



## THE SCREENING OF MUSTARD VARIETIES RESISTANCE AGAINST MUSTARD APHID *LIPAPHIS ERYSIMI* KALT

S.A. Dwivedi<sup>1</sup>, R.S. Singh<sup>2</sup>, S.K. Gharde<sup>1</sup>, A.M. Raut<sup>1</sup> and Ajay Tomer<sup>3</sup>

<sup>1</sup>Department of Entomology, Lovely Professional University Punjab-144411

<sup>2</sup>Department of Entomology, C.S. Azad University of Agriculture and Technology Kanpur, Uttar Pradesh-208002

<sup>3</sup>Department of Plant pathology, Lovely Professional University Punjab-144411

Email address of corresponding author: sunil.21186@lpu.co.in

### Abstract

The field experiment was carried out at student instructional farm of C.S. Azad University of Agriculture and Technology, Kanpur during rabi season 2013-14 and 2014-15 to know the screening of mustard varieties resistance against mustard aphid. The screening of eight varieties of Indian mustard against aphid but not a single variety was resistant to the aphid. The effect show that plant sap feeder most destructive pest; *Lipaphis erysimi* (Kalt) appeared from germination till maturity of the crop. The incidence of aphid start on eight varieties eight week after sowing the peak period of aphid population third week of February, and maximum population found on the variety Varuna 285.7 aphid/10 cm top shoot portion and minimum population on the variety Rohini 110.5 aphids/10 cm apical shoot on the 3<sup>rd</sup> week of February. Overall maximum mean population of mustard aphid found on variety Varuna and minimum found on variety Rohini during 2013-14. The next year maximum population found on the second week of February on variety Varuna 281.3 aphids/10 cm apical shoot, and minimum found on variety Rohini 86.3 aphid/10 cm apical shoot on that week. Overall maximum mean population found on variety Varuna and minimum on variety Rohini during 2014-15. On the basis aphid infestation index (AII) at full flowering stage and at full pod formation stage found varieties Varuna and Vaibhav susceptible to the aphid incidence and Vardan, Uravasi, Maya, Ashirvad and Pitambari were found moderately resistant to aphid and variety Rohini found resistant to the aphid incidence which may be used as a check experimental material for screening of varieties resistant to aphid during both year.

**Keywords:** Resistant, Mustard aphid, Susceptible and varieties.

### Introduction

Mustard (*Brassica spp.*) is a most important edible oilseed crop in Northern India is the second largest producer of this crop in the world. Oilseed crop is an important group of crops in India. *Brassica* species comprise different types of Indian mustard [*Brassica juncea* (L.) Czern. & Coss.], toria (*B. rapa* L. var. *toria*), yellow sarson (*B. rapa* L. var. *yellow sarson*), brown sarson (*B. rapa* L. var. *brown sarson*), swedes/ gobhi sarson (*B. napus* L.), Abyssinian mustard/ karan rai (*B. carinata* Braun.) and rocket/ taramira (*Eruca sativa* Mill.) related genera, which are found in India, are black mustard/ banarsi rai (*B. nigra* Koch), white mustard (*Sinapis alba* L.), wild mustard (*B. tournefortii* Gouan) and candrasura (*Lepidium sativum* L.) a close relative. *Brassica* the main source of edible oil after groundnut in both productivity and production (Ali *et al.*, 2010). Oilseed crops include groundnut, sesame, rapeseed mustard, sunflower, safflower and soybean. There has been great emphasis on screening of those mustard varieties which are less prone to the attack of aphid and have some degree of tolerance to this noxious pest. Produce healthy seeds and their effect show plant increase canopy and flower portion plant became susceptible for attack different kinds of pests and growth of plant become stunted (Husain and Begum, 2009) Cultivation of resistant or tolerant varieties is the very effective and cheapest method of cultural control to save mustard crop from insect pests. Due to screening resistance variety/germplasm against aphids get increase of production in aphid-infested area and save environment from insecticidal residues. Field assessment also helpful to found the resistance varieties against aphid attack (Dey *et al.*, 2005).

