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Efficacy of Different Insecticides Against Aphid *Myzus persicae* L. on Tobacco Crop

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Abstract.- Studies were conducted on the efficacy of different chemical insecticides against *Myzus persicae* L. (Homoptera: Aphididae) on tobacco crop at Pakistan Tobacco research station, khan Ghari, Mardan, NWFP-Pakistan. Results showed that lowest mean pupation of aphid/leaf was recorded with confidor (20 aphid/leaf) and actara (18 aphid/leaf) treated plots, while highest mean population of aphid per leaf was recorded with methomyl (42 aphid/leaf) and tracer (39 aphid/leaf). Significant differences were not found in plant height (cm), number of leaves counted and fin leaf area (cm^2) among the different treatments. Yield of tobacco was highest (2253.0 kg/ha) with confidor application, while lowest (1732.0 kg/ha) in Sundaphos treatment.

Key words: Tobacco, insecticides, *Myzus persicae*.

INTRODUCTION

Tobacco is an important cash crop of NWFP. It is widely grown in Peshawar, Mardan, Buner, Charsadda, Swabi, Swat and Hazara districts. Two species of tobacco, *Nicotiana tabacum* L. and *N. rustica* L. are mainly grown in these tobacco growing regions (Ali, 1986).

Tobacco crop is damaged by a number of insect pests, which includes mainly cutworms *(Agrotis ipsilon, A. segetum, A. jlammatra)* (Lepidoptera: Noctuidae), budworms *(Heliocoverpa armigerea)* (Lepidoptera: Noctuidae) and aphids *(Myzus persicae* and *Aphis tabaci)* (Homoptera: Aphididae). These pests adversely affect the crop growth and yield. Insect pest attack starts right from the nursery and continue till crop maturity. In Mardan region tobacco crop is mainly damaged by *M. persicae* and *H. armigera* (Ali, 1979).

M. persicae cause damage to tobacco crop from sowing of nursery till crop maturity. Both nymphs and adults suck sap from the green parts of the plant in general, and from the leaves in particular. The growth of the young plants in the nursery is seriously retorted. As a result vigor of the plant is decreased, the leaves become curled up and deformed, chlorosis occurs and thus the leaves become vulnerable to the attack of the pathogen (Mistrick and Clark, 1983).

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Keeping in view the importance of tobacco crop and aphids *M. persicae.* The present research was, therefore, designed to determine relative efficacy of different chemical insecticides against *M. persicae* and effect of the application of these chemicals against this pest and on different growths and yield of tobacco crop.

MATERIALS AND METHODS

The present experiments on efficacy of different chemical insecticides on aphid on FCV Tobacco *(Nicotiana tabacum* L.*)* were carried out at Tobacco Research Station Khan Ghari, Mardan during 2003. FCV tobacco was grown in a well prepared seedbed. The seedlings were transplanted in the last week of March. Standard agronomic practices were followed in seedbed preparation and seedling transplantation.

The experiments were laid out in Randomized Complete Block (RCB) Design with four replications. There were seven treatments in each replication with three rows per treatment. Plant-to-plant and row-to-row distance was kept 60 cm and 90 cm, respectively. There were at least 30 plants per treatment (10 plants/row). The size of each plot was 3 x 5.40 m^2. The following insecticides were applied according to the recommended rates (Table I). In control plots, fresh tap water was sprayed on the crop.

Efficacy of different chemicals against M. persicae

In this experiment, efficacy of six different

chemical insecticides were tested against *M. persicae.* Population density of *M. persicae* was recorded by selecting three plants randomly from each treatment. The number of *M. persicae* was counted on top, middle and bottom of the plant and then its average was calculated. Data of pest population in each treatment was recorded after day 1st, 2nd, 3rd, 4th and one week of pesticide application.

Table I.- List of different insecticides applied against *M. persicae* on tobacco crop.

Trade Name	Common Name	kg.a.i/ac
Confidor WG 70	Imidachloprid	12 g
Actara 25 WG	Thiamethaxan	24 g
Sundaphos 50 SCW	Methamedophos	500 ml
Deltaphos 350+ 1 OEC	Deltamethrin + Triazophos	400 ml
Tracer 240 SC	Spinocyd	66ml
Methomyl 20 EC	Lannate	250 ml

Plant height (cm)

After the plants attained maturity, 10 randomly selected plants from the central two rows in each treatment, plant height was measured (cm) from soil level to tip of the upper most leaf of plant by a measuring rod.

