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Host plant resistance in tomato genotypes against sucking insects in relation to physiomorphic traits, leaf curl indices, and yield

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ABSTRACT

Tomato (*Solanum lycopersicum*) is one of the most widely cultivated and economically important vegetable crops in Bangladesh. Different sucking insect pests namely thrips, aphid and whitefly leading to substantial yield and quality losses of tomato. Development of pest-resistant variety is a sustainable approach to overcome these pest problems. This study was conducted from July 2024 to June 2025 in the experimental field and laboratory of the Department of Entomology, Gazipur Agricultural University, Gazipur, Bangladesh, following a Randomized Complete Block Design (RCBD), to evaluate the physiomorphic traits and yield of sixteen tomato genotypes- BD-12384, BD-12386, BD-12389, BD-12390, BD-12391, BD-12392, BD-12394, BD-12395, BARI Tomato-18, BARI Hybrid Tomato-5, BARI Hybrid Tomato-7, Binatomato-12, Binatomato-13, Uttaran Plus, Unnayon, and Asa-1225 under natural infestation of thrips, aphid, and whitefly. A significant variation was observed among the genotypes in pest abundance and correlation analysis revealed that all physio-morphic characteristics except trichome density were positively correlated with thrips, aphid, and whitefly abundance. BARI Hybrid Tomato-5 recorded the highest yield (38.9±1.5 t ha^{-1}), the lowest abundances of thrips, aphid, and whitefly (1.2 ± 0.11, 0.7 ± 0.11, and 1.7 ± 0.22 per branch, respectively), and low leaf curl index (4.1 ± 0.5%); therefore, it was considered a resistant genotype. The genotypes BD-12391, BD-12392, BD-12395, BARI Hybrid Tomato-7, Uttaran Plus, Unnayon, and Asa-1225 were identified as moderately resistant, whereas Binatomato-12 was found as susceptible, and the remaining genotypes were recorded as moderately susceptible.

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Introduction

Tomato (*Solanum lycopersicum*) belongs to the family Solanaceae is one of the most important vegetables and salad commodities in the world. Tomato fruit is a rich source of vitamins A, B, and C, as well as minerals such as potassium and folate, and it contains lycopene, a natural antioxidant that protects human skin from inflammation caused by ultraviolet rays (Miller *et al.*, 2002). Tomato is widely cultivated in Bangladesh, where total production in 2022 reached 469.2 thousand metric tons from 31.14 thousand hectares of land, ranking the country 45th in global tomato production (BBS, 2023). Insect pest infestation is a major constraint to tomato production in Bangladesh, with a total of thirteen species of sucking and chewing insects attacking the crop at different growth stages (Amin *et al*., 2023). Among the sucking insect pests, thrips *Thrips tabaci* (Thysanoptera: Thripidae), aphid *Aphis gossypii* (Hemiptera: Aphididae), and whitefly *Bemisia tabaci* (Hemiptera: Aleyrodidae) cause severe and widespread infestation of tomato crops throughout Bangladesh (Khatun *et al*., 2014; Mondal *et al*., 2024).

Thrips, aphids, and whiteflies are highly polyphagous pests whose immature and adult stages feed on plant sap, causing chlorotic lesions, leaf wilting, and defoliation. These effects severely impair plant growth and reproduction and induce quantitative changes in phytochemical contents, ultimately resulting in reduced crop yields (Rahman *et al*., 2019; Shahrin *et al*., 2021). The infestation levels of sucking insects on tomato leaves, inflorescences, flowers, and fruits in Bangladesh have been reported to be as high as 45.8%, 24.5%, 23.1%, and 25.4%, respectively (Shahrin *et al*., 2021). During feeding, these insects excrete honeydew that promotes sooty mold growth and attracts black ants, forming a sticky layer on plant surfaces that interferes with normal photosynthetic activity (Nasrin *et al*., 2021; Shipa *et. al*., 2021). In addition to direct feeding damage and honeydew excretion, these insects are important vectors of viral diseases in tomato, especially in tropical and subtropical regions, with Tomato Yellow Leaf Curl Virus (TYLCV), transmitted by whiteflies, causing severe crop damage (Czosnek *et al*., 2017). A study reported that tomato yield was 58.0 t ha^{-1} under insecticide treated conditions and 27.1 t ha^{-1} under untreated conditions, resulting in a yield loss of 53.3% (Ahmed *et al.,* 2020).

