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Incidence of saw fly, *Athalia lugens proxima* Klug. as influenced by level of irrigation and fertilizers on mustard

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A B S T R A C T

The experiments were conducted in the Instructional farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal in two successive *Rabi* seasons of 2005-06 and 2006-07with an objective to study the incidence of saw fly (*Athalia lugens proxima* Klug.) as influenced by level of irrigation and fertilizers on mustard c.v. NC-1 (Jhumka) of *Brassica campestris* var. yellow sarson. Highest saw fly population (0.26 larvae/plant) was recorded on the crop grown without irrigation and medium level of fertilizers (60:30:30 Kg NPK ha^{-1}) while lowest population level (0.10 larvae/plant) was observed at highest level of irrigation (three) coupled with medium level of fertilizers (60:30:30 kg NPK ha^{-1}) and two irrigations coupled with lowest level of fertilizers (40:20:20 Kg NPK ha^{-1}).

Introduction

Mustard sawfly, *Athalia lugens proxima* Klug., an important pest of mustard, attacks all types of cruciferous plants like mustard, rapeseed, cabbage, cauliflower, knol-khol, turnip, radish etc. Larvae alone are destructive and start to feed from margin of leaves. The grown up larvae make holes preferably on young leaves and skeletonise them. Sometimes they also feed on the epidermis of the tender shoots, flowers and fruits. Singh *et al*. (1979) observed that irrigation applied at the seedling stage brought about a spectacular reduction in saw fly infestation, probably due to annihilation of the larval stage for lack of aeration. The population of *Athalia lugens proxima* in *Brassica campestris* increased with increased dose of nitrogen whereas high doses of P_2O_5 and K_2O reduced incidence of the pest (Ram and Gupta, 1992).

Under present investigation an attempt has been made to evaluate the role of important cultural practices like fertilizer and irrigation application on the infestation of mustard saw fly.

Materials and Methods

The experiments were conducted in the Instructional Farm of Uttar Banga Krishi Vishwavidyalaya, Pundibari, Cooch Behar, West Bengal in two successive Rabi seasons of 2005-06 and 2006-07. NC-1 (Jhumka) an improved variety of *Brassica campestris* var. yellow sarson commonly grown in the region was considered as planting material. Seeds were sown on 13th December and 10th December during 2005-06 and 2006-07 respectively at 5 $kgha^{-1}$ in 3x3 m^2 plot at a spacing of 30 cm×10 cm. Common irrigation channels measuring 1 m between each rows of plot were maintained. The experiment was laid out in a split plot design in which irrigation levels and fertilizers levels were kept at main plot and sub plot respectively. The irrigation levels were zero, one (30 DAS), two (30 and 45 DAS) and three (30, 45, 60 DAS) whereas the fertilizer doses were 80:40:40, 60:30:30, 40:20:20 Kg $NPKha^{-1}$. Urea, single super phosphate, muriate of potash were used as a source of nitrogen, phosphorus and potassium respectively. In addition to these, borax at 12 $kg.ha^{-1}$ was applied in all the plots as a source of boron, an essential micro nutrient of cruciferous crop required for this zone. The plots where irrigation was not given, full dose of nitrogenous fertilizer were applied as basal whereas half dose as basal and remaining half with first irrigation were applied in the plots with one irrigation. But in the plots with two or three irrigation schedule, half dose was given as basal, one fourth with the first irrigation and one fourth with the second irrigation. Allocation of treatments was done randomly and thus there were twelve treatment combinations. The treatments were replicated thrice. Standard agronomic practices were adopted for growing the crop successfully. For recording

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incidence of saw fly, numbers of larvae were considered from each of five randomly selected plants at 10 days interval started from the 25 days after sowing. Data thus obtained from two years were pooled and analyzed statistically.

Results and Discussion

Population of saw fly in both the years studied was very low and it is interesting to note that saw fly infestation was recorded only at an early stage of crop growth and it was limited for a month only. The pooled mean data presented in Table-1 reveals that the population of mustard saw fly was inversely proportional to the level of irrigation. The population was significantly higher on the crop raised without irrigation (I_0) (0.23 larvae/plant) and decreased gradually with the increased level of irrigation. However difference in population of saw fly among one, two and three irrigations (I_1, I_2 and I_3) was non-significant. It is well known fact that the grubs of mustard saw fly hide under the clods, cracks and crevices in soil. Ayyar (1963) advised flooding of field crops to force down the soil borne or subterranean insects like cutworms, white grubs, flea beetle etc. which hide and take shelter in clods, cracks and crevices in soil. This might be the reason, why the infestation of mustard saw fly decreased with increments of irrigation level. Similar result was also obtained by Singh *et al.* (1979) who observed that irrigation at the seedling stage brought about a spectacular reduction in saw fly infestation on mustard and they pointed out that this reduction might be due to annihilation of the larval stage for lack of aeration.

