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Studies on insect-pests complex in mustard (*Brassica juncea* L.)

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Abstract

The present investigation was carried out at Students' Instructional Farm of Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya during *Rabi*, 2016. Among various *Brassica* oilseed crop mustard is an important *Rabi* oilseed crop, attacked by mustard aphid (*Lipaphis erysimi*), mustard sawfly (*Athalia lugens proxima*), painted bug (*Bagrada hilaris*) and cabbage butterfly (*Pieris brassicae*) insect-pests at different part of plant at different growth stages. The result of present studies revealed that the populations of mustard sawfly appeared at an early stage of crop growth 45th SW of 2016 which continued up to 1st SW of 2017 with varying population ranging from 0.33 grubs/plant to 3.33 grubs/plant. The maximum population of mustard sawfly was recorded as 3.33 grubs/plant in 48th SW of 2016. The 1st occurrence of mustard aphid was recorded during 49th SW of 2016 which continued up to 10th SW of 2017 with varying population ranging from 0.41 to 212.67 aphids/10cm central twig/plant. The peak period of occurrence of mustard aphid was observed in 7th SW of 2017, the maximum population of this insect was recorded as 212.67 aphids/10 cm central twig/plant. The population of painted bug initiated during 2nd SW of 2017 and remained up to 9th SW of 2017. The bug population ranged from 0.33 to 2.67 bugs/plant. The maximum population of bug was recorded as 2.67 bugs/plant in 5th SW of 2017. The other insect-pests (grass hopper, green bug cabbage butterfly, etc.) made its first appearance during 46th SW of 2016 and continued up to 11th SW of 2017 with population varying from 0.33 to 4.00 insects/plant.

Keywords: Mustard, painted bug, mustard aphid, sawfly, spiders, *coccinella spp.* temperature and humidity

Introduction

The mustard is an important oilseed crop belongs to the family Crucifereae. The oilseed crop plays an important role in agricultural economy of India. India is one of the largest mustard growing countries in the world occupying the third position in area and production after China and Canada with 12 % of world's total production. *Brassica juncea* is the second most important oilseed crop in the country after groundnut and accounts for nearly 30.7% of the total oilseed production in the country. India may be the fourth largest producer. India's share in global production of mustard oil in 2015-16 may be around 9.0 per cent. The US and China were the leading importing countries of mustard oil in the world. India was the 7th largest importing country in 2014-15. (Anonymous, 2016a) ^[4]. In India, it had the area of 5.79 million ha with production of 6.28 MT and productivity of 1083 kg/ha. (Anonymous, 2016b) ^[5]. The crop starts flowering in the months of December to January and harvesting season starts mainly from mid- February to April month. There are several insects which cause damage to mustard crops viz., mustard aphid, *Lipaphis erysimi*; mustard saw fly, *Athalia lugens proxima* (Klug.); painted bug, *Bagrada hilaris* (Burm.); pea leaf miner, *Chromatomyia horticola* (Gour.); cabbage butter fly, *Pieris brassicae* (Linn.) and bihar hairy caterpillar, *Spilarctia oblique* (Syn. *Spilosoma obliqua*) (Walker).

Mustard aphid appears during the end of December and remains active up to the end of March. Both nymphs and adults suck the cell sap from different parts of the plant. The mustard aphid alone causes about 9 to 96 per cent losses (Singh *et al.* 2005) ^[10] in seed yield and up to 10 per cent in oil content.

Method and Material

Mustard crop was grown at Student's instructional farm, Kumarganj in *Rabi*, 2016-17 in total 273 m² areas with all agronomical practices. These areas were divided into 3 parts with 10m x 5m area. Each part work as replication.

The incidence of insect pest was recorded on 10 randomly selected plants from each plot of each replication at weekly interval from germination to harvesting stage of the crop by following the mode of observations.

