

INTEGRATION OF CHEMICAL CONTROL AND HOST PLANT RESISTANCE AGAINST APHIDS ON WHEAT

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ABSTRACT

Based on population density of aphids, Iqbal-2000 and V-00146 were selected from a screening trial including 30 genotypes of wheat during 2002-03. Population of aphids was controlled by applying insecticides under field conditions on a susceptible (Iqbal-2000) and a resistant (V-00146) genotypes at 219 RB, Faisalabad during 2003-2004 season. The application of Advantage showed maximum increase in yield (2.38%) over control as compared to Deltanet (1.53%) and Dc-Tron (1.29%). All the insecticides were statistically equal in controlling the population of aphids but not the yield. The increase in yield on average basis was recorded to be 2.06 percent with the application of insecticides.

INTRODUCTION

In Pakistan, wheat is severely attacked by wheat aphids (Mohyuddin, 1981). The sucking of cell sap by aphids reduces the vitality of the plants, infested leaves turn pale, wilt and wear a silky appearance. The honeydew secreted by this insect encourages the snappy growth of sooty fungus on the foliage, which eventually affects the rate of photosynthesis in plants (Mahmood, 1981; Kindler *et al.* 1995. Aheer *et al.* (1993) reported that 7.19 aphids per tiller reduced 16.38 % yield Kieckhefer and Gallner (1992) stated that 15 aphids per plant caused 30 to 40 percent loss in grain yield.

The control of aphids with insecticides revealed that fenvalerate and fluvalinate were the safe insecticides to natural enemies for the control of cereal aphids in wheat (Jansen, 2000). Application of pirimicarb at 1/3 rate was as effective as the full label rate in controlling moderate aphid infestation. The reduced rate application of alpha-cypermethrin was less effective than the recommended rate. Dimethoate, pirimicarb and alpha-cypermethrin reduced the proportion of damaged grains by 33, 13 and 28%, respectively (Oakley, 2000).

Monocrotophos (0.05%), methyl demeton (0.03%), dimethoate (0.03%) and deltamethrin (0.03%) were highly effective for up to 15 days and malathion (0.05%) was the least effective against corn leaf aphid on wheat (PR-21) (Shukla and Pathak, 2000).

Ahmed *et al.* (2001) evaluated mixtures of imidacloprid and tebuconazole for three consecutive growing season (1996/97, 1997/98 and 1998/99) to determine the effects on plant stands, aphid control and grain yield of wheat cv. Debeira. They concluded that the application of imidacloprid at the rate of 1.05/0.04 and 0.7/0.04 g. a.i.

resulted in efficient control of aphid and increased in plant stand per unit area compared with untreated plots. The studies of integrating wheat resistance with chemical control has not been evaluated so far. The present project was planned to integrate the plant resistance with chemical control of aphids on resistant and susceptible varieties.

MATERIALS AND METHODS

The experiment was conducted in farmer's field at 219 RB, Faisalabad. Two genotypes viz., Iqbal-2000 (susceptible to aphids) and V-00146 (comparatively resistant to aphids) were sown on November 15, 2004. Three insecticides viz., Deltanet 400 EC (furathiocarb), Advantage 20 EC (carbosulfan) and Dc-Tron (petroleum oil) @ 300 ml, 500 ml and 500 ml per acre, respectively were sprayed twice on March 1, and March 16, 2005 with the help of hand Knapsac sprayer. The plot size was 8.26-m x 7.64-m. The data on the population of aphids were recorded at weekly interval from January 15 to April 14, 2005. The grain yield data were also recorded after threshing. The experiment was laid out under two factor RCBD with three replications. Comparison of means was done by DMR Test at P=0.05.

RESULTS AND DISCUSSION

Table 1 reveals that resistant genotypes V-00146 showed comparatively lower population of aphids as compared to susceptible genotype Iqbal-2000 throughout the crop season at all the dates of observation. The seasonal average of aphid population per tiller on Iqbal-2000 and V-00146 was 4.50 and 2.74, the two values differed significantly from one another. Highest aphids (11.48) per tiller was recorded on February 28 and it differed significantly from aphids number at all other

dates of observation. First application of insecticides decreased population, which increased on March 14 i.e., 6.42 per tiller. The second application of insecticides was done on March 16 and population of aphids remained low on subsequent dates of observation.

