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Impact of Front-Line Demonstrations on Yield and Economics of Marigold

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ABSTRACT

The present study was carried out to evaluate the performance of improved varieties with scientific package of practices on production and profitability of marigold. Front Line Demonstration (FLD) is an appropriate tool to demonstrate recommended technologies among the farmers. Krishi Vigyan Kendra, Fatehpur-Shekhawati, Sikar has conducted 10 front line demonstrations in farmer's field during rabi 2021-22 in total 2.0 hectare with the objectives of convincing farmers and extension functionaries together about the marigold flower production technologies for further wide scale diffusion. The farmer practice was considered as local check in demonstration cluster. These check plots were maintained by the farmers according to their own traditional cultivation practices. The result revealed that the highest plant height (90.26 cm), plant spread (12.38 cm) primary branches/plant (12.38), no. of flowers/ plant (54.00), flower diameter (5.88 cm) and flower yield (272.65 q/ha) was obtained in Pusa Narangi Gainda followed by Pusa Basanti Gainda, whereas, it was observed lowest in farmer's practice. The highest extension gap (46.80 q/ha) and lesser technology gap (27.25 q/ha) and technology index (9.12%) were also calculated in Pusa Narangi Gainda. Higher average net return (Rs. 331675/ha and 303085/ha) was obtained in the demonstration plots of Pusa Narangi Gainda and Pusa Basanti Gainda compared to farmers' practice plot (Rs 263775/ha). The average B:C ratio was calculated 5.29 and 4.92 in demonstrated plots compared to 4.52 in farmer's plot.

Key words : *Cultivation; Demonstrations; Economics; Marigold; Pusa Basanti; Pusa Narangi; Yield.*

Floriculture has emerged as a viable agribusiness by improving the productivity of land, generating vast employment opportunities from grower's field to retailer's shop and ultimately improving economic status of the farmers and entrepreneurs. Commercial floriculture has increased its credibility for diversification in agriculture as well as potential foreign-exchange earner in India. Recently flower petals of marigold are used as poultry feed in order to improve the colour of egg yolk as well as broiler's skin. Lutein, which is the major constituent of xanthophyll, is used for colouring foodstuffs (*Singh, 2006*). The essential oil present in different species of *Tagetes* can find a use in the perfume industry. Marigold cultivation controls the nematode population in soil and is used for making mosquito repellent products (*Gupta et al., 2001*).

The commercial cultivation of marigold can be a good source of income and employment to marginal as well as large farmers as this crop fetches more price per unit area as compared to cereals. The farmers of district were growing traditional crops and getting a meager income from the agriculture. To motivate the farmers towards diversification and bring floriculture as a subsidiary source of income in addition to their already adopted farming. Farmers are growing the local varieties without knowing the yield potential and quality. Till date the productivity level of marigold is not sufficient on account of several causes like unavailability of quality seeds of improved varieties in time and poor crop management practices due to unawareness and non-adoption of recommended production and plant protection technologies. Therefore, it is very essential to demonstrate the high yielding varieties, resistant to biotic and abiotic stresses and other production technologies which the farmers generally do not adopt. Keeping above points in view front line demonstrations were conducted on marigold crop by Krishi Vigyan Kendra, Fatehpur-Shekhawati. The main objectives of the study were to exhibit the

performance of recommended high yielding marigold varieties with full recommended package of practices for getting higher crop yields.

