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# Efficacy of few selected insecticides for the management of corn leaf aphid in barley

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## Abstract

**Field trials on evaluation of seven chemical insecticides against corn leaf aphid in barley were conducted at ICAR-Indian Institute of Wheat and Barley Research, Karnal during 2015-16 and 2016-17. To determine the efficacy of insecticides, aphid counts were made on five randomly selected plants, one day before spray and then after 1, 2, 7 and 15 days after spray. Pooled data analysis of two seasons revealed that treatments of flubendamide 480 SC @20g a.i./ha, clothianidin 50 WDG@15g a.i./ha and acetamiprid 20 SP@20g a.i./ha recorded significantly lower number of aphids; 0.5, 0.8 and 1.1 aphids/shoot after 15th days of spraying, respectively as compared to other treatments. The maximum yield of 41.8 q/h was obtained in treatments of flubendamide 480 SC @20g a.i./ha and clothianidin 50 WDG@15g a.i./ha.**

**Keywords:** Aphid, efficacy, barley, insecticides.

## 1. Introduction

Barley (*Hordeum vulgare* L.) is one of the most important world-wide cereal grain crops after rice, wheat and maize (Xu, 1990). Barley was grown in an area of 6.6 lakh hectares in India with a production of 1.77 million tones and productivity of 26.79 q/ha during 2017-18. The major barley producing states in India are Rajasthan, Uttar Pradesh, Madhya Pradesh, Haryana, Punjab, West Bengal and Jammu & Kashmir. It is also grown in some pockets of Bihar, Uttaranchal and Himachal Pradesh. In olden times, barley was used as animal feed for making flour and sattu. However, barley now is mainly used for malt purpose and for making baby foods and milk based beverages. It has medicinal properties of curing diuretics and kidney stone ailments. Similar to other cereal crops, barley is prone to diseases and insect-pests which can cause significant yield reduction and result in poor grain quality. Amongst insect-pests attacking barley, aphids and termites are key insect-pests causing damage to barley crop (Kumar *et al.*, 2014). Corn leaf Aphid (CLA); *Rhopalosiphum maidis* (Fitch), is considered as a common insect pest of barley in India causing about 14-27 per cent losses and even more during severe infestation since almost all Indian barley varieties are susceptible to CLA infestation (Gill and Metcalfe, 1977; Malik *et al.*, 2013). The damage is seen during the early growth stages when both the adults and nymphs cause damage by sucking cell sap which reduces the vitality of the plants. The infested leaves turn pale, wilt and wear a glossy appearance. The pest can cause yield losses either directly by sucking the sap of the plants or indirectly by transmitting viral diseases (Dedryver *et al.*, 2010). In addition, aphids also secrete honeydew on which black sooty mould which hinders the photosynthesis (Miller *et al.*, 1994). Various control measures *viz.*, cultural, physical, mechanical, biological, chemical and host plant resistance have been evaluated for the management of aphid infestation. However, under favorable weather conditions, the aphid population can increase drastically causing considerable crop damage and then it can only be managed through insecticides. Many new insecticides have been routinely launched in Indian market with high efficacy and are tested for their efficacy against different insect pests but scanty information is available on efficacy of these new insecticides against aphid attacking barley crop. With this perspective, the

present study was conducted at Karnal, to determine the effectiveness of few selected insecticides against corn leaf aphid of barley.

## 2. Material and methods

A field trial was conducted during 2015-16 and 2016-17 under All India Co-ordinated Research Program (AICRP) on Wheat and Barley at Research farm of ICAR-Indian Institute of Wheat and Barley Research (IIWBR), Karnal to determine efficacy of few selected insecticides against corn leaf aphid. The trial was laid in Randomized Block Design (RBD) with seven treatments with untreated control replicated thrice under irrigated conditions. The barley variety DWR-UB-64 was sown in second week of November during each season by following recommended package and practices. The row to row spacing was kept 25 cm in plots of 6 rows of 6 m long which was recommended plot size under AICRP trials. The insecticides application was done with knapsack sprayer using 250 litres of water per hectare at heading stage. The spray was carried out when average infestation of aphids reached 20 aphids per shoot or above. Evening hours were preferred for spraying because of low wind velocity in order to keep spray drift to the minimum in the field. Observation of aphid counts were recorded on five randomly selected shoots from each treatment. Pre-spray aphid counts were taken one day prior to application and post-spray counts were made 1, 2, 7 and 15 days after insecticidal application. Only live aphids were taken into account for counting the aphid population after application of treatments. At maturity, grain yield was recorded on whole plot basis and converted in quintals per hectare (q/ha). The experimental data were subjected to analysis of variance (ANOVA) and different treatment means were separated by least significant difference test (Gomez & Gomez, 1984).