### Material and Method

A field experiment was carried out for determining relative resistance of eight variety of Indian mustard during

2013-14 and 2014-15. Seed of these varieties/germplasm were obtained from the Department of Genetic and Plant Breeding. The experiment was conducted in R.B.D with 3<sup>rd</sup> replications on October 15<sup>th</sup>. A buffer area of one meter was left between two varieties. Screening of strains was done on the basis of aphid infestation index at the flowering and pod setting stage of each variety. Aphid infestation indices were calculated as described by Bakhietia and Sandhu (1973).

**Aphid infestation index:** The scoring of plants done on the basis of following grade:

1. The free from aphid infestation plant showing excellent growth even if a single apterous aphid was found on any portion of the plant considered as infested.
2. Normal plant growth, leaf have not curls but changing in colour from greenish to yellowish of leaves except for only a few aphids along with small symptoms of injury, good flowering and pod setting on almost all twigs.
3. Average growth of plant, leaf shape got curls and yellowing of a few leaves average flowering and pod setting on almost all the twigs. Small aphid colonies found on a few twigs and topical shoot
4. Growth less than average, curling and yellowing of leaves on some branches. Plant show some stop the growth. Less number of flowering and little pod setting aphid colonies on almost all the twigs.
5. Plants growth was very poor, large number of curling and yellowing of the leaves, stunted plant growth little flowering and only few pods formed. Heavy aphid colonies on plants.
6. Heavy infestation affect plant growth become almost stunted condition, curling leaf show crackling and

yellowing of almost all the leaves. No flowering, no pod formation and plant full of aphid.

- The plants of each variety were examined and given suitable grades. To work out the index, the number of plants falling in each grade was multiplied by the respective grade number. The total was divided by the plant population in each replication of the variety. The mean index was worked out after totaling the figures of three replications. Separate indices were estimated at the full of flowering and full of pod setting stages. Finally the indices of these two stages were pooled and a mean infestation index of different variety was calculated according to below Table-1

**Table 1 :** Grading according to aphid infestation index scale

Sr. No	Grading	Aphid Infestation index
1	0	Highly resistant
2	0-1	Resistant
3	1-2	Moderately Resistant
4	2-3	Moderately Susceptible
5	3-4	Susceptible
6	4-5	Highly Susceptible

## Results and Discussion

Eight varieties of mustard aphid were screened to find out the degree of resistance /susceptibility against mustard aphid, *Lipaphis erysimi* Kalt. at weekly intervals (WAS), starting with the incidence of aphid population till harvesting of mustard crop. The result of eight varieties entries of mustard, screened against mustard aphid, *Lipaphis erysimi* Kalt. were presented in the table 2 and 3. It is evident from the table aphid population was observed 8-18 WAS during Rabi 2013-14 and 8-19 WAS during second year 2014-15. The population of aphid ranged from 0.0 to 5.6 aphid /10cm shoot on test varieties at first week of incidence at 8 WAS and significant difference were observed among the test varieties. The lowest population was recorded on Rohini and Urvashi which statistically differed significant from remaining six test varieties. Next category of test varieties on which aphid population was 1.5, 3.1, 3.1, 4.1, 4.3 and 5.1 aphids/shoot were Uravasi, Maya, Pitambari, Vardan, Ashirvad and Vaibhav respectively. They were significant to rest two varieties but non-significant among themselves. Urvashi was at par to all but significant to remaining test varieties. The highest population of aphid *i.e.* 5.6 on Varuna was non-significant from remaining varieties.

At 9 week after sowing the minimum population was observed on Rohini *i.e.* 1.7 aphids/10cm shoot was significant to all other varieties Urvashi variety having aphid population 2.5 which was non-significant but significant to rest of the varieties. The maximum aphid population was recorded on Varuna 9.9 aphids/shoot which did not significantly differ to Maya having 9.5 aphids/shoots but differed significantly from rest of varieties viz. Vardan, Pitambari, Ashirvad and Vaibhav. The population count at 10WAS revealed significant difference among the test varieties as shown in table-3 the lowest population was noticed on Rohini variety 2.9 aphids/ shoot. Followed by varieties Urvashi and Vardan having 6.2 and 8.3 aphids /shoot they were at par among each other but significantly superior to five test varieties . The highest population was observed on the Varuna 21.7 which differed significantly to

all test varieties followed by Vaibhav (18.5 aphids/shoot) and Maya (17.5 aphids/shoot) which were significantly different to Varuna having highest population of aphid. After 11 was significant difference among the test varieties was observed. The minimum population was recorded on Rohini (3.7 aphids/shoot), Urvashi (8.9 aphids/shoot) and Vardan (12.2 aphids/shoot) which were significantly differ from each other and rest of other varieties. Maximum aphid was recorded on Varuna (31.2 aphids/ shoot) which was significant to rest varieties. (Fig-4a)

