



Asian Journal of Plant Sciences

ISSN 1682-3974

science
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The Physico-Morphic Influence of Different Doses of Tamaron 600 SL on FH-682 Cotton at Faisalabad (Pakistan)

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Abstract: Studies were conducted to observe the physico-morphic influence of different doses of Tamaron 600 SL viz., 200, 300, 400, 500 and 600 ml per acre on FH-682 cotton at Faisalabad under natural field conditions. The experiment was laid out in Randomized Complete Block Design with 6 treatments including control and with 3 repeats. The crop was sprayed 3 times during its growth season. All the physico-morphic characters were studied at crop maturity stage. Results revealed that Tamaron 600 SL @ 400 ml/acre was found to be the most effective than others. Seed cotton yield was found to be positively correlated only to the plant height, weight of dry brackets and number of opened bolls but other plant characters like weight of dry leaves, weight of dry stem, number of leaves, number of unopened bolls and leaf area index were found to be negatively correlated. All the characters under study showed significant differences to different doses of insecticide under trial.

Key words: Physico-morphics, doses of tamaron, cotton

Introduction

Cotton is an important cash crop and plays a significant importance in Pakistan national economy. FH-682, cotton is one of the most recent introduction but attacked by a variety of insect pests which damage it, causing an enormous decrease in its yield. One of the easiest ways to avoid such a situation is to restore the use of insecticide. They not only kill the pest population, but also induce such biochemical changes, which indirectly influence the final performance of the crop in the form of this yield, through affecting its physico-morphic status, during growth.

Reddy and Rao (1981) reported that when cotton crop was given 7 sprays of phosphamidon, carbaryl and dichloro diphenyl trichloroethane (DDT) mixed with urea, the physico-morphic characters such as plant height, number of branches per plant and seed - cotton yield were all found to increase significantly. Regupathy and Subramaniam (1981) reported that the granular - application of Aldicarb increased the cotton plant height and seed cotton yield of the crop but delayed its maturity. Balikai *et al.* (1986) sprayed cotton crop with amitraz and observed that there was a significant increase in the vegetative and reproductive growth of cotton plant, which ultimately resulted in an increased yield of cotton. Lloyd and Krieg (1987) recorded that the application of flucythrinate increased the total plant size and dry weight whereas, chloridimeform increased the reproductive growth and Malathion significantly increased the boll number per plant. Sahay and Pundarikakshudu (1987) applied Decies (deltamethrin) to the cotton crop, which increased the leaf area, biomass production, boll size, specific leaf area as well as the seed cotton yield. Ali *et al.* (1988) pointed out that disulfoton, monocrotophos and parathion methyl increased the plant height in cotton cultivar, 407/26 while carbaryl, permethrin, chlorpyrifos and monocrotophos increased the plant height in B-557. Ahmad (1993) treated S-12 cotton variety with different doses of Tamaron 600 SL and Dimecron 100SCW and recorded the plant height, weight of dry leaves, weight of dry brackets, weight of dry stem, number of opened bolls as well as leaf area index. He recorded that the application of Tamaron 600 SL was found to be comparatively more effective than that of Dimecron 100 SCW. Afzal *et al.* (2000) studied the physio-morphic influence of 10 different insecticides from 4 major groups of modern synthetic insecticides, compounds with new pesticidal chemistry, surfactants and emulsifiers in form of five different latest recommended schedules on newly released cotton cultivar FH-672 at Faisalabad (Pakistan).

The physio-morphic characters under present research investigations were plant height, weight of dry leaves, weight of dry branches, weight of dry stem, number of leaves, number of branches, number of unopened bolls, number of opened bolls, leaf area index, leaf area and seed cotton yield. Results revealed that spray-schedules influenced only 4 physio-morphic characters like seed cotton yield, plant height, leaf area index and leaf area. The final performance was negatively correlated with leaf area index and leaf area. All other characters did not show any correlation to seed cotton yield. The main aim of these studies, was not only to observe the influence of insecticides on the physico-morphic characters of FH-682 cotton, in this region, but also to see if these changes could, in some way, be correlated to its seed-cotton performance.

