Pak. J Agri. Sei, Vol. 39(4), *2002*

EFFECT OF ABIOTIC FACTORS AGAINST THE INFESTATION OF PINK BOLLWORM *(Pectinophora gossypiella)* ON DIFFERENT NECTARID AND NECTARILESS COTTON VARIETIES UNDER UNSPRAYED CONDITIONS

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The study was conducted at Nuclear Institute for Agriculture and Biology (NIAB) Faisalabad. There were eight cotton varieties namely NIAB Karishma, Karishma-1, Karishma-2, FH-901, MNH-554, N-86, N-98 and CIM-482. The experiment was conducted to study the effect of abiotic factors against the infestation of pink bollworm and also determine co-efficient of correlation among different variables considering the role of abiotic factors and the role of nectarid and nectariless cotton varieties under unsprayed condition. The pink bollworm infestation negatively correlated with abiotic factors like Temp. (0C), R. H. (%) and rainsfall (mm) in both nectarid and nectariless cotton. However nectariless cotton less attacked as compared to nectarid cotton varieties. High level of pink bollworm infestation was observed during October, when the infestation level on nectarid cotton was 16.07% on flowers, 8.99% on squares and 11.43% on green boils, and temperature ranges (28.31-30.08)oC and relative humidity ranges from (46.91-53.50)% and there was no rain fall during October.
Key words: Pink bollworm infestation, abiotic factors, cotton.

INTRODUCTION

Cotton plays a vital role in the economy of Pakistan. it is the leading cash crop and primary input to the country's largest industrial sector. It earns major part of our foreign exchange upto 62.3 - 68.3% (Khan and Khan,1995). This crop is handicapped due to the infestation of cotton bollworm complex among which pink bollworm is considered as limiting factor in the production of this crop. So the development of resistant nectariless cotton varieties is an important strategy against bollworms complex. However, the resistance in plant is not governed by any single factor rather it is a combination of physical and environmental factors. The present study was under taken to establish relationship between abiotic factors and pink bollworm infestation on different nectarid and nectariless cotton varieties.

MATERIALS AND METHODS

Eight cotton varieties viz; NIAB Karishma (N-K), Karishma-1 (K-1), Karishma-2 (K-2). (Nectariless), FH-901, MNH-554, NIAB-86 (N-86), NIAB-98, CIM-482. (Nectarid), were tested in randomized complete block design having four replications with a plot size 31m x24m. The data of pink bollworm infestation were recorded from flowers, squares, and green boils on weekly basis from five randomly selected plants from each treatment starting from 27-07-01 to 15-10-01. At the end of season, the data were statistically analysed at 5% level of significance (Steel and Torrie, 1980) in such a way, to determine the correlation among different variables considering the role of abiotic factors and the role of nectarid and nectariless cotton varieties against the infestation of pink bollworm under unsprayed condition,.

RESULTS AND DISCUSSION

The data of pink bollworm infestation showed that there were significant differences in nectarid and nectariless cotton varieties (Table 1). Peak infestation was observed during October on nectarid cotton when there was no rain fall.. The average air temperature and relative humidity was 29.33°C and 49.58% respectively. Chaudhary *et al.* (1999) and Guirguis *et al.*, (1999) have also reported maximum infestation of pink bollworm during October, when the temperature ranges 25.0-35.0^{O}C and relative humidity ranges from 45.0-55.0% and there was no rain fall.. Moreover, nectariless cotton varieties were less attacked as in the findings of Satpute *et al.* (1994) who reported minimum attack on American nectariless varieties. Correlation coefficients between pink bollworm infestation and abiotic factors in nectarid and nectariless cotton varieties, have been reported in Table 2 and 3. These results are similar to those of Chaudhary *et al.. (1999)* who reported negative correlation between infestation and abiotic factors. Present results contradict to those of Sadaany *et al.* (1999), who observed positive correlation between the infestation of pink bollworm and abiotic factors. Nectarid cotton, like (FH-901, MNH-554, N-86, N-98, CIM-482) had highly significant correlation coefficient values with the air temperature and relative humidity while non-significant in case of rainfall.

Table-1. Overall mean infestation of pink bollworm on nectarid and nectariless cotton on different dates with observed abiotic factors.