The population of aphid on test varieties at 12WAS is presented in table-2 the minimum population was appeared on variety Rohini 17.5 aphids/shoot was significant to all test varieties. Next in order of minimum pest population were two varieties Pitambari and Urvashi 29.3 and 35.3 aphids/shoot This was inferior to Rohini but superior to other all remaining varieties but similar to each other statistically. Highest population of aphid was recorded on Varuna 86.5 aphids/shoot which was at par with Vaibhav, Vardan, Maya and Ashirvad having 85.3, 65.4, 65.2 and 59.1 aphids/ shoot respectively. The remaining varieties were significantly to Varuna. At 13 WAS varieties differed significantly with respect to aphid incidence. The maximum population recorded on Varuna 186.5 aphids/shoot, which was significantly superior to all test varieties. The lowest population 96.5 aphids/shoot was notice on Rohini which statistically significant to all varieties followed by Uravasi having aphid population 98.2 aphids/ 10 cm apical shoot. (Fig-4b)

The peak population of aphid reached at 14 WAS as shown in table- 8 in this week lowest population was recorded on Rohini having 110.5aphids/shoot, which was statistically significant to rest seven varieties followed by Uravasi and Pitambari having aphid population 141.3 and 175.2 aphids/shoot respectively. Varuna with 285.7 aphid /shoot was at to Vaibhav having 270.4 aphids/shoot harboured maximum number of aphid. The remaining varieties elicited intermediary population. The populations of aphid gradually decreased after 14 WAS and at 15 WAS minimum aphids were noticed on Rohini 50.3aphid/shoot, which was significant to rest varieties. Next in order of significance were varieties with population recorded 60.3 and 96.3 aphids/ shoot on Urvashi and Ashirvad respectively, which did not differ significantly to each other but significant to rest varieties. Maximum aphid recorded on Varuna 180.3 aphids /shoot which was at par with Vaibhav, Vardan and Maya but significant to remaining varieties (Table No-2, Fig-4b).

At 16 WAS, population decreased minimum population was noticed on Rohini 35.3 aphids/shoot followed by Urvashi and Ashirvad having 37.2 and 42.1aphids/shoot respectively, which was significant to each other and to the remaining varieties. The maximum population was noticed on Varuna 75.3 aphids/shoot, which was at par to Vaibhav and Maya but significant to rest of varieties. At 17 WAS, aphid population continuous to decreased minimum population noticed on Rohini 10.3aphids/shoot followed by Pitambari and Urvashi having 11.3 and 16.5 aphids/shoot respectively, which was significant to each other and to the remaining varieties. The maximum population was noticed on Varuna 35.3aphids/shoot which was at par to Vaibhav and Maya but significant to rest of varieties. Aphid population was recorded in lowest 18 WAS. In this week minimum

population was observed on Rohini 2.1aphid/shoot which was significant over all varieties tested. The highest population was observed on Varuna 9.1aphids/shoot which was significant to rest all the varieties. (Table No-2, Fig-4c)

