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Pest Scenario of Coriander (*Coriandrum sativum* L.) and Population Dynamics in Semi-arid Region of Rajasthan

N.K. Meena^{1*}, G. Lal¹, R.S. Meena¹, Harisha, C.B. and S.R. Meena¹

¹ICAR-National Research Centre on Seed Spices, Ajmer-305206, Rajasthan.

*Corresponding authors. E-mail: narottammeena@gmail.com

Abstract: In a field investigation on insect-pests scenario of coriander (*Coriandrum sativum* L.) in Rabi season crop were carried out in semi-arid region, stated that coriander crop received an infestation of fifteen pest species from different order and family. Three species of aphids (*Hyadaphis coriandri*, *Aphis gossypii* and *Myzus persicae*) and thrips (*Thrips tabaci*, *Scirtothrips dorsalis* and *Frankliniella schultzei*), one species each of seed wasp (*Systole albipennis*), seed bug (*Nysius* sp.), painted bug (*Bagrada hilaris*) and tobacco caterpillar (*Spodoptera litura*) were reported as a pests of major status. The insects like *Empoasca* sp., *Bemisia tabaci*, *Dysdercus koenigii*, *Nezara viridula*, *Agrotis* spp., *Helicoverpa armigera* and *Hellula undalis* were found as minor pests of coriander in the region. The population of aphids was maximum 137.5 aphids/plant or umbel, whereas remaining pests populations were found in ranged between 0.20 to 3.10 insects/plants or umbel.

Keywords: Insect-pests, *Coriandrum sativum*, population dynamics, semi-arid region.

INTRODUCTION

Coriander (*Coriandrum sativum* Linn.) is an annual herb (chromosome No. $2n = 22$) belongs to the family Apiaceae (Umbelliferae). Its origin is considered to be Europe to south western Asia and now it has been distributed to India, Morocco, Romania, France, Spain, Argentina, Italy, Egypt, Russia, Iran, Canada

and Australia. In India, coriander is a most important and valuable crop next to cumin among all seed spices. It is growing in 6.24 lakh hectare area, producing 5.73 lakh tonnes of seeds in 2015-16 (Anonymous, 2016) reflecting as largest producer, consumer and exporter country in the world. It is cultivated mainly as a winter season crop for seed production; however, in some part of Rajasthan,

Gujarat and north east region, it is growing in summer for leafy purpose. Coriander is primarily used for flavoring, seasoning and imparting aroma in variety of food items and beverages. Besides importance in food industry, it has several medicinal properties used in various pharmaceutical preparations and also in cosmetic industry (Malhotra and Vashishtha, 2008). The mature dry seeds are tan to brownish-yellow and have 6.3–8.0% moisture, 1.3% protein, 0.3–1.7% volatile oil, 19.6% non-volatile oil, 31.5% ether extract, 24.0% carbohydrates, 5.3% mineral matter and vitamin A 175 IU per 100 g (Peter, 2004). Green leaves of coriander contain 87.9% moisture, 3.3% protein, 0.6% fat, 6.5% carbohydrates and 1.7% mineral matter.

Due to above conspicuous elements contain in the coriander plants, it receives a number of insect-pests right from germination to harvesting of the crops. Aphids, *Hyadaphis coriandri* (Das), and *Aphis gossypii* Glover; thrips, *Thrips tabaci* Lindeman, *Scirtothrips dorsalis*, and *Frankliniella schultzei* Trybom; jassids, *Empoasca* sp., *Bemisia tabaci* (Gen.); seed midge, *Systole albipennis* Walker; fruit eating caterpillar, *Helicoverpa armigera* (Hub.), seed bug, *Nysius* sp. and other minor insects feed on crop and caused damage in different levels. The reported insect pests appear at different crop growth stages. In the absence of regular monitoring as well as suitable control measure on time, pests' population exceeded above injury level, resulting significant yield and quality loss both in leaves as well as seeds. Keeping these in view a field experiments were carried out to state the diversity of insect-pests and effective control in coriander in semi-arid region of Rajasthan.

MATERIAL AND METHODS

Field trials were conducted at experimental farm, ICAR-NRCSS, Ajmer (A semi-arid region of Rajasthan) during 2013-14 and 2014-15 to study the diversity of insect-pests on coriander crop in Rabi season. The experimental site is located at latitude

of 26° 27' 0" N and 74° 38' 0" E longitude having 460 meter msl altitude. The experimental location is surrounded by Aravalli hills, receives annual average rainfall 300-550 mm, temperature 2-5° Celsius in January and 42-45° Celsius in May-June and 60-80% relative humidity during the period of study.

