STUDY ON THE POPULATION DYNAMICS OF MUSTARD APHID, *Lipaphis erysimi* (*Kalt*.) IN RELATION TO WEATHER PARAMETERS IN CHITTAGONG

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ABSTRACT

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The population dynamics of mustard aphid, *Lipaphis erysimi* (kalt.) on six variety and germplasm of mustard in relation to weather parameters was studied at Regional Agricultural Research Station, Hathazari, Chittagong during the Rabi 2006-07 crop season. This 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, varietals selection, correct time of pesticide application, etc. The natural appearance of mustard aphid on variety and germplasm of mustard was observed on January 03, 2007 (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, 25.86 and 19.72 respectively and a mean relative humidity of 88.86% on 24th January at 71 DAS. Then, decline in aphid population. Correlation coefficient (r) showed a positive effect with minimum, maximum and average temperature. Whereas mean relative humidity showed significantly negative effect.

Key Words: Mustard aphid, *Lipaphis erysimi* kalt., Weather parameters.

INTRODUCTION

Oilseeds occupy an important place in agriculture and industrial economy (Singh *et al*., 1994). Mustard is one of the most important oilseed crops in Bangladesh. Among different insect pests attacking mustard, the mustard aphid (*Lipaphis erysimi* kaltenbach) is the most serious and destructive pest and major limiting factor for mustard cultivation (Begum 1995 and Biswas and Das 2000) The rate of reproduction varies from 5 to 9 youngs in a single day by a single female and the total number of youngs produced by the female varies from 76 to 188 (Nair, 1986).

The nymphs and adults of aphids suck saps from leaves, stems, inflorescence and pods as the plant shows stunted growth, withered flower and deformed pod (Butani and Jotwani, 1984; Begum, 1995; Atwal and Dhaliwal, 1997). This pest may reduce about 30-90% yield of mustard without an intervention of any control measure (Rouf and Kabir, 1997). Weather conditions play the most favorable role for its rapid multiplication (Sinha *et al.*, 1989; Rana *et al*., 1993; Singh and Malik, 1998). It has become absolutely imperative that a fresh approach to pest control be undertaken by studying its population fluctuation in relation to agro-cofactors. 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, varietals selection, correct time of pesticide application, etc. Therefore, the present study was formulated to observe the aphid population fluctuation in relation to the weather parameters.

MATERIALS AND METHODS

The experiment was conducted at Regional Agricultural Research Station, Hathazari, Chittagong during Rabi, 2006-07 crop season. Six variety and germplasm of mustard were sown in RCB design with three replications. Plot size was 4x2 m^2. In each plot row to row distance was 40 cm and plant to plant 10 cm which were maintained by thinning. No insecticides were sprayed in the plot. Aphid populations were counted (in situ) from 10 randomly selected plants in each replicated plots on 10 cm twig on January 03, 2007 to February 14, 2007 at 7 days intervals. The meteorological parameters viz. temperature and relative humidity were also recorded during the study period (November, 2006 to February, 2007). The mean values of previous 7 days data of the above parameters were computed for 7th days of observations.