**Table 2:** Screening of mustard varieties against Mustard Aphid (2013-14)

Sr. No	Treatment	Population count no/10cm shoot Standard week and date of observation											Overall mean
		8	9	10	11	12	13	14	15	16	17	18	
DOB		5	12	19	26	2	9	16	23	2	9	23	
		JAN	JAN	JAN	JAN	FEB	FEB	FEB	FEB	MARCH	MARCH	MARCH	
1	Varuna	5.6 (2.47)	9.9 (3.22)	21.7 (4.71)	31.2 (5.63)	86.5 (9.33)	186.5 (13.67)	285.7 (16.92)	180.3 (13.45)	75.3 (8.71)	35.3 (5.98)	9.1 (3.10)	84.2
2	Vardan	4.1 (2.15)	6.2 (2.59)	8.3 (2.96)	12.2 (3.56)	65.4 (8.12)	132.2 (11.52)	250.3 (15.84)	125.1 (11.21)	56.2 (7.53)	21.2 (4.66)	4.4 (2.22)	62.3
3	Vaibhav	5.1 (2.36)	8.2 (2.95)	18.5 (4.36)	37.2 (6.14)	85.3 (9.26)	128.7 (11.37)	270.4 (16.46)	150.5 (12.29)	72.3 (8.54)	32.5 (5.74)	3.1 (1.89)	73.8
4	Uravasi	1.5 (1.41)	2.5 (2.73)	6.2 (2.59)	8.9 (3.07)	35.3 (5.98)	98.2 (9.93)	141.3 (11.91)	60.3 (7.83)	37.2 (6.14)	16.5 (4.12)	4.1 (2.15)	37.4
5	Maya	3.1 (1.90)	9.5 (3.16)	17.5 (4.22)	23.4 (4.90)	65.2 (8.11)	148.2 (12.19)	195.3 (13.99)	85.3 (9.26)	68.2 (8.29)	23.1 (4.86)	7.3 (2.71)	58.7
6	Ashirvad	4.3 (2.20)	7.2 (2.78)	13.4 (3.73)	22.3 (4.78)	59.1 (7.72)	156.3 (12.52)	185.3 (13.63)	96.3 (9.84)	42.1 (6.53)	18.2 (4.32)	3.1 (1.90)	55.2
7	Rohini	0.0 (0.71)	1.7 (1.48)	2.9 (1.82)	3.7 (2.05)	17.5 (4.24)	96.5 (9.85)	110.5 (10.54)	50.3 (7.13)	35.3 (5.98)	10.3 (3.29)	2.1 (1.61)	30.0
8	Pitambari	3.1 (1.90)	6.3 (2.61)	9.7 (3.19)	18.5 (4.36)	29.3 (5.44)	143.2 (11.99)	175.2 (13.25)	87.3 (9.37)	49.5 (7.07)	11.3 (3.43)	6.1 (2.57)	49.0
SEm±		0.03	0.02	0.02	0.06	0.02	0.02	0.1	0.03	0.02	0.03	0.01	0.02
CD at 5%		0.10	0.09	0.08	0.2	0.06	0.06	0.4	0.10	0.08	0.11	0.04	0.07

### The population of *Lipaphis erysimi* on test varieties appeared during 2014-15

At 8 WAS population was found in same order as observed in the first year. The minimum population was recorded on Rohini and Urvashi which were found free from aphid population and were significant to remaining all test varieties. The maximum population was counted on Varuna 6.1 aphid/shoot which was at par with Ashirvad having 5.1aphids/shoot it was significant to all remaining varieties. The population count on eight test varieties at 9 WAS revealed that there was no aphid incidence on Rohini and was significant to all tested varieties followed by Urvashi with 0.2 aphids/shoot which was significantly superior to test varieties. Highest population was recorded on Varuna 8.3 aphids/shoot which at par to Maya 7.4 aphids/shoot but significantly superior to rest of varieties. At 10 WAS the minimum population was recorded on Rohini 3.1 aphids/shoot followed by Urvashi 7.5 aphids/shoot were significant to rest varieties and maximum population observed on Varuna 25.7 aphids/shoot at par with Ashirvad and Vaibhav having 24.3 and 23.7 aphid/shoot it was significant to all varieties (Table -3, Fig. 5a)

In the fourth week of observation at 11WAS the lowest populations of 9.4 and 10.4 aphids/shoot were recorded on Rohini and Urvashi which were superior to all. Next in order to lowest population were Vardan and Pitambari which were at par but significant to rest varieties. The highest population was recorded on Varuna and Ashirvad 48.5 and 48.3 aphid /shoot. Rest of varieties better than Varuna and Vardan. At 12 WAS minimum population observed on Rohini 17.5 aphids/shoot was significantly superior to all variety. This was followed by Urvashi, Vardan and Ashirvad were found

to be statistically significant to the rest varieties. The maximum population was recorded on Varuna and Vaibhav 111.3 and 107.1 aphids/shoot which were at par to each other but significant to rest varieties.

