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Chemical Control of Mites on Apple in Swat Valley

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Abstract: The effects of different insecticides on mite complex of apple (*Cenopalpus pulcher, Panonychus ulmi, Tetranychus viennensis* and *Aculus schlechtendli*) were studied. Insecticides namely Thiovit 80 WP (250 gm/100 lit. of water), Mepra 50 EC, Methyl parathion 50 EC, Laser 25 EC each (250 ml/100 lit. of water) and Polo (80 ml/100 lit. of water) were applied in the month of August at three different localities named Ghar Shin, Sher Palam and Kalakot. Pre-spray data was recorded 24 h before each spray. Post-spray data were recorded after 24, 48 and 72 h and then at weekly intervals upto five weeks. At Ghar Shin best results were obtained with Mepra where infestation of phytophagous mites (mean number of mites/leaf) was lowest (0.91) among all treatments. Thiovit (1.20), Polo (1.66), Laser (2.11) and Methyl parathion (3.87) followed it while in check plot highest mean infestation (7.68) was recorded. The lowest mean infestation of phytophagous mites at Sher Palam was recorded with Mepra (0.59) which was followed Polo (0.61), Methyl parathion (0.69) thiovit (0.877) and Laser (1.20) while in check plot highest mean infestation (2.10) was observed. At Kalakot the lowest mean infestation with Mepra (1.13) followed by Polo (1.22), Laser (1.23), Methyl parathion (1.25) and Thiovit (1.21) while in check plot the highest mean infestation (2.81) was recorded.

Key words: Mite complex, infestation, phytophagous mites, *Cenopalpus pulcher, Panonychusulmi, Tetranychus viennensis, Aculus schlus schlechtendli*

Introduction

Apple *Malus pumila* Mill. (Rosaceae: Pomoidea) is the leading fruit of the temperate region. In Pakistan it is grown in Swat, Dir, Chitral, Bunir districts and some tribal areas of Malakand division, South Waziristan agency (Wana), Murree, Gilgit and upland of Quetta and Kallat. It is also grown in Muzaffarabad, Bagh and Poonch Districts of Azad Jammu and Kashmir. In NWFP, total area under apple orchards during 1991-92 was 7627 hectares with a production of 81863 tones which is 40 % of the total production of Pakistan (Survey MFVDP, 1992).

Mites attack almost every growing thing: food, forages and fibre crops, fruit, trees and weeds. Losses can be staggering. Grain yield can drop by a ton per acre in a heavy infestation. Silage losses of 5 t acre^{-1} are not uncommon in untreated fields. Cotton crops in a "bad" mite year may show a decrease of 25% with impaired maturity and lower seed viability. In fruit trees, early infestation can cause fruit deformity, followed by subnormal budding the next year. Latter attacks can cause damage that ranges from discoloration and down grading to early drop of fruit and defoliation. Tree vigor may be impaired for a season or more. The mite if uncontrolled can multiply with frightening speed. Populations of 1400 mites have been counted on a single leaf. The entire crop can disappear under the severe attack of mite (Omite, 1992).

It was found that the red spider mite *Panonchus ulmi* and hawthorn mite *Tetranychus viennensis* were the chief pests of apple orchards in the Crimea Ukraine (Petrushova and Medvedeva, 1991). Apple orchards in the wet temperate high hills of Shimla and Kulu regions of Himachal Pradesh, India presented a scorched look due to an outbreak of *Panonychus ulmi* (Kumur and Bhalla, 1993). It has been found that scab, scale and mites are the most commonly reported problems, all occurring in about 70 % of orchards in Malakand division (MFVDP, 1992).

Since mites attacks almost every thins that grow, it is almost impossible to show damage for each crop. However specific symptoms are quite common such as spotting, stippling, extreme dryness and defoliation. Webbing is also a common symptom of mite attack, but some extremely common species like *Panonychus ulmi* and *P. citri* do not web at all. Others web only slightly. The damage symptoms vary from host to host for example Panonychus olievora mite damage is silvery on lemon and brownish or black on oranges. Damage levels also vary from crop to crop. On grapes and bean leaves *Tetranychus pacificus* damage is often confined to a light color stippling when population densities are low. Yet the same light infestation on pears will turn leaves dark red and scorch looking. The difference is probably due to tolerance of the host to toxins injected by the mites during feeding. Consumer demands and market grades necessitate production of a very high quality apples (Doubleday, 1992). One of the major problems, which make it a difficult task, is mites on apple. Progress is being made in addressing this problem by adoption of integrated pest management (IPM). Among other thins IPM involves detailed monitoring, adoption of threshold below which damage can be tolerated and selective use of insecticides and acaricide. Chemical control of mites on apple has been investigated and found effective by most of the researchers. Bulut and Zeki (1992), Longhurst *et al*. (1992), Botha *et al*.. (1993), and Niemczyk and Skorupinsiki (1994) reported that pesticides successfully controlled mite population on apple. Therefore the present trial was conducted to test some of the available chemicals to study their effectiveness against the mite complex in Swat region where no such study has been conducted.