All the insecticides were statistically at par (2.37 to 2.53 aphids/tiller) among them in controlling the population of aphids as against control (7.14/tiller). (Table 2).

Table 1. POPULATION OF APHIDS PER TILLER ON VARIOUS DATES OF OBSERVATION ON IQBAL-2000 AND V-00146 DURING 2005.

Dates of Observation	Aphids Population/Tiller		
	Iqbal-2000	V-00146	Means
January 15	0.07 n	0.02 n	0.05 h
January 22	0.31 mn	0.10 n	0.21 h
January 29	0.96 kl	0.52 lmn	0.74 g
February 07	1.21 k	0.80 klm	1.00 g
February 14	3.53 fg	0.77 hig	3.15 f
February 21	6.87 c	5.14 d	6.01 c
February 28	13.09 a	9.87 b	11.48 a
March 07	3.30 fgh	2.35 J	2.82 f
March 14	10.12 b	2.72 ij	6.42 b
March 22	4.56 e	3.19 ghi	3.88 e
March 30	7.24 c	3.78 f	5.51 d
April 07	7.08 c	4.35 e	5.71 cd
April 14	0.12 n	0.01 n	0.06 h
Means	4.50 a	2.74 b	-

Means sharing similar letters are not significantly different by DMR Test at P=0.05

Table 2. EFFECT OF INSECTICIDES ON APHIDS POPULATION.

Treatment	Dose	Aphids Population per Tiller		
		Genotype		Means
		Iqbal-2000	V-00146	
Control		8.51 a	5.77 b	7.14 a
Deltanet	300 ml/acre	3.05 c	1.68 d	2.44 b
Advantage	500 ml/acre	3.14 c	1.74 d	2.37 b
Dc-Tron	500 ml/acre	3.29 c	1.77 d	2.53
Means		4.50 a	2.74 b	-

Means sharing similar letters are not significantly different by DMR Test at P=0.05

Table 3. MEANS COMPARISON OF THE DATA REGARDING GRAIN YIELD (Kg) IN DIFFERENT TREATMENT AND IN SELECTED GENOTYPES.

Treatments	Yield Kg/Plot			Yield Kg/ha	% Increase
	Iqbal-2000	V-00146	Means		
Control	36.14 e	36.88 c	36.51 b	5785.375	
Deltanet	36.55 d	37.53 a	37.04 a	5875.696	1.53
Advantage	36.72 cd	37.45 ab	37.08 a	5926.404	2.38
Dc-Tron	36.67 d	37.30 b	36.99 a	5861.44	1.29
Means	36.52 b	37.29 a			
				2.06%	

Means sharing similar letters are not significantly different by DMR Test at P=0.05

Table 3 reveals maximum yield (37.08 kg/plot) in advantage treated plot was at par statistically with Deltanet and Dc-Tron treated plots (37.04 and 36.99 kg/plot), respectively. The increase in yield was observed to be maximum in Advantage treated plot i.e., 2.38 percent, whereas 1.53 and 1.29 percent increase in yield was recorded in Deltanet and Dc-Tron treated plots. On an average 2.06 percent increase in yield was observed with the application of insecticides.

In the present study, all the insecticides showed significant control of aphids population as compared to control. In general Advantage showed maximum control of aphids followed by Deltanet and Dc-Tron. Similar trend was also observed in both genotypes, however Iqbal-2000 (a susceptible genotype) showed maximum population of aphids as compared to V-00146 (a resistant genotype). The application of Advantage showed maximum increase in grain yield followed by Deltanet and Dc-Tron. Furthermore, V-00146 showed maximum yield as compared to Iqbal-2000. The present findings cannot be compared with those of Jansen (2000), Oakley (2000), Shukla and Pathak (2000) and Ahmed *et al.* (2001) because control of the aphid population by applying different insecticides other than those used in the present studies could be the one reason.

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