



POPULATION DYNAMICS OF MUSTARD APHID AND ITS NATURAL ENEMIES

RAHUL KUMAR, R S SINGH AND NEELAM YADAV*

Department of Entomology, Chandra Shekhar Azad University of Agriculture and Technology,
Kanpur 208002, Uttar Pradesh, India
Email: neelu.amogh@gmail.com (corresponding author)

ABSTRACT

A field experiment was conducted on mustard aphid *Lipaphis erysimi* Kalt. and its natural enemies to document its seasonal incidence over four varieties of mustard during rabi season at the Instructional Farm, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. The aphids appeared in first week of January at the flowering stage, which peaked during 7th standard week were 115.5-155.0, 98.01-121.0, 75.5-108.6 and 55.80-86.49, aphids/ plant on mustard variety Urvashi, Vardan, Varuna and Rohini, respectively. Correlation coefficients of incidence with weather factors have been worked out.

Key words: Mustard, *Lipaphis erysimi*, incidence, natural enemies, weather parameters, seasonal variation, varieties, correlation coefficients, population dynamics

Mustard is an important oilseed crop which is considered to be highly economic important crop for national and international trade. A number of insect-pests are found to be associated with rapeseed-mustard crops in India, which include mustard aphid, *Lipaphis erysimi* Kaltenbach (Homoptera: Aphididae), sawfly, *Athalia lugens* Klug (Hymenoptera: Tenthredinidae), painted bug, *Bagrada hilaris* Burmeister (Hemiptera: Pentatomidae), diamond back moth (*Plutella xylostella* Linnaeus), cabbage butterfly (*Pieris brassicae* Linnaeus), larger moth (*Crociodomia binotalis* Zeller), green peach aphid (*Myzus persicae* Sulzer) etc. (Dhaliwal and Arora, 2006) but mustard aphid is very important among them which may alone prove as limiting factor in the production of mustard. However, this insect-pest can be managed through chemicals, which have been found detrimental for their natural enemies as well as to human health. Therefore, development of ecofriendly techniques in IPM are required and with this in view this study evaluates the seasonal incidence of these.

MATERIALS AND METHODS

Before sowing the mustard, the experimental fields were prepared by ploughing with the soil turning plough-followed by two ploughings with cultivator and levelled. The most popular varieties of Indian mustard in Uttar Pradesh like Varuna, Vardan, Rohini and Urvashi were selected. The trial was conducted in 2.8 x 5m² net plot size replicated thrice with split plot design, with 45 x 10 cm spacing. The occurrence of grubs and adult of

species of *Coccinella septempunctata* predators were recorded on selected plants at weekly intervals. To determine the population dynamics of aphid in relation to weather parameters, aphid incidence was recorded at weekly intervals on 10 randomly selected plants on 10 cm top shoots (Mathur and Singh, 1986b). The meteorological data was obtained from the Department of Agronomy of the University. The seed yield was recorded at harvest. The method for counts of aphids followed All India Co-ordinated Research Project on oilseeds and Bakhietia et al. (1989). The data were analysed for the correlation coefficients ($p=0.05$).

RESULTS AND DISCUSSION

The observations on aphid incidence and weather factors given in Table 1, Figs. 1 and 2 reveal that the aphid *L. erysimi* appeared in first week of January, and reached a peak of 115.5-155.0 aphids plant⁻¹ on Urvashi, 98.01-121.0 on Vardan, 75.5-108.16 on Varuna, and 55.80-86.49 aphids plant⁻¹ on Rohini varieties during 7th standard week in second week of February; and it was nil in the last week of February and first week of March during 2010-11 and 2011-12, respectively. The natural enemies of mustard aphid observed led to the observations on the coccinellid *Coccinella septempunctata*. This appeared during second and third week of February and reached its peak mid-February when the aphid incidence was maximum. Srivastava et al. (1995) observed *L.* towards the end of December on flowering. Rohilla et al. (1996) studied the abundance of Aphidoidea on five rapeseed cultivars,