RESULTS AND DISCUSSION

Aphids did not appear till January 02, 2007. Initial level of infestation of mustard aphid was observed on January 03, 2007 (50 days after sowing) at minimum, maximum and average temperature of 14.71, 19.57 and 17.14 ^{o}c and also mean relative humidity of 90.14% (Table -1) with the aphid population varies from 0-10.30 aphids/10 cm twig on different variety and germplasm of mustard and continued up to 2nd week of February at the pod maturity stage (Table -2). At 71 DAS on 24th of January population increases rapidly 31.30-175.50 aphids/10 cm twigs on all variety and germplasm with the increase of 2.58 ^{o}C average temperature and also 1.28% reduction in mean relative humidity as compared to 50 DAS. The present findings are in agreement with the reports of Singh and Malik (1998) that the increase in temperature was significantly conducive for aphid multiplication but relative humidity has shown negative response on its intensity. On 24th of January at 71 DAS the peak was obtained ranging from 31.30-175.50 aphids/10 cm twig at minimum, maximum and average temperature at 13.57, 25.86 and 19.72 respectively and mean relative humidity of 88.86% then after it was declined gradually. Further decrease in population was obtained ranging from 0-16.5 aphids/10 cm twig at 92 DAS with minimum, maximum and average temperature of 9.28, 14.58 and 11.93 and mean relative humidity of 91%. In the present findings, the aphids disappeared after 92 DAS on the mid of February. It is due to the maturation of crop. Identical reports are obtained by Singh and Malik (1998). It was further explained by Singh and Singh (1994) that maturation of crop has created net deficit in water content in plant tissues leading to food scarcity and alate formation in aphid colonies.

Table 1. Meteorological data during the period of infestation at 7 days interval at RARS, Hathazari, Chittagong

Observation date	Crop age (DAS)*	Mean Temperature(^{o}c)			Mean Relative humidity (%)
		Minimum	Maximum	Average	
03.01.07	50	14.71	19.57	17.14	90.14
10.01.07	57	15.57	20.14	17.86	91
17.01.07	64	12.71	25.14	18.93	91.28
24.01.07	71	13.57	25.86	19.72	88.86
31.01.07	78	11.86	21	16.43	91.28
07.02.07	85	9.86	15.43	12.64	90.43
14.02.07	92	9.28	14.58	11.93	91

*DAS-Days after Sowing

Table 2. Mean aphid population on variety and germplasm of mustard

Date of observation	03.01.07	10.01.07	17.01.07	24.01.07	31.01.07	07.02.07	14.02.07
Days After Sowing	50 DAS	57 DAS	64 DAS	71 DAS	78 DAS	85 DAS	92 DAS
Germplasm							
Bari sharisha-11	10.30	57.00	104.47	127.70	44.00	24.90	16.50
Bari sharisha-9	9.40	38.80	144.80	171.60	22.50	2.00	0.00
Daulat	0.00	47.30	138.80	150.60	21.00	2.80	0.20
BCWY-3	0.00	13.70	26.20	31.30	11.80	0.00	0.00
BJ-3	0.00	24.00	129.60	175.50	83.90	10.2	16.00
OTBC-1097	0.00	12.30	80.10	82.10	4.68	4.10	2.00

Mean aphid population/10 cm twig

Correlation coefficient (r) showed a positive effect with minimum temperature, maximum temperature and average temperature (Table 3). Whereas mean relative humidity showed significantly negative effect. Infestation of mustard aphid on different germplasm is largely governed by the average temperature and negatively by mean relative humidity. The same reports have been reported by Singh and Singh (1994). It is in confirmation of earlier reports of Atwal *et al*. (1971) and Sinha *et al.* (1989). Contrary results have been found by Chandra and Kushwaha (1986) that temperature had 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 or mustard aphid. Moreover, Singh and Singh (1994) concluded that abiotic factors Shares 77.69% impact on aphid population. Therefore, it was finally concluded that weather factors play an important role in the abundance of mustard aphid. So, the weather factors are an important tool in forecasting the aphid multiplication and the farmers are forewarned for the management of mustard aphid by various pest management strategies at proper time or mustard crop.

Table-3: Correlation matrix: Effect of weather parameters on aphid population in mustard at RARS, Hathazari, Chittagong

Germplasm	Minimum temperature	Maximum temperature	Average temperature	Mean relative humidity (%)
Bari sharisha-11	0.323	0.885	0.763	-0.380
Bari sharisha-9	0.327	0.898	0.774	-0.435
Daulat	0.334	0.891	0.772	-0.362
BCWY-3	0.397	0.927	0.822	-0.306
BJ-3	0.158	0.870	0.688	-0.374
OTBC-1097	0.238	0.855	0.708	-0.385

Significant at 5% level

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