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Evaluation of Short duration cassava (*Manihot esculenta* Crantz.) varieties under Manipur condition

K. James Singh, A.K. Bijaya Devi, Loitongbam Sulochana Devi

College of Agriculture, Central Agricultural University, Imphal, Manipur (India) -795004

ABSTRACT: A field experiment entitled, "Evaluation of Short duration cassava (*Manihot esculenta* Crantz.) varieties under Manipur condition" was conducted at Horticultural Research Farm, CAU, Andro during the year 2012-2013. The experiment was laid out in a randomize block design in 3 replications. Based on the results obtained from the experiment, it can be concluded that Sree Prakash recorded the maximum number of tuber (3.55), maximum single tuber weight (479.40 g), tuber yield per hectare (24.68t/ha) leaf area index (2.67) and harvest index (53.95 %). However, the minimum tuber yield per hectare (10.94 t/ha) was recorded from local variety. Such variability in yield and yielding parameters might be due to the genetic makeup of varieties. The results on quality analysis revealed that the highest dry matter content (44.70%) was observed from CI-850 which was significantly higher than the rest of the varieties. The highest starch content was observed from Sree Vijaya (24.80%) which was at par with Sree Jaya (24.06%) and CI-850(23.04%).

KEYWORDS: Cassava, yield, starch and dry matter content

I.INTRODUCTION

Cassava is a perennial shrub of the family Euphorbiaceae, cultivated mainly for its starchy roots. It is commonly known as tapioca, manioc, mandioca and yuca. It is an important staple food in many developing countries of Africa, South and Central America and South east Asia. Cassava can grow in poor soil and can withstand drought condition. It is an important famine reserve crop in countries with unreliable rainfall. According to the Food and Agriculture Organization of the United Nation Global Cassava Development Strategy, cassava is the third most important source of calories in the tropics after rice and corn. This crop is vital for both food security and income generation. Growing of suitable variety which is screened by proper varietal evaluation is one of the means to increase the productivity.

II.MATERIAL AND METHODS

The experiment was conducted in the Horticultural Research Farm, Andro, Imphal East, Manipur during 2012-2013. The studied area is located at 24° 45.89'N latitude and 94° 03.46'E longitude with an elevation of 808 m MSL. The soil type is clay loam and acidic in reaction (pH 5.24). The treatments consist of Sree Vijaya, Sree Jaya, Sree Prakash, CI-848, CI-850, H-119 and Local cultivar as check. The experiment was conducted in RBD with tree replication.

Net assimilation rate (NAR): It is expressed as gram of dry matter produced per square meter of leaf in a day. NAR was computed by the formula given by Gregory (1926) as;

$NAR = (W_2 - W_1 / L_2 - L_1) \times (\text{Log } L_2 - \text{Log } L_1 / T_2 - T_1)$

Where, W_1 and W_2 refer to whole plant dry matter weight at T_1 and T_2 . L_1 and L_2 refer to leaf area on two successive periods at T_1 and T_2 .

Leaf area index : Leaf area index was calculated by the formula given by (Watson 1947)

LAI = Total leaf area (cm^2)/ canopy of the plant (cm^2)

Harvest index : Harvest index was calculated by the formula given by Yoshida (1981) as;

HI= Economic yield/ Biological yield X 100

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Starch content: Tuber starch content was determined by Anthrone reagent method (Thimmaih, 2006)

Yield and yield attributes: Number of tuber per plant, tuber length (cm), tuber diameter (cm), single tuber weight (g), tuber weight per plant (g) and dry matter of tuber were recorded at the time of harvesting.

III.RESULT AND DISCUSSION

Leaf area index:

Leaf area index (LAI) showed significant differences among the cultivars. The leaf area index increased with the advancing of days and decreased at later stage of growth, which was due to the production of more number of leaves at early stages and later decreased due to senescence, mutual shading of leaves within the canopy. The highest leaf area index was recorded from the cultivar Sree Prakash (2.67) at 180 DAP which was at par with Sree Jaya (2.62) and lowest was observed at local cultivar (2.30). This finding is in conformity with Goswami (2000) and Indira (1996).

Net assimilation rate:

There were significant differences among the cultivars in respect to net assimilation rate. The highest net assimilation rate was observed with Sree Jaya (0.0261 g m^{-2} day^{-1}) and minimum was recorded from local cultivar (0.0216 g m^{-2} day^{-1}) which was at par with CI-850 (0.0226 g m^{-2} day^{-1}), CI-848 (0.0229 g m^{-2} day^{-1}) and Sree Vijaya (0.0231 g m^{-2} day^{-1}). The higher rate of NAR at 180 days after planting might be due to rapid increase in fresh and dry weight of tuber as reported by Tsuno and Fujise (1965).

