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Diversity of arthropod fauna associated with marigold (*Tagetes erecta* L.) in Jammu

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Abstract

The studies revealed that marigold was attacked by several insect pests at different growth stages of the crop. Survey of insect pests, pollinators and natural enemies attacking marigold at different locations of Jammu division revealed the infestation of aphid (*Lipaphis erysimi*), thrips (*Thrips tabaci*), red spider mite (*Tetranychus urticae*), pod borer (*Helicoverpa armigera*), leaf miner (*Liriomyza sativae*), mealy bug (*Drosicha spp.*), hadda beetle (*Epilachna vigintioctopunctata*), lygus bug (*Lygus spp.*), green sting bug (*Nezara viridula*) and grasshopper (*Bycotophus longicepes*). Pollinator's viz. *Apis mellifera*, *A. dorsata*, *Pieris brassicae* and thistle butterfly (*Vanessa cardui*) were recorded visiting on *T. erecta*. Among the natural enemies, syrphid fly (*Syrphus spp.*), lady bird beetle (*Coccinella septempunctata*), spider (*Oxyopes javanus*) and big eyed bug (*Geocoris spp.*) were recorded.

Keywords: Survey, insect pests, pollinators, natural enemies, marigold

1. Introduction

Floriculture has been well defined as an area of horticulture concerned with the farming of flowers and ornamental plants for parks, gardens and floristry, which together consist of the floral industry^[8]. Floriculture being an important agri-business sector contributes widely to the Indian economy through opportunities in terms of employment, income generation earning foreign exchange and empowerment, thus raising the socio – economic status in both rural and urban areas^[12]. The Government of India has identified floriculture as a sunrise industry and accorded it 100 per cent export oriented status. Floriculture, an intensive branch of agriculture is becoming boon and boom for the farmer's involved in its production and trade related activities because of its ample demand in domestic as well as international market. Marigold (*Tagetes spp.*), one of the most popular flowering annuals, belonging to family asteracea, native to North and South America, is mainly grown for commercial purposes. There are more than 50 species of genus *Tegetes* and among all these, *Tegetes erecta* L. (African/American tall marigold) and *T. patula* L. (French/dwarf marigold) are popular and suitable for commercial cultivation^[1]. Marigold gained popularity amongst of its easy culture and wide adaptability. Its habit of free flowering, short duration to produce marketable flowers, wide spectrum of colour, shape, size and good keeping quality make marigold as acceptable commercial crop. Marigold had an important economic values, its cropping knew a continuous increase in the last years due to its usage in a more and more large area in the pharmaceuticals and cosmetic domain^[7]. In India, marigold is one of the most commonly grown cut flower and extensively used in religious and social occasions in the one form or other. In spite its uses are well known to decorate the marriage homes, restaurant, temples, receptions, farewells, birthday occasion, wedding ceremonies and various public and social events. Large scale intensive cultivation of marigold has destabilized the crop-pest equilibrium and invited a number of problems. Attack by insects, mites and other pests is one of the important bottlenecks for successful production of these crops. The attack by insects, mites and other pests increased manifold in the recent past. Various species of insect-pests viz. thrips, aphids, leaf hoppers, scale insects, mealy bugs, leaf miners, caterpillars, cut worms and chaffer beetles attack marigold^[3]. Moreover, some new pests are appearing to invade the crop mainly due to the recent climate change and shift in crop culture methods. Several workers have reported a number of pests infesting the crop from various parts of the country. Information on pests infesting a crop is an essential prerequisite for developing a suitable pest management strategy particularly in the context of ever changing pest scenario. Since, very little information is available on the pests of marigold from this region, the present study was proposed to investigate the pest infestation in marigold.

2. Materials and Methods

The present study was conducted at University Research Farm, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu. Surveys were conducted to marigold growing areas of Jammu region selected for the present investigation such as R. S. Pura, Bishnah and Akhnoor of Jammu district, Samba, Sumb and Vijaypur of Samba district and Hiranagar, Kathua and Chadwal of Kathua district during February to May, 2014 and 2015 to examine and record various insect pests at farmer's field infesting the marigold. Insect pests were also collected and preserved in a specimen bottle containing 70 % ethyl alcohol. These specimens were further sent for identification to IARI, New Delhi.

