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Purti

Department of Entomology,
CCS Haryana Agricultural
University, Hisar, Haryana,
India

Rinku

Department of Entomology,
CCS Haryana Agricultural
University, Hisar, Haryana,
India

VS Malik

Department of Entomology,
CCS Haryana Agricultural
University, Hisar, Haryana,
India

Correlation between the incidence of *Systole albipennis* and abiotic factors of the environment

Purti, Rinku and VS Malik

Abstract

All the ten varieties/germplasm viz., Hisar Anand, Hisar Sugandh, Hisar Surbhi, DH-220, DH-206, Hisar Bhoomit, DH-2, Pant Haritima, DH-236 and DH-306 of coriander crop was raised during 'rabi' 2014-15 following recommended agronomical practices. The experiment was laid out in randomized block design, with three replications and plot size of 3m x 2m. Incidence of seed midge (*Systole albipennis*) was recorded on the basis of exit holes present in coriander seed observed at harvest. The first observation was made on the umbels bagged on 18th March, 2015. The highest incidence of seed midge was observed in the 1st week of April in germplasm DH-2 and the lowest incidence of this pest was recorded in variety DH-220. Correlation between the incidence of *Systole albipennis* and abiotic factors of environment (minimum and maximum temperature, relative humidity, wind speed, sunshine hours and rainfall) was worked out to know their relationship, if any. The maximum temperature showed the positive effect on the incidence of seed midge. Minimum temperature, relative humidity, wind speed, sunshine hours and rainfall had non - significant effect on the incidence of the seed midge.

Keywords: *Systole albipennis*, incidence, abiotic, correlation, coriander

Introduction

Coriander is an important seed spice crop and it has a great importance in preparing the tasty dishes. It enhances the taste of food by adding its flavor and smell. Coriander crop is attacked by a number of insect-pests. Among them seed midge, *Systole albipennis* is a major insect-pest of coriander. It has been reported from Asia, Africa and Europe, whose larvae damage the fruits and survive in them. The adult fly lays eggs in the developing coriander seed. After hatching, the young larva feeds inside the seed and pupates therein. The adults emerge out by making a round hole in the seed in the stores. Though the weight loss is a low but qualitative loss is heavy because of non acceptability by consumers. The pest significantly reduces the market value of coriander seed and is one of the major constraints in quality seed production. The Presence of immature stages of seed midge in seed affects export as it is an important quarantine pest ^[10, 2]. Infestation occurs at field level and continues during storage of seed ^[6, 3]. It is found that seed damage by female of seed midge, *S. albipennis* ranged 40 percent in fennel, *Foeniculum vulgare* Mill., 35 percent in carrot, *Daucus carota* L., 30 percent in coriander, 27 percent in dill, *Anethum graveolens* L., 20 percent in cumin, *Cuminum cyminum* L. and 10 percent in ajwain, *Trachyspermum ammi* Sprague ^[5]. Agarwal and co-workers ^[1] found that *S. albipennis* has been found most prevalent causing more than 50 percent damage in fennel crop. A field experiment was conducted by Kant and co-workers ^[4] on the management of seed midge (*S. albipennis*) on coriander crop which includes the study of effect of date of sowing, use of plant products and synthetic insecticides. But different weather parameters also play an important role in controlling the population of this insect. So keeping this in view, correlation of different weather parameters was also worked out along with the population of seed midge.

Material and Methods

For this experiment all the ten varieties/germplasm viz., Hisar Anand, Hisar Sugandh, Hisar Surbhi, DH-220, DH-206, Hisar Bhoomit, DH-2, Pant Haritima, DH-236 and DH-306 of coriander crop was raised during 'rabi' 2014-15 following recommended agronomical practices. The experiment was laid out in randomized block design, with three replications and plot size of 3m x 2m.