Materials and Methods

The trials were, laid out at Ayub Agricultural Research Institute, Risalewala, Faisalabad, in a Randomized Complete Block Design (Steel and Torrie, 1980). There were six treatments including a control, and 5 different doses of Tamaron 600 SL viz., 250, 300, 400, 500 and 600 ml/ acre having 5 repeats each on FH-682, cotton. Crop was brought in contact with different doses of Tamaron 600 SL two months after being sown, and the doses were each sprayed over to the crop thrice, at an interval of a fortnight. The data on the physico-morphic characters were collected from 5 randomly selected plants from each plot, at the time of this maturity (Afzal *et al.*, 2000). The physico-morphic characters studied were plant height, number of leaves per plant, weight of dry brackets, weight of dry-leaves, weight of dry stem, number of unopened bolls, number of opened bolls, leaf area index and seed cotton yield. The information collected was finally presented in the form of an overall mean-value of five plants per repeat. Then correlation was established between physicomorphic characters and different doses of Tamaron 600 SL.

Results and Discussion

A highly significant change in the mean values of seed cotton yield, plant height, weight of dry-leaves, weight of dry-brackets, weight of dry-stem, number of opened bolls and leaf area index from one treatment to another (Table 1). In case of number of leaves and number of unopened bolls, this change was found only to be significant. A further analysis reveal that mean value of different characters in T₆, the check were found to be lower than other insecticide treated a lot T₁ to T₅. Considering the seed cotton yield to be an ultimate measure of physico-morphic performance of a plant, suggests that the nature of changes in the plant growth were associated with reciprocal changes in other physicomorphic characters of the test crop. A correlation of the changes in the seed cotton yield with other physico-morphic characters of the treated crop was calculated.

The correlation matrix in column 1 (Table 2) reveals that there were 2 pattern of changes in the physico-morphic influence of different doses of Tamaron 600 SL on cotton crop under discussion. The change in plant height, weight of dry brackets and number of opened bolls, has a positive correlation with in the seed cotton yield. Whereas the weight of dry leaves, weight of dry stem, number of leaves, number of unopened bolls and leaf area index had no correlation with them, at all. Tamaron 600 SL @ 400 ml/acre was found to be the most effective than the others.

A comparison of these findings with those already completed by Reddy and Rao (1981), Regupathy and Subramaniam (1981), Derrick and Durant (1986), Balikai *et al.* (1986), Sahay and Pundarikakshudu (1987), Ali *et al.* (1988), Ahmad (1993) Wahla *et al.* (1998) and Raza *et al.* (2000), under different conditions revealed that they collected very little different information about the present project. They mostly concentrated on taking the mortality counts of the pest(s) after an insecticide application, or on taking the yield estimates of the treated crop rather than finding out of the physicomorphic influence of the test insecticides. The information collected by them was also not as comprehensive as the one being reported, at present. The statistical impact

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Table 1: A multiple comparison of the mean values/ plant of different physiomorphic characters of FH-682, cotton, treated with different doses of Tamaron 600 SL.

Treatment	Doses (ml/acre)	Seed cotton yield (gm)	Plant height (cm)	Wt. of dry leaves (gm)	Wt. of dry brackets (gm)	Wt. of dry stem (gm)	No. of leaves	No. of unopened bolls	No. of opened bolls	Leaf area index
T ₃	400	**61.930a	**103.20a	**24.52c	**2.102ab	**38.24a	**55.68ab	*2.60a	**9.72b	**2.51a
T ₂	300	59.900ab	102.20a	29.57b	2.020ab	41.59a	54.23ab	2.06ab	10.35ab	2.47a
T ₁	250	55.346bc	95.59bc	36.79a	1.860b	37.67a	58.59a	1.96ab	10.97a	1.73b
T ₅	600	55.116bc	103.60a	31.43b	2.274a	41.73a	56.24a	2.33a	8.13c	2.59a
T ₄	500	53.898cd	101.00ab	33.10ab	1.890b	41.80a	59.19a	2.05ab	9.36b	2.86a
T ₆	000	50.102d	91.92c	21.03c	1.496c	32.96b	50.79b	1.74b	7.79c	1.71b

** = Significant at 1 % level of probability and * = Significant at 5 % level of probability

Table 2: A correlation matrix between the seed-cotton yield and different physiomorphic characters of FH-682, cotton, treated with different doses of Tamaron 600 SL.

