RELATIVE RESISTANCE OF SOYBEAN CULTIVARS AGAINST SUCKING INSECT PESTS

S. R. Khanzada, M. S. Khanzada, G. H. Abro, T. S. Syed , K. Soomro, A. M. Khanzada[1], S. Anwar[2] and N.Shakeel[3.]

Department of Entomology, Sindh Agriculture University, Tandojam, Pakistan.
[1]Department of Plant Pathology, Sindh Agriculture University, Tandojam, Pakistan
[2]Sugar cane Research Institute Mardan.
[3]Department of Agronomy KPK, Agriculture University Peshawar.
Corresponding author, email: sdrani21.khanzadakhan@gmail.com

ABSTRACT: A field experiment was carried out to determine the relative resistance of soybean cultivars against sucking insect pests in the experimental area of Oilseed Section, Agriculture Research Institute, Tandojam during the Kharif season of 2005. Seeds of ten soybean cultivars (FS-85, AGS-9, AG-109 MA-4085, AGS-8, E-91-=270, PR-142, AGS-20, Wales-2 and Braggs) were sown in rows 45 cm apart in a three replicated Randomized Complete Block Design. It was observed that there was a significant difference in infestation of cultivars by the sucking insect pests.The population of whiteflies and thrip were more abundant during early growth stage, while jassids were more abundant during advanced growth stage of crop. The over all means of pest population showed that thrips were more abundant (3.485 $\pm$ 0.126) followed by jassid (1.015 $\pm$ 0.014) and whitefly (0.902 $\pm$ 0.12) per leaf. The highest thrip (4.107$\pm$ 0.369 per leaf) population was observed on cultivar E91- 270. The highest jassid (1.253$\pm$ 0.275 per leaf) population was observed on cultivar MA-4085. Where as, the highest whitefly (1.093$\pm$ 0.15 per leaf) population was found on cultivar FS-85.As far as cultivars are concerned, Wales-2, Braggs and AGS-109 were comparatively susceptible, while PR-142 and AGS-9 were comparatively resistant, however, rest were moderately resistant.

Key Words: Soybean, Relative Resistance , Sucking Insect Pests.

INTRODUCTION

Soybean [*Glycine max* (L.) Mirrill] is a unique crop with high nutritional value, providing 40% protein and 20% edible oil, besides minerals and vitamins. It is playing an important role in augmenting both the production of edible oil and protein simultaneously under the circumstances in which the shortage of these commodities are being experienced by people. It also supports many industries; soybean oil is used as raw material in manufacturing of antibiotics, paints, varnishes, adhesives, lubricants etc. Soybean meal is used as protein supplement in human diet, cattle and poultry feed (Alexander, 1974). In Sindh province of Pakistan, the soybean is cultivated on marginal scale (44 hectare) with production of 45 M.t (Anonymous, 2005). The yield per unit area is low; this might be due to improper management practices and insect pests, which are the main factor causing considerable losses to the crop.

Soybean is an important oil seed crop, it provides highly quality edible oil. At present soybean provides 20% t world supply of f oils, more than any other single vegetable or animal source. Soybean is not only the prime source of vegetable oils and proteins, but is also enriching the soil fixing atmospheric nitrogen. It is also used for ensilage (Ashraf *et al*., 2001).

The soybean is a luxuriant crop, soft and succulent foliage attracts many insects. About 380 species of insects have been reported on soybean crop from many parts of the world, About 65 insect species have been reported to attack soybean from cotyledon to harvesting stage from Karnataka (Rai, *et al*., 1973; Thippaiah, 1997). The sucking pests viz. *Bemisia tabaci* (Genn) and *Thrips palmi* (Karny) cause economic damage. (Singh and Singh, 1990).