METHODOLOGY

The present study was carried out by Krishi Vigyan Kendra, Fatehpur-Shekhawati, Sikar (SKN Agriculture University, Jobner-Jaipur) during the rabi season of 2021-22 in the farmer's field of two adopted village *viz*., (Shyampura and Purohit ka Bas) of Sikar district through front line demonstration. Total 10 demonstrations in 2.0 hectare area were conducted at 10 farmer's field. All the demonstrations were conducted by the active participation of farmers with the objective to demonstrate the improved technologies of marigold production in adopted villages. In demonstration plots, a few critical inputs in the form of quality seedling of improved varieties (Pusa Narangi and Pusa Basanti Gainda), seed treatment with tricoderma, line sowing, raised nursery bed, weed control technique, recommended dose of fertilizer, etc. were emphasized (Table 1). In case of farmer's practices, existing practices used by farmers were followed. The soil in the demonstration areas was sandy loam in texture with pH ranges 7.8 to 8.3. One month old, healthy, vigorous and uniform seedlings were selected and transplanted in demonstration plots during September at a spacing of 40 × 40 cm. Before conducting the demonstrations, training to the framers of respective villages was imparted with respect to envisaged technology interventions, site selection, farmer's selection, layout of demonstration, and farmer's participation etc were followed. The data of growth, flower attributes, yield, production cost and returns were collected by KVK scientists with frequent field visits during crop period from demonstration fields and farmers practice (FP) fields (control). Collected data were statistically analyzed as per method suggested by *Sheoran et al., (1998*). Extension gap, technology gap, and technology index were calculated as given by (*Singh and Sharma, 2017*).

$$\% \text{ increase in yield} = \frac{\text{Demo. yield} - \text{FP yield}}{\text{FP yield}} \times 100$$

$$\text{Tech. index} = \frac{\text{Potential yield} - \text{Demo. yield}}{\text{Potential yield}} \times 100$$

Technology gap = Potential yield – Demo. yield

Extension gap = Demo. yield – Farmers practice yield

RESULTS AND DISCUSSION

Growth and yield attributing traits : The analysis of variance of data showed significant difference among the treatments. The findings of impact of front-line demonstrations on growth and yield of marigold are presented in Table 2. It is evident from the study that, the highest plant height (90.26 cm), plant spread (12.38 cm) primary branches/plant (12.38), number of flowers/plant (54.00), flower diameter (5.88 cm) and flower yield (272.65 q/ha) were recorded in Pusa Narangi Gainda followed by Pusa Basanti Gainda (85.76 cm), (11.55 cm), (13.50), (51.40), (5.55 cm) and (253.59 q/ha), respectively. Whereas, it was observed lowest in farmer's practice. The results indicated that the front-line demonstration gave good impact over the farming community of Sikar district as they were motivated by new agricultural technologies applied in the FLD plots. The higher average marigold yield in demonstration plots compared to farmer's field

Table 1. Details of marigold growing under demonstrations and existing practices

Operations	Existing practices	Improve practice demonstrated
Variety	Use of local/own seeds	Pusa Narangi Gainda and Pusa Basanti Gainda
Seed treatment	No seed treatment	Seed treatment with tricoderma @ 5g/kg seed
Nursery Rising	Flat bed or direct seed sowing	Raised nursery bed
Method of seed sowing in nursery	Broadcasting	Line sowing
Pinching	No pinching	Thirty days after planting
Fertilizer application	Imbalanced application of fertilizer FYM-10 t/ha, N:P:K @ 70:40:00 kg/ ha	Application of recommended dose of fertilizer FYM-30 t/ha N:P:K @ 125:50:120 kg/ ha
Weed management	Hand weeding	Atrazine 500 g a.i., ha at 1-2 DAS & hand weeding 30 DAS
Sucking pest management	Non-adoption of IPM practices	Adoption of Integrated pest and disease management as recommended in PoP

was due to superior varietal characters of improved varieties and integrated crop management practices. These results are in line with the findings of *Singh et. al., (2020), Choudhary, et. al., (2014)* and *Kachari and Mahanta (2020)* in marigold.

Gap analysis : Yield of the front-line demonstration plots and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology index (Table 3). Highest technology gap (74.15 q/ha) was observed in farmer's practices. This could be due to the lack of awareness about the improved crop management practices of marigold. The technology gap observed might be attributing to the dissimilarity in soil fertility status and weather conditions. Therefore, variety wise location specific recommendation appears to be necessary to minimize the technology gap for yield level in different situations. The highest extension gap was found in Pusa Narangi Gainda (46.80 q/ha) followed by Pusa Basanti Gainda (27.74 q/ha), which emphasized the need to educate the farmers through various means for the adoption of improved high yielding varieties and improved agro technologies to reverse this trend of wide extension gap. More and more use of new high yielding varieties by the farmers will subsequently change this alarming trend of galloping extension gap. The lower the value of technology index more is the feasibility. The technology index showed the feasibility of the evolved technology at the farmer's fields. The ratio between technology gap and potential yield expressed as percentage is technology index. The technology index was lowest in the Pusa Narangi Gainda (9.12). This has arisen as a result of technology gap. With adoption of improved practices, the technology gap can be reduced as a result technology index will be reduced. Similar results were also reported by *Singh et. al., (2020)* in marigold, *Choudhary et. al. (2020)* in Kharif onion.