In order to manage sucking insect, tomato growers primarily rely on synthetic insecticides (Mondal *et al*., 2023), which in turn due to continuous and indiscriminate use has led to insecticide resistance, reducing long-term effectiveness. In contrast, cultivating insect-resistant varieties offers a more sustainable and economical solution. Screening programs are essential to identify resistant genotypes, which can then be utilized in breeding efforts. Plant morphological and biochemical traits contribute to antixenotic resistance, making these resistant genotypes valuable either as direct cultivars or as breeding material for developing improved tomato varieties.

Therefore, this study was conducted to evaluate tomato genotypes for physio-morphic traits associated with resistance to major sucking insect pests. Specifically, the study examined pest abundance and leaf curl index caused by thrips, aphids, and whiteflies to categorize tomato genotypes into different levels of resistance.

Materials and methods

Experimental site and climatic conditions

The study was conducted from July 2024 to June 2025 in the field and laboratory of the Department of Entomology, Gazipur Agricultural University (GAU), Gazipur, Bangladesh (25°25′ N, 89°5′ E; 34 m above sea level). The study area falls within the Madhupur Tract having soil pH 5.8 to 6.5, indicating highly to moderately acidic conditions. The region's annual average maximum and minimum temperatures are 36.0°C and 12.7°C, with a relative humidity of 65.8% and an annual rainfall of 237.6 cm.

Experimental inputs and raising of seedlings

In this study, sixteen tomato genotypes were utilized as experimental materials. These included BD-12384, BD-12386, BD-12389, BD-12390, BD-12391, BD-12392, BD-12394, BD-12395, BARI Tomato-18, BARI Hybrid Tomato-5, BARI Hybrid Tomato-7, Binatomato-12, Binatomato-13, Uttaran Plus, Unnayon, and Asa-1225. The seeds of the varieties and advanced breeding lines were sourced from the Horticulture Research Centre and the Plant Genetic Resources Centre (PGRC) under the Bangladesh Agricultural Research Institute (BARI), located in Joydebpur, Gazipur, and also from the Bangladesh Institute of Nuclear Agriculture (BINA), Mymensingh. In addition, seeds of other commercial varieties were obtained from the local market in Gazipur. For raising seedlings, seeds of the genotypes were sown on 24 October 2024 in a well-prepared seedbed, covered with polythene to maintain temperature and moisture, and watered regularly.

Experimental design and cultivation of tomato genotypes

The experimental field was well prepared and fertilizers were applied following the Fertilizer Recommendation Guide 2018. The field was divided into 48 plots, each having an area of 3.0 m × 2.0 m. Four-week-old tomato seedlings were transplanted on November 20, 2024 in the plots arranged in a Randomized Complete Block Design (RCBD), with a spacing of 1.0 m between blocks and 1.0 m between plots. Intercultural operations such as irrigation and weeding were performed as needed; however, sucking insect control measures were not adopted during the study.

Observation of sucking insects and leaf curl indices

Weekly field inspections were conducted, and data collection started as soon as thrips, aphid and whitefly appeared and continued until the last harvest of tomato fruits. On each observation day, five plants of each genotype were chosen randomly to gather data on the

Table 1. Resistance category of tomato plants based on leaf curl scoring scale

Leaf curling	Score	Resistance category
Symptoms absent	1	Immune (I)
Curling of 1-10% leaves	2	Resistant (R)
Curling of 11-25% leaves	3	Moderately resistant (MR)
Curling of 26-50% leaves	4	Moderately susceptible (MS)
Curling of 51-75% leaves	5	Susceptible (S)
Curling of >75% leaves	6	Highly susceptible (HS)

abundance of sucking insects. A hand lens was used to count the number of sucking insects on top branch of each plant. The leaf curl index (LCI) for virus infection was assessed at 30-day intervals for all genotypes using the following scoring scale proposed by Rao *et al*. (2020).

