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Article in International Journal of Current Microbiology and Applied Sciences · December 2018

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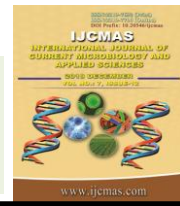


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Screening of Cotton Varieties/Genotypes against Jassid, *Amrasca biguttula biguttula* (Ishida) under Rainfed Conditions

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ABSTRACT

Keywords

Cotton, *Gossypium*, jassid, *Amrasca biguttula biguttula*, screening, varieties/genotypes, Seed cotton yield

Article Info

Accepted:
 10 November 2018
 Available Online:
 10 December 2018

Screening of sixteen cotton varieties/genotypes against jassid, *Amrasca biguttula biguttula* (Ishida) was carried out under rainfed conditions during *kharif* seasons of 2015-16 and 2016-17 at Regional Cotton Research Station, Navsari Agricultural University, Maktampur farm, Bharuch, Gujarat. The results revealed that none of the cotton variety/genotype was totally free from attack of *A. biguttula biguttula* and categorized as resistant based on population of jassid. Eleven varieties/genotypes viz., G.Cot.-12, GSHV-01/1338, GISV-267, G.N.Cot.-22, GSHV-159, GISV-272, GBHV-177, GBHV-170, GBHV-180, GBHV-164 and G.Cot.-16 were designated as moderately resistant to jassid by recording the population ranged from 2.41 to 6.37 jassids/3 leaves. The susceptible cotton varieties/genotypes comprised G.Cot.-10, LRA-5166 and G.Cot.-100 which registered population ranged from 8.11 to 11.38 jassids/3 leaves. However, genotype Cocker-310 and GSB-21 were categorized as highly susceptible to jassid with population of more than 11.73 jassids/3 leaves. The highest seed cotton yield (2522 kg/ha) was recorded on moderately resistant genotype GISV-272. The seed cotton yield showed highly significant negative correlation with jassid population ($r = -0.646$).

Introduction

Cotton is the most important cash crop of monsoon season in India and popularly known as “white gold”. India has a unique distinction of being the only country in the world to cultivate all four cultivable *Gossypium* species. *Gossypium hirsutum* represents 99.9 per cent of the hybrid cotton in India and all the current Bt cotton hybrids are either *G. hirsutum* or inter-specific hybrids with *G. barbadense*. In India, cotton is grown under 40 per cent irrigated and 60 per cent rainfed

conditions, Gujarat and Odisha where much of the crop is rainfed. India ranks first in cotton production (27.0 million bales of 480 lb.) as well as area (10.85 million hectares) in global scenario. However, the productivity of cotton crop in India (542 kg/ha) is still far less than world average (781 kg/ha) in 2016-17 (Anonymous, 2018a). Gujarat leads in cotton production with 95.00 lakh bales. The provisional cotton productivity of Gujarat is 671 kg/ha from an area of 24.05 lakh hectares in 2016-17 (Anonymous, 2018b). Cotton crop attract a variety of insect pests and mites, such

as sucking pest complex (whitefly, jassids, thrips and mites) and bollworm pest complex (Spotted, Pink and American bollworm). Gouda *et al.*, (2014) noted that the lower productivity of cotton was mainly due to crop grown under rainfed situation and incidence of insect pest (15-20%). Estimated losses in cotton production due to pests were 20.9 per cent and those due to diseases as 13.5 per cent, an average (Freire *et al.*, 1999). Chavan *et al.*, (2010) observed that the avoidable losses due to major insect-pests (sucking pests + bollworms) were 2.94 q/ha or 28.13 per cent.

American cotton is highly susceptible to sucking insect pests and of which jassid, *A. biguttula biguttula* also referred, as leafhopper is important sucking pest. Both nymphs and adults suck the plant sap and apparently introduce salivary toxins that impair photosynthesis in proportion to the amount of feeding. The affected leaves curl downwards, turn yellowish, then to brownish before drying and shedding. The incidence of sucking pests was more or less similar in both *Bt* and non *Bt* hybrids. Panchabhavi *et al.*, (1990) reported that the average losses due to sucking pests (aphids, jassids and thrips) in cotton were 46.41 per cent. Singh and Lakra (1992) assessed the average reduction in yield of seed cotton due to *A. biguttula biguttula* [*A. devastans*] was 15.9 per cent.