Coriander variety ACr-1 was grown in well prepared and laid out field and recommended package of practices were applied for optimum growth of the plants. There was no plant protection measures applied for management of insect-pests on the crops. A regular field monitoring of insect pests were carried out to know the qualitative and quantitative pest status. The observations on insect pests of coriander were recorded at fortnightly intervals right from germination of the crop to disappearance of the pests. The population of aphid (scale: 01 aphid = 25), thrips, jassid and whiteflies were recorded on 5 randomly selected and tagged plants in a plot. In early growth period, the whole plant was taken as a single unit and later on observations were recorded on three umbels of every tagged plant. All the stages of nymphs and adults of these pests were taken in to account while counting. *Nysius* bug, painted bug and red cotton bug were counted per plant, whereas tobacco caterpillar, gram pod borer and cut worm were observed per plot during the study period.

RESULTS AND DISCUSSION

The data on insect-pests complex of coriander were recorded and presented in table 1, revealed that, there were fifteen insect species from different order and family were recorded on coriander crop in semi-arid region of Rajasthan during the study period. Among pest complex, three species of thrips (*Thrips tabaci*, *Frankliniella schultzei* and *Caliothrips indicus*) and jassids (*Empoasca* sp.) were noticed on the crop at 15 days and 30 days after germination. Aphid species *Aphis gossypii*, *Hyadaphis coriandri* and *Myzus persicae* initiated on coriander at three to four leaf stage, almost

Table 1
Pest complex of coriander (*Coriandrum sativum* L.) in semi-arid region of Rajasthan

Sl. No.	Name of pests	Scientific name	Order and family	Pest status
1.	Aphid	Hyadaphis coriandri (Das) Myzus persicae (Sulzer) Aphis gossypii Glover	Hemiptera: Aphididae	Major
2.	Thrips	Thrips tabaci Frankliniella schultzei Tryb. Caliothrips indicus Bag.	Thysanoptera: Thripidae	Major
3.	Jassids	Empoasca sp.	Hemiptera: Cicadellidae	Minor
4.	Seed wasp	Systole albipennis (Walker)	Hymenoptera: Eurytomidae	Major
5.	Whitefly	Bemisia tabaci Genn.	Hemiptera: Aleurodidae	Minor
6.	Seed bug	Nysius sp.	Hemiptera: Lygaeidae	Major
7.	Red cotton bug	Dysdercus koenigii Fab.	Hemiptera: Pyrrhocoridae	Minor
8.	Painted bug	Bagrada hilaris (Burm.)	Hemiptera: Pentatomidae	Major
9.	Stink bug	Nezara viridula (Linn.)	Hemiptera: Pentatomidae	Minor
10.	Cut worm	Agrotis spp.	Lepidoptera: Noctuidae	Minor
11.	Termite	Odontotermes obesus (Ramb)	Isoptera: Termitidae	Minor
12.	Tobacco caterpillar	Spodoptera litura (Fab.)	Lepidoptera: Noctuidae	Major
13.	Leaf eating caterpillar	Helicoverpa armigera (Hub.)	Lepidoptera: Noctuidae	Minor
14.	Seed borer	Hellula undalis (F.)	Lepidoptera: Crambidae	Minor
15.	Grasshopper	Acrida spp.	Hemiptera: Acrididae	Minor

30-45 days after germination and being active on crop throughout the cropping season categorized as major pest of coriander (Table 1). Whitefly (*Bemisia tabaci*) infestation was recorded initially few after germination and continued up to flowering stage. The similar observations were made by other worker that aphid, *Myzus persicae* (Araujo, 1986), *Hyadaphis coriandri* (Jain and Yadav, 1988), *Aphis gossypii* (Singh and Baswana, 1948) were caused damage to coriander at different level get support the present findings. Meena *et al.* (2016) also reported that aphids' mixed population caused severe damage (40-50% yield loss) to coriander crop in semi-arid regions. The cut worm (*Agrotis* spp.) and termite (*Odontotermes obesus*) damage was recorded at early growth stage but some time termite damage was also noticed on full grown plants. Cut worm's larva and termite's workers damaged the

crop by cutting the roots inside soil as resulted whole plants dried. The infestation of red cotton bug (*Dysdercus koenigii*), painted bug (*Bagrada hilaris*) and stink bug (*Nezara viridula*) was recorded during inception of flowering on coriander and was being active till seed maturation. Likewise the other pests i.e. tobacco caterpillar (*Spodoptera litura*), leaf eating caterpillar (*Helicoverpa armigera*) and seed borer (*Hellula undalis*) were found to damage the coriander in full grown stages to withering of flowers. The similar results were found by Meena (2005), he reported that few lepidopteran caterpillars inflict damage to coriander are accordance with the present study. Seed wasp (*Systole albipennis*) and seed bug (*Nysius* sp.) were noticed on coriander crop at flowering stage to initiation of seed formation and continued till harvesting of crops. *Systole albipennis* infestation was

