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Screening of different mustard varieties for their susceptibility to the painted bug

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Abstract

The experiment was conducted at Agriculture Research Station and Laboratory in the Department of Entomology, College of Agriculture, Bikaner during *rabi*, 2016-17. Ten varieties of mustard were screened for their relative susceptibility against *Brassica cruciferarum* indicated that three varieties *viz.*, RGN-145, RGN-303 and RGN-73 were found less susceptible, whereas, three varieties NRCBH-101, Vasundhra and Laxmi were found highly susceptible. The remaining varieties RGN-236, RGN-229, RGN-48 and Pusa bold were found moderately susceptible against painted bug.

Keywords: Mustard, painted bug, susceptibility and varieties

Introduction

Rapeseed and mustard are important oilseed crops belong to the family cruciferae and occupy prominent place among oilseed crop being next to soyabean in India. The word "rape" and "mustard" have been derived from the Latin word "*rapum*" meaning turnip and European practice of mixing the sweet "must" of old wine with crushed seeds of black mustard, *Brassica nigra* (L.) to form a hot paste, respectively (Hemingway, 1976) [3].

The oil content in mustard seed ranges from 32-42 per cent. Besides, uses as edible oil, the seeds and oil are also used as condiment in preparation of pickles, flavorings, curries and vegetables. The cake is usually used as cattle feed and to some extent it is also used as organic manure. The young plants and their leaves are often used as green vegetables.

In India, the factors responsible for low and unstable yield are poor plant population, inadequate fertilization and vulnerability to insect-pests and diseases. Amongst these, the incidence of insect-pests is of immense importance (Bakhetia and Sekhon, 1986; Singh and Malik, 1993) [1, 7]. About 50 insect species have been found infesting rapeseed-mustard in India (Sharma and Singh, 2010) [5]. Among which, painted bug is a serious pest of rapeseed mustard and found active during seedling (October-November) (Vora *et al.*, 1985) [11] to harvesting stage (March-April) (Singh and Malik, 1993; Singh, 1996) [7, 8].

The painted bug has been active throughout the year and infests various crucifer crops during winter, where it causes considerable damage (Singh *et al.* 1993) [9]. The pest incidence at seedling stage resulted into complete failure of the mustard crop necessitating re-sowing (Bakhetia and Sekhon, 1986; Singh *et al.*, 1993) [1, 9]. Both nymphs and adults suck cell sap from leaves at seedling stage and developing pods, which gradually wilt and dry up. Leaves of young plants develop white spots due to bugs feeding. Severe attack at seedling stage may even kill the plants and bear a brunt-up look. Both nymphs and adults suck cell sap even in the threshing floor from seeds in the pods. Adult bugs excrete a resinous substance which spoils the pods. The loss attributed at seedling stage due to painted bug attack varied from 26.8 to 70.8 per cent. The attack at the pod formation and maturity stages is much more alarming as it results in losses to the tune of 18.50 to 19.62 per cent in yield (Singh, 2013) [6]. This needs a safer, economical and effective insect pest management system. As such no systematic study on the management of painted bug on mustard in this zone has been conducted.

Materials and Methods

Experiment was laid out in a Randomized Block Design (R.B.D.). The seeds of ten varieties were sown on 27th October, 2016 and each replicated three times. The plot size was 3 x 2.25 m² with row to row and plant to plant distance of 45 and 10 cm, respectively. The recommended mustard varieties were screened for relative susceptibility against painted bug

and were considered as treatments. The population of painted bug was counted on 5 plants. The painted bug population on each plant was observed from 10 cm terminal shoot. The first count of painted bug population was taken at seedling stage after sowing and subsequent observations were taken at a week interval for Rabi season. The population of painted bug was counted visually

Results and Discussion

Screening of ten varieties of mustard was done against painted bug during 2016-17 the data of susceptibility are being presented below:

The data presented in table 2 revealed that none of the variety was found completely free from the attack of painted bug. The infestation of painted bug started two weeks after sowing of mustard crop in all the varieties screened and remained up to 49th standard week (03rd December, 2016 to 10th December, 2016). Thereafter, painted bug population disappeared on all the varieties during vegetative stage of the mustard crop. The population of painted bug reappeared from 5th standard week (28th January, 2017 to 04th February, 2017) and gradually increased up to 10th standard week (04th March, 2017 to 11th March, 2017) of the year 2017 where the crop was harvested on 11th March, 2017. The data presented in table 2 indicate that a significant difference existed in the population of painted bug on 8th, 9th and 10th standard week where maximum level of population was recorded on all the varieties. On 8th standard week the variety RGN-145 (6.67 per plant) registered least population followed by RGN-303 (7.00 per plant) and RGN-73 (7.67 per plant) which were at par to each other and significantly superior to other varieties. Maximum painted bug population was recorded on variety Laxmi (11.60 per plant) followed by NRCBH-101 (11.40 per plant) and Vasundhra (11.07 per plant). All these varieties were at par to each other; however, the populations of these varieties were comparable to the population of RGN-48 (10.80 per plant), RGN-229 (10.60) and Pusa Bold (10.47 per plant). The population ranging from 9.67 to 10.80 painted bug per plant was recorded on the variety RGN-236 (9.67 per plant), Pusa Bold (10.47 per plant), RGN-229 (10.60 per plant) and RGN-48 (10.80 per plant).

