RESEARCH ARTICLE

SEASONAL INCIDENCE OF DIAMOND BACK MOTH, *PLUTELLA XYLOSTELLA* (L.) ON CABBAGE AT NORTHERN HILLS OF CHHATTISGARH

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Abstract: Seasonal incidence of diamondback moth *Plutella xylostella* L. on cabbage was conducted at three spots during winter season 2017-18. The result of experiments revealed that the pest was appeared from the 4th SMW (in the month of last January) with an average population of 1.7 larvae/plants at all locations and remained in the fields until the 14th SMW (in the month of April). The peak population of DBM was observed in 11th SMW with average population 7.4 larvae/plants at maximum and minimum temperature, 31.6°C and 16.2°C and relative humidity 69 per cent, respectively, thereafter the population started declining. The larval activity suddenly decreased with 0.7 larvae/plants in the 14th SMW (in the second week of April), during the period maximum and minimum temperature were increased and relative humidity also decreased.

Keywords: Cabbage, Diamondback moth, Seasonal incidence, Chhattisgarh

INTRODUCTION

Cabbage (*Brassica oleracea* var. *capitata*) is one of the most important cruciferous vegetable crops in India and second largest producer of cabbage in the world, next to China. Countrywide, it is grown in an area of 407 hectare with an annual production of 8971mt ranking second to cauliflower in area but topping in production among cole crops (NHB 2016). The area of Chhattisgarh is 12913.82 ha, production is 217980.83mt and productivity is 16.15mt in 2015-16 (Tegar *et al.*, 2016).

It is the most popular vegetable around the world in respect of area, production and availability, almost round the year and occupies the pride place among cole crops due to its delicious taste, flavour and nutritive value. It is grown for heads which are used as vegetable, eaten raw and frequently preserved as sauerkraut or pickle.

This cole crop is attacked by many insect pest *i.e.* aphid, semilooper, head borer, diamondback moth etc. The diamondback moth (DBM), *Plutella xylostella* L. (Lepidoptera: Plutelidae), is a major and serious pest of crucifer crops as worldwide (You and Wei, 2007). Fletcher (1914) recorded this pest for the first time in India on cruciferous vegetable and perusal of literature revealed that the pest is distributed all over India. Krishnakumar *et al.* (1984) reported 52 per cent loss in marketable yield of cabbage due to the attack of *P. xylostella* (L.). While Srinivasan (1984) reported 90-92 per cent loss could occur if cabbage is left unprotected and also vary from 30-100 per cent (Lingappa *et al.*, 2000). In India, Krishnamoorthy (2000) has also reported a 52 per cent reduction in yield and the losses to DBM is estimated to be $ 16 million annually in a cultivated area of 5, 01,700 ha (Mohan and Gujar, 2003).

DBM has developed resistance to as many as 73 insecticides (Zhao *et al.*, 2002; Phani Kumar and Gujar, 2005). Studies on alternative control methods to ensure environmental and food safety have become an important task for agriculture professionals. Now a day's ecofriendly pest management has gained worldwide attention. It is not only effective against crop pests but also safer to beneficial insects and environment. Chemical insecticides usually play a major role in management of *P. xylostella*. Currently growers are facing serious threats from this pest, particularly due to insecticide resistance and ineffective biological control.

So we need to adopt most effective management tactics that prevent the infestation and losses without harming beneficial insects. Keeping in mind the above facts, present investigation was carried out.

MATERIALS AND METHODS

The present investigation entitled''Seasonal incidence of diamondback moth *Plutella xylostella* (L.) on cabbage at northern hills of Chhattisgarh''was conducted at Research cum Instructional farm of RMD College of Agriculture and Research Station, Ambikapur during winter season 2017-18.

