Importance of occasional pests of rapeseed-mustard in punjab, India

B. S. Sekhon

[1]*Punjab Agricultural University Regional Research Station, Bathinda, Punjab, India Email: drbssekhon@yahoo.ca*
(Present address: Dr Baljinder Sekhon, 95 Banting Cres Brampton, Ontario. L6Y 2M3, CANADA)

Abstract

The Rapeseed-Mustard, are among the major *Rabi* (winter) cash crops in Punjab, India. The crop area has been growing or squeezing in the state, depending upon the prevailing market prices. The incidence of occasional pests also affects the popularity of the crops with the farmers. Observations during the last more than 20 years show that, two occasional pests of the crops become serious pests in some years and inflict heavy losses. Both the pests, *Bagrada hilaris* Burmeister and *Cornifrons ulceratalis* Lederer, appear in very dry years, when the rain fall is scanty and the soil is dry and loose, which is ideal for these insects. *C ulceratalis* is a new record as pest on Rapeseed-Mustard crops in the world. It inflicts heavy damage to *Eruca vesicaria* in dry seasons, especially in south western zone of Punjab. Similarly in dry weather *B. hilaris* is so serious that the germinating crops are completely wiped out and the farmers have to sow the crop again. The population of these pests remains below economic thresholds when it rains some days before sowing or if it rains within a few days after crop germination.

Integrated Pest Management developed to control these pests, include such simple but effective control measures as giving the first irrigation, as soon as possible after 3 weeks of sowing.

Key words: Oilseeds, Bagrada hilaris, Cornifrons ulceratalis, Brassica, juncea, compestris, carinata, Painted bug, cultural control, irrigation

Introduction

Rapeseed and Mustard are important rabi (winter) oilseed crops in Punjab, India. Aphid species, *Lipaphis erysimi* Kalten and *Myzus persicae* are serious pests on these crops (Bakhetia and Sekhon, 1989), but in some years other pests including Painted Bug, *Bagrada hilaris* Burmeister become very serious and in dry years the incidence of the Bug on germinating crop becomes so severe that the farmers have to sow the crop afresh (Sekhon *et al*, 1993). As the winter progresses its population goes down and again the bug population increases at harvest when in some years it causes serious damage even to the harvested crop lying in the fields before threshing (Singh *et al,* 1980). Abu-Manzar *et al* (1998) observed that the incidence of Painted Bug is negatively correlated with relative humidity and positively with temperature. Some workers have tried to find effective synthetic (Swaran D and Seema, 1998) and botanical insecticides (Johri *et al*, 2004) against this pest, but observations on plants accidentally irrigated in a rainfed trial at Bathinda, which showed that the irrigation plants could withstand the attack of the Painted Bug (Sekhon *et al*, 1993) led to these studies.

Material and Methods

The field trials, six in all, were conducted between 1993 and 2003 at Regional Station of Punjab Agricultural University at Bathinda, Punjab, India, only during dry years when the population of the painted bug was expected to be high on the germinating crop. The crop was sown early so as to increase the chances of heavy infestation. The trials, one each on *Brassica juncea* variety RLM 619, *Brassica juncea* variety PBR 91, *Brassica carinata* variety PC 5 and three on *Brassica compestris* variety TL 15, were laid in split plot design, with six replications, keeping irrigation on different days as main treatments and sprayed and unsprayed plots as sub treatments. The plot size was kept at 3 m×4.5 m, row to row spacing 30 cm and plant to plant 10-15cm. The day the irrigation was given, in plots marked as sprayed, Metasystox @ 250 ml/acre was sprayed. Painted bug population was recorded in the whole plot and total and killed plants were recorded from one meter rows sections from 5 spots in a plot. The data for population was analyzed after $\sqrt{n+1}$ transformations and for percent plants killed after arc sin transformations.

Results and Discussion

The data presented in Table 1 shows that irrigation whenever it was given reduced the population of the painted bug drastically. In most of the observations in all the trials the differences were statistically significant except in one observation on trial on toria when irrigated 26 days after sowing and one in *B.carinata* when it was irrigated 33 days after sowing, where differences were statistically non significant, which were due to overall low population of the bug. The maximum population 107.0 bugs/plot, was observed in unirrigated plots of *B. juncea* variety PBR 91, while the corresponding population in irrigated plots was only 7.3 bugs/plot. Similarly in *B. juncea* variety RLM 619, *B carinata* variety PC5 and *B. compestris* variety TL15 population in irrigation and unirrigates plots were, 45.2 and 1.67, 29.2 and 1.2 and 61.7 and 1.8 respectively.