Keeping in view the gravity of the problem faced by the farmers and the potential effectiveness of the pesticides against the mites, the present study was conducted in three locations of Swat district to determine the most effective pesticide against the mite complex of apple.

Materials and Methods

The effectiveness of different insecticides of different groups against phytophagous mites on Red delicious apple *Malus pumila* Mill. (Rosaceae; Pomoidea) was studied at three different localities in Swat valley during 1995. Pre spray data was recorded on 7.8.1995 and an insecticidal spray was done on 8.8.1995. The experiment comprised of 6 treatments (5 insecticides and one control) in randomized complete block design. Each treatment consisted of 20 apple trees. Apple orchards were observed for mite's incidence and population abundance. Weekly data collection was started before treatment in the month of July. Four trees were selected and marked by paint randomly in each plot for data recording. Ten leaves were collected from each apple tree randomly from top to bottom. These leaves were packed in polythene bags carefully. These bags were marked according to their respective plots. Number of phytophagous mites was counted on both sides of the leaves.

The following insecticides with recommended doses were used against the mites in all localities of the experiment:

Thiovit 80 WP, Mepra 50 EC, Methyl parathion 50 EC Lasser 25 EC and Polo were sprayed with power sprayer machine (Table 1) Post spray data of phytophagous mites was recorded after 24, 48 and 72 hours and then at weekly intervals. The data was analyzed statistically for comparison of different insecticides.

Table 1: Insecticides with recommended doses

Treatments	Trad Name	Common Name	Recommended dose/100 Lit. of water
T1	Thiovit 80 WP	Sulphur	250 g
T2	Mepra 50 EC	Methyl parathion	250 ml
T3	Methyl paration 50 EC	Methyl paration	250 ml
T4	Lasser 25 EC	Dimethoate+Cypermethrin	250 ml
T5	Polo	Diafenthioran	250 ml
T6	Control (Untreated)	----	----

Results and Discussion

Locality: Ghar Shin: Pre spray data was recorded on 7.8.1995 and an insecticidal spray was done on 8.8.1995. Data recorded 24 hours after insecticide application revealed that the number of mites were reduced in T1 (0.100), T2 (0.400), T3 (1.350), T4 (1.075) and T5 (1.625). All treated plots were non-significantly different from each other but significantly lower than T6 (13.00).

Forty-eight hours after insecticidal application mites infestation was significantly lower in T1 (0.200) T2 (0.850), T2 (0.850), T4 (1.125) and T5 (1.350). In T3 (4.625) number of mites were significantly higher than the other treated plots but significantly lower than T6 (17.90). Seventy-two hours after insecticide application mites infestation was significantly lower in T1 (0.450), T2 (0.350), T4(1.750) and T5(1.600). In T3 (4.00), mite's infestation was significantly higher than the other treated plots but significantly lower than To (8.82). Mean values of weekly data (5 weeks) revealed that the average number of phytophagous mites per leaf were highest in To (7.681) followed by T3 (3.875), T4 (2.117), T5 (1.664) T1 (1.200) and T2 (0.910) at Ghar Shin. Among the insecticides used Mepra (T2) proved to be the best insecticide at Ghar Shin having less no. Of Phytophagous mites per leaf followed by thiovit (T1), while the highest infestation was recorded in Methyl parathion (T3) followed by Laser (T4) and Polo (T5). All the insecticides proved to be significantly effective than the control (Table 2), Fig. 1.

