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## The Comparative Efficacy of Insecticides for the Control of the Insect Pest Complex of Cotton (*Gossypium hirsutum* L.).

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### Abstract

The tested insecticides at their recommended doses significantly reduced the insect pest complex of Cotton as compared to that of control. Tamaron 600SL (Methamedophos) ranked 1st by giving more than 85 percent mortality of the sucking insect pests (white fly, thrips, jassids, and mites). Furry 100EC (Zectacypermethrin) was the least effective insecticide with less than 70 percent killing of the test insects. Against bollworms, Pyrethroids reduced 85.95 percent of pest infestation, while Curacron (Profenofos) 500EC, an organophosphate could only reduce 61% of boll infestation. However, compared to check all the insecticides in reducing the pest infestation were statistically significant at alpha 0.05. Sprays of Polytrin-C (Curacron + Cypermethrin) 440EC, at 14 days interval gave maximum yield of solution.

### Introduction

Cotton (*Gossypium hirsutum* L.), Family: Malvaceae, is an important cash crop of Pakistan. Being a major source of foreign exchange, it also plays a key role in the national economy. Besides, providing lint to domestic textile industry, the edible oil obtained from its seed is also a good source of edible oil and contributes 69.5 percent share in national oil production. (Awan, 1994). Moreover, Cotton seed cake (Khal Binola), is also used as source of cattle concentrate feed.

The area in Pakistan under Cotton cultivation was 3148.6 ha with the production of 9374.2 bales in 1996-97 (Abrar, 1998). Besides, other factors, the insect pest complex of Cotton inflicts heavy losses to the crop by reducing yield and quality of seed Cotton. Although many control measures could be used for the control of these insect pests by giving quick knock down and required mortality results of the insect pests. Number of sprays have a positive influence on the physiomorphic characteristics as well as the yield of seed Cotton. (Ahmad, 1993; and Iqbal, 1993).

### Materials and Methods

#### Experiment No. 1

**Comparative Efficacy of Insecticides:** The experiment was conducted at the research area of the Entomology section, Agricultural Research Institute (A.R.I.), Ratta Kulachi, Dera Ismail Khan, during Kharif 1998. The experiment was designed in simple Randomized Complete Block (R.C.B.) with 3 replications, each having 11 plots (10 insecticides and 1 check). In all the plots (9x3 sq. m each), the agronomic practices were maintained uniform. The insecticides were sprayed randomly with knap sac sprayer at their recommended doses when ever the pest population reached the Economic Threshold Level (E.T.L.). The efficacy of the insecticides was determined by taking pre and post harvest data. Three leaves (from upper, middle, and lower

canopy) per plant from three randomly selected plants in each plot were examined with magnifying glass for sucking insects (Aphids, Jassids, White fly, Thrips, and Mites). Data were then converted to percent mortality/percent reduction in the population of the sucking pests as:

$$\frac{\text{Pre spray data} - \text{post spray data (Current population)}}{\text{Pre spray data}} \times 100$$

Similarly data on Boll infestation by bollworms were recorded from five randomly selected Cotton plants from each treatment as:

$$\frac{\text{Infested Bolls}}{\text{Total Bolls}} \times 100$$

Now the percent infestation reduction was calculated as:

$$\frac{\text{Pre spray infest. \%age} - \text{Post spray infest. \%age}}{\text{Pre spray Infestation \% age.}} \times 100$$

The data were recorded after 24, 36, and 72 hours of the application of each insecticide. These data were then subjected to statistical analysis and means were separated by Least Significance Difference (L.S.D.) test.

#### Experiment No. 2

**Evaluation of No. of Sprays of Polytrin-c 440 Ec Against the Insect Pest Complex of Cotton:** For effective, yet judicious/economical use of insecticides against the insect pest complex of Cotton, a control trial on the number of sprays was carried out at the farm of Agriculture Research Institute (A.R.I.), Ratta Kulachi, Dera Ismail Khan, during Kharif 1998. The experiment was laid in simple R.C.B.

design. There were 6 treatments, each replicated three times. Cotton variety Gomal 93 was sown in plots (6x3 sq.m. each). All the cultural practices were given uniformly to whole field as and when needed.