Table 1. Seasonal incidence of *L. erysimi* on varieties of mustard

Varieties	2010-11												2011-12														
	No. of aphids/ plant						No. of aphids/ plant						No. of aphids/ plant						No. of aphids/ plant								
	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-9	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-9	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-9
Urvashi	2.50 (1.58)	5.95 (2.44)	13.76 (3.71)	21.07 (4.59)	31.02 (5.57)	68.06 (8.25)	115.5 (10.7)	65.12 (8.07)	19.98 (4.47)	5.81 (2.41)	12.60 (3.55)	18.49 (4.30)	26.63 (5.16)	69.39 (8.33)	86.86 (9.32)	155.0 (12.45)	73.96 (8.60)	23.72 (4.87)	5.81 (2.41)	12.60 (3.55)	18.49 (4.30)	26.63 (5.16)	69.39 (8.33)	86.86 (9.32)	155.0 (12.45)	73.96 (8.60)	23.72 (4.87)
Vardan	2.34 (1.53)	3.39 (1.84)	7.24 (2.69)	12.82 (3.58)	22.47 (4.74)	55.80 (7.47)	98.01 (9.90)	48.86 (6.99)	17.22 (4.15)	4.49 (2.12)	10.69 (3.27)	16.73 (4.09)	23.62 (4.86)	51.55 (7.18)	68.06 (8.25)	121.0 (11.0)	58.38 (5.66)	21.81 (4.67)	4.49 (2.12)	10.69 (3.27)	16.73 (4.09)	23.62 (4.86)	51.55 (7.18)	68.06 (8.25)	121.0 (11.0)	58.38 (5.66)	21.81 (4.67)
Varuna	1.80 (1.34)	3.57 (1.89)	7.67 (2.77)	22.66 (4.76)	27.25 (5.22)	44.09 (6.64)	75.5 (8.69)	34.34 (5.86)	11.29 (3.36)	3.65 (1.91)	9.06 (3.01)	13.91 (3.73)	23.33 (4.83)	36.48 (6.04)	58.98 (7.68)	108.16 (7.68)	47.75 (6.19)	13.84 (3.72)	3.65 (1.91)	9.06 (3.01)	13.91 (3.73)	23.33 (4.83)	36.48 (6.04)	58.98 (7.68)	108.16 (7.68)	47.75 (6.19)	13.84 (3.72)
Rohini	1.51 (1.23)	2.96 (1.72)	7.13 (2.67)	22.47 (4.74)	28.20 (5.31)	36.60 (6.05)	55.80 (7.47)	30.69 (5.54)	9.00 (3.00)	2.99 (1.73)	7.40 (2.72)	11.16 (3.34)	17.64 (4.20)	29.05 (5.39)	43.03 (6.56)	86.49 (9.3)	38.19 (6.18)	12.46 (3.53)	2.99 (1.73)	7.40 (2.72)	11.16 (3.34)	17.64 (4.20)	29.05 (5.39)	43.03 (6.56)	86.49 (9.3)	38.19 (6.18)	12.46 (3.53)
SE(d)	0.03	0.97	0.11	0.11	0.12	0.15	0.19	0.17	0.1	0.04	0.08	0.1	0.13	0.18	0.21	0.27	0.14	0.13	0.04	0.08	0.1	0.13	0.18	0.21	0.27	0.14	0.13
CD p=0.05)	0.07	0.2	0.38	0.24	0.27	0.32	0.42	0.37	0.22	0.08	0.16	0.22	0.29	0.39	0.45	0.58	0.31	0.27	0.08	0.16	0.22	0.29	0.39	0.45	0.58	0.31	0.27