At fifth week of observation on aphid population 13WAS was recorded on Rohini and Urvashi 45.1 and 48.5aphids/shoot which were significant to each other and remaining test varieties. The highest population of aphid record on Varuna 185.0aphids/shoot followed by Vaibhav 180.2 aphids/shoot which was significant over control. The population observed at 14 WAS on test varieties were presented in Table-3. The lowest population of aphid counts on variety Rohini 86.3 aphids/shoot which was significantly different from all varieties. Urvashi and Vardan also infested lower aphid population 95.1 and 98.4 aphid/shoot which were at par to each other but significantly superior to rest varieties. The highest population count on Varuna 281.3 aphids/shoot followed by Vaibhav 231.3 aphids/shoot. The population recorded remaining varieties decreasing in order were Maya, Ashirvad, and Pitambari having aphid population 210.5, 195.3 and 191.1aphids/shoot which differ significantly from Varuna. It was peak aphid infestation week (Table -3, Fig-5a).

At 15 WAS the population started decreasing as shown in Table-3. The minimum population recorded on Rohini 59.1 aphids/shoot which was significantly superior to all varieties followed by Urvashi and Vardan. The maximum population recorded as 235.3 aphids/shoot on Varuna. At 16 WAS minimum aphid population recorded on Rohini and Urvashi having 25.3 and 32.3 aphids/shoot respectively which were statistically at par significant superior to rest varieties. The highest population recorded on Varuna 170.5

aphids /shoot. At 17 WAS the maximum population recorded on Varuna 55.3 aphids/shoot which statistically significant to all test varieties followed by Vaibhav 34.1aphids/shoot. Vardan, Maya and Ashirvad having aphid population 25.5, 24.5 and 23.8 aphids/shoot respectively at par with each other the lowest population counts on Rohini 8.5 aphids/shoot which was significant to all tested varieties. The last observation of aphid population was at 18 WAS in which minimum aphid population was recorded on Rohini and Urvashi having 2.1 and 3.1 aphids statistically at par with each other but significant to rest of the varieties. Maximum aphid population count on Varuna and Vaibhav 18.7 and 13.1 aphids/shoot respectively did not differ significant to each other. The population ranged from 6.1 to 9.0 aphids/shoot on

remaining varieties Ashirvad, Vardan, Maya and Pitambari which did not differ significantly among themselves but significantly superior to Varuna and Vaibhav (Table -3, Fig-5b).

Response to eight selected varieties to aphid was observed based on aphid infestation index (AII) at flowering and pod formation stages. AII of eight mustard Varieties ranged from 0.29 to 2.8 and 0.26 to 3.5 at flowering stage during 2013-14 and 2014-15 respectively. The lowest AII was recorded on Rohini 0.29 and 0.26 during both years. The highest AII was recorded Varuna Vaibhav Vardan and Maya having 2.8-3.5, 2.7-3.3, 1.7-2.8and 2.7-2.8 during 2013-14 and 2014-15. Rest of the varieties had intermediary AII in the Table-4