Correspondence**Purti**

Department of Entomology,
CCS Haryana Agricultural
University, Hisar, Haryana,
India

Incidence of seed midge (*S. albipennis*) was recorded on the basis of exit holes present in coriander seed observed at harvest. Ten aphid free inflorescence/umbels selected at random from each variety/germplasm, were tagged. These tagged inflorescence/umbels, after seed setting, were given one week exposure for the incidence of *S. albipennis*, before being bagged (muslin cloth). Similarly, ten inflorescence/umbels each in all the entries/plot were bagged at an interval of five days till harvest. After completion of the observations we worked out the correlation between the incidence of seed midge and different weather parameters. The data on important weather parameters viz., maximum temperature, minimum temperature, relative humidity (both morning and evening), wind speed, sunshine hours and rainfall were obtained from the Meteorological Observatory, Department of Agricultural Meteorology, CCS Haryana Agricultural University, Hisar.

Results and discussion

The data on the incidence of seed midge was recorded at an interval of five days and the first observation was made on the umbels bagged on 18th March, 2015. The samples of coriander seeds, tagged on 2nd April, showed the highest incidence of 12.62 percent in germplasm DH-2 (Figure 1 and Table 2) and the lowest incidence of this pest was recorded in variety DH-220 (5.43%). The similar observations were reported by Singh and Baswana [9] related to the screening of coriander varieties against *S. albipennis* on the basis of emergence holes in the seeds was conducted in Hisar. They reported that out of 88 coriander varieties, the infestation of coriander seeds varied from 1.5-28.3 percent (number basis). The damage (weight basis) ranged from 1.8-17.7 percent. The damage (0.50 – 17.50%) caused by *S. albipennis* are more or

less close with the findings of Patel *et al.* (1986) who also reported that the damage of *S. albipennis* in fennel ranged from 5.4 to 20.7 percent but with regards to the data on the incidence. Correlation between the incidence of *Systole albipennis* and abiotic factors of environment (minimum and maximum temperature, relative humidity, wind speed, sunshine hours and rainfall) was worked out to know their relationship, if any. The maximum temperature and minimum temperature showed the significantly positive effect on the incidence of seed midge whereas minimum temperature, relative humidity, wind speed, sunshine hours and rainfall had non - significant effect on the incidence of the seed midge (Table 1)

Similar findings were studied by Nema Ram [7] and he reported that the maximum and minimum temperatures had positive significant correlation with seed midge infestation ($r = 0.889$ and 0.914 respectively), while average relative humidity had negative significant correlation ($r = -0.873$). Total rainfall had non-significant correlation with seed midge damage ($r = -0.263$).

Table 1: Correlation coefficients between incidence of *Systole albipennis* and abiotic factors of the environment

Abiotic factors of environment	Incidence of <i>S. albipennis</i>
Maximum temperature (°C)	0.969
Minimum temperature (°C)	0.948*
Relative Humidity morning (%)	-0.776
Relative Humidity evening (%)	-0.943
Wind speed (Km/h)	0.049
Sunshine (Hrs)	0.698
Rainfall (mm)	-0.875

