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THE HOST PLANT SUSCEPTIBILITY INDICES AND VARIETAL PREFERENCE OF JASSID (*AMRASCA BIGUTULLA BIGUTULLA* ISHIDA) ON EGGPLANT (*SOLANUM MELONGENA* L.) IN PUNJAB PAKISTAN

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ABSTRACT

The present study evaluated relative plant resistance of different cultivars of egg plant (*Solanum melongena* L.) against the jassid (*Amrasca biguttula biguttula*). Nine cultivars were tested for their susceptibility against jassid. All the cultivars were significantly different ($P \leq 0.05$) for the tested parameters i.e. pest preference, host plant susceptibility indices (HPSI) as well as yield/plot. Infestation increased and reached its peak when the crop was 12-week old afterwards it decreased gradually. The most preferred variety of jassid was Bemissal (3.36 jassids/ leaf) whereas the least preferred variety recorded was Rubi (1.42 jassids per leaf). The Bemissal proved to be the most susceptible cultivar having maximum level of HPSI (18%). However in terms of yield/ plot, Bemissal resulted the lowest yield (35.25kg/plot). One the other hand, Rubi was the least preferred cultivar (1.42 jassids/ leaf); having the lowest HPSI (7%) and the highest yield / plot (Approx. 85.25kg/plot).

Keywords: Eggplant, *Solanum melongena*, Susceptibility, *Amrasca bigutulla bigutulla*, Jassid.

INTRODUCTION

The eggplant (*Solanum melongena* L.) commonly known as brinjal is considered an important vegetable crop in the world, and it has been grown on a large scale in Pakistan India and China (Lohar, 2001). It is a cheap source of nutrients i.e., 92.7% water, 1.1% Protein and 0.02% Carbohydrate, having good source of calories and vitamin A and B (Shanmugavelu, 1989). In Pakistan, it occupies 9,044 ha area and its production is 88,148 tonnes (FAO, 2012).

The eggplant is such type of crop which is preferred by many insects from planting to till harvesting. The important insect pests of eggplant are brinjal stem and fruit bore, leaf roller, aphid, whitefly, thrips, and jassid are serious pest (Ahmad, 1986; Mall *et al.,* 1992; Mahmood *et al.,* 2002; Sirinivasan, 2009).

Jassid (*Amrasca bigutulla bigutulla*) is a serious pest on different crops in Pakistan and reported as one of the yields limiting factor for eggplant crop in the country and in other brinjal growing areas (Nagia *et al.,* 1993). Adults and nymphs of jassid both feed on the underside of the leaves and suck the plant sap due to this sucking the color of plant become yellowing and curling of leaves. During the sucking process they inject toxic material which severely infested leaves show burn symptom and such leaves may ultimately drop down (Rahman, 2009). *A. biguttula biguttula* causes damage right from an early seedling stage to the fruit setting stage, resulting in a loss of 50% in yield (Bindra and Mahal, 1981). Resistant varieties can serve as an alternative to chemical control against insect pests and can extend insect control with no further cost and no environmental and human health. Screening of various brinjal varieties in various regions of sub-continent have been reported resistance against jassid (Ghosh and Senapati, 2001; Kumar *et al.,* 2002; Elanchezhyan *et al.,* 2008.

The categorization of resistant genotypes against jassid will provide a baseline for an effective and sustainable management of this pest by the farmers to get the high yield. Considering the host plant resistance the present research work was carried out to evaluate the response by various genotypes brinjal to jassid. The host plant resistance with grouping of other methods show the environmentally safe and

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also very helpful for IPM, It is only possible when resistant varieties of crops are identified. If we use the resistant varities which may give a foundation on which we can develop the integrated control measure which shows excellent result when we used with the combination of other control measure. The small level of resistance in a crop can produce the positive role for the reduction of pesticide applications (Srivastava, 1993).

MATERIALS AND METHODS

Field screening of jassids preference as host plant on nine (9) varieties of eggplant was carried out at Post-graduate Agricultural Research Station (PARS), University of Agriculture, Faisalabad during 2010. The seeds of the varieties (Rubi, Vrib-01, Vrib-02-F1, Vrib-0401, Vrib-04, Bemissal, Vrib-9901, Nirala and Cluster King) were procured the vegetable Market Multan and the Vegetable Research Institute (VRI), Ayub Agricultural Research Institute (AARI), Faisalabad. The Randomized Complete Block Design (RCBD) was used with the three replications The seedlings were sown in the field in February 2010 with a plot size 20 x 25 feet with 36x30 cm row to row and plant to plant distance, respectively. No chemical was sprayed during the experiment.