Number of leaves per plant

Number of leaves per plant was recorded by selecting 10 plants randomly from each treatment. The number of leaves from bottom to top of the main stalk of each plant was counted and average was calculated.

Leaf area (cm^2)

In order to determine this parameter, length and breadth of 5th, 10th and 15th leaf of ten randomly selected plants was measured (cm) in each treatment and leaf size (cm) was measured by leaf area meter and then the following formula was used (Idrees and Khan, 2001).

Leaf size = Leaf length x Leaf breadth x 0.634 (Factor)

Yield per hectare (kg ha^{-1})

Total weight (kg) of cured leaves in each treatment after each picking was summed and yield per hectare for each treatment was obtained as under:

$$\text{Cured leaf yield (kg ha}^{-1}\text{)} \frac{\text{Total cured weight (kg)}}{\text{Net area harvested}} \times 10000$$

The data for individual parameters was analyzed according to appropriate statistical procedure for RCB design using F-test and the means were separated by using LSD test, as outlined by Steel and Torrie (1984).

RESULTS

Chemical control

First spray

One day after the pesticides application, the results showed significant differences among the treatments, where the average low'est pest population/ leaf was recorded with actara (33.25), which was followed by confidor (42.00) and deltaphos (44.25), while highest pest population/leaf was recorded with Methomyl (49.50) and tracer (46.25) (Table II). In the control treatment pest density was 63.25 aphidlleaf. Two days after pesticide application lowest pest density of 22.50 aphids/leaf was achieved with actara, which was followed by 25.00 with confidor and 33.50 with deltaphos. Highest population density/leaf of 45.50, 42.75 and 42.00 was observed with methomyl, tracer and sundaphos treated plots, respectively where as pest density in the control treatment was 68.25/leaf. Three days after spray, the lowest population density of *M. persicae* /leafwas 15.50 with actara treatment, which was followed by confidor (19.50) and deltaphos (27.25), while highest population of aphid/leaf was observed in methomyl (41.75), tracer (40.25) and sundaphos (35.75) treated plots. In the control treatment, population of *M. persicae/leaf* was 72.75. Data recorded on fourth day of chemical application showed that population density of *M. persicae* /leaf was lowest 10.75 in actara treatment, which was followed by confidor (14.75) and deltaphos (22.00). Highest population of aphids/leaf was recorded 39.75 in methomyl, 35.75 in tracer and 31.50 in sundaphos treated plots. In the control treatment, it was 78.50 aphid/leaf. One week after first spray,

Table II.- Mean population density of *M. persicae* per leaf after application of first spray in tobacco field on June 3, 2003

Chemicals	Pre-treatment Population	Post-treatment population density of *M. persicae* after				
		1 st day	2nd day	3;d day	4th day	One week
Actara	50.25 d	33.25 e	22.50 e	15.50 f	10.75 g	5.75 g
Sundaphos	57.50 ab	49.50 b	42.0 c	35.75 c	31.50 d	26.50 d
Methomyl	53.75 cd	49.50 b	45.50 b	41.75 b	39.25 d	36.25 b
Confidor	61.00 a	42.00 d	25.0 e	19.50 e	14.75 f	9.25 f
Tracer	51.75 d	46.25 bc	42.75 bc	40.25 b	35.35 c	32.50 c
Deltaphos	53.75 cd	44.25 cd	33.50 d	27.25 d	22.0 e	18.0 e
Control	56.50 bc	63.25 a	68.25 a	72.75 a	78.50 a	87.75 a

Means in columns followed by the different letters are significantly different at 5% level of probability. (F=test).

Table III.- Mean population density of *M. persicae* per leaf after application of second spray in tobacco field on June 19, 2003.

Chemicals	Pre-treatment Population	Post-treatment population density of *M. persicae* after				
		1 st day	2nd day	3;d day	4th day	One week
Actara	26.75 e	14.75 f	9.25 g	5.50 g	3.75 g	2.25 g
Sundaphos	48.50 b	40.50 c	36.25 d	32.75 d	30.0 d	28.25 d
Methomyl	52.25 b	48.50 b	45.25 b	44.25 b	43.75 b	41.25 b
Confidor	30.0 e	20.35 e	15.50 f	11.0 f	9.25 f	5.75 f
Tracer	50.25 bc	46.50 b	42.50 c	40.75 c	40.25 c	37.50 c
Deltaphos	39.75 d	30.50 d	25.25 e	21.35 e	19.0 e	16.75 e
Control	107.8 a	111.5 a	115.3 a	116.8 a	120.3 a	124.0 a

