Journal of Root Crops, 2016, Vol. 42 No. 2, pp. 44-46
Indian Society for Root Crops
ISSN 0378-2409, ISSN 2454-9053 (online)

Enhancement of Cassava Productivity by Adopting Integrated Crop Management Practices in Tamil Nadu: A Case Study

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Received: 28 November 2016; Accepted: 15 December 2016

Abstract

Front Line Demonstrations (FLD) on integrated crop management practices including sett treatment with carbendazim 2 g litre^{-1}, application of micronutrient mixture @ 12.5 kg ha^{-1}; release of *Acerophagus papayae* parasitoid @ 100 numbers ha^{-1} and foliar spaying of 1% $FeSO_4$ and 0.5% $ZnSO_4$ on 60 and 90 days after planting to manage papaya mealy bug and micronutrient deficiency in cassava were conducted at 15 farm holdings (1 acre per farm) in Tiruchirappalli district, Tamil Nadu during 2011. The results revealed that the average storage root yield of 34.5 t ha^{-1} was recorded in demonstration plot which was 20.7% greater than the check plot yield. On an average, 6.61 storage roots per plant were recorded in demonstration plots whereas 5.46 storage roots per plant were recorded in check plot. On an average, farmer earned an additional net income of Rs. 16,700/- by adopting the improved technologies. The infestation of papaya mealybug was reduced by 72% compared to control due to parasitization of *Acerophagus papayea.*

Key words : Cassava, crop management, demonstration

Introduction

Cassava is an important tuber crop of the tropics. It is relatively tolerant to drought and normally grown in soils of marginal fertility. In India, Tamil Nadu occupies first position in terms of area (1,20,600 ha), annual production (49,75,600 t) productivity (41.3 t ha^{-1}) and is the highest in the world (Indian Horticulture Database, 2014). In Tamil Nadu, 60% of the crop is grown under irrigated conditions in Salem, Erode, Dharmapuri and Namakkal districts while 40% is cultivated as rainfed crop. However, in Tiruchirappalli district, cassava var. Mulluvadi is cultivated in 4,573 ha with an average productivity of 39.3 t ha^{-1} (Season and crop report, 2013-14). Cassava is a heavy feeder of nutrients and requires large quantities of N, P and K for realization of high yield (Ashok et al., 2013), hence continuous cultivation of cassava without adequate fertilization can result in severe reduction in yield. Iron and zinc deficiencies are more common when cassava is grown under calcareous soils. During 2011, cassava yield was drastically reduced in this district due to severe mealybug infestation and wide spread iron deficiency. This makes imperative to take up demonstration trials in farmers' holdings on the management of mealybug and micronutrient deficiency to increase productivity in cassava. The average fertility status of the soils of demo plots was found to be low: low: high in available N, P and K content respectively and calcareous in nature.

Materials and Methods

Front Line Demonstrations (FLD) on integrated crop management practices including sett treatment with carbendazim @ 2 g litre^{-1} to prevent fungal infection, application of micronutrient mixture (MN) @ 12.5 kg ha^{-1} as basal and foliar spraying of 1% $FeSO_4$ and 0.5% $ZnSO_4$ on 60 and 90 days after planting to correct

micronutrient deficiency and release of *Acerophagus papayea* parasitoid @ 100 numbers ha^{-1} to control papaya mealybug were conducted at 15 farm holdings (1 acre per farm) in Musiri and Thuraiyur blocks of Tiruchirappalli district during 2011.

Check plots were maintained in all 15 locations by omitting above said practices. All other cultural operations were carried out as per the Crop Production Guide of Department of Agriculture, Tamil Nadu. Setts were treated in carbendazim solution (2 g $litre^{-1}$) before planting to control root rot and micronutrient mixture @ 12.5 kg ha^{-1} was mixed with 125 kg of powdered FYM and applied basally after last ploughing. Foliar spraying of $FeSO_4$ @ 10 g per litre plus citric acid @ 1 ml per litre plus $ZnSO_4$ @ 5 g per litre was done on 60 and 90 days after planting to correct iron and zinc deficiency. *Acerophagus papayea* parasitoid @ 100 numbers ha^{-1} was released in the eight month after planting to control papaya mealy bug infestation.

Observations on number of storage roots per plant and average root weight and storage roots yield were recorded at the time of harvest at 11 months after planting. Economics was worked out for demonstration. The details of experiment and weather data during crop growth period are given in Table 1.

