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Aphid incidence and its correlation with different environmental factors

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Abstract

The aphid incidence and its correlation with environmental factors were studied. Mustard variety “Sampad” was used as test crop. Aphid incidence varied significantly at various parts of mustard plant and time of the day. The highest number of aphid was observed in the vegetative parts of the mustard plant in the morning. High cloudiness, relative humidity and dew point favoured the aphid population and slight rain fall quickly declined the aphid population. Among the different environmental factors maximum temperature, dew point and sun shine hours were positively correlated with aphid population and minimum temperature, relative humidity and wind speed were negatively correlated with aphid population.

Keywords: Mustard aphid, Incidence, Environmental factors

Introduction

In Bangladesh, many types of oilseed crops are grown, which are occupied 556,000 hectares of land and produces about 7,36,000 metric tons of oilseed. Among the oilseed crops mustard ranks the first occupying 72,000 hectares of land with 74,000 metric tons of production (BBS, 2004).

The yield of mustard seed crop in Bangladesh is very low and pest attacks is one of the important factors responsible for such low yield. Among the insects pests, *Lipaphis erysimi* (Kalt.), commonly known as the mustard aphid, is the most destructive one (Rouf and Kabir, 1997). Recent studies reported that the yield loss due to aphid infestation in mustard ranged from 87.16 to 98.16% in Bangladesh (Anon., 1995).

Aphid present throughout the year in the field and its population reaches to peak during December to February, which is the main growing period of mustard (Ekbom, 1995). It infests mustard plants seriously at vegetative, flowering and podding stages. Environmental factors such as temperature, relative humidity, rainfall and total sunshine usually influence the insect population greatly (Kisimoto and Dyck, 1976).

Present experiment was undertaken with a view to find out the aphid incidence at different parts of mustard plant (e.g. vegetative, flowering and fruiting,) and different times of the day (e.g. morning and afternoon). In addition, aphid incidence and its correlation with different environmental factors were studied.

Materials and Methods

The experiment was conducted at the experimental farm of the crop Botany Department, Bangladesh agricultural University (BAU), Mymensingh. Mustard variety “Sampad” was used in the experiment.

Incidence of mustard aphid, *Lipaphis erysimi* (Kalt.) and its population build-up was recorded two times daily to estimate total and mean number of aphid population from 10 selected mustard plants on different parts of plant at different times of the day counting of aphids (nymphs and adults) under natural field condition (Singh and Singh, 1995).

The whole plant was divided into three parts namely vegetative parts (Shoots and Leaves), flowering parts and fruiting parts (Kaher and Ratul, 1992). Each part was observed carefully and number of aphid counted daily two times at 8.00 am and 3.00 am with the help of magnifying lens. During the whole period the daily temperature, rainfall, dew point, sunshine and wind speed data were collected from weather yard, Dept. of Irrigation and water management, BAU, Mymensingh.

The experimental data were analyzed following Completely Randomized Design (CRD) using MSTAT Programme. The Significant means were compared by DMRT. Correlation test was also done.

Results and Discussion

The results of aphid incidence in vegetative, flowering and fruiting parts based on aphid population were counted daily from 19-01-07 to 4-02-07 at different mustard plants and found ranging from 0.00 to 205.6 aphid/10 plant Fig 1. The aphid population significantly differed at $p < 0.01$ among the different parts of mustards plant. The highest number of aphid was found on vegetative part of the plant than the other parts. The mean number of aphid per 10 plants (88.22) was found on vegetative part whereas 32.5 on flowering part and 64.75 on fruiting part of the plant. The highest number of aphid per 10 plants (205.6) was recorded on vegetative part of the plant on 26.01.07 and there after aphid population decreased gradually in all parts of the plants.

These findings supported by the report of Birch (1985), who observed that aphid population varied significantly, highest at the vegetative parts, followed by fruiting and flowering parts. Aphid population becomes higher during vegetative stage has also been reported by Misari *et al.*, (1987) and Jena *et al.*, (1997).

The observation of aphid incidence during morning and afternoon were based on mean aphid population on whole mustard plant and counted separately. The incidence of mustard aphid differed significantly at $p < 0.01$ at different day times (Fig. 2). Significantly higher numbers of aphids were found at morning (98.70) than afternoon (96.22). The highest number of aphid was observed on at morning 26.01.07 which was 227.50. After January 26 aphid population decreased gradually due to environmental factors. No aphid population was observed after 3.2.07 (Fig.1 & 2).

From the above findings it was observed that aphid incidence varied greatly among different day times, higher numbers of aphids were found in the morning than afternoon. This result is particularly similar with the report of Latigo *et al.*, (1985), who reported that aphid number become peak during the morning times from 06.00 to 08.00 hours followed by mid and afternoon.