Following the grading, the percent leaf curl indices (LCI) of the tomato genotypes were calculated using the following formula.

$$\text{LCI (\%)} = \frac{\sum Numerical\ score}{Highest\ score\ \times Total\ plants\ examined} \times 100$$

Study of physiomorphic traits

The fifth leaf from the top of one of the selected plants branches was removed. The leaves were transported to the laboratory to measure the trichome density per square centimeter after being stored in plastic bags. One square centimeter leaf samples were prepared using a metal tube and hammer. A manual counting machine was used to count the trichomes on the abaxial surface after they were examined under a stereo microscope (BOE3200, BOECO, Hamburg, Germany). For each genotype, the experiment was repeated three times.

Moisture content of leaf samples was determined using the oven-drying method. Initially, five fresh leaves were collected from each genotype, thoroughly cleaned, and weighed using an electronic balance. The samples were then placed in a drying oven maintained at 65°C for 72 hours. After drying, the samples were weighed again, and moisture content was calculated.

Reducing and total sugar contents of leaves were estimated following Bertrand's method as described by Kumar *et al*. (2011). Fresh leaf tissue (20 g) was homogenized with distilled water and the volume adjusted to 100 ml, after which 50 ml of the extract was centrifuged at 4000 rpm for 20 min. For reducing sugar estimation, 10 ml of the supernatant was reacted with Bertrand A and B reagents, heated in a sand bath at 150 °C for 1 h, and cooled to obtain a red precipitate. For total sugar estimation, a 5 ml aliquot of the supernatant was first hydrolyzed with concentrated HCl and heated in a sand bath before reaction with Bertrand A and B reagents. In both cases, the precipitate was washed, dissolved in Bertrand C reagent, and titrated against 0.4% $KMnO_4$ solution (0.1 N) to determine sugar content.

Chlorophyll content was estimated following Gagoi and Basumatary (2018). Fresh leaf tissue (0.05 g) was extracted in 25 ml of 80% acetone in darkness for 72 h, and the absorbance of the extract was measured at 645 and 663 nm using a spectrophotometer.

Quantifying yield

At fruit maturing stage, all the fruits from each plot were harvested and brought to the laboratory. A digital weighing balance was used to take the weight of fruits. Then the plot wise yield was converted as yield of ton ha^{-1}.

Data analysis

One-way analysis of variance (ANOVA), followed by Tukey's HSD post-hoc test, was conducted to evaluate variations in observed parameters. Correlation analysis was employed to assess the relationships between physio-morphic plant characteristics and insect abundance. All statistical analyses were carried out using IBM SPSS software version 21.0.

Results and Discussion

Genotypic variation in leaf physio-morphic traits of tomato

Significant genotypic variation was evident among the tested tomato genotypes for all physio-morphic leaf characteristics studied (Table 2). Trichome density varied markedly among the tested tomato genotypes, lowest density recorded in Binatomato-12 (17.6±0.6) and highest in BD-12390 (56.0±0.5). Higher trichome density was also recorded in Unnayan, Uttaran Plus, and BD-12392, whereas comparatively lower trichome density was observed in BARI Tomato-18, BD-12389, and Binatomato-13. Leaf moisture content showed significant variation among genotypes, with values ranging from 77.6±0.05% in Unnayan to 85.3±0.05% in Binatomato-12. Relatively higher moisture content was observed in Binatomato-12 and BARI Tomato-18, while most BD lines and commercial hybrids exhibited comparatively lower moisture levels. Reducing sugar content was minimum in Unnayan (1.1±0.03%) and maximum in Binatomato-12 (2.3 ± 0.06%). Higher reducing sugar content was recorded in Binatomato-12, BARI Tomato-18, and BD-12389, whereas lower values were observed in BD-12390, Uttaran Plus, and Asa-1225. Total sugar content also exhibited significant genotypic variation, ranging from 2.4±0.02% in Unnayan to 4.6±0.09% in BD-12389. The highest total sugar content was recorded in BD-12389 and Binatomato-12, followed by BARI Tomato-18, while most BD genotypes and hybrids showed comparatively lower values. The maximum chlorophyll content was observed in Binatomato-12 (2.9±0.03 mg g^{-1} FW), followed by BARI Tomato-18 and BD-12389. In contrast, lower chlorophyll content was recorded in Unnayan, Uttaran Plus, and several BD genotypes.

