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CONTROL OF COTTON JASSID EMPOASCA DEVASTANS, BY PETKOLIN AS COMPARED WITH OTHER INSECTICIDES

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Petkolin, Sevin, Toxaphene, Dimecron, Diazinon, Endrin and Malathion were compared to evaluate their efficacy against jassids, *Empoasca devastans* on Cotton crop. Three lb active ingredient per acre Petkolin gave 84.51% mortality after 24 hr 90.7% after 72 hrs while 2 lb Toxaphene gave 76.0% and 80.0% mortalities after 24 hr and 72 hr respectively.

Maximum cotton yield of 17 maunds per acre was obtained with Sevin while Petkolin gave 14 maunds and in Toxaphene the yield was 12.13 maunds per acre.

The pesticidal potentialities of Petkolin[1] have been reported earlier by Ashrafi *et al.* against cockroaches, housefly and mosquito larvae[2,3], locusts,[4] and flour beetles[5] in the Laboratory conditions and against different crop pests[6,7] in West Pakistan. Petkolin showed very low mammalian toxcity[8] against white rats and was nontoxic to the plants.

The present paper deals with the extensive field evaluation of Petkolin in comparison with Sevin, Toxaphene, Dimecron, Diazinon, Endrin and Malathion against jassids, *Empoasca devastans*, on cotton crop.

Materials and Methods

The experiment was laid out on 6 acres land in the Cotton Botanists Multiplication Area for evaluation of Petkolin in comparison with Sevin, Toxaphene, Dimecron, Diazinon, Endrin and Malathion. Six acres land was equally divided into 24 plots of 1/4 of an acre, each measuring approximately 100 ft^2. Three replications were kept in the experiment. Each replication consisted of 8 plots. One plot was kept for each insecticide and 1 plot as control in each replication was also kept. Seven insecticides were evaluated for their efficacy in 3 replications. The plots were selected on randomised basis and were designated as T_1, T_2, T_3, T_4, T_5, T_6, T_7 and T_8 for the 8 treatments in each replication. Out of 8 treatments T_1 to T_7 were treated with the insecticides and T_8 was kept as control.

The experiment was carried out on M-100 variety of cotton to control jassids, *Empoasca de-*

Table 1.—Quantity of Insecticides Available in 2.5 Gallons Water when the Amount of Water Per Acre was 20 Gallons, 30 Gallons and 40 Gallons.

Insecticides	Qty. of insecticide/-acre (a.i.)	% conc. (a.i.)	Amount of insecticide available	Qty. of insecticide in 1/4th of an acre	Qty. of insecticide in 2.5 gallons water when the amount of H_2O per acre was		
					20 gallons	30 gallons	40 gallons
1. Petkolin 40% E.C.	3 lb	0.3	7.5 lb	30 oz	435 ml	290 ml	217.5 ml
2. Sevin 85% W. P.	1 lb	0.1	1.2 lb	4.8 oz	69.6 ml	46.4 ml	34.8 ml
3. Toxaphene 80% E.C.	2 lb	0.2	2.5 lb	10 oz	145 ml	96.6 ml	72.5 ml
4. Dimecron 100% E.C.	4–6 oz	0.037	4.0 oz	1 oz	14.5 ml	9.6 ml	7.25 ml
5. Diazinon 60% E.C.	4–6 oz	0.037	6.6 oz	1.6 oz	23.2 ml	15.4 ml	11.6 m
6. Endrin 20% E.C.	4–6 oz	0.037	20 oz	5 oz	72.5 ml	48.3 ml	36.25 ml
7. Malathion 57% E.C.	1 lb	0.1	30 oz	7.5 oz	108.7 ml	72.5 ml	54.3 ml
8. Control	—	—	—	—	—	—	—

vastans. A knapsack shonsil power sprayer of 2.5 gallons capacity tank was used for spraying the insecticides. The spraying schedule was kept at fortnight intervals during the first three sprays. The fourth spray was done at an interval of 3 weeks and fifth spray after 1 week due to rains. In all five treatments were made during the entire cotton season.

Standards doses of insecticides used were 3 lbs active ingredient (a.i.) per acre of Petkolin (40% E.C.), 2 lbs (a.i.) per acre of Toxaphene (80% E.C.), 1 lb (a.i.) per acre Malathion (57% E.C.), 1 lb. (a.i.) per acre Sevin (80% W.P.), 6 oz per acre of Dimecron (100% E.C.), 6 oz per acre Diazinon (60% E.C.) and 6 oz Endrin (20% E.C.) (Table 1).

The quantity of water used during the season ranged between 20 gallons per acre in the first two sprays, 30 gallons per acre in the third spray and 40 gallons per acre in the fourth and the fifth sprays depending upon the height and foliage of the crop.

Pre-treatment count of jassid population was taken early in the morning 24 hr before spraying. Five full sized leaves (1 upper, 2 middle and 2 lower) were selected at random from one plant for counting the nymphs and adults of jassids on the ventral surface of the leaves. In this way 50 leaves on 10 plants were counted from each plot. The plants were selected at random. Efforts were made not to disturb the insect population while counting. Last observation of the previous spray was taken as pretreatment count for the next spray.