In order to record the observation, 15 plants in each plot were randomly selected and tagged. 3 leaves (one from top, other from middle and one from bottom) were carefully examined to record the nymph and adult jassid. Data were recorded on weekly basis.

The average population/leaf (nymph and adult) for each genotype was calculated by the simple arithmetic means using the following formula,

$$X = \frac{X1+X2+X3+, \cdots +X14+X15}{N}$$

Where: N = Total numbers of plants,
X = Mean plant-1, and

Host plant susceptibility indices (HPSIs):

Host Plant Susceptibility Indices were calculated which based on per leaf population of jassid (adult/ nymph) from the various selected varieties of eggplant individually and on cumulative basis by using Excel Microsoft chart package and IBM compatible computer. The objective of this test was to check the level of susceptibility of each genotype.

The HPSI (%) was calculated with the following formula:

$$HPSI(\%) = \frac{B - A}{B} \times 100$$

A= Population of pest (Adult/Nymph) in individual variety.
B= Population of pest (Adult/Nymph) in all varieties on average basis.

Fruit yield data:

The fruits yield (kg/plot) of different eggplant cultivars in each treatment of each replicate from 1st picking to last picking was recorded for comparison.

Statistical analysis

The analysis of variance (ANOVA) was calculated and means were separated by Duncan's New Multiple Range Test (DMR) at α 0.05 by using M stat-C computer generated software. (Steel *et al*., 1997).

RESULTS AND DISCUSSION

The comparison of means of jassid population between the different dates of observation during the study period on different varieties of eggplant is presented in Table 1. Data of Jassids on different varieties revealed that the pests first appeared when the crop was 6-week old (4th April). It gradually increased and reached its peak when the crop was 12-week old (23rd May) afterwards pests population started declining gradually. This population distribution pattern is presented in Fig. 1.

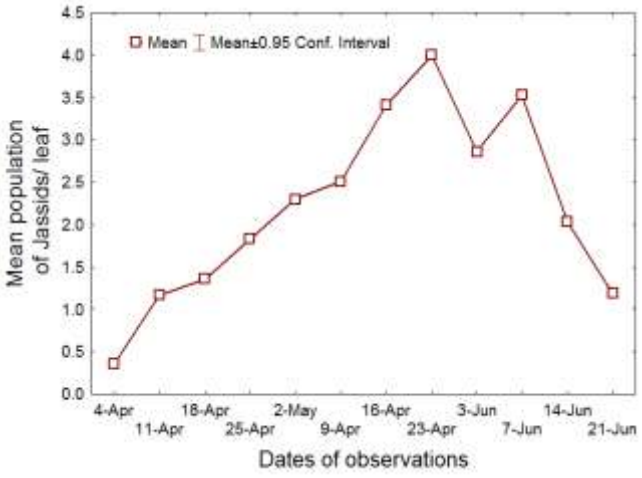

Fig. 1

Mean population of jassid/leaf during the whole cropping period of eggplant crop

The pest infestation initiated from the early stage of crop growth and infestation was observed in the middle stage of crop growth (Fig.1). The highest incidence of pest was recorded on 23rd May. A population pattern observed by (Mahmood *et al*., 2002) resembles our results, but more fluctuation was reported by (Yousafi *et al*., 2013). This disagreement of population pattern is strongly governed by the seasonal difference as they conducted their experiment in the cooler months of the year. This study work can be compared with the (Khaire and Lawande, 1986) they screened out 49 brinjal varities on insect pest of brinjal against *A. biguttula biguttula* under the natural conditions. This study can be compare with those of (Sharma and Sharma, 1997) and (Kumar *et al.,* 2002) they all reported jassid on the eggplant crop. When different varieties were compared, it was found that highly preferred variety by jassid was Bemissal (3.36 jassids per leaf) whereas the least preferred variety recorded was Rubi (1.42 jassids per leaf). The average mean population remained 3.03, 3.03 2.02,1.92, 1.78, 1.67, 1.67, on genotypes Vrib-04, Nirala, Vrib-0401, Vrib- 9901, Vrib-02-F1, Vrib-01

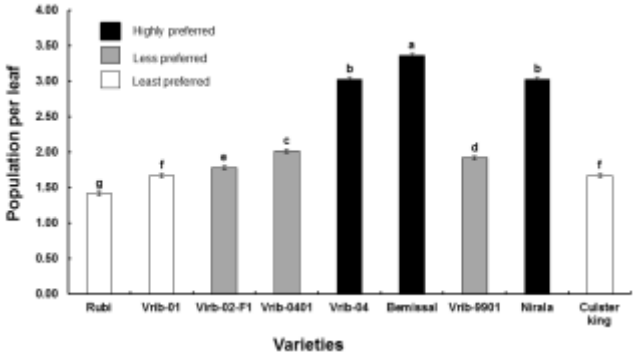

Fig. 2

Mean population of Jassids per leaf on different varieties of Brinjal.

