Original Research Article

EFFECT OF TECHNOLOGICAL INTERVENTION ON YIELD OF SUMMER PEARL MILLET

ABSTRACT

Front line demonstrations (FLDs) were conducted by pearl millet Research Station, JAU, Jamnagar **at** on 313 farmer's field in 125 hectares of different villages how many? of Gujarat state during summer season of 2015 to 2019. Prevailing farm practices were treated as control for comparison with recommended package what was this package?. The cumulative effect of technological intervention over five years, revealed average grain yield 43.62 q/ha, and dry fodder yield 73.65 q/ha which is 6.17 % and 12.76 % higher over the farmers practices. The economics and cost benefit ratio of both farmers and improved practices was worked out. On an average net profit was obtained 6837 ₹/ha due to adoption of improved package of practices. Cost befit??? ratio was 2.23 to 3.54 under improved demonstration practices which specific ones?, while it was 1.99 to 3.20 under farmers practices. By conducting the Frontline Demonstrations of proven technologies, yield potential and net income from pearl Millet cultivation can be enhanced to a great extent with increase in the income level of the farming community.

Mention the economic model(s) for analysis

Key words: Pearl Millet, Front Line Demonstration, Net profit rearrange alphabetically!!

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INTRODUCTION

Pearl millet is a cereal crop that thrives in the arid and semi-arid tropical regions of Asia and Africa. It is an important food crop in areas with low rainfall and shallow soils. Being short in duration, it is the most drought-tolerant millet grown in the arid and semi-arid regions of the world (Bhagavatula *et al.* 2013). Pearl millet is grown in over 8.0 m ha mainly as a rainfed crop

in north and northwestern parts of **country** India **comprises** comprising states of Gujarat, Rajasthan, Maharashtra and Haryana.

In Gujarat it is an important food and fodder crop as it is second in terms of area after wheat and third after wheat and rice in terms of production. It is an important staple food for the people of arid and semi-arid regions of the state, North Gujarat, Kutch and Saurashtra. It is cultivated by Gujarat farmers in 3 different seasons viz., kharif, semi-rabi and summer.

In Gujarat it is grown in 26 out of 33 districts covering an area of 1.63 lakh ha in Kharif with an average productivity 1272 kg/ha and around 2.4 lakh ha area under summer cultivation with an average productivity of 2628 kg/ha (Anonymous, 2018). The total area of Pearl Millet in the state is 3.97 lakh ha (Anonymous, 2018) with an average productivity 2430 kg/ha. The area of summer cultivation is increasing gradually due to short period of time window **is** available to farmer after rabi crops, acute demand of fodder and suitable climatic situation in the state.

Its grain has very high nutritive value for human consumption and livestock also relish its straw, both in fresh and dried forms. Pearl millet is an important coarse grain crop and serves as stable diet for the millions of people thriving under hunger living in poverty!!. It is considered as whole crop utilization - a source of grain for human consumption and fodder for livestock (Gill 1991).

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Available agricultural technology does not serve its purpose till it reaches and be adopted by its ultimate users, the farmers. Technology transfer refers to the spread of new ideas from originating sources to ultimate users. There is ample scope for further improvement of production and productivity of pearl millet for raising the income level of the farming community of the Gujarat State. Yield loss under real farming condition can be attributed to several biotic and abiotic factors, important among them are use of farmer's hybrid and imbalanced use of nitrogenous fertilizers. Adoption of high yielding varieties under FLDs plays important role in the maximization of pearl millet production (Chaudhari *et al.,* 2018). With an

object to combat the cause of yield erosion and lower economic returns, dissemination of recommended technology through front line demonstration was successfully attempted.

Clearly demonstrate these FLDs and their significance in pearl mullet productivity

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MATERIALS AND METHODS

Front line demonstrations were organized and conducted by Pearl Millet Research Station, JAU, Jamnagar **at** on 313 farmer's field in 125 hectares of different villages how many? of Gujarat state during summer season under real farming situations during 2015 to 2019. The **area under each** demonstration area was 0.40 ha and all demonstrations on various locations were under direct supervision of the scientists. To manage the assessed problem, improved variety which one?, seed rate 4 kg/ha, timely sowing, line sowing with spacing of 60 cm (R-R) and 10-12 cm (P-P), balanced use of fertilizers which ones?, thinning 15 days after sowing, weed management (pre emergence **apply** Atrazin @ 0.5 kg a.i./ha and one hand weeding), proper critical stage apply irrigation not clear…amount applied and which mode!!, two foliar spray of profenophos 0.05 % at 20 and 40 days after germination to control **the** shoot fly and stem borer pests infesting pearl millet, timely harvesting and threshing were followed as interventions during the course of front line demonstration scheme. Before the conduct of demonstrations, training to the farmers of respective villages was imparted with respect to proven technological interventions. All other steps like site and farmer selection, lay out of demonstrations, farmers**'s** participation were followed as suggested by Chaudhary (1999). Visits of farmers and extension functionaries were organized at demonstration plots to disseminate the message at large scale. The yield data were collected from both the demonstration and control (Farmer's practices) by random crop cutting method How many crops?? and analyzed by using simple statistical tools which ones?. The cost of cultivation, net income and cost benefit ratio were computed and analyzed. The extension gap, technology gap,