The field/plots were surveyed for the attack of sucking insects and bollworms after every two days. Diagonal method for scouting the sucking pests on upper, middle, and lower leaves of Cotton plant, with the help of magnifier, was used. Flowers, squares, and bolls of ten randomly selected plants per plot were observed for bollworms infestation. In this experiment T1 was sprayed with Polytrin-C 440EC, at its recommended dose of 1375 ml ha<sup>-1</sup>, only once. All other treatments were also given their first spray of Polytrin-C 440EC at the time T1 was sprayed. The interval for the remaining spray treatments, excepting T2, was adjusted by dividing the period from the date of first spray to the mid of October by the spray number. T2 received its second spray at the E.T.L. for Bollworms. Knap-sac hand sprayer was used for spraying the treatment plots. The appraisal of the Number of Sprays was made by computing their effect on the parameters like, the Number of Bolls, Bollweight, Plant height, and the Yield of seed Cotton per hac.

## Results and Discussion

### Experiment No. 1

#### Efficacy of Ten Insecticides

**White fly :** All the insecticides gave better control of White Fly as compared to check plots (Table-1). Maximum mortality (87.02 percent) was recorded with Tamaron 600SL, although it was at par with those of Polytrin-C 440EC, Nurelle-D 505EC, Curacron 500EC, Baythroid TM 525EC, and Lorsban 40EC. Tamaron 600 SL gave significantly higher mortality over Pirate AC630, and Azodrin 400WSC, with (83.33 percent), and (82.84 percent) mortality of White Fly respectively. Pirate AC630, and Azodrin 400WSC were statistically at par with Nurelle-D 505EC, Curacron 500EC, Baythroid TM 525EC, Lorsban 40EC, and DPX-MPO 15SC, but better than Furry 100EC, and Check with 70.76 percent and 10.47 percent mortality of White Fly, respectively.

**Jassid:** It is evident from Table-1, that all the insecticides controlled Jassid very effectively, however, here too Tamaron 600 SL proved more effective with 85.85 percent mortality. It was statistically similar to Baythroid TM 525EC, Nurelle-D 505EC, Azodrin 400WSC, Lorsban 40EC, DPX-MPO 15SC, Curacron 500EC, and Polytrin-C 440EC. Pirate AC630 (82.57 percent) mortality was at par with all the insecticides in study except Tamaron 600SL, and Furry 100 EC. Furry 100EC, with 72.95 percent mortality, although better than Check (11.14 percent), was least effective of all the tested insecticides.

**Thrips:** The Table-1 illustrates that all the insecticides were equieffective in controlling Thrips but significantly better than Furry 100EC. Maximum mortality of Thrips was

recorded in plots sprayed with Polytrin-C 440EC (86.05 percent), while minimum in check plots (12.78 %).

**Mites:** All insecticides gave better control of the Mite and were equieffective in controlling Mite except Furry 100EC (Table- 1). Tamaron 600SL, however, was at the top with (85.33 percent) mortality. Khalid (1990), Rangel (1990), Kandil *et al.* (1991), Nagia *et al.* (1992), Basharat (1993), Rizwan (1993), Afzal *et al.* (1995), Mehmood (1995), and Tufail (1996) obtained almost similar results in controlling the sucking pests of Cotton.

**Bollworms:** Our findings (Table-1) indicate that pyrethroids gave better control of Bollworms. DPX-MPO 15SC was the best insecticide with maximum infestation reduction percentage (85.95 percent) when applied at 437.5 mlha<sup>-1</sup>. It was statistically similar to Polytrin-C440 EC, Lorsban 40EC, Baythroid TM 525EC, Nurelle-D 505EC, Azodrin 400WSC, Pirate AC630. Azodrin 400WSC, Pirate AC630, and Furry 100EC with 83.51 percent, 82.60 percent, and 71.81 percent boll infestation reduction, were statistically similar in effect. Tamaron 600SL (60.75 percent) infestation reduction and Furry 100EC were at par. Curacron 500EC with 58.21 percent boll infestation reduction was the least effective treatment, followed by the check with 12.66 percent. These findings agree with those of Bhatti *et al.* (1990), Khalid (1990), Mahar (1993), Talpur *et al.* (1993), and Anonymous (1995). Studies carried out by Basharat (1993) although does not show the similar result, however, he too acknowledges the supremacy of Baythroid TM in controlling the Bollworms.

