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Role of technology adoption on summer marigold (Variety-Seracole) production through front line demonstration in the Nagaon district of Assam

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Abstract

A field trial was conducted with African marigold variety Seracole during 2nd week of March, 2019–20 and 2020–21 as summer planting in Matikhola, Lokhonabondha and Bengennati villages of Nagaon district of Assam with the objective of popularizing summer marigold (variety - Seracole) among the farmers through a Front Line Demonstration (FLD). Front Line Demonstration is an appropriate tool to demonstrate recommended technologies among the farmers under the close supervision of scientist. October planted winter marigolds were grown as control. The data were collected on growth and yield parameters and economic indicators. The results showed that the winter marigold had an average flower weight of 6.73 gm, shelf life of 12.53 days and the yield was 234.20 q ha^{-1} which was closely followed by summer marigold with average flower weight of 5.82 gm, shelf life of 11.15 days and the yield was 199.92 q ha^{-1} respectively with good compact flowering. It is obvious from the study that variety Seracole have good economic potential so farmers may grow both as summer and winter varieties. However, summer marigold gave higher profit compared to winter marigold as it fetched best market price due to summertime scarcity and increased market demand. During the two years of study, summer marigold proved to be more advantageous than winter planting in terms of both B.C. ratio 4.34 and high net return Rs.538317.00 ha^{-1}.

Keywords: Adoption, B.C. ratio, frontline demonstration, summer marigold

1. Introduction

Marigold scientifically known as *Tagetes erecta* L. is a vivid and versatile flower that is frequently appreciated for its endurance beauty and various symbolic meanings. Marigolds are utilized in religious rituals, celebratory decorations, and even culinary endeavors because of their characteristic golden-orange hues. These cheerful blooms come in different varieties and are one of the most important commercially grown flowering plants in the world and in India as well responsible for more than half of the national production of loose flower. This is a native of Central and South America, especially Mexico, from where it spread to different parts of the world during the early 16th century but marigold has been adapted so well to Indian conditions (Gawle *et al*., 2012) [5]. It comprises 33 species of strongly scented annual and perennial herbs. Mostly cultivated types of marigold include African marigold (*Tagetes erecta* L., 2n = 24) and French marigold (*Tagetes patula* L., 2n = 48). Marigold is in great demand as loose flower throughout the year. Easy cultivation, hardy nature and wider adaptability of the crop have increased its popularity (Gulia *et al*., 2017) [7]. It is one of the important commercial flower crop grown worldwide and is being utilized in traditional medicine as well as for ornamental purpose (Singh *et al*., 2014) [15]. The adoption of IPM technology in tomato using African marigold as a trap crop with ratio 1:16 rows of tomato is effective to reduce the menace of fruit borer (Gajanana *et al*., 2006) [4]. Marigold extract has been used commercially as an additive to poultry to increase the yellow colour of egg yolk (Balnave and Bird, 1996) [2]. Marigold is one of the richest sources of natural carotenoids. African Marigold (*Tagetes erecta* Linn.) and French Marigold (*Tagetes patula* Linn.) are mainly grown in the winter season. But this crop can be grown as either a perennial or as an annual outside of the winter season, which usually gives a good economic return. Marigold cv Seracole is a day neutral plant with the potential to produce compact, medium-sized, orange- red flowers having a long shelf life. The variety Seracole exhibited maximum for quantitative traits with respect to vegetative, floral, self life, loose flower life and yield characters under agroclimatic condition of Assam. The var. Seracole also exhibited highest carotenoid content 290.50 µg g^{-1} (Mahanta *et al*., 2020) [9]. The plant has the capacity to produce flowers all year round, but it does not produce any during the summer or the kharif season, despite the fact that there is an equivalent need for flowers throughout several festivals, including marriages (Maharana *et al*., 2016) [8]. Flowers are purchased from adjacent states throughout festival and wedding season in order to fulfil the constantly rising demand. In general, farmers in Nagaon District grow rice and legumes to earn a living. In order to motivate farmers to diversify and to offer floriculture as an

additional source of income beyond already established agriculture, marigold cultivation can be an important area of diversification. Growing marigolds outside of the winter season can be a good source of income and employment for both large and small farmers as this crop fetches a higher unit price than rice and legumes. Therefore, this demonstration was undertaken in the farmer's field with an objective to disseminate Summer Marigold var Seracole and its production technology in the operational area of KVK Nagaon, Assam.

2. Materials and Methods

The study was conducted using observation data and field data on a farmer's field during the Summer 2nd week of March, and winter season (October) in Matikhola (Hojai) and Lokhonabondha (Koliabor) villages in Nagaon District during the cropping year 2019–20 to 2020–21 in the operational area of the KVK Nagaon carried out to convince farmers of the potential of this Seracole marigold which can be planted in the summer season and whose yields can fetch more income in the off-season. Well rooted terminal cuttings with uniform growth and vigour having 3–4 leaf were transplanted into 3×2 m^2 plots spaced at 45x45 cm^2 apart in the second week of March 2019 to 2021. A light rinse was applied after the transplant. At the time of planting a uniform dose of FYM 5 kg m^{-2} and the recommended fertilizer rate N:P:K @ 10:10:10 gm^{-2} was applied. The transplanted seedlings were pinched 45 days after transplanting to encourage vegetative growth. Well matured and fully opened flowers were harvested at weekly intervals and various growth and flowering parameters were recorded by using standard methods. The mean yield data was recorded to assess the effect of FLD intervention marigold yield. Marigold cultivation during the winter season was considered as a control plot in the demonstration cluster. In addition field days and group meetings were organized to provide other farmers the opportunity to experience the benefits of the technologies being demonstrated. The data output were collected from both demonstration and control plots and cultivation costs, net income, and cost-effectiveness ratios were also worked out (Samui *et al*., 2000) [13] reported by (Aklade *et al*., 2018) [1].

