



Research Article

Screening of Resistant Cotton Varieties against Thrips, *Thrips tabaci* in Multan, Punjab, Pakistan Based on Population Dynamic

Muhammad Ramzan^{1*}, Muhammad Nadeem¹, Masood Maqbool¹, Ghulam Murtaza²

¹Institute of Plant Protection, MNS-University of Agriculture Multan, Punjab, Pakistan

²Department of Entomology, University of Agriculture Faisalabad, Punjab, Pakistan

Article History

Received: October 08, 2019

Revised: October 15, 2019

Accepted: November 28, 2019

Published: December 24, 2019

Authors' Contributions

MR planned the study and wrote the manuscript. UNU reviewed the manuscript and analyzed the data. MN, MM, MA and GM helped in data collection.

Keywords

Cotton, *Thrips tabaci*, Cultivars, Resistance, Multan, Pakistan

Abstract | An experimental study was conducted to screened out the different resistant varieties of cotton against thrips, *Thrips tabaci*. In this experiment seven cotton genotypes viz. MNH-886, MNH-986, MNH-554, MNH-52, NIAB-78, NIAB-98 and NIAB-999 were sown on dibbling method during 2017. The present study resulted that no variety was free from the attack of thrips population. Among all tested varieties, NIAB-78 and MNH-886 were found most resistant and susceptible against thrips, respectively. The mean population of thrips on MNH-886 and NIAB-78 were recorded 5.43 and 3.49 per plant, respectively. The study revealed that NIAB-98 (4.92/plant) and NIAB-999 (4.92/plant) were found more attractive varieties against thrips population during the whole study period. The study concluded that NIAB-78 is best variety and shows resistance against insect pests like thrips.

To cite this article: Ramzan, M., Nadeem, M., Maqbool, M. and Murtaza, G., 2019. Screening of resistant cotton varieties against thrips, *Thrips tabaci* in Multan, Punjab, Pakistan based on population dynamic. *Punjab Univ. J. Zool.*, **34(2)**: 185-189. <https://dx.doi.org/10.17582/journal.pujz/2019.34.2.185.189>

Introduction

Cotton, *Gossypium hirsutum* L. belongs to Malvaceae family (Dorothy and Stolon, 1999; Stephen, 2004) and known as white gold (Ramzan, 2019) is cash and fiber crop of various countries like Pakistan. In the economy of country, cotton plays a key role in the form of oil and food source (Salman *et al.*, 2011) for the human and animal. Cotton products and raw material are the main source of foreign exchange. Its production can be reduced due to various biotic and abiotic factors such as climate and insects (Mohyuddin *et al.*, 1997). The major reason of its yield reduction is attacked of insect pests

(Ramzan, 2019) such as sucking (Thrips, *Thrips tabaci*, whitefly, *Bemisia tabaci*, Jassid, *Amrassica Biguttula* and red cotton bug, *Dyesdercus koenigii*) (Ashfaq *et al.*, 2011) and chewing (American bollworm, *Helicoverpa armigera*, Pink bollworm, *Pectinophora gossypiella* (Dhaka and Pareek, 2007) Spotted bollworm, *Earias insulana* (Arshad *et al.*, 2001; Dhaka and Pareek, 2007), armyworm, *Spodoptera litura* and *Spodoptera exigua* insect pests (Amin *et al.*, 2008; Shah, 2014; Ramzan, 2019). The combined attack of thrips and jassid can caused about 37.6% yield losses (Attique and Ahmad, 1990).

Among sucking insect pests, thrips is the major one that such cell sap from plant leaves (Ali and Aheer, 2007; Arif *et al.*, 2006; Salman *et al.*, 2011). Thrips is small and slender insect pest. Both adults and nymphs of thrips

Corresponding author: Muhammad Ramzan

ramzan.mnsua@gmail.com

such cell sap from sowing to harvesting. The excessive cell sap sucking can cause necrosis and reduce the process of photosynthesis which ultimately affect the cotton production (Hashmi, 1994) throughout the cotton growing zones of the world including Pakistan (Arif *et al.*, 2006; Khan *et al.*, 2008). During severe pest infestation, about 10-40% losses occurred in crop production (Gahukar, 2006).