**Table 3:** Screening of mustard varieties against Mustard Aphid (2014-15)

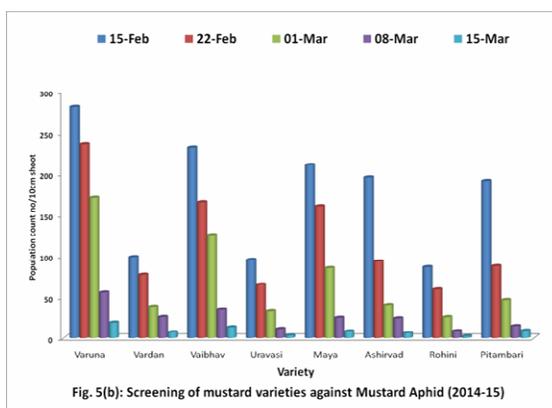
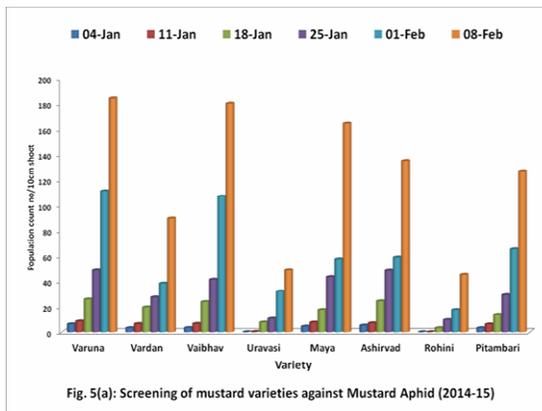
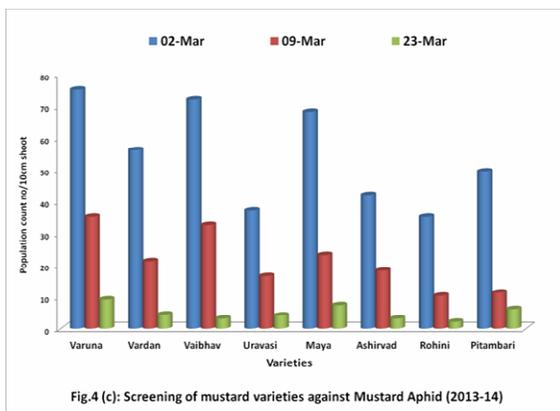
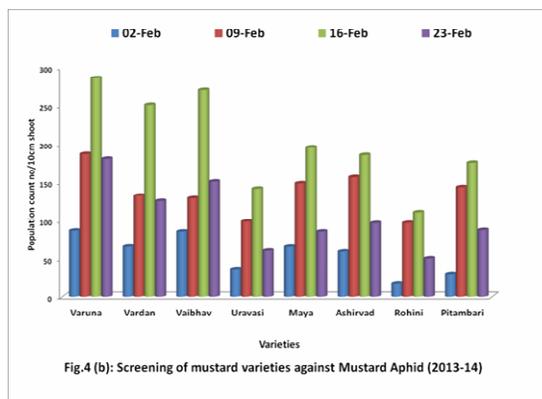
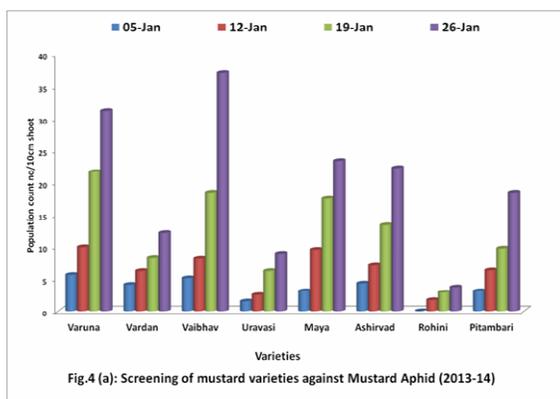
Sr.No	Treatment	Population count no/10cm shoot Standard week and date of observation											Over all mean
		WAS	8	9	10	11	12	13	14	15	16	17	
DOB		4 JAN	11 JAN	18 JAN	25 JAN	1 FEB	8 FEB	15 FEB	22 FEB	1MARCH	8 MARCH	15 MARCH	
1	Varuna	6.1 (2.57)	8.3 (2.97)	25.7 (5.12)	48.5 (7.00)	111.3 (10.57)	185.0 (13.62)	281.3 (16.71)	235.3 (15.35)	170.5 (13.08)	55.3 (7.47)	18.7 (4.38)	104.2
2	Vardan	3.1 (1.90)	6.3 (2.61)	19.5 (4.47)	27.3 (5.27)	38.3 (6.23)	90.1 (9.52)	98.4 (9.95)	77.1 (8.81)	38.3 (6.24)	25.5 (5.10)	7.1 (2.76)	39.1
3	Vaibhav	3.2 (1.92)	6.4 (2.62)	23.7 (4.92)	41.3 (6.47)	107.1 (10.37)	180.2 (13.42)	231.3 (15.23)	165.1 (12.87)	125.1 (11.21)	34.1 (5.88)	13.1 (3.69)	84.6
4	Uravasi	0.0 (0.71)	0.2 (0.83)	7.5 (2.83)	10.4 (3.30)	32.1 (5.71)	48.5 (7.00)	95.1 (9.71)	65.1 (8.10)	32.3 (5.73)	11.1 (3.40)	3.1 (1.90)	27.7
5	Maya	4.3 (2.20)	7.4 (2.82)	17.5 (4.24)	43.3 (6.62)	57.5 (7.61)	165.1 (12.87)	210.5 (14.53)	160.3 (12.68)	85.1 (9.25)	24.5 (5.00)	8.1 (2.93)	71.2
6	Ashirvad	5.1 (2.36)	6.9 (2.72)	24.3 (4.98)	48.3 (6.99)	58.9 (7.71)	135.1 (11.64)	195.3 (13.99)	93.1 (9.67)	40.3 (6.39)	23.8 (4.93)	6.1 (2.57)	57.8
7	Rohini	0.0 (0.71)	0.0 (0.71)	3.1 (1.90)	9.4 (3.15)	17.5 (4.24)	45.1 (6.75)	86.3 (9.32)	59.1 (7.72)	25.3 (5.08)	8.5 (3.00)	2.1 (1.61)	24.2
8	Pitambari	3.1 (1.90)	6.0 (2.55)	13.7 (3.77)	29.1 (5.44)	65.3 (8.11)	127.1 (11.29)	191.1 (13.84)	87.5 (9.38)	46.3 (6.84)	14.5 (3.87)	9.0 (3.00)	53.8
SE(m±)		0.01	0.02	0.04	0.04	0.01	0.01	0.00	0.02	0.02	0.04	0.05	0.00
CD at 5%		0.03	0.08	0.13	0.12	0.05	0.04	0.01	0.06	0.06	0.13	0.16	0.01