Table 1: Growth parameters of frontline demonstration on marigold cv Seracole

Year	Plant height (cm)		Primary branches plant^{-1}		Secondary branches plant^{-1}		Days to flower bud emergence		No of flowers plant^{-1}	
	Summer planting	Winter planting	Summer planting	Winter planting	Summer planting	Winter planting	Summer planting	Winter planting	Summer planting	Winter planting
2019 - 2020	59.43	58.66	3.87	5.36	14.36	18.23	45.24	46.79	123.69	132.25
2020 - 2021	57.65	63.40	3.63	5.64	13.62	20.67	44.80	49.27	126.52	128.43
Average	58.54	61.03	3.75	5.5	13.99	19.45	45.02	48.03	125.12	130.34

Table 2: Yield parameters of frontline demonstration on marigold cv Seracole

Year	Flower diameter (cm)		Individual flower weight (g)		Shelf Life (days)		Yield plant^{-1} (kg)		Yield Plot^{-1} (kg)	
	Summer planting	Winter planting	Summer planting	Winter planting	Summer planting	Winter planting	Summer planting	Winter planting	Summer planting	Winter planting
2019 - 2020	4.89	5.62	5.74	6.64	11.45	12.72	0.72	0.88	12.56	14.35
2020 - 2021	5.48	5.47.	5.90	6.82	10.86	12.35	0.74	0.83	11.74	13.76
Average	5.20	5.54	5.82	6.73	11.15	12.53	0.73	0.86	12.15	14.06

Table 3: Yield performance and economic indicators of frontline demonstration on marigold cv. Seracole

Year	Avg. yield (q ha^{-1})		% increase	Gross Return (Rs ha^{-1})		Net Return (Rs ha^{-1})		B:C Ratio	
	Summer planting	Winter planting		Summer planting	Winter planting	Summer planting	Winter planting	Summer planting	Winter planting
2019 - 2020	204.25	239.07	14.56	714875	478140	554635	332612	4.46	3.28
2020 - 2021	195.58	229.24	14.68	684530	458480	521999	313760	4.21	3.16
Average	199.92	234.20	14.62	699702	468310	538317	323186	4.34	3.22

3. Results and Discussion

The results obtained from the present study have been discussed under the following heads:

3.1. Vegetative parameters

The results revealed that there was a significant difference between the summer and winter planting of marigold cv Seracole in relation to plant height. The average of 2-year data showed that the maximum plant height (61.03 cm) was found in October planting followed by 58.54 cm in the summer planting. As for the branching of marigold cv. Seracole showed primary and secondary branch counts (5.5, 19.45) when planted in October closely followed by summer planting with primary and secondary branch counts of 3.75, 13.99 respectively with compact flowering in both the seasons. This may be due to the time of planting which significantly affects the height of the plants and the number of primary - secondary branches. These results are in conformity with the findings of Ghosh and Pal, 2008 [6].

3.2. Reproductive parameters

Marigolds planted in summer showed early flower bud emergence at 45.02 DAT, followed by October planting at 48.03 DAT.

3.2.1 Flower diameter and Individual flower weight

Marigold plants planted in October recorded significantly more weight of flowers plot^{-1} (6.73 g) and number of flowers (130.34) and diameter of flowers (5.54 cm) while weight (5.82 g), number (125.12) and diameter of flowers (5.20 cm) plant^{-1} was recorded during planting in summer. The same was reported by Mohanty *et al*., 2015 [11] and Sharma *et al*., 2023 [14] for African marigold when planted in November recorded more weight of flowers plot^{-1} and maximum number of flowers ha^{-1} compared to other planting dates. Meena *et al*. (2015) [10] also observed the maximum number of flowers plant^{-1} when planting in October compared to September and November planting which is due to the better environmental conditions and more number of branches plant^{-1}.

The differences in weight of flower might be due to the variation in size, diameter, length and number of petals of the flower. This might be due to the good plants vigour and optimum temperature prevailing during the growing season to advantageously produce bigger size flowers with more flower weights. The results are in close agreement with the findings of Narsude *et al*. (2010) [12], Deepa *et al*. (2016) [3] in marigold.

Days to flower bud emergence is earliest in summer planting compared to winter planting. This is in conformity with the findings of Singh *et al*. (2015) [16].

3.2.2 Flower yield

Flower yield data recorded showed that the maximum yield (0.86 kg) plant^{-1}, 14.06 kg plot^{-1} and 234.20 q ha^{-1} was obtained during winter planting as observed in this study compared to summer planting of (0.730 kg plant^{-1}, 12.51 kg plot^{-1} and (199.92 q ha^{-1}).

3.3 Economics and B.C ratio

The prices of inputs and products prevailed during demo year took into account for calculation of cultivation costs, net returns and cost-benefit ratio. Economic analysis of yield showed that summer marigold had higher net return of Rs. 538317/- ha^{-1} compared to winter marigold Rs. 323186/- ha^{-1}. The higher B:C ratio of 4.34 was recorded in the summer planting compared to the October planting of 3.22 due to high market demand as marigold is rare in the market which fetch better price during the summer season.

4. Conclusion

From this it can be concluded that the marigold cv Seracole can be cultivated both in summer and winter season. But when grown in summer it fetches a higher price due to market demand which can double the farmer's income by adopting this technology. Farmers should be encouraged to adopt the recommended production technologies in order to get the maximum benefit of production from the considerable areas. This would sustainably increase the incomes and livelihoods of the farmers in the Central Brahmaputra Valley Zone.

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