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MORPHO-BIOCHEMICAL CHARACTERISTICS OF BRINJAL GERMPLASMS AFFECT THE ABUNDANCE AND INFESTATION OF JASSID

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ABSTRACT

The tropical vegetable, brinjal is cultivated throughout the year in Bangladesh but the crop is infested by a number of insects including jassid. This study investigated the effects of different biophysical and bio-chemical characteristics of twelve brinjal germplasms on the abundance and infestation of jassid. The experiment was conducted during September 2018 to March 2019 in Gazipur, Bangladesh with twelve brinjal germplasms namely BD-7320, BD-7328, BD-9952, BD-10154, BD-10158, BARI Begun-1, BARI Begun-4, BARI Begun-5, BARI Begun-6, BARI Begun-7, BARI Begun-8 and BARI Begun-9. The incidence of jassid was recorded from 3rd December to 26th March, and the lowest population was found on BARI Begun- 6. Among the biophysical traits, plant height, number of branch and leaf per plant, and leaf area exerted significant positive correlation; whereas trichome on lower and upper surfaces of leaf, spine per stem and leaf showed significant negative correlation with the abundance of jassid. On the other hand, moisture, reducing sugar, total sugar and protein content of the leaves and fruits, chlorophyll content of the leaves exerts significant positive correlation but ash and pH contents of the leaves and fruits were negatively correlated with the abundance of jassid. Jassids showed the lowest level of leaf infestation on BARI Begun-6, which could be for further analysis to develop jassid resistant brinjal.

Keywords: Germplasm, Resistance, *Solanum melongena, Amrasca biguttula biguttula,*

INTRODUCTION

Brinjal, *Solanum melongena* (Solanaceae), a widely used vegetable, is cultivated over 52375.2 ha in Bangladesh, but the production is very low (530610 Mt) because of

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different biotic and abiotic stresses (BBS, 2019). Amin et al. (2018) reported that the insects, thrips, aphid, jassid, whitefly, leaf hopper, epilachna beetle, and shoot and fruit borer frequently infest brinjal plants and cause damage. Kumar et al. (2019) observed jassid, whitefly, and shoot and fruit borer as the major pests of brinjal.

The sucking insect, jassid, *Amrasca bigutulla bigutulla* Ishida (Hemiptera: Cicadellidae) is one of the important sucking pests of brinjal. Both the nymph and adult suck sap from the leaf and tender parts of brinjal plants resulting reduced growth and leaf curl symptoms. Jassids inject toxin into infested plants thus leads to leaf yellowing and hopper burn symptom (Kadu et al., 2018). Dahal et al. (2020) reported that jassids can cause 35-40% of crop yield losses in okra and their damage may reach 60-70% at optimum condition. The presence of certain characteristics in host plants can attract or deter the infestation of jassid. Sowmya and Pradeep (2020) screened different brinjal varieties against jassid on the basis of its variations of occurrence on them. In Bangladesh, Sultana et al. (2017) worked with different okra varieties to explore the varietal preference of jassid.

The feeding and oviposition behavior, and fecundity of the herbivore insects are affected by the physicomorphic characteristics of the host plants (Bilal et al., 2017). Amin et al. (2017b) observed that the number of leaf trichome conferred resistance to cotton plants against *Spodoptera litura*. The abundance of jassid on cotton was negatively affected with trichome density of leaf (Amin et al., 2017a). The nutrient content of the host plants affects the growth and survival of phytophagous insects (Amin et al., 2011).

Identifying the resistant germplasm can be a better scope to manage insect pests without environmental hazards. Intensive morphological, biochemical, molecular and genetic traits can be used to identify specific resistant or tolerant germplasm (Abang et al., 2016). Therefore, the present study was conducted to know the effects of different biophysical and bio-chemical characteristics of twelve brinjal germplasms in relation to the abundance and infestation of jassid on them.