Note: Figures in parenthesis are under root x+0.5 Transformed value, WAS- Week After Sowing, DOB- Date of Observation

**Table 4:** Aphid infestation index of different varieties of mustard crop Aphid infestation index (0-5 scale)

Sr. No.	Varieties	2013-14		Overall	2014-15		Overall	Grading
		At full flowering stage mean	At full pod formation stage mean		At full flowering stage mean	At full pod formation stage mean		
1.	Varuna	2.8	3.9	3.3	2.8	3.9	3.3	S
2.	Vardan	1.8	1.4	2.5	2.5	3.1	2.8	MR
3.	Vaibhav	2.7	3.9	3.2	2.7	3.4	3.0	S
4.	Uravasi	1.3	2.8	2.0	1.9	2.3	2.1	MR
5.	Maya	2.7	3.2	2.9	2.8	3.1	2.9	MR
6.	Ashirvad	2.0	3.1	2.5	2.5	3.2	2.8	MR
7.	Rohini	0.29	1.6	0.94	0.26	1.5	0.88	R
8.	Pitambari	2.7	3.2	2.9	2.1	3.2	2.6	MR

S-Susceptible, MR-Moderately resistance and R-Resistance



At full pod formation stage AII of Rohini was recorded as 1.5-1.6 during both years as minimum. Highest AII was recorded on Varuna Vaibhav Vardan and Maya having 3.9-3.3, 3.4-3.7, 3.3-3.1 and 3.2-3.1 during both years. Based on overall AII, variety viz., Rohini was highly resistant, showing AII of 0.94-0.88 during 2013-14 and 2014-15 respectively. Two varieties Varuna and Vaibhav were found to be susceptible to mustard aphid and AII of these varieties were 3.3- 3.7 and 3.0-3.5 during 2013-14 and 2014-15 respectively. Rest five varieties viz. Vardan, Uravasi, Maya, Ashirvad and Pitambari were found moderately resistant, as their AII were 2.5-2.9, 2.0-2.1, 2.9-2.9, 2.5-2.8 and 2.9-2.9 during 2013-14 and 2014-15 respectively.

In this experiment eight varieties were screened out for resistance against mustard aphid *Lipaphis erysimi* in field under pesticides free condition during 2013-14 and 2014-15. None of the varieties was found free from the aphid infestation at 14WAS the population of aphid was at its peak on different varieties. The lowest population was recorded on Rohini and Uravasi variety and maximum number of

