



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SPI: 1375-1378

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Population fluctuation of *Lipaphis erysimi* (Kalt) on mustard crop in Western U. P.

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Abstract

The field experiment was conducted in randomized block design with three replications of eight treatments for a crop season of the year i.e. "Rabi 2015-16" at entomological research block of crop research centre, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut - 250110 (U.P.), India. In extensive during study, the population of *Lipaphis erysimi* (Kalt), on mustard crop. The data showed that population of *L. erysimi* appeared in last week of December i.e. 51st standard week and continued till last week of March i.e. 13th standard week. The pest populations recorded as number of aphids per 10 cm main apical shoot. The aphid population was low during the 51st standard week of the December to 3rd week of January which varied between 2.50 to 7.50 aphids. The pest population increased from third week of January and reached its peak during 7th standard week i.e. third week of February. During this period the weather parameters like mean temperature and relative humidity ranged from 12.10 °C to 16.20 °C and 80.2 to 71.70 per cent, respectively. The pest population declined thereafter and varied from 18.50 to 65.25 aphids/10cm main apical shoot. During this period mean temperature and relative humidity ranged from 12.10 °C to 16.20 °C and 81.20 to 71.70 per cent, respectively. The population of aphids suddenly decreased in the last week of March (12th standard week) and last week of March (13th standard week).

Keywords: Population fluctuation, mustard crop

Introduction

Mustard, *Brassica juncea* (Linnaeus), belongs to family cruciferae so that oilseed crops play an important role in agricultural economy of India. It constitutes the second largest agricultural product in the country next to food grains. India holds first position as a grower, producer, importer and exporter of vegetable oils in the world scenario. source of edible oil and vegetable for human as well as cakes for animals. Aurvedic Samhitas describes the use of 'Sarson' in India. In Sanskrit literature, 'Sorson' seeds have been described as antiseptic (Das, 1997). Rapeseed-mustard (*Brassica* spp.) are the major *Rabi* oilseed crops, grown over an area of 6.34 million hectare with a production of 7.82 million tones and productivity of 1234 kg/ha in 2012-13 in India (Thomas *et al.*, 2014).

Rajasthan is the largest mustard seed producing state in India accounting for over 45 per cent share in Indian mustard seed production followed by UP (15 per cent), M.P. (11 per cent). It also account for over 40 per cent of acreage. According to latest, data released from Department of Agriculture, Govt of Rajasthan, as on 2nd Nov, 2015, area under Rape & Mustard is pegged at 11.77 lakh hectares (lh) which is lower by 2.93 lh or 20 per cent lower compared to last years' sowing data. In 2015-16 *Rabi* season, Rajasthan has target to plant about 27 lakh hectares (lh) of Rape & Mustard. (Anonymous 2015-16)

Several insect-pests attack and cause damage to these crops. About 38 insect species were reported to be associated with the *Brassica* oilseed crops (Bakhetia and Sekhon, 1989). Out of which, mustard aphid, *Lipaphis erysimi* (Kalt.) Mustard sawfly, *Athalia proxima* (Klug). Painted bug, *Bagrada hilaris* (Kirk). Leaf miner, *Chromatomyia horticola* (Goureau) and Bihar hairy caterpillar, *Spilarctia obliqua* (Walker) are the pests of major importance. Among these, *L. erysimi* is one of the most destructive insect (Rai, 1976). On heavy infestation, aphids are largely congregated underside of leaves, they curling and yellowing them and plants fail to develop pods, if young pods develop do not produce healthy seeds and also resulting plant to loss their growth (Mamun *et al.*, 2010). The yield loss in rapeseed-mustard also varies with their germplasms and agro-ecological practices (Ansari *et al.*, 2007).

However, the excessive use of the chemical insecticides is not desirable because of its residual effects on the food chains. Hence, there is a need for continuous evaluation of chemicals against pest and safety to the non-target species. Now a day's many new emerging chemicals

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are available in the market with good efficacy for pest control and safety to non-target organism. Therefore, it is necessary to test the efficacy of such new chemicals at specific time which fit well in pest management programme. Keeping these points in view, the present study was efficacy of bio pesticides and novel insecticides for control of *Lipaphis erysimi*.

Materials and Methods

The present investigation on Efficacy of bio-pesticides and novel insecticides against mustard aphid, *Lipaphis erysimi* (Kalt.) in western U.P.” was carried out from Rabi 2015-16 in order to explore better developing management against this pest on aphid. The details field experiment was carried out during Rabi 2015-16 at Crop Research Centre (C.R.C), Chirauri farm, S. V. Patel Univ. of Agri. & Tech., Meerut (U.P.) India.

