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EFFECT OF LEAF TRICHOMES AND METEOROLOGICAL PARAMETERS ON POPULATION DYNAMICS OF APHID AND JASSID IN COTTON

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Abstract

This study was conducted with CB1, CB3, CB5, CB8 and C12 cotton varieties to determine the role of leaf trichomes and meteorological factors on the abundances of aphid and jassid. The mean population of the pests on the tested varieties differed significantly and showed negative correlation with trichomes. The pests were most abundant on CB12, and each variety revealed significantly higher population of jassid than that of aphid. Both the pests built up their population in the juvenile stage of the plants (73 days after sowing) and continued until harvesting. Aphid population was the highest on CB12 in the first week of November, whereas maximum abundance of jassid was on CB12 in the third week of December. Weather parameters were found insignificant on aphid abundance, but jassid population on the varieties was correlated with maximum and minimum temperatures, relative humidity and rainfall. Multiple regression equation based on weather parameters exerted 8.8 - 43.2% and 54.4 - 77.7% role on population build up of aphid and jassid, respectively. Maximum temperature had the most important effect which contributed 61.2% population fluctuation of jassid on CB12.

Keywords: Abiotic factors, *Gossypiun hirsutum*, sucking insects.

Introduction

Twelve species of insects are reported causing damage to cotton, *Gossypium hirsutum* in Bangladesh. Of them aphid, *Aphis gossypii* Glover (Hemiptera: Aphididae) and jassid, *Amrasca devastans* Distant (Hemiptera: Cicadellidae) are the most destructive, and cause damage throughout the season (Amin *et al.,* 2008; Amin *et al.,* 2009; Tithi *et al*., 2010; Azad *et al.,* 2011). Management of these sucking insects in Bangladesh is mostly relied on synthetic insecticides, which pollute the environment and threats to the abundance and diversity of predator and pollinator species (Azad *et al.,* 2010; Hossain *et al.,* 2013).

The aphid and jassid are sucking insects which ingest cell sap from leaves and developing bolls of cotton and transmit viral diseases. During feeding aphids

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secrete honeydew, which enhances sooty mold development, while jassids inject toxic substance, thus the pest retards photosynthesis, transportation of nutrients and water, and growth of the plants (Bi *et al*., 2001). The infested plants produce significantly lower amount of yield with degraded quality of fiber that creates problem in lint processing (Sharma and Singh, 2011). Bangladesh is a highly vulnerable country to climate change. The increasing temperature and CO_2 gases cause irremediable rainfall and drought that enhances pest problems and reduces the effectiveness of current pest management strategies (Amin *et al.,* 2013). Population fluctuations of herbivore insects throughout the cropping season depend on the amount and daily distribution of rainfall, relative humidity, temperature and sunshine (Jindal and Brar, 2005).

Different host plant species and varieties protect themselves from insect attack either with their chemical substances or morphological structures, which interrupt the life cycle, reproduction and population dynamics of the pests. Cotton varieties with higher densities of leaf trichomes exhibit resistance to insects (Bhat *et al.,* 1984). Cultivation of resistant variety ensures the plant to keep free from insect infestation and exerts higher yield without pest management expenditure (Nault *et al*., 2004). Information on cotton insect pests associated with the commercial varieties are inadequate in Bangladesh and the relevance of the results in relation to weather conditions is unknown, however, knowledge on varietal susceptibility or resistance, and population dynamics of the pest regarding weather parameters are fundamental components in forecasting model of an integrated pest management program. Considering the damage severity of aphid and jassid on cotton in Bangladesh, this study was designed to know the impact of weather parameters and leaf trichomes on the population dynamics of these two sucking insects on five commercially cultivated varieties.

Materials and Method

The study was conducted during July 2013 to January 2014 in the research field of the Department of Entomology, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur, Bangladesh. The eexperimental location (25°25′ North latitude and 89°5′ East longitude) is surrounded by Sal, *Shorea robusta* Gaertn forest and characterized by a well-defined dry season (February to May), wet season (June to September) and short winter (December and January).

