

## Field efficacy of some insecticides against foliage feeding barley aphid (*Rhopalosiphum maidis* Fitch.)

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Barley (*Hordeum vulgare* L.) is one of the important cereal crops in the world, occupying fourth position in cultivation after wheat, rice and maize. Uttar Pradesh is one of the most important barley growing state of the country with 0.146 mha area, 0.385 mt production and productivity 24.5 q/ha (Anonymous 2015-16). From economic cultivation point of view it is necessary to protect the crop from the attacks of barley aphid (*Rhopalosiphum maidis*) in early stages. The environmental factors play an important role in influencing the behaviour of this insect. It is main criteria for assessing the aphid infestation in the crop. The knowledge of appearance and its infestation period helps the growers to control the pest well in advance. To control the aphids through various chemicals/insecticides is other option. Many insecticides are available which can effectively control the aphid population and can reduce the damage to a large extent. On the basis of above facts, the present studies to evaluate the performance of different insecticides for the control of barley aphids was undertaken.

Field experiment was conducted during Rabi 2016-17 at Nawabgaj Research Farm, C.S.Azad University of Agriculture and Technology, Kanpur. The field was ploughed once with a soil turning plough followed two ploughing with deshi plough to make the soil well pulverized and free from weeds. Farm yard manure @ 150 q/ha was also applied at time of last ploughing. The insecticidal evaluation experiment was laid out in plots measuring 3m x 4m in Randomized Block Design (RBD) and each treatment was replicated thrice. Seven insecticides available in market namely, Imidacloprid 2.8% SL (100ml), Clothianidin 50WDG (30gm), Flubendamide (Fame 480SC) (250ml), Acetamiprid 20SP (100gm), Thiamethoxam 25 WG (Actara) (50gm), Chlorantranilpride 18.5%SC (Coragen) (100ml), Dimethoate 30EC (Roger) were used in this experiment to evaluate the efficacy of insecticides against barley aphids. One spray application was done with sprayer @ 250 literha<sup>-1</sup> after

appearance of aphids. The spray solution was prepared on the basis of formula-1. The number of aphids were counted one day before spray application. The post spray observations were recorded after 1, 2, 7 and 15 days. The number of aphids were counted on 10 randomly selected shoots in each plot. The effect of various insecticidal treatments on grain yield of barley was also determined after harvesting each plot. The percentage reduction in population over untreated checks was calculated with formula-2.

### Formula: 1

$$\text{Quantity of the proprietary insecticide required} = \frac{\text{Percentage of active ingredient in spray solution desired} \times \text{Total quantity of spray solution required}}{\text{Percentage of ingredient of the proprietary insecticides}}$$

### Formula: 2

$$\text{Percentage reduction} = \frac{C - T}{C} \times 100$$

The data presented in Table-1 exhibited that all insecticides showed their superiority in minimizing the damage of aphid in comparison to untreated check (26.71 aphids/shoot). The application of Flubendamide (13.56 aphids/shoot) was proved to be significantly superior and most effective in comparison to rest of the treatments except Thiamethoxam (13.56 aphids/shoot) which was found to be at par with Imidacloprid, Clothianidin, Acetamiprid, Chlorantranilpride and Dimethoate being 14.65, 13.81, 14.89, 15.79 and 15.79 aphids/shoot, respectively. The efficacy of Dimethoate and Chlorantranilpride was numerically inferior among the insecticide but statistically

at par with all the insecticide except Flubendamide and Thiamethoxam .

The percentage reduction in aphid population after one day of spray over untreated check was significantly higher in treatment Flubendamide (49.23) followed by Thiamethoxam, Imidacloprid , Clothianidin , Acetamiprid, Chlorantranilpride and Dimethoate with 49.23, 45.15, 48.29, 44.25, 40.88 and 40.88 per cent respectively.

After two days of spray all the insecticides were found to be significantly superior over untreated check in minimizing the aphid population. The spray application of Flubendamide having 2.36 aphids/shoot was proved to be most effective which was at par with Thiamethoxam , Imidacloprid and Acetamiprid . The application of Dimethoate was found to be significantly superior to check but numerically least effective which was at par Chlorantranilpride having 4.31 aphids/shoot. The observation recorded after seven days of spray, all the insecticides were found significantly effective in reducing the aphid population in comparison to check. However, Fludendamide (1.95 aphids/shoot) was found numerically superior than other insecticides. The application of Dimethoate (6.4 aphids/shoot) was found to be least effective which was at par with Chlorantranilpride having 3.62 aphids/shoot.

The observation recorded after 15th days indicated that all the insecticides were found significantly effective in controlling aphid population. Numerically Flubendamide (1.44 aphids/shoot) was found most effective but was at par with other insecticides. The application of Dimethoate (3.59 aphids/shoot) was found to be least effective but was at par with other insecticides.