The whitefly infestation starts to increase at the beginning of July and peaked in August in the Mediterranean region. Whitefly reduces crop yield by direct feeding and is also a vector of numerous plant viruses (Byrne, *et al.,* 1990; Morales and Anderson, 2001; McKenzie, 2002; Jones, 2003; Ruiz, *et al*., 2006; Adimani, 1976; Mann, *et al*., 2008; Sidhu, et al., 2009). Injury to soybeans is caused both by nymphs and adults sucking sap from leaves. Whiteflies secrete abundant honeydew. This honeydew, containing metabolized sugars, forms a suitable medium for the development of a dark sooty mold, which inhibits light penetration and reduces photosynthesis. Infestation of whiteflies usually heaviest during the pod-filling period and can cause severe yield reductions. Chemical control of the whitefly has proven expensive and insecticides are losing their effects rapidly (Byrne, *et al*., 2003; Ullah, *et al.*, 2006). For this reason, the cultivars grown have to be resistant to whitefly in the area heavily infested with whitefly. The jassid, *Amrasca devastans* (Dist.) is serious pest of soybean, injury to plants is due to the loss of sap and probably also due to the injected toxins. The attacked leaves turn pale and then rust red with change in appearance; the leaves also turn downwards dry up and fall to the ground. There are two species of thrips. Both species of the thrips, cause damage to the plants by sucking sap. The leaves attacked by them become silvery white in appearance. They curl, stunted by them and give stick look. The present study was carried out to assess the relative resistance performance of soybean cultivars against sucking insect pests.

MATERIALS AND METHODS

The experiment was laid out in the experimental area of Oil Seeds Section, Agriculture Research Institute, Tandojam during kharif season of 2005. Homogenous seeds of soybean cultivars were sown in a well prepared seed bed on 19th June 2005, keeping a row to row distance of 45 cm. The treatment size was 5x1.8 meters for each variety. There were four rows of each variety. Each plot was replicated three times, thus there were thirty plots. The experiment was land out in randomized complete block design. The names of the cultivars evaluated are: V1=Fs-85, V2=AGS-9, V3=AG-109, V4=MA-4085, V5=AGS-8, V6=E-91-270V7=PR-142, V8=AGS-20, V9=Wales-2, V10=Braggs.

Cultural practices such as fertilizer and irrigation application, inter culturing and weeding were adopted as per the recommendation. However spray of insecticides of any kind in and around that experimental area was avoided for proper exploitation of insect pests. For recording observation on population build up of sucking pests, whitefly, Jassid, and Thrips. Five plants were selected randomly from each plot of respective variety and tagged. Three leaves from each selected plant were examined on random basis and population of pests were recorded. The observations were recoded at weekly intervals from July 8 to October 15, 2005. The data on population of sucking insect pests recorded were arranged as mean, standard deviation and standard error, further analysis of variance of data was carried out and the mean values of pests were compared through least significant difference tests, as per the method outlined by (Gomez and Gomez 1984).

RESULTS AND DISCUSSION

The results on overall average of three sucking insect pests recorded on ten soybean varieties obtained are presented in the Table 1. The results indicated that all varieties evaluated were infested by the three sucking pests. Comparatively the population of whitefly was low on variety Braggs (0.627±0.089) followed by Wales (0.773±0.162), AGS-20 (0.78±0.132), PR-142 (0.787±0.133) per leaf, respectively. However, the population of jassids were more on variety MA-4085 (1.253±0.275), followed by AGS-20 (1.133±0.185), Wales-2 (1.067±0.162), AGS-109 (1.013±0.176), and AGS-8 (1.000±0.157) /leaf. Whereas greater population of thrip was recorded on E-91-270 (4.107±0.363/leaf) and AGS-109 (4.05±0.387/leaf), varieties, while other varieties were moderately resistant. These differences may be attributed due to change in the morphological characters of varieties. Sucking insect pests cause serious loss to the soybean crop, these not only damage the crop but are also vector of certain viral diseases. The results of study envisaged that all ten varieties evaluated infested by the whitefly, jassids and thrips. The population level varied between time interval and within pest species. The results further demonstrated that thrips were more abundant on all varieties planted as compared to whitefly and jassids. It was observed that the insect pest populations on all varieties evaluated increased gradually and was maximum during the vegetative growth period. Jassids and thrips were found more active up to pod filling while whitefly was found active in the middle of crop season and was low during the entire growth period on all varieties. Among the ten varieties sown E-91-270 and AGS-109 were susceptible against sucking insect pests, while Wales-2 and PR-142 were resistant, while remaining varieties were moderately resistant. A highly positive correlation (r=0.93) was observed between whitefly and Temperature and between whitefly and Relative Humidity % (r = 0.96). A positive correlation (r = 0.57) and (r = 0.61) was observed between Thrip and temperature and Thrip and Relative Humidity%, respectively. While no correlation was found between Jassid and Temperature and Jassid and Relative Humidity% (r = 0.07) and (r = 0.09), respectively (Fig.1-6). However, none of the variety proved immune. Research conducted earlier by Gaur and Deshpande, (1998) for the relative susceptibility of promising soybean cultivars NRC-12, JS-71-05, PK-564, NRC-7, JS-355, PUSA-16 and NRC-8 found that NRC-7 was tolerant to the infestation of jassid and whitefly. El-Khouly *et al*., (1998) studied population density of sucking insect pests (Aphid, whitefly, thrips and jassids) on soybean. They found that the whitefly, thrips and jassids have one generation while the aphids had 2 generations in a season. MicPherson and Lambert, (1995) surveyed soybean cultivars Braxton and Cobb every 7 to 10 days from mid July to the end of September to determine the seasonal population abundance of *Bemisia argentifolii* and *Tricaleurodes abutilonia*. Population density peaked in early September at over 31 eggs and nymphs per 2.54 cm of leaf area on Cobb soybean and 15 eggs and nymphs on Braxton soybean. Bridhar *et al*., (2003) evaluated 30 soybean lines for resistance to stemfly and whitefly and found that MACS 57 was promising against stemfly attack whereas DS-1016 was consistently found a promising source of resistant to whitefly attack. Salman *et al*., (2002) tested six soybean cultivars for infestation with cotton whitefly and spider mites. It was found that the seasonal abundance of whitefly was moderately low during July peaked during August, then decreased at the lowest level in September. A similar trend was observed for spider mite.