MATERIALS AND METHODS

Cultivation of brinjal germplasms

The study was conducted with twelve brinjal germplasms namely BARI Begun- 1, BARI Begun- 4, BARI Begun- 5, BARI Begun- 6, BARI Begun- 7, BARI Begun- 8, BARI Begun- 9, BD- 7320, BD- 7328, BD- 9952, BD- 10154 and BD-10158. The seeds of the germplasm were collected from the Horticulture Research Center, Gazipur, Bangladesh and cultivated during September 2018 to March 2019 in the experimental plots of Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur. Thirty days old seedlings were transplanted on 14th November, 2018 in 3.0 m × 3.0 m plots following randomized complete block design (RCBD) with three replications. Every plot contained 15 plants each apart from 60 cm. Fertilizers were applied according to Fertilizer Recommendation Guide (FRG, 2018) of Bangladesh

Agricultural Research Council (N = 40, P = 12.5, K = 30 and S = 5 kg ha^{-1}, respectively, and cow dung 5 ton ha^{-1}). All the required intercultural operations except insect management were done whenever necessary.

Data collection

Data were collected from five randomly selected plants of each germplasm at weekly intervals. The number of jassid was recorded from top leaf of each plant. Number of leaves, branch and spine of the plants were recorded and plant heights were measured. The selected leaves of the plants were collected and brought to the laboratory and the leaf area was measured using a digital leaf area measuring machine (LI-3100C Area Meter, China). The number of spines of the leaves was counted in necked eyes and the numbers of trichomes of the abaxial and adaxial leaf surfaces from a portion of one cm^2 for each sample were observed under a stereo microscope (BOE3200, BOECO, Germany). At every inspection, the number of total leaves and the number of infested leaves of the selected plants were counted, and the infestation level was calculated in percentage. The phytochemical contents in the leaves and fruits of the selected plants were estimated.

Estimation of bio-physiological contents

The moisture content of leaf and fruit was determined through oven-drying method. Reducing sugar and total sugar content of leaf and fruit of each germplasm were estimated using Bertrand's method (Kumar et al., 2011). The nitrogen content of leaf was estimated using Micro Kjeldahl method (Maehre et al., 2018). Each of the values was then multiplied by 6.25 to get the percentage of protein. Content of Chlorophyll of leaf was estimated using the procedure explained by Gagoi and Basumatary (2018). The ash content of leaf samples was estimated in wet basis using Muffle Furnace (Nielsen, 2010). A digital pH meter was used to determine the pH of the samples (Sharma and Rao, 2013). Proline content of leaf was determined with Colorimetric Assay (Abraham et al., 2010).

Data analysis

Multivariate analysis of variance (MANOVA) was employed to determine the abundance and infestation of jassid during the study. A one-way analysis of variance (ANOVA) was used for determining the mean abundance and infestation. The mean values were separated according to Tukey HSD posthoc test. Correlation coefficients were applied to determine the relationship of the abundance of jassid with plant bio-physiological traits. All the analyses were performed using IBM SPSS 20.0.

RESULTS AND DISCUSSION

Incidence of jassid on the brinjal germplasms was recorded from 3rd December to 26th March and the results showed significant variations among them (Table 1).

Table 1. Abundance of jassid/3 leaves on twelve brinjal germplasms during December 2018 to March 2019.

