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Short Communication

Incidence and Development of *Thrips tabaci* and *Tetranychus urticae* on Field Grown Cotton

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ABSTRACT

Incidence of pests is highly affected by weather factors like mean air temperature; relative humidity and rainfall. Correlations were developed between average population counts of cotton thrips, *Thrips tabaci* and red spider mites, *Tetranychus urticae* on eight genotypes of cotton at NIAB, Faisalabad under prevailing weather conditions. The data taken from 1st July, 2006 to 15th November, 2006 revealed that temperature played a significant and positive role for thrips (r = 0.645) but a negative one for red spider mites (r = -0.510). Relative humidity and rainfall were not correlated with mite population but positively associated with thrips population.

Key Words: Population fluctuations; Thrips; Mites; Cotton; Weather factors

INTRODUCTION

The incidence of insect pests considerably reduces both the yield and quality of cotton production. The incidence and development of all the insect pests are much dependent upon the prevailing environmental factors such as temperature, relative humidity and precipitation (Aheer *et al.*, 1994). Nath *et al.* (2000) reported that American cotton (*Gossypium hirsutum*) is more susceptible to the attack of sucking insect pests as well as bollworm complex than desi cotton (*G. arborium*).

Thrips (*Thrips tabaci* Lind.) have recently attained the status of a regular cotton insect pest in the Punjab province of Pakistan, probably due to over use of pesticides (Ali *et al*., 1993). *Thrips tabaci* is the most important early-season sucking insect pest on cotton (Wilson & Bauer, 1993). Different weather factors like temperature, relative humidity were found to have positive association with thrips population on cotton (Li *et al*., 1992; Shah, 2003). The peak population of cotton thrips was recorded in the second fortnight of September (Gupta *et al*., 1997). Khan and Ullah (1994) observed a negative relationship between population buildup of *Thrips tabaci* and *Tetranychus urticae* and the mean relative humidity and rainfall.

Besides thrips, red spider mites (*Tetranychus urticae*), also a notorious insect pest of cotton is reported to cause retardation in plant growth and vigour (Wilson & Morton, 1993; Gupta *et al*., 1997; Gogoi *et al*., 2000). Meteorological factors played a significant role in the population fluctuation of cotton mites. Crop growth reduction due to mite infestation on cotton was greater in early than in late infested crops (Sadras & Wilson, 1997). Maximum activity of cotton mites was noticed in the month of November and the mite population was favored by high temperature and low humidity (Wilson & Morton, 1993; Patel & Rote, 1997; Linger *et al*., 1998).

The present project was undertaken on eight advanced genotypes of cotton *viz*., NIAB-98, IR-448, NK, FH-925, IR-443, NIAB-999, FH-901 and NIBGE-I with the objective to determine the changes in the population of some cotton pests in relation to abiotic factors like temperature, relative humidity and rainfall in fluctuating the thrips and mite population on cotton under Faisalabad ecological conditions.

MATERIALS AND METHODS

Study was carried out at the Nuclear Institute for Agriculture and Biology, Faisalabad, Pakistan, during the 2005-06 cotton season. Experiment was laid out in a randomized complete block design (RCBD) with three replications and the plot size was kept at 25 x 10 ft, the row-to-row and plant-to-plant distance was 2 ½ ft and 1 ¼ ft, respectively. The cotton genotypes sown were NIAB-98, IR-448, NK, FH-925, IR-443, NIAB-999, FH-901 and NIBGE-I.