3. Results and Discussion

The data presented in Table 1 and 2 showed that insect pests, pollinators and natural enemies attacking marigold (*T. erecta*) at different locations of Jammu division which includes R. S. Pura, Bishnah and Akhnoor of Jammu district, Samba, Sumb and Vijaypur of Samba district and Hiranagar, Kathua and Chadwal of Kathua district where marigold is growing regularly for commercial purpose and seed production. The study revealed the presence of aphid (*Lipaphis erysimi* Kalt.), thrips (*Thrips tabaci* L.), red spider mite (*Tetranychus urticae* Koch), pod borer (*Helicoverpa armigera* Hub.), leaf miner (*Liriomyza sativae*), mealy bug (*Drosicha spp.*), hadda beetle (*Epilachna vigintioctopunctata* F.), lygus bug (*Lygus spp.*), green sting bug (*Nezara viridula* L.) and grasshopper (*Bycotophus longicepes*) during different years of observation. Aphid (*L. erysimi*), thrips (*T. tabaci*), red spider mite (*T. urticae*) and pod borer (*H. armigera*) were recorded from the surveyed areas during both years of study (2014 and 2015). The results are in agreement with that of Anonymous (2014) [3] who reported that marigold is attacked by insect-pests like thrips, aphids and mites. Aslam *et al.* (2000) [4] reported that Green stink bug (*N. viridula*), American bollworm (*H. armigera*) and grasshoppers are serious pests of sunflower (Kakakhel *et al.*, 2000) [9]. Taleb and Sardar (2008) [15] in a similar study reported tetranychid mites (*T. bioculatus*) as serious pest of marigold and is one of the major problems in successful production of many ornamental and

field crops. Pal and Sarkar (2009) [11] reported a number of aphid species viz. *Myzus persicae* on Carnation, gerbera and *Anthurium*; *Macrosiphoniella sanborni* on Chrysanthemum; *Aphis gossypii* on China rose. They further reported that *Taeniothrips simplex* and *H. armigera* was very much serious causing havoc to Carnation, Gerbera and Chrysanthemum during dry summer months. Coradini *et al.* (2012) [7] also reported that thrips, *T. tabaci* can cause serious damages in *Calendula* crop.

Pollinators visiting on *T. erecta* at different locations of Jammu comprises of italian bee (*Apis mellifera* L.), rock bee (*Apis dorsata* F.), cabbage butterfly (*Pieris brassicae* L.) and thistle butterfly (*Vanessa cardui* L.) were recorded from all the locations of surveyed areas during 2014 and 2015 except thistle butterfly (*V. cardui*). Comba *et al.* (1999) [6] observed that marigold (*T. patula*) were visited by *Apis mellifera*, three *B. lapidarius*, one *B. terrestris*, two solitary bees, two hoverflies (*Sphaerophoria scripta*), two 7-spot ladybirds (*C. septempunctata* L.), a moth and a small tortoiseshell butterfly [*Aglais urticae* (L.)]. Bista and Shivakoti (2001) [5] reported marigold as rich source of nectar and pollen for honeybee species. Shilpa *et al.* (2014) [14] in a similar study reported that blooming marigold is attracted by three species of honeybee viz. *A. cerana*, *A. florea* and *A. dorsata* besides four species from Anthophoridae and one each from Vespidae and Scolidae.

Among the natural enemies, syrphid fly (*Syrphus spp.*), lady bird beetle (*Coccinella septempunctata*), spider (*Oxyopes javanus*) and big eyed bug (*Geocoris spp.*) were observed from all the locations during both the years of the study. Lady bird beetle, coccinellids have significant importance as a biological control agent because of its extend to control many soft body insects pest especially the aphids on which its larvae as well as adult stages feeds vigorously Omkar and Srivastava, 2003 [10]; Sarmad *et al.*, 2015 [13]. In agro ecosystem, coccinellids have achieved great economic importance due to the effecient predation and effective control against many phytophagous insect pests (Agarwala and Bardhanroy, 1999) [2]. Once established in an ecosystem, the natural enemies are self sufficient, self regulating and self powered.