Harvest index (%):

The maximum harvest index was recorded from Sree Prakash (53.95 %) which was significantly higher than the rest of the treatments and the minimum harvest index was recorded from local cultivar (30.11 %). The high harvest index obtained in the mentioned treatments is due to high tuber yield. The result was in conformity with the findings of Ruth and Ramaswamy (2001).

Number of tubers per plant:

The highest number of tubers per plant was observed from the cultivar Sree Prakash (3.55) which was at par with Sree Jaya (3.51), CI-850 (3.53) and CI-848 (3.51) and the lowest number of tubers per plant was recorded from local cultivar (2.93). Similar finding was also reported by Bharathi *et al.* (2005).

Tuber length and tuber diameter:

The maximum tuber length was recorded from the cultivar Sree Jaya (36.46 cm) and the minimum tuber length was found in H-119 (30.59 cm). In tuber diameter, Sree Prakash recorded the maximum of 5.40 cm which was at par with Sree Jaya (5.19 cm) whereas the minimum tuber diameter was recorded from local cultivar (4.13). Similar finding was also reported by Nageswari *et al*. (1997) and Ruth and Ramaswamy (2001).

Single tuber weight and tuber weight per plant:

Single tuber weight at harvesting was as high as 479.40 g in Sree Prakash followed by Sree Jaya (422.32 g) and the minimum (252.70 g) was recorded in local cultivar. Similarly the maximum tuber yield per plant was also recorded from Sree Prakash (1699.76 g) which was significantly higher than the rest of the treatments, followed by Sree Jaya (1484.50 g) and the minimum was obtained from local cultivar (739.43 g). The result was in conformity with the findings of Ruth and Ramaswamy (2001) and Nedunchezhiyan and Naskar (2004).

Tuber yield :

The highest tuber yield per hectare was recorded from Sree Prakash (26.68 tha^{-1}), followed by Sree Jaya (21.99 tha^{-1}) and minimum tuber yield per hectare was obtained from local cultivar (10.95 tha^{-1}). This result was in conformity with the findings of Hedge *et al.* (1993).

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Dry matter percentage:

The highest dry matter percentage was observed in the cultivar CI-850 (44.70 %) which was significantly higher than the rest of the cultivars and the minimum was obtained in CI-848 (40.24 %). Such finding was also observed by Sen and Goswami (1992).

Starch content (%)

The highest starch content was recorded in Sree Vijaya (24.79 %) which was at par with Sree Jaya (24.06 %) and CI-850 (23.08 %). The minimum starch content (20.06 %) was recorded from CI-848 which was at par with Sree Prakash (22.04 %), Local (21.80 %) and H-119 (21.10%). This result was in conformity with the finding of Samutthong *et al.* (2003).

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Table 1. Physiological parameters of Short duration cassava varieties at 180 days after planting.

Treatments	Leaf area index	Net assimilation rate (gm $^{-2}$ day $^{-1}$)	Harvest index (%)
Sree Vijaya	2.34	0.0231	34.93
CI-848	2.30	0.0229	36.66
Sree Jaya	2.62	0.0247	48.82
CI-850	2.50	0.0226	45.07
H-119	2.30	0.0236	38.14
Local	2.30	0.0216	30.11
Sree Prakash	2.67	0.0261	53.95
S.Ed (±)	0.09	0.0012	1.21
CD (0.05)	0.20	0.0026	2.65

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Table 2. Yield attributes of short duration cassava varieties at harvest.

Treatments	Number of tuber per plant	Tuber length (cm)	Tuber diameter (cm)	Single tuber weight (g)	Tuber weight per plant (g)	Tuber yield (tha^{-1})	Dry matter (%)	Starch content (%)
Sree Vijaya	3.22	32.26	4.13	237.91	766.83	11.36	40.24	24.80
CI-848	3.38	33.39	4.54	269.82	909.97	13.48	36.09	20.06
Sree Jaya	3.51	36.46	5.19	422.32	1484.50	21.99	40.94	24.06
CI-850	3.53	33.83	4.87	329.11	1161.12	17.20	44.70	23.04
H-119	3.51	30.59	4.49	258.98	908.59	12.46	40.73	21.10
Local	2.93	32.44	4.28	252.70	739.43	10.95	39.48	21.80
Sree Prakash	3.55	35.11	5.40	479.40	1699.33	24.68	41.12	22.04
S.Ed (±)	0.07	1.20	0.13	4.77	33.16	0.55	1.27	1.12
CD (0.05)	0.16	2.62	0.29	10.40	72.29	1.21	2.77	2.44