Means in columns followed by the different letters are significantly different at 5% level of probability (F-test)

Table IV. Effect of insecticides on plant height, number of leaves per plant, leaf area and yield (kg)/ha

Chemicals	Plant height (cm)	Number of leaves per plant	Leaf area ((cm^2))	Yield/ha (kg)
Actara	101.975 a	20.875 a	732.793 a	2121 a
Sundaphos	102.093 a	24.025 a	656.300 a	1732 c
Methomyl	103.425 a	22.500 a	790.892 a	1908bc
Confidor	95.425 a	22.200 a	742.170 a	2253 a
Tracer	94.092 a	22.275 a	712.250 a	2015 abe
Deltaphos	99.905 a	21.813 a	672.427 a	1834 be
Control	96.228 a	22.025 a	590.985 a	1717 e

Means in columns followed by the different letters are significantly different at 5% level of probability (F-test)

population of *M. persicae*/leaf was 5.75 with actara, which was followed by confidor (9.25) and deltaphos (18.00). On the same data recording date 36.25-pest population of aphid/leaf was recorded with methomyl, which was followed by 32.50with tracer and 26.50 with sundaphos. In the control treatment, it was 87.75 aphid/leaf.

Second spray

After application of second spray, the mean pest population/leaf decreased significantly on first day with actara (14.75), which was followed by confidor (20.75) and deltaphos (30.50), while highest population of 48.00 aphids/leaf was recorded with methomyl, (46.50) with tracer, and (40.50) with sundaphos (Table III). In the control treatment, it was 111.5 aphids/leaf. Two days after pesticide application, lowest population of 9.25 aphids/leaf was achieved with actara, which was followed by 15.50 with confidor, and 25.25 with deltaphos. Highest pest population of 45.25 aphid/leaf was obtained with methomyl, which was

followed by 42.50 with tracer and 36.25 with sundaphos. In the control treatment, population of *M. persicae/*leaf was 115.3. Three days after second spray lowest *M. persicae* population/leaf was obtained with actara (5.50), which was followed by 11.00 with confidor and 21.75 with deltaphos, while highest population of 44.25 aphid/leaf was recorded with methomyl, 40.75 with tracer and 32.75 with sundaphos. In the control treatment pest density was 116.8 aphids/leaf. Data recorded on fourth day of the second pesticide application showed that actara has the lowest population of 3.75 aphid/leaf, which was followed by confidor (9.25) and deltaphos (19.00) while highest population of aphids/leaf was recorded with methomyl (43.75), tracer (40.25) and sundaphos (30.00). Pest density in the control treatment was 120.3 aphids/leaf. One week ,after second chemical spray, confidor gave lowest pest population of 2.25 aphids/leaf, this was followed by 5.75 with confidor and 16.75 with deltaphos. Highest population of 41.25 aphid/leaf was obtained with methomyl, which was followed by 37.50 with tracer and 28.25 with sundaphos. In the control treatment pest density/leaf was 124.0.

Plant height (cm)

Data revealed that plant height was not significantly different among the treatments. Maximum plant height of 103.42 cm was recorded in methomyl treatment, which was followed by 102.09 cm in Sundaphos and 101.97 cm in actara. Minimum plant height of 94.02 cm was found in tracer treated plots, which was followed by 95.42 cm in confidor and 99.05 cm in deltaphos treatment as compare to control where plant height was 96.22 cm (Table IV)

Number of leaves per plant

The data on number of leaves per plant was not significantly different among different treatments (Table IV). However, the maximum number of 24.02 leaves per plant was recorded in actara treatment which was followed by 22.50 in methomyl and 22.27 in tracer. Lower number of 20.87, 21.81 and 22.02 leaves per plant were recorded in actara, deltaphos and in control treatments respectively. recorded in actara, deltaphos and in control treatments respectively.

Leaf area (cm^2)

The data of leaf area (cm^2) was also not significantly different among the different treatments (Table IV*).* However, the maximum leaf area of 790.82 cm was recorded in methomyl treatment, which was followed by 742.17 cm^2 in confidor and 732.79 cm^2 in actara treatments. Leaf area was 656.30 cm^2 in sundaphos and 672.42 cm^2 in deltaphos treatments as compare to control (990.98 cm^2).