The insect pest management programme against cotton jassid still relies heavily on the chemical insecticides, which lead to a destabilization of ecosystem and enhanced resistance to insect pests. To overcome these problems, varietal screening is an important component of Integrated Pest Management concept. Therefore, attempts have been made to have comprehensive information on screening of cotton varieties/genotypes against jassid, *Amrasca biguttula biguttula* under rainfed conditions.

Materials and Methods

Sixteen cotton varieties/genotypes were screened for their resistance/susceptibility against jassid under rainfed conditions at Regional Cotton Research Station, Navsari Agricultural University, Maktampur, Bharuch, Gujarat during *kharif* 2015-16 and 2016-17 (Plate-1). The seeds of different cotton varieties/genotypes were collected from Main Cotton Research Station, Navsari Agricultural University, Athwa farm, Surat and Regional Cotton Research Station, Navsari Agricultural University, Maktampur, Bharuch. The geographic location of experiments was 21.712684° N latitude, 73.012663° E longitude and 21.711245° N latitude, 73.012157° E longitude during *kharif* seasons of 2015-16 and 2016-17, respectively. During both *kharif* seasons, the crop was sown on 30th July, 2015 and 4th July, 2016. The experiment was laid out in Randomized Block Design replicated thrice. Each cotton variety/genotype was sown in five rows with ten dibbles in each row. The crop was sown under a spacing of 120 x 45 cm with 120 kg/ha nitrogen fertilizer application and under normal agronomic practices. The field experiment was conducted with gross plot size of 7.20 m x 5.40 m (cotton + okra) and 6.00 m x 4.50 m (cotton crop), whereas net plot size of 3.60 m x 3.60 m. The treatment details are as under.

| Cotton varieties/genotypes | | | |
|----------------------------|--------------|-----------------|------------|
| T ₁ | GSHV-159 | T ₉ | G.Cot.100 |
| T ₂ | GSHV-01/1338 | T ₁₀ | G.Cot.10 |
| T ₃ | GISV-267 | T ₁₁ | LRA-5166 |
| T ₄ | GISV-272 | T ₁₂ | G.Cot.16 |
| T ₅ | GBHV-164 | T ₁₃ | Cocker-310 |
| T ₆ | GBHV-170 | T ₁₄ | GSB-21 |
| T ₇ | GBHV-177 | T ₁₅ | G.Cot.12 |
| T ₈ | GBHV-180 | T ₁₆ | G.N.Cot.22 |

Sowing of okra and cultural operations

All the cultural operations adopted timely resulted in good crop condition till to maturity stage during both seasons. However, crop was kept free from insecticidal spray during entire crop period. Okra crop (GAO-5 variety) was grown with cotton for population buildup of jassid. One infester row of okra was sown in between each treatment of five rows of cotton variety/genotype. Two dibbles of okra were also sown in each row of cotton *i.e.* one dibble of okra at each side in each row having ten dibbles of cotton. Okra crop was removed after 60-75 days after sufficient population buildup of cotton jassid (Plate-2). Okra crop was also kept free from insecticidal spray.

Method of recording observations

The population of jassid was recorded at weekly interval starting from the 30 days after sowing till crop period. The observations on jassid were recorded by counting of nymphs and adults of jassid from ten randomly selected plants in each replication of different cotton varieties/genotypes. The numbers of jassids were recorded from three leaves *i.e.* top, middle and bottom of each selected plant.