The variability of susceptibility recorded in mustard varieties on the 8th standard week was in the order of Laxmi>NRCBH-101 >Vasundhra> RGN-48>RGN-229 >Pusa Bold > RGN-236 > RGN-73>RGN-303 > RGN-145.

On 9th standard week minimum population of painted bug was observed on variety RGN-145 (10.47 per plant) followed by RGN-303 (10.60 per plant) and RGN-73 (10.93 per plant). All these three varieties were statistically at par and significantly superior to rest of the varieties, However, the population of RGN-73 (10.93 per plant) was comparable to those of RGN-236 (12.13 per plant) and RGN-48 (12.27 per plant). The maximum population of painted bug was recorded on variety Laxmi (13.73 per plant) followed by Vasundhra (13.27 per plant) and NRCBH-101 (13.13 per plant). All these three varieties were comparable to each other, however, the population on these varieties was at par with the population of RGN-229 (12.73 per plant) and Pusa Bold (12.87 per plant). The population ranging from 12.13 to 12.87 was recorded on the varieties RGN-236 (12.13 per plant), RGN-48 (12.27 per

plant), RGN-229 (12.73 per plant) and Pusa Bold (12.87 per plant).

The variability of susceptibility recorded in mustard varieties on the 9th standard week was in the order of Laxmi>Vasundhra>NRCBH-101 Pusa Bold > RGN-229 > RGN-48>RGN-236 > RGN-73>RGN-303 > RGN-145. The population on 10th standard week on different varieties revealed significant difference among themselves. The variety RGN-303 (12.40 per plant) was significantly superior to rest of the varieties and registered. Minimum population followed by RGN-145 (12.60 per plant) and RGN-73 (13.00 per plant). The varieties RGN-73 (13.00 per plant) was also comparable to that of RGN-229 (14.13 per plant). The population ranging from 14.13 to 15.27 was recorded on RGN-229 (14.13 per plant), RGN-236 (14.20 per plant), Pusa Bold (14.87 per plant) and RGN-48 (15.27 per plant) which were comparable to each other. All these four varieties were significantly inferior to RGN-303 (12.40 per plant), RGN-145 (12.60 per plant) and RGN-73 (13.00 per plant) and superior to Vasundhra (16.00 per plant), NRCBH-101 (16.00 per plant) and Laxmi (16.33 per plant). The maximum population was recorded on Laxmi (16.33 per plant) followed by NRCBH-101 (16.00 per plant) and Vasundhra (16.00 per plant).

The variability of susceptibility recorded in mustard varieties on the 10th standard week was in the order of Laxmi>NRCBH-101 >Vasundhra> RGN-48 >Pusa Bold > RGN-236 > RGN-229 > RGN-73 > RGN-145 >RGN-303.

Overall mean of ten observations recorded from painted bug emergence to harvesting of crop, the minimum infestation was recorded on variety RGN-145 (4.09 per plant) followed by RGN-303 (4.11 per plant) and RGN-73 (4.35 per plant). These three varieties were statistically at par to each other. The maximum infestation was recorded on varieties Laxmi (6.62 per plant) followed by Vasundhra (6.43 per plant) and NRCBH-101 (6.38 per plant). These varieties were statistically at par to each other and significantly inferior to all other varieties. The painted bug population recorded on the varieties RGN-236, RGN-48, RGN-229 and Pusa Bold was 5.51, 5.59, 5.75 and 5.76 per plant, respectively. These varieties were found in middle order of their degree of infestation. The variability of susceptibility recorded in mustard varieties based on over all mean of ten observations were in the order of RGN-145 <RGN-303 <RGN-73 <RGN-236 <RGN-48 < RGN-229 <Pusa Bold <NRCBH-101 <Vasundhra <Laxmi.

On the basis of formula ($\bar{X} \pm \sigma$) on peak period of incidence of painted bug three distinct groups were obtained i.e. below 13.02, between 13.02 to 15.94 and above 15.94 per plant. Using this parameter the varieties were categorized as least susceptible, moderately susceptible and highly susceptible. Taking into consideration the above parameter, the varieties RGN-145, RGN-303 and RGN-73 were categorized as least susceptible with a painted bug population as below 13.02 per plants. The varieties RGN-236, RGN-48, RGN-229 and Pusa Bold were categorized as moderately susceptible with painted bug population ranging from 13.02 to 15.94 per plant. The varieties NRCBH-101, Vasundhra and Laxmi were highly susceptible with painted bug population above 15.94 per plant (Table- 1).