Similar genotypic variation in leaf physio-morphic and biochemical traits of tomato has been widely reported. Suarez *et al*. (2008) documented significant differences in moisture content among tomato genotypes. Dorais *et al*. (2001) reported considerable variation in reducing sugar content in tomato, while Teka (2013) emphasized the role of leaf sugar composition in determining plant physiological behavior. Recent studies have also confirmed significant variability in leaf chlorophyll content among tomato genotypes, which is closely linked to photosynthetic efficiency and stress tolerance (Hallmann, 2012). Furthermore, Shahrin *et al*. (2022) observed notable negative associations between the abundance of sucking insects and trichomes. Glas *et al*. (2012) reported that genotypic differences in trichome

Table 2. Physio-morphic characteristics of leaves of among tested genotypes of tomato

Genotypes	Trichome	Moisture (%)	Reducing sugar (%)	Total sugar (%)	Chlorophyll (mg/g FW)
BD-12384	49±1.5bc	78.5±0.05fg	1.3±0.01fg	2.8±0.01c	1.9±0.06e-h
BD-12386	45.6±1.7cd	81.6±0.20c	1.5±0.01d	3.2±0.02bc	2.1±0.04d
BD-12389	27.3±0.8gh	80.0±0.10d	1.8±.03c	4.6±0.9a	2.4±0.04c
BD-12390	56±0.5a	77.8±0.03ij	1.2±0.04gh	2.5±0.05c	1.8±.01gh
BD-12391	47±1.1b-d	78.3±0.03gh	1.3±0.04fg	2.7±0.03c	1.9±0.02e-g
BD-12392	49.6±1.4bc	80.0±0.03d	1.5±0.04de	3.1±0.05bc	2.0±0.1de
BD-12394	42±0.5de	79.7±0.03d	1.4±0.02d-f	3.0±0.05bc	2.0±.05ef
BD-12395	37.6±0.8ef	79.2±0.05e	1.4±0.05d-f	2.9±0.04bc	1.9±0.01e-g
BARI Tomato-18	26±0.5gh	84.5±0.05b	2.1±0.06b	4.2±0.06ab	2.7±0.01b
BARI Hybrid Tomato-5	46.3±1.2cd	78.8±0.03ef	1.3±0.02e-g	2.8±0.02c	1.9±0.01e-g
BARI Hybrid Tomato-7	31.6±1.4fg	80.1±0.05d	1.5±0.05d-f	3.1±0.04bc	2.0±0.01de
Binatomato-12	17.6±0.6i	85.3±0.05a	2.3±0.06a	4.5±0.04a	2.9±0.03a
Binatomato-13	21.3±1.2hi	81.5±0.05c	1.7±0.03c	3.5±0.05a-c	2.3±0.01c
Uttaran plus	51±1.1a-c	78.0±0.03h-j	1.2±0.03gh	2.6±0.04c	1.8±0.01f-h
Unnayan	52.6±1.4ab	77.6±0.05j	1.1±0.03h	2.4±0.02c	1.8±0.01h
Asa-1225	48±0.5b-d	78.2±0.05g-i	1.2±0.02gh	2.5±0.02c	1.8±0.01gh

Data expressed as mean ± SE (standard error). Means within a column followed by same letter(s) are not significantly different by Tukey HSD posthoc statistic at <0.05.

density play a crucial role in determining leaf surface characteristics and plant-environment interactions.

Genotypic variation in abundance of sucking insect pests on tomato

Result shows significant variation in the abundance of sucking insect pests among the tested tomato genotypes. Thrips population ranged from 0.7±0.11 per shoot in BARI Hybrid Tomato-5 and BARI Hybrid Tomato-7 to 2.0±0.19 per branch in Binatomato-12. Aphid abundance varied from 1.7±0.22 per branch in BARI Hybrid Tomato-5 to 6.0±0.33 per branch in Binatomato-12. Similarly, whitefly population ranged from 1.2±0.11 per branch in BARI Hybrid Tomato-5 to 5.3±0.19 per branch in Binatomato-12. Overall, the results indicate significant genotypic differences in susceptibility of tomato genotypes to major sucking insect pests (Table 3).