Categorization of cotton varieties/genotypes for susceptibility to jassid based on population of jassid

The cotton varieties/genotypes were grouped into four categories of resistance to *A. biguttula biguttula viz.*, resistant, moderately resistant, susceptible and highly susceptible based on number of jassids per three leaves. For the purpose, the mean value of individual genotype (\bar{X}_i) was compared with mean value of all genotypes (\bar{X}) and standard deviation (SD) following the scale adopted by Patel *et al.*, (2002). The scale used for categorizing different genotypes was as under.

| Category of resistance | Scale of resistance |
|---------------------------|--|
| Resistant (R) | $\bar{X}_i < (\bar{X} - SD)$ |
| Moderately Resistant (MR) | $\bar{X}_i > (\bar{X} - SD) < \bar{X}$ |
| Susceptible (S) | $\bar{X}_i > \bar{X} < (\bar{X} + SD)$ |
| Highly susceptible (HS) | $\bar{X}_i > (\bar{X} + SD)$ |

Seed cotton yield

The seed cotton yield was recorded from each replication of different treatments during each picking and converted to hectare basis.

Results and Discussion

The results obtain during present studies are presented in Table 1 to 3 and depicted in Figure 1 and 2. The season wise results are discussed hereunder.

Population of jassid (2015-16)

The data on population of jassid on different cotton varieties/genotypes during 2015-16 presented in Table 1 indicated that none of the cotton genotypes was found completely free from the attack of jassids. The cotton variety G.Cot.-12 registered less jassid population with 1.94 jassids/3 leaves among all cotton genotypes which was at par with GSHV-01/1338 and GISV-267 by recording 2.53 and 3.19 jassids/3 leaves, respectively. The next varieties/genotypes *viz.*, G.N.Cot.-22 (3.40 jassids/3 leaves), GSHV-159 (3.49 jassids/3 leaves) and GISV-272 (3.66 jassids/3 leaves) showed less population of jassid followed by GBHV-177 (4.33 jassids/3 leaves). Significantly the highest population of jassid was observed in GSB-21 (17.88 jassids/3 leaves). The next genotype Cocker-310 (11.82 jassids/3 leaves) showed higher jassid population followed by G.Cot.-100 (9.37 jassids/3 leaves). Two genotypes *viz.*, G.Cot.-

10 and LRA-5166 recorded above economic threshold level of jassid population *i.e.* 6.44 and 6.21 jassids/3 leaves, respectively and it was at par with each other. The rest of genotypes *viz.*, GBHV-180, GBHV-170, GBHV-164 and G.Cot.-16 showed intermediate range of jassid population *i.e.* 5.07 to 5.93 jassids/3 leaves.

Population of jassid (2016-17)

Perusal of data presented in Table 1 on jassid population on different cotton varieties/genotypes during 2016-17 revealed that all the cotton varieties/genotypes differed significantly in population of jassid. The population of jassid on various varieties/genotypes ranged from 2.71 to 21.91 jassids/3 leaves. Genotype GSHV-01/1338 (2.71 jassids/3 leaves) recorded significantly lowest jassid population which was at par with G.Cot.-12 (2.87 jassids/3 leaves), GISV-267 (3.44 jassids/3 leaves), GSHV-159 (3.82 jassids/3 leaves) and G.N.Cot.-22 (3.85 jassids/3 leaves). The next varieties/genotypes *viz.*, GISV-272 (4.20 jassids/3 leaves), GBHV-170 (4.91 jassids/3 leaves), GBHV-180 (5.29 jassids/3 leaves) and GBHV-177 (5.65 jassids/3 leaves) recorded below economic threshold level of jassid population and it was at par with each other. However, significantly the highest population of jassid was observed in GSB-21 (21.91 jassids/3 leaves) and it was at par with Cocker-310 (18.38 jassids/3 leaves). The rest of varieties/genotypes *viz.*, GBHV-164, G.Cot.-16, G.Cot.-10, LRA-5166 and G.Cot.-100 registered above economic threshold level of jassid population *i.e.* 6.30, 6.81, 9.78, 10.83 and 13.40 jassids/3 leaves, respectively.

