

STUDY ON THE SEASONAL INCIDENCE OF MUSTARD APHID (*LIPAPHIS ERYSIMI* KALT.) IN RELATION TO WEATHER PARAMETERS

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Abstract: The aphid incidence and its correlation with weather parameters were studied at college of Agriculture and Research Station, Raigarh, Chhattisgarh during the Rabi 2013-14 and 2014-15 crop seasons. Mustard variety "Pusa bold" was used as test crop. This study will provide an opportunity to fact the pest challenge by manipulating the manageable ecological parameters in the form of planting to harvesting time adjustment, varietal election, correct time of pesticide application, etc. The aphid appearance of mustard aphids were observed on January 2nd & 5th 2013-14 & 14-15 and disappeared after mid March. The peak period of aphid population was found at 5th to 9th SMW 114.41 to 318.01 aphid/plant during Rabi 2013-14 and 113.92 to 314.52 aphid /plant during 2014-15. The correlation coefficient (r) showed a non-significant negative effect with maximum and minimum temperature whereas relative humidity showed non-significant positive effect.

Keywords: Mustard, Aphid, *Lipaphis erysimi*, Population, Humidity, Temperature

INTRODUCTION

Mustard is the second most important oil seed crop in India after soybean. It accounts for nearly 20- 22% of the total oilseeds produced in the country. Mustard seed is grown with a different consumption pattern in the country. Indian mustard is mainly used for extraction of mustard oil while black mustard is mainly used as a spice. White mustard is used as fodder crop or as green manure.

Among different insect pests attacking mustard, the mustard aphid (*Lipaphis erysimi* Kalt.) is the most serious and destructive pest and major limiting factor for mustard cultivation (Begum 1995 and Biswas and Das 2000). An opportunity to fact the pest challenge by manipulating the manageable ecological parameters in the form of planting or harvesting time adjustment, varietals selection, correct time of pesticide application, etc. The natural appearance of mustard aphid on variety and germplasm of mustard was observed on January (50 days after sowing) and disappeared after mid-February (92 days after sowing). The peak aphid population was found at a minimum, maximum and average temperature of 13.57 °C, 25.86 °C and 19.72 °C respectively and a mean relative humidity of 88.86% on 24th January at 71 DAS. (Rashid *et al.*, 2009)

The nymphs and adults of aphids suck saps from leaves, stems, inflorescence and pods as the plant shows stunted growth. Weather conditions play the most important role for its rapid multiplication (Sinha, *et. al.*, 1989; Rana, *et. al.* 1993; Singh and Malik, 1998). Such study will provide an opportunity to fact the pest challenge by manipulating the manageable ecological parameters in the form of planting or harvesting time adjustment, varietal selection, timely pesticide application, etc. Therefore,

the present study was formulated to observe the aphid population fluctuation in relation to the weather parameters.

MATERIAL AND METHOD

The experiment was conducted at College of Agriculture and Research Station, Raigarh (C.G.) during the Rabi season 2013-14 and 2014-15. Mustard was sown variety Pusa bold in total experimental plot size was 25x20 m² and row to row distance was 30 cm and plant to plant 10 cm which were maintained by thinning. The insecticides were no sprayed in the plot. Experimental area was divided into four replication. Aphid populations were counted from 10 randomly selected plants in each replicated plots on the appearance of the pest up to harvesting of the crop at weekly interval. While at flowering and podding stages of the crop, the simple technique was used. In sampling method, tool a Petri dish of 15 cm diameter and then divided it into eight equal parts with the help of a white paper already marked, affixing underneath the Petri plate. Now dislodged the whole population of aphids (10 cm length) on to Petri plate and spread evenly on it with the help of a fine camel hair brush and then counted the number of aphids in a part and multiplying by the number of components in Petri plate, we could become able to get the aphid population. The data so obtained were then correlated with meteorological parameters.

RESULT AND DISCUSSION

Aphid population during rabi 2013-14 ranged from 3.5 to 318.01 per plant. On the first date of observation i.e. second January (1st SMW) the

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population of pest was 3.35 per plant. In subsequent observation the pest population increased and attained a peak 318.01 aphid per plants (Table 1) on 27th February (9th SMW), afterwards the population showed declined trend in up to the end of the crop season. The minimum aphid population of 2.81 per plant was recorded on 20th March 2014 (12th SMW). During rabi 2014-15 the aphid population ranged from 3.86 to 314.52 per plant. In the first date of observation *i.e.* fifth January (1st SMW) 3.86 aphids per plants were recorded. There after the population was found to be in increasing trend reaching to a peak of 314.52 aphids per plants (Table 2) on 23rd February (8th SMW). Afterward aphid population was sharply declined to a level of 2.98 aphids per plants on 23 March 2015 (12th SMW).

The maximum and minimum temperatures during the period of study were correlated with weekly average of aphid population. For the year maximum and minimum temperature were found to be statistically non significant (NS) table 1 and 2. The maximum and minimum temperature during the peak activity of the pest are ranged from 26.14 °C to 28.43 °C and 12.85 °C to 15.71 °C on the 5th to 9th SMW in the year 203-14. These figure ranged from 24.98 °C to 28.79 °C and 10.78 °C to 19.78 °C on 5th to 8th SMW in the year 2014-15.