Yield/ha (Kg)

The data showed that yield/ha was significantly different among different treatments. The maximum yield of 2253 kg was recorded in confidor treatment, which was followed by 2121 kg in actara, 2015 kg in methomyl and 1908 kg in tracer treated plot. Minimum yield of 1717 kg was recorded in. control treatment, which was followed by 1732 kg in sundaphos and 1834 kg in deltaphos treated plots.

DISCUSSION

Among the different pesticides tested, confidor and actara gave the lowest *M. persicae* population per leaf after 1**,** 2, 3, 4 and 7 days of pesticide application, as compared to the other pesticides. Highest *M. persicae* population per leaf was recorded in methomyl and tracer treatments. Sannio (1997), found confidor with high performance against *M. persicae* in an experiment in Olivola. Ramaprasad *et al.* (1998) conducted experiment in Andra Pradesh, India, to evaluate the performance of confidor and other insecticides for controlling *M. persicae.* They found that confidor effectively controlled the pest population throughout the year. Link *et al.* (2000) evaluated the efficacy of chemical control of *M. persicae* and concluded that the commercial formulation imidacloprid (confidor) was efficient in the control of this pest. According to Patil and Lingappa (2000) confidor was highly effective against *M. persicae* as compared to acephate and endosulfan so our chemical control results tally with the comparison of the above mentioned scientists. In the present study, plant

height, number of leaves per plant and leaf area was not significantly different among the different treatments. Maximum plant height was recorded in methomyl treatment, while minimum in tracer treatment. Maximum number of leaves per plant was recorded in sundophos, while lower number of leaves per plant in actara treatment. Similarly, maximum leaf area was recorded in methomyl treated plots, while lower in sundaphos treatment. As the insecticides used for the control of pest has no effect on the physiological characteristics of plants it may be one of the reason that plant height, number of leaves per plant and leaf area are non significant. Tobacco leaf yield was also significantly different among the different treatments. The maximum yield was recorded in confidor treatment, while lower yield was found in the control treatment. The grade index was significantly different among the different treatments. The maximum grade index was recorded in tracer, while minimum in deltaphos treated plots. Tobacco leaf ,is marketed by its physiological characteristics like color, texture, size and aroma, etc., which when grouped together represent its quality. Abdul and Peer (1999) conducted experiments on effect of *M. persicae* population on flue-cured tobacco production. According to them the greatest effect was measured on the yield of leaves from the middle portion of the plant. The leaves on which the population of *M. persicae* was greater had significantly greater reduction in price because of lower grade index.

REFERENCES

ABDUL, R. AND PEAR, M., 1999. Impact of NPK fertilizers and granular insecticides on the incidence of tobacco aphid, *Myzus persicae* (Sulzer). *Sarhad J. Agric*., **15**: 599-602.

ALI, M., 1979. Different insects of tobacco.. *Pak. Entomol*., **1**: 32-34.

ALI, M., 1986. Growing area of tobacco in NWFP. *Pak. Entomol*., **1-2**: 47-49.

IDREES, Q.M. AND KHAN, S., 2001. *Effect of different seedling sizes and NPK doses of fertilizer on the yield and quality of flue-cured tobacco.* Thesis, Agronomy Deptt., NWFP Agriculture, University, Peshawar.

LINK, D., WEBER, L.F. AND LEAL, R.S., 2000. Control of the black Cutworm, tobacco stemborer and the green peach aphid with insecticides sprayed on tobacco seedlings produced by float system. *Rev. Agric. Piracicaba*, **75**: 175-186.

MISTRICK, W.J. AND CLARK, G.B., 1983. Marvik and other insecticides for the control of insects on flue-cured tobacco. *Tob. Abst*., **5-6**: 1174.

PATIL, C.S. AND LINGAPPA, S., 2000. Selective toxicity of some insecticides against tobacco aphid, *Myzus nicotianae* Blackman and its predator, *Cheilomenes sexmaculata* (Fabricius). *J. biol. Cont*., **14**: 41-44.

RAMAPRASAD, G., SREEDHAR, U., SITARAMAIAH, S., RAO, S.N. AND SATYANARAYANA, S.V.V., 1998. Efficacy of imidacloprid, a new insecticide for controlling *Myzus nicotianae* on flue cured Virginia tobacco (*Nicotiana tabacum*). *Indian J agric. Sci,* **68**: 165-167.

SANNINO, L., 1997. Protection of tobacco from aphids with foliar and systemic root insecticides. *Info. Agrar*., **53**: 101-103.

STEEL, R.G.D. AND TORRIE, J.H., 1984. *Principles and procedures of statistics*. 3rd ed. McGraw Hill Book Co. Inc., New York.

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