



## Role of cropping pattern for the management of insect pests of Safflower, *Carthamus tinctorius* L.

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### Abstract

Safflower, *Carthamus tinctoriosus* is one of the important oil seed crops cultivated mainly under rainfed condition. The average yield of safflower is quite low due to several reasons, of which insect pests is one. Among the insect pests, the safflower aphid, *Uroleucon compositae* (Theobald) and capsule borer, *Helicoverpa armigera* (Hubner) are the major pests, which causes severe damage to safflower crop throughout the cropping season. To minimize the damage by these pests efforts have been made to conserve the predators like *Chrysoperla carnea* (Stephens) and coccinellids by manipulating the cropping pattern. Volatile compounds or plant odor believed to play a vital role in the orientation and conservation of various predators and parasitoids. Keeping this view in background, the study was undertaken to know the effect of coriander, *Coriander sativa* L. as mixed crop in safflower ecosystem at Agricultural Research Station Annigeri, India during 2006 Rabi season. The results showed that coriander sown as mixed crop with safflower @13 per cent recorded significantly higher number of *C. carnea* eggs (7.6 eggs/ plant) and coccinellids (1.4 grubs and adults/plant) on safflower crop and while lowest pest activity was noticed as compared to safflower as a sole crop. But, in other treatments where mixed cropping of coriander with safflower @ 10 and 7 per cent were next best in recording higher predatory population and lower pest density compared to rest of the treatments including safflower as a sole crop.

**Key words:** *Carthamus tinctorius* - *Uroleucon compositae* - *Helicoverpa armigera* - *Chrysoperla carnea* - mixed cropping – coccinellids - coriander

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### Introduction

In India, safflower (*Carthamus tinctorius* L.) is under cultivation for centuries for its orange red and yellow dye (Carthamine) extracted from petals and for its oil, rich in poly unsaturated fatty acids, which are considered to reduce blood cholesterol and is heart friendly. The safflower aphid, *Uroleucon compositae*, capsule borer, *Helicoverpa armigera* (Hub.) and leaf eating caterpillar, *Pergae capensis* considered as major pests which causes severe damage to safflower crop and reduces yield by up to 35-80 per cent. Since, it is a poor man's crop we have to look forward for the management of insect pest of safflower by manipulating the crop ecosystem. With this background to minimize the damage by the pests, the efforts have been made to conserve the predators, *Chrysoperla carnea* (Stephens) and coccinellids during the vegetative and reproductive stage of the crop growth. Plant odour is believed to play a very important role in the orientation of various predators, particularly those belonging to the order Neuroptera and Coleoptera. In the present study, coriander, which has very strong odour, was mixed in different proportions with the main crop to conserve the predators like *Chrysoperla* and coccinellids in safflower crop.

### Materials and Method

The experiment was carried out at Agricultural Research station, Annigeri, Karnataka, during rabi, 2006-07. Coriander (local variety) at 13,10,7 and 5 per cent seeds on volume basis were mixed with A1 cultivar of safflower and sowing was taken up on 10-10-2007. There were five treatments replicated thrice in randomized block design. The treatments comprised,



- T1-Coriander mixed @13.0 % on volume basis with A1 variety of safflower
- T2- Coriander mixed @10.0 % on volume basis with A1 variety of safflower
- T3-Coriander mixed @7.0% on volume basis with A1 variety of safflower
- T4-Coriander mixed @5.0 % on volume basis with A1 variety of safflower
- T5-Safflower as a sole crop

The distance from row to row was maintained at 60 cm as per recommended package of practice of UAS, Dharwad. Fertilizer application and all other recommended agronomical practices were followed. During the crop growth period / experimentation, we have not given any insecticide spray.

Finally, the number of capsules bored by *Helicoverpa armigera* on five-selected plants in each treatment,, number of aphids / 5 cm apical twig and number of predators/ plant on safflower were observed from each replication at pre-flowering stage of the crop. Finally yield of each plot was recorded separately and was extrapolated to hectare. The data thus obtained was subjected to statistical analysis.

## Result and Discussion

Growing of coriander as mix crop with safflower recorded significantly lowest aphid population compared to sole safflower crop (52.8 aphids/ 5 cm twig). Among the different treatments, mixing of coriander with safflower @ 13 and 10 per cent was significantly superior, and recorded 42.0 and 42.2 aphids per 5 cm twig, respectively. *Helicoverpa armiger* damage on capsule was significantly lower i.e., 16.0 and 16.8 per cent in 13 and 10 per cent coriander mixed safflower plots, respectively. The aphid and per cent capsule damage in safflower as sole crop treatment was on par with 5 per cent coriander mixed safflower plots. Population of predators viz., *Chrysoperla cornea* and coccinellids was significantly higher in all the coriander mixed safflower plots compared to sole safflower plots. However, coriander sown @ 13 and 10 per cent of safflower was significantly superior with 7.6 and 7.2 number of *chrysoperla* and 1.40 and 1.20 number of coccinellids per plant, respectively. Treatments, coriander @ 13 and 10 per cent were statistically at par with other treatments viz., 7 and 5 per cent coriander mixed safflower treatments with respect to the number of *Chryosoperla* (Grub + Eggs) per plant being 6.80 and 6.00, respectively. Safflower as a sole crop recorded significantly less number of *C. carnea* and coccinellids per plant i.e., 4.8 and 0.8 number per plant, respectively, but it is on par with T4 (coriander within the row of Safflower @ 5 per cent) in recording lower *Chrysoperla* and coccinellids population 4.8 and 0.8, respectively. These findings are in confirmation with Pimbert and Shrivastava (1991) and Turkar *et al.* (2000) who reported higher parasitism in rows near coriander and coriander within the row of chickpea.