Observation date	Germplasms											
	BD 7320	BARI Begun 5	BD 7328	BD 9952	BARI Begun 1	BARI Begun 6	BARI Begun 4	BARI Begun 7	BARI Begun 8	BARI Begun 9	BD 10158	BD 10154
03/12/18	2.2 df	0.2 f	1.6 e	1.0 f	2.0 g	0.0 h	0.8 g	0.4 g	0.6 i	3.8 cd	1.0 gh	1.2 h
10/12/18	0.4 f	0.0 f	4.4 de	2.2 ef	2.0 g	0.4 gh	2.2 fg	1.8 fg	1.8 hi	3.5 cd	0.6 h	2.4 gh
19/12/18	2.0 df	1.0 ef	3.6 e	0.8 f	1.8 g	1.4 fh	2.6 eg	4.2 eg	2.6 gi	2.5 cd	2.0 gh	3.4 gh
26/12/18	3.6 ce	1.4 ef	3.8 e	4.6 df	3.8 fg	1.6 fh	2.6 eg	8.4 df	4.2 gi	1.6 d	2.2 fh	9.0 df
02/01/19	2.4 df	0.4 f	3.0 e	3.0 ef	7.0 ef	2.2 eh	5.8 df	8.2 df	3.4 gi	2.4 d	3.2 eh	6.2 fg
09/01/19	1.6 df	0.4 f	4.2 e	3.6 df	7.4 df	2.0 eh	6.6 cf	10.6 be	4.0 gi	2.6 cd	3.4 eh	10.8 ce
15/01/19	1.4 ef	1.0 ef	6.2 ce	4.6 df	4.6 fg	1.8 eh	6.8 ce	5.2 dg	12.2 cf	2.8 cd	4.4 eg	2.6 gh
24/01/19	0.8 ef	1.0 ef	12.8 b	4.4 df	3.4 fg	1.4 fh	1.2 g	7.2 dg	16.2 cd	3.0 cd	6.0 de	3.4 gh
31/01/19	1.4 ef	2.6 de	10.8 bd	5.0 de	7.0 ef	3.0 eh	9.8 bd	16.4 ac	7.6 fh	11.2 ab	5.8 df	8.4 ef
07/02/19	1.4 ef	3.4 cd	12.2 bc	5.0 de	9.6 de	2.6 eh	9.8 bd	15.4 ac	8.8 eg	12.0 ab	8.8 cd	9.6 df
14/02/19	2.6 cf	4.4 cd	14.2 ab	7.4 cd	11.6 cd	4.2 dg	11.0 ac	16.0 ac	10.8 df	13.2 ab	11.0 bc	10.6 cf
21/02/19	3.4 ce	5.2 c	15.2 ab	9.8 bc	14.2 bc	4.8 df	12.2 ab	17.4 ab	12.6 df	14.8 ab	13.6 ab	12.4 be
28/02/19	4.4 cd	7.2 b	17.0 ab	11.8 ab	15.2 ac	5.6 de	13.6 ab	18.6 a	14.2 ce	16.8 ab	16.6 a	15.0 ac
05/03/19	5.4 c	9.2 a	19.6 a	13.8 a	19.4 a	8.0 d	14.8 a	21.0 a	15.0 ce	17.8 a	13.2 ab	13.0 ad
12/03/19	8.4 b	7.6 ab	15.0 ab	10.6 ac	17.6 ab	14.8 c	10.6 ac	16.2 ac	18.4 bc	14.8 ab	11.4 bc	15.0 ac
19/03/19	16.0 a	8.8 ab	11.4 bc	11.8 ab	19.2 a	21.0 b	9.2 bd	9.8 ce	24.4 b	10.0 bc	8.4 cd	16.6 ab
26/03/19	18.8 a	9.0 ab	11.4 bc	13.0 ab	19.2 a	27.4 a	9.4 bd	11.4 bd	31.4 a	10.0 bc	5.8 df	17.2 a

Means within a column followed by same letter(s) are not significantly different according to Tukey′s HSD post hoc test at $P < 0.05$ level of significance.

All the germplasms revealed high abundance of jassid in the late growing period of the study which might be associated with the increased temperature at the end of the season. The result is in agreement with that of Shipa et al. (2021), who found the abundance of jassid on the tested cotton varieties as having significant positive correlation with temperature. The mean abundances of jassid on the germplasm differed significantly and the highest (11.7 ± 1.3 jassids/leaf) and the lowest (3.7 ± 0.8 jassids/leaf) results were found on BARI Begun- 5 and BARI Begun- 6, respectively (Figure 1). Yousafi et al. (2013) found a number of 14.6 jassids/leaf on the susceptible variety of brinjal.

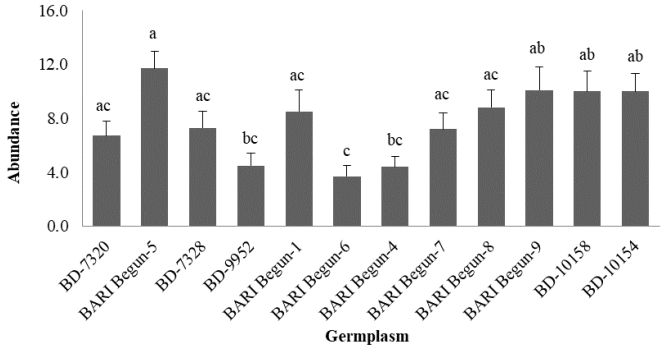

Figure 1. Mean abundance of jassid (number/3 leaves) on twelve brinjal germplasms during December 2018 to March 2019. Data expressed as mean ± SE. Bars with common letter(s) are not significantly different by Tukey HSD posthoc statistic at $P< 0.05$.

