Content list available at http://epubs.icar.org.in, www.kiran.nic.in; ISSN: 0970-6429

Indian Journal of Hill Farming

June 2018, Volume 31, Issue 1, Page 146-148

Productivity Enhancement in Finger millet through Frontline Demonstrations in Erode District of Tamilnadu

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ARTICLE INFO

Article history:
Received 27 July 2017
Revision Received 12 January 2018
Accepted 18 March 2018

Key words:
Finger millet, frontline demonstration, integrated crop management

ABSTRACT

Finger millet (*Eleusine coracana*.) is one of the most important millet crop cultivated over 5000 ha in Erode district of Tamil Nadu. However, the productivity of finger millet in the district is low. Attempts were made to improve the productivity and to increase the area under finger millet by adopting integrated crop management practices. The integrated crop management practices comprised of introduction of high yielding variety, seed treatment, integrated nutrient and plant protection measures were demonstrated. The results showed that the higher grain yield of 2729.5 kg/ha recorded in demonstration compared to 2194 kg/ha in farmers practice with an yield advantage of 24.40 per cent over the farmer practices. The average extension gap, technology gap and technology index were 535.5 kg / ha, 770.5 kg/ ha, and 22.01 percent respectively. The integrated crop management practices gave higher benefit cost ratio of 2.51 compared to farmer practices. Considering the above facts, FLDs were carried out in a systematic and scientific manner on farmer's field to show the worth of a new variety and the potentialities of improved production management technologies in finger millet for further adoption.

1. Introduction

Finger millet is also called as Ragi is the major staple food for hilly regions of Erode District. 85 percent of the total area comes under rainfed cultivation. Ragi is rich in carbohydrates, calcium, fibre, proteins and vitamins, contains slow releasing carbohydrates and provides continuous energy and is being promoted as food for diabetics. There was a steady decrease in finger millet area was noticed in Erode district over a decade of (Anonymous, 2013). Traditionally, the farmers in Western Ghats region of Tamil Nadu are cultivating finger millet as one of the predominant crop in their land. The problem is compounded by the fact that the majority of the farmers in the rainfed regions are lack of awareness on new and high yielding varieties, resource poor with low risk bearing capacity and they generally do not apply recommended practices. The productivity of finger millet per unit area could be increased by adopting improved crop management practices and suitable varieties (Ranawat *et al.,* 2011). Hence to overcome the problems of the farmers, frontline demonstrations were laid out to demonstrate the production potential of new finger millet variety with improved package of practices in the farmers' holdings of Erode District of Tamil Nadu.

2. Materials and Methods

Frontline demonstrations on integrated crop management in finger millet were conducted by Krishi Vigyan Kendra during Kharif 2015 and 2017 in the farmers' field of selected villages. Each demonstration was conducted in an area of 0.4 ha and adjacent to the farmers' fields in which the crop was cultivated with farmer's practice/variety. Scientific interventions under frontline demonstrations were taken as mentioned in Table 1. The selected progressive farmers were trained on all scientific finger millet cultivation aspects before starting of frontline demonstrations. The demonstrated fields were regularly monitored and periodically observed by the scientists of KVK.

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At the time of harvest yield data were collected from both the demonstrations and farmers practice. Cost of cultivation, net income and benefit cost ratio were worked out. To study the impact of frontline demonstrations, data from FLD and farmers practices were analyzed. The extension gap, technology gap and technology index were calculated using the formula as suggested by Samui *et al.* (2000).

$$Extension\ gap\ \left(\frac{qtl}{ha}\right) = DY\ (Qtl\ /Ha) - LY\ (Qtl/\ Ha)$$

$$Technology\ gap\ \left(\frac{qtl}{ha}\right) = PY\ (Qtl\ /Ha) - DY\ (Qtl\ /\ Ha)$$

$$Technology\ Index\ (\%) = \frac{PY\ (Qtl\ /Ha) - DY\ (Qtl/\ Ha)}{PY\ (Qtl\ /Ha)} \times 100$$

Where,
DY = Demonstration Yield
LY = local Check Yield
PY = Potential Yield of variety