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technological index (Samui *et al.,* 2000, Thakur *et al.,* 2019) and state average yield gap (Parmar et. al., 2016) were calculated by using the following formula **as given below**:

$$\text{Percentage increase yield} = \frac{(\text{Improved practice yield} - \text{Farmer practice yield}) \times 100}{\text{Farmer practice yield}}$$

$$\text{Technology gap} = \text{Potential yield} - \text{Improved practice yield}$$

$$\text{Extension gap} = \text{Improved practice yield} - \text{Farmer practice yield}$$

$$\text{Technology index} = \frac{(\text{Potential yield} - \text{Improved practice yield}) \times 100}{\text{Potential yield}}$$

$$\text{State average yield gap} = \frac{(\text{Improved practice yield} - \text{Average state yield}) \times 100}{\text{Average state yield}}$$

Clearly and systematically show the research steps!!!

RESULTS AND DISCUSSION

The gap between the farmers practices and improved technologies of pearl millet in different district of Gujarat is presented in Table 1. The gap was observed in use of variety, sowing method, seed rate, sowing spacing, plant population, weed management, application of fertilizers dose, irrigation and application of plant protection measure.

The yield performances are presented in Table -2. The **data**results indicated **reported** that under improved practices, the grain yield**performance** of pearl millet **grain yield** was found to be substantially higher than **the** under farmers (local) practices during all the years (2015-2019). The grain yields of pearl millet under improved practices recorded **was** were; 39.67, 40.00, 45.15, 45.89 and 47.39 q/ha use SI units during summer of 2015, 2016, 2017, 2018 and 2019, respectively. The yield improvement due to technological intervention was to the tune of 4.61, 6.10, 8.87, 5.79 and 5.45 % **per cent** over farmer's practices. The cumulative effect of technological interventions over five years, revealed an average yield 43.62 q/ha, which was 6.17 % higher over farmer's practices. The **data** results revealed that the average dry fodder yield of 2015 to 2019 was 73.65 q/ha in the improved practices which was 12.76 % higher than the farmer practices 65.51 q/ha. The highest dry fodder yield of 76.12 q/ha was recorded in

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improve practices during summer of 2018. The results indicated that higher yields were obtained under improved demonstration practices compared to farmer practices.

The extension gap of 1.75, 2.30, 3.68, 2.51 and 2.45 q/ha was observed during summer of 2015, 2016, 2017, 2018 and 2019, respectively in Table 3. On an average extension gap was observed 2.54 q/ha. The technology gap ranged between 19.79 to 27.51 q/ha and on an average technology gap in the five years of the FLD programmes was 23.56 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation. The technology index varied from 29.46 to 40.95 per cent. On an average technology index **was** observed was 35.07 per cent, which shows the efficacy of good performance of technical interventions. The wider gap between state average yield and improved farmer practice was 49.25 %, 45.45 %, 65.63 %, 57.21 % and 79.37 % during the summer of 2015, 2016, 2017, 2018 and 2019, respectively. On **an** average, state average gap in the five years of FLD programmes was 59.38 %. It indicates that the pearl millet growers with low yield were identified by low knowledge of scientific technology of pearl millet cultivation. It is a point of concern for research and extension workers to disseminate improved pearl millet production technology for raising **the production**its production **of pearl millet**.

The economic viability of improved technologies over farmer' practices w**as**ere calculated depending on prevailing prices of inputs and outputs costs (Table 4). It was found that the cost of cultivation of pearl millet varied from 30656 to 31247₹/ha with an average of 30687₹/ha in improved practices as against the variation in cost of cultivation from 31920 to 32600 ₹/ha with an average of 31954₹/ha in farmers practice too long…paraphrase to make sense!!!. The cultivation of pearl millet in the improved practices gave higher net return which ranged from 37856 to 79473₹/ha with a mean value of Rs???. 52825₹/ha as compared to farmers practice which recorded 31674 to 71812₹/ha with a mean of 45988₹/ha. **The h**Higher benefit cost ratios of 2.23, 2.81, 2.40, 2.60 and 3.54 were found under improved practices compared to 1.99, 2.53, 2.10, 2.35 and 3.20 **and** under farmer practices in the corresponding

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seasons. On **an** average, a net profit of 6837 ₹/ha was obtained due to adoption of improved package of practices. Hence, there is a wide scope to increase the production of pearl millet crop by providing need based training and demonstration on improved production technology to the farmers. The above findings are **in** similar to those**ly with the findings** of Singh (2002), Zala *et al.* (2013), Parmar *et. al*. (2016) and Thakur *et al. (*2019). Clearly explain each result, citing relevant references!!!!