Relationship between abundance of jassid and morphological traits of the brinjal germplasms are shown in Table 2. The abundance of jassid was positively correlated with the morphological traits such as plant height (cm), number of branch and leaf per plant, and leaf area (cm^2). Abundances of jassid were negatively correlated with the numbers of abaxial and adaxial leaf trichomes, and the numbers of spines on the stems and leaves of the germplasm. Bindra and Mahal (1981) reported that high density of hair on midrib was responsible to give resistance to brinjal against jassid. The presence of trichomes on leaf hinders free movement, ease of feeding, and oviposition of insects and thus affects the growth and development of them (Amin et al., 2011). That is why the abundance of jassid was lower on the germplasms where the presence of trichomes and spines was higher. Thus, the morphological characteristics of plants affect the growth of insect population as well as its abundance.

Table 2. Correlation between jassid abundance and plant morphological characteristics of twelve brinjal germplasms

Germplasm	Morphological characteristics							
	Plant height (cm)	Branch/plant	Leaf/plant	Leaf area	Trichome on lower leaf surface	Trichome on upper leaf surface	Spine/ stem	Spine/ leaf
BD-7320	0.901*	0.910*	0.739^{NS}	0.899*	-0.846^{NS}	-0.681^{NS}	-0.645^{NS}	-0.645^{NS}
BARI Begun-5	0.905*	0.969**	0.848^{NS}	0.764^{NS}	-0.884*	-0.897*	-0.945*	-0.935*
BD-7328	0.922*	0.871^{NS}	0.967**	0.569^{NS}	-0.866^{NS}	-0.819^{NS}	-0.901*	-0.921*
BD-9952	0.922*	0.958**	0.867^{NS}	0.956*	-0.941*	-0.641^{NS}	-0.891*	-0.945*
BARI Begun-1	0.903*	0.938*	0.937*	0.695^{NS}	-0.737^{NS}	-0.920*	-0.945*	-0.963**
BARI Begun-6	0.905*	0.368^{NS}	0.846^{NS}	0.859^{NS}	-0.813^{NS}	-0.858^{NS}	-0.894*	-0.881*
BARI Begun-4	0.960**	0.981**	0.899*	0.767^{NS}	-0.909*	-0.931*	-0.918*	-0.845^{NS}
BARI Begun-7	0.371^{NS}	0.949*	0.905*	0.912*	-0.860^{NS}	-0.919*	-0.925*	-0.877*
BARI Begun-8	0.504^{NS}	0.921*	0.938*	0.869^{NS}	-0.765^{NS}	-0.895*	-0.921*	-0.930*
BARI Begun-9	0.144^{NS}	0.942*	0.960**	0.937*	-0.903*	-0.927*	-0.775^{NS}	-0.933*
BD-10158	0.866*	0.942*	0.939*	0.879*	-0.980**	-0.955**	-0.942*	-0.942*
BD-10154	0.867*	0.822^{NS}	0.977**	0.945*	-0.897*	-0.926*	-0.989**	-0.949**

NS, Non-significant, * Significant ($P < 0.05$), ** Highly Significant ($P < 0.01$).

In addition to morphological traits, we have also analyzed the abundance of jassid with some of the physiological and nutritional parameters. We found that the moisture, total chlorophyll, proline, reducing sugar, total sugar, nitrogen and protein content exerted positive correlation, while ash and pH contents in the leaves were found to be negatively correlated (Table 3). Our results are in line with some of the previous findings such as Khan et al. (2015) reported that the abundance of *A. biguttula biguttula* had significant positive correlation with the moisture and protein content of leaf of brinjal but the ash content had negative effects. Host plant selection by insects relies upon their nutritional requirements (Gogi et al., 2010). The presence of high amount of moisture makes the plant succulent and palatable to insects, which ultimately leads to higher insect infestation. Gall and Behmer (2014) reported that protein and carbohydrate affect the body mass gain and development of juveniles of the phytophagous insects. The abundance of jassid thus is positively correlated with the presence of high moisture, nitrogen and sugar contents of leaf of brinjal.