In the field experiment, each plot was properly demarcated during the seasons with the following technical programme. In a plot of 10x10 m^2 area, Cabbage variety "Green Challenger" was sown. An observation of DBM population was recorded from their appearance on plants till harvest at different intervals. Ten plants were selected randomly at each 3 spots for the study of diamondback moth by the direct visual counting method at weekly interval during morning hours, without disturbing the pest fauna. The observed population was correlated with the meteorological data during the study period.

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RESULTS AND DISCUSSION

Observations were recorded at three spots at northern hill zone of Chhattisgarh from January, soon after the transplantation of cabbage seedling for the seasonal incidence of the diamondback moth is presented in Table No. 1.

The pest first appeared in the 4th SMW (Standard Meteorological Week) at all three spots and remained in the fields until the 14th SMW. The average larval population 1.7 larvae/plants were recorded during the 4th SMW in the last week of January, when maximum temperature 24.6°C, minimum temperature 6.2°C and relative humidity 86 per cent, respectively.

The larval population after the rainy day suddenly increased to 3.4 larvae/plant during the 8th SMW (1st week of March) when the maximum temperature, minimum temperature and relative humidity were 30.0°C, 13.5°C and 80 per cent, respectively.

The peak population of 7.4 larvae/plants were observed at 11th SMW in the 4th week of March at 31.6°C maximum and 16.2°C minimum temperature and 69 per cent relative humidity, thereafter the population started declining.

The larval activity suddenly decreased with an average population 0.7 larvae/plant during the 14th SMW (second week of April) at 33.8°C maximum temperature, 19.1°C minimum temperature and 67 per cent relative humidity, respectively.

Finding the result accordance Chaudhuri *et al*. (2001) revealed the larval population of diamondback moth maximum in the last week of March. The larval population showed positive correlation with average temperature, relative humidity and rainfall.

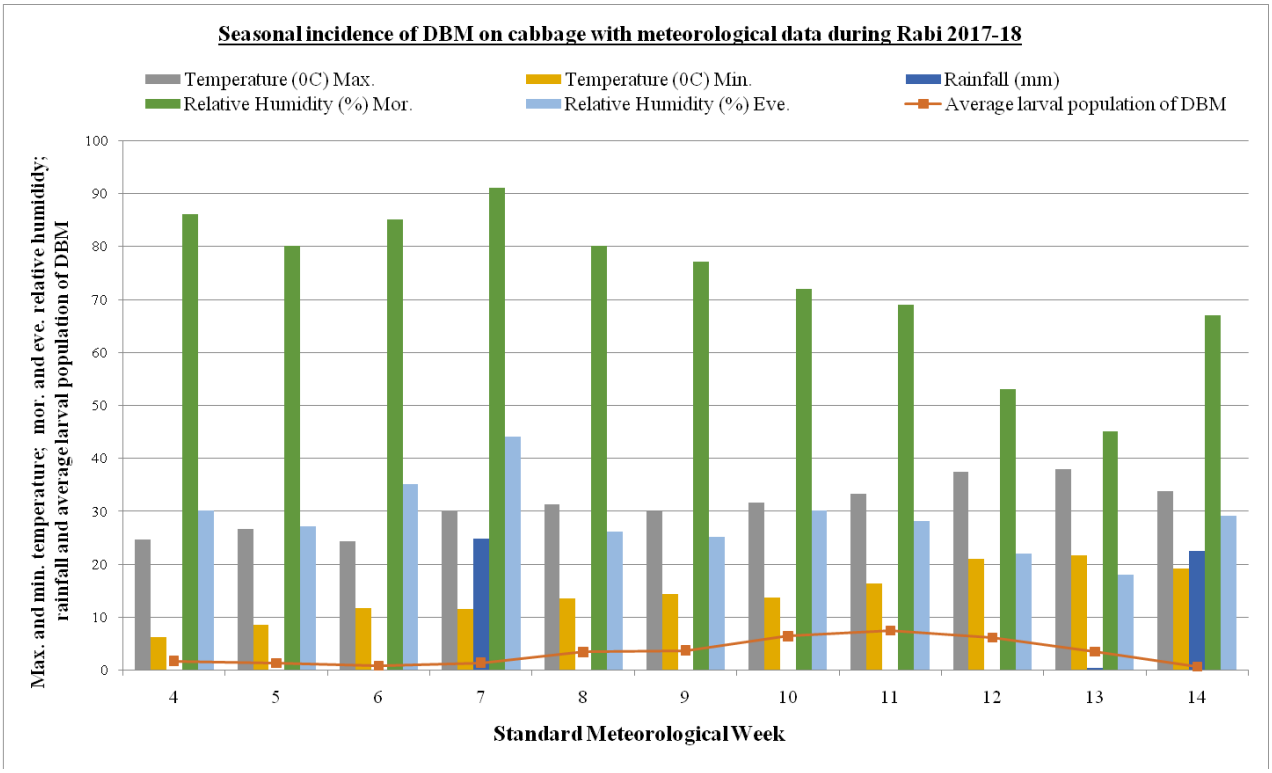
Iga (1985), Lee (1986), Srinivasan and Rao (1987) reported that the maximum activity of the diamondback moth was found in winter season, when the maximum and minimum temperature ranged between 30^{0}C and 10^{0}C and morning and evening relative humidity was 85 to 90 per cent. Patel (2002) also reported that the maximum activity was during winter season, when the maximum and minimum temperature was recorded to be 27.5 and 9.4°C, morning and evening relative humidity was 87 and 29 per cent.