The commercial cotton varieties CB1, CB3, CB5, CB8 and CB12 released by the Cotton Development Board of Bangladesh were cultivated for this study. The experimental design was randomized complete block with three replications. The plot size was 4.0m × 4.0m and the spacing between block to block and plot to plot was 1.0m and 1.0m, respectively. Seeds were sown on 2nd July 2013 in rows apart from 50 cm plant to plant and 1.0 m from row to row. All agronomic practices except pest control were adopted time to time to successfully raise the crops.

To observe the population abundance of aphid and jassid on the tested varieties, field inspection was done weekly from emergence of seedlings to first harvest of the seed cotton. For the counts of aphid and jassid population, three plants were randomly selected from each plot and tagged. The leaves of the plants were observed in such a way that one leaf of the upper part of the first plant, one leaf of the middle part of the second plant and one leaf of the bottom part of the third plant of each variety were taken into account. Both aphid and jassid built up their population in the second week of September (73 day after sowing, DAS) *i. e.,* at the blooming stage of the plants and data collection was started from 75 DAS. The population of aphid and jassid were counted with the help of a magnifying glass (FD75, Ballon Brand, China). Meteorological data related to temperature, relative humidity and rainfall were recorded from the adjoining meteorological observatory section of BSMRAU.

An analysis of variance (ANOVA) with Duncan's Multiple Range Test (DMRT) was applied to compare the population abundance of aphid and jassid on the cotton varieties. Comparison between aphid and jassid population on each variety was made with Student's T test. The Pearson's correlation was used to examine the relationship between trichome number and the pest population. The effects of weather parameters on the population abundance of aphid and jassid on the cotton varieties were determined by working out simple correlation. The combined effect of the maximum and minimum temperature, relative humidity and rainfall on the population abundance of the insects were measured by using a Multiple Linear Regression Equation. All the analyses were performed using IBM SPSS statistics 21.

Results and Discussion

A. Results

Mean abundance of aphid and jassid on the cotton varieties (Fig. 1) ranged from 4.3 ± 0.4 to 6.4 ± 0.7 and 7.3 ± 0.6 to 13.1 ± 1.1 $leaf^{-1}$, respectively and the results differed significantly (aphid: $F_{4, 250} = 2.9$, $p < 0.05$; jassid: $F_{4, 250} = 9.9$, $p < 0.001$). Among the tested varieties, CB12 revealed significantly higher number of aphid and jassid population compared to other varieties. T statistics demonstrated significantly higher abundance of jassid than aphid on each variety ($t_{50} = 4.7$, $p < 0.001$; $t_{50} = 5.7$, $p < 0.001$; $t_{50} = 4.8$, $p < 0.001$; $t_{50} = 3.2$, $p < 0.01$; $t_{50} = 4.9$, $p < 0.001$ for CB1, CB3, CB5, CB8 and CB12, respectively).

Number of trichomes on the midrib of the varieties showed significant negative correlation ($y = -0.050x + 7.607$, $r = 0.904$, $F_{1, 3} = 13.0$, $p < 0.05$) with aphid, and non-significant negative correlation ($y = -0.107x + 14.57$, $r = 0.684$, $F_{1, 3} = 2.6$, $p = 0.20$) with jassid population (Fig. 2).

