Seasonal Incidence of Diamond Back Moth in Broccoli (*Brassica oleracea* var. *italica*)

ABSTRACT

The present field experiment was conducted at entomology research field, Institute of Agriculture and Natural Sciences, Deen Dayal Upadhyaya Gorakhpur University, Gorakhpur during *Rabi*, 2022-23, for studying the seasonal incidence of Diamond back moth in broccoli. The broccoli planted in plot size of 3x3.15 m in three replications with spacing of 60x45 cm during first week of November. First appearance of DBM in broccoli field was started in 49th SMW 2nd week of December, the pest population reached at peak in 2nd SMW 2nd week of January. The correlation studies showed that maximum temperature, minimum temperature is significantly negatively correlated to pest population whereas morning relative humidity showed negative non- significant correlation with the pest population, rainfall had non-significant and evening relative humidity had positively significant effect on the pest population.

Keywords: Broccoli; pests; DBM; seasonal incidence; correlation and weather parameters.

1. INTRODUCTION

The broccoli belongs to the "Cole Crop Group" of *Brassica oleracea* species and is planted in the cool seasons for its green blooming head. It is closely related to cabbage, cauliflower, kale, and mustard. It usually has a green colour and is grouped in a tree-like form on branches that emerge from a large, delicious stalk. Broccoli is one of the most widely consumed frozen vegetables and a high-quality vegetable for fresh consumption. It is a crop that is very nutrient-dense and contains significant amounts of vitamins A and C as well as minerals K, P, Ca, and Fe. Additionally, it includes thiamine, riboflavin, and niacin [1].

After China, India produces the most broccoli, with the US coming in third. In many other nations, like Spain, Mexico, Italy, France, the United States, etc., it is also consumed as a vegetable. The Mediterranean region is the origin of broccoli. A cultivar of wild cabbage is broccoli. Wild cabbage was first domesticated thousands of years ago throughout the northern and western coasts of the Mediterranean [2,3].

According to Boopathi and Pathak [4], more than sixteen insect pest species have a costly impact on broccoli with one mite and eleven natural enemies. *Plutella xylostella* L., *Crocidolomia binotalis* Zeller, *Atalia ligens proxima* Klug, *Brevicoryne brassica* L., *Bagrada cruciferarum* Kirkaldy, and *Hellula undalis* Feb. are examples of cabbage webworms and diamond backmoths. Termite (*Microtermes obesi* Holemgren), cutworm (*Agrotis ipsilon* hufnagel), leaf eating weevil (*Tanymecus circumdatus* Wiedemann), cabbage semilooper (*Trichoplusia ni* Hubner), leaf minor (*Chromatomyia horticola* Goureau), whitefly (*Bemisia tabaci* Gennedius), red spider mite (*Tetranychus urticae* Koch), crucifer flea beetle (*Phyllotreta cruciferae* Goeze), thrips (*Frankliniella accidentalis* Pergande), etc. are the major insects of broccoli. The diamondback moth is the bug that causes the most damage to broccoli [5]. Crop output is impacted by the high incidence of DBM. Crop damage from insects includes gnawing on foliage, suckling on juice, spreading disease, and laying eggs. Farias et.al. [6] reported diamond back moth (*Plutella xylostella* L.) is an important pest of broccoli (*Brassica oleracea* L.) and Khan and Talukder [7] reported that the primary pests of *Brassica* is

diamondback moth (DBM). The caterpillars being eating on the undersides of the leaves soon after hatching. The leaves of severely injured plants have numerous feeding holes.

2. MATERIALS AND METHODS

The field experiment was conducted at entomological research station, IANS, DDUGU to study the seasonal incidence of diamond back moth on broccoli during *Rabi*- 2022. Experiment was laid out in randomized block design (RBD) laid with three replications. Twenty-five-day old broccoli seedlings were transplanted in the plot of 3x3.15 m with spacing of 60x45 cm during first week of November. Recommended management practices except insect pests' management practices were employed during the raising of crop. Weekly observation was taken after one week of transplanting till maturity of the crop. DBM larvae, counted from randomly selected five plants per replication. Weather parameters (maximum temperature, minimum temperature, relative humidity morning, relative humidity evening, rainfall) were correlated with the pests population.

