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Comparative Efficacy of Five Different Insecticides against *Brevicoryne brassicae* (Linn.) (Homoptera: Aphididae), a Pest on Canola in Southern Punjab, Pakistan

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Abstract.- Of the five insecticides *viz*., Confidor 200 SL (imidachloprid), Mospilan 20SP (acetamaprid), Advantage 20 EC (carbosulfan), Actara 25 WP (thiomethoxan) and Lannate 40SP (methomyl) administered at the rate of 370 ml, 198 g, 741 ml, 60 g and 560 g per hectare, Lannate resulted in maximum reduction in the population of *Brevicryne brassicae* a pest on canola at all the post treatment intervals. The insecticidal effect was statistically equal 7 days after spray.

Key words: *Brevicoryne brassicae*, canola, insecticides.

Many insecticides belonging to different groups like organochlorides (Bakhetia *et al*., 1986), organophosphates (Mustafa, 1998) and pyrethroids (Parsad, 1992) have been used to control aphids on *Brassica* but many of these are associated with undesirable traits such as failure in controlling *Lipaphis erysimi* (Kalt), persistence in the environment and development of resistance by the pest.

Mustafa (2000) reported that all the insecticides were found statistically same except for Advantage, which reduced the *L. erysimi* population by 74.53% - 80.47%. After 72 hours of treatment Confidor was the most effective with 92.28% mortality followed by Metasystox, Polo and Talstar. After one week, Confidor, Talstar, Polo and Metasystox were statistically similar and they reduced the pest population by 93.45% to 96%. According to Aslam *et al*. (2001) Imidachloprid 25 WP @ 250 g/ha, Advantage 20 EC @ 1800 ml/ha, Triazophos 40 EC @ 1400 ml/ha and Confidor @ 600 ml/ha gave effective control over *L. erysimi* and *Brevicoryne brassicae* on canola, at pod formation stage. All the insecticides gave effective control of the *L. erysimi* nine days after treatment. However, Triazophos was best because of its consistent effectiveness throughout the experiment. Liu *et al*. (2001) studied the toxicity baselines and efficacies of primicarb, imidachloprid, thiamethoxam and lambda-cyhalothrin against *L.erysimi* on *Brassica*. They observed that primicarb and lamda-cyhalothrin were the most effective insecticides. Devi *et al*. (2002) reported that Phosalone showed average 72.8% control of *L. erysimi* followed by endosulfan, which gave 63% control, and bioneem showed 51.8% control of *L. erysimi* on *Brassica*, respectively. Mustafa (2004) reported that after 72 hours, Actara and Mospilan showed same results and gave highest mortality of *L. erysimi* 95.86% and 95.06%, respectively. However, these were significantly different from Polo (94.16%). Minimum mortality of *L. erysimi* was observed in plots treated with DC.tron (a commercial name of a pesticide).

The present project was initiated to investigate the effectiveness of different insecticides like Confidor 200 SL (Imidachloprid), Mospilan 20 SP (Acetamiprid), Advantage 20 EC (carbosulfan), Actara 25 WPC (thiomethoxam) and Lannate 40 SP (methomyl) which are considered environmental friendly and safe for *B. brassicae* population suppression on canola crops. It was necessary to find out the more effective insecticides which are comparatively economical and provide maximum control over pests and can increase the yield.

Materials and methods

The study was conducted with the objective to find out comparative efficacy of different insecticides against *B. brassicae* on canola (*Brassica*). The trials were done in the experimental fields of University College of Agriculture, Bahauddin Zakariya University, Multan during 2001-2002 following RCB design with four replicates and 4 x 5m plot size through "chatta" method. Five insecticides *viz*., Actara 25 WP

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(thiomethoxan, an organophosphate), Advantage 20 EC (carbosulfan, a carbamate), Confidor 200 SL (imidachloprid, a pyrethroid), Mospilan 20 SP

Table I.- Effect of different insecticides on mortality of aphids of canola crop.

Trade name (Active ingredient)	Dose/ha	Average population before treatment	Mortality (%) after treatment			
			Day 1	Day 2	Day 3	Day 7
Confidor 200SL (Imidachloprid)	370ml	32.13a	26.92b v	61.94c v	95.73d v	89.65e v
Mospilan 20SP (Acetamaprid)	198g	33.38a	40.15b w	62.96c v	93.09d v	96.63d w
Advantage 20EC (Carbosulfan)	741ml	34.80a	36.73a x	74.41b w	96.35c v	96.89c w
Actara 25WP (Thiomethoxam)	60g	36.05a	18.87b y	53.44c x	80.81d w	93.37e x
Lennate 40SP (Methomyl)	560g	33.95a	51.98b z	83.43c z	97.37d v	98.25d y

Mean sharing in rows and columns similar letters are not significantly different by DMR test at P=0.05.