Solangi *et al*. (2017) with their six tomato genotypes found that Nagina genotype was more susceptible to attack of all sucking pests including thrips, whereas Rutgar and Eden Oblong genotypes were the least susceptible against various sucking pests. The results are in conformity with Harshita *et al*. (2019) who also found that most susceptible variety

Table 3. Abundance of the sucking insects on different genotypes of tomato

Genotypes	Abundance (number per branch)		
	Thrips	Aphid	Whitefly
BD-12384	1.1±0.11b-d	3.87±0.29b-d	2.6±0.19de
BD-12386	1.7±0.11ab	4.7±0.19b	4.5±0.29ab
BD-12389	1.2±0.11a-d	4.2±0.19bc	2.6±0.19de
BD-12390	0.89±0.11cd	2.5±0.19ef	2.2±0.22de
BD-12391	1.4±0.11a-d	3.2±0.50c-e	2.3±0.19d-f
BD-12392	0.8±0.11cd	2.8±0.69d-f	2.0±0.19d-f
BD-12394	1.3±0.19a-d	4.1±0.69bc	3.8±0.29bc
BD-12395	1.0±0.19b-d	2.5±0.11ef	2.7±0.19cd
BARI Tomato-18	1.4±0.22a-d	4.4±0.19b	4.6±0.19ab
BARI Hybrid Tomato-5	0.7±0.11d	1.7±0.22f	1.2±0.11f
BARI Hybrid Tomato-7	0.7±0.11d	2.7±0.11d-f	2.4±0.22de
Binatomato-12	2.0±0.19a	6.0±0.33a	5.3±0.19a
Binatomato-13	1.6±0.19a-c	3.7±0.19b-d	2.8±0.29cd
Uttaran plus	1.5±0.11a-d	3.6±0.19b-e	2.4±0.29de
Unnayan	1.1±0.11b-d	3.2±0.11c-e	1.5±0.22ef
Asa-1225	1.3±0.19a-d	2.7±0.22d-f	2.1±0.11d-f

Data expressed as mean ± SE (standard error). Means within a column followed by same letter(s) are not significantly different by Tukey HSD posthoc statistic at <0.05.

with highest mean population of aphids was observed on variety SUN-7610, followed by LE-1-2, LE-66, BL-142, BT-317, and so on. Jamuna *et al*. (2017) who reported that, out of the six tomato cultivars were screened against whitefly, least population of adult whitefly was observed in Vybhav (1.50 adults per 3 leaves) followed by Arka Samrat and Arka Rakshaka which recorded 3.25 and 3.50 adult whitefly per three leaves, respectively. Whereas, Arka Ananya, PTR 6 and PTR 4 recorded 4.0, 6.0 and 6.25 adult whitefly per three leaves, respectively which support the present findings.

Correlation between leaf physio-morphic traits and abundance of sucking insect pests

Results show the correlation between leaf physio-morphic traits and sucking insect abundance (Table 4). Thrips abundance was positively correlated with moisture ($r = 0.570^*$), reducing sugar ($r = 0.510^*$), and chlorophyll ($r = 0.572^*$), while correlations with total sugar and trichome density were non-significant. Aphid and whitefly populations were highly positively correlated with moisture, reducing sugar, total sugar, and chlorophyll, and negatively correlated with trichome density (aphid: $r = -0.556^*$; whitefly: $r = -0.591^*$). Overall, higher leaf moisture, sugar, and chlorophyll favor pest abundance, whereas denser trichomes reduce infestation.

Leaf curl indices and resistance categories of tomato genotypes

The highest leaf curl index (%) was recorded in Binatomato-12, with values of 23.9±1.0 at 30 days after incidence (DAI), 72.7±1.1 at 60 DAI, and 72.7±1.1 at 90 DAI, resulting in a significantly higher mean index of 56.4±0.9, and categorizing it as susceptible (Table 5).