General Geographical and Meteorological information

Topologically, district Meerut is situated between 29° 17, N latitude and 77° 42, longitude at an altitude of 237 meter above mean sea level in sub-region of upper gangetic plains. This region falls under western plain zone of Uttar Pradesh with subtropical and semi arid climate having very hot summer and severe cold winters. The maximum temperature is about 45 °C during summer and a minimum temperature is 4-5 °C and below during winter. An average rainfall in this area is about 863 mm, of which 75-80 per cent is through south-west monsoon, during july to September. The weather data pertaining to the crop season from November to March, 2015-16, as recorded from the meteorological observatory of IIFSR (Indian Institute of Farming System Research, Modipuram) is depicted in Table-1 and Figure-1.

Standard evaluation system for aphids

0	=	Plant free from aphid infestation
1	=	Aphids present but colonies not built up. No injury due to pest appearance on plant
2	=	Small colonies of aphids present on leaves of plant. Such leaves exhibit slight curling due to aphid feeding
3	=	Large colonies of aphids present on leaves and others parts, damage symptoms visible due to aphid feeding
4	=	Most of the leaves covered with aphid colonies and the plant shows more damage symptoms due to aphid feeding.
5	=	The plant completely covered with aphid colonies, plant growth hindered due to feeding (Stunting)

The average aphid index will worked out by using following equation :

$$0N+ 1N +2N+ 3N + 4N+ 5N$$

$$\text{Average aphid index} = \frac{\text{Total number of plants observed}}{\text{Total number of plants observed}}$$

Where,

0, 1, 2, 3, 4, 5 are the aphid index.

N = Number of plants showing respective aphid index.

Estimation of mustard aphid population

To record the aphid population, ten plants were randomly selected and tagged. The aphid population was recorded on these selected plants, starting with the appearance of the aphids till the harvesting of the crop. The observation for recorded on 4th January, 2015 and other observation were recorded at weekly intervals. The observation for recording the aphid population was confined to only top 10 cm of the central shoot on each plant. Further, 5 Plants from each row

were selected to record the average height of the plant, average number of branches per plant and pod size of each tested variety.

The scales comprised (based on 0-5 grades) are

High tolerant	=	0.1-1.0
Tolerant	=	1.1-2.0
Moderately tolerant	=	2.1-3.0
Susceptible	=	3.1-4.0
Highly susceptible	=	4.1-5.0

Counting scale of aphids population.

Aphid population	Scale	Aphid reaction
1-20 mean no. of aphid/10 cm. inflorescence.	0.1-1.0	High tolerant
21-50 mean no. of aphid/10 cm. inflorescence.	1.1-2.0	Tolerant
51-100 mean no. of aphid/10 cm. inflorescence.	2.1-3.0	Moderately tolerant
100-150 mean no. of aphid/10 cm. inflorescence.	3.1-4.0	Susceptible
> 150 mean no. of aphid/10 cm. inflorescence.	4.1-5.0	Highly susceptible

Result

Buildup of *Lipaphis erysimi* (Kalt) in relation to abiotic factor

The population of *Lipaphis erysimi* (Kalt), on mustard crop along with meteorological observations during Rabi 2015–2016 has been presented in Table 2 and Figure 2. The data showed that population of *L. erysimi* appeared in last week of December i.e. 51st standard week and continued till last week of March i.e. 13th standard week. The pest populations recorded as number of aphids per 10 cm main apical shoot see the The aphid population was low during the 51th standard week of the December to 3rd week of January which varied between 2.50 to 7.50 aphids. The pest population increased from third week of January and reached its peak during 7th standard week i.e. third week of February. During this period the weather parameters like mean temperature and relative humidity ranged from 12.10 °C to 16.20 °C and 80.2 to 71.70 per cent, respectively. The pest population declined thereafter and varied from 18.50 to 65.25 aphids/10cm main apical shoot. During this period mean temperature and relative humidity ranged from 12.10°C to 16.20°C and 81.20 to 71.70 per cent, respectively. The population of aphids suddenly decreased in the last week of March (12th standard week) and last week of March (13th standard week).

