

Relative Resistance in Different Cultivars of Pakistani Cotton against Cotton Whitefly, *Bemisia tabaci*

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Abstract: A total of 10 cultivars of cotton were screened against whitefly in the agro-climate of Faisalabad. Observations were taken on weekly basis and per leaf population of whitefly was taken from 14-07-2005 to 22-9-2005. The results indicated that NIAB-778 was most susceptible as compared with all other tested cultivars, in contrast MNH-768 was resistant against whitefly. Moreover results revealed that during the observation period whitefly ranged from 0.99-2.57/leaf. From the result it was clear that month of August was the most favorable for whitefly, because during this month population was maximum.

Key words: Screening • Population Dynamics • *Gossypium hirsutum* • Abundant period

INTRODUCTION

Cotton white gold of Pakistan is a major cash crop of Pakistan. The average yield of cotton in Pakistan is low as compared to other cotton growing countries of the world [1]. Cotton productivity is influenced by biotic and abiotic factors. Abiotic factors are mainly concerned with environment whereas biotic factors are related with insect pest and diseases. A total of 1326 insect pests attack cotton crop during its growth stage, which cause heavy quantitative and qualitative losses [2]. Amongst insect pests, whitefly alone can damage crop in different ways i.e., by desaping, honey dew excretions and transmission of cotton leaf curl viruses. In order to avoid such losses caused by pest insects, farmers preferably rely on use of pesticides. In Pakistan nearly 80% of the total pesticides consumption is being used on cotton crop alone [3]. Market share of pesticides was 90 % for the Punjab, 8 % for Sindh and 2 % for NWFP and Balochistan [4]. Such over dependence of insecticides has resulted in ill effects in the form of health hazards, insecticidal resistance and environmental pollutions [5]. Situation demands more attention toward plant/ varietal resistance against insect pest. Host plant resistance is safe and effective tool in integrated pest management. In plant resistance several

physical and chemical factors are involved. Therefore, the main objective of the present study was to sort out comparative resistance among different cultivars of cotton against whitefly during the cotton growing season.

MATERIALS AND METHODS

The present studies were carried out at PARS (Post Graduate Research Station, Faisalabad), following Randomized complete block design. Treatment material consisted of 10 different cultivars viz., BH-162, BH-163, MNH-700, MNH-768, NIAB101, NIAB-111, NIAB-814, NIAB-884, super-98, VH-159 of cotton were replicated thrice. There were 8 rows in each replicate. Plot size was 16.5x20 feet. Row to row distance was 2.5 feet. For taking the population estimates, observations were carried out under natural infestation at weekly intervals from appearance of insect pest till crop maturity. Whitefly population was recorded from 10 randomly selected plants from each plot and observations were taken from 14-07-2005 to 22-9-2005. Pest population was calculated by using leaf turn method and sampling was done in such a way that upper leaf of first plant, middle leaf of second plant and bottom leaf of the third plant and so on Sohail *et al.* and Amjad and Aheer [6,7].

Statistical Analysis: All data regarding population dynamics of whitefly among tested genotypes of cotton were analyzed using analysis of variance (ANOVA) and means were separated by using Tukey's honestly significant difference (HSD) test. All analysis was done using SPSS (SPSS Institute, Chocago, Illinois). The significant differences among means were found out through the Duncan's Multiple Range Test [8] at different levels of probability.

RESULTS

Analysis of variance of data revealed highly significant differences among various dates of observation, cultivars and their interactions.

Period of Abundance: The results revealed that the maximum population (2.57/leaf) was recorded on 11-08-2005, which was the peak of the season. Population of whitefly in general was low and below economic threshold (ETL). This population was started to record on 07-07-2005 (0.35/leaf) and increased gradually till the highest peak (2.57/leaf) during August. It declined thereafter up to 01-09-05 (0.71/leaf). The population recorded started to rebuild up again (1.32/leaf) on 22-09-2005 and finally declined later on as shown in Fig. 2.

Resistance/ Susceptibility of Cotton Cultivars to Whitefly: The seasonal mean results presented in Fig. 2 showed that NIAB-814 indicated maximum susceptibility against whitefly with population (1.95/leaf) that was at par with MNH-768 bearing population 1.93/leaf. The minimum whitefly population recorded on MNH-700 was (0.99/leaf) and was statistically at par with BH-162, NIAB-111 and

Table 1: Multi-factor effects of observation date, variety and their interaction on seasonal mean population of whitefly

Factor	d.f	F-value
Week	11	45.47**
Variety	9	11.41**
Week x variety	99	3.96**

Super-98 with population of whitefly i.e., 1.09 and 1.23/leaf, respectively. The conclusion drawn from these results justified that NIAB-111 was found comparatively susceptible while MNH-700 was resistant against cotton whitefly as shown in Fig. 1.

DISCUSSION

Host plant resistance is an important tool of integrated pest management. Host plant resistance depends upon mechanisms as well as components of resistance. Plant resistance affects the behavior of herbivorous insect pest due to the pest makes decision to accept or reject food. Due to these provisions plants exhibit immunity, resistance, susceptibility or tolerance against insect pest. Screening trial is used to determine plant resistance against insect pest under laboratory, green house and field.