The various methods such as cultural, biological, botanical, entomopathogenic fungi and chemicals are being practiced by farmers on small as well as large scale to control the insect pests. Insecticides are excessively used to control the insect pests of cotton. Excessive use of insecticides can cause resistance (Salman *et al.*, 2011) and hazardous for environment (Ramzan, 2019). Insecticides can kill the beneficial fauna like predators and parasitoids etc. The pressure of insect pests can lower through the use of ecofriendly tactics.

By keeping in view the present situation of insect pests like thrips on cotton, there is need to develop best and ecofriendly pest management tactic. The screening of cultivars is the main management tactic use to control insect pests especially thrips (Yousafi *et al.*, 2013) on cotton crop. The current research work was performed to evaluate the preference of thrips on different cotton cultivars.

Materials and Methods

An experimental study was conducted at the Farmer field District Multan during 2017. In the research study, seven cultivars of cotton such as NIAB-78, NIAB-98, NIAB-999, MNH-886, MNH-986, MNH-554 and MNH-52 were sown on dibbling or furrow method. In the current study, plant to plant and row to row distance was kept 9 inches and 30 inches, respectively. Each furrow was replicated thrice times with 20 meters long. All the recommended agronomical practices such as soil preparation, irrigation and fertilization etc. were maintained throughout the study period. Data was recorded on weekly basis early in the morning after one month of crop sowing. During the whole study, 20 plants were selected randomly from each row. The number of adult and nymph on each cultivar were counted on randomly selected plant i.e. two leaves from top of first plant, two leaves from middle portion of second plant and two leaves from bottom portion of third plant in each replication of each treatment. Mean population of thrips was recorded on each variety. The recorded data was statistically analyzed by using software Student Statistix 8.1.

Results and Discussion

In the current study, seven different cotton varieties such as NIAB-78, NIAB-999, NIAB-98, MNH-886, MNH-986, MNH-554 and MNH-52 were sown

at Multan to check their performance against thrips population. The study revealed that among all cotton varieties used in the experiment, NIAB-78 was found more resistant against thrips followed by MNH-552, MNH-554, MNH-886, NIAB-999, NIAB-99 and MNH-986 as mentioned in Table 1. The mean population of thrips was different on each cotton variety. The mean population of thrips on NIAB-78 (3.49) was followed by MNH-552 (4.18), MNH-554 (4.27), MNH-986 (4.57), NIAB-999 (4.92), NIAB-98 (5.14) and MNH-886 (5.43) per plant.

NIAB-98 and MNH-886 were the most attractive varieties of cotton against thrips while NIAB-78 was least attractive. The similar findings have been reported by earlier studies (Nahiyoon *et al.*, 2016). The study showed that significant difference was found between interval but no difference between different cotton varieties.

The current study was revealed that Thrips, *Thrips tabaci* adults and nymphs damage the plants parts such as leaves. During severe attacked of adult and nymph, leaves convert into brownish or silvery white, leaves look cup shaped and later changed dirty white. Our results are in line with many researcher's findings (Gahukar, 2006; Khan *et al.*, 2003). Ravi cultivar was most resistant against sucking insect pests including thrips (Khan *et al.*, 2003).

Another study was carried out by Gahukar (2006) to check the sucking pest infestation on different cotton varieties and resulted that among sucking insect pests, thrips is the major damaging pest of cotton in cotton growing areas of the world. Khan *et al.* (2003) have been reported 3.98, 7.86 and 6.92 per leaf population of whitefly, jassid and thrips on MNH-147, CIM-436 and CIM-436 cotton varieties respectively. The current study results were similar to Shad *et al.* (2001) and Nizamani *et al.* (2002) who observed that AEH-4 was most resistant variety against thrips than all other nine varieties of okra such as CRIS-128, AEH-1, CRIS-124, AEH-2, CRIS-9, AEH-6, CRIS-121, Red and CRIS-129. CRIS-468 was most resistant while CRIS-467 susceptible against sucking insect pests (Pathan *et al.*, 2007). In another study, twenty-two cotton genotypes were used to check the preference of sucking insect pests such as jassid, whitefly and thrips. Among twenty-two varieties, CIM-499 was most resistant against pests (Aslam and Saeed, 2004). Salman *et al.* (2011) reported that SLH-257 was found highly resistant as compared to others tested varieties. Many earlier scientists studied the physio-morphich characters of different cotton genotypes against sucking insect pests and found significant results (Bhatnagar and Sharma, 1991; Syed *et al.*, 1996; Rafiq and Shah, 1998; Aheer *et al.*, 1999; Sontakke *et al.*, 2000; Natwick *et al.*, 2002; Nizamani *et al.*, 2002; Syed *et al.*, 2003; Abro *et al.*, 2004; Arif *et al.*, 2004). In a study, different cotton varieties such as BH-178, AA-802, Bt-2131, Bt-141, Tarzan-2,

