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Seasonal incidence of aphid, *myzus persicae* (Sulzer) on cumin, *cuminum cyminum* linn.

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Abstract

Studies on seasonal incidence of aphid, *Myzus persicae* (Sulzer) on cumin was conducted at Instructional farm, College of Agriculture, Bikaner (Rajasthan) during *rabi*, 2016-17. Incidence of aphid started in the last week of December (52th standard meteorological week) and reached to its peak in fourth week of January (4th standard meteorological week) and gradually declined thereafter. Significant negative correlation was observed between infestation of aphid with maximum temperature whereas, morning relative humidity showed positive significant correlation. Aphid was significant positive correlation with predator, *Coccinella septempunctata*.

Keywords: Seasonal incidence, cumin, aphid, *M. persicae*, correlation.

Introduction

Cumin (*Cuminum cyminum*) is important seed spice crop commonly known as Jeera belongs to family Apiaceae. It is a drought tolerant, tropical or subtropical crop. In India, cumin is sown from October until the beginning of December and harvesting starts in February. It is an ingredient of most curry powders and many savory spice mixtures. The seeds of cumin are used for flavoring especially meat casseroles and lentil soup. It is stimulant, antispasmodic carminative and also diuretic. It is valuable in dyspepsia diarrhea and may relieve flatulence and colic. India is the largest producer and consumer of cumin seed in the world. In India, it occupied an area of 8.1 lakh hectares with annual production 5.0 lakh tones (Anonymous, 2015-16) [1]. The crop is mainly cultivated in Rajasthan and Gujarat. Both the states together contribute more than 95 per cent of total country's cumin production. In Rajasthan, it is cultivated in area 3.0 lakh hectares with annual production of 2.0 lakh tones (Anonymous, 2015-16) [1]. It grows abundantly in the mild, equable climate where rich well drained, sandy, loamy soil and the sunny, conducive environment are available. In Rajasthan main producing districts are Jalore, Jodhpur, Barmer, Nagaur, Pali and Bikaner etc.

Cumin is a very sensitive crop. Various factors such as attack of insect pests and diseases, temperature, weather, irrigation facilities and clear sky etc affect the development of crop. Cumin has been found to be infested by many insect pests viz., aphid, *Myzus persicae* (Joshi and Mathur, 1967) [5]; *orthops compestris* (L.) and *Lygus compestris* (L.) (Korez, 1977) [7]; Gram pod borer, *Heliothis armigera* (Judal and Upadhyay, 1989) and brown wheat mite, *Petrobia latens* (Gupta, 1990) [3, 4]. Among the insect pests aphid, *Myzus persicae* (Sulz.) was reported as the major insect pest of cumin in Rajasthan. Both nymph as well as adult cause's damage to the crop by sucking the cell sap from tender stem, leaves, inflorescence and developing grains and secreting honey dew. Due to their fast multiplication within few days, aphids cover the entire surface of apical shoots and as a result of continuous feeding by such a large population yellowing, curling and subsequent drying of leaves takes place resulting in poor and shriveled seed formation.

Materials and Methods

The present experiment was conducted at Instructional farm, College of Agriculture, Bikaner (Rajasthan) during *rabi*, 2016-17. Cumin variety GC-4 was sown on 15th November, 2017 in plot measuring 10 X 10 m², keeping row to row and plant to plant distance of 0.3 m and 0.10 m, respectively. The experiment was laid out in a randomized block design (R.B.D.). The population of aphid was recorded from five randomly selected and tagged plants in plot. Frequent visits of the experimental field were made to observe the occurrence of aphid and predator on the plants. The population estimation was done at weekly intervals as soon as aphid appeared and counted on three umbels (lower, middle and upper) from each of the five tagged plants. The population of aphid was counted in early morning hours at weekly intervals from appearance to harvesting of crop. The population of natural enemy *Coccinella* was also

recorded from randomly selected plants in experimental plot. Data on weather parameters viz. temperature in °C (maximum and minimum), per cent relative humidity (morning and evening) and rainfall in mm were obtained from the meteorological observatory, Agricultural Research Station, SKRAU, Beechwal, Bikaner.