In contrast, the lowest leaf curl index was observed in BARI Hybrid Tomato-5, which showed 0±0 at 30 DAI, 5.2 ±1.0 at 60 DAI, and 7.2 ±1.0 at 90 DAI, with a mean of 4.1±0.5, and was classified as resistant. These findings emphasize the high susceptibility of Binatomato-12 and the strong resistance of BARI Hybrid Tomato-5.

Table 4. Correlation coefficients (r values) between the abundance of sucking insects and physio-morphic characteristics of leaves of the tomato genotypes

Insect	Moisture (%)	Reducing Sugar (%)	Total Sugar (%)	Chlorophyll Content (mg/g FW)	No. of trichome cm^{-2}
Thrips	0.570*	0.510*	0.438^{NS}	0.572*	-0.441^{NS}
Aphid	0.728**	0.714**	0.690**	0.761**	-0.556*
Whitefly	0.849**	0.763**	0.652**	0.770**	-0.591*

NS: Non-significant ($p \geq 0.05$), * Significant ($p < 0.05$), **Highly Significant ($p < .0.1$)

Similarly, Mandali and Vijayalakshmi (2020) evaluated tomato genotypes for resistance to Tomato Leaf Curl Virus (ToLCV) using disease severity indices and identified DT1504 × DT911 as highly resistant, along with parental lines such as DT911 and DT806, while Pusa Ruby and Pusa Rohini were highly susceptible. In our study, the leaf curl index served as an indicator, where varieties with lower index values were considered less susceptible to whitefly-induced leaf curl, reflecting the same principle observed in ToLCV resistance screening.

Yield performance of the tomato genotypes

The highest yield was recorded on BARI Hybrid Tomato-5 (38.9±1.5 ton ha^{-1}) (Figure 1). Binatomato-12 showed the lowest yield with mean value of 11.9±0.5 ton ha^{-1}.

According to Amin *et al*. (2016), the moderate variety BARI Tomato-7 showed comparatively higher level of yield reduction, as the variety exerted highest abundance of fruit borer larval abundance and infestation. The study by Solangi *et al*. (2017) identified Rutgar and Eden Oblong as the least susceptible genotypes to sucking pests like

Table 5. Categories of resistance of the tested genotypes of tomato based on percent leaf curl indices (LCI)

Genotypes	LCI (%) at different days after incidence (DAI)			Mean LCI (%)	Resistance category
	30 DAI	60 DAI	90 DAI		
BD-12384	17.6±1.0bc	27.4±1.2ef	33.0±0.9fg	26.0±0.5de	Moderately susceptible
BD-12386	16.6±1.0c	45.7±1.4bc	64.9±1.4b	42.4±1.05b	Moderately susceptible
BD-12389	14.5±1.0cd	24.2±0.9ef	37.8±0.3ef	25.5±0.5de	Moderately susceptible
BD-12390	7.2±1.0ef	19.9±1.2gh	19.9±1.2ij	15.7±1.1hi	Moderately resistant
BD-12391	11.3±1.1de	23.1±0.9fg	26.2±1.1h	20.2±0.2fg	Moderately resistant
BD-12392	7.2±0.9ef	10.3±1.0jk	19.7±1.0ij	12.4±1.0i	Moderately resistant
BD-12394	22.8±1.0ab	40.8±1.1c	45.1±0.7d	36.2±0.8c	Moderately susceptible
BD-12395	10.4±1.0de	16.5±0.9hi	21.9±0.7h-j	16.2±0.8g-i	Moderately resistant
BARI Tomato-18	23.5±0.7a	48.9±1.0b	55.3±0.9c	42.5±0.3b	Moderately susceptible
BARI Hybrid Tomato-5	0±0g	5.2±1.0k	7.2±1.0k	4.1±0.5j	Resistant
BARI Hybrid Tomato-7	7.2±1.0ef	13.5±1.0ij	16.6±1.0j	12.4±0.5i	Moderately resistant
Binatomato-12	23.9±1.0a	72.7±1.1a	72.7±1.1a	56.4±0.9a	Susceptible
Binatomato-13	11.3±1.1de	33.8±0.6d	39.7±0.8de	28.3±0.8d	Moderately susceptible
Uttaran plus	7.2±1.0ef	32.4±1.1de	32.0±1.4g	23.8±1.0ef	Moderately resistant
Unnayan	14.5±1.0cd	14.5±1.0ij	20.5±1.1ij	16.5±0.7gh	Moderately resistant
Asa-1225	4.1±1.0fg	13.5±1.0ij	23.1±0.9hi	13.6±0.5hi	Moderately resistant

Data expressed as mean ± SE (standard error). Means within a column followed by same letter(s) are not significantly different by Tukey HSD posthoc statistic at <0.05.

