20	25.00	92.20	0.00
2	TCa14-2	358.80	9.10	7.00	29.00	21.80	22.60	27.70	237.60	67.80
3	TCa14-3	334.90	12.10	9.70	36.10	18.60	**43.30**	25.40	128.40	5.60
4	TCa14-4	299.50	10.30	8.80	38.40	16.80	26.90	24.90	94.90	0.00
5	TCa14-5	300.30	9.40	8.70	32.60	16.50	35.20	26.90	117.90	0.00
6	TCa14-6	305.70	10.60	7.70	31.60	18.30	27.50	27.40	127.10	75.00
7	TCa14-7	288.90	9.80	7.10	29.60	16.00	15.10	25.60	111.30	11.70
8	TCa14-8	324.60	10.70	8.20	37.20	21.10	**47.40**	27.00	169.00	51.70
9	Sree Athulya	402.00	13.10	8.60	38.90	19.90	**41.30**	28.70	136.30	0.00
10	Local	382.10	12.80	10.60	40.20	15.90	29.70	27.60	174.60	7.40
	CD (P=0.05)	56.00	1.30	2.20	7.00	1.90	8.50	1.20	31.00	-
	CV%	9.80	6.90	10.80	11.40	6.20	19.50	2.70	12.90	-
	SEd	26.40	0.60	1.10	3.30	0.90	4.40	0.60	14.60	-

Table 2: Pooled Performance of K-efficient cassava genotypes under Uniform Regional Trail (URT) for growth, yield and CMD characters during 2016-17 to 2017-18

Treatment	Plant height (cm)	Stem girth (cm)	No. of Tubers/ plant	Tuber length (cm)	Tuber girth (cm)	Tuber yield (t/ha)	CMD (Score)	Starch (%)	Dry matter (%)	Fibre (%)	HCN (ppm)	Utilization of available K ($kg.ha^{-1}$)
Tca 14-1	2.83	8.76	8.10	43.40	14.14	36.05	1.22	24.59	37.99	3.08	85.40	60.79
Tca 14-3	3.38	10.64	7.56	43.04	15.57	39.79	1.00	23.81	40.89	4.90	178.50	34.54
Tca 14-4	2.52	8.64	10.28	33.71	14.49	38.18	1.02	24.04	44.66	2.89	187.25	41.20
Tca 14-5	2.76	8.51	10.64	36.80	16.14	**43.92**	1.07	25.34	45.66	0.92	147.57	**12.90**
Tca 14-6	2.76	9.95	8.20	33.56	16.19	31.19	1.42	26.17	44.99	0.93	137.68	53.80
Sree Athulya	3.15	10.61	10.27	32.19	19.73	**47.45**	1.29	27.67	41.66	2.98	167.20	32.90
Local	2.97	10.48	8.78	36.69	17.01	41.83	2.35	26.48	34.66	2.89	193.59	28.57
C.D.	N/A	N/A	1.32	5.61	2.23	9.24	0.09	1.77	3.36	0.23	12.20	-
SE(m)	0.18	0.64	0.43	1.80	0.72	2.97	0.03	0.57	1.08	0.07	3.92	-
SE(d)	0.25	0.91	0.60	2.55	1.01	4.19	0.04	0.80	1.52	0.10	5.54	-
C.V.	10.49	11.56	8.07	8.42	7.65	12.92	3.81	3.86	4.50	4.81	4.33	-

Table 3: Pooled Performance of K-efficient cassava genotypes under Multi Locational Trail (MLT) for growth, yield, CMD and quality characters during 2018-19 to 2020-21

Genotypes	Plant height (m)					Stem girth (cm)					No. of Tubers / plant				
	L_1	L_2	L_3	L_4	Mean	L_1	L_2	L_3	L_4	Mean	L_1	L_2	L_3	L_4	Mean
TCa 14-3	3.07	2.40	2.95	2.61	2.76	12.63	10.70	9.75	14.17	11.81	9.17	10.67	10.50	16.40	11.69
TCa 14-5	2.46	2.23	2.33	2.25	2.32	8.48	8.07	6.83	9.83	8.30	15.17	13.50	10.67	13.71	13.26
TCa 14-6	2.70	2.14	2.66	2.53	2.51	8.43	7.43	8.78	8.19	8.21	10.33	10.67	9.00	11.17	10.29
Sree Athulya	3.26	2.45	2.88	3.24	2.96	10.32	10.08	9.77	12.04	10.55	13.00	10.17	10.30	11.92	11.35
Local	2.86	2.58	3.53	2.82	2.95	8.60	9.00	7.20	9.60	8.60	9.33	8.17	6.50	11.77	8.94
C.D.	-	-	-	-	0.34	-	-	-	-	1.35	-	-	-	-	2.48
SE(m)	-	-	-	-	0.11	-	-	-	-	0.43	-	-	-	-	0.80
SE(d)	-	-	-	-	0.16	-	-	-	-	0.61	-	-	-	-	1.13
C.V.	-	-	-	-	8.14	-	-	-	-	9.11	-	-	-	-	14.34