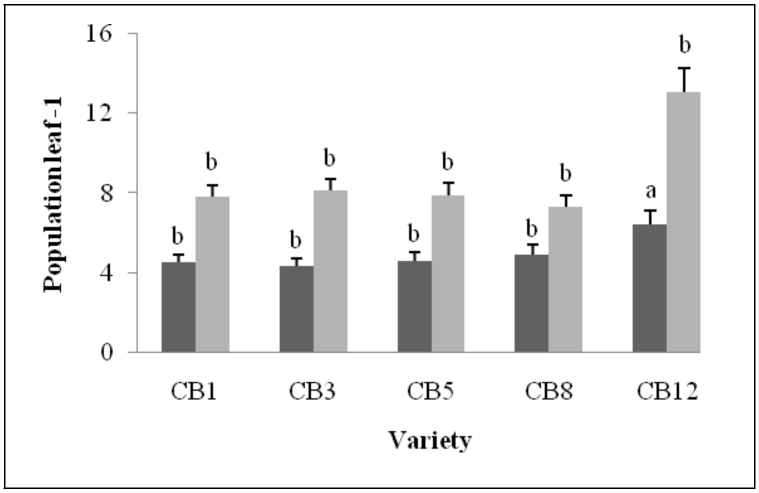

Fig. 1. Abundance (mean ± SE) of aphid (■) and jassid (□) population on five cotton varieties. Bars with same letter are not significantly different (DMRT, $p \leq 0.05$).

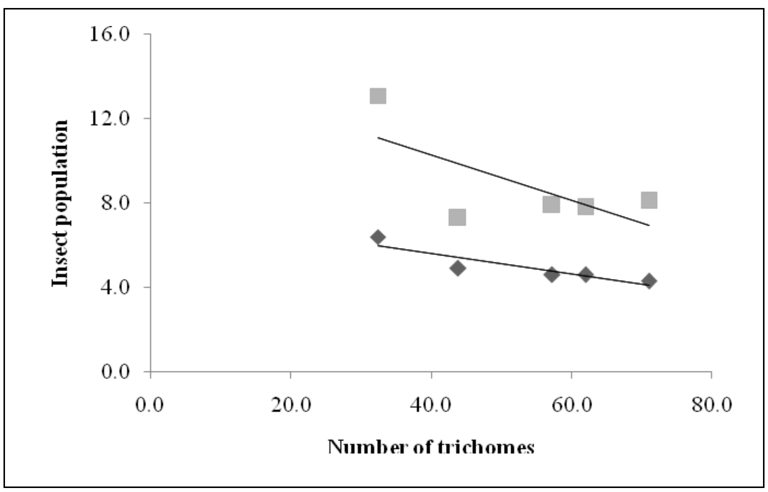

Fig. 2. Relationship between insect population (aphid ■ and jassid □) and number of trichomes on ventral midrib of the five cotton varieties.

Figure 3 showed the population abundance of aphid throughout the season on the tested varieties. An increased trend of population was observed in the first week of November on all the varieties and then declined. At that time, aphid population reached to the peak (17.0 leaf^{-1}) on CB12 followed by CB3, CB8, CB5 and CB1. Again aphid population increased rapidly in early December and reached the highest (15.0 leaf^{-1}) on CB12 followed by CB1, CB3, CB8 and CB5. After that, aphid population declined rapidly and again increased in early January and showed higher density (12.3 leaf^{-1}) on CB12 followed by CB8, CB1, CB5 and CB3.

Jassid population abundance throughout the season on the tested varieties showed fluctuations (Fig. 4). It increased in the second week of November and then declined. At that time, jassid showed the highest density (22.7 leaf^{-1}) on CB12 followed by CB8, CB5, CB1 and CB3. Jassid population increased rapidly and reached to the peak (26.3 leaf^{-1}) after second week of December on CB12. After this peak, its population declined rapidly and again increased in early January and showed higher density (19.7 leaf^{-1}) on CB12.