Table 1: Insect pests, pollinators and natural enemies of marigold (2014)

Common Name	Scientific Name	Family: Order	Jammu			Samba			Kathua		
			R.S. Pura	Bishnah	Akhnoor	Samba	Sumb	Vijaypur	Hiranagar	Kathua	Chadwal
PESTS											
Aphid	<i>Lipaphis erysimi</i>	Aphididae: Hemiptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Thrips	<i>Thrips tabaci</i>	Thripidae: Thysanoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Red spider mite	<i>Tetranychus urticae</i>	Tetranychidae: Trombidiformes	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pod borer	<i>Helicoverpa armigera</i>	Noctuidae: Lepidoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Leaf miner	<i>Liriomyza sativae</i>	Agromyzidae: Diptera	✓	X	✓	✓	X	X	✓	X	✓
Mealy bug	<i>Drosicha spp.</i>	Margarodidae: Hemiptera	X	✓	X	X	✓	✓	X	X	✓
Hadda Beetle	<i>Epilachna vigintioctopunctata</i>	Coccinellidae: Coleoptera	✓	✓	✓	✓	X	✓	X	X	✓
Lygus bug	<i>Lygus spp.</i>	Miridae: Hemiptera	X	X	✓	✓	X	X	X	X	X
Green sting bugs	<i>Nezara viridula</i>	Pentatomidae: Hemiptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Grasshopper	<i>Bycotophus longicepes</i>	Acrididae: Orthoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pollinators											
Italian bee	<i>Apis mellifera</i>	Apidae: Hymenoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rock bee	<i>Apis dorsata</i>		✓	✓	✓	✓	✓	✓	✓	✓	✓
Cabbage butterfly	<i>Pieris brassicae</i>	Pieridae: Lepidoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Thistle butterfly	<i>Vanessa cardui</i>	Nymphalidae: Lepidoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Natural Enemies											
Syrphid fly	<i>Syrphus spp.</i>	Syrphidae: Diptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lady bird beetle	<i>Coccinella septumpunctata</i>	Coccinellidae: Coleoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Spider	<i>Oxyopes javanus</i>	Oxyopidae: Araneae	✓	✓	✓	✓	✓	✓	✓	✓	✓
Big eyed bug	<i>Geocoris spp.</i>	Geocoridae: Hemiptera	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 2: Insect pests, pollinators and natural enemies of marigold (2015)

Common Name	Scientific Name	Family: Order	Jammu			Samba			Kathua		
			R.S. Pura	Bishnah	Akhnoor	Samba	Sumb	Vijaypur	Hiranagar	Kathua	Chadwal
PESTS											
Aphid	<i>Lipaphis erysimi</i>	Aphididae: Hemiptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Thrips	<i>Thrips tabaci</i>	Thripidae: Thysanoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Red spider mite	<i>Tetranychus urticae</i>	Tetranychidae: Trombidiformes	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pod borer	<i>Helicoverpa armigera</i>	Noctuidae: Lepidoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Leaf miner	<i>Liriomyza sativae</i>	Agromyzidae: Diptera	✓	X	✓	✓	X	X	✓	X	✓
Mealy bug	<i>Drosicha spp.</i>	Margarodidae: Hemiptera	X	✓	X	X	✓	✓	X	X	✓
Hadda Beetle	<i>Epilachna vigintioctopunctata</i>	Coccinellidae: Coleoptera	X	X	✓	✓	X	✓	✓	X	X
Lygus bug	<i>Lygus spp.</i>	Miridae: Hemiptera	X	✓	✓	✓	X	X	X	X	X
Green sting bugs	<i>Nezara viridula</i>	Pentatomidae: Hemiptera	✓	✓	✓	✓	✓	X	X	✓	✓
Grasshopper	<i>Bycotophus longicepes</i>	Acrididae: Orthoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pollinators											
Italian bee	<i>Apis mellifera</i>	Apidae: Hymenoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rock bee	<i>Apis dorsata</i>		✓	✓	✓	✓	✓	✓	✓	✓	✓
Cabbage butterfly	<i>Pieris brassicae</i>	Pieridae: Lepidoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Thistle butterfly	<i>Vanessa cardui</i>	Nymphalidae: Lepidoptera	X	✓	✓	✓	✓	X	X	✓	✓
Natural Enemies											
Syrphid fly	<i>Syrphus spp.</i>	Syrphidae: Diptera	✓	✓	X	✓	X	✓	✓	X	X
Lady bird beetle	<i>Coccinella septumpunctata</i>	Coccinellidae: Coleoptera	✓	✓	✓	✓	✓	✓	✓	✓	✓
Spider	<i>Oxyopes javanus</i>	Oxyopidae: Araneae	✓	✓	✓	✓	✓	✓	✓	✓	✓
Big eyed bug	<i>Geocoris spp.</i>	Geocoridae: Hemiptera	✓	X	X	X	X	✓	✓	X	X

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5. References

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