In all the trials addition of Metasystox spray @250 ml/acre did not help in further reducing the pest population and the differences in sprayed and unsprayed plots in irrigated plots were non significant. However it was effective in unirrigated plots and in almost all the observations reduced the pest population and differences in sprayed and unsprayed plots in unirrigated

plots were statistically significant. Population of painted bugs/plot in unirrigated plots sprayed 33 days after sowing and unirrigated and unsprayed plots for *B.juncea* variety RLM619, *B.juncea* PBR 91, *B. carinata* variety PC 5, *B. compestris* variety TL 15, trial 1, 2 and 3 were, 45.2 and 11.0, 107.0 and 16.8, 7.6 and 2.2, 24.0 and 5.3, 69.5 and 8.5 and 61.7 and 14.8 respectively. The observations support the findings of Sekhon *et al.* (1993) and also of Abu-Manzar *et al* (1998) who observed that the incidence of Painted Bug is negatively correlated with relative humidity and positively with temperature.

The reduction in painted bug population did not always reflect itself in the increased yield of the crop. In trial on *B. juncea* variety PBR 91 and *B. compestris* variety TL 15 trial 2, the yield in all the plots were at par with each other. In all the trials the maximum yield was obtained in plots which were irrigated. The spraying of Metasystox did not result in higher yield in irrigated plots. Under unirrigated conditions also only in PC 5 variety of *B. carinata,* the sprayed plots had significantly higher yield than unsprayed plots and in all the other trials the differences were non significant. In *B. juncea* variety RLM 619, *B. carinata* variety PC 5 the yield increase was at par in plots irrigated 26 days after sowing or 33 days after sowing. The plots of PBR 91 variety of *B. juncea* gave the highest yields among all the trials, the maximum recorded was 3711 kg/ha in treatment in which irrigation was given 33 days after sowing. The minimum yield of only 32 kg/ha was recorded in *B. compestris* variety TL 15 Trial. Non significant differences in yield of irrigated and unirrigated plots in some years could be attributed to sufficient rain during the crop season, which helped the plants to compensate the loss caused by the bugs.

Table 1. Effect of irrigation and insecticide spray on population of Painted Bug

Treatment		Painted Bug population 2 days after treatment		Yield (kg/ha)	Painted Bug population 2 days after treatment		Yield (kg/ha)	Painted Bug population 2 days after treatment		Yield (kg/ha)
		B.juncea (RLM 619)			*B.juncea* (PBR 91)			*B. carinata* (PC 5)		
Irrigation 26 DAS*	SP**	0.8 a		3037 a	0.5 a		3486	0.0 a		1318 a
	US	1.8 a	1.3 a	2979 a	4.0 a	2.2 a	3301	1.2 a	0.6 a	1228 a
Unirrigated	SP	12.5 b		2544 ab	5.3 b		3373	2.8 b		878 b
	US	16.8 b	14.7 b	2268 bc	41.3 d	23.3 b	3362	29.2 d	16.0 c	635 c
Irrigation 33 DAS	SP	0.3 a		2095 c	2.8 a		3711	1.4 a		1348 a
	US	1.67 a	1.0 a	1983 c	7.3 b	5.1 a	3357	5.8 c	3.6 b	1223 a
Unirrigated	SP	11.0 b		1401 d	16.8 c		3501	2.2 b		919 b
	US	45.2 c	28.1 c	1073 d	107.0 e	61.9 c	3532	7.6 c	4.9 b	607 c
		B.compestris (TL15) Trial 1			*B.compestris* (TL 15) Trial 2			*B.compestris* (TL15) Trial 3		
Irrigation 26 DAS	SP	0.3 a		770 a	0.5 a		523	1.7 a		1628 a
	US	1.0 a	0.7 a	639 a	0.7 ab	0.6 a	704	0.8 a	1.3 a	1479 ab
Unirrigated	SP	0.7 a		137 cd	4.3 bc		677	7.7 b		935 c
	US	2.0 a	1.3 a	230 bc	18.5 d	11.4 b	397	39.0 c	23.3 b	1034 c
Irrigation 33 DAS	SP	0.0 a		290 b	7.2 c		645	1.8 a		1011 c
	US	5.2 a	2.6 a	197 bc	13.0 c	10.1 b	489	1.8 a	1.8 a	1065 bc
Unirrigated	SP	5.3 a		151 bcd	8.5 c		480	14.8 b		853 c
	US	24.0 b	14.7 b	32 d	69.5 e	39.0 c	400	61.7 c	38.3 b	816 c

