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Review of environmental toxins polls in mortality or canola cabbage aphid (*Brevicoryne brassicae*) in Golestan Province

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Abstract

Rapeseed aphid *Brevicoryne brassicae* among the key pests of canola in Iran is considered the direct and indirect losses caused by plant diseases and viruses are transmitted. In this study the sensitivity of these aphids to pesticides Oxydemton methy, and more Pirimicarb and Trichlorofen that pesticides are recommended for controlling this pest, were studied. Biometric immersion technique leaves a toxic solution, was performed. The LC_{50} obtained for Oxydemton methyl 20.234, Pirimicarb 28.734 and Trichlorofen 96.434 ppm, respectively. These results show that the greatest impact on aphid PirimicarbOxydemton methy and rapeseed.

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Introduction

Aphids feed by sucking sap from their host plants. They produce a sugary waste product called honeydew, which is fed on by ants. In turn, the ants provide the aphids with protection from natural enemies. Continued feeding by aphids causes yellowing, wilting and stunting of plants (Opfer and McGrath, 2013). Severely infested plants become covered with a mass of small sticky aphids (due to honeydew secretions), which can eventually lead to leaf death and decay (Griffin and Williamson, 2012). Cabbage aphids feed on the underside of the leaves and on the center of the cabbage head (Hines and Hutchison, 2013). They prefer feeding on young leaves and flowers and often go deep into the heads of Brussels sprouts and cabbage (Natwick, 2009). Colonies of aphids are found on upper and lower leaf surfaces, in leaf folds, along the leafstalk, and near leaf axils. The cabbage aphid is difficult to distinguish from the turnip aphid (*Lipaphis erysimi* (Kaltenbach). The cabbage aphid is 2.0 to 2.5 mm long and covered with a grayish waxy covering, but the turnip aphid is 1.6 to 2.2 mm long and has no such covering (Carter and Sorensen, 2013). In temperate climates, eggs overwinter in plant debris near the soil surface (Hines and Hutchison, 2013). Eggs are not laid in warm climates; females produce female nymphs directly (Kessing and Mau, 1991). In instances where eggs are not produced, the female gives birth to nymphs. Nymphs differ from adults (including wingless adults, known as apterae) in having less developed caudae and siphunculi. The nymphal period varies from seven to ten days. Winged forms develop and start migrating to new host plants only when plant quality deteriorates or when a plant becomes overcrowded. Aphids are soft-bodied and oval or pear shaped with a posterior pair of tubes called cornicles, which project backward. Aphids have piercing-sucking mouthparts. Adult cabbage aphids can take on two forms: winged and wingless (Herrick and Huntgate, 1911). Wingless adults are 1/10 inches long, oval-shaped and appear grayish-green or grayish-white due to their waxy covering (Natwick 2009; Hines and Hutchison 2013; Opfer and McGrath, 2013). On the upper abdominal surface, eight dark brown or black spots are located beneath the waxy coating. These spots increase in size toward the posterior end. Winged females are smaller and lack the waxy covering of wingless females (Natwick, 2009). The wings are short with prominent veins. The head and thorax are dark brown to black with dark brown antennae. The winged aphids have a yellow abdomen with two dark spots on the dorsal anterior abdominal segments. These two spots merge into a dark band across the last abdominal segment (Kessing and Mau, 1991).Cabbage aphid has been reported in all parts of Iran And the farm: cabbage, turnip, mustard, radish, wild mustard, turnip, and many weeds Cruciferae families, in recent years to make canola damage. The bright green to dark green aphids and the larvae head is darker than the body the abdomen is dark until the end of the tape. Body of waxy flour-like substance is covered. This pest, although on the Canola causing damage but regular cabbage, cauliflower and Brussels sprouts to the other fig.s would prefer. This pest of leaves, stems and flowers, and attack with a waxy white coating on the plant reducesproduct or complete destruction of the plant. Moreover, the complexity and spoon-feeding of young plants the leaf margins are (Behdad, 2002; Khanjani, 2006). Aphids are serious pests under cool and dry conditions. Cultural and biological control strategies can help reduce aphid infestation and use of pesticides while still maintaining yield and quality of produce. For large scale (commercial) production, insecticide application should be considered when 2% of plants are infested with aphids. It is important to add a spreader-sticker (liquid detergent to break the surface tension of droplets) to the insecticides to increase surface contact with the waxy covering of the aphids' bodies (Griffin and Williamson 2012). If one can delay pesticide application before head formation in Cole crops, it can save expenses and help to conserve natural enemy populations (Natwick, 2009). For small-scale vegetable growers (home growers), aphids can be repelled by planting crops with reflective mulch-covered beds and monitored by filling yellow pans with water, if aphids are found in great numbers in the water traps additional control measures may be necessary (Griffin and Williamson, 2012). Many insecticides are effective against aphids. Care must be taken that sprays thoroughly wet the plants, because of the waxy nature of the pest and crop. To achieve maximum control with minimum efforts, proper surfactant proportions in combination with well-adjusted spray equipment are important (Kessing and Mau, 1991). Aphids have been managed using insecticidal soaps (e.g. Safer Soap). Application timing is very important to keep aphids under control while conserving populations of natural enemies (Griffin and Williamson, 2012; Hines and Hutchison, 2013). A study on insecticide resistance in cabbage aphid carried out in Pakistan reports that aphids developed resistance to chemicals including methomyl, emamectin benzoate, and pyrethroids (cypermethrin, lambdacyhalothrin, bifenthrin and deltamethrin) and neonicotinoids (imidacloprid, acetamiprid, and thiamethoxam). Their resistance level was also found to increase progressively in concurrence with regular use on vegetables (Ahmad and Akhtar, 2013). Toxic effects Imidaclopraid, Crbosulfan and Triazofus rapeseed aphid control was evaluated during the 99-1998 season, But because Triazofus Paydarsh effects during testing had the best effect (Aslam and Ahmad, 2001) also test the effects of pesticides and other malicious Imidaclopraid, Endosulfan, Carbosulfan, and Atofenuprox Difenthiuron on cabbage aphid were analyzed. This review on the two host Brassica olerace, *Brassica rapa* was performed. All insecticides tested on both products, they effectively control aphids (Aslam and Ahmad, 2002). Sensitivity to pesticides cabbage aphid adults was studied. Most phosphorus and carbamate compounds tested in this study were toxic to aphids. Profenofos showed the highest toxicity to insects. (Dimetry and Marei, 1992). Effect of four insecticides on *Diaertiella rapae* parasitoid wasp and its host, cabbage aphid were studied in laboratory conditions. Four insecticides Thiamethoxam (Cruiser), Imidaclopraid (Cnfidor) natural oils with plant bug (Nat-1) and Pirimicarb were tested. AyfoxCruiser and highest impacton their parasitoid. Confidor and then followed by Nat-1. The highest concentration tested (0.125) for Cruiser, Ayfox, Confidor and Nat-1, after 24 hours, respectively, the 56.52, 56.52, 34.78 and 25.53 percent mortality Diaertiella rapae were After 72 hours, the 57.45, 57.45, 36.17, 34.78 percent mortality, and then, more deaths were observed. In aphids, the concentration tested (0.125); Cruiser and Ayfox after 24 hours of one hundred percent mortality in the aphid, the Confidor after 48 hours and Nat-1 after 5 days of one hundred percent mortality rates were aphids (Farag and Gesraha, 2007). Motivation and aims of the study are review of environmental toxins polls in mortality or canola cabbage aphid (Brevicoryne brassicae) in Golestan Province