Table 1: Mode of observation of insect-pests and predators

S. No.	Insect-pests/ Predator	Mode of observation
A. Insect- pests		
1.	Mustard sawfly	Number of grubs/plant
2.	Painted bug	Number of bugs/plant
3.	Mustard aphid	Number of aphids/10 cm central twig/plant
B. Predators		
1.	<i>Coccinella spp.</i>	Number of grub and adults/plant
2.	Syrphid Fly	Number of Syrphid Fly/plant
3.	Spiders	Number of Spiders/plant

Results and Discussion

1. Seasonal occurrence of insect-pests of rapeseed-mustard:

Studies on occurrence of insect-pests revealed that altogether there appeared three insect-pests viz., mustard-sawfly, mustard aphid and painted bug during *Rabi* season, 2016-17. The incidence of insect-pests was observed the weekly observation on major insect-pests on mustard starting from germination to harvest showed that mostly three insect- pest's viz., mustard sawfly (*Athalia lugens proxima*), mustard aphid (*Lipaphis erysimi*) and painted bug (*Bagrada hilaris*) caused damaged to mustard in this area. The incidence of mustard sawfly recorded on periodic basis during crop season, revealed that the insect appeared at early stage (45th standard week to 11st standard week) of crop growth. During *Rabi* 2016-17, the initial population of this insect (0.33 grub/plant) was recorded in 45th standard week (2nd week of November, 2016). This increased to the level of 2.33 grubs/plant in 50th standard week (2nd week of December, 2016). The present finding are also in partial agreement with the finding of Jat *et al.* (2006)^[7] who record the infestation of sawfly from the first week after sowing up to 4th week during *Rabi*, 2002-03. Sawfly population peaked (6 grubs/ 5 plants) during the 2nd week of November. The present investigation are in accordance with the finding of Manzar *et al.* (1998)^[8] and Vishwakarma (2003) who record

the population of mustard saw fly 2.5 grub/plant during the last week of November. The occurrence of mustard aphid was stated from 49th standard week (First week of December, 2016) to 10th standard week with varying population ranging from 0.41 to 212.67 aphids/10 cm central twigs per plant in different standard weeks. The peak period of occurrence of this insect was observed in 7th standard week. During *Rabi* 2016-17, the maximum population of this insect was recorded as 212.67 aphids/10 cm central twig/plant. The maximum infestation of mustard aphid was recorded at minimum temperature 9.9 °C, maximum temperature of 25.7 °C, relative humidity of 70.3% and sunshine for 5.5 hours. The minimum 0.41 per 10 cm central twig per plant population was recorded at 49th standard week with minimum temperature 11.7 °C, maximum temperature of 19.2 °C, relative humidity of 86.6% and sunshine for 1.7 hours. In the present study, mustard aphid found attacking of crop growth, which was found in accordance with records by several workers (Ahuja, 1990; Biswas and Das, 2000; Vishwakarma, 2003b and Anonymous (2006)^[1, 6, 3]. The occurrence of painted bug was recorded from 2nd standard week to 9th standard week with varying population ranging from 0.33-2.67 bug/plant in different standard weeks. The peak period of occurrence of this insect was observed in 5th standard week. During *Rabi* 2016-17, the maximum population of this insect was recorded as 2.67 bug/plant. The present finding are also in partial agreement with the finding of Anonymous (2004a)^[2] who record the population of painted bug (2.57 bugs/plant) was 47th standard week. The present finding are also in partial agreement with the finding of Manzar *et al.* (2000)^[9] who reported the maximum population of painted bug (78.7 bugs/plant) during first week of (2.5 bugs/ plant) March. The peak activity of painted bug was observed during 47th standard week. The occurrence of other insect-pests (grass hopper, green bug, roge beetle, cabbage butterfly, etc.) was started from 46th standard week to 11th standard week with varying population ranging from 0.21 to 4.00 insects per plant in different standard weeks. The peak period of occurrence of these insects was observed in 52nd and 2nd standard week. During *Rabi* 2016-17, the maximum population of these insect was recorded as 4.00 insects/plant. The minimum population 0.21 insect/plant was recorded at 11th standard week.

