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Original Research Article

Population Dynamics of Major Lepidopteran Insect Pests of Cabbage

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Keywords

Population dynamics, Lepidopteran insect pests, Cabbage.

A B S T R A C T

The experiment was conducted to study population dynamics of major lepidopterous insect pests on cabbage during *rabi* 2016-17 at farm of Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.). The larval population of DBM, head borer, leaf webber, cabbage semilooper and tobacco leaf eating caterpillar ranged from 1.2 to 5.5, o.45 to 1.8, 2.0 to 7.0, 0.77 to 1.2 and 1.98 to 3.2, respectively. The infestation of DBM, head borer, leaf webber and cabbage semilooper was initiated during 47th MW and of tobacco leaf eating caterpillar during 46th MW. The peak incidence of DBM, head borer, leaf webber, cabbage semilooper and tobacco leaf eating caterpillar was observed during 51th, 3rd, 48th, 49th and 49th MW, respectively during 2016-17.

Introduction

Cabbage is attacked by several insect-pests due to their succulent nature and year round availability. More than 27 species of insect-pests are reported on cabbage in India (Bhatia and Verma, 1993), of which 11 belonged to order Lepidoptera, 5 to Orthoptera, 3 each to Heteroptera and Coleoptera, 2 each to Homoptera and Hymenoptera and 1 to Diptera. Among these, fourteen pests have so far been recorded infesting cabbage crop in Maharashtra (Palande *et al.*, 2004). The insect-pests attacking cabbage are diamondback moth (*Plutella xylostella* Linnaeus), cabbage butterfly (*Pieris brassicae* Linnaeus), tobacco caterpillar (*Spodoptera litura* Fabricius), cabbage semilooper (*Trichoplusia ni* Hubner), aphid (*Brevicoryne brassicae* Linnaeus), painted bug (*Bagrada cruciferarum* Kirkaldy), cabbage leaf webber (*Crocidolomia binotalis* Zeller), cabbage head borer (*Hellula undalis* Fabricius), cabbage flea beetle (*Phyllotreta cruciferae* Goeze) and bihar hairy caterpillar (*Spilosoma obliqua* Walk) are observed commonly on cabbage in different seasons and cause considerable losses. The present studies on population dynamics of major pests of cabbage would give an idea about their peak period of activity and may be helpful in developing pest management strategy against them.

Materials and Methods

The experiment was conducted during *rabi* 2016-17 at farm of Department of Agricultural Entomology, Vasantrao Naik

Marathwada Krishi Vidyapeeth, Parbhani (M.S.). Cabbage cv. *F1 hybrid cabbage No 5005* was transplanted in 100 m² area by adopting 60 × 30 cm^2 spacing. This area was divided into four quadrates (5 m × 5 m). No insecticidal treatment was applied at any stage of the crop growth. The crop was grown following recommended package of practices. The observations were recorded on five randomly selected plants in each quadrate and were labeled with plastic tag. The observations were recorded at weekly intervals starting from 10 days after transplanting.

Results and Discussion

The observations on larval count of different lepidopteran insect pests on cabbage are presented in Table 1.

Diamondback moth, *Plutella xylostella*

The incidence of diamondback moth initiated in the last week of November (47thMW) with a mean population of 4.6 larvae/plant. The population increased gradually and touched its peak with a mean of 5.2 larvae/plants during third week of December (51th MW).

Thereafter, population reduced gradually. The weather parameters *viz*. maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, bright sunshine hours and rainfall during the peak period of incidence were 29.6°C, 8.8^{o}C, 75 per cent, 24 per cent, 9.8 hours and 0.0 mm, respectively.

Head borer, *Hellula undalis*

The head borer larvae occurred from 47th MW *i.e*. last week of November with (0.5 larva/plant). Then infestation increased gradually and reached at a peak of 1.8 larvae/plant at third week of January (3rd MW) during 2016-17. The weather parameters viz. maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, bright sunshine hours and rainfall during the peak period of incidence were 28.9°C, 11.5^{o}C, 75 per cent, 37 per cent, 7 hours and 0.0 mm, respectively.