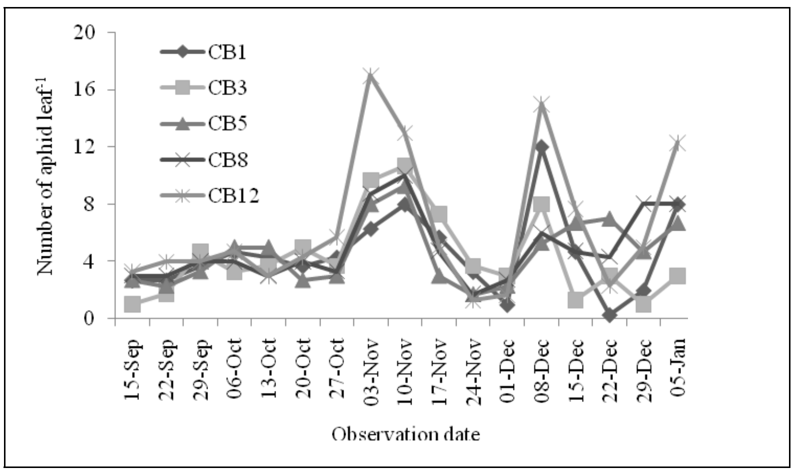

Fig. 3. Population build up of aphid on five cotton varieties.

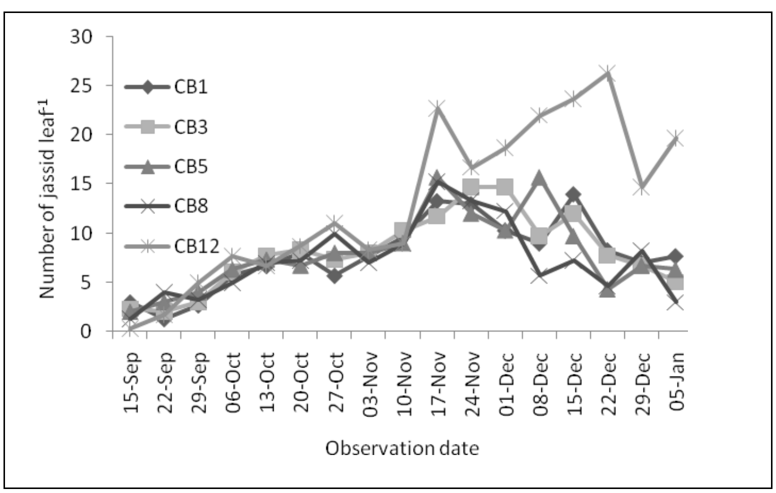

Fig. 4. Population build up of jassid on five cotton varieties.

The weather parameters indicated that in the middle of September when aphid and jassid population were first recorded, the maximum and minimum temperatures were 32.3 °C and 26.0 °C, respectively. At that time relative humidity was 85%, and there was no rainfall (Table 1). At the end of October when aphid population started rising, the maximum and minimum temperatures decreased (25.0 °C and 21.5 °C, respectively), the relative humidity slightly declined (77%), and there was little rainfall (1.1 mm). The peak of aphid population was recorded in the first week of November and at that time maximum and minimum temperatures, relative humidity were 30.0 °C, 21.0 °C and 84% respectively, and there was no rainfall.

Table 1. Data regarding meteorological observations on various weather parameters

Observation date	Temperature °C		%Relative humidity	Rainfall (mm)
	Maximum	Minimum		
15.09.13	32.3	26.0	85	0.0
22.09.13	33.5	27.5	76	0.0
29.09.13	32.0	26.0	85	1.6
06.10.13	30.0	25.0	92	12.9
13.10.13	34.0	29.0	77	0.0
20.10.13	32.0	26.0	92	0.0
27.10.13	25.0	21.5	77	1.1
03.11.13	30.0	21.0	84	0.0
10.11.13	30.8	16.0	84	0.0
17.11.13	29.0	14.0	73	0.0
24.11.13	28.2	13.5	68	0.0
01.12.13	29.0	15.0	75	0.0
08.12.13	24.0	14.0	75	0.0
15.12.13	24.0	11.5	73	0.0
22.12.13	25.0	13.0	90	0.0
29.12.13	25.0	11.0	89	0.0
05.01.14	22.0	11.0	90	0.0