### Experiment No. 2

Evaluation for number of sprays Against The Insect Pest Complex Of Cotton.

**Number of bolls:** As is clear from the Table 2, the maximum number of 53 bolls per plant was recorded from the plots sprayed 6 times with Polytrin-C 440EC recommended dose of 1375 mlha<sup>-1</sup>, although it was statistically at par with those with 5 sprays (48.67) bolls. Data recorded from the plots, given 4, 3, and 2 sprays of Polytrin-C 440EC were statistically similar as regards to boll number per plant. Minimum number of bolls per plant (30.67) were obtained from the plots sprayed with Polytrin-C 440 EC.

This result is in accordance with those of Ahmad (1990) and Iqbal (1993), who although used Baythroid TM 525EC and Tamaron 600SL, however, found positive influence on the number of bolls as well as other physiological characters.

**Boll weight:** Maximum Boll weight was obtained from plots of Cotton sprayed twice Table 2. However, it was at par with plots receiving 1 and 3 sprays of Polytrin-C 440EC. Minimum Boll weight was recorded in plots with

Table 1: Comparative efficacy of insecticides against the insect pest complex of cotton, Percent population reduction of Boll Inf., Red. By Bollworms.

No.	Insecticides	White Fly % Mortal	Jassids % Mortal	Thrips % Mortal	Mites % Mortal	Boll worms % Inf. Re.
	Azodrin 400WSC	82.84c	84.47ab	84.62a	83.47a	83.51ab
	Nurelle-D 505EC	84.71abc	84.82ab	85.63a	84.65a	84.93a
	Polytrin C 440EC	86.52ab	84.04ab	86.05a	84.97a	85.57a
	DPX-MPO 15SC	83.93bc	84.30ab	84.54a	83.60a	85.95a
	Furry 100EC	70.76d	72.95c	73.33b	49.24b	71.81bc
	Tamaron 600SL	87.02a	85.85a	85.65a	85.33a	60.75cd
	Curacron 500EC	84.48abc	84.22ab	85.61a	83.28a	58.21d
	Lorsban 40EC	84.04abc	84.41ab	84.10a	85.21a	85.41a
	Baythroid	84.35abc	85.06ab	84.05a	84.70a	85.32a
	Pirate AC630	83.33c	82.57b	84.21a	83.15a	82.60ab
	Check	10.47e	11.14d	12.78c	9.98c	12.66e

Table 2: Effect of number of sprays of polytrin-C 440EC on the physiomorphic features and yield of cotton

No. of sprays	No. Of Bolls	Boll Wt. (Gm.)	Yield/h. (Kg.)
	30.67c	3.330a	1340f
	37.00b	3.360a	1785e
	39.40b	3.187ab	2222d
	38.67b	2.863bc	2604c
	48.67a	2.790c	3147b
	53.00a	2.567c	3410a

Means with similar letters are not statistically different from each other at  $\alpha = 0.05$  probability.

Number of sprays of Polytrin-C 440EC. However, it was statistically similar to the plots sprayed 4, and 5 times. There was no significant difference in the Boll weight of the plots sprayed 4 and 5 times. As the boll weight increases the boll number and the yield decreases,

**Plant height:** As shown in the Table 2, no significant difference was found among any of the insecticidal treatment for plant height.

This result differs totally from those of Ahmad (1993), and Iqbal (1993), probably because of the difference of site and the insecticide, since they used Baythroid TM 525EC, and Tamaron 600SL.

**Yield per ha:** The Table 2 illustrates that all the treatments significantly increased the yield of seed Cotton (Table 2). It decreased with reduction in number of sprays and shows directly proportional trend. Maximum yield (3410 Kgs) was recorded from the plots sprayed 6 times with Polytrin-C 440EC. Minimum yield was obtained from plots treated once (at E.T.L. for sucking insects for the first time) with Polytrin-C 440EC. Spray number has positive effect on the boll number and yield of seed cotton but negative influence on boll weight.