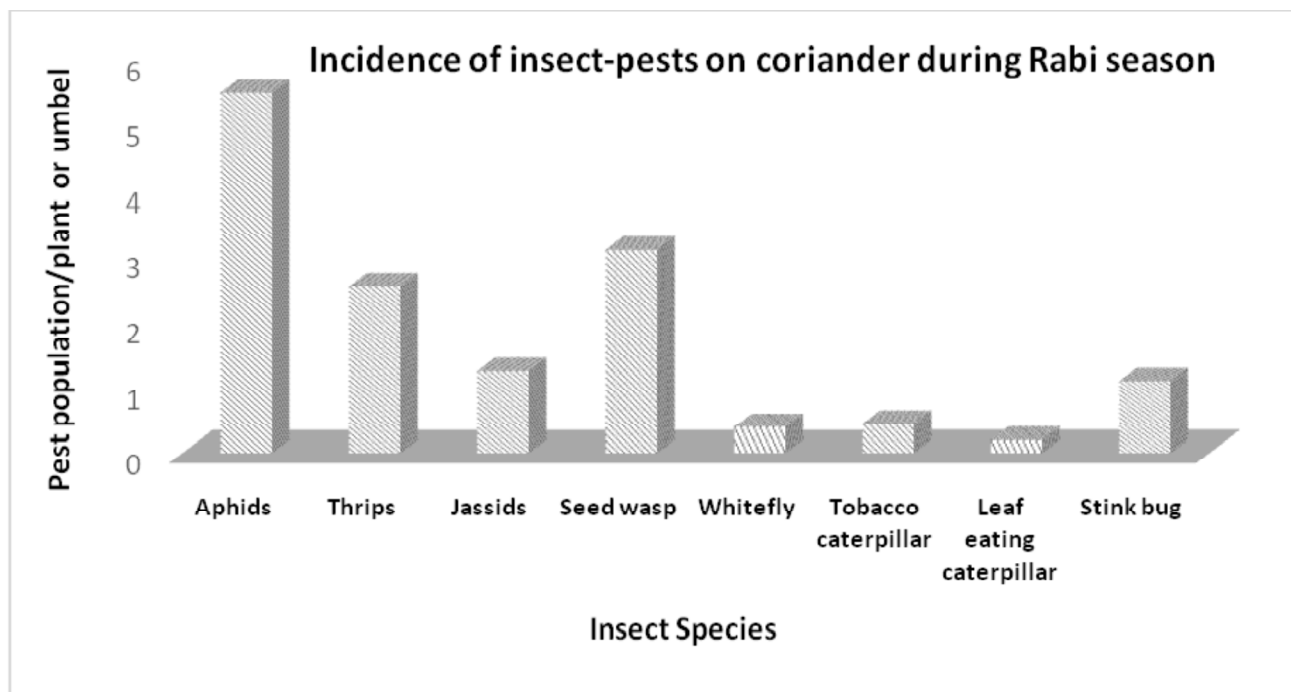


Figure 1: Pest abundance on coriander in semi-arid region during *Rabi* season

found higher on the plants, on which pest management practices were not applied throughout cropping season and the pest was categorized as major status on coriander. The pupae of seed wasp became alive inside matured coriander seed till storage, hence it could consider as storage pest of coriander.

The pest occurrence and population level on coriander were also recorded and presented in figure 1, revealed that sucking pests *viz.*, aphids, thrips, jassids and whiteflies were appeared on crops in early growth stage in scanty population during November and December. Among these, aphid infestation was more severe (137.5 aphids/plant or per umbel) than thrips, jassids and whiteflies, where population were 2.55, 1.25 and 0.4 insects per plant, respectively. The sting bug infestation was recorded on coriander during flowering stage to maturity of crop with an average population was 1.10 bugs/plant. Seed wasp infestation was also started during flowering to seed formation stage and lasted till harvesting of crop. Its population was fluctuated

more or less in number, depending upon the biotic and abiotic factors. The average population of 3.15 wasps/umbel was recorded. Likewise, the other lepidopteran caterpillars, tobacco caterpillar (0.45 larvae/plant) and leaf eating caterpillar (0.20 larvae/plant) were also noticed on coriander plants in very less in number during the study period.

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