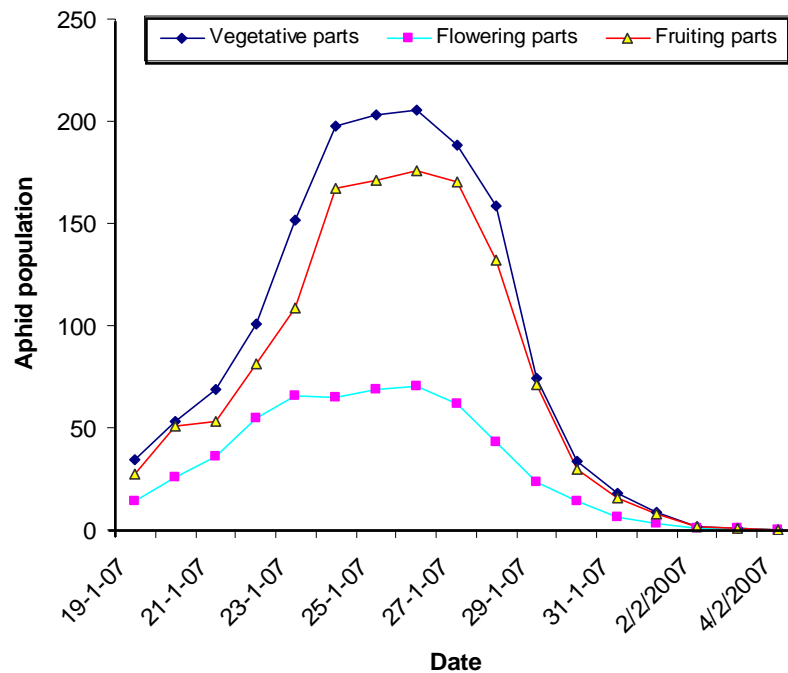


Fig. 1. Mustard aphid population at different parts of the plant from 19-1-07 to 4-2-07

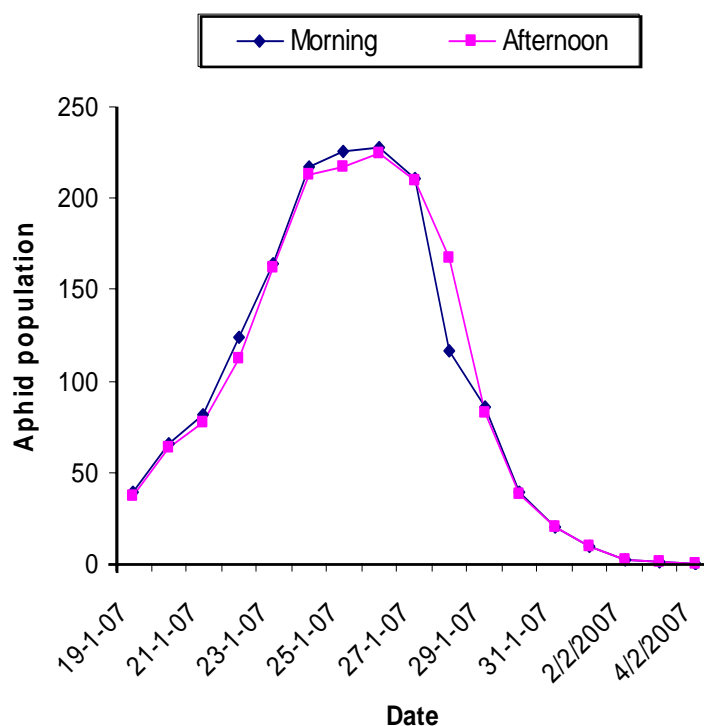


Fig. 2. Aphid population at different times of the day from 19-1-07 to 4-2-07.

During monitoring, it was observed that aphid population varied in mustard ecosystem with the variation of weather parameters. It was observed that trace amount of rainfall, dew point coupled with very low sunshine hours resulted in high cloudiness which favored the aphid incidence. Again aphid population declined with the decreased of average temperature and total sunshine. After February 3 no aphid was observed (Fig. 2).

Kumar *et al.*, (1997) reported that average temperature of 18.06°C (Maximum 22.81° and Minimum 13.31°C) under the influence of high relative humidity with the range from 80.71% to 86.5% provided conducive conditions for aphid incidence.

Correlation (r) coefficient between mean number of aphid and different environmental factors for mustard variety (Sampad) have been evaluated and presented in Table 1. The correlation values showed that environmental factors either positively or negatively correlated with mustard aphid.

Among the environmental factors the maximum temperature and dew point positively correlated with aphid population. The minimum temperature, RH and wind speed has negative influence on the population build up of aphid (Table 1).

Table 1. Correlation coefficient (r) of aphid incidence with different environmental factors

	Temperature			Rainfall	Dew point	Air pressure	Relative humidity	Sunshine	Wind speed
	Maximum	Minimum	Average						
Aphid no. (morning)	0.83*	-0.19**	-0.94	-0.24	0.19**	0.26	-0.50*	0.83**	-0.21**
Aphid no. (afternoon)	0.84*	-0.18**	-0.94	-0.24	0.22**	0.25	-0.52*	0.84**	-0.19**

** = Significant at $P < 0.01$; * Significant at $P < 0.05$

From the above results it was also found that high cloudiness, relative humidity, dew point favoured the aphid incidence and slight rainfall quickly declined the aphid population from the field. This finding is in full agreement with the report of Kisimoto and Dyck (1976); Bakhetia and Sindhu (1983).

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