Table 2: Occurrence of insect-pests on mustard along with weather parameters during *Rabi*, 2016-17

Standard Week	Insect-Pests				Predator				Temperature		Rainfall (mm)	RH (%)	Sunshine (hrs.)
	Saw Fly (grub/plant)	Mustard Aphid (aphid/ 10 cm central twig/plant)	Painted Bug (bug/plant)	Other	<i>Coccinella</i> spp. (grub/plant)	Syrphid fly (grub/plant)	Spider	Other	Min.	Max.			
44	0	0	0	0	0	0	0	0	14.1	31	0	65.4	2.6
45	0.33	0	0	0	0	0	0	0	12.7	29.7	0	67.2	1.5
46	1	0	0	0.33	0	0	0	0	11.8	29	0	67.4	1.8
47	2	0	0	1.67	0	0	0.33	0	11.8	27.3	0	67.4	2.4
48	3.33	0	0	3	0	0	2	0	12.2	25.8	0	79.9	1.1
49	1.33	0.41	0	2.33	0	0	1	0	11.7	19.2	0	86.6	1.7
50	2.33	1.21	0	1.67	0	0	2	0	9	19.5	0	86.9	1.5
51	0.67	2.67	0	3	0	0.33	1.33	0	7.5	23.2	0	74	2.3
52	0	5.67	0	4	0	0	2	0.67	10.6	20.1	0	84.1	1.5
1	0.67	13.67	0	1.67	0.33	0.33	1	0.33	10.2	18	0	88.2	1
2	0	27.33	0.67	4	0.67	0.67	1.33	1	4.9	20.1	0	66.3	2.2
3	0	23	0.33	1.33	0	0	0.67	0	5.9	22.4	0	68	2.5
4	0	47	0.33	3.33	0.33	1	1	0	9.1	23.7	16.8	76	2
5	0	110	2.67	3.33	2.67	3.33	1.33	0.67	8.2	21.9	0	80	2.7
6	0	115.67	1	2	1.31	0.33	2	0	8.4	24.5	0	69.3	5.2

7	0	212.67	2	2	2.67	3.67	2	1.67	9.9	25.7	0	70.3	5.5
8	0	61.67	0.33	1.67	1.33	0.33	0.67	0.33	11.1	27.9	0	63.9	5.3
9	0	14.33	0.33	1	0.67	0	0.33	0.33	11.5	28.8	0	57.8	6.4
10	0	4.2	0	0.67	0	0	0.33	0	12.3	27.8	0	62.4	4.4
11	0	0	0	0.21	0	0	0.33	0	10	29.4	0.7	56.8	7.9

2. Occurrence of major predators

The incidence of lady bird beetle *Coccinella* spp. as a predator of mustard aphid was recorded on crop with various species. *Coccinella* spp. was observed active in predating on mustard aphid from 1th standard week to 9th standard week during *Rabi* 2016-17. The *Coccinella* spp. population ranged from 0.33 to 2.67 during whole observation period. The population of the predator was initially low (0.33 insect/plant) on 1th and 4th standard week. The population of predator increased gradually and reached at peak, (2.67 insects/plant) on 5th and 7th standard week. The incidence of syrphid fly as a predator of mustard aphid was recorded on crop with various species syrphid fly was observed active in predating on mustard aphid from 51st standard week to 8th standard week (Third week of February, 2017) during *Rabi* 2016-17. The syrphid fly population ranged from 0.33 to 3.67 during whole observation period. The population of the predator was initially low (0.33 insect/plant) in different standard week. The population of predator increased gradually and reached at peak, (3.67 insects/plant) in 7th standard week. The Incidence of spider as a predator of insects was recorded on mustard crop with various species. Spider was observed active in predating on mustard insect-pests from 47th standard week to 11th standard week during *Rabi* 2016-17. The Spider population ranged from 0.33 to 2.00 during whole observation period. The population of the predator was initially low (0.33 insect/plant) on 47th, 9th, 10th, and 11th standard week. The maximum population of predator (2.00 spider/plant) on 48th, 50th, 52th, 6th, and 7th standard week. The Incidence of mustard sawfly recorded on periodic basis during crop season, revealed these predators appeared at 52nd standard week to 9th standard week of crop growth. During *Rabi* 2016-17, the initial population of these predators (0.33 predators/plant) was recorded in 1st, 8th and 9th standard. This increased to the level of 1.67 predator/plant in 7th standard week. Thereafter, the population of predators declined and it was not observed in 10th and 11th standard week. The incidence of mustard sawfly was observed fluctuating under varying weather conditions.

Conclusion

The weekly observations on major insect-pests of mustard starting from germination to harvest showed that major three insect-pests viz., mustard sawfly (*Athalia lugens proxima*), mustard aphid (*Lipaphis erysimi*) and painted bug (*Bagrada hilaris*) caused damage to mustard in this area. The incidence these insect-pests were fluctuating under varying weather conditions.