The relationship between weather parameters and aphid population was calculated by adopting the following formula:

$$r_{X_1Y_1} = \frac{\sum X_1Y_1 - \frac{\sum X_1 \sum Y_1}{n}}{\sqrt{[\sum X_1^2 - \frac{(\sum X_1)^2}{n}][\sum Y_1^2 - \frac{(\sum Y_1)^2}{n}]}}$$

Where,

- r = simple correlation coefficient
- x = Independent variable i.e. abiotic factors
- y = Dependent variable i.e. pest
- N = Number of observations

Table 1: Incidence of aphid, *M. persicae* on cumin and their correlation with biotic and abiotic factors

| SMW** | Duration | | Temperature (°C) | | Relative humidity (%) | | Rainfall (mm.) | Mean aphid Population/3 umbel | Mean <i>Coccinella septempunctata</i> population/ 10 plant |
|---|----------|----------|------------------|-----------|-----------------------|-----------|----------------|-------------------------------|--|
| | From | To | Maximum | Minimum | Morning | Evening | | | |
| 52 | 25/12/16 | 31/12/16 | 27.3 | 7.9 | 84.9 | 39.0 | 0.0 | 6.5 | 0.0 |
| 1 | 01/01/17 | 07/01/17 | 20.1 | 7.9 | 90.4 | 78.7 | 0.0 | 28.2 | 1.6 |
| 2 | 08/01/17 | 14/01/17 | 19.3 | 4.1 | 86.0 | 47.6 | 0.0 | 54.2 | 2.7 |
| 3 | 15/01/17 | 21/01/17 | 19.1 | 4.9 | 83.9 | 43.4 | 0.0 | 70.2 | 3.2 |
| 4 | 22/01/17 | 28/01/17 | 22.0 | 8.1 | 90.1 | 56.7 | 2.2 | 90.0 | 4.1 |
| 5 | 29/01/17 | 04/02/17 | 26.4 | 8.5 | 91.3 | 32.9 | 0.0 | 64.4 | 3.3 |
| 6 | 05/02/17 | 11/02/17 | 26.3 | 5.8 | 87.0 | 30.3 | 0.0 | 39.1 | 1.9 |
| 7 | 12/02/17 | 18/02/17 | 30.0 | 10.0 | 71.7 | 23.3 | 0.0 | 8.0 | 0.4 |
| 8 | 19/02/17 | 25/02/17 | 30.2 | 10.6 | 63.9 | 18.6 | 0.0 | 3.0 | 0.2 |
| Correlation coefficient with aphid population (r) | | | -0.67* | -0.51(NS) | 0.66* | 0.39 (NS) | 0.59 (NS) | | 0.99* |

*Significant at 5 per cent level

SMW** = Standard Meteorological Weeks

NS = Non-significant

Correlation between incidence of aphid and abiotic factors

The maximum temperature showed significant negative correlation with incidence of aphid while, morning relative humidity showed significant positive correlation. The other abiotic factors including, minimum temperature, evening relative humidity and rainfall showed non significant correlation with the incidence of *M. persicae*. The present finding are in conformity with those of Sarangdevot and Kumar (2005) [10], Kumawat and Singh (2008) and Kumar and Paul (2017) [8] who found a significant negative correlation between incidence of aphid and maximum temperature and while significant positive correlation with relative humidity but minimum temperature showed non-significant correlation. The correlation between incidence of aphid and ladybird beetle, *C. septempunctata* was also computed and it was significant positive. These result are in agreement with Varmora *et al.* (2009) [11] and Kumar and Paul (2017) [8] who reported that population of coccinellid was increased with the increase in population of aphid on the crop.

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Results and Discussion

Incidence of aphid, *M. persicae* on cumin

The infestation of *M. persicae* on cumin started in the last week of December, when there was maximum and minimum temperature; morning and evening relative humidity were 27.3°C, 7.9°C and 84.9 per cent, 39.0 per cent evening, respectively. Initially population of aphid was low later on increased gradually and reached to its peak when 22.0°C maximum, 8.1 °C minimum temperature and 90.1 per cent, 56.7 per cent morning and evening relative humidity, respectively, thereafter a gradual decline in the population of aphid was evident. Bhadauria *et al.* (1998) [2] who reported that aphid appeared in last week of December. Initially, population of aphid was low but increased gradually and reached to its peak in third week of January. Thereafter the population declined gradually. The results are in agreement to those of Gupta and Yadava (1990) [3, 4], Varmora *et al.* (2009) [11] and Kumar and Paul (2017) [8] who reported peak of aphid at the end of January to first week of February.

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