Pooled data (2015-16 and 2016-17)

The overall mean pooled data of year 2015-16 and 2016-17 presented in Table 1 and depicted in Figure 1 demonstrated that the population of jassid on various cotton varieties/genotypes

ranged from 2.41 to 19.89 jassids/3 leaves. The lowest population of jassid was recorded in G.Cot.-12 (2.41 jassids/3 leaves) which was at par with GSHV-01/1338, GISV-267, G.N.Cot.-22, GSHV-159, GISV-272, GBHV-177, GBHV-170, GBHV-180 and GBHV-164 showed jassid population of 2.62, 3.32, 3.62, 3.65, 3.93, 4.99, 5.06, 5.18 and 5.87 jassids/3 leaves, respectively. However, the highest jassid population was observed in GSB-21 (19.89 jassids/3 leaves) and it was at par with Cocker-310 (15.10 jassids/3 leaves). The rest of varieties/genotypes *viz.*, G.Cot.-16, G.Cot.-10, LRA-5166 and G.Cot.-100 registered above economic threshold level of jassid population *i.e.* 6.37, 8.11, 8.52 and 11.38 jassids/3 leaves, respectively. The ascending order of jassid population on different cotton genotypes was G.Cot.-12 < GSHV-01/1338 < GISV-267 < G.N.Cot.-22 < GSHV-159 < GISV-272 < GBHV-177 < GBHV-170 < GBHV-180 < GBHV-164 < G.Cot.-16 < G.Cot.-10 < LRA-5166 < G.Cot.-100 < Cocker-310 < GSB-21. The interaction (Year x Treatment) was showed significant effects which indicated non-consistent performance of cotton genotypes over the year.

In past, Mohapatra and Nayak (2014) investigated the efficacy of twenty seven Bt cotton hybrids under rainfed conditions of Odisha and showed the mean population of jassid ranged from 0.72/leaf to 4.95/leaf. Yousaf *et al.*, (2015) tested twenty five cotton genotypes and observed the minimum average population of jassid on cultivars FH-941 (1.54 and 1.47/leaf) and PB-900 (1.54 and 1.53/leaf) and found comparatively resistant however, maximum average population was found on cultivars BH-172 (10.90 and 3.04/leaf) and MNH-814 (2.61 and 3.00/leaf). The ranges of jassids population in different cotton genotypes reported by earlier scientists are more or less in line with the present investigation however they tested different cotton genotypes at different places.

Categorization of cotton varieties/genotypes for susceptibility to jassid based on population of jassid

An attempt was made to classify different cotton varieties/genotypes with four categories of susceptibility to *A. biguttula biguttula* viz., Resistant (R), Moderately Resistant (MR), Susceptible (S) and Highly Susceptible (HS) based on population of jassid. Genotypes were grouped into above categories based on number of jassids/3 leaves by comparing the mean incidence of individual genotype (\bar{X}_i) with mean incidence of all genotypes (\bar{X}) and standard deviation (SD). The details of categorization are presented hereunder.

The data presented in Table 2 revealed that none of the cotton genotypes evaluated in the present study fall under categories as resistant. Eleven varieties/genotypes viz., G.Cot.-12, GSHV-01/1338, GISV-267, G.N.Cot.-22, GSHV-159, GISV-272, GBHV-177, GBHV-170, GBHV-180, GBHV-164 and G.Cot.-16 were designated as moderately resistant to jassid by recording the population ranged from 2.41 to 6.37 jassids/3 leaves. The susceptible varieties/genotypes comprised G.Cot.-10, LRA-5166 and G.Cot.-100 which registered population ranged from 8.11 to 11.38 jassids/3 leaves. However, genotypes Cocker-310 and GSB-21 were categorized as highly susceptible to jassid with population of more than 11.73 jassids/3 leaves.

