

Short communication

**Use of agrometeorological indices for forecasting of mustard aphid
(*Lipaphis erysimi* Kalt.)**

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Oilseed crops play an important role in India's economy. The incidence and multiplication of mustard aphid is largely influenced by meteorological parameters like temperature, relative humidity, rainfall, wind speed and cloudiness (Kar and Chakravarty, 2000). Weather based agrometeorological indices can provide clues to management strategies for insect control through minimum use of insecticides and reduced risks of environmental contamination. Keeping this in view, the present study was conducted.

The study was conducted for nine years (1988-89 to 1996-97) at Ludhiana, Punjab, India (30°54' N latitude, 75°48' E longitude and 247 meters above mean sea level). Daily weather data from the Meteorological Observatory Research Farm, Punjab Agricultural University, Ludhiana were collected for crop years (1988-89 to 1996-97). The data on aphid population for the corresponding periods were collected from the Department of Plant Breeding, Genetics and Biotechnology (Oil-seed Section), PAU, Ludhiana. The aphid observations were recorded in Raya (*Brassica juncea*), once weekly on the randomly selected central

shoot of the plant by counting the number of aphids on top 10 cm length of apical shoot.

Growing degree days (GDD) using base temperature of 4.5°C and humid-thermal ratio (HTR) were calculated:

$$\text{HTR} = \text{Relative Humidity (\%)} / \text{Temperature (°C)}$$

Relationship between weekly aphid population and humid-thermal ratio:

The relationship between peak aphid population (Y) and HTR (X) was evaluated by pooling the data from 1988-89 to 1996-97.

$$Y = 6915.10 - 2812 X + 286.71X^2 \quad (R^2=0.42)$$

For peak aphid population, the HTR value ranged between 3.0 to 5.6. With an increase in HTR, the peak aphid population decreased. The relationship between weekly aphid population (Y) and HTR (X) is as follow:

$$Y = 7927.30 - 1409.60 X + 62.646 X^2 \quad (R^2=0.79)$$

The HTR value ranged between 7.0 to 12.5. The R² value was significant at 1 and 5

Table 1: Correlation between accumulated growing degree days (AGDD) and aphid population recorded at different times

Aphid observations	Mean AGDD	Correlation coefficient (r)
First aphid observation	287	0.42
Maximum aphid population	329	0.70*
Last aphid observation	839	0.31

* Significant at 5 % level

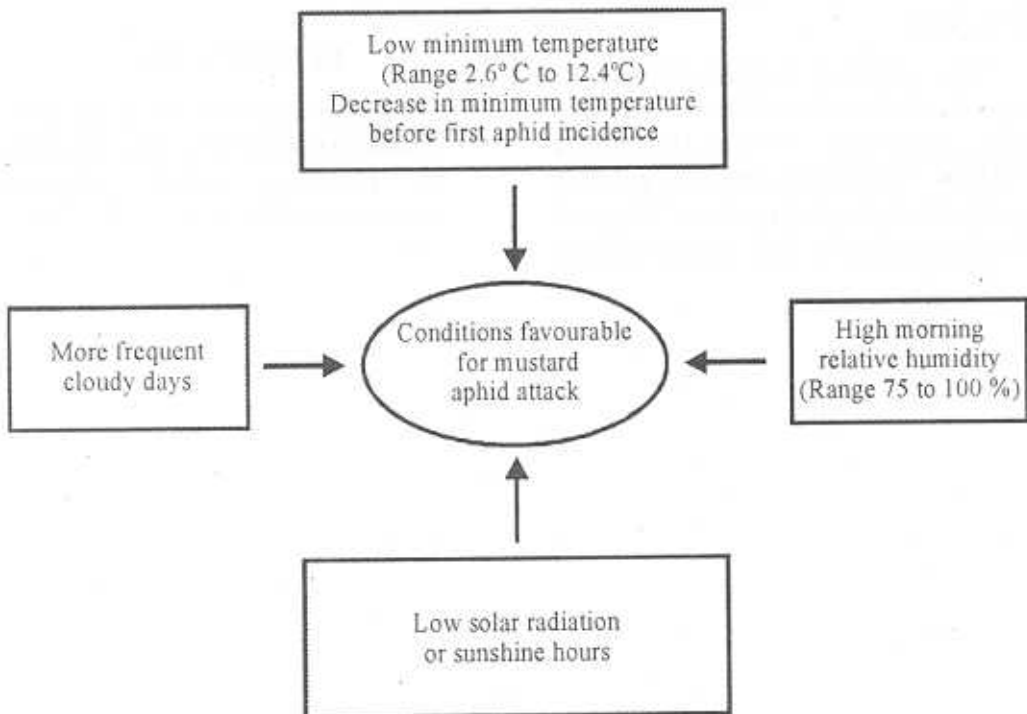


Fig. 1: Pest-weather diagram for mustard aphid 15 days before first aphid incidence during high aphid infestation years (1992-93 and 1996-97)

percent level of significance.

The years 1992-93 and 1996-97 were identified as the high aphid infestation years because during these years the aphid population ranged between 700 to 1300 aphids/plant. HTR was computed for high aphid attack years and the results revealed that the value of HTR ranged from 3.4 to 6.5. The relationship between weekly aphid population (Y) and HTR (X) is:

$$Y = 4817.00 - 1765.60 X + 161.741 X^2 \\ (R^2 = 0.53)$$

Relationship between peak aphid population and accumulated growing degree days:

The growing degree days were accumulated from December 1 for all the years. They were 287 for first aphid incidence, 329 for peak aphid population and 839 for last aphid incidence. The peak aphid population had a significant

correlation (Table 1) with accumulated GDD ($r=0.70$). The relationship developed between GDD (X) and peak aphid population (Y) is as follow:

$$Y = 754.14 - 0.8105 X + 0.001 X^2 \\ (R^2 = 0.75)$$

Based on the historical data, a pest weather diagram (Fig. 1) for mustard aphid (15 days before first aphid incidence) during high-aphid infestation years, revealed that lower minimum temperature, high morning relative humidity, decrease in solar radiation or sunshine hours were most favourable meteorological factors for aphid incidence.

REFERENCES

- Kar G and Chakravarty N V K. 2000. Predicting growth and aphid incidence in *Brassica* under semi-arid environment. *Ind. J. Agric. Sci.* 70(1): 3-7.