Original Research Article

Comparative study of different insecticide efficiencies against the populationof winter wheat aphids (Sitobionavenae)

Abstract: Wheat is one of the most important crop in India, it is 2nd most grown crop after the maize across all over the world (Form last few decades the one of serious pest named aphids (Sitobionavenae).it is the common or regular pest of winter wheat, which can cause up to the 40 percent of crop yield loss. The effectiveness of six pesticides as foliar applications against Sitobionavenae population was assessed at their recommended doses. The insecticides used, thiamethoxam 25% WG, imidacloprid 17.8 SL, monocrotophos 36 SL, quinalphos, lambda-cyhalothrin and the mixture solution of two insecticides thiamethoxam 12.6 % and the lambda cyhalothrin 9.5% ZC with their recommended field doses. However, one plot was also observed where no chemical treatment was given. Application of thiamethoxam 25 WG resulted significant control over the aphid's population whereas the quinalphos was observed a(as?) less effective against the population of Sitobiaonavenae. It can be resulted that the thiamethoxam among all the chemical control applications could be highly effective or efficiently insecticide for restricting the growth of winter wheat aphids in field.

Keywords: Sitobionavenae, Winter wheat aphids, Thiamethoxam, lambda-cyhalothrin, Wheat pests, Wheat pesticides, Monocrotophos, Imidacloprid, Wheat pest control.

Introduction: Wheat (Triticum aestivum) is the one of the highest cultivatable crops. It has its place in the Poaceae family and it is the second most cultivated cereals crop after maize. The winter wheat adversely affected with infestation of several pests. Out of these pests aphids (Sitobionavenae) is the one of most common pest which cause severe loss of winter wheat yield because they can suck the cell sap and reduce the vigour of plant (Srivastava et al., 2016; Shah et al., 2007). On average aphids can cause nearly 30 to 40 percent damage to crop productivity (Singh and Deol, 2003). Nowadays one of the most used methods to control the pest are the chemical controls known as pesticides or insecticides (Gomes et al., 2005). These pesticides play a vital role in the controlling of pests in crop by killing or inhibiting them. However, their indiscriminate administration has been the most important factor in serious health issues. Moreover, this can also lead to the insecticide resistance developing in the winter wheat aphids' populations (Xu et al., 2021). This research study has an aim to compares the efficiency of different commonly used chemical based insecticides at the flowering stage. The insecticides were the Imidacloprid, Monocrotophos, Thiomethoxam 25 % EC, Lambda Cyhalothrin. However, one field was not treated with any chemical, known as untreated (considered as a control field?).

Material and methods: This research was done during the rabi season of 2021 at LehraDhurkot, a village is located in the district Bathinda in Punjab in northern part of India. In this research total 7 plots were selected. 6 of these plots was given separate administration of insecticides named as plot T1 to T6 during trail, and remained plot was not received any treatment of insecticides. Here 24 hours Before the administration of the insecticides the 10 spikes of wheat were selected randomly from each plot and marked by binding the threads, the number of aphids was counted and their mean value calculated using formula Mean = {Sum of Observation} ÷ {Total numbers of Observations} (please, explain this formula. Are the authors calculating the mean number of aphids per wheat spike in each plot?). The different doses of insecticide in the 500 liter/ha of water were administrated during the flowering stage of wheat when the population of aphids were more than the threshold level (Johnston, R. L., & Bishop, G. W. 1987). The detail of administrated insecticides is given below:

T1: Thiamethoxam 25 WG 500 ml/ha

T2: Imidacloprid 17.8 SL 100 ml/ha

T3: Quinalphos 1600 ml/ha

T4: Monocrotophos 36 SL 1000 ml/ha

T5: combination of thiamethoxam 12.6 and lambda-cyhalothrin 9.5 ZC 150 ml/ha

T6: Lambda-cyhalothrin 5% EC 500 ml/ha

T7: Untreated

According the forementioned detail of treatments, each plot received foliar spray according to the local farmer practices, observation of these plots was recorded on the 1,3,7 and 25 DAS (days after spray). After this, the recorded values of aphid's population before and after the foliar spray treatments was analyzed in the laboratory by the mean and percentage of their mortality or population densities and the insecticidal efficiency of these pesticides by using statics methods(which ones?).

Results and discussion: Each plot was received the T1 to T7 treatments separately. In the treatment T1, the insecticide thiamethoxam 25 % WG at dose of 500 ml/ha used. In this analysis of research, the highest efficiency of Thiamethoxam (T1) followed by the Imidacloprid in (T2), lambda cyhalothrin in (T6) was observed after the period of 15 day (what about thiametoxam + lambda c, mean population = 0.37?). Whereas the treatment with Quinalphos in (T3) was less efficient among all insecticides, having mean population of aphids (4.56) after the 15 days of application, while the un-treated plot was the highest no of mean population of aphids (8.296). The efficiency of insecticides was accordingly T1>T2>T6>T5>T4>T3>T7.The data on insecticidal activity of the insecticides on the wheat aphids at 1,3,7, and 15 days after the foliar application of insecticides are given the table 1. The mean population of aphids before the application of insecticides 24 hours before the application of insecticides were 6.8,6.6,7.2 in fields treated with Imidacloprid 17.8 SL Monocrotophos 36 SL, Thiamethoxam 12.6 + Lambda Cyhalothrin 9.5 % ZC respectively whereas plots administrated with Thiamethoxam 25 % WG, quinalphos 25% and Lambda cyhalothrin 5 % EC had 6.4,7.5 and 6.9 respectively. The data gives the clear information about the superior efficiency of these insecticides over the non-treated plot. The minimum mean population of aphids (2.41) was recorded in the T1 and maximum in T3 among the insecticide administrated plots. Apart from this, the T2, T6, T5, and T4 the mean population of aphids were (2.45),(3.99),(3.15),(4.189) respectively.

Table 1 : Effectiveness of different insecticides against the population of aphids in winter wheat field

Sr. No	**Insecticide**	**Dose Ml,g/ha**	**Mean population of Aphids**					**Mean**
			DBS	**1DAS**	**3DAS**	**7DAS**	**15DAS**	
1	Imidacloprid 17.8 SL	100	6.8	2.61	1.31	1.04	0.52	2.41
2	Monocrotophos 36 SL	1000	6.6	6.6	4.79	2.09	0.90	4.18
3	Thiamethoxam 12.6+ Lambda Cyhalothrin 9.5 % ZC	150	7.2	5.80	1.86	0.54	0.37	3.15
4	Thiamethoxam 25% WG	500	6.4	2.75	1.68	1.20	0.67	2.45
5	Quinalphos 25% EC	1600	7.5	5.47	4.16	3.02	2.66	4.56
6	Lambda cyhalothrin 5% EC	500	6.9	5.22	3.09	2.68	2.07	3.99
7	untreated	0	6.5	7.34	7.85	8.95	10.84	8.29
8	Mean		7.74	5.11	3.53	2.78	2.57	

***DBS**= Days before spray**, *DAS**= Days after spray

Conclusion

It is concluded that mean population of winter wheat aphid was lowest on all chemical treatment but plot treated with thiamethoxam 25 WG was highest efficient against the aphids followed by imidacloprid 17.8 SL, lambda cyhalothrin 5% EC whereas higher densities were found on quinalphos 25% EC and untreated field.

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