The present findings are in conformity with the findings of Patel (2014) who screened fifteen *hirsutum* cotton genotypes for their reaction to *A. devastans* and reported that no genotype was found resistant to jassid infestation. Ten genotypes viz., K-3, K-2, KH-120, KH-121, KH-122, KH-113, JKHy-1, JK-4, KH-111 and KH-119 were categorized as tolerant (2.05 to 4.10 jassids/leaf) while five genotypes viz., KH-117, KH-134, KH-143, KH-138 and KH-132 as susceptible (> 4.10

jassids/leaf). Kumar *et al.*, (2015) evaluated the resistance levels of fourteen cotton genotypes to sucking pest complex at Lam, Guntur and observed the leafhopper population early in the cropping season, gradually increased and reached to maximum between 90 to 120 days after sowing. The genotypes NDLH-1938 and L-603 had shown comparatively greater resistance against leafhoppers with the population of 6.03 and 6.30 per 3 leaves per plant and leafhopper injury index 1.25 and 1.37 respectively. The genotypes LK-861 and L-389 were highly susceptible to leafhoppers with the population of 20.10 and 20.73 per 3 leaves and leafhopper injury index 3.14 and 3.22 respectively. These findings are more or less in similar with present study however they screened different cotton genotypes at different places.

Seed cotton yield of different cotton varieties/genotypes

First year (2015-16)

The seed cotton yield obtained from different cotton varieties/genotypes and their correlation coefficient with jassid population during 2015-16 presented in Table 3 revealed that seed cotton yield was significantly influenced by different varieties/genotypes. Significantly the highest (2053 kg/ha) seed cotton yield was recorded in genotype GISV-272 which was statistically at par with GISV-267 (1881 kg/ha) and GBHV-170 (1837 kg/ha); all these genotypes were found moderately resistant to *A. biguttula biguttula*. Next in line were another three moderately resistant genotypes viz., GBHV-164 (1775 kg/ha), GBHV-180 (1658 kg/ha) and GSHV-159 (1614 kg/ha). On other side the lowest seed cotton yield was recorded in GSB-21 (413 kg/ha) which did not differ statistically from Cocker-310 (537 kg/ha); both of these genotypes were found highly susceptible to *A. biguttula biguttula*. However, the moderately

resistant genotype G.Cot.-12 was statistically at par with these two highly susceptible genotypes by recording seed cotton yield of 589 kg/ha.

Table.1 Jassid population on different cotton varieties/genotypes under rainfed condition at Bharuch

| Sr. No. | Cotton varieties/ genotypes | Mean number of jassids/ 3 leaves | | |
|-------------------|-----------------------------|----------------------------------|-----------------|-----------------|
| | | 2015-16 | 2016-17 | Pooled |
| 1 | GSHV-159 | 1.94 (3.49)* | 2.00 (3.82)* | 1.97 (3.65) |
| 2 | GSHV-01/1338 | 1.67 (2.53) | 1.72 (2.71) | 1.70 (2.62) |
| 3 | GISV-267 | 1.83 (3.19) | 1.91 (3.44) | 1.87 (3.32) |
| 4 | GISV-272 | 1.98 (3.66) | 2.11 (4.20) | 2.05 (3.93) |
| 5 | GBHV164 | 2.35 (5.44) | 2.52 (6.30) | 2.43 (5.87) |
| 6 | GBHV170 | 2.33 (5.21) | 2.26 (4.91) | 2.30 (5.06) |
| 7 | GBHV177 | 2.14 (4.33) | 2.43 (5.65) | 2.28 (4.99) |
| 8 | GBHV180 | 2.30 (5.07) | 2.32 (5.29) | 2.31 (5.18) |
| 9 | G.Cot.-100 | 2.95 (9.37) | 3.53 (13.40) | 3.24 (11.38) |
| 10 | G.Cot.-10 | 2.49 (6.44) | 3.03 (9.78) | 2.76 (8.11) |
| 11 | LRA-5166 | 2.48 (6.21) | 3.22 (10.83) | 2.85 (8.52) |
| 12 | G. Cot.-16 | 2.44 (5.93) | 2.63 (6.81) | 2.54 (6.37) |
| 13 | Cocker-310 | 3.39 (11.82) | 4.14 (18.38) | 3.77 (15.10) |
| 14 | GSB-21 | 4.08 (17.88) | 4.49 (21.91) | 4.28 (19.89) |
| 15 | G. Cot.-12 | 1.51 (1.94) | 1.78 (2.87) | 1.64 (2.41) |
| 16 | G.N. Cot.-22 | 1.90 (3.40) | 2.02 (3.85) | 1.96 (3.62) |
| S Em ± (T) | | 0.12 | 0.13 | 0.27 |
| CD at 5 % (T) | | 0.35 | 0.37 | 0.81 |
| S Em ± (Y x T) | | -- | -- | 0.13 |
| CD at 5 % (Y x T) | | -- | -- | 0.36 |
| CV (%) | | 8.90 | 8.56 | 8.80 |