Significantly highest grain yield of 10.82, 10.46, 9.60 and 9.20 q/ha was recorded from plots sown with coriander within the row of safflower @ 13, 10, 7, and 5 per cent of total seed quantity, respectively. Safflower as a sole crop recorded significantly lowest yield of 8.6 q/ha than compared to any of the cropping pattern proportions. The results are contrary to Pimbert and Shrivastava (1991), who reported no significant difference in pod damage between chickpea sole crop and chickpea surrounded by coriander. But the present findings are in agreement with those obtained earlier by Yadav *et al.* (1989) and Prasad and Chand (1991) who reported significant reduction in pod damage when chickpea intercropped with linseed, mustard, wheat, barley and lentil as compared to chickpea sole crop. In the present study, coriander mixed with safflower seeds at different proportion given significantly lower pest population, conserved higher natural enemies (*Chrysoperla* and Coccinellids) and recorded highest grain yield of safflower when compared to safflower as a sole crop. This may be due to coriander pollen and nectar may attracted many natural enemies in the flowering stage of the coriander and later after harvest of the coriander all these natural enemies might have shifted to the main crop, safflower and brought down the pest incidence. The present study is also in agreement to the results of Hanumantharaya *et al.*, (2007) Turker *et al.* (2000). Who reported that coriander intercropped with chickpea at different row proportions recorded highest parasitization by *Compestris chloridea* Uchid on chickpea pod borer, *Helicoverpa armigera* than compared to chickpea as a sole crop.



Table 1: Population of pests and natural enemies on safflower crop as influenced by the coriander mixed cropped with safflower.

Tr.No.	Treatments	Mean Population of Aphid/5 cm apical twig	% Capsule damage	No. <i>Chrysoperla carnea</i> /plant	Coccinellids/ plant	Yield Q/ha
T1	Coriander mixed @13 % on volume basis with A1 variety of safflower	42.0	16.0 (23.58)	7.6	1.40	10.82
T2	Coriander mixed @10 % on volume basis with A1 variety of safflower	42.2	16.8 (24.20)	7.2	1.20	10.46
T3	Coriander mixed @7% on volume basis with A1 variety of safflower	48.4	18.0 (25.10)	6.8	1.10	9.60
T4	Coriander mixed @5 % on volume basis with A1 variety of safflower	50.2	20.0 (26.57)	6.0	1.00	9.20
T5	Safflower as a sole crop	52.8	20.60 (26.99)	4.8	0.80	8.60
	<b>CD</b>	4.2	2.62	1.80	0.20	0.92
	<b>SEM±</b>	1.40	0.87	0.60	0.07	0.31
	<b>CV</b>	11.24	8.20	6.80	7.60	10.20

Note: Figures in the parenthesis are angular transformed values.



## References

- Hanumantharaya, L., Naik,V.R.,Kubsad,V. and Raju,S.G., 2007, Survey of safflower pest and their natural enemies in northern parts of Karnataka.National Seminar on *Changing Global Vegetable Oils Scenario: Issues and Challenges Before India* held at DOR, Hyderabad,India, January 29-31, 174-176.
- Pimbert, M.P. and Shrivastava,C.P.,1991, Vegetation management and biological control of *Helicoverpa armigera* in chickpea. *CAB Chickpea and Pigeonpea*, **4** (4): 57-58
- Prasad, D. and Chand, P., 1991, Effect of intercropping on the incidence of *Helicoverpa armigera* (Hub.) and grain yield of chickpea. *CAB Chickpea and Pigeonpea*. **4** (3):43
- Turkar, K.S., Gupta R., Banerjee, S.K. and Wanjari, R.R., 2000, Influence of intercropping chickpea with coriander on parasitisation of *Helicoverpa armigera* (Hub.) by *Campoletis chlorideae* Uchida. *Journal of Entomological Research*, **24** (3) : 279-281.
- Yadav, C.P., Lal, S.S. and Sachan, J.N., 1989, Effect of mixed/ intercropping on gram pod borer damage chickpea. *National Symposium on Newfrontiers in Pulses Research and Development*, Nov.,10-12,ISPRD Directorate of Pulses Research,Kanpur,1989:96pp