*Significant at P = 0.05

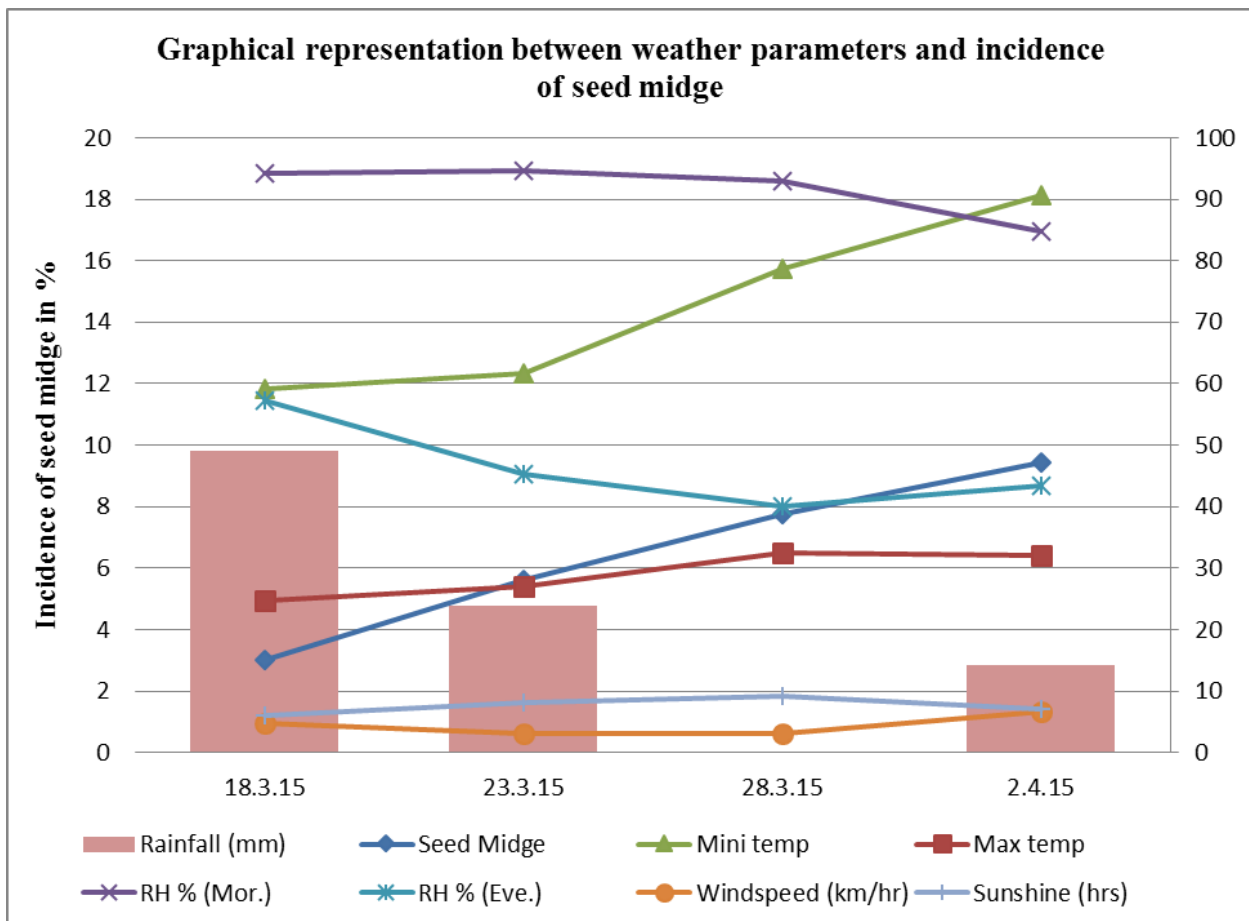


Fig 1: Graphical representation between weather parameters and population of seed midge.

Table 2: Meteorological data for correlation of population of seed midge with weather parameters.

Dates of observation	Population of Seed Midge	Mean values of weather parameters						
		Max. temp. (°C)	Mini. temp (°C)	RH % (Mor.)	RH % (Eve.)	Windspeed (km/hr)	Sunshine (hrs)	Rainfall (mm)
18.3.15	3.002	24.800	11.814	94.143	57.286	4.857	6.000	49.000
23.3.15	5.606	26.943	12.314	94.571	45.286	3.100	8.171	23.800
28.3.15	7.758	32.457	15.743	92.857	40.000	3.114	9.229	0.000
2.4.15	9.449	31.986	18.143	84.714	43.429	6.700	7.057	14.200

Conclusion

Weather parameters play an important role in the management of population of *Systole albipennis* along with the other management practices. The study conducted on correlation between the incidence of *Systole albipennis* and abiotic factors of the environment concluded that among the different abiotic factors of the environment (minimum and maximum temperature, relative humidity, wind speed, sunshine hours and rainfall), the maximum temperature showed significant positive relationship with incidence of seed midge while minimum temperature, relative humidity, wind speed, sunshine hours and rainfall had non - significant effect on the incidence of the seed midge.

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