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Sustainability and impact studies (FLD) on banana yield and economics

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Abstract

Tamil Nadu is the 4th important banana producing state. There has been 32% raise in banana production in the state. Traditional farming is one of the major problem leads to low productivity due to lack of suggested package of practices and high yielding varieties. To replace this discrepancy of practices, Krishi Vigyan Kendra, Madurai conducted Front line demonstrations in the farmer's field. The frontline demonstration was done in the farmers field and were provided with all the inputs with improved technologies. The technology adopted in his field is micronutrient spray @ 2% on 4th, 5th and 6th month's interval from the date of planting. This resulted in higher yield in demonstration field (160 t ha⁻¹) than that achieved through the treatment receiving farmer's practices (143 t ha⁻¹). The average percentage of increase over farmers practice through this demonstration was recorded to be 11.9 percent during 2019-20 and 15.4 percent during 2020-21. The average BC ratio over farmers practice through this demonstration was recorded to be 1.34 percent during 2019-20 and 1.46 during 2020-21. The sustainability in area as well as yield has shown during 2020-21 and 2021-22. The farmers were well adopted the technologies and got benefited.

Keywords: FLD, banana, micronutrients, foliar spray, sustainability, economics

Introduction

India is the world's leading producer of bananas and Tamil Nadu is the fourth highest banana producing state in the country. There has been 32% increase in banana production in the state in last five years. Tamil Nadu exports the fruit to foreign countries, especially from Theni and Dindigul region as it produces the good quality banana in the state (Padmini Sivarajah 2022) ^[1]. In India everyone table in the home banana has occupied. It decreases the heart related problems. It produce immediate energy to the human body systems. Malnutrition is one of the key role of Banana. The bananas fourth most dietary staple food for human (Samui *et al.*, 2000) ^[2]. Enlargement of enhanced technologies, transfer to, and adoption by small farmers is significant to improving the productivity and regular income of farmers, and ultimately reducing poverty in nation (Wossen *et al.*, 2017) ^[3]. The implementation of improved production technologies has a important effect on the welfare of households (Ayenew *et al.*, 2020; Mendola, 2007) ^[4, 5]. It improved food security (Justice and Tobias, 2016) ^[6] The main objective of the Front Line Demonstrations is to expose and spread the positive enhanced production technologies to the farmers.

Materials and Methods

The study was carried out in Krishi Vigyan Kendra, Agricultural College and Research Institute, Madurai during *Kharif* season of 2019-20 and 2020-21. Ten farmers were selected in Melavalavu and Melanedungulam villages, Kottampatti and Thiruparankundram blocks of Madurai district during 2019-20 and 2020-21, Ten farmers were selected in Kottampatti block and Thiruparankundram block during 2019-20 and 2020-21. Altogether twenty front line demonstration on cultivation of Banana (Muppattai) was laid out in one acre each totaling eight hectares correspondingly under irrigated condition. Imparted many number of training programmes to the beneficiaries related to improved crop production technologies as a part of demonstration. The other aspects included in the frontline demonstration were introduction of new variety, integrated nutrient management, weed management, irrigation schedule, integrated pest management and harvesting. The detail guidance regarding scientific crop production technologies practices of banana cultivation were given to the farmers to increase the awareness of improved technology and to increase productivity of banana.

The technology adopted in his field is micronutrient spray @ 2% on 4th, 5th and 6th month's interval from the date of planting. Growth and yield data was collected from farmer's practices. Cost and economics computed and analysed.

% Increased over farmers practices = Improved practices (IP) – Farmers practices (FP) / farmers practices (FP) x 100

B: C ratio = Net income (Rs. / ha) / cost of cultivation (Rs. / ha)

Results and Discussion

Yield

The average yield of banana under improved practices was 163 q/ha during 2019-20 and 165 q/ha during 2020-21. The yield was much elevated than compared to that of farmer's practices which was only 148 q/ha during 2019-20 and 145 q/ha during 2020-21. The average percentage of increase in

the yield over farmer's practices was 10.1% and 13.8% respectively during 2019-20 and 2020-21. The results shows that the Frontline Demonstration gives better impact on higher productivity due to adopting new improved cultivation practices (Santhosha *et al.*, 2020) [8] and (Ancy and Kurien, 2000) [9].

