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Relative Resistance of Cotton Cultivars to Sucking Complex

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Abstract: The resistance level of ten cotton cultivars viz, AEH-1, AEH-2, AEH-4, AEH-6, CRIS-9, CRIS-121, CRIS-124, CRIS-128, CRIS-129 and Red Okra to sucking complex i.e. thrips, jassids, and whiteflies was evaluated in the cotton experimental field of IPM at Agriculture Research Institute, Tandojam during Summer, 2000. It was observed that the cultivar AEH-4 showed comparatively greater resistance to attack of thrips (infestation per leaf basis) when compared with rest of the cultivars tested, and cultivar AEH-2 showed relative susceptibility to thrips attack. Cultivars AEH-1, AEH-4 and AEH-6 were highly susceptible to jassid, whereas cultivars CRIS-129, CRIS-121, CRIS-124, Red Okra, CRIS-128, AEH-2 and CRIS-9, showed medium response to jassid attack. The population of whitefly illustrate that cultivar Red Okra was found resistant to a greater level against this pest on per leaf infestation basis. It is concluded that thrips, jassids and whiteflies all attacked the cotton cultivars tested. Although, whiteflies population was very low throughout the observation period and its population was below economic injury level. The population of thrips rapidly increased between June 27th to July 11th and then sharply declined up to August 8th. After this date the population of thrips remained very low and did not exceed the level of one thrip per leaf infestation, while jassids population exceeded the economic injury level from July 11th to August 16th. It could, therefore, be inferred that control strategies to combat sucking insect pests should be planned during vegetative phase. However, the resistant cotton cultivars may be exploited to avoid environmental pollution and residual problems of insecticides.

Keywords: Resistance, Population, Sucking Complex, Cotton Cultivars, Injury Level

Introduction

Cotton crop in Pakistan is under serious threat of many insect pests. As many as 148 different species of insect pests have been reported to attack the cotton crop in Pakistan. Among these, twenty-four insect species are key pests of cotton. Included in this category are the sucking insect pests namely thrips, jassids, aphids and whiteflies whose nymphs and adults suck the sap from leaves and other tender parts thereby weakening the plant. The losses due to the pest attack on the crop could amount up to 30-40 percent (Haq, 1970 and Naqvi, 1973). Hargreane (1948) have reported 1356 insect attacking cotton, out of those 15 species (including thrips, jassids, whiteflies) are of great economic importance. Grammer (1967) and Naqvi (1980) have reported loss of 14.05 and 50.0% of cotton production due to the pest attack in developing countries of Asia.

As a remedial and sometimes preventive effort, the crop receives frequent applications of insecticides in order to kill the pests and get higher yields of the cotton crop. On the other hand, the application of pyrethroids and other pesticide groups have increased the menace of sucking pests as well as bollworms on cotton crop. The entire story has become more grave with the fact that these pesticides pose serious hazards to human health by polluting the sprayed material with their long residual effects. The carcinogenic effect tops among all other disorders caused by the residual effects of the pesticides. The picture is not altogether so much shabby. Fortunately, a new natural tool has been identified to curb this ever-mounting parasitic complex, this is the in built resistance in the plants against pest. At present, cultivation of resistant varieties is the safest tool against the pests of cotton. Many resistant cultivars of cotton against sucking pests have been developed or identified in other parts of world but very little research is done in this regard in Pakistan. Keeping in view the factual position, the study was carried out at TandoJam on the relative resistance of cotton cultivars to sucking complex.

Materials and Methods

The seeds of ten cotton cultivars viz, AEH-1, AEH-2, AEH-4, AEH-6, CRIS-9, CRIS-121, CRIS-124, CRIS-128, CRIS-129 and Red Okra were sown during 3rd week of May 2000, in a "Complete Randomized Block Design" with three replicates. Each replicate comprised of ten lines of nine-meter length with a row to row distance of 30 cm. A plant to plant distance of 20 cm. was maintained. The cotton cultivars in all the plots received normal cultural practices and irrigation.

Observation on Sucking Insect Pests: The observations on the incidence and population fluctuation of three sucking insect pests namely thrips, jassids and whiteflies on different cotton cultivars were recorded at weekly intervals starting from 4th week of June upto 4th week of August (maturity stage). For this purpose, five plants were selected at random and tagged in each sub plot. Five leaves from each plant were scanned for recording the population of pests' i.e. one leaf from upper portion and two from each middle and lower portions of the plant. The observations were recorded during morning hours.