3. Results and Discussion

Results indicated that variety ML-365 with integrated crop management practices had higher number of tillers (8.92), test weight of seed (3.11 gram). Similarly the farmers harvested an average grain yield of 2729.5 kg/ha with an yield advantage of 24.40 percent over the existing variety cultivated by the farmers. The findings of the present study are in line with Dhaka *et al.* (2011) and Rai *et al.* (2015). From these results it is evident that the performance of improved variety along with improved practices was found better than the local check under local conditions. Yield of frontline demonstration trials and potential yield of the crop was compared to estimate the yield gap further it was categorized into extension gap, technology gap and technology index. The extension gap shows the gap between the demonstration yield and local yield and it was 535.5 kg/ha. The technology gap shows the gap between the potential yield of the crop over demonstrated yield and it was 770.5 kg/ha. The observed extension gap and technology gap may be attributed due to dissimilarities in soil fertility levels, pest and disease incidence, improper usage of manures and fertilizers in this region. Hence, to narrow down the yield gaps location specific technologies needs to be adopted. Technology index shows the feasibility of the variety at the farmers' field. The lower the value of the technology index more is the feasibility. Table 3 revealed that the technology index values were 22.01 per cent. The findings of the present study are in line with the findings of Dhaka *et al.* (2011), Hiremath and Nagaraju (2009) and Rai *et al.* (2015). It was found that the average cost of cultivation for ML-365 under improved crop management practices was Rs. 17295/ha in 2015 and 17500/ha in 2017 with an average of Rs. 17397.50 and an average cost of Rs. 17207.50 /ha in farmers practice. The additional cost incurred in the improved crop management practices was mainly due to the new variety seed cost and seed treatment practices carried out by farmers. The demonstrated field recorded the higher mean gross return of Rs.43672.00/ha and the net return of Rs. 26274.50/ha with the high benefit cost ratio of 2.63. These findings are in line with the findings of Hiremath and Nagaraju (2009) and Sreelakkshmi *et al.* (2012). these results are clearly indicated that the adoption of improved package of practices was enhancing the finger millet production and economic returns in Erode district. Thus it can be concluded that the demonstrations of high yielding finger millet variety along with integrated crop management practices enhances the productivity of finger millet and motivate the other farmers of the district to adopt the improved / recommended practices.

Table 1. Improved crop management practices demonstrated in Frontline Demonstrations

Sl. No	Intervention points	Recommended improved practices
1.	High yielding variety	ML - 365
2.	Seed treatment	Treat the seeds with pseudomonas fluorescens @ 10 gram/kg seed. Followed by the seeds are treated with 600 gram of Azospirillum culture
3.	Spacing	22.5 x 10 cm
4.	Manures and fertilizers	12.5 ton FYM, 40:20:20 kg (N:P:K) / ha
5.	Weeding	Hand weeding on 15 and 30 days after sowing
6.	Irrigation	Critical stages: Tillering and pre - flowering

Table 2. Yield and Yield Attributes influenced by improved crop management practices

Year	Number of tillers		Test weight (gram)		Grain yield		Straw yield	
	ML – 365	Co-14	ML – 365	Co-14	ML – 365	Co-14	ML – 365	Co-14
2015	8.28	6.86	3.08	2.85	2584.5	2216.0	3217.0	2665.0
2017	9.56	7.02	3.14	2.87	2874.5	2172.0	3474.0	2515.0
Average	8.92	6.94	3.11	2.86	2729.5	2194	3345.5	2590

Table 3. Yield, Extension gap, Technology gap and Technology index of the demonstration

Variables	Yield (kg/ha)	Extension gap (kg/ha)	Technology gap (kg/ha)	Technology index (%)
Farmer practice	2194			
Improved practices	2729.5	535.5	770.5	22.01
Potential yield	3500			

Table 4. Cost of cultivation, gross return, net return and benefit cost ratio influenced by improved crop management practices

Year	Cost of cultivation (Rs/ha)		Gross return (Rs/ha)		Net Return (Rs/ha)		Benefit cost ratio	
	ML-365	Co-14	ML-365	Co-14	ML-365	Co-14	ML-365	Co-14
2015	17295.00	17065.00	41352.00	35456.00	24057.00	18391.00	2.39	2.08
2017	17500.00	17350.00	45992.00	34752.00	28492.00	17402.00	2.63	2.00
Average	17397.50	17207.50	43672.00	35104.00	26274.50	17896.50	2.51	2.04

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