Economics : Economic parameters are presented in Table 4. The inputs and outputs prices of commodities prevailed during the study of demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit: cost ratio. Economic evaluation in terms of gross expenditure, gross returns; net returns and BC ratio clearly revealed that the net returns from the recommended practice were substantially higher than control *i.e.*, farmers practice. Higher net returns (Rs. 331675/ha and 303085/ha) were obtained in the demonstration plots of Pusa Narangi Gainda and Pusa Basanti Gainda, respectively compared to farmers' practice plot (Rs 263775/ha). Higher cost of cultivation under recommended practice was attributable to higher seed cost of improved marigold varieties. The average B: C ratio was calculated 5.29 and 4.92 in demonstrated plots compared to 4.52 in farmer's plot. The cost of cultivation under recommended practice was recorded Rs. 773000 while, it was Rs. 75000 under farmer's practice. Thus, favorable cost benefit ratio and higher net returns proved the economic viability of the intervention

Table 2. Performance of marigold under front line demonstration and farmers practices

Name of technology	Plant height (cm)	Plant spread (cm)	No. of primary branches/ plant	No. of flowers/ plant	No. of days taken to first flower	Flower diameter (cm)	Flower yield (q/ha.)
T_1-Farmers practices	83.80	9.95	11.30	40.70	45.80	5.09	225.85
T_2-Pusa Narangi Gainda	90.26	12.38	14.40	54.00	43.80	5.88	272.65
T_3-Pusa Basanti Gainda	85.76	11.55	13.50	51.40	41.60	5.55	253.59
S.Em±	1.45	0.39	0.62	1.82	1.03	0.07	5.11
C.D. at 5%	4.35	1.18	1.85	5.44	3.09	0.22	15.31

Table 3. Yield performance, technology gap, extension gap and technology index of marigold under farmer's practices & front-line demonstration

Name of technology	Potential yield	Flower Yield (q/ha.)	% Increased in yield over farmers' practice	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index (%)
T_1-Farmers practices	300	225.85	-	74.15	-	-
T_2-Pusa Narangi Gainda	300	272.65	20.72	27.35	46.80	9.12
T_3-Pusa Basanti Gainda	300	253.59	12.28	46.41	27.74	15.47

Table 4. Economics of marigold under front line demonstration

Name of technology	Gross cost (Rs/ha)	Gross return (Rs/ha)	Net returns (Rs./ha)	Additional net return	BCR
T_1-Farmers practices	75000	338775	263775	-	4.52
T_2-Pusa Narangi Gainda	77300	408975	331675	67900	5.29
T_3-Pusa Basanti Gainda	77300	380385	303085	39310	4.92

made under recommended practice and convinced the farmers on the utility of intervention technology provided at real farming situation. Similar findings were reported by *Mishra et.al. (2018), Mehta (2022), Kaur, et al. (2018)* in marigold in green gram.

CONCLUSION

The results clearly indicated that the higher average yield was obtained in demonstration practice plots over the years compared to farmer's practice due to high knowledge and adoption of full package of practices *i.e*., use of improved variety seed, application of recommended dose of fertilizers, timely application of plant protection chemicals. Front line demonstration program was effective in changing attitude of farmers towards flower cultivation. Cultivation of demonstrated plots of marigold with improved technologies has increased the skill and knowledge of the farmers. The FLD produced a significant positive result and provided an opportunity to demonstrate the productivity potential and profitability of the latest technology (intervention) under real farming situation. FLD also helped in replacement of local un-recommended varieties with improved recommended varieties. This also improved the relationship between farmers and scientists and built confidence between them. The farmers' where improved technology was demonstrated also acted as primary source of information for other farmers on the improved practices of marigold cultivation. Therefore, the study concludes that FLDs conducted by KVK, Sikar in marigold crop made significant impact on horizontal spread of the technology.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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