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Early Seasonal Okra (*Abelmoschus esculentus*) Cultivation Provides Better Returns to Farmers

Sanjay Kumar Ray[1], B Debnath[1], B Das[2] and V K Mishra[3]

[1]ICAR-KVK, South Tripura, Birchandramanu, Tripura (S), 799144

ABSTRACT

The objective of the study was to determine the performance of Okra with integrated nutrient management (INM) practices in order to promote early seasonal cultivation among small and marginal farmers in South Tripura for increasing economic returns. The study was conducted at three villages of South Tripura district with 15 farmers and four treatment combinations {T1=75% of state's recommended dose (SRD) of NPK+ 3 spraying of gibberellic acid at 21, 31 & 41 DAS, T2=75% of SRD of NPK+FYM @ 5 t/ha, T3=120:70:60 NPK kg/ha (100% of state SRD) and T4=Farmers' practice (80:40:40 kg NPK/ha)}. The results of the study revealed that cultivation of Okra with INM practices during both normal and early growing seasons considerably enhanced yield compared to farmers' practice (4.67 t/ha). However, regardless of the treatments, Okra production during the normal growing season (0.28 to 1.62 t/ha) was much higher than early seasonal growth. In comparison to the selling price, net returns on Okra were substantially greater in the early growing season (Rs. 37/- kg and Rs. 1,02,350 to Rs. 1,33,350/- ha) than in the normal growing season (Rs. 19/- kg and Rs.13,570 to Rs. 47,290/- ha). Therefore, it was concluded that early seasonal Okra production could be an economically feasible and sustainable agriculture system in Tripura's South district.

Key Words: Early seasonal bhindi, small and marginal farmers, INM practices, economic returns.

INTRODUCTION

Tripura is the third smallest state of India, with a net sown area of only 24.45% (2.55 lakh ha) of total geographical area, far less than the national average (43.4 %). About 96 per cent of farmers in the state are small and marginal (compared to 81% across India), with an average holding size of 0.50 ha. The favourable agro-climatic conditions, deep fertile soil, and sub-tropical humid climate with abundant rainfall provide ample opportunity for year-round vegetable cultivation in the state. Potato, tomato, cabbage, cauliflower, brinjal, okra, radish, and peas are the most common vegetables grown in the state, which covers about 0.367 lakh ha. The annual vegetable production of the state is 6.05 lakh tones, with average summer and winter vegetable productivity of 15.2 and 17.59 t/ha, respectively (Tripura, C-SAP, 2015-20). In spite of the higher productivity than other North-Eastern states (Tripura, C-SAP, 2015-20), per capita vegetable availability (22.3 kg/year) in Tripura is much lower than the requirement (64.6 kg/year), compared to the national availability of 60.6 kg/year (Basu *et al,* 2006).

To ensure a per capita availability of vegetables in Tripura, increasing vegetable production and expanding the area for vegetable crops is important, which can be accomplished by growing vegetable crops in between cropping sequences. Being vegetables are short duration crops they fit well in multiple cropping systems. In Tripura, Okra is a popular vegetable that can be grown throughout the

Corresponding Author's Email:sanjayray2006@gmail.com

[1]ICAR-KVK, South Tripura, Birchandramanu, Tripura(S), 799144

[2]ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra, Tripura-799210

[3]ICAR Research Complex for NEH Region, Umiam 793103, India

Table 1. Location and treatment combinations of OFT and FLD of Okra.

Site	GPS Location	OFT (nos.)	Sowing Date	Technology Options	Number of FLDs	Sowing Date	Technology Demonstrated
West Pilak	23°21.59'N 091°34.47'E	5	15th January	T1=75% SRD of NPK+GA, T2=75% SRD of NPK+FYM @ 5t/ha, T3=120:70:60 NPK kg/ha (100% SRD), T4=FP (80:40:40 kg NPK/ha)	35	22nd January	75% SRD of NPK+FYM @ 5 t/ha
North Jolaibari	23°13.30'N 091°42.20'E	5	20th January		25	17th January	
Kalashi	23°17.69'N 091°36.48'E	5	18th January		36	18th January	

#FP: Farmers practice # SRD: State recommended dose

year, except winter months, due to its adaptability to a variety of agro-climatic conditions. Farmers in Tripura generally grow Okra during the normal season (March to June), but because to high production during the pick season, farmers are unable to obtain the best price. In addition to that farmers also use a little amount of NPK fertilizer for Okra growth, which is approximately 60-70 per cent of the state's recommended dose (SRD). With this background, an on-farm trial (OFT) followed by a frontline demonstration (FLD) on Okra was conducted during the early season with integrated nutrient management (INM) among small and marginal farmers of South Tripura district. The objective was to find out the productive performance of early seasonal Okra under INM practices and overall changes of the farmers' net returns.

MATERIALS AND METHODS

Study area and OFT & FLD details: OFT and FLDs on early season Okra cultivation were undertaken during the years 2019–2021, at three villages of South Tripura district (Table 1). During the study period; monthly temperatures ranged from 12 to 36.6◦ celsius, with average rainfall ranging from 198 to 207 mm. Soils of the demonstration sites were characterized by very strongly acidic in reaction, moderately high in soil organic carbon, low in available N and P, and medium in available K (Soltanpour and Schwab, 1977). The trial was conducted with four treatment combinations of integrated nutrient management (INM) practices {T1=75% of SRD of NPK+ 3 spraying of gibberellic acid at 21, 31 & 41 DAS, T2=75% of SRD of NPK+FYM @ 5 t/ha, T3=120:70:60 NPK kg/ha (100% of state SRD) and T4=Farmers' practice (80:40:40 kg NPK/ha)} for two consecutive years 2019-20 by growing Okra during both the early and normal growing seasons (March-June). Subsequently, in the year 2021, FLD programme was also carried out with the best treatment combinations of the trials (OFT), which was 75 percent of the SRD +FYM @ 5 t/ha.