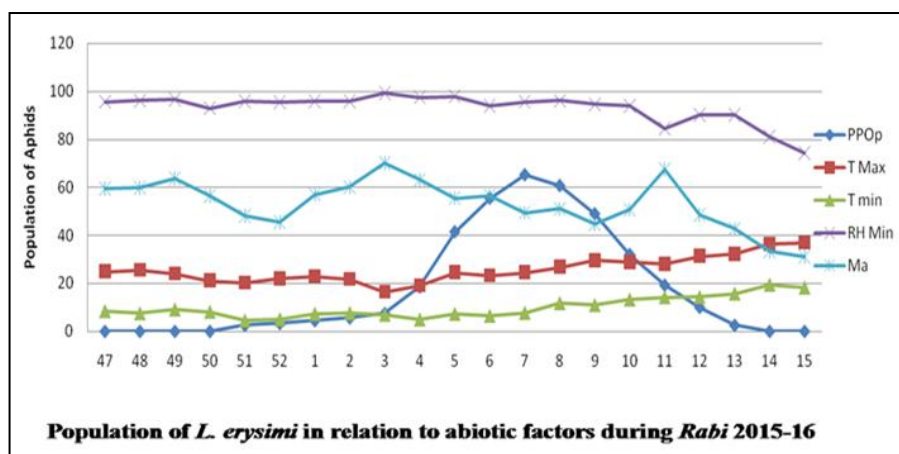
These observations are in agreement with the earlier findings of Kumar Kantipudi Rajesh *et.al.*, (2013) Singh and Rawat (1983) seasonal incidence of mustard aphid showed sparse population of adult winged aphid from the first week of January and it multiplied slowly till third week of February, then declined and disappeared in the first or second week of March. Awasthi (1993). Ahuja (1990) studies on population dynamics of mustard aphid on Indian mustard crop revealed that the insect appeared in late December, which increased gradually and reached at peak level between 26th January and 1st February during 1985-86, while in the next year during 1986-87 it appeared in early January and the population of mustard aphid reached at its peak between 22nd and 26th February in Rajasthan. Also reported that aphids appearance commenced from fourth week of December.

Table 1: Population of *L. erysimi* in relation to abiotic factors during *Rabi* 2015-16

S.W.	Period	Mean aphid/Population/10 cm main apical shoot	Weather parameters						
			Temperature ° C			Relative humidity (%)			Rainfall (mm)
			Max.	Min.	Mean	Max.	Min.	Mean	
47	20 Nov.- 26 Nov.	00.00	25.00	8.5	19.0	95.6	59.5	75.0	00.00
48	27 Nov.- 03 Dec.	00.00	25.60	7.6	19.1	96.0	60.0	78.4	00.00
49	04 Dec.- 10 Dec.	00.00	24.00	9.2	16.6	96.6	63.7	79.9	00.00
50	11 Dec.- 17 Dec.	00.00	21.20	8.2	14.7	92.9	56.5	76.6	00.00
51	18 Dec.- 24 Dec.	02.50	20.30	4.6	12.5	95.7	48.2	70.6	00.00
52	25 Nov.- 31 Dec.	03.25	22.00	5.1	13.5	95.5	45.6	70.6	00.00
1	01 Jan. - 07 Jan.	04.50	22.90	7.4	15.2	95.8	57.1	76.3	00.00
2	08 Jan.- 14 Jan.	05.60	21.70	7.7	14.7	95.8	60.2	78.0	00.00
3	15 Jan. - 21 Jan.	07.50	16.50	7.0	11.8	99.2	70.2	83.0	00.00
4	22 Jan. - 28 Jan.	18.50	19.10	5.0	12.1	97.4	63.2	81.2	00.00
5	29 Jan. - 04 Feb.	41.50	24.60	7.4	16.0	97.8	55.6	76.5	00.00
6	05 Feb. - 11 Feb.	55.50	23.20	6.5	14.9	93.9	56.5	77.2	01.00
7	12 Feb.- 18 Feb.	65.25	24.60	7.8	16.2	95.6	49.5	71.7	00.00
8	19 Feb. - 25 Feb.	60.75	26.80	11.8	19.3	96	51.1	73.4	00.00
9	26 Feb.- 4 Mar.	49.00	29.60	11.0	20.3	94.5	44.9	70.5	00.00
10	5 Mar.- 11 Mar.	32.00	28.80	13.3	21.1	93.9	50.7	72.6	05.40
11	12 Mar.- 18 Mar.	19.25	28.10	14.3	21.2	84.5	67.4	80.7	14.80
12	19 Mar.- 25 Mar.	10.00	31.40	14.4	22.9	90.0	48.6	66.6	00.00
13	26 Mar.- 1 Apr.	02.50	32.20	15.8	24.0	90.0	42.8	66.4	00.00
14	02 Apr.- 8 Apr.	00.00	36.40	19.5	28.0	81.2	33.5	57.4	01.20
15	09 Apr. - 15 Apr.	00.00	36.90	18.3	27.6	74.3	31.2	52.8	00.00