In three trials one each on *B.compestris* variety TL 15, *B. juncea* variety RLM 619 and one on *B. carinata* variety PC 5, observations on Painted Bug population and plant mortality were recorded from 4 weeks to 6 weeks. The data presented in Table 2 shows that after two days of irrigation the population of the bug decreased drastically. In TL 15, the population of the bug in plots where irrigation was given after 26 days, reduced population in irrigated plots increase from 1 bug/plot to 4.46 in the 5th week and to 55.67 in the 6th week, where as the mortality of the plants, decreased from 12.73% to 1.82% in the 5th week and slightly increased to 4.32% in the 6th week. In unirrigated plots the population of the bug increased from 2 bugs/plot to 13.88 in the 5th week and 52.17 in the 6th week. But in this treatment the percent plants killed increased steadily from 15.94% in 4th week to 20.1% in 6th week. Similarly in plots irrigated after 33 days, in 6th week, though the population of Painted Bug was 92.3 bugs/plot as compared to 34.8 in unirrigated plots, but there was marked difference in plants killed in the two treatments. While in spite of the heavy infestation in irrigated plots only 8.9% plats were killed as opposed to 45.5% in unirrigated plots in this week. In the other two species *B. juncea* variety RLM 619 and *B. carinata* variety PC 5, both the population of the bug and the plant mortality remained lower than in the unirrigated plots. In RLM 619 the population (bugs/plot) and percent plants killed in plots irrigated after 26 day and unirrigated plots in 6th week were 1.3 and 0.0 and 13.2 and 0.9 and in plots irrigated after 33 days and unirrigated plots were 1.7 and 0 and 45.2 and 18.9 respectively. Similarly in *B. carinata* the observation on population and percent plants killed in the sixth week after sowing were 3.2 and 0 in plots irrigated after 26 days and 12.6 and 5.3 in unirrigated plots. The differences in population dynamics of the Painted Bug in *B. compestris* where the population of the pest grew even in irrigated plots as against other two species, *B. juncea* and *B. carinata* where after irrigation the pest population remained lower in irrigated plots than unirrigated ones, may be due to the behavior of the pest, which always tries to seek shelter when not feeding. The irrigation reduces those places by eliminating small loose clods in the field and thus the bugs move to other places, but as *B. compestris* crop soon flourishes to provide shelter under fallen leaves the pest returns to the irrigated plots also while in other species due to slow growth such conditions were not available with in 6 weeks, when the observation on pest populations were last taken.

Figures followed by the same letter within a column do not differ significantly (P=0.05). Differences in columns with no

letter are non significant. * DAS= Days after sowing. **SP= Sprayed, US= unsprayed plots. The population counts are bugs/13.5 m^2 (per plot). Statistical analysis was done after appropriate transformations.

The other pest *Cornifrons ulceratalis* Lederer, appeared only in very dry years and inflicted heavy damage to *Eruca vesicaria* and in some years there was complete mortality of plants. The larvae of the pest (Fig 2) are nocturnal feeders and remain hidden in the sand beneath the *E.vasicaria* plants. There colour is yellowish but look green when fully fed. The larvae pupate in the sand under the plants. The larvae make silken flexible shells around themselves before pupation (Fig 3). *C. ulceratalis* is a new record as pest on Rapeseed-Mustard crops in the world. It inflicts heavy damage to *Eruca vesicaria* in dry seasons, especially in south western zone of Punjab.

Fig 1 Painted Bug Management Trial Plots Fig 2 Fig 3

Table 2. Effect of Painted Bug population on plant mortality

Treatment		Population or % plants killed, Weeks after sowing								
		4	5	6	4	5	6	4	5	6
		B. compestris TL 15			*B. juncea* RLM 619			*B. carinata* PC 5		
Irrigation after 26 DAS*	population	1.00	4.46	55.67	0.00	1.83	1.33	5.00	1.20	3.2
	% plants killed	12.73	1.82	4.32	0.00	0.60	0	1.10	0.20	0
Unirrigated	population	2.00	13.88	52.17	5.83	16.80	13.2	41.00	29.20	12.6
	% plants killed	15.94	17.10	20.1	0.45	0.70	0.9	2.30	8.20	5.3
Irrigation after 33 DAS	population	1.00	5.24	92.33	10.17	1.83	1.67	20.60	1.20	5.8
	% plants killed	4.80	1.19	8.94	0.00	0.00	0	4.00	5.90	8.1
Unirrigated	population	3.33	24.04	34.83	9.33	28.80	45.2	15.40	9.20	7.6
	% plants killed	20.10	8.20	45.5	5.81	11.20	18.9	2.50	4.20	5.1

* DAS= Days after sowing

References

Abu-Manzar, LalM N and Singh S S. 1998. Correlation between incidence of insect pests on Brassica species and ecological parameters. *Shashpa***. 5**(2): 171-174

Bakhetia D R C and Sekhon B S. 1989. Insect pests and their management in rapeseed mustard. *J. Oilseeds Res*. **6**: 269-299

Johri P K, Ranjeeta M, Deepa S, Divya T, Reeta J.2004. Comparative toxicity of seven indigenous botanical extracts against the infestative stage of three insect pests of agricultural importance. *J. Appl Zool. Res*.**15**(2): 202-204

Sekhon B S, Arora P K, Dhillon S S, Gurdev Singh and Karmuka K S. 1993. Studies in resistance in rapeseed mustard varieties to painted bug (Bagrada hilaris (Burm.). In Parasad, M V R (Ed). *Sustainability in Oilseeds*. Indian Society of Oilseeds Research Hyderabad. pp. 359-364.

Singh H V, Gupta D S, Yadava,T P, Dhawan,K.1980. Post-harvest losses caused by painted bug (Bagrada cruciferarum Kirk.) to mustard. *Haryana Agri. Univ. J Res*. **10**(3): 407-409

Swaran D and Seema. 1998.Relative toxicity of some important insecticides with particular reference to change in susceptibility level of Bagrada cruciferarum Kirk. during the last quarter century. *J Ent. Res*. **22**(4): 307-311