The level of fertilizers had a direct effect on the pest incidence. The infestation of mustard saw fly increased with the increase in level of fertilizers. Minimum population (0.13 larvae/plant) was recorded at 40:20:20 kg NPKha^{-1} (F_1) i.e. at

Table 1
Effect of different level of irrigation and fertilizers on the incidence of saw fly

	Saw fly (average number of larvae/plant)							
Treatments	**1st Obs**	**2nd Obs**	**3rd Obs**	**4th Obs**	**5th Obs**	**6th Obs**	**7th Obs**	**Mean**
Irrigation(I)								
I_0	0.29	0.26	0.14	0.00	0.00	0.00	0.00	0.23
I_1	0.23	0.12	0.07	0.00	0.00	0.00	0.00	0.15
I_2	0.18	0.14	0.01	0.00	0.00	0.00	0.00	0.12
I_3	0.23	0.11	0.00	0.00	0.00	0.00	0.00	0.11
SEm (±)	0.03	0.04	0.02					0.02
CD (P= 0.05)	**0.09**	**0.13**	**0.06**	-	-	-	-	**0.06**
Fertilizer(F)								
F_1	0.19	0.17	0.08	0.00	0.00	0.00	0.00	0.13
F_2	0.25	0.15	0.07	0.00	0.00	0.00	0.00	0.16
F_3	0.27	0.16	0.03	0.00	0.00	0.00	0.00	0.17
SEm (±)	0.02	0.02	0.02					0.01
CD (P= 0.05)	**0.07**	**N.S.**	**N.S.**	-	-	-	-	**0.04**
Interaction								
I_0F_1	0.23	0.23	0.07	0.00	0.00	0.00	0.00	0.18
I_0F_2	0.30	0.30	0.17	0.00	0.00	0.00	0.00	0.26
I_0F_3	0.33	0.23	0.17	0.00	0.00	0.00	0.00	0.24
I_1F_1	0.20	0.10	0.10	0.00	0.00	0.00	0.00	0.13
I_1F_2	0.27	0.10	0.10	0.00	0.00	0.00	0.00	0.16
I_1F_3	0.23	0.17	0.10	0.00	0.00	0.00	0.00	0.17
I_2F_1	0.10	0.20	0.00	0.00	0.00	0.00	0.00	0.10
I_2F_2	0.20	0.13	0.03	0.00	0.00	0.00	0.00	0.12
I_2F_3	0.27	0.10	0.00	0.00	0.00	0.00	0.00	0.12
I_3F_1	0.23	0.13	0.00	0.00	0.00	0.00	0.00	0.12
I_3F_2	0.23	0.07	0.00	0.00	0.00	0.00	0.00	0.10
I_3F_3	0.23	0.13	0.00	0.00	0.00	0.00	0.00	0.12
F at same level of I								
SEm (±)	0.05	0.04	0.04					0.03
CD (P= 0.05)	**0.14**	**0.13**	**0.11**	-	-	-	-	**0.08**
I at same or different level of F								
SEm (±)	0.05	0.05	0.03					0.03
CD (P= 0.05)	**0.14**	**0.16**	**0.11**	-	-	-	-	**0.09**

lowest level of fertilizers. The population increased gradually with increased level of NPK, being 0.16 larvae/plant and 0.13 larvae/plant at 60:30:30 kg NPKha^{-1} (F_2) and 80:40:40 kg NPKha^{-1} (F_3) respectively, however, the levels of pest infestation at different levels of fertilizers were statistically at par with each other. The result of the present investigation conforms those of Ram and Gupta (1992) who reported that saw fly infestation increased as a result of increments of nitrogen fertilization.

The interaction between fertilizer and irrigation level and their resultant effect on saw fly population showed that populations of saw fly did not vary significantly between different levels of fertilizer at same level of irrigation. However significant differences were recorded between different levels of irrigation at same or different levels of fertilizers. The data presented showed that highest saw fly incidence (0.26 larvae/plant) occurred on the crop raised without irrigation (I_0) with medium level of fertilizer i.e. 60:30:30 kg NPKha^{-1} (F_2) and lowest (0.10 larvae/plant) being at two irrigations (I_2) with minimum level of fertilizers i.e. 40:20:20 kg NPKha^{-1} (F_1) and three irrigations (I_3) with medium level of fertilizers i.e. 60:30:30 kg NPKha^{-1} (F_2).

Although the population of mustard saw fly was too low to draw any conclusion; however, from overall observations the trend indicates that rainfed crop coupled with higher fertilizer level favoured infestation of mustard saw fly. On the contrary, even one irrigation at early crop growth stage minimizes infestation of mustard sawfly.

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