*Figures in the parentheses are original mean values and those outside are $\sqrt{X+0.5}$ transformed values

Table.2 Categorization of cotton varieties/genotypes for their susceptibility to jassids (based on mean number of jassids/3 leaves)

| Category of resistance | Scale | Cotton varieties/genotypes |
|---|----------------------------|---|
| Population of jassid (numbers/3 leaves): \bar{X} = 6.88 | | SD = 4.85 |
| Resistant (R) | $\bar{X}_i < 2.03$ | -- |
| Moderately Resistant (MR) | $\bar{X}_i > 2.03 < 6.88$ | G.Cot.-12 (2.41)* GSHV-01/1338 (2.62) GISV-267 (3.32) G.N.Cot.-22 (3.62) GSHV-159 (3.65) GISV-272 (3.93) GBHV-177 (4.99) GBHV-170 (5.06) GBHV-180 (5.18) GBHV-164 (5.87) G.Cot.-16 (6.37) |
| Susceptible (S) | $\bar{X}_i > 6.88 < 11.73$ | G.Cot.-10 (8.11) LRA-5166 (8.52) G.Cot.-100 (11.38) |
| Highly susceptible (HS) | $\bar{X}_i > 11.73$ | Cocker-310 (15.10) GSB-21 (19.89) |

Note: \bar{X} = Mean value of all varieties/genotypes

\bar{X}_i = Mean value of individual genotype

SD = Standard Deviation

* Figure in the parenthesis are mean values of jassid population

Figure.1 Jassid population on different cotton varieties/genotypes (Pooled of 2015-16 and 2016-17)