(acetamaprid, an organophosphate) and Lannate 40 SP (methomyl, a carbamate) @ 60 g, 741 ml, 370 ml, 198 g and 560 g per hectare were sprayed at economic threshold level (ETL) (30-40 aphids per 10 cm central shoot) (Bakhetia *et al*., 1986) in their respective plots of canola by hand knapsack sprayer. The sprayer pressure was 18 PSI and the wind was blown 5 km/hour at the time of spray.

Population data of *B. brassicae* was recorded from 10-cm main stem inflorescence of 10 randomly selected plants per plot before spray, then 1, 2, 3 and 7 days after application. The population reduction in percentage was calculated by the following formula.

$$\text{Reduction (\%)} = \frac{\text{Population before spray} - \text{Population after spray}}{\text{Population before spray}} \times 100$$

The data was analyzed statistically with the help of computer using M-Stat package. The means were separated by DMR test at P=0.05.

Results and discussion

The results presented in Table I revealed highly significant difference among treatment at all the post treatment intervals. Actara was inferior (80.81%) as compared with other treatments and reduction in pest population was up to 3 day after spray. On the other hand, Lannate was the most effective (98.25%) and gave maximum reduction in aphid population at all the post treatment intervals and was equal statistically with the population reduction of *B. brassicae* recorded in all the insecticides application at 7 days after spray.

The present findings cannot be compared with those of Devi *et al*. (2001), Sinha *et al*. (2001), and Devi *et al.* (2002) because they applied different insecticides for the control of *L. erysimi* as those of tested in the present study. The present findings are in conformity with those of Aslam *et al*. (2001) who reported that imidachloprid 25 WP, carbosulfan 20 EC, triazophos 40 EC and imidachloprid 200 SL @ 250 g, 1800 ml, 1400 ml and 600 ml/hectare were effective against *B. brassicae* up to nine days after application but in the present study all the insecticides were equally affective seven days after spray. The findings of Mustafa (2000) and Liu *et al.* (2001) can also be compared with the present findings with little variation. However, Liu *et al*. (2001) reported that thiomethoxam did not prove the best when compared with primicarb, imidachloprid and lambda cyhalothrin. Similar findings were also found in the present study that Actara (thiomethoxam) did not show good control of *B. brassicae* on canola crops.

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Microbiological Examination of Milk From Different Villages of Gilgit

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Abstract.- During July and August twelve milk samples were collected randomly from four different villages of Gilgit for grading on the basis of enumeration of fecal coliform colonies by standard plate count method and methylene blue reduction test. The fecal coliform count in raw milk of 1:1000 dilution was recorded from 578-714 colonies from Basin milk samples, followed by 576-589 colonies from Barmas and 286-594 colonies from Nagaral. The lowest fecal coliform contamination (185-210) colonies were counted from Kashrote milk samples. In the pasteurized milk samples the fecal coliform count was low in all the milk samples: 139–175 colonies from Basin milk samples, 136–138 colonies from Barmas samples, 93-146 colonies from Nagral and 67–89 colonies from Kashrote samples of the 1/1000 dilution. The methylene blue test was performed for raw milk samples revealed from Basin and Barmas all the milk samples were poor, from Nagral out of three samples one was poor and two were fair. From Kashrote all the samples were good, while the pasteurized milk samples from all the villages were good and Kashrote samples were excellent.

Key Words: Raw milk, Pasteurize milk, Methylene blue Reduction test, standard plate count.

Milk is major part of diet of vast population of human on earth due to its high nutritional value for human beings and plays a prominent role in the Pakistani diet. Approximately 50% of milk produced, is consumed as fresh or boiled, remaining is utilized for manufacturing of indigenous varieties of milk product such as Ice cream, Butter, Khoa, Paneer, Rabri, Kheer and Gulabjaman (Soomro *et al*., 2002).

If it is produced unhygenically and handled carelessly, it gets contamination very easily because it has high nutritional value, leading to its early spoilage (Chatterjee *et al*., 2006). It also serves as high water quantity which leads to serve as an excellent culture medium for the growth and multiplication of microorganisms (Haridy, 1992). Milk and its products also serve as vehicle for transmission of gastrointestinal disease when suitable temperature exists (Ekici *et al*., 2004).

Among all microorganisms, coliforms particularly *Escherichia coli* (*E. coli*) is frequently used in the microbiological analysis of food as an indicator of poor hygienic condition. The coliform group of bacteria is defined as the indicator of suitability of milk for drinking (Karans *et al*., 2005). *E. coli* was isolated from milk products like Mawa/ Khoa, Cream, Dahi, Cheese, Butter and Gulabjaman (Kulshrestha, 1990). Microbiological examination of milk is essential to find the degree of contamination with the detection and enumeration of indicator organisms. The present study is designed to assess the milk quality with special reference to fecal coliforms and methylene blue reduction test.

