Frontline demonstrations on blast tolerant and short duration finger millet variety KMR 630 in Tumkur, Karnataka

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 Received: 14.03.2023/Accepted: 29.04.2023

ABSTRACT

Frontline demonstrations were conducted in farmers' fields in Tumkur district of Karnataka during kharif 2019 to 2021 to demonstrate the improved production technologies in finger millet and create awareness among the farmers. The practices including cultivation of blast tolerant and short duration finger millet variety KMR 630, integrated nutrient management and integrated pest and disease management were demonstrated and compared with the existing farmers' practice followed in finger millet cultivation. Results showed that demonstration of finger millet variety KMR 630 with integrated crop management practices recorded higher grain yield of 20.83 q/ha against 15.96 q/ha in farmers' practice. Adoption of integrated crop management practices increased the grain yield of finger millet to the tune of 30.58 per cent compared to farmers' practice. Farmers earned higher net income of Rs 33,746/ha through the demonstrations and Rs 19,345/ha with their own practice. Besides, farmers realized higher benefit-cost ratio (2.47) through the demonstrations compared to farmers' practice (1.94). Thus the frontline demonstration of improved variety with crop management practices increased the grain yield and net income of the farmers growing finger millet under rainfed condition.

Keywords: Finger millet; frontline demonstrations; farmers' practice; KMR 630

INTRODUCTION

Finger millet [*Eleusine coracana* (L) Gaertn] is one of the important millets grown extensively in Tumkur district of Karnataka. It is a hardy crop and has good adaption to wide range of environment especially heat, drought, marginal and degraded soils (Okalebo et al 1990). It is mainly grown for its grains and is highly nutritious. Its grains contain carbohydrate (65-75%), protein (5-8%), dietary fibre (15-20%), minerals (2.5-3.5%) and vitamins (Chethan and Malleshi 2007). It is superior to rice and wheat in respect of crude fibre, amino acids and minerals like calcium (344 mg/100 g) and potassium (408 mg/100 g). It also contains anti-nutritional factors such as phytates, polyphenols, tannins and trypsin inhibitory factors. Regular consumption of whole grain of finger millet and its products helps in managing diabetes and its complications by regulation of glucose homeostasis and prevention of dyslipidemia. It also gives protection against the risk of cardiovascular disease, gastrointestinal cancers and other health issues. It has health beneficial effects such as anti-diabetic, anti-diarrheal, anti-ulcer, anti-inflammatory, anti-tumerogenic and atherosclerogenic effects and antioxidant and antimicrobial properties (Devi et al 2014).

Finger millet is being cultivated in an area of about 1,85,000 hectares in Tumkur district of Karnataka. About 90 per cent of the area under finger millet is being cultivated under rainfed condition during kharif season (Shreenivasa et al 2020). Under rainfed condition, farmers have been facing the problem of moisture stress at various crop growth stages, thereby, experiencing low yield and crop loss to some extent. Besides, moisture stress, lack of knowledge on the availability of drought tolerant varieties, non-adoption of improved cultivation practices, prevalence of nutrient deficiency and pest and disease incidence also lower the finger millet productivity. Hence, the productivity of finger millet might be increased by growing suitable

variety along with improved crop management practices. Crop yield increase by adoption of improved crop management practices was also reported by Subhashree et al (2017) in finger millet, Sharma et al (2016) and Singh (2017) in wheat, Jat and Gupta (2015) in pearl millet and Meena et al (2014) in maize

Considering the above facts, frontline demonstrations were proposed and conducted in the farmers' holdings to demonstrate the improved package of practices for higher productivity in finger millet under rainfed condition.

MATERIAL and METHODS

Frontline demonstrations were conducted to demonstrate the potential of the drought and blast tolerant variety with the improved package of practices in comparison to the existing farmers' practice in the farmers' fields of Tumkur district, Karnataka during kharif 2016-2018 under rainfed condition. Demonstrations were conducted in 25 ha area in three villages involving 50 farmers. The soil samples of the demonstration fields were collected and analysed for their initial soil nutrient status.

The results showed that the soils were slightly alkaline in soil reaction, non-saline, low in nitrogen and medium in phosphorus and potassium content. Each demonstration was conducted in an area of 0.4 ha and with an adjacent area of 0.4 ha selected for farmers' practice. In the demonstrations, the improved practices including cultivation of finger millet variety KMR 630, integrated nutrient management and integrated pest and disease management were demonstrated along with the farmers' practice. Finger millet variety KMR 630 was released from University of Agricultural Sciences, Bengaluru during 2018. Variety is of 100-105 days duration, high yielding and tolerant to blast disease. In farmers' practice, finger millet variety ML 365 was grown with the existing farmers' practices such as broadcasting of seeds, basal application of complex fertilizers etc. The details on the technological interventions followed in the demonstrations and farmers' practice are given in Table 1. Before initiating the demonstrations, the beneficiary farmers were trained in all the improved practices in finger millet cultivation which were applied in the demonstrations. Demonstration fields were periodically observed by the scientists of Krishi vigyan Kendra. At the time of harvest, the data on plant population, plant height, number of tillers per plant, days taken to 50 per cent flowering and grain yield of finger millet crop were recorded from both the demonstrations and farmers' practice. Based on the cost of inputs and market price of the produce, economic parameters such as net return and benefit-cost ratio were worked out.