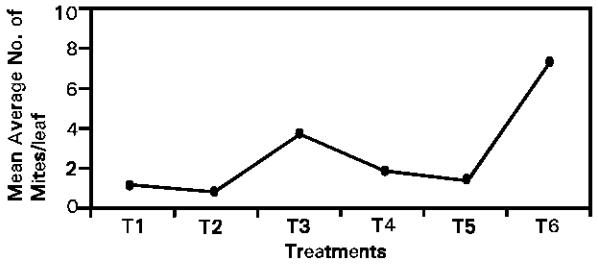

Fig. 1: Mean average number of phytophagous mites per leaf at ghar shin

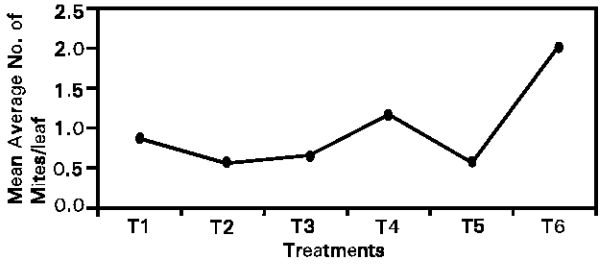

Fig. 2: Mean average number of phytophagous mites per leaf at sher palam

Locality: Sher Palam: Pre spray data was recorded on 6.8 .1995 and an insecticidal spray was done on 7.8.1995. Data recorded 24 hours after insecticide application revealed that the number of mites were reduced in T3 (0.175), T5 (0.175), T2(0.250), T4 (0.350) which were non significantly different with one another. It was followed by T1 (0.450),

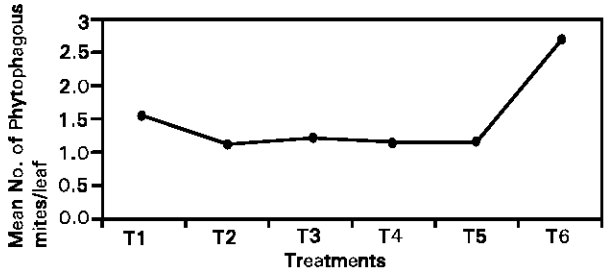

Fig. 3: Mean average no of phytophophagous mites per leaf at Kalakot

which was significantly higher than T3 and T5 but non significant from T2 and T4. Mite population was significantly higher in To (0.625) than T2, T3, T4 and T5 but non-significant from T1.

Forty eight hours after insecticidal application mites infestation was significantly lower in T2 (0.150), T5 (0.150), T3 (0.200) and T1 (0.250), all being non significant with one another. These were followed by T4 (0.325), which was significantly higher than T2 and T5 but non-significant with T3 and T1. Mite population was significantly higher in T6 (0.625) than all treated plots.

After seventy-two hours of spray significantly lower population was recorded in T5 (0.075) and T3 (0.100), both non-significant with one another. Infestation in T2 (0.250) and T4 (0.275) was significantly higher than T5 and T3 but lower than T1 and To. Mite's infestation was significantly higher than T5 and T3 but lower than T1 and To. Mite's infestation was significantly higher in T1 (0.450) and To (0.550), which were non-significant with each other.

Mean values of weekly data (5 weeks) revealed that the average number of phytophagous mites per leaf were highest in To (2.100) followed by T4 (1.200), T1 (0.877), T3 (0.690) T5 (0.610) and T2 (0.590). Among the insecticides used Mepra (T2) proved to be the most effective insecticide having less no. Of mites per leaf followed by Polo (T5) and Methyl parathion (T3) while the highest infestation was observed in treatments with Leser (T4) and Thiovit (T1) (Table 3), Fig. 2.

Locality : Kala Kot. Pre spray data was recorded on 6.8.1995 and an insecticidal spray was done on 7.8.1995. After 24 hours of spray mite population was significantly lower in all treated plots i.e., T1 (0.100), T2 (0.100), T3 (0.450), T4 (0.350) and T5 (0.525) which were non significant with one another but significantly lower than To with (4.350) no. Of mites per leaf.

Similarly forty eight hours after spray significantly lower population was recorded in T2 (0.350), T1 (0.400), T4 (0.450), T3 (0.500) and T5 (0.525) all being non significant with one another. The population was significantly higher in To (5.650) than all the other treatments. Seventy-two hours after spray significantly lower infestation was recorded in T5 (1.250), T4 (1.400), and T2 (1.750) all are being non-significant from one another. Population of mites were significantly higher in T1 (2.000), T2 (2.200) and To (2.300) all being non-significant from one another and T2.