Genotypes	Tuber length (m)					Tuber girth (cm)					Tuber yield (t/ha)				
	L_1	L_2	L_3	L_4	Mean	L_1	L_2	L_3	L_4	Mean	L_1	L_2	L_3	L_4	Mean
TCa 14-3	50.83	30.92	35.67	40.64	39.52	16.78	14.78	15.58	15.92	15.77	39.62	36.86	28.70	49.63	38.70
TCa 14-5	31.17	30.42	29.92	32.63	31.04	18.33	14.97	14.67	17.10	16.27	44.67	34.65	27.51	43.62	37.61
TCa 14-6	28.75	32.67	29.83	36.32	31.89	21.09	15.67	16.58	19.06	18.10	40.31	32.36	30.66	43.13	36.62
Sree Athulya	24.63	35.67	28.00	30.30	29.65	18.64	17.83	18.00	19.14	18.40	42.66	39.48	28.58	56.38	**41.78**
Local	30.15	25.83	25.00	33.88	28.72	16.33	17.98	16.50	16.51	16.83	27.63	25.33	20.38	35.94	27.32
C.D.	-	-	-	-	N/A	-	-	-	-	1.89	-	-	-	-	4.90
SE(m)	-	-	-	-	2.49	-	-	-	-	0.61	-	-	-	-	1.57
SE(d)	-	-	-	-	3.52	-	-	-	-	0.86	-	-	-	-	2.23
C.V.	-	-	-	-	15.48	-	-	-	-	7.11	-	-	-	-	8.65

Genotypes	CMD (Score)					Dry Matter (%)					Starch (%)				
	L_1	L_2	L_3	L_4	Mean	L_1	L_2	L_3	L_4	Mean	L_1	L_2	L_3	L_4	Mean
TCa 14-3	1.00	1.00	1.00	1.00	1.00	40.33	46.00	41.00	42.33	42.42	25.70	24.95	26.56	23.64	25.21
TCa 14-5	1.11	1.02	1.07	1.06	1.07	40.33	40.00	42.00	41.00	40.83	21.40	24.54	23.75	25.46	23.79
TCa 14-6	1.58	1.45	1.54	1.73	1.58	36.67	43.33	44.33	46.67	42.75	23.75	25.54	26.50	28.51	26.08
Sree Athulya	1.01	1.29	1.19	1.24	1.18	41.33	37.33	41.33	40.00	40.00	25.82	23.21	25.56	29.02	25.90
Local	2.32	2.42	2.35	2.38	2.37	34.33	37.33	39.33	36.67	36.92	23.75	23.54	23.40	25.90	24.15
C.D.	-	-	-	-	0.13	-	-	-	-	3.82	-	-	-	-	N/A
SE(m)	-	-	-	-	0.04	-	-	-	-	1.23	-	-	-	-	0.78
SE(d)	-	-	-	-	0.06	-	-	-	-	1.74	-	-	-	-	1.10
C.V.	-	-	-	-	5.66	-	-	-	-	6.05	-	-	-	-	6.21

Table 3 Continued…

Genotypes	Sugars (%)					HCN (ppm)					Fibre (%)				
	L_1	L_2	L_3	L_4	Mean	L_1	L_2	L_3	L_4	Mean	L_1	L_2	L_3	L_4	Mean
TCa 14-3	1.83	2.50	2.08	3.10	2.38	244.80	177.90	136.95	238.15	199.45	2.80	2.08	2.05	2.92	2.46
TCa 14-5	2.40	2.60	2.86	2.60	2.62	277.75	248.18	173.60	296.80	249.08	1.08	1.50	1.05	1.05	1.17
TCa 14-6	1.30	1.78	1.25	1.50	1.46	107.51	117.77	108.76	150.10	121.04	1.52	1.12	1.44	2.70	1.70
Sree Athulya	1.46	2.51	2.35	2.70	2.26	230.66	218.62	233.99	284.05	241.83	1.84	2.15	1.34	1.48	1.70
Local	2.70	2.55	2.38	2.92	2.64	256.55	162.65	163.70	241.80	206.18	2.51	1.44	2.64	2.50	2.27
C.D.	-	-	-	-	0.49	-	-	-	-	41.96	-	-	-	-	0.76
SE(m)	-	-	-	-	0.16	-	-	-	-	13.47	-	-	-	-	0.24
SE(d)	-	-	-	-	0.22	-	-	-	-	19.05	-	-	-	-	0.34
C.V.	-	-	-	-	13.81	-	-	-	-	13.24	-	-	-	-	26.09

Note: L_1- Peddapuram, L_2 – R.B.Patnam, L_3- Jaggampeta, L_4 – Pandirimamidi

Table 4 : Pooled Initial, final K status of soil and Utilization of available K ($kg.ha^{-1}$)

Entries	Initial status of K ($kg.ha^{-1}$)	Final Status of K ($kg.ha^{-1}$)	Utilization of available K ($kg.ha^{-1}$)
TCa 14-3	208.17	156.95	51.22
Tca 14-5	210.55	192.47	**18.08**
Tca 14-6	239.82	160.19	79.63
Sree Athulya	174.55	138.75	35.81
Local	237.81	150.10	87.71

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