Data on per leaf basis for thrips (adults & nymphs), *Thrips tabaci* and red spider mites, *Tetranychus urticae*

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Table I. Effect of weather factors on insect pest population in different varieties of cotton under unsprayed conditions, at NIAB, Faisalabad

Varieties	Weather factors					
	Temperature (°C)		Relative humidity (%)		Rainfall (mm)	
	THRIPS	MITES	THRIPS	MITES	THRIPS	MITES
NIBGE-I	0.654*	-0.479	0.538	-0.388	0.301	-0.071
IR-443	0.536	-0.548*	0.542	-0.448*	-0.200	-0.180
IR-448	0.639	-0.495	0.571*	-0.310	0.295	-0.120
NK (Niab Karishma)	0.555	-0.420	0.547	-0.389	0.395*	-0.185
FH-901	0.574	-0.561	0.543	-0.422	0.294	-0.184
FH-925	0.662*	-0.451	0.497	-0.446*	0.289	-0.264*
NIAB-999	0.679**	0.357	0.490	-0.317	0.361	-0.162
NIAB-98	0.728**	-0.627**	0.581*	-0.446*	0.371*	-0.373*

* Significant at $P \leq 0.05$; ** Significant at $P \leq 0.01$

were recorded early in the morning at weekly intervals, taking two leaves each from top, middle and bottom of five randomly selected plants in each replication of each treatment for counting of their population. Meteorological data regarding mean daily temperature, relative humidity and rainfall were collected from the meteorological observatory of Plant Physiology Section of Ayub Agricultural Research Institute, Faisalabad, Pakistan.

Population means of each pest on each observation date as well as weather factors were recorded. Population means and overall means of sucking insect pests for whole growing seasons were calculated. The data were subjected to statistical analysis and the Duncan's Multiple Range Test at 5% was applied to test the level of significance (Steel & Torrie, 1980) and correlation between insect pest populations, varieties and weather factors were derived. The results were interpreted to see the effect of different weather parameters on the incidence and development of thrips and mites on different advanced genotypes of cotton under unsprayed conditions.

RESULTS AND DISCUSSION

The cotton entries behaved differently from each other either due to genetic characters or greater adaptability of genotypes to a particular environment. The data analysis revealed that the response of temperature, relative humidity and rainfall was positive and significant for thrips but mite population was negatively associated with all the above weather factors.

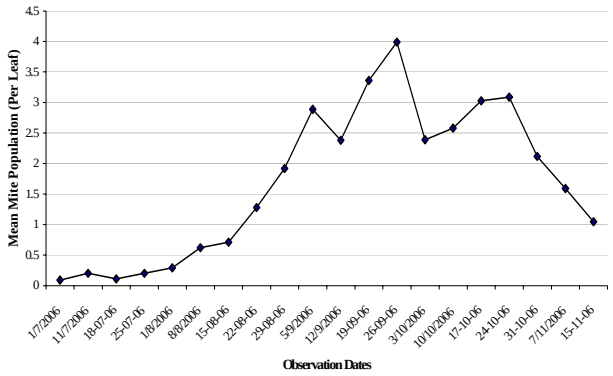
On cumulative basis, thrips population was affected significantly by temperature (r = 0.645), relative humidity (r = 0.553) and rainfall (r = 0.318) (Table I, II; Fig. 1), which are in partial agreement to Shah (2003) and Panikar and Patel (2001). However, the results are not in accordance with the reports of Wahla *et al.* (1996) who found that rainfall and relative humidity and minimum air temperature were negatively correlated with the thrips population. On the other hand, red spider population was negatively correlated with all of with temperature ((r = -0.510), relative humidity (r = -0.418) and rainfall (r = -0.137). Linger *et al.* (1998) reported that cotton mite population was favoured by higher temperature, which disfavours the present results, but also negatively correlated by the relative humidity, which on the other hand, favours the study.

Table II. Correlation coefficient between population density of thrips and mites and the weather factors

Insect-pests	Weather factors		
	Temperature (°C)	Relative humidity (%)	Rainfall (mm)
Thrips	0.645	0.553	0.318
Mites	-0.510	-0.418	-0.204

* Significant at $P \leq 0.05$; ** Significant at $P \leq 0.01$

Fig. 1. Overall mean per leaf thrips population on different genotypes of cotton observed on different dates at NIAB, Faisalabad



In conclusion, these data suggest that sowing dates can be adjusted to save cotton crop from severe attack of insect pests reported in this study.

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