Table 3. Correlation co-efficient (r) between jassid abundance and biochemical content of leaf of twelve brinjal germplasms

Germplasm	Biochemical content								
	Moisture (%)	pH	Ash (%)	Total Chlorophyll	Proline	Reducing sugar	Total sugar	N_2 (%)	Protein (%)
BD-7320	0.584^{NS}	-0.873*	-0.840^{NS}	0.840^{NS}	0.408^{NS}	0.764^{NS}	0.919*	0.873*	0.840^{NS}
BARI Begun-5	0.786^{NS}	-0.629^{NS}	-0.945*	0.643^{NS}	0.786^{NS}	0.845^{NS}	0.786^{NS}	0.945*	0.922*
BD-7328	0.967**	-0.943*	-0.943*	0.943*	0.845^{NS}	0.871^{NS}	0.943*	0.871^{NS}	0.871^{NS}
BD-9952	0.946*	-0.943*	-0.891*	0.891*	0.845^{NS}	0.871^{NS}	0.871^{NS}	0.943*	0.945*
BARI Begun-1	0.915*	-0.748^{NS}	-0.791^{NS}	0.748^{NS}	0.948*	0.915*	0.915*	0.948*	0.948*
BARI Begun-6	0.953**	-0.930*	-0.813^{NS}	0.791^{NS}	0.791^{NS}	0.930*	0.845^{NS}	0.930*	0.894*
BARI Begun-4	0.963**	-0.891*	-0.901*	0.891*	0.764^{NS}	0.943*	0.891*	0.945*	0.901*
BARI Begun-7	0.949*	-0.949*	-0.877*	0.877*	0.896*	0.949**	0.949**	0.959**	0.949**
BARI Begun-8	0.930*	-0.930*	-0.813^{NS}	0.813^{NS}	0.930*	0.930*	0.930*	0.894*	0.930*
BARI Begun-9	0.971**	-0.971**	-0.971**	0.992**	0.923*	0.904*	0.904*	0.971**	0.983**
BD-10158	0.942*	-0.942*	-0.970**	0.908*	0.970**	0.908*	0.970**	0.962**	0.985**
BD-10154	0.949**	-0.949**	-0.949**	0.959**	0.987**	0.877*	0.987**	0.949**	0.989**

NS, Non-significant, * Significant ($P < 0.05$), ** Highly Significant ($P < 0.01$).

Abundance of jassid showed positive correlation with moisture, total sugar and reducing sugar, but revealed negative correlation with pH of the fruits of the germplasm (Table 4). The tissue hardiness, wax content and the presence of pubescence act as barriers and affect insect mobility and population. Lima et al. (2004) found that chlorophyll level and proline content of leaf manipulate insect feeding. Laichattiwar et al. (2018) reported that moisture content of brinjal leaf exerted positive impact on the abundance of sucking insects.

Table 4. Correlation co-efficient (r) between jassid abundance and biochemical content of fruit of twelve brinjal germplasms

Germplasm	Biochemical content			
	Moisture	pH	Reducing sugar	Total sugar
BD-7320	0.491^{NS}	-0.919*	0.873*	0.873*
BARI Begun-5	0.967**	-0.943*	0.945*	0.871^{NS}
BD-7328	0.954*	-0.963**	0.846^{NS}	0.943*
BD-9952	0.846^{NS}	-0.963**	0.943*	0.871^{NS}
BARI Begun-1	0.886*	-0.943*	0.915*	0.948*
BARI Begun-6	0.813^{NS}	-0.930*	0.813^{NS}	0.813^{NS}
BARI Begun-4	0.623^{NS}	-0.945**	0.871^{NS}	0.891*
BARI Begun-7	0.949**	-0.949**	0.959**	0.877*
BARI Begun-8	0.916*	-0.930*	0.930*	0.930*
BARI Begun-9	0.971**	-0.923*	0.971**	0.942*
BD-10158	0.977**	-0.908*	0.948**	0.970**
BD-10154	0.949**	-0.949**	0.949**	0.949**

NS, Non-significant, * Significant ($P < 0.05$), ** Highly Significant ($P < 0.01$).