## References

- Abrar, M., 1998. Agriculture Statistics of Pakistan, 1996-97. Govt. of Pakistan. Ministry of Food, Agriculture, and Livestock division, Economic Wing, Islamabad.
- Afzal, M; Z. Hussain and M.A. Wahla, 1995. The comparative efficacy of different doses of Tamaron 600 SL (Methamedophos) against the Cotton White Fly, *Bemisia tabaci* (Genn) on FH682 Cotton Pak. Entomol., 17: 43-45.
- Ahmad, I., 1993. The physiomorphic influence of different doses of Tamaron/Dimecron on S12 Cotton. M.Sc.(Honours) Agri Thesis, Deptt. of Agri Entomology, Univ of Agri. Faisalabad.
- Anonymous, 1995. Percentage population reduction of *Heliothis* larvae by different insecticides. Ann. Per. Entomologist, 1995-96, pp: 17-18.
- Awan, M.N., 1994. Evaluation of some insecticidal combinations and Neem extracts for the control of Cotton pests (Jassids, Thrips, White flies, and Boll worms). Thesis, M.Sc.(Honours) Agric., Deptt. of Entomology, Faculty of Agri., Gomal University, D.I.Khan., pp: 92.
- Basharat, M., 1993. The comparative efficacy of some insecticidal spray schedules against the insect pest complex on FH367 Cotton. M.Sc.(Honours) Agri. Thesis. Deptt. of Entomology, Univ. of Agri., Faisalabad.
- Bhatti, M.B., S.M.I. Waseem, M.J. Iqbal, and W.S. Khan, 1990. Determination of dosage of Nurelle-D 505EC in comparison to Polytrin-C 440EC against Cotton Boll worms. Pak. Entomol. 12.
- Iqbal, M., 1993. The Physiomorphic influence of some insecticidal spray schedules on FH682 Cotton. M.Sc.(Honours) Agri. Thesis, Deptt. of Entomology, Univ. Agri., Faisalabad.
- Kandil, M.A., A.A. Barkat, A.Y. Saleh, and N.M. Ibrahim, 1991. Evaluation of some insecticides for Thrips, and Aphid control in Cotton fields. Bulletin, Faculty Agri., Univ. Cairo. 42: 1149-1156.

- Khalid, H., 1990. Effect of insecticidal application on the insect pest complex and yield potential of different varieties of Cotton MNH129. M.Sc.(Honours) Agri. Thesis, Deptt. of Entomology, Univ. Agric., Faisalabad.
- Mahar, A.M., M.K. Lohar and G.H. Abro,1993. Field evaluation on the efficacy of Endosulfan, Chlorpyrifos, and Fenpropathrin against Cotton Boll worms. Rev. Appl. Entomol.(A), 18: 1805.
- Mehmood, K., 1995. The comparative effectiveness of some latest insecticidal spray schedules against Cotton Jassid *Amrasca devastans* (Dist.) on FH682. M.Sc.(Honours) Agri. Thesis, Deptt. of Entomology, Univ. Agri., Faisalabad. 073-05789.
- Nagia, D.K., S. Kumar, S.P. Sharma, M.L. Siani, H. Parsad, and A.K. Dikshit, 1992. Fields studies on effectiveness and residues of some organophosphorus insecticide against pest complex of Cotton. Plant Prot. Bull. Faridabad, 44: 18-20.
- Rangel, M.C., E.B. Registano, A.I. Clari, R. Hamamura, F.Y. Arashiro, 1990. Experimental control of the two spotted spider mite *Tetranychus urticae* Koch, Amais-da-soiedade-Entomologica-do-Brazil.1990, 19:1, 171-179.
- Rizwan, M., 1993. The comparative efficacy of some spray schedules against the sucking insect pests of FH682 Cotton. M.Sc. (Honours) Agri. Thesis, Deptt. of Entomology, Univ. Agri., Faisalabad.
- Talpur, M.A. Rustmani, T. Hussain, J. Lakho, R.B. Sabhayo, and A. Memon, 1993. Comparative effectiveness of pyrethroids combinations against Spotted Boll worm *Earias vitella* (F) on Cotton. Pakistan J. of Zoology, 1993, 25: 41-43.
- Tufail, M., M. Ahmad and M.A. Wahla.,1996. The comparative efficacy of different doses of Tamaron 600SL (Methamedophos) against the sucking insect pest complex of FH682 Cotton. Pak. Entomol., 18: 54-55.