## 3. Results and discussion

The efficacy of insecticides against corn leaf aphid was recorded during two crop seasons of 2015-16 and 2016-17. The efficacy of insecticides and yield obtained during two seasons did not differ significantly among two seasons, hence the data recorded was pooled for analysis. The major findings are described below. Aphid populations did not differ statistically among all the treatments one day before treatment. The data revealed that all the treatments reduced the aphid population significantly and increased the grain yield as compared to untreated check. After 1 day of spraying, the plots treated with acetamiprid 20 SP @ 20g a.i./ha registered significantly lower (3.4 aphids/shoot) number of aphids/shoot followed by clothianidin 50 WDG @ 15 g a.i./ha (4.3 aphids/shoot) and flubendamide 480 SC @ 20 g a.i./ha (4.6 aphids/shoot). After 2$^{nd}$ day of spray, treatments of flubendamide 480 SC @ 20 g a.i./ha and clothianidin 50 WDG @ 15 g a.i./ha recorded minimum aphid population of 3.2 aphids/shoot followed by acetamiprid 20 SP @ 20g a.i./ha (3.5 aphids/shoot). After 7$^{th}$ day of spraying, treatment of flubendamide 480 SC @ 20 g a.i./ha recorded significantly lower number of aphids followed by acetamiprid 20 SP @ 20g a.i./ha (2.0 aphids/shoot). The aphid population in all the insecicidal treatments were significantlly lower than untreated check. The grain yield did not differ statistically among all the treatments. Although, the maximum grain yield of 41.8 q/ha was recorded in treatments of flubendamide 480 SC @ 20 g a.i./ha and clothianidin 50 WDG @ 15 g a.i./ha (Table 1).

Table 1. Efficacy of selected insecticides against corn leaf aphid (*Rhopalosiphum maidis*) during 2015-16 and 2016-17 at Karnal, Haryana (Pooled data)

| Treatments | Dose (g a.i./ha) | Pre-spray (count) | No. of aphids per shoot at different days after spraying (DAS) | | | | Grain yield (q/ha) |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 7 | 15 | |
| Imidacloprid 17.8 SL (Confidor) | 20 | 42.7 | 5.0 (2.4) | 4.2 (2.3) | 3.1 (2.0) | 1.7 (1.6) | 42.0 |
| Clothianidin 50 WDS (Dantotsu) | 15 | 43.1 | 4.3 (2.3) | 3.2 (2.0) | 2.2 (1.8) | 0.8 (1.3) | 41.8 |
| Flubendamide 480 SC (Fame) | 20 | 41.0 | 4.6 (2.4) | 3.2 (2.0) | 1.4 (1.5) | 0.5 (1.2) | 41.8 |
| Acetamiprid 20SP (Pride) | 20 | 45.4 | 3.4 (2.1) | 3.5 (2.1) | 2.0 (1.7) | 1.1 (1.4) | 40.1 |
| Thiamethoxam 25 WG (Actara) | 12.5 | 41.2 | 5 (2.4) | 3.9 (2.2) | 2.3 (1.8) | 0.7 (1.3) | 38.8 |
| Chlorantranilipride18.5SC (Coragen) | 20 | 40.8 | 5.4 (2.5) | 4.1 (2.2) | 3.1 (2.0) | 0.9 (1.4) | 38.3 |
| Dimethoate 30 EC (Rogor) | 300 | 45.5 | 6.8 (2.8) | 5.2 (2.5) | 3.7 (2.2) | 1.1 (1.4) | 38.4 |
| Control | | 43.7 | 42.2 (6.6) | 35.2 (6.0) | 33.5 (5.9) | 31.2 (5.7) | 38.4 |
| CD at 5% | | NS | 0.41 | 0.53 | 0.22 | 0.21 | 5.19 |

* Figures in parentheses indicate $V_{n+1}$ transformed value

The present studies revealed that treatments of flubendamide 480 SC @ 20g a.i./ha, clothianidin 50 WDG @15g a.i./ha and acetamiprid 20SP @ 20g a.i./ha were the effective for managing aphids on barley at Karnal location. Similar results of effectiveness of flubendamide have been earlier reported against wheat aphid (Mhaske et. al., 2007), mustard aphid (Khedkar *et. al.*, 2012) and aphids in other crops (Tohnishi *et.al.*, 2010). The findings are in line with the findings of Babu *et. al.* (2006) who reported that the neonicotinoids, *viz.* imidacloprid, thiamethoxam and clothianidin were quite effective in reducing aphid population in wheat crop. Vastrad (2003) and Patil *et al.* (2007) also reported that insecticides belonging to neonicotinoid group of insecticides are very effective against sucking pests. Joshi and Sharma (2009) reported that Confidor 200 SL @ 400 ml/ha treatment was found most effective against wheat aphids. Aziz *et al.* (2013) reported that neem seed oil-expeller proved as effective as imidacloprid in controlling the aphids. The new insecticides have the advantage of being required in lesser quantities and have shorter length of residual activity (Brunner *et al.*, 2005). The information generated from the study will be beneficial to the farmers as with emerging climate change aphid problem is becoming more serious in barley growing regions of the country. Hence, these tested new insecticides can reduce pesticide load in barley crop and can also fit well in IPM programme.

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