Figures in parentheses square root transformed values; SW- standard week

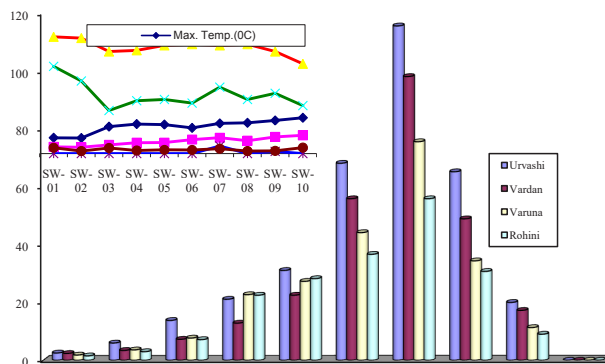


Fig. 1. Population dynamics of *L. erysimi*

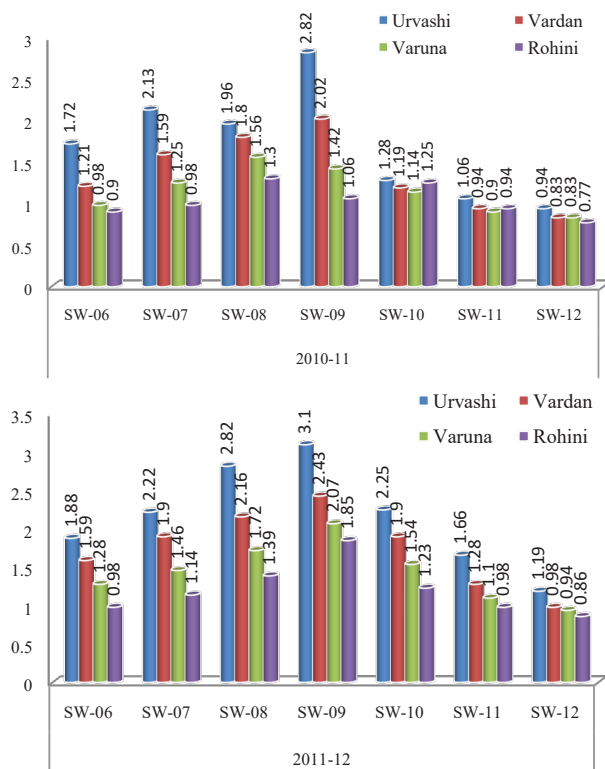


Fig. 2. Population dynamics of *C. septempunctata* in mustard (2010-11 and 2011-12)

and observed that *L. erysimi* appeared on *B. napus* in the 1st and 3rd week of January; and reached peak in the 2nd and last week of February. Singh and Malik (1998) reported its population buildup on *B. juncea* cv. Varuna with beginning of January and peaking in middle of February. Biswas and Das (2000) observed the first aphid infestation on mustard in the first/ third week of January with buildup during January-February, reaching the peak on the 8th February. Panda et al. (2000) reported that the aphid infested the crop from the 5th to the 14th standard week (SW) with its peak during 7th standard week on 70 days old crops. Kumar et al. (2000) reported that the aphid appeared during the second half of January, and rapidly decreased to zero in late February/ early March.

REFERENCES

- Bakhetie D R C, Sekhon B S, Brar K S, Ghorband A W. 1989. Determination of economic threshold of *Lipaphis erysimi* Kalt. on Indian mustard. *Journal of Aphidology* 3 (1-2): 125-134.
- Biswas G C, Das G P. 2000. Population dynamics of the mustard aphid, *Lipaphis erysimi* (Kalt.) (Homoptera: Aphididae) in relation to weather parameters. *Abstracts Bangladesh Journal of Entomology* 10(1/2): 15-22.
- Damodaram T, Hegde D M. 2010. Oilseeds situation: A statistical compendium. Directorate of Oilseeds Research, Hyderabad. 455 pp.
- Dhaliwal G S, Arora G. 2006. Integrated pest management. Kalyani publishers, Ludhiana. pp. 61-62.
- Kumar J, Singh S V, Malik Y P. 2000. Population dynamics and economic status of *Lipaphis erysimi* on mustard *Brassica juncea*. *Indian Journal of Entomology* 62(3): 253-259.
- Mathur Y K, Singh S V. 1986b. Population dynamics of *Myzus persicae* Sulzer and *Lipaphis erysimi* Kalt. on rapeseed and mustard in Uttar Pradesh. *Journal of Oilseeds Research* 3(2): 246-250.
- Panda D, Thakur B S, Patro B. 2000. Population dynamics of *Lipaphis erysimi* (Kalt.) on *Brassica juncea* L. at Raipur, Madhya Pradesh. *Plant Protection Bulletin Faridabad* 52(3/4): 28-30.
- Rohilla H R, Singh H, Yadava T P. 1996. Seasonal abundance of aphid pests on rapeseed-mustard crops. *Annals of Agri Bio Research* 1 (1/2): 75-78.
- Singh S V, Malik Y P. 1998. Population dynamics and economic threshold of *Lipaphis erysimi* on mustard. *Indian Journal of Entomology* 60(1): 43-49.
- Srivastava A, Singh H, Thakur H L. 1995. Impact of abiotic factors on the population dynamics of mustard aphid, *Lipaphis erysimi* (Kalt.) (Homoptera: Aphididae). *Abstracts Journal of Oilseeds Research* 12 (2): 197-202.

(Manuscript Received: November, 2020; Revised: January, 2021;
Accepted: January, 2021; Online Published: April, 2021)
Online published (Preview) in www.entosocindia.org Ref. No. e20259