CONCLUSIONS

From the above discussion, it can be concluded that front line demonstrations have shown the adoption of improved package of practices like improved variety, seed rate 4 kg/ha, timely sowing, line sowing with spacing of 60 cm (R-R) and 10-12 cm (P-P), balanced use of fertilizers, thinning 15 days after sowing, weed management (pre emergence apply Atrazin @ 0.5 kg a.i./ha and one hand weeding), proper critical stage apply irrigation, two foliar spray of profenophos 0.05 % at 20 and 40 days after germination to control the shoot fly and stem borer pests infesting pearl millet, timely harvesting and threshing may result in higher productivity of pearl millet. In demonstration plot improved production technology of pearl millet performs better than control plot. It improves productivity 6.17 % in grain yield and 12.76 % dry fodder yield. The productivity of yield under FLD over farmer's practices created awareness and motivated the other farmers to adopt improved production technology of the pearl millet.

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Clearly give your conclusions based on your results/findings!!!!

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163
164 **Table. 1 Difference between improved and farmers' practices under front line**
165 **demonstration on pearl millet**

Sr. No.	Components	Improved Practices	Farmers Practices
1	Land preparation	Two Ploughing	Two Plouging
2	Variety	Improved Hybrid GHB 558, GHB 538 and GHB 732	Local available variety
3	Sowing method	Line sowing	Broadcasting & Line sowing
4	Seed rate	3.75 kg/ha	6-8 kg/ha
5	Spacing of row to row and plant to plant	60 cm & 10-15cm	45 cm & 10 cm
6	Plant population	Optimum	Uneven
7	Weed management	Pre emergence apply Atrazin @ 0.5 kg a.i./ha + one hand weeding	Weeding in not common
8	Doses of NPK fertilizers	120-60-0 kg/ha	Imbalance and inadequate

9	Irrigation at critical stage	8-10	Unequal
10	Plant protection	Application of recommended dose of insecticide as per requirement	Use of incorrect dose and plant protection is not common

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Table.2 Yield performance of FLD on pearl millet crop

Season	No. of Demon-strations	Variety	Grain yield (q/ha)		% Increase in yield over farmers practice	Dry fodder yield (q/ha)		% Increase in dry fodder yield over farmers practice
			Improved practice	Farmers practice		Improved practice	Farmers practice	
Summer 2015	76	GHB-558, GHB-732	39.67	37.92	4.61	69.43	56.89	22.04
Summer 2016	75	GHB-538, GHB-732	40.00	37.70	6.10	71.88	65.69	9.42
Summer 2017	62	GHB-558, GHB-538, GHB-732	45.15	41.47	8.87	74.92	66.07	13.39
Summer 2018	50	GHB-732	45.89	43.38	5.79	76.12	69.82	9.02
Summer 2019	50	GHB-538, GHB-732	47.39	44.94	5.45	75.91	69.06	9.92
Mean	**313**	**-**	**43.62**	**41.08**	**6.17**	**73.65**	**65.51**	**12.76**

Table.3 Extension gap, technology gap, technology index and state average gap (%) of pearl millet under FLD and existing package of practices

Season	Grain yield (q/ha)		Extension gap (q/ha)	Technology gap (q/ha)	Technology Index	State average yield gap (%)
	Potential	State average				
Summer 2015	67.18	26.58	1.75	27.51	40.95	49.25
Summer 2016	67.18	27.50	2.30	27.18	40.46	45.45
Summer 2017	67.18	27.26	3.68	22.03	32.79	65.63
Summer 2018	67.18	29.19	2.51	21.29	31.69	57.21
Summer 2019	67.18	26.42	2.45	19.79	29.46	79.37
Mean	**67.18**	**27.39**	**2.54**	**23.56**	**35.07**	**59.38**

Table.4 Economics of FLD on pearl millet crop

Year	Gross expenditure (₹/ha)		Gross return (₹/ha)		Net return (₹/ha)		C:B ratio	
	Improved practice	Farmers practice	Improved practice	Farmers practice	Improved practice	Farmers practice	Improved practice	Farmers practice
Summer 2015	30656	31920	68512	63594	37856	31674	1:2.23	1:1.99
Summer 2016	30875	32173	86816	81413	55941	49240	1:2.81	1:2.53
Summer 2017	30387	31610	72821	66337	42435	34727	1:2.40	1:2.10
Summer 2018	30268	31470	78690	73959	48422	42489	1:2.60	1:2.35
Summer 2019	31247	32600	110720	104411	79473	71812	1:3.54	1:3.20
Mean	**30687**	**31954**	**83512**	**77943**	**52825**	**45988**	**1:2.72**	**1:2.43**

Selling price of pearl millet grain was 1377, 1811, 1281, 1383 and 2016₹/q in June month of 2015, 2016, 2017, 2018 and 2019, respectively. Dry fodder yield 200₹/q