Mean values of weekly data (5 weeks) revealed that the average number of phytophagous mites per leaf were highest in To (2.810) followed by T1 (1.58), T3 (1.25) T4 (1.23) and T5 (1.22) and T2 (1.13). Among the

Table 2: Average number of phytophagous mite/leaf at Ghar shin

Treatments	Pre-spray	Hours			Weeks					Mean
		24	48	72	1st	2nd	3rd	4th	5th	
T1	1.450	0.100B	0.200C	0.450C	1.750D	1.350C	2.250B	1.250BC	2.050A	1.20
T2	2.500	0.400B	0.850C	0.350C	0.500D	0.525C	0.500C	0.650CD	2.000A	0.91
T3	10.35	1.350B	4.625B	4.000B	5.900B	3.700A	2.250B	1.650AB	1.050B	3.87
T4	5.350	1.075B	1.125C	1.750C	3.100C	2.350B	2.400B	1.050BCD	0.850B	2.11
T5	5.700	1.625B	1.325C	1.600C	0.700D	1.050C	0.450C	0.450D	2.050A	1.66
T6	6.200	13.00A	17.90A	8.825A	7.875A	4.500A	8.200A	2.125A	0.500B	7.68

Table 3: Average number of phytophagous mite/leaf at Sher palam

Treatments	Pre-spray	Hours			Weeks					Mean
		24	48	72	1st	2nd	3rd	4th	5th	
T1	3.150	0.450AB	0.250BC	0.450A	0.400B	0.700CD	1.050B	0.850B	0.750B	8.877
T2	2.150	0.250BC	0.150C	0.250BC	0.400B	0.500C	0.500CD	0.475C	0.650B	0.59
T3	3.650	0.175 C	0.200BC	0.100CD	0.225B	0.200D	0.250D	0.425C	1.050B	0.69
T4	3.600	0.325 BC	0.325 B	0.275B	0.800B	2.125B	0.900BC	0.425C	2.050A	1.20
T5	2.650	0.175C	0.150C	0.075D	0.200B	0.350CD	0.200D	1.150B	0.600B	0.61
T6	3.050	0.625A	0.625A	0.550A	3.350A	4.000A	3.750A	2.200A	0.750B	2.10

Table 4: Average number of phytophagous mite/leaf Kalakot

Treatments	Pre-spray	Hours			Weeks					Mean
		24	48	72	1st	2nd	3rd	4th	5th	
T1	3.500	0.100B	0.400B	2.000A	1.500B	2.200A	1.450A	1.600A	1.500BC	1.58
T2	2.650	0.100B	0.350B	1.750AB	1.450BC	1.400B	0.650C	0.800B	1.100BC	1.13
T3	2.650	0.450B	0.500B	2.200A	1.200C	1.050B	0.550C	0.500C	2.175AB	1.25
T4	2.050	0.350B	0.450B	1.400B	1.500BC	1.100B	1.050B	0.900B	2.300A	1.23
T5	3.450	0.450B	0.525B	1.250B	1.200C	1.350B	0.375C	0.850B	1.600C	1.22
T6	3.850	4.350A	5.650A	2.300A	3.000A	2.00A	1.825A	1.650A	0.650D	2.81

Table 5: Average number of phytophagous mites per leaf at three localities

Treatments	Ghar shin	Sher palam	Kalakot	Mean
T1	1.20	0.877	1.58	1.21
T2	0.91	0.59	1.13	0.87
T3	3.87	0.69	1.25	1.93
T4	2.11	1.20	1.23	1.51
T5	1.66	0.61	1.22	1.16
T6	7.66	2.10	2.81	4.19

insecticides used Mepra (T2) proved to be the most effective having the lowest infestation followed by Polo (T5), Laser (T4) and Methyl parathion (T3) while the highest infestation was recorded in Thiovit (T1). However all the insecticides were non-significantly different from each other. (Table 4), Fig.3.

The data given in Table 4 represents the performance of each insecticide at three localities. The data showed that Mepra (T2) proved to be the most effective at all the three localities and had a mean average infestation of 0.87 mites per leaf followed by Polo (1.16). Thiovit (T1) also performed well having 1.21 mean average infestation. The highest mean average infestation of all three localities was recorded in control (To) having a mean average infestation of 4.19 followed by Methyl parathion (T3) with 1.93 and Laser (T4) with 1.51 mean average infestation (Table 5).

The results of the present study are in accordance to the work of other scientists as for as the effectiveness of the insecticides is concerned. Longhurst *et al*.. (1992) used fenazaquin against apple pests in field trials in France and concluded that the compound reduced the population of Panonychus ulmi after 14 days from 27 and 99 per leaf in each of the two trials to 0.7 and 3.5 per leaf respectively, Bulbut and Zeki (1992) found Lambda-cyhalothrin and fenpropathrin as effective in controlling mites, Niemczyk and Skorupinski (1994) found Phosalone (Zolone) while Botha *et al*.. (1994) applied acrinathrin, azocyclotin, propargite, abamectin and toxin of *Bacillus thuringiensis* and found that all the compounds were effective although Acrinathrin and abamecting were the more effective. In our own trial we found all the insecticides significantly effective than no treatment which suggest that the insecticides have great potential in controlling the insect pest complex of apple.

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