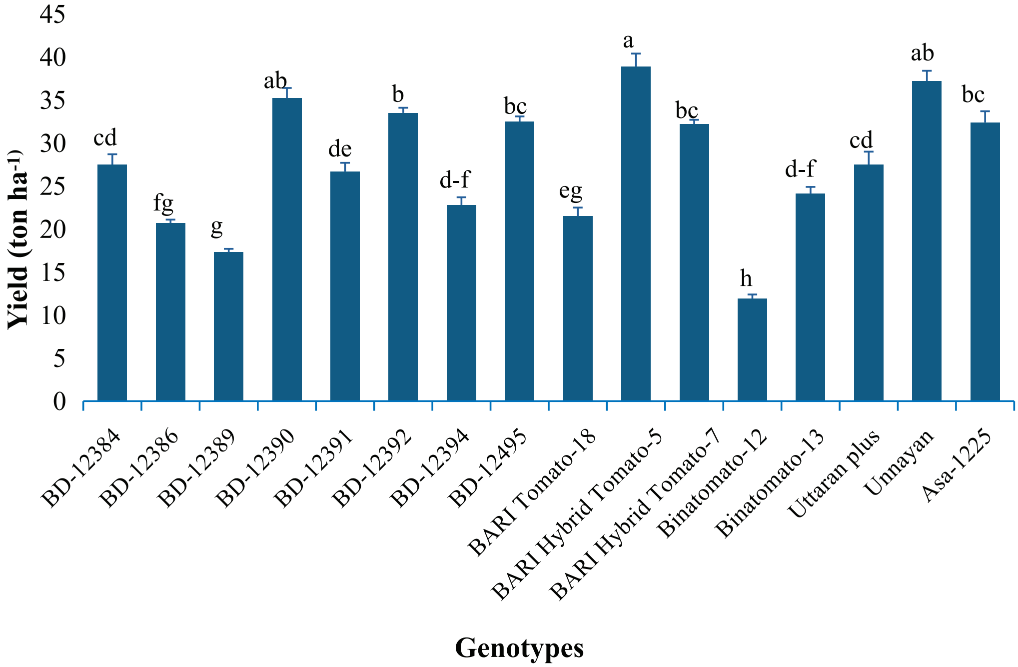

Fig. 1. Yield of the tested genotypes of tomato. Data expressed as mean ± SE (standard error). Means within a bar followed by same letter(s) are not significantly different by Tukey HSD posthoc statistic at <0.05.

aphids, thrips, whiteflies, jassids, and mites, suggesting these genotypes for higher yields with lower pest densities.

Conclusion

The study revealed significant variation among tomato genotypes in their response to sucking insect pests, which was closely associated with leaf physio-morphic traits, leaf curl index, and yield. Higher leaf moisture, sugar, and chlorophyll contents favored pest abundance, while higher trichome density reduced aphid and whitefly incidence. BARI Hybrid Tomato-5 exhibited the lowest pest abundance, minimal leaf curl index, and the highest yield, indicating resistant variety. Several genotypes showed moderate resistance, whereas Binatomato-12 was susceptible with severe leaf curl symptoms and low yield. Overall, the results highlight host plant resistance as an effective and sustainable approach for managing sucking insect pests in tomato, and the identified resistant genotypes can be utilized in cultivation and breeding programs.

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Authors' contribution

Data collection, analysis and manuscript writing (Md. Mehedi Hasan Emon); manuscript review and editing (Md. Mamunur Rahman); data analysis and manuscript review (Priyanka Roy, Hania Binta Aslam), conceptualization, research supervision and editing (Md Ruhul Amin).

Conflict of interests

The authors have reported no conflicts of interest.

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