3. RESULTS AND DISCUSSION

First appearance of DBM in broccoli field was started after two weeks of transplanting in 49th SMW in second week of December and the pest population reached at peak (2.47 larvae / plant) in 2nd SMW second week of January when the maximum temperature (15.89°C), minimum temperature (7.57°C), Relative humidity morning (85.57%), Relative humidity evening (67.14%). The lowest recorded population (0.27 larvae / plant) of DBM was in the. 49th SMW in second week of December when maximum temperature (25.73°C), minimum temperature (11.17°C), relative humidity morning (83.57%), relative humidity evening (45.57%) no rainfall was recorded during the course of investigation (Table 1).

The corelation studies showed that maximum temperature (r = -0.890), minimum temperature (r = -0.825) is significantly negatively correlated to pest population whereas morning relative humidity (r = -0.224) showed negative non-significant correlation with the pest population, rainfall (r = 0.135) had non-significant and eventing humidity (r = 0.825) had positively significant effect on the pest population. (Table 2). And the correlation of DBM with

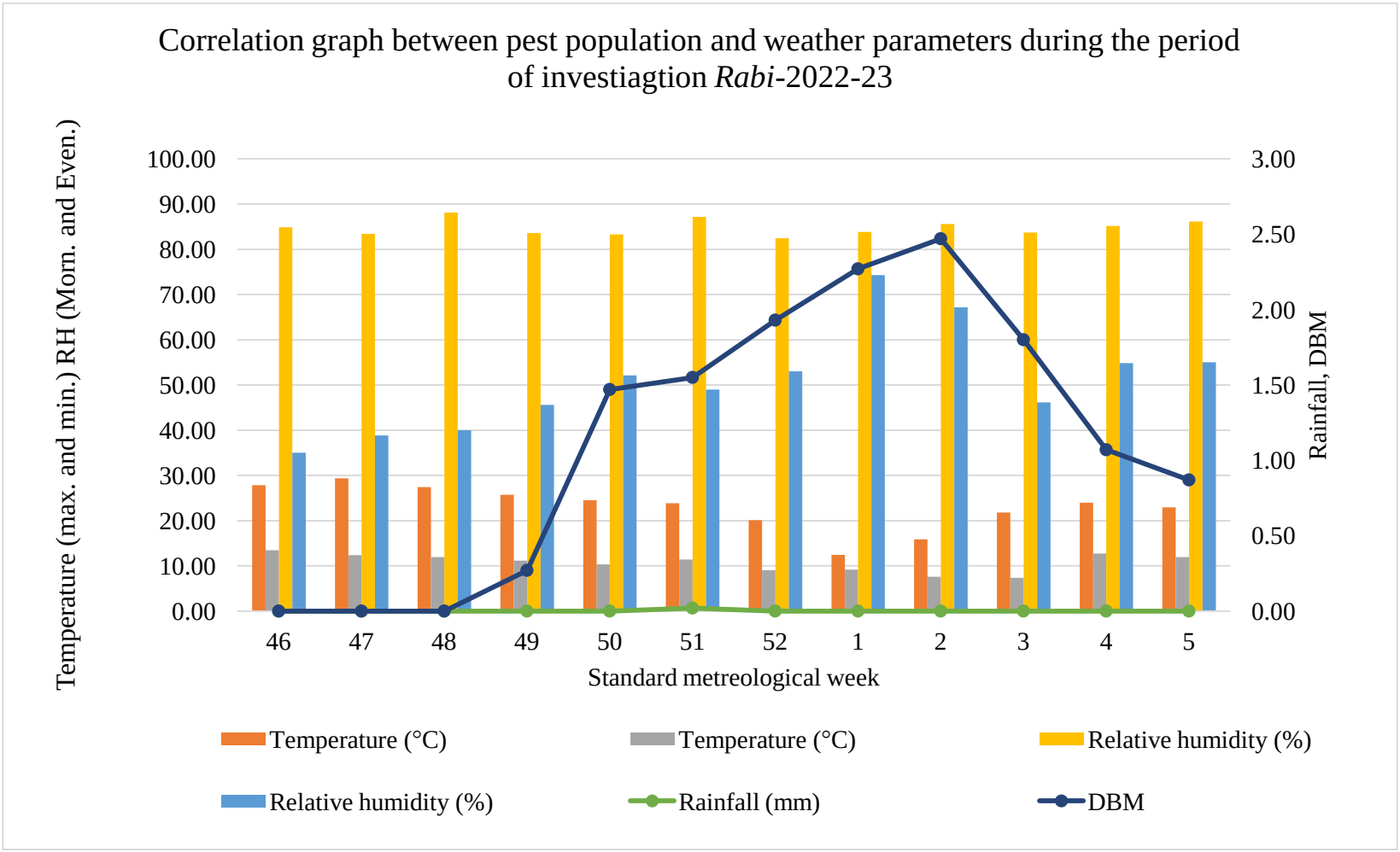

Fig.1. Correlation of DBM with weather parameters during the period of investigation *Rabi*-2022-23

Table 1. The incidence of diamond back moth in relation with abiotic factor on broccoli, During the cropping period (*Rabi*-2022-23)

S.N.	SMW	Temperature (°C)		Relative humidity (%)		Rainfall (mm)	DBM
		Max temp.	Min temp.	Morn.	Even.		
1	46	27.86	13.47	84.86	35.00	0.00	0.00
2	47	29.33	12.39	83.43	38.86	0.00	0.00
3	48	27.39	11.91	88.14	40.00	0.00	0.00
4	49	25.73	11.17	83.57	45.57	0.00	0.27
5	50	24.50	10.34	83.29	52.14	0.00	1.47
6	51	23.84	11.43	87.14	49.00	0.02	1.53
7	52	20.11	9.04	82.43	53.00	0.00	1.93
8	1	12.44	9.14	83.86	74.29	0.00	2.27
9	2	15.89	7.57	85.57	67.14	0.00	2.47
10	3	21.80	7.36	83.71	46.14	0.00	1.80
11	4	23.96	12.70	85.14	54.86	0.00	1.07
12	5	22.91	11.97	86.14	55.00	0.00	0.87

