Research Article

Screening of Brinjal (*Solanum melongena*) Varieties against Jassid, *Amrasca bigutulla bigutulla*

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Abstract | Brinjal (*Solanum melongena*) is a very important and nutritious vegetable grown in tropical and subtropical regions of the world. Both nymphs and adults of *Amrasca bigutulla bigutulla* suck the cell sap from underside the leaves resulting in leaves curling and yellowing. Jassid (*Amrasca bigutulla bigutulla*) inject toxic materials into leaves which results necrosis. An experimental study was conducted by using randomized complete block design (RCBD) during 2018 to check the resistant brinjal varieties (Nirala, Dilnasheen and Bemisal) against jassid (*A. bigutulla bigutulla*). The highest population of jassid was recorded on 5 November while lowest on 2 December on all tested varieties. The population density was lowest in December on all varieties such as Nirala (1.0), Dilnasheen (2.1) and Bemisal (1.2), while maximum in November such as Nirala (3.8), Dilnasheen (6.6) and Bemisal (4.2) per leaf. Bemisal and Dilnasheen varieties had significantly higher jassid population per leaf as compared to Nirala variety on different sampling dates.

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1. Introduction

Brinjal (*Solanum melongena*) is an important vegetable that mostly grown in tropical and subtropical regions of the world (Anonymous, 2010). It is highly rich with many minerals, nutrients and vitamins (Obho *et al.*, 2005; Matsubara *et al.*, 2005). According to FAO (2012), brinjal is grown in an area of 9,044 ha with 88,148 tonnes production and 97,466 kg/ ha yield in Pakistan.

The production of brinjal is decreasing every year due to biotic and abiotic factors in Pakistan. The various insect pests such as sucking (*Bemisia tabaci*, *Aphis gossypii*, *Thrips palmi*, *Thrips tabaci* and *Amrasca biguttula biguttula*) and chewing (*Leucinodes orbonalis* and *Euzophera perticella*) are the major insect pests (Murtaza *et al.*, 2019) of different crops like brinjal in Pakistan (Mahmood *et al.*, 2002).

Among pests, jassid, *Amrasca biguttula biguttula* is serious and destructive pest of brinjal attack the crop till harvesting. Both nymphs and adult of jassid suck the cell sap from underside the leaves, resulting curling and yellowing of leaves. The excessive feeding by nymphs and adults can result necrosis from toxin that exerted in leaves (Ramzan *et al.*, 2020). The infested leaves show burning and even fall down (Rahman *et*

al., 2009). Different management approaches (Aslam *et al*., 2004; Rahman *et al*., 2009) are adopted at large and small level by farmers to minimize the attack of jassid and increase the yield of brinjal (Latif *et al*., 2010; Saimandir and Gopal, 2012; Ramzan *et al*., 2019a).

Chemical applied extensively to control the pest population, but excessive use of insecticides can cause toxic chemicals or environmental pollution (Saimandir and Gopal, 2012; Sajid *et al*., 2020) that proved harmful for human beings and biological fauna (parasitoids, parasites, predators). The insect resistance against various groups of insecticides is major disadvantage of chemicals use (Dadmal *et al*., 2004; Ramzan *et al*., 2019b).

Resistant host plants are plying key role in the suppression of pest population like jassid and a part of integrated pest management (IPM) (Elanchezhyan *et al*., 2008; Ramzan *et al*., 2019d). Different resistant varieties (Mara, BL095, Acc 612, BL114 and ISD006) of brinjal had been evaluated against jassid by many early researchers (Alam *et al*., 2003). All these tested varieties have been recommended as resistant varieties against jassid population (Lit, 2009a).

By keeping in view, in the present study three brinjal varieties were grown in the present study to screen out and evaluate the resistant varieties against jassid population. The aim of current study was to evaluate the resistant and tolerant varieties against jassid and tolerant varieties recommended as control method alone or in combination with our IPM strategies.

2. Material and Methods

2.1 Study area

An experimental study was performed on a farmer field in district Faisalabad during 2018. Three brinjal varieties (Nirala, Dilnasheen and Bemisal) were grown to screen the resistant variety against jassid.

2.2 Study design

Seed was purchased from private seed companies and were sown on 10 July 2018 in earthen pots for nursery growing. Nursery was transplanted on 10 September 2018 in the field with 50.0 cm plant to plant distance. Trial was conducted in Randomized Complete Block Design (RCBD) with four replications in which replications and plots were separated by two and one-meter empty space, respectively. All the agronomic practices were equally adopted for all the grown varieties.