Table 1: Mean population of thrips on different cotton cultivars.

Date of observation	Varieties						
	MNH-986	MNH-886	NIAB-78	MNH-554	MNH-552	NIAB-98	NIAB-999
19-5-2017	3.14	2.45	2.20	1.76	2.14	1.70	2.70
26-5-2017	6.62	6.97	5.24	5.03	4.62	3.99	4.94
2-6-2017	6.06	5.76	7.87	6.46	8.06	8.58	8.57
9-6-2017	8.76	6.87	4.59	8.13	9.76	6.94	7.99
16-6-2017	7.72	9.00	2.56	5.96	7.72	5.43	6.46
23-6-2017	5.22	6.97	7.12	4.86	6.32	6.46	5.42
30-6-2017	7.46	7.47	7.99	7.40	5.56	10.17	8.19
7-7-2017	9.16	3.67	6.56	5.96	7.16	5.94	7.96
14-7-2017	8.31	4.34	5.89	7.73	6.21	9.77	7.79
21-7-2017	10.63	4.34	2.89	6.03	5.63	6.79	4.79
28-7-2017	7.32	5.34	2.16	5.09	4.32	6.19	7.16
4-8-2017	6.03	3.23	0.93	3.17	4.03	6.99	3.93
11-8-2017	9.33	5.76	0.98	1.44	2.33	5.94	4.98
18-8-2017	6.51	4.01	3.50	2.67	3.51	4.56	5.50
25-8-2017	5.76	5.98	5.26	4.76	5.66	4.23	4.26
1-9-2017	3.23	6.87	3.56	4.65	4.33	6.72	4.76
8-9-2017	4.25	3.98	5.06	7.56	3.45	6.28	5.26
15-9-2017	4.46	5.87	4.98	3.45	5.56	4.57	4.58
22-9-2017	5.63	4.65	3.50	4.65	2.43	3.54	4.52
29-9-2017	1.42	3.45	1.53	2.45	4.43	2.14	2.03
6-10-2017	1.73	0.65	0.43	1.34	2.65	2.05	1.03
13-10-2017	0.69	0.45	0.99	0.56	1.99	2.37	1.09
20-10-2017	0.43	0.87	0.75	0.90	0.87	0.88	0.75
27-10-2017	0.41	0.65	0.79	0.54	0.10	0.09	0.79
Total	130.28	109.6	83.8	102.55	100.25	123.32	118.15
Mean	5.43	4.57	3.49	4.27	4.18	5.14	4.92

MN-121, FH-114, FH-113, CBS-1, FH-4243, IR-3, GM-2085, IR-901, IR-4, IUB-212, IUB-222, IR-824, Subhan-2001, IUB-2009 and VH-259 were screened out against thrips and study resulted that among all varieties, AA-802 was highly resistant while VH-259 susceptible (Saleem *et al.*, 2013).

During the study, it was observed that pest population reached peak point during months of July and August. The similar observations have been observed by many researchers (Nahiyoony *et al.*, 2016). The pest population was highest at the start of study period and decrease continuously after August and minimum at the end of September. Our results are completely agreement with the findings of Nahiyoony *et al.* (2016) who reported that pest population was lowest after month of August.

Conclusion

The study concluded that all cotton varieties are very important but NIAB-78 is best variety and shows

resistance against insect pests like thrips than all other varieties. July and August are the favorable months of thrips population.

Acknowledgement

Authors are highly thankful to Maqbool Ahmad for providing study area.

Conflict of interest

Authors have no conflict of interest.

Source of funding

There was no source of funding.

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