Table-1. Overall Mean ± S.E. population of sucking pests/leaf recorded on different varieties of soybean at Tandojam from July to October, 2005.

Varieties	Whitefly	Jassid	Thrip
V1 = FS-85	1.093±0.151 A	0.867±0.152 H	3.907±0.320 C
V2 = AGS-9	0.947±0.134 C	0.960±0.180 EF	3.737±0.356 F
V3 = AGS-109	0.973±0.129 B	1.013±0.176 D	4.053±0.387 B
V4 = MA-4085	0.893±0.134 D	1.253±0.275 A	3.840±0.325 D
V5 = AGS-8	0.947±0.119 C	1.000±0.157 D	3.813±0.288 E
V6 = E-91-270	0.893±0.146 D	0.987±0.221 DE	4.107±0.369 A
V7 = PR-142	0.787±0.133 E	0.947±0.196 FG	3.520±0.260 H
V8 = AGS-20	0.787±0.132 E	1.133±0.185 B	3.733±0.403 F
V9 = Wales-2	0.773±0.162 F	1.067±0.162 C	3.453±0.380 I
V10 = Braggs	0.627±0.089 G	0.920±0.153 G	3.680±0.275 G
Mean	0.902±0.012	1.015±0.014	3.485±0.126

Mean±S.E followed by same latter in a column are not significantly **(**P<0.05) different from each other by LSD.

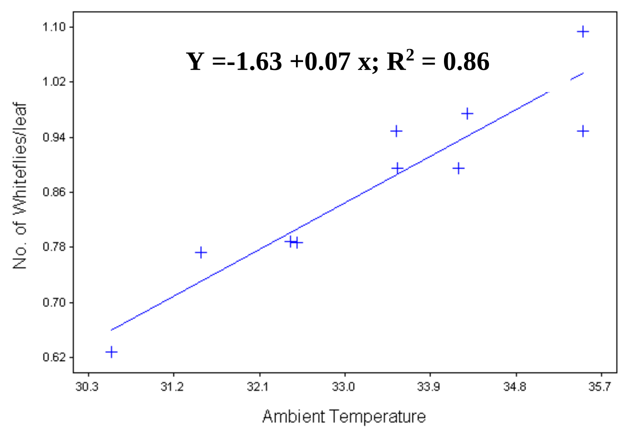

Fig.1 Relationship between No. of Whiteflies/leaf and Ambient Temperature.