Leaf infestation of the germplasm varied from 4.2% to 23.0%. The infestation was quite lower at early growth stages, during 3rd December to 26th December, and reached the peak on 28th of February (Table 5). The findings of our study were not similar to Singh et al. (2015) who found the highest infestation of jassid in the 3rd week of August (35.4%) then declined gradually, and the lowest incidence occurred in the last week of December (9.1%). This difference might happen due to the variation of the study period. The finding of our study is in accordance with Bharadiya and Patel (2005) who found the lowest and the highest infestations of jassid in the second week of December (8.8%) and the fourth week of February (16.7%), respectively.

Table 5. Infestation level of jassid on leaf of twelve brinjal germplasms during December 2018 to March 2019

Observation date	Germplasms											
	BD 7320	BARI Begun 5	BD 7328	BD 9952	BARI Begun 1	BARI Begun 6	BARI Begun 4	BARI Begun 7	BARI Begun 8	BARI Begun 9	BD 10158	BD 10154
03/12/18	23.0 a	8.1 b	19.3 a	7.1 b	10.6 ad	7.9 ef	4.2 e	9.0 ad	7.2 b	13.9 bf	13.9 bd	13.9 ab
10/12/18	21.0 a	10.1 b	17.1 ab	9.2 ac	11.1 ac	8.9 df	6.5 de	6.8 bd	9.4 ab	12.3 dg	13.6 be	15.3 a
19/12/18	16.1 ac	19.9 a	20.5 a	11.8 ab	14.9 a	16.3 ab	12.9 ac	8.9 ad	10.5 ab	15.9 be	11.7 cf	12.1 ae
26/12/18	14.2 ac	12.2 b	15.2 ac	14.4 a	12.2 ab	8.8 df	8.1 be	6.2 cd	13.3 a	13.4 cf	16.3 ac	10.7 ae
02/01/19	10.2 bc	9.0 b	8.7 ce	6.2 b	10.5 bd	10.6 ce	12.1 ad	8.5 ad	10.7 ab	11.0 dg	11.7 cf	10.0 ae
09/01/19	9.4 bc	8.3 b	7.7 de	5.6 c	10.4 bd	10.1 cf	11.1 ad	10.5 ad	11.4 ab	10.3 eg	10.4 cf	10.8 ae
15/01/19	9.5 bc	6.2 b	8.5 ce	5.8 c	7.4 ce	6.4 ef	9.7 ae	5.8 d	10.9 ab	5.1 g	9.0 df	6.1 e
24/01/19	8.8 c	6.2 b	8.6 ce	4.6 c	7.3 ce	5.7 f	7.9 ce	8.3 ad	11.6 ab	7.5 fg	10.1 cf	6.9 ce
31/01/19	8.9 bc	8.7 b	4.9 e	6.6 b	6.0 e	6.3 ef	14.4 a	7.6 bd	6.6 b	9.5 eg	6.5 f	6.4 de
07/02/19	9.1 bc	8.0 b	5.5 e	7.8 b	6.5 de	6.6 ef	14.9 a	7.3 bd	6.2 b	9.8 eg	6.8 df	7.8 be
14/02/19	9.5 bc	7.8 b	5.6 e	8.2 b	6.9 ce	7.9 ef	14.9 a	8.0 ad	7.5 ab	11.7 dg	9.3 df	11.1 ae
21/02/19	9.4 bc	7.9 b	5.6 e	8.0 b	7.3 ce	9.0 df	13.9 ab	9.3 ad	7.5 ab	14.7 bf	11.4 cf	12.2 ae
28/02/19	13.9 ac	8.1 b	7.5 de	7.5 b	8.4 be	10.1 cf	14.0 a	11.1 ad	9.6 ab	16.8 ae	15.0 bd	12.8 ae
05/03/19	15.9 ac	8.6 b	9.4 ce	8.1 b	10.4 bd	12.9 bd	13.4 ac	11.5 ad	11.0 ab	18.2 ad	15.3 ad	13.1 ad
12/03/19	16.1 ac	8.3 b	10.2 be	8.2 b	10.2 be	14.5 bc	13.7 ac	12.7 ac	11.5 ab	20.2 ac	16.8 ac	13.5 ac
19/03/19	18.2 ab	8.4 b	11.2 be	8.9 ac	10.4 bd	15.4 ab	14.0 a	12.8 ab	11.9 ab	21.2 ab	18.6 ab	13.5 ac
26/03/19	20.8 a	10.1 b	14.2 ad	10.2 ac	12.1 ab	19.4 a	14.2 a	14.4 a	13.3 a	23.8 a	21.8 a	15.8 a