weather parameters during the period of investigation *Rabi*-2022-23 presented in graph. (Fig. 1). The studies showed that the incidence of diamondback moth was affected by temperature, i.e., when the temperature raised, the population of pest declined.

Present work of investigation is partially in line with previous worker Sharma et al. [8] and Bana et al. [9], they reported that the infestation of diamondback moth reached to peak in the first week of January (1st SMW). Meena and Singh [10] and Shukla and Kumar [11], reported that the peak population of diamondback moth reached peak in last week of January to 1st week of February and the infestation started from 2nd week of November. And the correlation findings are similar to Kumari [12] and Sharma et al. [8], reported that maximum and minimum temperature were significantly negatively correlated with the larval population and negatively non-significant correlation with the relative humidity. However, they reported negative non-significant correlation with relative humidity morning. Sharma et al. [13], Aishwarya et al. [14] reported that the maximum and minimum temperature showed significant negative correlation with larval population of diamond back moth whereas non-significant correlation with relative humidity.

Table 2. Correlation of DBM population with weather parameters

Weather parameters	Correlation (r)
Maximum Temperature	-0.890
Minimum Temperature	-0.825
Relative humidity Morning	-0.224
Relative humidity evening	0.825
Rainfall	0.135

4. CONCLUSION

The initialof DBM in broccoli field was started after two weeks of transplanting in 49th SMW in second week of December the pest population reached at peak in 2nd SMW second week of January.The correlation studies showed that maximum temperature (-0.81), minimum temperature (-0.825) is significantly negatively correlated to pest population whereas morning relative humidity (-0.224) showed negative non-significant correlation with the pest population, rainfall (0.135) had non-significant and eventing humidity (0.825) had positively significant effect on the pest population.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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