Table 2. Correlation coefficient (r) values between aphid population on five cotton varieties and weather parameters

Variety	Temperature °C		Relative humidity (%)	Rainfall (mm)
	Maximum	Minimum		
CB1	- 0.266 NS	- 0.181 NS	- 0.105 NS	0.002 NS
CB3	0.118 NS	- 0.056 NS	- 0.051 NS	- 0.092 NS
CB5	- 0.308 NS	- 0.328 NS	0.344 NS	0.008 NS
CB8	- 0.313 NS	- 0.399 NS	0.401 NS	- 0.122 NS
CB12	- 0.319 NS	- 0.252 NS	0.109 NS	- 0.111 NS

NS, Non-significant ($p \leq 0.05$).

Table 3. Multiple linear regression models along with coefficients of determination (R^2) regarding the impact of weather parameters on the population of aphid throughout the season on five cotton varieties

Variety	Regression equation	R^2	100 R^2	Role of individual factor (%)	F statistic	
CB1	$Y = 10.371 - 0.204X_1$	0.071	7.1	7.1	$F_{1,15} = 1.15$	p = 0.30
	$Y = 11.541 - 0.279 X_1 + 0.052X_2$	0.076	7.6	0.5	$F_{2,14} = 0.57$	P = 0.58
	$Y = 16.278 - 0.322X_1 + 0.082X_2 - 0.050X_3$	0.092	9.2	1.6	$F_{3,13} = 0.44$	P = 0.73
	$Y = 16.552 - 0.311X_1 + 0.072X_2 - 0.055X_3 + 0.047X_4$	0.094	9.4	0.2	$F_{4,12} = 0.31$	P = 0.87
CB3	$Y = 1.686 + 0.093X_1$	0.014	1.4	1.4	$F_{1,15} = 0.21$	p = 0.65
	$Y = - 3.099 + 0.401 X_1 - 0.213X_2$	0.087	8.7	7.3	$F_{2,14} = 0.67$	P = 0.53
	$Y = - 4.181 + 0.411X_1 - 0.220X_2 + 0.011X_3$	0.088	8.8	0.1	$F_{3,13} = 0.42$	p = 0.74
	$Y = -4.314 + 0.406X_1 - 0.215X_2 + 0.014X_3 - 0.023X_4$	0.088	8.8	0.0	$F_{4,12} = 0.29$	p = 0.88
CB5	$Y = 9.954 - 0.186X_1$	0.095	9.5	9.5	$F_{1,15} = 1.57$	p = 0.23
	$Y = 8.151 - 0.070 X_1 - 0.080X_2$	0.112	11.2	11.2	$F_{2,14} = 0.89$	p = 0.44
	$Y = - 3.648 + 0.037X_1 - 0.156X_2 + 0.125X_3$	0.275	27.5	16.3	$F_{3,13} = 1.65$	p = 0.23
	$Y = -3.760 + 0.032X_1 - 0.152X_2 + 0.127X_3 - 0.019X_4$	0.276	27.6	0.1	$F_{4,12} = 1.14$	p = 0.38
CB8	$Y = 10.625 - 0.201X_1$	0.098	9.8	9.8	$F_{1,15} = 1.63$	p = 0.22
	$Y = 7.012 + 0.032 X_1 - 0.161X_2$	0.160	16.0	6.2	$F_{2,14} = 1.34$	P = 0.30
	$Y = - 8.443 + 0.172X_1 - 0.260X_2 + 0.163X_3$	0.409	40.9	24.9	$F_{3,13} = 3.00$	p = 0.07
	$Y = - 9.201 + 0.142X_1 - 0.231X_2 + 0.178X_3 - 0.129X_4$	0.432	43.2	2.3	$F_{4,12} = 2.28$	p = 0.12
CB12	$Y = 18.226 - 0.413X_1$	0.102	10.2	10.2	$F_{1,15} = 1.70$	p = 0.21
	$Y = 18.768 - 0.448 X_1 + 0.024X_2$	0.102	10.2	0.0	$F_{2,14} = 0.95$	P = 0.47
	$Y = 11.830 - 0.385X_1 - 0.020X_2 + 0.073X_3$	0.114	11.4	1.2	$F_{3,13} = 0.56$	p = 0.65
	$Y = 10.543 - 0.436X_1 + 0.029X_2 + 0.098X_3 - 0.219X_4$	0.130	13.0	1.6	$F_{4,12} = 0.45$	p = 0.77