Post-treatment observations were recorded 24 hrs, 72 hr, one week and two weeks after treatment in the first two sprays. Due to exceptionally heavy rains in the later half of July and the first fortnight of August, one week's observation in the third spray could not be taken. When the pretreatment count of jassids was taken before the fourth spray tremendous increase in jassid population was noted in the entire cotton area in the region. It was due to heavy and persistant rains, cloudy weather and high humidity which might have helped in building up the jassid population.

Keeping in view the weather conditions and approaching picking time of cotton it was decided to reduce the spraying interval for the fifth and final treatment to 8 days instead of the original 15 days.

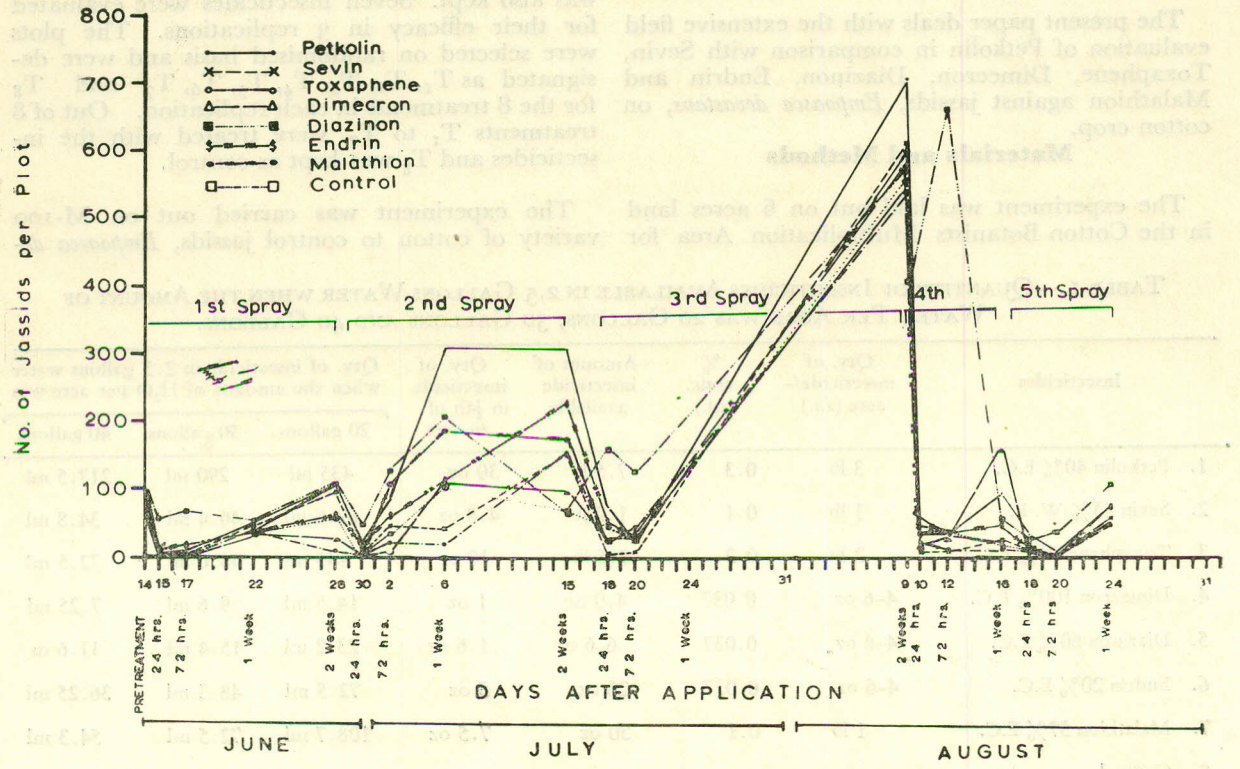

Fig. 1.—Effect of peckolin and other insecticides for the control of jassid population during five sprays at different intervals.

Average percent mortalities of jassids were counted on 50 leaves on 10 plants in each of the treated plots and the control. The mortalities were corrected by using Abbott's[9] formula.

The yield data was taken in the first fortnight of September. A long rope was held diagonally between the two opposite corners of each plot and cotton was picked from 10 plants after moving 5 steps along the rope from one corner to the other. Similarly another 10 plants were selected from the remaining 2 opposite ends of the same plot and the cotton lint weighed and compared with the yield of other plots.

Results and Discussion

The effect of Petkolin and other insecticides on jassid population during 5 treatments has been shown in Fig. 1. and average percent mortalities of jassids due to the insecticidal action in Table 2. Twentyfour hours after the first treatment a significant decrease in the number of jassids was noticed both in Petkolin as well as in other insecticides treated plots. Petkolin and other insecticides kept the population of jassids well under control till 72 hr. One weeks observation showed slight increase in jassid population in all treatments and in the control in all replications. Two weeks observations after treatment with Toxaphene, Dimecron, Diazinon and Endrin showed comparitively lesser number of jassids than the plots treated with Sevin, Malathion and Petkolin.