Leaf webber, *Crocidolomia binotalis*

The leaf webber larvae appeared in the last week of November (47th MW) with a mean population of 4 larvae/plant. The larval population increased gradually and reached at a peak of 7 larvae per plant in 48th MW and after that population reduced until the harvest.

The weather parameters *viz*. maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, bright sunshine hours and rainfall during the peak period of incidence were 31.5°C, 10.1^{o}C, 77 per cent, 25 per cent, 9.1 hours and 0.0 mm, respectively.

Tobacco leaf eating caterpillar, *Spodoptera litura*

The incidence of caterpillars initiated in the third week of November (46thMW) with 2.6 larvae /plant. The population increased gradually and touched its peak with a mean of 3.26 larvae/plants during second week of December (49thMW). Thereafter, pest population reduced gradually.

The weather parameters *viz*. maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, bright sunshine hours and rainfall during the peak period of incidence were 30°C, 11.9^{o}C, 74 per cent, 36 per cent, 9.1 hours and 0.0 mm, respectively.

Cabbage semilooper, *Trichoplusia ni*

The incidence of cabbage semilooper noticed in last week of November (47th MW) with mean population 1.06 larvae/plant. Then larval population increased and reached at peak of 1.2 larvae/ plant in 49th MW during 2016-17. Thereafter, mean population decreased slightly. The mean weather parameters *viz.* maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, bright sunshine hours and rainfall during the peak period of incidence were 30°C, 11.9°C, 74 per cent, 36 per cent, 9.1 hours and 0.0 mm, respectively.

Bana (2012) observed that the infestation of diamondback moth started from the third week of November and reached peak in the first week of January. Riaz *et al.,* (2013) recorded that *Plutella xylostela* infestation on cabbage started soon after transplantation and reached the highest number of 16.1 ± 1.6 larvae per plant by November. At Loralai, *Plutella xylostela* infestation on cauliflower had a peak density of 3.9 ± 0.6 larvae /plant during early July. Shukla and Kumar (2004) studied that the population of diamondback moth in Udaipur, Rajasthan and found that DBM appeared in the beginning of September and population steadily reached its peak by the end of November followed by a declined phase from the last week of December to the last week of January in 2000-01 and 2001-02. Khaire *et al.,* (1987) reported that the peak incidence of cabbage semilooper on cabbage was recorded in second fortnight of September. Devjani and Singh (2002) reported that *S. litura* occurred in February–March in late season on cauliflower. Surender Kumar *et al.,* (1998) reported that *S. litura* was the major pest of cauliflower and is observed throughout crop growth period. Ojha *et al.,* (2004) reported that the lowest and highest population of head borer, *H. undalis* to the extent of 0.33 and 8.66 larvae per trial during first to last week of October.

However, the literature pertaining to incidence of diamondback moth, head borer, leaf webber, *S. litura*, and cabbage semilooper studied by earlier worker are more or less in conformity of present findings.

Table.1 Population dynamics of major lepidopteran insect pests on cabbage

Duration	MW	No. of larvae per plant				
		DBM larvae	Head borer larvae	Leaf webber larvae	Tobacco leaf eating caterpillar larvae	Cabbage semilooper larvae
29-04 Nov. 16	44	0	0	0	0	0
05-11 Nov. 16	45	0	0	0	0	0
12-18 Nov. 16	46	0	0	0	2.6	0
19-25 Nov. 16	47	4.6	0.5	4	3.2	1.06
26-02 Dec. 16	48	5	0.5	7	3	1.2
03-09 Dec. 16	49	4.8	0.45	6	3.06	1
10-16 Dec. 16	50	4.9	0.38	4.13	3	0.8
17-23 Dec. 16	51	5.2	0.45	4.5	2.87	0.77
24-31 Dec. 16	52	4.7	1.2	4	2.8	0.78
01-07 Jan. 17	1	4.7	1.4	3.5	2.6	0.9
08-14 Jan. 17	2	4.1	1.6	2.8	1.98	1
15-21 Jan. 17	3	1.2	1.8	2	0	0

*DBM = Diamondback moth

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