Materials and methods

All the milk samples were collected randomly from all the four localities in 15 ml sterilized screw caped test tubes from the milked container of the

formers. Samples were shifted in cold chain box to the laboratory of Department of Biological Sciences and processed within three hours for the isolation of fecal coliforms and methylene blue reduction test.

Table I.- Enumeration of microorganisms by standard plate count method and decolorizing time from Methylene blue test and grading of milk samples collected from different villages of Gilgit.

Name of area	Sample No.	Colony forming units				Decolourization time			
		Raw milk		Pasteurized milk		Raw milk		Pasteurized milk	
		1/1000	1/10,000	1/1000	1/10,000	Decolourization time	Grade	Decolourization time	Grade
Basin	1	714	145	175	36	52 min	Poor	6:35 h	Good
	2	585	136	161	32	56 min	Poor	6:40 h	Good
	3	578	132	139	28	48 min	Poor	6:25 h	Good
Barmas	1	576	130	136	24	1:45 h	Poor	6:10 h	Good
	2	589	132	138	28	1:25 h	Poor	6:11 h	Good
	3	585	130	137	26	1:35 h	Poor	6:24 h	Good
Nagral	1	498	112	120	22	2:12 h	Fair	6:35 h	Good
	2	594	135	146	27	1:21 h	Poor	6:37 h	Good
	3	286	84	93	22	4:27 h	Fair	6:50 h	Good
Kashrote	1	205	88	89	16	6:40 h	Good	>8 h	Excellent
	2	185	80	67	14	6:10 h	Good	>8 h	Excellent
	3	210	82	86	15	6:30 h	Good	>8 h	Excellent

Dilutions of 1:10, 1:100, 1:1,000, 1:10,000 were prepared by adding the sterilized phosphate buffer. The remaining milk samples were pasteurized by holding at 71°C for 15 seconds and prepared the same dilutions as for raw milk sample.

0.1 ml sample from 1:1,000 and 1:10,000 samples were transferred on already prepared MacConkey and Eosin Methylene Blue agar. The transferred samples were spread with a sterilized glass rod spreader and incubated aerobically at 37°C for 24 hours. After incubation the colonies were counted by standard plate count method (Grag and Usha, 1997).

For the isolated colonies biochemical tests such as indole production test, methyl red test and carbohydrate fermentation test were estimated.

The methylene blue reduction test (Benson, 2002**)** depends upon the ability of bacteria in milk to grow and to consume the dissolved oxygen, which reduce the oxidation reduction potentials in the medium. In the methylene blue reduction test 1 ml of the methylene blue solution was added to 10 ml of milk. The tubes were sealed with rubber stopper and slowly inverted three times to mix and placed in a water bath at 35°C upto 8 h incubation. The change in colour of sample was recorded every 30 minutes for 8 hours.

The quality of milk is graded on the basis of time taken for decolourization of methylene blue; more than 8 h is rated as excellent, 6-8 h as good, 2-6 h as fair, and less than 2 h as poor.

Results and discussion

The results of milk cultures summarized in Table I indicate that except Kashrote all the milk samples processed from Basin, Barmas and Nagaral showed high level of fecal coliforms contamination in 1:1000 dilution. This indicates that there are great health hazards to public if consumed without pasteurization. The milk should be sterilized if the cow is not infected. The existence of this high coliforms contamination indicates that the milk has been processed under poor hygienic conditions. Grewal and Tiwari (1992) stated that the sources of contamination of raw milk are the uncleaned hands of milking person, poor quality of water used for washing the milking utensils, udder of the cow and unclean teats could be the source of accelerating the

bacterial contamination of raw milk and raw milk products. Basin, Barmas and Nagaral are situated in the periphery of Gilgit where livestock are kept in cattle sheds and open channel water is used for cleaning of cow udder, teats and hands before milking the cows. Kashrote, on the other hand, is situated in the middle of the city and people keep only a single cow and use drinking tap water for washing the utensils, hands and teats of the cow during milking. There is therefore less fecal coliform contamination in these milk samples.

In the pasteurized milk samples again the fecal coliforms contamination was high in Basin, Barmas and Nagaral as compared to Kashrote, but according to Harrigan and McCance (1976), the fecal coliform contamination less than 200/g in food is acceptable.

The methylene blue reduction test performed for raw milk samples again showed the same results (Table I). Most of the samples processed from Basin, Barmas and Nagral were poor except two samples from Nagral were fair, while the milk samples processed from Kashrote were excellent. All the samples of the pasteurized milk samples were good and Kashrote samples were excellent.

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