In the second spray the observation taken after 24 hr showed that Dimecron, Diazinon, Sevin and Malathion controlled the jassids better than Petkolin, Toxaphene and Endrin, whereas, after 72 hr Dimecron still maintained its superiority as compared with others but among the chlorinated pesticides Petkolin controlled jassids better than Toxaphene and among the phosphatic better than Malathion only. One week after the second treatment, minimum population was noted in the plot treated with Toxaphene. It was followed by Sevin, Diazinon, Dimecron, Endrin, Malathion and Petkolin. Fortnightly observations which were taken on 15th July revealed that there was considerable increase of jassids in the plots treated with Endrin followed by Toxaphene and Sevin, whereas in cases of Dimecron, Diazinon and Malathion there was slight decrease in the jassid population. The infestation of jassids in the Petkolin plots remained almost the same as it was one week after the second spray.

In the third spray the observations taken after 24 hr showed that Sevin controlled the jassids better than Toxaphene, Dimecron, Malathion, Diazinon, Endrin and Petkolin. Control plots also showed slight decrease in jassid population after each treatment due to the effect of the insecticides which were sprayed in the adjoining plots. Petkolin checked the jassids population better than Toxaphene, Endrin and Diazinon after 72 hr, whereas Malathion, Dimecron and Sevin gave better control than the above insecticides.

During the fourth and the fifth sprays the population fluctuation showed the similar pattern of insecticidal activity as was noted earlier in the first three sprays. In the fourth spray Sevin, Dimecron, Toxaphene and Petkolin controlled the jassids better than Diazinon, Endrin and Malathion after 24 hr.

During the fifth and the final treatment Toxaphene, Malathion, Sevin, Dimecron, Diazinon and Endrin controlled the jassids better than Petkolin after 24 hr. After 72 hr Toxaphene controlled the jassids better than Dimecron, Endrin, Malathion, Diazinon, Sevin and Petkolin. One week after the fifth spray Dimecron again controlled the jassids better than Diazinon, Sevin, Toxaphene, Malathion, Endrin and Petkolin.

TABLE 2.—AVERAGE PERCENT MORTALITIES OF JASSIDS AFTER 24 HR, 72 HR AND ONE WEEK DURING FIVE SPRAYS.

Insecticides	Dosages (a.i.)/acre	Average percent mortalities after		
		24 hr	72 hr	1 week
Petkolin 40% E.C.	3 lb	84.51	90.7	7.9
Sevin 85% W.P.	1 lb	88.0	90.0	59.5
Toxaphene 80% E.C.	2 lb	76.0	80.0	6.3
Dimecron 100% E.C.	4–6 oz	88.79	90.41	7.40
Diazinon 60% E.C.	4–6 oz	71.82	85.0	40.4
Endrin 20% E.C.	4–6 oz	76.20	87.91	48.3
Malathion 57% E.C.	1 lb	87.16	81.41	46.1
Control	—	31.73	—3.62	22.2

TABLE 3.—PER ACRE YIELD OF COTTON IN PETKOLIN AND OTHER TREATMENTS.

Treatments	Insecticides	Yield/acre Mds	Sr
T_1	Petkolin 40% E.C.	14	—
T_2	Sevin 85% W.P.	17	—
T_3	Toxaphene 80% E.C.	12	5
T_4	Dimecron 100% E.C.	16	5
T_5	Diazinon 60% E.C.	14	5
T_6	Endrin 20% E.C.	13	5
T_7	Malathion 57% E.C.	14	5
T_8	Control	11	5

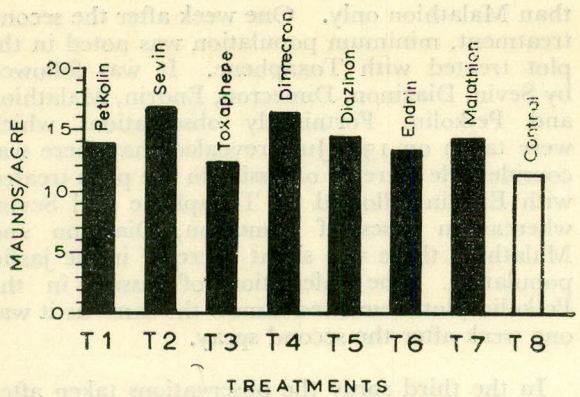

Fig. 2.— Per area yield of cotton in petkolin and other treatments.

The average percent mortalities have clearly indicated that Petkolin controlled the jassids better than Endrin, Toxaphene and Diazinon after 24 hr whereas after 72 hr better results were obtained with Petkolin as compared with Toxaphene, Endrin and Malathion (Table 2). Comparison of one week's data showed that maximum control was obtained with Sevin followed by Endrin, Malathion, Diazinon, Dimecron and Petkolin. Toxaphene gave the poorest performance and increase in jassid population was observed after one week.

It was concluded from the percent mortalities of jassid that Petkolin had effectively controlled jassids upto 8 days. The yield of cotton in case of Petkolin was found to be 14 md per acre while in Toxaphene 12.13 md (Table 3, Fig. 2) Taking into consideration the yield data of cotton and the average percent mortalities of jassids at different intervals, Petkolin gave better results than Toxaphene among the chlorinated pesticides.

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