2.3 Data recording

Pest population was appeared on 10 October while data was recorded in last week of October. Data of jassid adult and nymphs were recorded from two middle rows of each plot in early morning. Two plants were randomly selected from middle two rows and jassid population was counted from three leaves, one from the upper, one from the middle and one from the lower of each plant. Data was recorded on weekly basis.

2.4 Statistical analysis

The data were analyzed by the Analysis of Variance (ANOVA) using Minitab (Minitab, 2010) statistical software and least significance difference (LSD) calculated by comparing the means using MSTAT-C (MSU, 1993) statistical package.

3. Results and Discussion

Jassid population was recorded on each tested variety and compared with different sampling dates as shown in (Table 1). The maximum population of jassid was observed on Dilnasheen while minimum on Nirala. Dilnasheen had 6.6 Jassid per leaf on 5 November while 2.1 on 2 December. The jassid population on Dilnasheen, Bemisal and Nirala were 4.3, 3.4 and 2.1 per leaf on 12 November, respectively.

Bemisal and Dilnasheen varieties had significantly higher jassid population per leaf as compared to Nirala variety on sampling dates. The highest population of jassid was recorded on 5th November while lowest on 2nd December on all tested varieties. The population was minimum in December while maximum in November.

The current study was conducted in a farmer field to check the brinjal resistant varieties against jassid during 2018. There are two types of brinjal varieties such as resistant and highly resistant as categorized by many early researchers. According to early researchers, resistant and highly resistant varieties are those having 7-9 and 4-5 jassid per leaf, respectively.

Table 1: Population density of Jassid on different brinjal varieties.

Varieties	21 Oct.	29 Oct.	5 Nov.	12 Nov.	19 Nov.	26 Nov.	2 Dec.
Nirala	1.4+0.15d	1.9+0.34d	3.8+0.40d	2.1+0.33d	2.4+0.25c	1.3+0.13cd	1.0+0.17c
Dilnasheen	3.3+0.11b	4.9+0.32b	6.6+0.39b	4.3+0.30b	3.8+0.29bc	3.0+0.19b	2.1+0.10b
Bemisal	2.1+0.22bcd	2.1+0.25cd	4.2+0.20cd	3.4+0.18d	3.1+0.30b	2.0+0.9bc	1.2+0.14bcd
LSD	0.89	1.36	1.19	1.09	1.34	0.41	0.34

In the current study, dilnasheen and bemisal were found highly resistant while nirala was resistant against jassid population. Jassid population can varies according to climate, location and sowing dates. Our study findings are in line with the early researchers' findings (Elanchezhyan *et al.*, 2008). They have been reported that jassid population varies according to brinjal varieties. The environmental factors play key role in the distribution of pest population on various crops like brinjal (Naeem-Ullah *et al.*, 2020). Many researchers had reported the similar results (Deole, 2008; Mahmood *et al.*, 2002; Ramzan *et al.*, 2019c).

During the study, it was observed the pest population was found maximum in the early stage of crop or in October while increased in the November 5 and then decreased in the December on all tested varieties. In the mid of December, no jassid population was recorded and is similar to other scientists findings (Lit *et al.*, 2002; Lit, 2009a, b). Our current study findings are similar to Yousafi *et al.* (2013) who reported that Nirala was least resistant while Dilnasheen and Bemisal are more resistant.

Conclusions and Recommendations

The study concluded that among tested brinjal varieties, Nirala was highly resistant variety while Bemisal and Dilnasheen were least resistant varieties against jassid. All these varieties are recommended to farmers as a part of integrated pest management but the Nirala is most suitable. The crop production can be increase and pest population minimized by the sowing or cultivation of these varieties.

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Novelty Statement

Amrasca bigutulla bigutulla is an emerging pest in brinjal crop because maximum varieties become susceptible to this pest. So, we need to evaluate resistance variety against this pest. This study will be helpful to minimize attack of this pest by sowing these verities, especially Nirala variety.

Author's Contribution

GM conducted the study and wrote the manuscript. MR helped in writeup. VS, AR, MU and AZ helped in data collection while MA and MN analyzed the data and critically reviewed the manuscript.

Conflict of interest

The authors have declared no conflict of interest.

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