In the present studies cotton cultivars were also screened against under field conditions during the cotton growing season from 14-07-2005 to 22-9-2005. Based on results of the present study it was found that the first two weeks of August were found to be the best for the population build up of whitefly. The present findings are inline with the findings of Hegde *et al.* [9] who reported that peak whitefly population occurred during

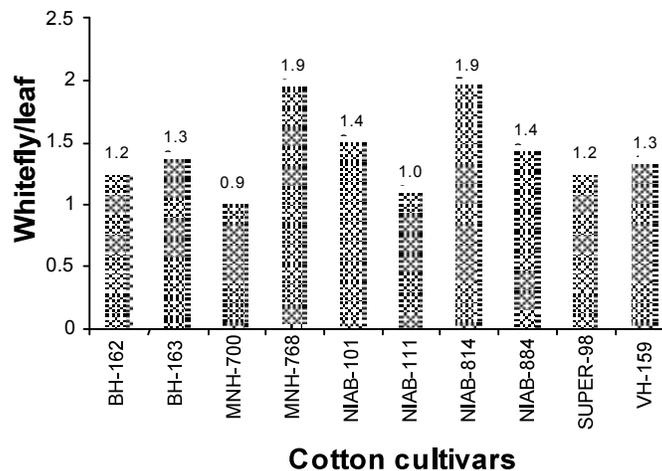


Fig. 1: Population of whitefly among different cultivars of cotton

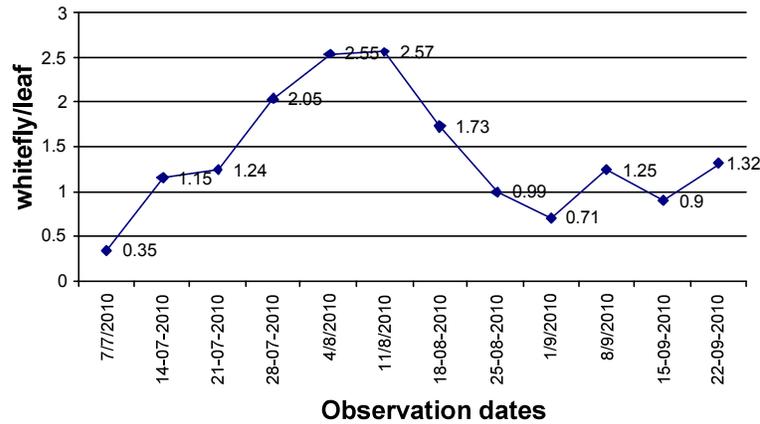


Fig. 2: Whitefly population recorded on different dates of observations

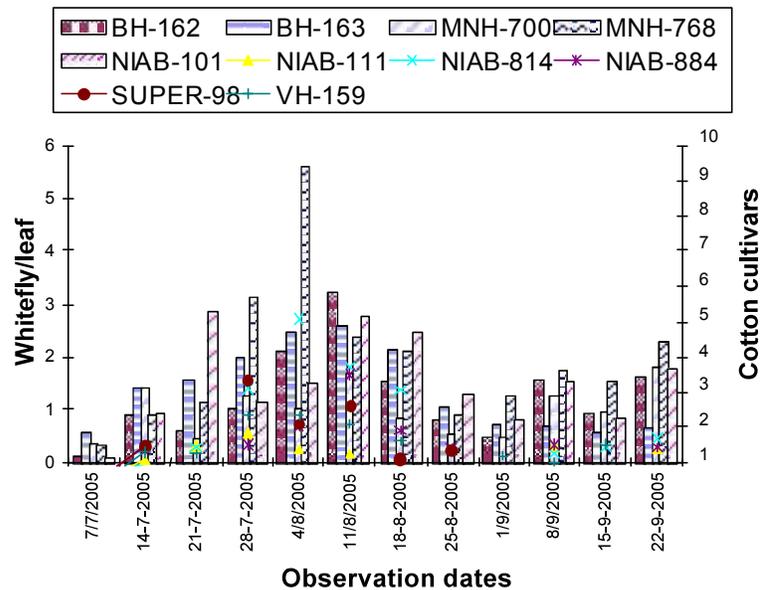


Fig. 3: Mutual response of cotton cultivars and observation dates on Population fluctuation of whitefly among different cultivars of cotton

the month of October with 6.43 per leaf. Present findings are contradictory to the findings of Anitha and Nandihalli, [10] who reported that peak incidence of whitefly was noticed during last week of April.

The present studies also revealed that among the tested cultivars of cotton NIAB-814 was most susceptible against whitefly. The present findings are contradictory to the findings of Mumtaz *et al.* [11], who identified NIAB-26 as the most resistant among the seven varieties tested against whitefly. The similar results regarding whitefly population but on different tested genotypes are in conformity with those of Raza and Afzal and Bashir *et al.* [12, 13]. The findings of same researches [14-23etc.] could not be compared to the present studies because of

the differences in the varietal/pest combinations tried by them.

Population dynamics of insect pest depends upon the environment and plant species/variety. As such, the present efforts were definitely a new addition to the previous fund of knowledge.

CONCLUSION

Abundant population of whitefly was recorded on NIAB-778 during the month of October. So farmers are advised to remain careful about the outbreak of whitefly in future by understanding favorable climate and existence of susceptible host.

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