Y, aphid population leaf^{-1}; X_1, maximum temperature (ºC); X_2, minimum temperature (ºC); X_3, relative humidity (%); X_4, rainfall (mm).

Jassid population started increasing after second week of November when daily maximum and minimum temperatures, and relative humidity were 29.0 ^{o}C, 14.0 ^{o}C and 73%, and there was no rainfall (Table 1). Jassid population appeared to the peak in the third week of December when the maximum and minimum temperatures, and relative humidity were 25.0^{o}C, 13.0^{o}C and 90%, respectively and there was no rainfall.

The correlation coefficient values between aphid population and weather parameters exerted that population on CB3 had non-significant positive relationship with maximum temperature, whereas other varieties revealed non-significant negative relationship (Table 2). Multiple linear regressions demonstrated that maximum temperature individually contributed 1.4 - 10.2% aphid population fluctuation among the tested varieties and the effects were non-significant (Table 3). Minimum temperature exerted non-significant negative correlation with aphid population on each variety (Table 2) and its individual contribution on population fluctuation among the varieties ranged from 0.0 - 11.2% (Table 3), and the effects were non-significant.

The relative humidity revealed non-significant negative correlation with aphid population on CB1 and CB3, and non-significant positive correlation on CB5, CB8 and CB12 (Table 2). The relative humidity individually contributed 0.1 - 24.9% population fluctuation among the varieties and its effect was non-significant (Table 3). Rainfall showed non-significant positive correlation with aphid population on CB3 and CB5, and other varieties revealed non-significant negative correlation (Table 2). Multiple regression analysis indicated that rainfall individually exerted 0.0 - 2.3% contribution towards the population fluctuation of aphid on the varieties and its effect was insignificant (Table 3).

The multiple linear regression analysis showed that all the weather parameters together contributed 43.2% population fluctuation of aphid on CB8 followed by 27.6%, 13.0%, 9.4% and 8.8% on CB5, CB12, CB1and CB3, respectively, but none of the equation was found to be significant (Table 3).

Table 4. Correlation coefficient (r) values between jassid population on five cotton varieties and weather parameters

Variety	Temperature ^{o}C		Relative humidity (%)	Rainfall (mm)
	Maximum	Minimum		
CB1	- 0.437	- 0.716**	- 0.442	- 0.210
CB3	- 0.271	- 0.573*	- 0.552*	- 0.185
CB5	- 0.344	- 0.528*	-0.601*	- 0.141
CB8	- 0.083	- 0.391	- 0.579*	- 0.173
CB12	- 0.782 **	- 0.863**	- 0.234	- 0.211

* Significant ($p \leq 0.05$), ** Highly significant ($p \leq 0.01$).

Table 5. Multiple linear regression models along with coefficients of determination (R^2) regarding the impact of weather parameters on the population of jassid throughout the season on five cotton varieties