Similarly, Devi and Raj (1991) had reported that the maximum activity of the diamondback moth was during the month of March and April.

The current findings have been observed as similar in trend. The peak period of cabbage diamondback moth was observed during the month of March, when the maximum and minimum temperature was recorded to be 31.6°C to 16.2°C, morning and evening relative humidity was 69 to 28 per cent.

Table 1. Seasonal incidence of diamondback moth *Plutella xylostella* (L.) on cabbage and meteorological data during 2017-2018.

SMW	Date of Observation	Larval Population of Diamondback Moth			Total	Overall Mean	Temperature (^{0}C)		Rainfall (mm)	Relative Humidity (%)	
		Spot 1	Spot 2	Spot 3			Max.	Min.		Mor.	Eve.
4	31/1/2018	1.5	1.6	2.0	5.1	1.7	24.6	6.2	0.0	86	30
5	7/2/2018	1.3	1.3	1.3	3.9	1.3	26.6	8.4	0.0	80	27
6	15/2/2018	0.7	1.0	0.9	2.6	0.8	26.5	11.6	0.0	85	35
7	22/2/2018	1.4	1.1	1.8	4.3	1.4	24.3	11.4	24.8	91	44
8	1/3/2018	2.7	3.1	4.6	10.4	3.4	30.0	13.5	0.0	80	26
9	7/3/2018	5.4	0.5	5.3	11.2	3.7	31.3	14.3	0.0	77	25
10	14/3/2018	6.4	7.1	5.9	19.4	6.4	29.9	13.7	0.0	72	30
11	21/3/2018	8.0	6.2	8.2	22.4	7.4	31.6	16.2	0.0	69	28
12	28/3/2018	6.4	5.9	6.2	18.5	6.1	33.3	15.6	0.0	70	20
13	4/4/2018	3.4	3.6	3.5	10.5	3.5	36.3	17.0	0.0	64	20
14	11/4/2018	0.6	0.8	0.7	2.1	0.7	33.8	19.1	22.4	67	29



CONCLUSION

The larval population of diamondback moth was started from the 4th SMW in the month of last January to 14th SMW in the second week of April at all locations. The peak population was observed in 11th SMW in the fourth week of March, thereafter the population started declining. The larval activity suddenly decreased in the 14th SMW in the second week of April on the cabbage crop. Hence, maximum plant protection measures should be taken up against the diamondback moth during the month of March under northern hills region of Chhattisgarh.

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