Characters										
Seed-cotton yield (g)	1.0000									
Plant height (cm)	0.4643*	1.0000								
Wt. of dry leaves (g)	0.0702N.S	0.3362N.S	1.0000							
Wt. of dry brackets (g)	0.4293*	0.3839*	0.2351N.S	1.0000						
Wt. of dry stem (g)	0.2305N.S	0.3825*	0.4115*	0.5694*	1.0000					
No. of leaves	0.1493N.S	0.0182N.S	0.6088*	0.2048N.S	0.4212*	1.0000				
No. of unopened bolls	0.2252N.S	0.1745N.S	0.0807N.S	0.3749*	0.4219*	0.0703N.S	1.0000			
No. of opened bolls	0.4344*	0.1510N.S	0.4480*	0.2284N.S	0.1545N.S	0.3049N.S	0.0662N.S	1.0000		
Leaf area index	0.3327N.S	0.5443*	0.1324N.S	0.4543*	0.6795*	0.2182N.S	0.3895*	0.3895*	1.0000	

* = Significant at 5 % level of probability, N.S = Non significant.

Table 3: The statistical impact of different physiomorphic characters of FH-682, cotton, treated with different doses of tamaron 600 SL, on its seed-cotton yield

Parameters	f-value	r ² -change
Number of opened bolls	2.373**	0.1358
Weight of dry stem (g)	0.399	0.000
Number of leaves	0.889	0.0153
Number of unopened bolls	0.904	0.0166
Plant height (cm)	1.763	0.2156
Weight of dry leaves (g)	-1.299	0.0398
Weight of dry brackets (g)	1.158	0.0373
Leaf area index	0.012	0.000
Overall	2.391*	0.4767**

** = Significant at 1 % level of probability. * = Significant at 5 % level of probability

of the changes in different physiomorphic characters treated with different doses of Tamaron 600 SL, on those of its seed-cotton yield, is displayed through Table 3 which revealed that all the physiomorphic parameters had influenced its yield. The overall F-value of 2.391 which is highly significant, however, confirms the above statement and indicates that all these characters contributed really well towards the seed-cotton yield of FH-682, cotton which is an ultimate measure of its physiomorphic performance. As to the individual effect of different test characters, the number of opened bolls which had a highly significant F-value, i.e., 2.373 was found to have a maximum effect on the seed-cotton yield. This means that this parameter has increased the seed-cotton yield significantly. The non-significant F-values against the weight of dry stem, number of leaves, number of unopened bolls, plant height, weight of dry leaves, weight of dry bracket as well as against the leaf area index did not, however, appear to have significantly increased the seed-cotton yield of FH-682, cotton. As to the quantitative contribution of various physiomorphic characters, an overall determination coefficient (R²) of 0.4767 indicates that 47.67% of the changes in the seed-cotton yield of FH-682, came through the changes in the above complex of characters. The factor(s) responsible for the remaining 52.33 of the changes in the seed-cotton yield of FH-682, cotton, however, still remain to be located. Thus, this suggests that some other physiomorphic character(s) should have been included in the above studies. As to the individual contributions of different physiomorphic characters, in the increase of seed-cotton yield of FH-682 cotton, on R²-change of 0.2156 against the plant height showed that 21.56% of the overall change in the seed-cotton yield came alone through this parameter. Another contributing factor appeared to be the number of opened bolls. A partial correlation coefficient value of 0.1358 for this character suggests that its contribution towards the change in the seed-cotton yield, under discussion, was only 13.58%. As such, it appears that these factors, may be considered to be the most important in the present research project. The contribution of weight of dry-stem, weight

of dry leaves, weight of dry brackets, number of unopened bolls, number of leaves and that of the leaf area index with an influence of 0.00, 3.98, 3.73, 1.66, 1.53 and 0.00, respectively, towards the changes in the yield of seed-cotton, was however found to be comparatively much lower.

Thus on the basis of results discussed above, it may be concluded that the application of different doses of Tamaron 600 SL at the rate of 250, 300, 400, 500 and 600 ml/acre to the FH-682 crop, has influenced the physiomorphic characters positively, and Tamaron 600 SL @ 400 ml/acre was found to be the most effective than the others, under trial. The final performance of FH-682, cotton, treated with different doses of Tamaron 600 SL, in the form of seed-cotton yield was found to be positively correlated to the plant height, weight of dry brackets, as well as to the number of opened bolls. Out of a total of 47.67 per cent contribution of all the physiomorphic characters towards the seed-cotton yield, discussed above, 21.56 per cent was shared by the plant height, alone. Every unit increase in this character, increased the final effect of different doses of Tamaron on the performance of FH-682, cotton, in the form of its seed-cotton yield, to an extent of 0.02959 units.

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