Relative humidity during the peak activity of the pest 5th to 9th SMW in 2013 - 14. The relative humidity of

maximum and minimum was noticed to be ranging from 81.14 to 89.00 per cent and 36.28 to 56.71 per cent respectively. Similarly, during the year 2014-15 it ranged from 81.67 to 89.82 per cent and 29.0 to 52.42 per cent 5th to 9th SMW in maximum and minimum, respectively. However, during both the years, significant relationship could not be established between relative humidity and the pest activity (Table 1 and 2). The similar reports have been reported by Chandra and Kushwaha (1986) that temperature had non-significant negative effect whereas relative humidity is positively correlated with the abundance of aphid. Devi *et al.* (1995) suggested that due to increase in mean relative humidity during third week of February favored the multiplication on mustard aphid. Contrary results have been reported by Rashid *et al.* (2009) that significant positive effect with minimum, maximum and average temperature whereas mean relative humidity significant negative effect. The same reports have been found by Singh and Singh (1994) and Sinha *et al.* (1989).

During the peak activity of the pest 5th to 9th SMW in 2013-14 the rainfall was noticed to be ranging from 7.62 to 25.40 mm. While during 2014-15 these figures were 0 mm (zero) no rainfall on 5th to 9th SMW. However during both the year non- significant relationship with the pest activity (Table 1 and 2).

Table 1. Seasonal aphid population per plant and influence of weather parameters during Rabi 2013-14 on mustard

SMW	Observation date	Aphid Population Per Plant	Temperature (°C)		Humidity (%)		Rainfall (mm)
			Max.	Mini.	Max.	Mini.	
1	02.1.14	3.35	25.43	13.85	89.42	54.57	0
2	09.1.14	13.10	25.29	14.86	90.71	61.14	0
3	16.1.14	13.82	25.29	14.71	90.14	61.42	0
4	23.1.14	66.28	25.71	15.42	89.57	57.28	0
5	30.1.14	114.41	26.14	14.57	84.28	41.57	0
6	6.2.14	195.97	28.43	13.00	84.42	36.28	7.62
7	13.2.14	208.80	28.43	14.00	81.14	41.71	25.40
8	20.2.14	308.32	26.28	12.85	89.00	48.71	0
9	27.2.14	318.01	27.28	15.71	88.85	56.71	0

10	6.3.14	135.46	26.14	13.43	81.57	55.14	0
11	13.1.14	19.96	29.85	14.71	78.14	53.85	5.08
12	20.3.14	2.81	34.42	16.86	71.85	33.71	0
Correlation Coefficient (r)			NS	NS	NS	NS	NS
			-0.1096	-0.3852	0.1834	-0.1912	0.6437

Table 2. Seasonal aphid population per plant and influence of weather parameters during Rabi 2014-15 on mustard

SMW	Observation date	Aphid Population Per Plant	Temperature (°C)		Humidity (%)		Rainfall (mm)
			Max.	Mini.	Max.	Mini.	
1	5.1.15	3.86	23.14	8.14	83.24	34.57	0
2	12.1.15	12.47	24.14	12.57	89.14	60.42	0
3	19.1.15	6.11	23.79	8.71	88.98	38.76	0
4	27.1.15	48.89	26.71	11	88.97	40.71	0
5	2.2.15	113.93	25.42	11.42	88.71	29.0	0
6	9.2.15	169.53	24.98	10.78	81.67	30.87	0
7	16.2.15	279.81	27.69	16.56	86.95	50.56	0
8	23.2.15	314.52	28.79	19.78	86.76	49.42	0
9	2.3.15	292.62	27.86	15.97	89.82	52.42	0
10	9.3.15	105.51	37.78	21.78	78.58	27.95	0
11	16.3.15	27.78	37.14	16.71	80.71	24.0	0
12	23.3.15	2.98	40.42	18.57	81.28	18.71	0
Correlation Coefficient (r)			NS	NS	NS	NS	
-0.1089			0.4202	0.2367	0.456		

REFERENCES

- Begum, S.** (1995). Insect pests of oilseed crops of Bangladesh. *Bangladesh J. Zool.* 23(2): 153-158.
- Biswas, G.C. and Das, G.P.** (2000). Population dynamic of the mustard aphid, *Lipaphis erysimi* (Kalt.) (Hemiptera: Aphididae) in relation to weather parameters. *Bangladesh J. Entomol.* 19(1 & 2): 15-22.
- Chandra, S. and Kushwaha, K.S.** (1986). Impact of environmental resistance on aphid complex of cruciferous crops under the agroclimatic conditions of Udaipur.I. Abiotic Components. *Ind. J. Ent.*, 48: 495-514.
- Devi, N., Desh Raj and Chandel, Y.S.** (1995). Population dynamic of *Lipaphis erysimi* (Kalt.) on rapeseed in mild hill zone of Himachal Pradesh (India). *J. Ent. Res.*, 49: 367-371.
- Rana, J.S., Khokar, K.S., Singh, H. and Sucheta** (1993). Influence of abiotic environment on the populationdynamic of mustard aphid *Lipaphis erysimi* (Kalt.). *Crop. Res.*, 6: 116-119.
- Singh, D. and Singh, H.** (1994). Correlation coefficient between abiotic biotic factors (Predator and parasitoid) and mustard aphid *Lipaphis erysimi* (Kalt.) population on rapeseed mustard. *J. Aphidol.*, 8: 102-104.
- Singh, S.V. and Malik, Y.P.** (1998). Population dynamic and economic threshold of *Lipaphis erysimi* (Kaltenbach) on mustard. *Ind.J.Ent.*, 60:43-49.
- Sinha, R P., Yazdani, S.S. and Varma, G.D.** (1989). Population dynamic of mustard aphid, *Lipaphis erysimi* (Kalt.) in relation to ecological parameters. *Ind. J. Ent.*, 51: 334-339.