Economic return

The inputs and outputs cost of produce exist during the study of demonstration were taken for calculating cost economics (Table 2). The demonstration of banana under improved practices gave higher net return and B: C ratio of Rs. 89390/- and 1.36 during 2019-20 and of Rs. 91990/- net returns and 1.42 B:C ratio during 2020-21. This might be due to higher yield attained from positively improved technology as compared to farmer's practices.

Table 1: Area and yield increase in demonstration

Crop	Variety	Planting method	Area (ha)	Yield (q/ha)		Increase over FP
				IP	FP	
2019-20						
Banana	Muppattai	Line Planting	4.0	160	143	11.9
2020-21						
Banana	Muppattai	Line Planting	4.0	165	143	15.4

Table 2: Economic impact of the demonstration

Economics of demonstration (Rs./ha)				Economics of check (Rs./ha)			
Gross Cost	Gross Return	Net Return	BCR (R/C)	Gross Cost	Gross Return	Net Return	BCR (R/C)
2019-20							
64551	152190	87639	1.34	67500	140600	73100	1.08
2020-21							
64550	158731	94181	1.46	67300	137750	70450	1.04

Table 3: FLD farmer's details and economic analysis of Banana (2019-20)

S No.	Name of Farmer	Village	Dist.	Variety	Crop	Area (ha)	Yield (q/ha)	B:C Ratio	Sustainable area (ha)		Sustainable yield (q/ha)	
									2020-21	2021-22	2020-21	2021-22
1	Velaiyappan	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	160	1.32	0.40	0.45	161	165
2	Rajaram V	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	165	1.38	0.45	0.50	166	168
3	Pitchai R	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	159	1.33	0.40	0.55	168	170
4	Selvaraj V	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	155	1.38	0.45	0.45	156	160
5	Ayyavur T	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	160	1.32	0.45	0.45	161	162
6	Mani B	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	165	1.38	0.40	0.55	167	170
7	Cinnanana	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	156	1.38	0.40	0.40	156	157
8	Cinnanana	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	155	1.38	0.40	0.55	155	160
9	Thanraj V	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	160	1.34	0.50	0.60	162	170
10	Karuppaiya N	Melavalavu	Madurai	Desi/Muppattai	Banana	0.4	167	1.42	0.45	0.45	168	169

Table 4: FLD farmer's details and economic analysis of Banana (2020-21)

S No.	Name of Farmer	Village	Dist.	Variety	Crop	Area (ha)	Yield (q/ha)	B:C Ratio	Sustainable area (ha)		Sustainable yield (q/ha)	
									2021-22	2022-23	2021-22	2022-23
1	Ganesan	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	168	1.43	0.4	0.45	168	169
2	A.Nandagobal	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	170	1.45	0.4	0.40	171	171
3	C.Malairajan	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	167	1.45	0.4	0.40	168	167
4	C.Pandi	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	163	1.49	0.4	0.45	163	164
5	P.Rajaram	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	163	1.37	0.4	0.40	163	163
6	K.Saraswathy	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	173	1.49	0.4	0.40	173	174
7	Alagupillai	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	164	1.47	0.4	0.40	164	164
8	Makkai	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	163	1.49	0.4	0.40	163	163
9	Kannan	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	165	1.41	0.4	0.45	166	167
10	Perumal	Nedungulam	Madurai	Desi/Muppattai	Banana	0.4	175	1.54	0.4	0.45	176	177

Conclusion

To conclude, the innovative science-based practices such as soil test based NPK fertilizers application, foliar spray of micronutrient during vegetative stage to maximize productivity while reducing environmental devastation and maintain the sustainable area and yield. More new ideas of entrepreneurship can be applied to make profit out of these procedures being employed towards agricultural sustainability. Scientific application and proper management, these practices can ensure productivity, profitability and sustainability in a long run.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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