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IMPACT OF FRONT-LINE DEMONSTRATION OF FOXTAIL MILLET VARIETY HN-46 OVER FARMER PRACTICE

S. Vanishree* and Renuka Biradar

Agriculture Extension Education Centre, Lingasugur, U.A.S., Raichur, Karnataka, India.

*Corresponding author E-mail : vaniravipatil@gmail.com

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ABSTRACT

The present study on performance of foxtail millet variety HN-46 under frontline demonstration in Lingasugur taluk, Raichur district of Karnataka, India was conducted by Agriculture Extension Education Centre, Lingasugur. The study was conducted in 30 demonstrations in 12 ha of farmer's field in different villages of Lingasugur for three years (2022-23 to 2024-25). The productivity of foxtail millet ranged from 13.0 to 15.50 q/ha with mean yield of 14.28q/ha under demonstration field as against a yield ranged from 9.50 to 12.50 q/ha with a mean of 10.90 q/ha recorded under farmers practice. In comparison to farmers practice 31.01% higher productivity was observed in demonstrated field. The foxtail millet variety HN-46 with improved package of practice recorded higher gross returns (Rs. 59466.70/ha), net return (Rs. 46866.67/ha) and B:C ratio (4.72) as compared to farmers practice. Further by inclusion of foxtail millet variety HN-46 with improved package of practice realized an additional income of Rs. 15066 per hectare, which created awareness and motivated the other farmers to adopt the technologies.

Key words : Foxtail millet, Extension gap, Technology gap, Yield.

Introduction

Millets offer nutritional security and there is a need for promoting millets as they are highly nutritious. Millets are rich in protein, fibre, iron, minerals, B-complex vitamins and calcium. Consumption of millets reduces risk of heart disease, protects from diabetes, improves digestive system, lowers the risk of cancer and detoxifies the body. The most widely grown millets are finger millet, proso millet and foxtail millet especially wherever annual rainfall is below 350 mm, perhaps no other cereal crop can be grown under such moisture stress. Foxtail millet is one of the oldest small millets cultivated for food and fodder. It is known for its drought tolerance and can withstand severe moisture stress and also suits to wide range of soil conditions. It is of short duration and low cost consumptive crop, nutritionally superior, providing protein, minerals and vitamins and forms of staple food for the poorer sections of the society. In India, Andhra Pradesh (4,79,000 ha), Karnataka (2,32,000 ha) and Tamil Nadu (20,000 ha) are the major foxtail millet growing states contributing about 90 percent of the total area under cultivation . Andhra Pradesh is a major foxtail millet growing state with an area contributing about 79 per cent of the total area. However, the yield per unit area is less as the crop is mainly grown by small and marginal farmers on poor shallow and marginal soils under rainfed conditions besides lacking of high yielding varieties. Farmers in Karnataka have doubled acreage to around 40,000 hectares under minor millets majorly for foxtail because of promotions in relation to foxtail nutritional value and its comparatively higher yield than other millets. Millets are now emerging need for alternating meal, fill the gap in the absence of essential nutrients. Since, NEK (North Eastern Karnataka) is leading producer of foxtail millet (Navane). In this region, local varieties of foxtail millet often cultivated under unmanured and unfertilized conditions has resulted in reduced returns. Hence, by keeping all the points in view, the study was carried out to study the performance of newly developed foxtail millet varieties in rainfed condition.

The Current study was under taken with a view to analyase the difference between technology introduced

with traditional local farmers practices *viz*., extension gap, technology gap and technology index and to compare the yield and economics of Front-line demonstration plots with farmers practice.

Materials and Methods

The present study was conducted by Agriculture Extension Education Centre Lingasugur, Raichur (India), Karnataka in an operational area of AEEC, for three years (2022-23 to 2024-25). The information on existing cultivation practices by the farmers were collected during pre-season by interacting with farmers in group discussion method. The information comprises of variety of seeds used, crop yield, economic returns and problem encountered by the farmers.

Selection of farmers : The purposive sampling method was adopted for the study. Farmers who are growing foxtail millet from past 3 yerars were selected based on their willingness to participate in the demonstration study. The study was implemented in 0.4 ha unit area of each farmer and total 4 ha field with 10 farmers in each year; totalling to 30 demonstrations in the area of 12 ha in different villages of Lingasugur taluka *viz*., Anahosur, Margantanal, Hesarur, Neeralakera etc., for three years. For the comparison between demonstration plot and farmers practice, other fields grown by the same farmer or different farmer adjoining to the demonstration field were used as control plot. During the study period farmers were trained for adopting improved agricultural practices by conducting different extension activities like trainings and method demonstrations.