The percentage reduction in population over untreated check was highest in treatment Flubendamide (82.04) followed by the treatments Thiamethoxam,,

Clothianidin 50 WDG , Imidacloprid , Dimethoate and Chlorantranilpride effectively reduced the population of aphids by 80.22, 77.48, 75.50, 71.54 and 71.93 per cent respectively. Singh *et al*(1979) recommended spray application of Phosphamidon, Methyl parathion, Dimethoate and Endosulphan for the control of barley aphids and produced 14 to 27 per cent higher grain yield of barley than the untreated check. Bhatia and Singh (1977) recommended spray application of 0.05 per cent methyl parathion or fenualerate or endosulfan @ 1000 ml/ha which protect the crop throughout the season. Verma (1990) found that phosphamidon appeared to be most effective as it reduced the population 15.44 aphids/shoot followed by quinalphos and cypermethrion having 17.31 and 18.53 aphids/shoot as against 113.65 in untreated check. Anonymous (2004) the foliar spray of imidacloprid @ 20g a.i./ha gave maximum control of foliar aphid in barley. Singh and Bhatia (1983) reported that the foliar spray of imidacloprid @ 20ga.i./ha have maximum control of aphid and increase the grain yield, seed treatment with imidacloprid @ 0.6 g.a.i./kg seed was found effective controlling aphid upto 80-85 days after sowing in barley. Jitendra *et al.* (2011) reported that imidacloprid 17.8 SI @ 112 ml/ha showed maximum control of aphid and increase the grain yield and was at par with acetamiprid @ 50 gm/ha which was also found effective in controlling the aphid population and increasing the yield.

Significantly higher grain yield was recorded in all treatment in comparison to untreated checks. The data presented in Table-1, indicated that the plot treated with Flubendamide gave highest yield (50.33q/ha) which was at par with Thiamethoxam (50.13q/ha) and Clothianidin (49.44 q/ha). These three insecticides were proved to be significantly superior to other treatments such as Imidacloprid (49.03q/ha), Acepamipride (48.33q/ha), Chlorantranilpride (48.05q/ha) and Dimethoate (47.58q/ha) in which grain yield was at par but significantly higher than untreated check (43.5 q/ha).

**Table-1:** Aphid population and its percentage reduction one day, 2<sup>nd</sup> day, 7<sup>th</sup> day and 15<sup>th</sup> days after spray:

S.No.	Treatments	Dose ml or gm/ha	One day No. of aphid/shoot	Percent reduction over control	2 <sup>nd</sup> day No. of aphid/shoot	Percent reduction over control	7 <sup>th</sup> day No. of aphid/shoot	Percent reduction over control	15 <sup>th</sup> day No. of aphid/shoot	Percent reduction over control	Grain yield (q/ha)	Percent Increase in yield over untreated check
1.	Imidacloprid 17.8% SL	100ml	6.49 (14.65)*	45.15	3.22 (10.31)*	67.98	2.65 (9.26)*	78.43	2.65 (9.28)*	75.50	49.03*	5.28
2.	Clothianidin 50 WDG	30gm	5.73 (13.81)*	48.29	3.17 (10.14)*	68.50	2.37 (8.72)*	79.69	2.20 (8.53)*	77.48	49.44*	5.69
3.	Flubendamide (Fame 480 SC)	250ml	5.36 (13.56)*	49.23	2.36 (8.72)*	72.91	1.95 (7.92)*	81.55	1.44 (6.80)*	82.04	50.33*	6.58
4.	Acetamiprid 20 SP	100gm	6.62 (14.89)*	44.25	3.48 (10.63)*	66.98	3.51 (10.78)*	74.89	3.18 (10.14)*	73.23	48.33*	4.58
5.	Thiamethoxam 25 WG	50gm	5.55 (13.56)*	49.23	2.95 (9.81)*	69.53	2.27 (8.53)	80.13	1.78 (7.49)*	80.22	50.13*	6.38
6.	Chlorantranilpride 18.5% SC	100ml	7.45 (15.79)*	40.88	4.31 (11.97)*	62.82	3.62 (10.94)*	74.52	3.43 (10.63)*	71.93	48.05*	4.30
7.	Dimethoate 30 EC	1000ml	4.47 (15.79)*	40.88	4.37 (10.47)*	67.48	4.13 (11.54)*	73.12	3.59 (10.78)*	71.54	47.58*	3.83
8.	Control	-	20.22 (26.71)	-	28.44 (32.20)	-	46.44 (42.94)*	-	37.72 (37.88)	-	43.75	-
	SEm+	-	0.443	-	0.510	-	1.218	-	0.686	-	0.406	-
	CD at 5%	-	1.357	-	1.561	-	3.731	-	2.102	-	1.244	-

The experiment was carried out for the management of barley aphid (*Rhopalosiphum maidis* Fitch) using barley variety K 551 at C.S.Azad University of Agriculture and Technology, Kanpur during 2016-17. Eight treatments including control, namely, Imidacloprid 17.8% SL, 100ml, Clothianidin 50WDG, 30gm, Flubendamide (Fame 480SC), 250ml, Acetamiprid 20SP, 100gm, Thiamethoxam 25 WG (Actara), 50gm, Chlorantranilpride 18.5% SC (Coragen), 100ml, Dimethoate 30EC (Roger), 100ml/ha and untreated check respectively were evaluated in-vitro. One foliar spray of these insecticides was applied on the appearance of aphids. After one, two, seven and fifteen days of spray the aphid population was again counted and population reduction was calculated. After one, two, seven and fifteen days of spray all the treatments were found significantly superior over control. However, among the treatments Flubendamide (Fame 480SC) and Thiamethoxam 25 WG (Actara) after one day of spray, Flubendamide (Fame 480SC) after two, seven, and fifteen days exhibited numerically best control of the aphids. The grain yield (q/ha) was observed significantly higher in all the treatments over control. However, Flubendamide (Fame 480SC) exhibited maximum grain yield (50.33 q/ha) among all the treatments.

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