On the basis of preference of jassids, all varieties can be grouped into three categories "Highly preferred, less preferred, the least preferred". The varieties Nirala, Bemissal and Vrib-04 appeared as highly preferred varieties, Vrib-9901, Vrib-0401 and Vrib-02 F1 were less preferred varieties while Rubi, Vrib-01, and Cluster king can be grouped as the least preferred varieties.

Susceptibility of jassids to different genotype of eggplant was screened by many researchers (Ghosh and Senapati, 2001; Soundararajan and Baskaran, 2002; Kumar *et al.,* 2002; Elanchezhyan *et al.,* 2008). In different spatio-temporal parameters and all of them found that hairy and pubescent varieties are resistant to jassids. In the current study Rubi, Vrib-01, and Cluster king were comparatively more hairy and pubescent and thus least preferred by jassid. This pubescence and tissue hardiness restrict insect mobility and therefore serves as natural structure barriers Ananthakrishnan (1992).

This study can be compared with the (Gogoi and Dutta, 2000) they reported that the population of jassids was high (37.53 nymphs/ leaf) in the last week of May 1998 and (30 nymphs/ leaf) was in mid-April during 1999 after when the crop approached maturity the population of jassid reduced. During his study (Iqbal *et al.,* 2010) concluded that maximum jassid population was noted during the third week of June. (Shivanna *et al.,* 2011) concluded that the maximum population of the jassid were identified during Mid season of May. This studies cannot be compared by (Patel *et al.,*1997; Kumawat *et al.*, 2000 and Lokesh and Singh, 2005) they reported various period of abundances which may be due to the variation between ecological conditions and sowing dates.

Host plant susceptibility indices (HPSIs)

The results were interpreted in (Fig.3) to calculate the host plant susceptibility indices (HPSI). The Rubi showed the lowest HPSI (7%) and Bemissal showed highest the 18% HPSI. While other verities contained the different HPSI level of followed by Virb-01 (8%), Culsterking(8%), Virb-02(9%), Virb-0401(10%), Virb-9901(10%) and Nirala (15%), respectively.

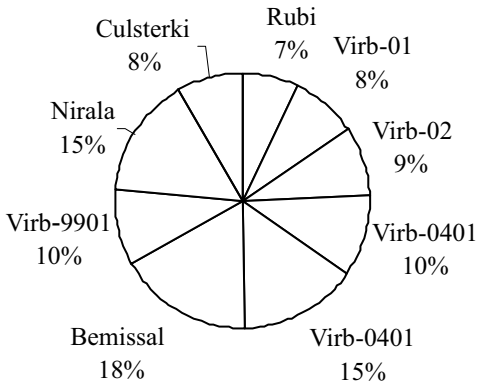

Fig. 3

Host plant susceptibility indices on different selected genotypes of eggplant.

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The lowest yield was produced by the Bemissal which is 35.25 kg/plot and higher yield was recorded in the Rubi 85.25 kg/plot. To seeing all other genotypes the data showed the significant difference. Yield data for all nine varieties is presented in (Table 1).

Table 1

Mean Fruit yield (kg/plot) of various genotypes of eggplant 2010.

Eggplant varieties	Weight Means (kg/plot)
Rubi	85.25 a
Vrib-01	79.15 b
Culster king	81.01 b
Vrib-9901	61.57 c
Virb-02-F1	59.01 c
Vrib-0401	57. 17 c
Vrib-04	51. 62 d
Nirala	52. 51 d
Bemissal	35. 25 e

LSD at P = 0.05, the means sharing similar letters are not significantly different by DMR Test.

CONCLUSION

It can be concluded that high pest infestation caused the lowest fruits yield. Genotype Rubi which was least preferred by the jassid was capable of producing more flowers and ultimately more fruit yield while as compare to the bemissal it showed the susceptible effect and fruit yield was also low. The screening of different genotypes of eggplants are helpful for the former to select the resistance genotypes for field and also helpful for the plant breeder to study the characters of resistance genotype like Rubi for production of hybrid variety.

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