Data Analysis: Relative abundance of each sucking insect species on different cotton cultivars were computed as the seasonal average of all observation dates. The data were analyzed through analysis of variance and means were separated through new Duncan's Multiple Range (DMR) test as suggested by Steel and Torrie (1980).

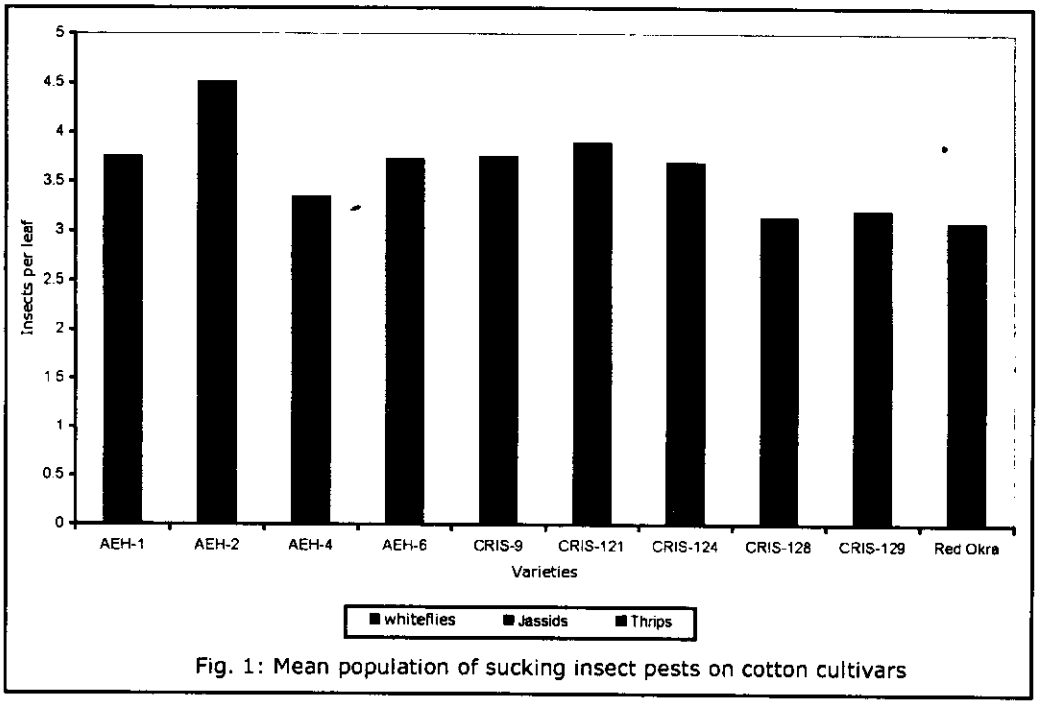

Fig. 1: Mean population of sucking insect pests on cotton cultivars

Results and Discussion

Resistance of Cultivars to Sucking Insect Pests: The resistance level of cultivars to different insect species (infestation %) is illustrated as (Fig. 1). It was observed that cultivar AEH-4 showed relatively greater resistance to thrips, while cultivars CRIS-128, Red Okra, CRIS-129, AEH-6, AEH-1, CRIS-9, CRIS-124, CRIS-121 also showed considerable resistance to this insect, however, cultivar AEH-2 could not make resistance against the pest and was considered as most susceptible among the cultivars tested. The results of Ozgur and Sekeroglu (1986) had partial similarity with the present results, who mentioned that the resistant cultivars had glabrous, either small or okra- shaped leaves, an open canopy and were taller than the rest, the cultivars with large pubescent leaves and a closed canopy were much more heavily infested. The infestation of jassid varied significantly ($P<0.05$) over cultivars regarding its population on different cotton cultivars. The LSD test showed two groups of cultivars, the resistant group included CRIS-129, CRIS-121, CRIS-124, Red Okra, CRIS-128, AEH-2 and CRIS-9. The second group comprising relatively susceptible cultivars included AEH-1, AEH-4 and AEH-6. These differences in jassid population over cultivars tested may be due to leaf thickness, hairiness and toughness, the pH of the cell sap, content of moisture, sugar, protein, minerals or tannin in the leaf. Hairiness was characteristic of hindrance to oviposition and feeding, and sugar, protein, tannin and some minerals tended to be high in the leaves, the resistance is not governed by any single mechanism, but that several physical and bio-chemical factors are combined and compliment which add resistance in cotton. In general, the jassid population was low on all the cultivars, this might be due to unfavorable climatic conditions for jassid population build-up. These results are further supported by the findings of Patel, *et al.* (1960), Moiz (1968), Ahmed (1973), and Agarwal, *et al.*(1979), who were of the conclusion that jassid infestation was below EIL on cotton. However, the whitefly population could not reach economic threshold level in all cultivars of cotton neither any cultivar was found completely resistant to whitefly. Cotton cultivar Red Okra demonstrated greater resistance to whitefly on per leaf infestation basis, followed by AEH-1, CRIS-124, AEH-2, CRIS-9, AEH-4, AEH-6, CRIS-121, CRIS-129 and CRIS-128. Supportive results have also been reported by Goze (1990), Navon, *et al.* (1991), Butter, *et al.* (1992) and Watson, *et al.* (1992).