The initial population of mustard sawfly (0.33 grub/plant) was recorded in 45th standard week (2nd week of November, 2016). This increased to the level of 2.33 grubs/plant in 50th SW (2nd week of December, 2016). The occurrence of mustard aphid was stated from 49th SW (December, 2016) to 10th standard week (March, 2017) with varying population ranging from 0.41 to 212.67 aphids/10 cm central twig per plant in different standard weeks, the maximum population of this insect was recorded as 212.67 aphids/10 cm central twig/plant during 7th SW. The appearance of painted bug

population was started in the experimental field from 2nd standard week upto 9th standard week with varying population ranging from 0.33-2.67 bug/plant, the maximum population of this insect was recorded as 2.67 bug/plant during 5th SW. The occurrence of other insect-pests (grass hopper, green bug, cabbage butterfly, etc.) was started from 46th standard week to 11th standard week with varying population ranging from 0.21 to 4.00 insects per plant in different standard weeks. The peak period of occurrence of these insects was observed in 52nd and 2nd standard week. The maximum population of these insect was recorded as 4.00 insect/plant. The minimum population 0.21 insect/plant was recorded at 11th standard. The Incidence of lady bird beetle *Coccinella* spp. as a predator of mustard aphid was recorded on crop with various species. *Coccinella* spp. was observed active in predating on mustard aphid from 1th standard week (First week of January, 2017) to 9th standard week (Last week of February, 2017) during *Rabi* 2016-17. The *Coccinella* spp. population ranged from 0.33 to 2.67 (grub/plant) during whole observation period. Syrphid fly was observed active in predating on mustard aphid from 51st standard week to 8th standard week. The syrphid fly population ranged from 0.33 to 3.67 (grub/plant) during whole observation period. The spider population was observed active in predating on mustard insect-pests from 47st standard week to 11th standard week. The spider population ranged from 0.33 to 2.00 (spider/plant) during whole observation period.

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Reference

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. All India Coordinated Research Project on Rapeseed-Mustard, National Research Centre on Rapeseed-Mustard, Bharatpur, Rajasthan, India, 2004a.
3. Anonymous. Annual Progress Report. All India Coordinated Research Project on Rapeseed-Mustard, National Research Centre on Rapeseed-Mustard, Bharatpur, Rajasthan, India, 2006.
4. Anonymous. Directorate General of Foreign Trade (DGFT), Department of Revenue and World Trade Organisation (WTO). Commodity Profile for Edible Oil. 2016a, p. 1-18.
5. Anonymous. The Soybean Processors Association of India, 2016b. (<http://www.sopa.org/>).
6. Biswas GC, Das CP. Population dynamics of mustard aphid, *Lipaphis erysimi* (Kalt.) in relation to weather parameters. Bangladesh. J Ent. 2000;10:15-22.

7. Jat DS, Jat MC, Sharma MM. Seasonal incidence of insect-pests of mustard in relation to abiotic factor. *Annals Plant Protec. Sci.* 2006;14(2):475-476.
8. Manzar A, Lal MN, Singh SS. Population dynamics of mustard aphid, *Lipaphis erysimi* (Kalt.) on Brassica crop in relation to abiotic and biotic factors. *Shashpa.* 1998;5(2):21-24.
9. Manzar A, Lal MN, Singh SS. Effect of temperature on incidence of mustard sawfly, leaf miner and painted bug on rapeseed-mustard (*Brassica spp.*) *Ann. pl. protect, Sci.* 2000;8(1):84-191.
10. Singh YP, Kumar A, Singh NB. Rapeseed-Mustard: Integrated insect-pest management. *Technical bulletin* No. 13, N.R.C.R.M. (ICAR), Sewar, Bharatpur, India, 2005.
11. Vishwarkama KDK. Studies on incidence of insect-pests of *Brassica* oilseed crops. M.Sc. (Ag.) Entomology Thesis, Deptt. of Entomology, N.D.U.A.& T., Faizabad, 2003a, 68.
12. Vishwarkama KDK. Studies on incidence of insect-pests of *Brassica* oilseed crops. M.Sc. (Ag.) Entomology Thesis, Deptt. of Entomology, N.D.U.A. & T., Faizabad, 2003b, 68.