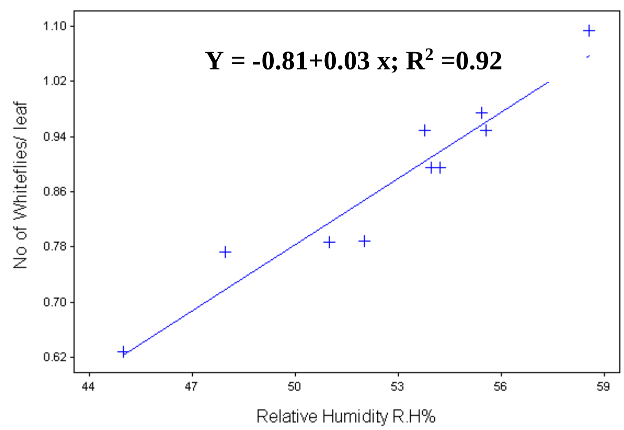

Fig.2 Relationship between No of Whiteflies/ leaf and Relative Humidity %

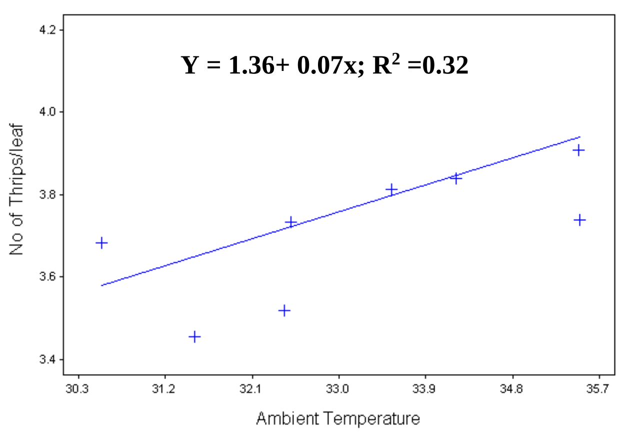

Fig.no.3 Relationship between No of Thrips/leaf and Ambient Temperature

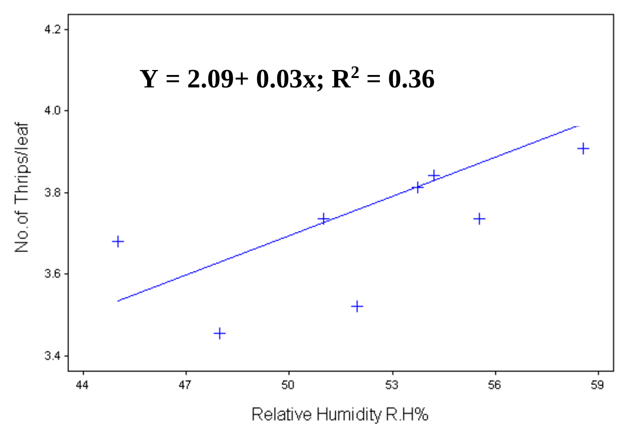

Fig.4. Relationship between No.of Thrips/leaf and Relative Humidity

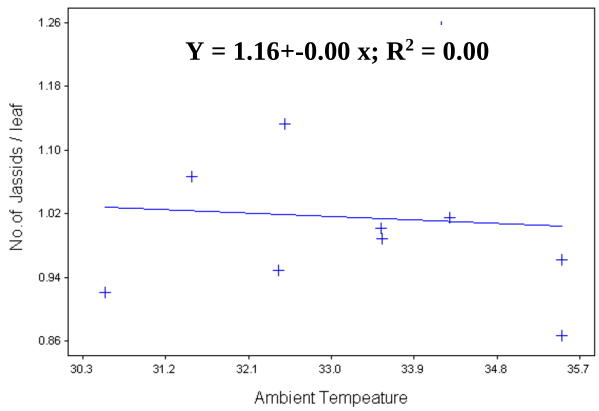

Fig.5.Relationship between No.of Jassids / leaf and Ambient Tempeature

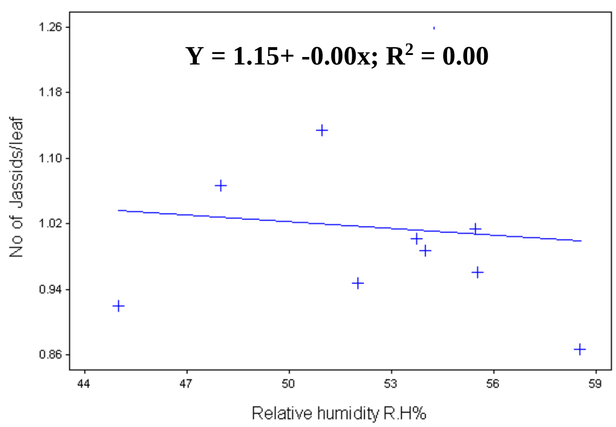

Fig.6. Relationship between No of Jassids/leaf and Relative humidity%

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