Table 2: Weather data during *Rabi* 2015-16

S.W.	Period	Weather parameters						
		Temperature ° C			Relative humidity (%)			Rainfall (mm)
		Max.	Min.	Mean	Max.	Min.	Mean	
47	20 Nov.- 26 Nov.	25.00	8.5	19.0	95.6	59.5	75.0	00.00
48	27 Nov.- 03 Dec.	25.60	7.6	19.1	96.0	60.0	78.4	00.00
49	04 Dec.- 10 Dec.	24.00	9.2	16.6	96.6	63.7	79.9	00.00
50	11 Dec.- 17 Dec.	21.20	8.2	14.7	92.9	56.5	76.6	00.00
51	18 Dec.- 24 Dec.	20.30	4.6	12.5	95.7	48.2	70.6	00.00
52	25 Nov.- 31 Dec.	22.00	5.1	13.5	95.5	45.6	70.6	00.00
1	01 Jan. - 07 Jan.	22.90	7.4	15.2	95.8	57.1	76.3	00.00
2	08 Jan.- 14 Jan.	21.70	7.7	14.7	95.8	60.2	78	00.00
3	15 Jan. - 21 Jan.	16.50	7.0	11.8	99.2	70.2	83	00.00
4	22 Jan. - 28 Jan.	19.10	5.0	12.1	97.4	63.2	81.2	00.00
5	29 Jan. - 04 Feb.	24.60	7.4	16.0	97.8	55.6	76.5	00.00
6	05 Feb. - 11 Feb.	23.20	6.5	14.9	93.9	56.5	77.2	01.00
7	12 Feb.- 18 Feb.	24.60	7.8	16.2	95.6	49.5	71.7	00.00
8	19 Feb. - 25 Feb.	26.80	11.8	19.3	96.0	51.1	73.4	00.00
9	26 Feb.- 4 Mar.	29.60	11.0	20.3	94.5	44.9	70.5	00.00
10	5 Mar.- 11 Mar.	28.80	13.3	21.1	93.9	50.7	72.6	05.40
11	12 Mar.- 18 Mar.	28.10	14.3	21.2	84.5	67.4	80.7	14.80
12	19 Mar.- 25 Mar.	31.40	14.4	22.9	90.0	48.6	66.6	00.00
13	26 Mar.- 1 Apr.	32.20	15.8	24.0	90.0	42.8	66.4	00.00
14	02 Apr.- 8 Apr.	36.40	19.5	28.0	81.2	33.5	57.4	01.20
15	09 Apr. - 15 Apr.	36.90	18.3	27.6	74.3	31.2	52.8	00.00

