



TRAP CROP OF AFRICAN MARIGOLD (*TAGETES ERECTA*) FOR ENHANCING RURAL HOUSEHOLD INCOME AND INSECT CONTROL IN TOMATO THROUGH FARMERS PARTICIPATORY APPROACH

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Abstract

On farm trials on cultivation of marigold on field bunds of tomato crop for additional income as well as component of insect pest management as trap crop indicates that the farmers could generate additional income of Rs. 63780/ha alongwith main crop. Yield advantage of 50%, 221% and 200% were recorded with the improved varieties of marigold viz. Namdhari, Orange 900 and Pusanarangi in comparison to local or deshi varieties during the year 2012-13, 2013-14 and 2014-15, respectively. Trap cropping of marigold with tomato also found effective in controlling fruit borer, *Helicoverpa armigera* (Hubner) infestation with increased population of coccinellid predators.

Key words : African marigold, tomato, additional income, benefit cost ratio, on farm trial.

Introduction

Mankind historical interest in gardening and culturing flowers to satisfy aesthetic need is evident from all civilizations. But, in the present world, flower becomes important not only for its aesthetic social values, but also for its economic contribution (Aditya, 1992; Dadlani, 2003). People usually use flowers in all their ceremonies like wedding, birthday, and marriage day greetings, religious offerings and sometimes in social, political and historical occasions. The demand for flowers is increasing tremendously with the changing scenario of progressive economy, changing life style and changes in social values of people of the country. Marigold, a member of the family Astereaceae, is a potential commercial flower that is gaining popularity on account of its easy culture, wide adaptability and short term lucrative return and increasing demand in the subcontinent. Flowers are sold in the market as loose or making in the form of garlands and extensively used in religious and social functions. Marigold plants also having insect - pest repellent characteristic thus its use as a trap crop is getting popularity among the farmers. Maximum egg laying by the fruit borer of tomato is observed on marigold flowers, from where larval movement is insignificant (Srinivasan *et al.*, 1993; Dhandapani *et al.*, 2003; Tamoghna *et al.*, 2014). Hence, the present study were undertaken in order to harness

the benefit of the marigold plant as insect repellent as well as generating additional income from the bunds of vegetable crops *i.e.* tomato remain barren or unutilized.

Materials and Methods

On farm trails were conducted during the *kharif* season of the year 2012-13, 2013-14 and 2014-15 at 22 farmer's fields of Sagar district of Madhya Pradesh. The trials consisted of tomato as main crop and improved varieties of marigold viz. Namdhari, Orange 900 and Pusanarangi which were planted around the bunds during the year 2012-13, 2013-14 and 2014-15 respectively as trap crop for extra income as well as insect control. The marigold plants were planted on the bunds around and in between the main field of tomato crop. However in case of improved varieties seeds were treated with Carboxin 37.5% + Thiram 37.5 (Vitavax power) prior to planting and recommended fertilizers dose of Nitrogen, phosphorus and potash (NPK) 120:80:80 kg/ha were applied.

The marigold plants were grown till maturity and the yield of flowers were recorded from October to February. The observations were made on fruit borer incidence per plants in randomly selected 100 plants from flowering to harvest of tomato as well as population of predators *i.e.* coccinellid. Finally, the yield was recorded and data was subjected to statistical analysis to know the

Table 1 : Details of on farm trails and yield of Marigold.

Technology details		Year	No. of trails	Yield/plot (320 plants in 1000 sq met)		Yield (q/ha)		Increase in yield (%)	Population of <i>Helicoverpa armigera</i> per plant	
				T ₁	T ₂	T ₁	T ₂		T ₁	T ₂
Improved technology (T ₁)	Farmers practice (T ₂)									
Improved variety-Namdhari + seed treatment with carbendazim+ fertilizer (NPK 120: 80: 80)	Local marigold variety	2012-13	05	7.3 q	3.65 q	73	36	50.6	0.5	1.1
Improved variety - Orange 900 + Seed treatment with Vitavax power + fertilizer (NPK 120: 80: 80)	Local marigold variety	2013-14	07	8.4 q	2.62 q	84	26	69.0	0.7	0.8
Improved variety - Pusanarangi+seed treatment with Vitavax power + fertilizer (NPK 120: 80: 80)	Local marigold variety	2014-15	10	7.79 q	2.60 q	78	26	66.6	0.6	0.9
Average/total			22	7.83	2.95	78	29		0.6	0.9

Table 2 : Cost of Marigold cultivation on bunds, net return and BC ratio of the technology.

Year	Av. cost of input (Rs.)		Sale price (Rs./kg)		Gross income (Rs.)		Net income (Rs.)		BC ratio	
	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
2012-13	4340	2450	8.00	6.00	58400	21900	54060	19450	13.45	8.93
2013-14	4870	2700	10.00	8.00	84000	20960	79130	18260	17.24	7.76
2014-15	4170	2950	8.00	8.00	62320	20800	58150	17850	14.94	7.05
Average	4460	2700	8.66	7.33	68240	21220	63780	18520	15.20	7.8

effectiveness of marigold as trap crop. The economics of the technology was also calculated after harvest of the crop. The benefit cost (B:C) ratio was calculated based on gross return. The following formulae were used to calculate the parameters as suggested by Tomar *et al.* (2009):

1. Increase in Yield = Yield from treatment – Grain from FP plot / Yield from treatment plot × 100

2. Net Return = Gross Return – Cost of cultivation

3. Benefit / Cost Ratio = Gross Return / Cost of Cultivation × 100

Results and Discussion

Marigold cultivation on the bunds around the main crop (tomato, in this case) and subsequently generate additional income for rural household presented in tables 1 and 2. It is evident that, the performance of improved marigold varieties was better as compared to the local variety in all the years. The yield of marigold flowers obtained for the local and improved varieties were 73 q

and 36.5 q; 84.0 q and 26.0 q; 78.0 q and 26.0 q per ha during the year 2012-13, 2013-14 and 2014-15, respectively. The improved technology given 50.6 and 69.0 and 66.6 per cent increase in yield of marigold in comparison to farmers practice. A yield advantage of 50%, 221% and 200% were recorded for the improved varieties viz. Namdhari, Orange 900 and Pusanarangi during the year 2012-13, 2013-14 and 2014-15 respectively as also reported by Aditya (1992). In tomato crop, fruit borer population was found below ETL due to trap crop of marigold. Monitoring should also be done on top three leaves. Maximum egg laying by the fruit borer is observed on marigold flowers. These flowers were collected and destroyed. The larval population in improved technology was 0.6 per plant and 0.9 per plant in local check. He results are in accordance with Srinivasan *et al.* (1993) and Dhandapani *et al.* (2003), they found a row of marigold *Tagett us* spp. after every 14 rows of tomato is very effective for control of fruit borer. The average cost of marigold cultivation as trap crop with tomato were 4460 and 2700 in improved and farmers practice which

given better net return of Rs. 63780/ha in case of improved varieties as compared to Rs. 18250/ha local check in the trials. The benefit cost ration was found 15.20 and 7.8 in improved and farmers practice. Jambhulkar *et al.* (2012) also reported maximum return from intercropping of tomato with marigold alongwith *alternaria* leaf spot disease control.

The result of on farm trails indicated that the farmers could generate additional income of Rs. 47260/ha from adoption of improved cultivation practices of marigold on field bunds of tomato crop. Jambhulkar *et al.* (2012) also reported the intercrop of marigold in tomato given addition monetary gain as well as fruit borer management. The trap crop of marigold also reduced the incidence of fruit borer and also increased the population of predators *i.e.* coccinellid.

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