Table 1. Details of experiment and weather data

Month of planting	:	30.12.2010
Farming situation	:	Irrigated
Manures	:	FYM – 25 t ha^{-1}45:90:120 kg
Fertilizers applied		NPK ha^{-1} as basal 45:120 kg NK ha^{-1} on 90 days after planting

Results and Discussion

The average data on storage root yield, yield attributes and economics of cultivation of individual farm holdings are presented in Table 2. In demonstration plots, the number of storage roots per plant ranged between 6.04 and 7.34 and mean root weight ranged between 312 and 344 g. On an average, 6.61 storage roots per plant was recorded in demonstration plots whereas, 5.46 storage roots per plant was recorded in check plots (Fig. 1). More number of storage roots and root weight in demonstration plots might be due to the improved growth and development by the best micronutrient management. Similarly on an average, 11.3% greater storage root weight was recorded in demonstration plot compared to check plot (Fig. 2). The mean storage yield of 34.4 t ha^{-1} was recorded in demonstration plot which was 20.7% greater than the check plot yield (Fig. 3). The greater storage root yield in demonstration plot might be due to the combined effect of reduction in mealybug infestation (Table 3) by release of parasitoid and timely correction of chlorosis through foliar application of ferrous sulphate. The intensity of papaya mealybug was reduced from 100% to

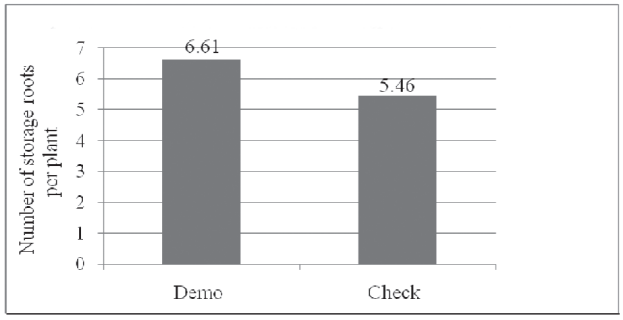

Fig. 1. Mean number of storage roots per plant in demonstration plots as compared to check plot

Table 2. Weather data of cassava growing regions of Tiruchirappalli district during 2011

Month	Rainfall (mm)	Temperature ^{0}C		Relative Humidity (%)
		Maximum	Minimum	
January 2011	0	0	32.0	18.6
February 2011	7.6	3	33.0	18.7
March 2011	0	0	35.7	20.1
April 2011	39	36.4	24.5	53.1
May 2011	37	38.9	24.9	47.325
June 2011	12.4	36.5	25.8	43.325
July 2011	14	35.8	25.5	47.6
August 2011	91.6	35	25.2	48.725
September 2011	82.2	35.4	24.9	47.625
October 2011	292.6	33.2	23.1	51.175
November 2011	179.2	31	22.3	52.175

(Source: Sugarcane Research Station, TNAU, Sirugamani)

Table 3. Storage root yield, number per plant, mean weight and mealy bug infestation in demonstration and check plot of cassava

Sl. No.	Location	Storage root yield (t ha^{-1})	No. of storage roots per plant	Mean storage root weight (g)	Mealy bug infestation (%)	B:C ratio
1	Kottaiyur (mean of 6 locations)	34.12	6.76	322	6.52	2.00
2	Kannanur (mean of 6 locations)	34.58	6.54	326	6.33	2.02
3	Thottiyam	35.30	6.70	328	6.3	2.07
4	Kosavampatti	34.87	6.44	324	6.1	2.04
5	Nachiyapudur	33.68	6.33	318	6.8	1.97
	Mean	34.40	6.61	324	6.41	2.02
	Check (mean of 15 locations)	28.50	5.46	291	22.8	1.70

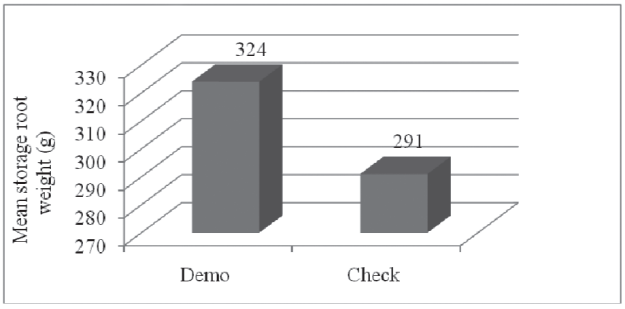

Fig. 2. Average storage roots weight in demonstration plots as compared to check plot

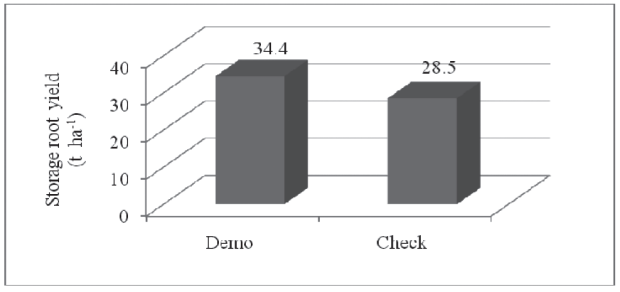

Fig. 3. Storage root yield in demonstration plots as compared to check plot

0.03% in cassava due to parasitization of *Acerophagus papayea* (Sankar et al., 2012).

Farmer earned an additional net income of Rs. 16,700/- by adopting the improved technologies when compared to check plot. The maximum B:C ratio (2.02) was recorded in the demonstration plot compared to the check plot (1.70).

Conclusion

Application of micronutrients especially Fe and Zn in deficient calcareous soils and timely adoption of plant protection measures enhanced the storage root yield in cassava besides increasing net returns.

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