Date	Pink bOllworm infestation						Abiotic Factors		
	Nectarid Cotton			Nectariless Cotton			Temp.	R.H*	Rainfall
	Flower	Squares	Boils	Flowers	Squares	Boils	°C	(%)	(mm)
$O_1$27-7-2001	6.68	6.27	3.41	5.30	3.25	2.08	31.86	58.69	3.18
$O_2$8-8-2001	7.48	6.44	3.26	5.86	3.40	2.36	31.31	68.30	1.15
O_3 15-8-2001	7.26	5.79	3.81	5.27	4.12	3.44	32.77	71.92	0.0
$O_4$22-8-2001	5.83	6.70	4.97	5.02	4.07	3.93	31.28	79.78	9.30
Os 29-8-2001	6.54	6.25	5.76	4.83	5.62	4.45	32.38	68.57	0.0
O_6 6-9-2001	5.43	6.12	7.36	4.00	3.94	4.84	32.06	61.68	0.125
O_7 13-9-2001	4.80	7.65	7.19	3.14	5.84	4.62	30.62	59.21	0.10
$O_8$20-9-2001	7.29	6.41	6.63	5.90	3.60	5.16	28.95	57.92	0.11
$O_9$27-9-2001	10.13	6.85	8.73	7.37	5.70	3.97	30.11	47.42	0.0
O_{10} 4-10-2001	13.95	8.55	10.64	9.45	6.73	4.82	30.08	48.35	0.0
O_{11} 9-10-2001	14.40	8.99	10.96	12.15	6.12	6.08	29.52	53.50	0.0
O_{12}15-10-2001	16.07	8.31	11.43	9.56	6.65	6.28	28.31	46.91	0.0
Mean (X)	8.82	7.03	7.01	6.49	4.92	4.34	30.77	60.19	1.16

* = Relative humidity.

Table 2. Correlation coefficient values between pink bollworm infestation on nectarid cotton varieties and abiotic factors.

Varieties	Air Temperature			Relative Humility			Rain Fall		
	Flowers	Squares	Balls	Flowers	Squares	Balls	Flowers	Squares	Balls
FH-901	-0.536*	-0.550 *	-0.738**	-0.651*	-0.450 ns	-0.741**	-0.415n.	-0.118n.	-0.341 ns
MNH-554	-0.640*	_0.417ns	-0.796**	-0.703*	_0.417ns	-0.857**	-0.346 ns	0.240ns	-0.471 ns
N-86	-0.732**	-0.807**	-0.725**	-0.735**	-0.807 **	-0.755**	-0.366 ns	_0.164ns	-0.387 ns
N-98	0.649*	-0.594*	-0.713**	-0.714**	-0.594*	-0.778**	-0.271 ns	-0.531*	-0.333 ns
Cim-482	0.605*	-0.467 ns	-0.662*	-0.456 ns	-0.467 ns	-0.694*	-0.128 ns	-0.058 ns	-0.327 ns

** = Highly Significant at p <0.01 * = Significant p <0.05 ns = Non-significant

Table 3. Correlation coefficient values between pink bollworm infestation on nectariless cotton varieties and abiotic factors.

Varieties	Air temperature			Relative Humility			Rainfall		
	Flowers	Squares	Balls	Flowers	squares	Balls	Flowers	Squares	Balls
N-K	0.572*	-0.570*	-0.514 *	-0.607*	-0.598 *	-0.575*	_0.359ns	-0.480 ns	-0.472 ns
K-1	-0.590*	-0.536 *	-0.644 *	-0.667*	-0.693*	-0.693 *	-0.261 ns	-0.450 ns	-0.159 ns
K-2	-0.639*	-0.5.69 *	-0.758**	-0.523 *	-0.686 *	-0.530 *	-0.050n.	_0.119ns	-0.288 ns

** = Highly Significant at p <0.01 * = Significant p <0.05 ns = Non-significant

In Table 3, the nectariless cotton varieties like (NIAB Karishma, Karishma-1 and Karishma-2) showed highly significant negative correlation coefficient with air temperature and relative humidity while non significant values in case of rainfall. Nasir (1986), also reported a negative correlation between infestation of pink bollworm with abiotic factors and non significant correlation with rainfall. The results of present study

differed with Jha and Bisen (1994) who reported that frequent rainfall always favour the infestation and development of this pest..

Finally there might be a number of other factors too that influence the pink bollworm infestation. These factors could be physio-morphological or bio-chemical that may correlate with each other to have some positive or negative effect in combination to influence the pink bollworm infestation.

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