RESULTS and DISCUSSION

Results given in Table 2 indicate that variety KMR 630 with integrated crop management practices recorded higher plant population (35.5/m^2), plant height (75.0 cm) and number of tillers per plant (4.55). Lower

Table 1. Technological interventions followed in finger millet cultivation under FLDs

Intervention	Farmers' practice	Improved practices under FLDs
Farming situation	Rainfed	Rainfed
Variety	ML 365	KMR 630
Time of sowing	First week of August	First week of August
Method of sowing	Broadcasting of seed; thinning operation not followed	Sowing of seed at a spacing of 30 cm × 10 cm; thinning and gap filling followed
Seed treatment	Not done	Seed treatment with *Trichoderma* @ 10 g/kg followed by biofertilizers viz *Azospirillum* and *Phosphobacteria* @ 25 g/kg each
Nutrient management	Basal application of 20:20:20 complex fertilizer @ 125 kg/ha	Basal application of FYM @ 12.5 tonnes/ha; application of recommended dose of NPK @ 40:20:20 kg/ha, zinc sulphate @ 12 kg and boron 5 kg/ha
Weed management	Not done	One hand weeding at 25-30 days after sowing
IPDM practices	No prophylactic or control measures adopted for managing pests and diseases	Need-based usage of plant protection chemicals and IDM practices

Table 2. Growth parameters of finger millet varieties KMR 630 and ML 365 under FLDs

Component	Variety	Plant number at harvest/m^2	Plant height (cm)	Number of tillers/plant	Days taken to 50% flowering
Farmers' practice	ML 365	28.5	64.5	2.50	65
FLDs	KMR 630	35.5	75.0	4.55	70

Table 3. Yield performance of finger millet varieties KMR 630 and ML 365 under FLDs during three years

Year	Village (block)	Number of farmers	Area (ha)	Yield (q/ha)		Change in yield (%)
				KMR 630	ML 365	
2019	Gunnagere (Kunigal)	10	4	22.50	17.40	29.31
2020	Gunnagere (Kunigal)	10	4	18.50	14.00	32.14
2021	Gunnagere (Kunigal)	10	4	21.50	16.50	30.30
Mean	-	-	-	20.83	15.96	30.58

Table 4. Economics of cultivation of finger millet varieties KMR 630 and ML 365 under FLDs during three years

Year	Demonstration variety KMR 630				Check variety ML 365			
	Gross cost (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	BCR	Gross cost (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	BCR
2019	27,214	54,478	27,264	2.36	27,357	41,543	14,186	1.90
2020	25,000	60,125	35,125	2.40	25,000	45,500	20,500	1.82
2021	23,500	62,350	38,850	2.65	22,500	47,850	23,350	2.12
Mean	25,238	58,984	33,746	2.47	24,952	44,964	19,345	1.94

plant population (28.5/m^2), plant height (64.5 cm) and number of tillers per plant (2.50) were recorded in farmers' practice.

Cultivation of drought tolerant finger millet variety KMR 630 with integrated crop management practices recorded higher average grain yield of 20.83 q/ha (Table 3) in comparison to ML 365 (15.96 q/ha). Adoption of improved practices increased the yield of finger millet to the tune of 30.58 per cent as compared to the farmers' practice.

The increased yield under demonstrations might be due to the combined effect of high yielding and drought tolerant variety and adoption of improved crop management practices adopted in the present study. Similar results of yield enhancement through frontline demonstrations of improved technologies were reported by Kumar et al (2010) in bajra, Solanki et al (2014) in maize and Naik et al (2016) in sorghum. Besides, the incidence of blast disease was not reported in the demonstrated variety which was 8 per cent in the farmers' practice.

The data on economics of cultivation of finger millet in FLDs and farmers' practice (Table 4) indicate that the cost of production was higher in demonstrations (Rs 25,238/ha) and lower in farmers' practice (Rs 24,952/ha). Farmers earned a net income of Rs 33,746/ha through the cultivation of KMR 630 variety with integrated crop management practices and Rs 19,345/ha with farmers' practice. Hence, farmers realized the higher benefit-cost ratio (2.47) through the cultivation of KMR 630 with integrated crop management practices compared to farmers' practice through ML 365 (1.94). It might be due to the higher grain yield recorded in under FLDs as compared to farmers' practice. Similar results on increase in net income and benefit-cost ratio due to adoption of improved technologies in the demonstrations were reported by Jat and Gupta (2015) in pearl millet, Dhaka et al (2010) in maize and Naik et al (2016) in sorghum.

CONCLUSION

Results of the frontline demonstrations revealed that cultivation of finger millet variety KMR 630 with integrated crop management practices increased the yield and income of the farmers under rainfed condition. In addition, the introduced variety could satisfiy the farmers' preferences such as high tiller production, early maturity and tolerance to grain shattering or dusting. Hence, the farmers were convinced with the performance of the variety with regard to its yield potential and income.

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