RESULTS AND DISCUSSION

Performance Okra under OFT

The cultivation of Okra with INM practices during early season increases yield (5.30 to 6.95 t/ha) of Okra by 28 to 67 per cent compared to farmers' practice (4.15 t/ha), while production (6.92 to 7.66 t/ha) were also increased significantly with INM by 48 to 64 per cent compared to farmers' practice (4.67 t/ha) during the normal season. The production of Okra during the normal growing season (0.28 to 1.62 t/ha) was substantially higher than the early seasonal growth, regardless of the treatments.

Table 2. Performance early Okra cultivation under different combinations of INM practices.

Treatment	Early growing season					Normal growing season				
	Mean Yield (t/ha)	Average Selling Price (Rs./kg)	Cross income (Rs.)	Net income (Rs.)	B:C ratio	Yield (t/ha)	Selling Price (Rs./kg)	Cross income (Rs.)	Net income (Rs.)	B:C ratio
T1	5.30	37	196100	102350	2.09	6.92	19	131480	37730	1.40
T2	6.95	37	257150	133350	2.08	7.23	19	137370	13570	1.11
T3	6.20	37	229400	131150	2.33	7.66	19	145540	47290	1.48
T4	4.15	37	153550	67800	1.79	4.67	19	88730	2980	1.03
SE (±)	1.21				0.22	1.33				0.218

Even though the yield was higher during the normal growing season, net returns were lower since the selling price of Okra in the early growing season (Rs. 37/-) was much higher than the normal season (Rs. 19/-). Net returns in INM practices varied from Rs.1,02,350 to Rs. 1,33,350/ ha during the early Okra growing season, but were significantly lower during the regular growing season, from Rs.13,570 to Rs. 47,290/-ha. It was determined that cultivation of Okra during the early season was substantially more profitable than cultivating during the normal season in terms of net returns and B: C ratio. Therefore, it was realized that cultivation of Okra during the early season was significantly more profitable than cultivating during the regular season.

Fig. 1 Performance trial on Early OkraCultivation with INM practice

Changes in soil fertility

When compared to the initial soil nutrient status, significant changes in physico-chemical parameters of the soil were noticed after two years of trials with INM practice. The value of soil available N, P and K in Okra plots declined drastically, when 75 percent of SRD of NPK (T1) was applied along with spraying of gibberellic acid (three times spraying), whereas soil pH value increased marginally from its initial value. Cultivation of Okra with 75 percent SRD (T2) of NPK+FYM (@ 5 t/ha) resulted in considerable increases in soil organic carbon, available N, and K, but a drop in soil pH. Use (T3) of state-recommended fertilizer (120:70:60 NPK kg/ha) in Okra cultivation raised soil available P and K content, but decreased SOC and N content from initial levels. In farmers' practice plots (T4), deterioration in soil available N, SOC, and pH was noticed due to limited application of NPK (80:40:40 kg NPK/ha).

Performance of Okraunder FLD programme

Frontline demonstrations with INM practice had a substantial impact on the productivity of Okra during the early growing season (Table 3). The yield of Okra in demonstration plots ranged from 6.33 to 6.67 t/ha, which was significantly greater than the yield (3.85-4.05 t/ha) in farmers' practice plots. It was calculated that yield in the demonstration plots were 59.8-64.9% higher than the control plots.

The variation in yield could be due to better availability of nutrient throughout the growing period in demonstrated plots, as compared to

Table 3. Location and treatment combinations of OFT and FLD of Okra.

Site	DP				FP					
	Yield	Gross returns (Rs.)	Net returns (Rs.)	B:C ratio	Yield	Gross cost (Rs.)	Net returns (Rs.)	B:C ratio	YI%	Change in income
West Pilak	6.33	234210	110410	1.89	3.96	146520	60770	1.71	59.8	49640
North Jolaibari	6.67	246790	122990	1.99	4.05	149850	64100	1.75	64.7	58890
Kalashi	6.35	234950	111150	1.90	3.85	142450	56700	1.66	64.9	54450
SE (±)	0.191			0.057	0.1			0.043		

farmer's plots. The returns were substantially greater (Rs. 1,10,410 to Rs. 1,22,990/-) in demonstration plots than in farmers' practice (Rs. 56,700 to Rs. 64,100/-). Similarly, the B: C ratio in INM practices were higher (1.89 to 1.99:1) than in farmers' practice (1.66 to 1.75:1). Promotion of INM in early seasonal Okra cultivation could resulted in greater per ha net returns of Rs. 49,640 to Rs. 58,890 than the existing nutrient management strategies that followed by the farmers of Tripura.

Fig. 2 Promotion of early Okracultivation with INM practice

CONCLUSION

Large-scale demonstrations on early-seasonal Okra farming with INM practice should be promoted, through training, demonstration, and inputs distribution programme within or outside the state, in view of higher income from early-seasonal Okra farming.

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