Materials and methods

First aphid canola rapeseed fields

First aphid canola rapeseed fields around the village of Qarghach and Narcalate sum was collected was transferred to the laboratory.

The aphids were reared

The aphids were reared on canola cultivar release and Hyola 401. Laboratory conditions: temperature, humidity, 70 ± 5 and 12 h and 12 h dark lighting, maintenance and breeding were.

Cache insecticides

Cache insecticides used in this experiment was the use of Oxydemton methy (Metasystox-R ®), Pirimicarb (Primor ®) and Trichlorofen (Diptrex ®).

First, preliminary tests

First, preliminary tests to determine the effective dose range of insecticides on the insect was and that doses of approximately 10 to 90 percent of casualties were caused determined and was used in final test And final test of immersion in the test solution poison leaf productivity were used. Five concentrations of pesticides so that the desired effect was fully prepared and puree. Five replicates for each concentration was repeated in each of 10 nymphs were completely random. Rapeseed leaves used in the biometric solution for 10 seconds in the case of toxic And after 10 seconds it out of solution and placed on wire mesh to dry.

Petri dishes

Petri dishes that had been prepared for the test holes on the petri dish lid and covered by netting, bottom Petri dishes were placed on filter paper and the value placed on damp cotton to supply the needed moisture. Leaves soaked in a toxic solution into the Petri dishes were Complete with brush and 10 nymphs were placed on leaves After putting the Petridish , to prevent aphids from escaping around it were covered with Para film Petri dish is then placed in the rearing room conditions and after 24 hours of death and the table was a note. Insects were not able to move and showed signs of severe toxicity were considered as dead. These steps are repeated for different concentrations of insecticides and pesticides became the Environmental Examination Survey obtained from the Polo PC software (POLO-PC) were analyzed.