Procurement of inputs : The certified seeds of foxtail millet variety HN-46 (Hagari Navane-46, UASR Released variety) was selected for the demonstration (This variety matures in 100 to 105 days and it is resistant to insect pests, diseases and tolerance to heat stress. Grain quality of foxtail millet was excellent and possess nutritional and therapeutic values) were purchased from the Seed Unit of Agriculture Research station Hagari, University of Agricultural Sciences, Raichur. For each farmer Seed was provided as the critical input @ 7.5 kg/ ha. Farmers were advised to undertake seed treatment. For the seed treatment Azospirillum and trichoderma were purchased from Institute of Organic Farming unit, University of Agricultural Sciences, Raichur and distributed. The other expenditures on recommended fertilizers (INM) and plant protection measures (IPM) were done by farmers.

The data on cost of cultivation, yield was collected from each selected farmer as well as from non-practicing farmer. For calculation of economics, price of the produce has been collected from Agricultural Produce Marker Committee (APMC), Lingasugur Raichur. From the collected data of yield, cost of cultivation, gross returns, net profit and B:C ratio were worked out. The extension gap, technology gap and technology index were estimated (Samui, 2004) by the following formulae and final conclusions were drawn.

1. Extension gap = Demonstration yield – Farmers yield

2. Technology gap = Potential yield – Demonstration yield

3. Technology index = [(Potential yield – Demonstration yield)/ Potential yield] × 100

The selection of critical input and participatory approach in planning and conducting the demonstration definitely help to the farmers. Singh *et al*. (2005) reported that the FLD was effective in changing the attitude, skill and knowledge of improved / recommended practices of high yielding variety of rice including adoption. Sunita *et al*. (2020) reported that the yield of foxtail millet was increased in FLD as compared to farmer practices. It shows a positive impact of FLD on adoption of recommended practices.

Results and Discussion

Comparison of technology intervention in FLD and farmers practices was revealed in Table 1. It is observed that partial gap was noticed with respect to seed rate (kg/ha), method and date of sowing, dose of fertilizers application and weed control. With respect to varieties, seed treatment, spacing and depth of sowing full gap was observed. This is because of lack of knowledge on new varieties and non availability of seeds in time. Most of the farmers were not followed seed treatment and proper spacing and also depth of sowing. It is due to less participation in agriculture extension programmes. These results are same with the findings of Harish *et al*. (2023).

Comparison of yield, extension gap and technology gap and technology index (Table 1).

Yield

The yield obtained during study period under demonstration plots and control plots are revealed in table 2. The productivity of foxtail millet ranged from 13.00 to 15.5 q/ha with mean yield of 14.28q/ha under demonstration field as compared to farmers practice with respect to yield ranged from 9.5 to 12.50q/ha with a mean of 10.90q/ha. In comparison to farmers practice there was an increase of 20, 37.17 and 36.84% higher productivity, respectively during 2022-23, 2023-24 and 2024-25. The higher yield of foxtail millet under

Table 1 : Comparison of technology intervention in FLD and farmers practice.

S. no.	Particulars	Demo Plot (FLD)	Control plot (Farmers practice)	Gap
1	Variety	HN-46	Local	Full gap
2	Seed rate(kg/ha)	5	7-8	Partial gap
3	Seed treatment	Azospirilum	No seed treatment	Full gap
4	Sowing methods	Seed drill	Dibbling/seed drill/tractor sowing	Partial gap
5	Spacing	22.5-30*5-7 cm row spacing	20 cm	Full gap
6	Depth of sowing	4cm	Deep sowing	Full gap
7	Sowing date	June-July	Late sowing	Partial gap
8	Fertilizers application	12:6:6 kg NPK/ha after 30 days after sowing	DAP:50 and Urea :50	Partial gap
9	Weed control	Pre-emergent application of Pendimethalin 30 EC @ 3.25 l/ha and one inter cultivation	Three inter cultivation and hand weeding	Partial gap
10	Plant protection	Based on recommended dose as per package of practices	Over dose and different pesticides	Partial gap

Table 2 : Yield and yield gap analysis of frontline demonstration and farmers practice.

Year	No. of demo's	Area (ha)	Potential yield (q/ha)	Yield		% increase in yield	Extension Gap	Technolo-gical gap	Technology index
				Demo (FLD)	Control (FP)				
2022-23	10	4	18	15	12.50	20.00	2.5	3	16.67
2023-24	10	4	18	15.5	11.30	37.17	4.2	2.5	13.89
2024-25	10	4	18	13	9.5	36.84	3.5	5	27.78
Mean	**10**	**4**	**18**	**14.28**	**10.90**	**31.01**	**3.38**	**3.72**	**20.67**

FP: Farmers practices FLD: Frontline Demonstration (Demo).

demonstration field was due to the use of latest and improved high yielding variety and with its recommended cultivation practice. These results are same with the findings of Hanumathappa *et al*. (2024).