Population Fluctuation of Sucking Insect Pests: The results for the fluctuation in the population of three sucking insect pests on different cotton cultivars are illustrated as Fig. 2, which depict that the incidence of the whitefly, *Bemisia tabaci* (Genn.) remained very low throughout the observation period, (below 1/leaf). However, Bhatnagar and Sharma (1991) argued that the late maturing cultivars generally, were less attacked by the cotton whitefly. These contradictions msay be due to variation in ecological conditions and morphological characteristics of cotton cultivars screened. The results regarding jassid, *Amrasca devastans* (Dist.) infestation manifest that the population exceeded the economic

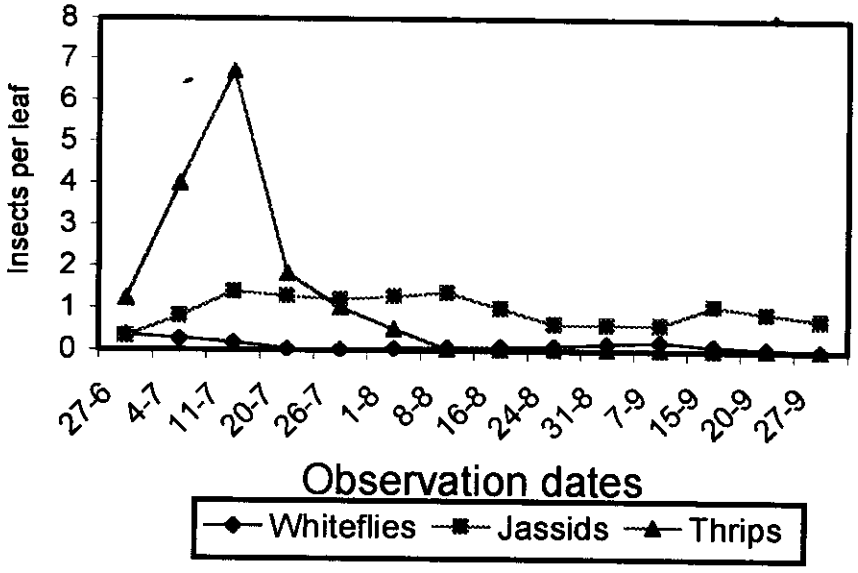

Fig.2: Seasonal population Fluctuation of Sucking insect pests on Cotton Cultivars

injury level (over 1/leaf) during July 11th to August 16th and then its population declined below Economic Injury Level (EIL). These results are in close conformity to those of Rao, *et al.* (1959), Younis (1972) and Naqvi (1973) who were of the experience that jassid, *Amrasca devastans* (Dist.) was a serious pest during July in cloudy weather and high relative humidity. The results on the population of thrip, *Thrips tabaci* (Lind.) indicated that the pest increased rapidly during June 27th to July 11th and the pest population was above EIL.Thereafter, the pest population sharply declined afterwards. The population remained significantly lower and the infestation did not exceed EIL (1/leaf). Since no extensive work on seasonal population fluctuation of thrips on cotton cultivars has been carried out under field conditions, therefore, it is hard to discuss the present results in detail. However, the results of Sewify, *et al.*, (1996) are well comparable to our results who reported that higher population of thrip on the early sown cotton, but the population density was very low on the late sown crop on different cotton cultivars.

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