Means within a column followed by same letter(s) are not significantly different according to Tukey′s HSD post hoc test at $P < 0.05$ level of significance.

The mean infestation level of jassid varied significantly among the germplasm ranging from 7.4 ± 0.4% to 12.6 ± 0.6%. The lowest result was found on BARI Begun- 6 (7.4 ± 0.4%) (Figure 2). The germplasm BARI Begun- 5, BARI Begun- 9, BD- 10158, and BD- 10154 showed statistically similar and the highest infestation levels (12.4 ± 0.5, 12.2 ± 0.7, 12.2 ± 0.6, and 12.6 ± 0.6%, respectively).

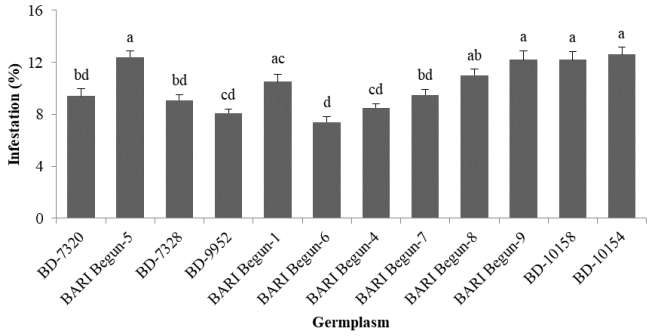

Figure 2. Mean infestation level of jassid on twelve brinjal germplasms during December 2018 to March 2019. Data expressed as mean ± SE. Bars with common letter(s) are not significantly different by Tukey HSD posthoc statistic at $P< 0.05$.

Rank abundance curve based on the number of total jassid individuals on the tested germplasms is presented in figure 3. Rank abundance showed that the lowest rank was found in BARI Begun 6 with 3.9% jassids of total abundance, followed by BARI Begun 4 and BD 9952 (4.8% in both the cases). BARI Begun 5 showed the highest rank with 12.6% of the total abundance of jassid.

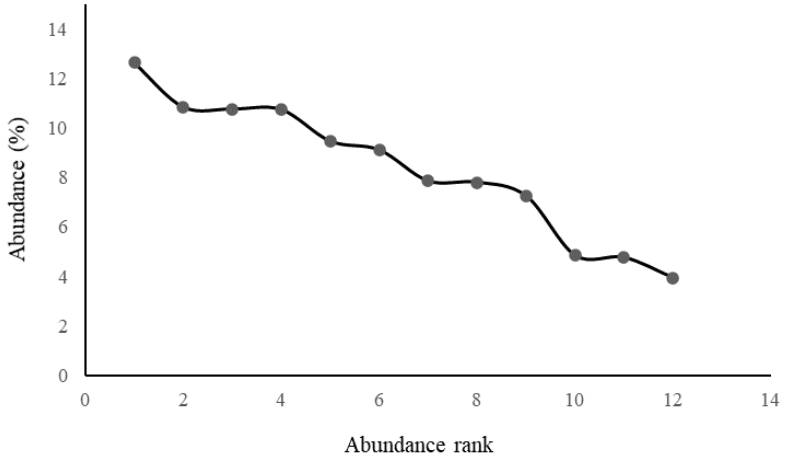

Figure 3. Rank abundance curve of total jassid individuals on twelve brinjal germplasms during December 2018 to March 2019.

The findings of the study revealed significant variations in the abundance and infestation of jassid on twelve germplasms of brinjal and showed that the germplasm BARI Begun- 6 had the lowest abundance and infestation. The result can be utilized by the plant breeders for development of jassid resistant brinjal variety.

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