Variety	Regression equation	R^2	100 R^2	Role of individual factor (%)	F statistic	
CB1	$Y = 19.915 - 0.423X_1$	0.191	19.1	19.1	$F_{1\ 15} = 3.55$	$p = 0.08$
	$Y = 6.239 + 0.458\ X_1 - 0.609X_2$	0.585	58.5	39.4	$F_{2\ 14} = 9.86$	$P < 0.01$
	$Y = 18.657 + 0.345X_1 - 0.530X_2 - 0.131X_3$	0.656	65.6	7.1	$F_{3,13} = 8.25$	$P < 0.01$
	$Y = 19.708 + 0.387X_1 - 0.569X_2 - 0.152X_3 + 0.179X_4$	0.675	67.5	1.9	$F_{4\ 12} = 6.23$	$P < 0.01$
CB3	$Y = 16.035 - 0.279X_1$	0.074	7.4	7.4	$F_{1,15} = 1.19$	$p = 0.29$
	$Y = 1.733 + 0.642\ X_1 - 0.637\ X_2$	0.454	45.4	38.0	$F_{2,14} = 5.83$	$P < 0.05$
	$Y = 20.856 + 0.469X_1 - 0.514X_2 - 0.202X_3$	0.603	60.3	22.3	$F_{3,13} = 6.58$	$p < 0.01$
	$Y = 22.293 + 0.526X_1 - 0.569X_2 - 0.230X_3 + 0.245X_4$	0.635	63.5	3.2	$F_{4,12} = 5.22$	$p < 0.05$
CB5	$Y = 18.190 - 0.359X_1$	0.118	11.8	11.8	$F_{1,15} = 2.01$	$p = 0.18$
	$Y = 8.029 + 0.296\ X_1 - 0.452X_2$	0.304	30.4	18.6	$F_{2,14} = 3.06$	$p = 0.08$
	$Y = 32.883 + 0.070X_1 - 0.293X_2 - 0.263X_3$	0.547	54.7	24.3	$F_{3,13} = 5.24$	$p < 0.05$
	$Y = 34.497 + 0.135X_1 - 0.355X_2 - 0.294X_3 + 0.275X_4$	0.587	58.7	4.0	$F_{4,12} = 4.26$	$p < 0.05$
CB8	$Y = 9.696 - 0.084X_1$	0.007	0.7	0.7	$F_{1,15} = 0.10$	$p = 0.75$
	$Y = -3.398 + 0.759\ X_1 - 0.583X_2$	0.332	33.2	32.5	$F_{2,14} = 3.48$	$P = 0.06$
	$Y = 17.730 + 0.567X_1 - 0.448X_2 - 0.223X_3$	0.516	51.6	18.4	$F_{3,13} = 4.63$	$p < 0.05$
	$Y = 19.048 + 0.620X_1 - 0.498X_2 - 0.249X_3 + 0.224X_4$	0.544	54.4	2.8	$F_{4\ 12} = 3.57$	$p < 0.05$
CB12	$Y = 61.330 - 1.687X_1$	0.612	61.2	61.2	$F_{1,15} = 23.68$	$p < 0.01$
	$Y = 42.598 - 0.481\ X_1 - 0.834X_2$	0.761	76.1	14.9	$F_{2,14} = 22.23$	$p < 0.01$
	$Y = 55.037 - 0.593X_1 - 0.755X_2 - 0.132X_3$	0.775	77.5	1.4	$F_{3\ 13} = 14.91$	$p < 0.01$
	$Y = 55.741 - 0.565X_1 - 0.781X_2 - 0.145X_3 + 0.120X_4$	0.777	77.7	0.2	$F_{4,12} = 10.43$	$p < 0.01$

Y, aphid population leaf^{-1}; X_1, maximum temperature (ºC); X_2, minimum temperature (ºC); X_3, relative humidity (%); X_4, rainfall (mm).

Jassid population on each variety showed negative correlation with weather parameters (Table 4). Maximum temperature individually exerted 0.7 - 61.2% population fluctuation among the tested varieties and its effect was highly significant only on the CB12 (Table 5). Minimum temperature individually exerted 14.9 - 39.4% population fluctuation and its effect was highly significant on all varieties except CB8. The combination effect of maximum and minimum temperature was found to be significant on CB1, CB3 and CB12.