Results and discussion

Results of thetestsare givenin Tablesbiometrics I usually see some deaths may Other factors besides the poison is in effect, the mortality rate has also sometimes seen In such cases, the percentage mortality was corrected by Abbott's formula. Controlmortality ratesless than 10percent, but ifmorethan10%mortalitywasobserved, the experimentwasrepeated.

$$P = (P' - C). (1 - C) \times 100$$

P: percent mortality corrected

P ': percent mortality observed

C: percentage mortality in control

BiometricsOxydemton methy

In this experiment five toxin concentrations of 300, 100, 30, 10 and 3 ppm (ppm) and control (without toxin) was used. The highest concentration of % 92.25 deaths and the lowest concentration, 27% of deaths, have occurred. Dose of 20.234 ppm caused mortality is 50% (Table 1), where the high and low, respectively, 31.344 and 11.759 is ppm. Therefore, LC_{10}, LC_{50} and LC_{90}, respectively poison Oxydemton methy 1.105, 20.234 and 357.189 are to be (Table 2).

Table 1. case fatality of 50% concentration, the slope of the line, Sam Kai score on aphid rapeseed Oxydemton methy.

(df) X2	Slope±SE (Confidence limits)	LC_{50}	Dose Total	The number of insect control
1.43 (3)	1.08±0.15	234.20	5	300

Table 2. Fungicidal Concentrations of 10, 50 and 90% with some up and down the toxin Oxydemton methy.

High	Low	Value (ppm)	Fungicidal dose
2.753	0.279	1.105	LC_{10}
31.343	11.759	20.234	LC_{50}
1049.318	186.127	357.189	LC_{90}

Biometrics Pirimicarb

In this experiment five toxin concentrations of 300, 100, 30, 10 and 3 ppm (ppm) and control (without toxin) was used. The highest concentration of % 96.85 deaths and the lowest concentration, 14.36 %deaths, have occurred. Dose of 28.734 ppm caused mortality is 50% (Table 3), where the high and low, respectively, 54.033 and 13.134 is ppm. Therefore, LC_{10}, LC_{50} and LC_{90} toxin Pirimicarb respectively 3.115, 28.734 and 278.921 can be. (Table 4).

Table 3. The case fatality of 50% concentration, the slope of the line, Sam Kai Pirimicarb score on rapeseed aphid.

(df) X2	Slope±SE (Confidence limits)	LC_{50}	Dose Total	The number of insect control
3.44 (3)	1.31±0.17	28.734	5	300

Table 4. Fungicidal concentrations of 10, 50 and 90% with some up and down the toxin Pirimicarb.

High	Low	Value (ppm)	Fungicidal dose
7.879	0.385	3.115	LC_{10}
54.033	13.134	28.734	LC_{50}
1556.136	124.918	278.921	LC_{90}

Biometrics Trichlorofen

In this experiment five toxin concentrations 480, 240, 120, 60 and 30 ppm and control (without toxin) was used. The highest concentration of% 88.23% mortality at the lowest concentration of 22.06 deaths, were observed. Dose of 96.434 ppm has caused 50% mortality (Table 5), where the high and low, respectively, 130.421 and 67.116 is ppm. Trichlorofen, LC_{10}, LC_{50} and LC_{90} more poison Trichlorofen respectively15.024, 96.434 and 644.115 are to be (Table 6).

Table 5. The case fatality of 50% Concentration, the slope of the line, Trichlorofen score more on detoxification of rapeseed aphid.

(df) X2	Slope±SE (Confidence limits)	LC_{50}	Dose Total	The number of insect control
0.38 (3)	1.58±0.25	96.434	5	300

Table 6. Fungicidal concentrations of 10, 50 and 90% more poison Trichlorofen with high and low limits.

High	Low	Value (ppm)	Fungicidal dose
25.948	5.537	15.024	LC_{10}
130.421	67.116	96.434	LC_{50}
1397.135	410.231	644.115	LC_{90}

According to the results obtained and calculated LC_{50}, respectively Oxydemton methy andPirimicarb with 19.628, 28.080 (per ppm) were the most effective pest control and more than Trichlorofen with LC_{50} 95.964. Dimethon phosphorus Oxichloride compounds are among the methyl and are classified as nerve toxins. According to the results Pirimicarb also has a great impact on canola aphid can be and only one was selected pesticides on aphids and some flies insecticide is effective and a good stretch in the integrated pest management. These results are comparable with the results of Islam *et al* (Aslam and Ahmad, 2001; Aslam and Ahmad, 2002) were also good in those Iimydaclopraid effects of rapeseed aphid control. May be inadequate because Trichlorofen more exposure than other pesticides has been less effective. Aphid insects examined in this study were susceptible to the examined insecticides and gave high mortality however, an appropriate management strategy for pesticide resistance should be considered (Pungerl, 1984).

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