**Fig 1:** Population fluctuation of *Liphaphis earysimi* during *rabi* 2015-16

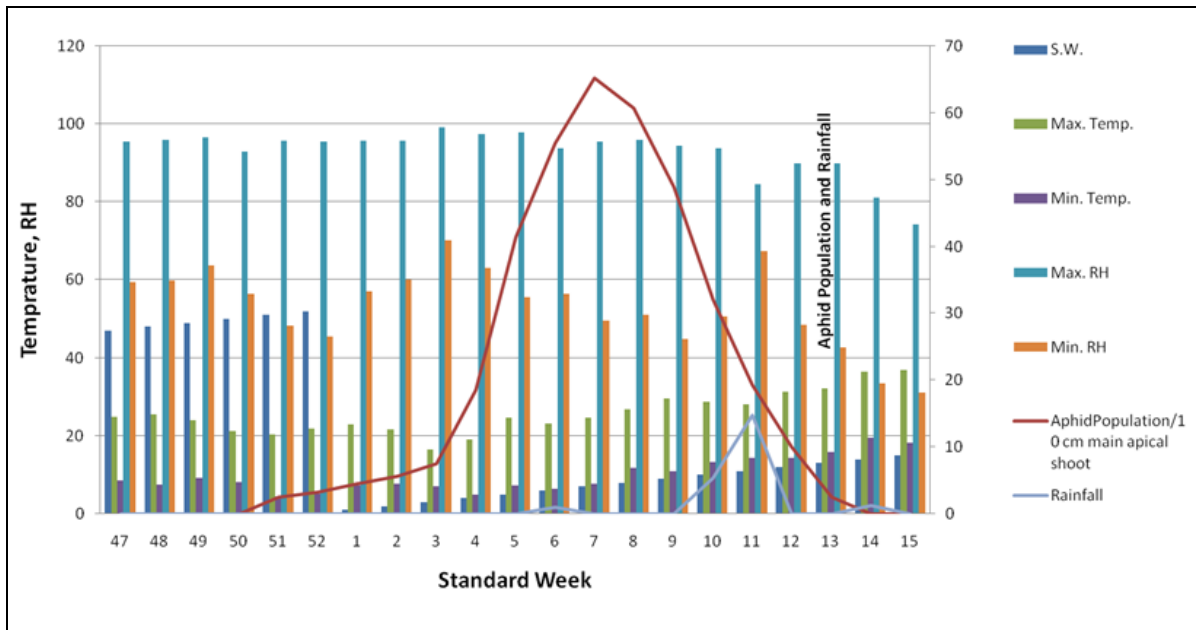


Fig 2: Weather data during Rabi 2015-16

Conclusion

The population of *L. erysimi* appeared in last week of December i.e. 51st standard week and continued till last week of March i.e. 13th standard week. The pest populations recorded as number of aphids per 10 cm main apical shoot. The aphid population was low during the 51st standard week of the December to 3rd week of January which varied between 2.50 to 7.50 aphids. The pest population increased from third week of January and reached its peak during 7th standard week i.e. third week of February. During this period the weather parameters like mean temperature and relative humidity ranged from 12.10 °C to 16.20 °C and 80.2 to 71.70 per cent, respectively. The pest population declined thereafter and varied from 18.50 to 65.25 aphids/10cm main apical shoot. During this period mean temperature and relative humidity ranged from 12.10 °C to 16.20 °C and 81.20 to 71.70 per cent, respectively. The population of aphids suddenly decreased in the last week of March (12th standard week) and last week of March (13th standard week).

References

1. Ahuja DB. Population dynamics of mustard aphid, *Lipaphis erysimi* (Kalt.) on Indian mustard, *Brassica juncea*. J. Pl. Prot. 1990; 18(2):233-235.
2. Anonymous. Annual Progress Report of All India Coordinated Research Project on Rapeseed and Mustard. National Research Centre on Rapeseed Mustard, Sewar, 3213003, Bharatpur, Rajasthan. 2014, 4-5.
3. Anonymous. Annual Progress Report of All India Coordinated Research Project on Rapeseed and Mustard. National Research Centre on Rapeseed Mustard, Sewar, 3213003, Bharatpur, Rajasthan. 2015-16, 155.
4. Ansari MS, Barkat H, Quzi NS. Influence of abiotic environment on the population dynamics of mustard aphid, *Lipaphis erysimi* (Kalt.). J Bio. Sci. 2007; 7(6):993-996.
5. Awasthi CJ. Incidence of mustard aphid, *Lipaphis erysimi* (Kalt.) in arid-zone, Uttar Pradesh. J Zool. 1993; 13:31-32.
6. Bakheta DRC, Sekhon BS. Insect-pests and their management in rapeseed-mustard. J Oilseeds Res. 1989; 6:269-299.
7. Kumar KR, Sachan SK, Singh DV. Bio-efficacy of some new insecticides against mustard aphid, *Lipaphis erysimi* (Kalt.) and their effect on coccinellid population in rapeseed mustard. Journal article. 2013; 26(2):159-163.
8. Mamun MSA, Ali MH, Ferdous MM, Rahman MA, Hossain MA. Assessment of several mustard varieties resistance to mustard aphid, *Lipaphis erysimi* (Kalt.). J Soil Nat. 2010; 4:34-38.
9. Rai BK. Pests of oilseed crops in India and their control. I.C.A.R., New Delhi, 1976, 131.
10. Singh OP, Rawat KR. Seasonal incidence and toxicological studies on *Lipaphis erysimi* (Kalt.) and its parasites, *Aphidius* spp. in Madhya Pradesh, India, Pranikee 1983; 4:259-267.
11. Thomas L. Strategies for enhancing rapeseed mustard production in rajsthan DRMR, Sewar, Rajasthan, 2014, 44.