The individual effect of the relative humidity revealed 1.4 - 24.3% fluctuation of jassid population and its effect was significant on CB3, CB5 and CB8 (Table 4). The combination effect of maximum and minimum temperature and relative humidity was significant on all varieties. Contribution of rainfall regarding population fluctuation of jassid among the tested varieties varied from 0.2 - 4.0% and its effect on each variety was insignificant (Table 5).

The multiple linear regression analysis showed that all the weather parameters together contributed 77.7, 67.5, 63.5, 58.7 and 54.4% population fluctuation of jassid on CB12, CB1, CB3, CB5 and CB8 variety, respectively, and the equations were significant (Table 5).

B. Discussion

Aphid and jassid population on the tested varieties differed significantly, and both the species showed significantly higher abundance on CB12. The differences in abundance of the pests on the tested varieties may be due to the leaf trichomes. Other characteristics, such as leaf thickness and toughness, the pH of the cell sap, content of moisture, sugar, protein, minerals or tanin in the leaf may affect the population abundance. The present study showed close conformity with Amjad *et al.* (2009) who tested five cotton cultivars against whitefly, thrips, jassid and aphid, and found significant variations in population abundance of the pests on different varieties. The present findings also showed congruity with Khan (2011) who studied jassid, thrips and white fly population on nine cotton varieties and found significant variations in their abundance.

This study showed that the leaf trichomes of the varieties had significant negative correlation with aphid and non-significant negative correlation with jassid and the varieties exerted significantly higher abundance of jassid compared to aphid. The trichomes created obstacles in foraging, feeding, ingestion, digestion, mating and oviposition, thus prevented their abundance.

The emergence of aphid and jassid population was associated with juvenile stage of the plants. Variations in weather conditions and time of the season also have affected population dynamics of the pests. Amjad *et. al.* (2009) observed the population abundance of sucking insects on five cotton cultivars and found significant variations in population abundance with time of the season. The population of aphid and jassid built up on the cotton varieties in the middle of September and continued throughout the season. Shivanna *et al.* (2011) found the abundance of aphid on cotton throughout the season except July, August and September when the rainfall was very high. In this study, both aphid and jassid population were found the highest on CB12 in the first week of November and in the third week of December, respectively. The meteorological conditions of those periods may be attributed to the enhanced rate of development and reproduction of the pests on cotton crops.

The individual and combine effect of the weather parameters showed non-significant effect on the population dynamics of aphid, however the combined effect of the parameters resulted 8.8 to 43.2% fluctuation. A study by Mahmood *et al.* (1990) in Pakistan showed that the weather parameters together were responsible for 73.0% population fluctuation of aphid on okra plants. A study by Sharma *et al.* (2013) dipicted that aphid population on tomato was positively but non-significantly correlated with the maximum temperature, negative non-significant with relative humidity and rainfall.

The maximum and minimum temperatures, relative humidity and rainfall showed significant negative correlation on the population of jassid on the varieties. The weather parameters together also contributed significant effect on the population which varied from 54.4 to 77.7%. Sharma and Singh (2012) noted 50.0 to 96.0% population fluctuation of jassid on five varieties of potato in Uttar Pradesh, India. Our findings are in line with Patel *et al.* (1997), who reported a negative correlation between the population of jassid and temperature. The present findings are partially in accordance with those of Arif *et al.* (2006), who reported a negative and non-significant correlation between the relative humidity and jassid-population on okra. Prasad and Logiswaran (1997) found a negative association between the jassid population and rainfall.

Understanding the demographic parameters of a pest regarding meteorological parameters, it is essential to develop an integrated pest management strategy for crop varieties, because these parameters provide population growth rate of an insect pest in the current and next generations (Frel *et. al.,* 2003). The present experiment demonstrated significant differences in the abundance of two sucking insects among the five cotton varieties tested. The lower population abundance of aphid and jassid on CB1 and CB3 was due to higher number of trichomes.

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