population was observed on variety Varuna and Vaibhav during both years. (Table -2 and 3 ) in agreement with our result Chaudhary and Pal (2009) reported that the aphid population attained peak level from 7<sup>th</sup> to 9<sup>th</sup> standard week, Saxena *et al.* (1995) found lowest yield loss in Rohini which have least aphid infestation which support present finding. Vardan, Uravasi, Maya, Ashirvad, and Pitambari found moderately resistant and Varuna and Vaibhav have highly susceptible to the aphid infestation but literature seems to be silent on any such report Srivastava *et al.* (1996) and Jat *et al.* (2007) screened out mustard germplasm against mustard aphid and mild susceptibility in Vaibhav variety, Lal *et al.* (1997) and Chaudhary and Patel (2016) observed Vaibhav variety as a susceptible variety which is in agreement to the present work on the basis Aphid Infestation Index (AII) Rohini categorized highly resistant and Varuna and Vaibhav were proved most susceptible against *Lipaphis erysimi* and rest of the varieties were found to be moderately susceptible against mustard aphid Hussain *et al.* (2015) observed different germplasm of mustard against aphids but not a

single variety found highly resistant it was similar to my work. The variety Agrani can be regarded moderately resistant to mustard aphid. The variety BARI Sarisha-9, BINA Sarisha-6, SS75, Sofol and BARI Sarisha-6 can be regarded as moderately susceptible; Tori-7 and SAU Sarisha-1 can be graded as susceptible to aphid infestation that was similar to my worked conducted in Kanpur area different varieties. Yadav *et al.* (2015) and Islam *et al.* (2017) were observed certain promising germplasm of Brassica spp. against aphids in field condition but no germplasm was found to belong to highly susceptible group while no germplasm was observed as highly resistance to the mustard aphid attack and Accession no. 491128 (13.64) showed minimum population on the plant as compared to the check Varuna (111.05) while accession no. showed population 491041 (267.00) higher than the test. These result was similar to my result highest population in same variety Varuna 285.7 and 281 in 14 WAS both year respectively.

### References

- Ali, A. and Rizvi, P.Q. (2011). Screening of different cultivars of rapeseed–mustard against mustard aphid, *Lipaphis erysimi* (Kalt.) with respect to sowing dates. *Asian Journal of Plant Sciences*, 10(8): 383-392.
- Bakhetia, D.R.C. and Sandhu, R.S. (1973). Differential response of *Brassica* species/varieties to the aphid *Lipaphis erysimi* Kalt. infestation. *Journal Research Panjab Agric. Univ.* 10(3): 272-279.
- Chaudhary, R.L. and Patel, C.C. (2016). Screening of Brassica germplasm for resistance to mustard aphid *Lipaphis erysimi* Kalt. *International Journal of plant protection*, 9(1): 62-67.
- Choudhury, S. and Pal, S. (2009). Population dynamics of mustard aphid on different Brassica cultivars under terai agro-ecological conditions of West Bengal. *Journal of Plant Protection Sciences*, 1(1): 83-86.
- Hossain, M.A.; Ali, M.R.; Begum, F. and Akhter, N. (2015). Screening of some mustard varieties against aphid Ann. *Bangladesh Agric.*, 19(2): 23-33.
- Jat, S.L.; Jat, B.L. and Choudhary, R.K. (2007). Screening of different mustard varieties for resistance against mustard aphid *Lipaphis erysimi* Kalt. *Journal of Oilseed Research*. 24(1): 212-214.
- Lal, M.N.; Singh, S.A. and Singh, V.P. (1997). Relative susceptibility of Brassica germplasm to mustard aphid *Lipaphis erysimi* Kalt. *Indian journal of Entomology*, 59(4): 369-373.
- Saxena, A.K.; Bhaduria, S.S.; Gadlwadkar, P.N.; Battaria, A.M.; Tomar, S.S. and Dixit, S.C. (1995). Yield losses in some improve varieties of mustard by mustard aphid *Lipaphis erysimi* Kalt. *Agriculture science digest (Karnal)* 75 (4): 235-237.
- Srivastava, A.; Singh, H. and Thakur, H.L. (1996). Assessment of avoidable yield loss caused by green peach *Myzus persicae* Sulzer and mustard aphid, *Lipaphis erysimi* Kalt. in Brassica. *Indian journal of plant protection*, 24(1-2): 115-116.
- Yadav, U.; Mishra, V.K. and Singh, C.P. (2015). Screening of certain promising germplasm of Brassica spp. against *Lipaphis erysimi* Kalt *International Journal of Agriculture, Environment and Biotechnology*, 8(4): 981-989.