Extension gap

With regard to extension gap, 2.50 to 4.2q/ha with an average of 3.38q/ha was observed during three years of study period (Table 2). This indicates that, technology awareness with reference to new agriculture practices was less. To mitigate this gap of knowledge of farmers can be fulfilled by educating farming community by adoption of improved technologies and high yielding varieties through various extension activities. These results are on par with the findings of Sunita *et al*. (2020) as stated that the higher extension yield gap due to lack of awareness for the adoption of improved farm technologies by the farmers indicating that there is a strong need to aware and motivate the farmers for adoption of improved farm technologies in foxtail millet over existing local practices.

Technology gap

The term technology gap indicates the difference between potential yield and demonstrated yield. The technology gap of 2.50 to 5.0q/ha with an average of 3.72 q/ha was recorded in Table 2. Variation in soil fertility and change in weather conditions of the prevailing area may be the reasons for this technology gap. To reduce the technology gap, location specific recommendation found to be necessary.

Technology index

Technology index, depicts the feasibility of the improved technology at the farmer's field. Lower the index higher will be the feasibility of improved technology. In this study lower technology index (13.89) was noticed in 2023-24, which was followed by 16.67 and 27.78 percent in 2022-23 and 2024-2025, respectively (Table 2). During 2023-24 lower technology index was recorded, this may be due to foxtail millet variety HN-46 performed well with improved farm practices in an area of higher

Table 3 : Economics of Foxtail millet in technology intervention and farmers practice under frontline demonstration.

Year	Cost of cultivation (Rs./ha)		Gross return (Rs./ha)		Net return (Rs./ha)		Additional income (Rs./ha)	B:C ratio	
	Demo	FP	Demo	FP	Demo	FP		Demo	FP
2022-23	11500	14400	48000	40000	36500	22100	14400	4.17	2.78
2023-24	12800	15000	58900	42940	46100	31100	15000	4.60	2.86
2024-25	13500	15800	71500	52250	58000	42200	15800	5.30	3.31
Mean	**12600**	**15066.7**	**59466.7**	**45063.3**	**46866.67**	**31800**	**15066**	**4.72**	**2.99**

soil fertility which was coupled with good weather condition. Technology index indicates the feasibility of generated farm technologies in the farmers' fields under existing agro-climatic conditions as stated by Vedna *et al*. (2007) and Choudhary *et al*. (2009). Lower the technology index, higher is the feasibility of generated farm technology under farmers' fields and vice-versa. Similar results were also reported by Jeengar *et al*. (2006) in maize.

Economics

Table 3 comprises information on cost of cultivation, gross and net returns and also B:C ratio**.** The data on economic analysis over the year revealed that the foxtail millet variety HN-46 with improved package of practice recorded higher gross returns (Rs. 71500/ha), net return (Rs. 58000/ha) and B:C ratio (3.31) as compared to farmers practice. Further by inclusion of foxtail millet variety HN-46 with improved package of practice realized an additional income of Rs. 15800 per hectare. The results revealed that higher profitability and economic viability was observed by adoption of improved foxtail millet variety HN-46 along with good agricultural practice under local agro-ecological situation. Higher returns and B:C ratio under improved practices in frontline demonstration was also reported by Thakur *et al*. (2017). Similarly superiority of HN-46, yielding higher gross returns, net returns and benefit-cost ratio was noticed in demonstrated plot compared to the local variety as reported by Hanamthappa *et al*. (2024).

Conclusion

From the study it can be concluded that, yield of foxtail millet variety HN-46 with improved agriculture practices was enhanced by 31.01percent (Average of three years) over the farmer practice with local variety. Further, an additional income of Rs. 15,066 per hectare was obtained in demonstration plot which created awareness and motivated the other farmers to adopt new improved variety. The beneficiary farmers of the frontline demonstration also play an important role as a source of information for wider dissemination of high yielding foxtail millet to nearby farmers. Thus, the frontline demonstration is an effective tool for increasing area, production and productivity of foxtail millet by changing the knowledge, skill and attitude of the farmers on the adoption of improved technologies. This dissemination of information on improved variety along with agricultural practices helps to improve economic and nutritional status of the farming community which inturn provides variety of avenues for small scale industries (primary and secondary processing) of millets.

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