Table 1: Categorization of mustard varieties with respect to susceptibility against painted bug

S. No.	Range of painted bug population per plant	Category of varieties	Varieties
1	Below 13.02	Least susceptible	RGN-145, RGN-303 and RGN-73
2	13.02 – 15.94	Moderate susceptible	RGN-236, RGN-48, RGN-229 and Pusa Bold
3	Above 15.94	Highly susceptible	NRCBH-101, Vasundhra and Laxmi

These findings are in agreement with those of Bawaskar *et al.* (2016) [2] who reported RGN-48 as moderately resistant against *B. cruciferarum*. Similarly, Takar *et al.* (2003) [10] reported Pusa Bold as moderately susceptible, against aphid corroborates with the present results. The present findings get support from the work of Jat *et al.* (2008) [4] who registered Pusa Bold as moderately susceptible variety against aphid. The present findings are also in agreement with the results of Imran *et al.* (2013) who registered RGN-236 as moderately susceptible variety against aphid.

The varieties NRCBH-101, Vasundhra and Laxmi harbored maximum number of painted bug and were categorized as highly susceptible in the present investigations; however, do not get support from the result of Jat *et al.* (2008) [4] who registered Laxmi as moderately susceptible variety. The variation in painted bug damage in different varieties screened in different regions may probably be due to difference in agro-climatic conditions, time of sowing and intensity of pest population.

Table 2: Screening of different mustard varieties against painted bug during *rabi* 2016-17

Varieties	Number of painted bug (per plant) at different standard weeks										Mean
	46 th	47 th	48 th	49 th	05 th	06 th	07 th	08 th	09 th	10 th *	
RGN-303	0.93 (1.18)	0.80 (1.14)	0.67 (1.08)	0.73 (1.11)	0.80 (1.14)	3.20 (1.92)	4.00 (2.12)	7.00 (2.73)	10.60 (3.33)	12.40 (3.59)	4.11 (2.15)
RGN-145	0.40 (0.93)	0.87 (1.17)	0.73 (1.11)	0.60 (1.05)	0.80 (1.14)	3.40 (1.97)	4.33 (2.20)	6.67 (2.68)	10.47 (3.31)	12.60 (3.62)	4.09 (2.14)
RGN-73	0.13 (0.79)	0.73 (1.11)	0.80 (1.14)	0.67 (1.07)	0.93 (1.20)	3.80 (2.07)	4.87 (2.32)	7.67 (2.85)	10.93 (3.38)	13.00 (3.67)	4.35 (2.20)
RGN-236	0.80 (1.13)	1.67 (1.46)	1.53 (1.42)	1.60 (1.45)	1.60 (1.45)	4.60 (2.26)	7.27 (2.78)	9.67 (3.17)	12.13 (3.55)	14.20 (3.83)	5.51 (2.45)
RGN-229	0.27 (0.85)	1.40 (1.37)	1.67 (1.47)	1.73 (1.49)	1.47 (1.40)	5.20 (2.39)	8.33 (2.97)	10.60 (3.33)	12.73 (3.64)	14.13 (3.82)	5.75 (2.50)
RGN-48	0.40 (0.94)	1.20 (1.30)	1.20 (1.30)	1.40 (1.37)	1.33 (1.35)	4.47 (2.23)	7.53 (2.83)	10.80 (3.36)	12.27 (3.57)	15.27 (3.97)	5.59 (2.47)
Pusabold	0.53 (0.99)	1.27 (1.33)	1.40 (1.36)	1.67 (1.47)	1.53 (1.42)	4.80 (2.30)	8.20 (2.94)	10.47 (3.31)	12.87 (3.64)	14.87 (3.92)	5.76 (2.50)
Vasundhra	0.80 (1.14)	1.93 (1.56)	1.87 (1.54)	2.07 (1.60)	2.00 (1.58)	5.40 (2.43)	9.87 (3.22)	11.07 (3.40)	13.27 (3.71)	16.00 (4.06)	6.43 (2.63)
NRCBH-101	0.73 (1.11)	1.80 (1.52)	1.93 (1.56)	2.13 (1.62)	1.93 (1.55)	5.40 (2.43)	9.33 (3.13)	11.40 (3.45)	13.13 (3.69)	16.00 (4.06)	6.38 (2.62)
Laxmi	0.53 (1.00)	1.80 (1.52)	2.00 (1.58)	2.20 (1.64)	2.00 (1.58)	6.20 (2.59)	9.80 (3.21)	11.60 (3.48)	13.73 (3.77)	16.33 (4.10)	6.62 (2.67)
SE m ±	-	0.06	0.07	0.07	0.06	0.06	0.07	0.07	0.07	0.05	0.02
CD at 5%	NS	0.18	0.19	0.20	0.17	0.19	0.20	0.20	0.20	0.15	0.06

Figures in parentheses are square root transformed values

NS=Non-significant

* Peak population of painted bug

Conclusion

Ten varieties of mustard were screened for their susceptibility against mustard painted bug. Based on painted bug population, RGN-145, RGN-303 and RGN-73 were found least susceptible registering (below 13.02 bugs per plant), RGN-236, RGN-48, RGN-229 and Pusa bold were found moderately susceptible (between 13.02 to 15.94 bugs per plant), whereas, NRCBH-101, Vasundhra and Laxmi were found highly susceptible against this pest (above 15.94 bugs per plant).

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