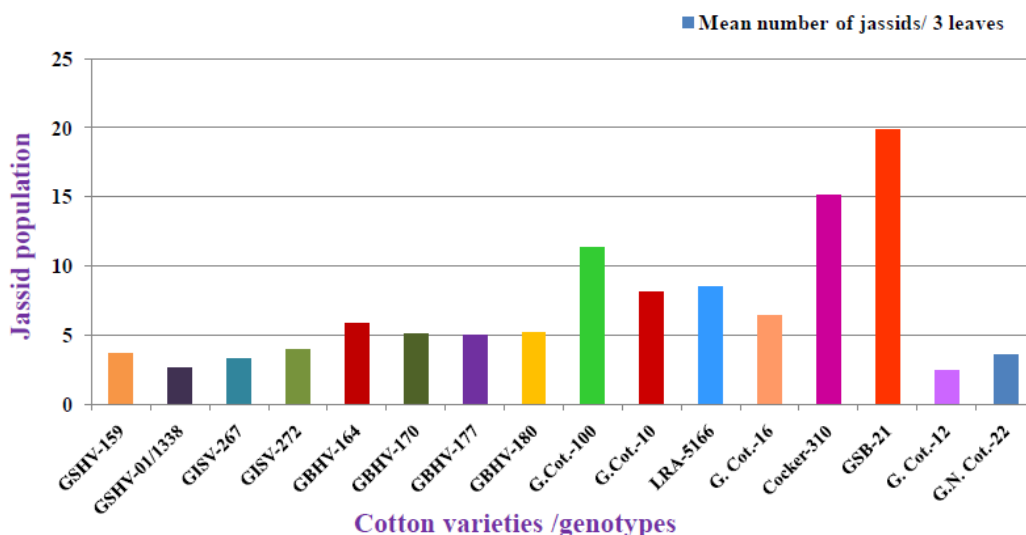


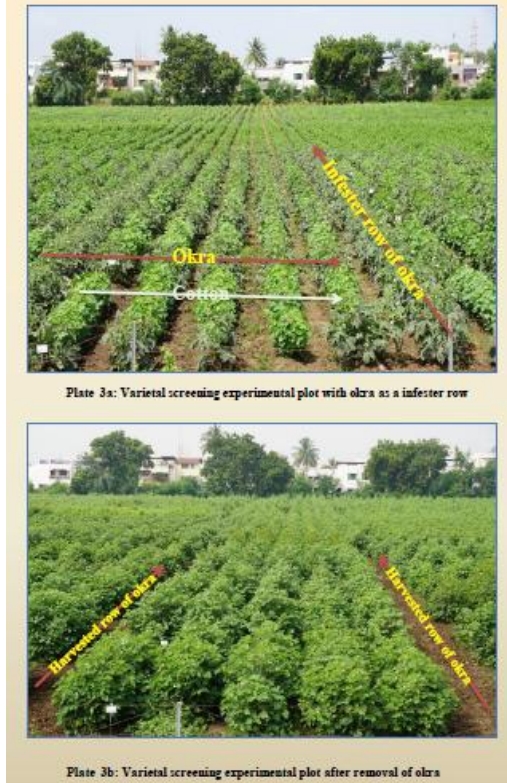
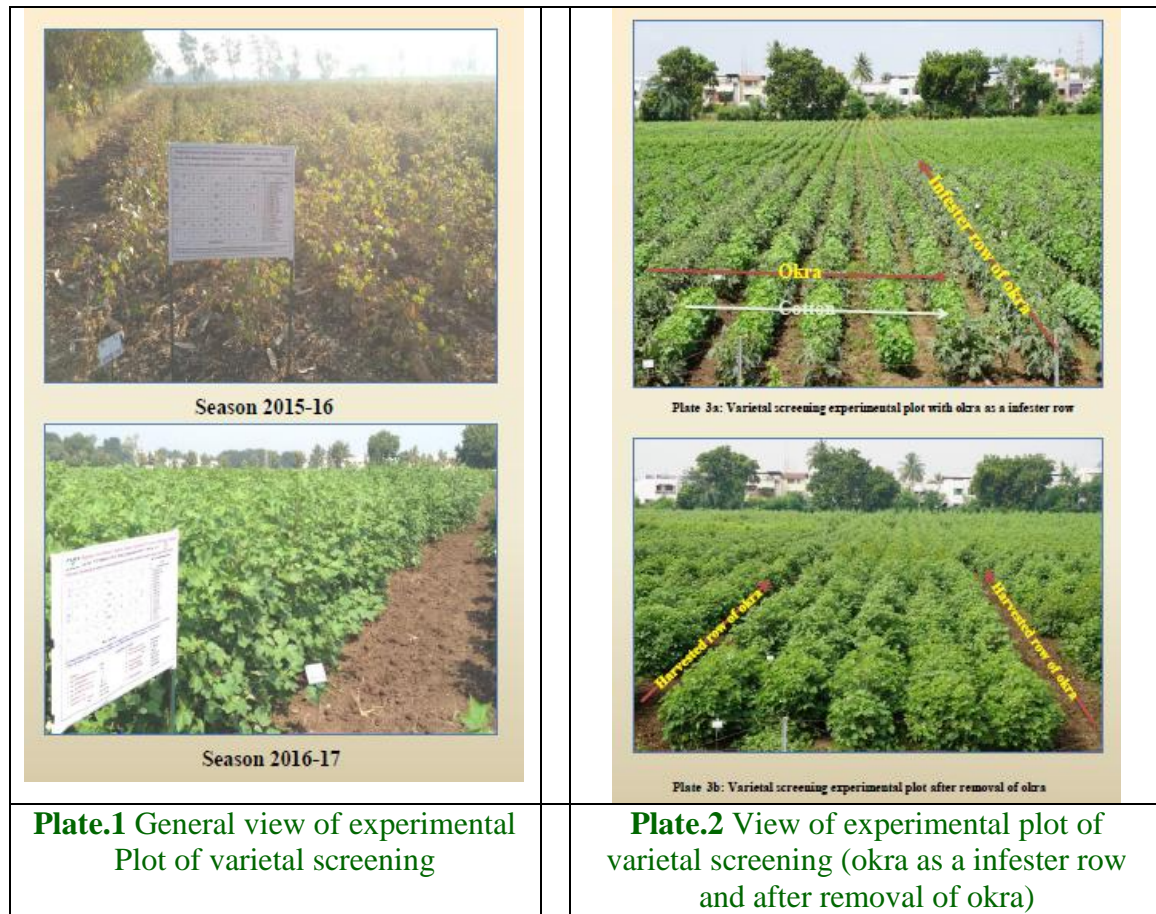
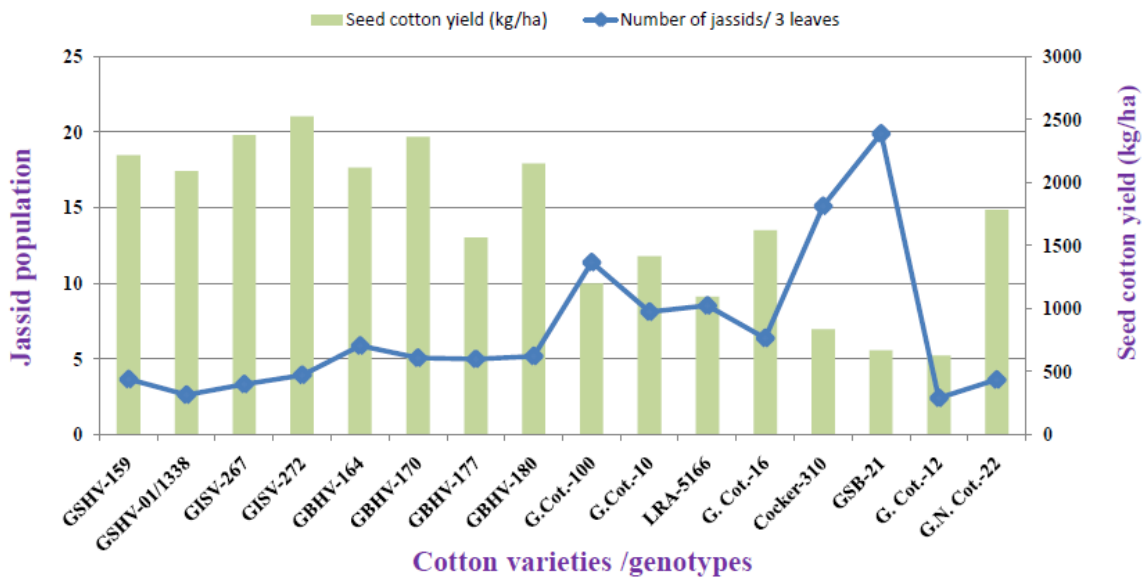
Table.3 Seed cotton yield of different cotton varieties/genotypes and its correlation with jassid population

| Sr. No. | Cotton varieties/ genotypes | Seed cotton yield (kg/ha) | | |
|-------------------------------|-----------------------------|---------------------------|-----------------|-----------------|
| | | 2015-16 | 2016-17 | Pooled |
| 1 | GSHV-159 | 1614 | 2815 | 2215 |
| 2 | GSHV-01/1338 | 1442 | 2738 | 2090 |
| 3 | GISV-267 | 1881 | 2872 | 2377 |
| 4 | GISV-272 | 2053 | 2990 | 2522 |
| 5 | GBHV164 | 1775 | 2457 | 2116 |
| 6 | GBHV170 | 1837 | 2883 | 2360 |
| 7 | GBHV177 | 1364 | 1761 | 1563 |
| 8 | GBHV180 | 1658 | 2645 | 2152 |
| 9 | G.Cot.-100 | 844 | 1553 | 1199 |
| 10 | G.Cot.-10 | 1023 | 1806 | 1415 |
| 11 | LRA-5166 | 956 | 1232 | 1094 |
| 12 | G. Cot.-16 | 1418 | 1822 | 1620 |
| 13 | Cocker-310 | 537 | 1139 | 838 |
| 14 | GSB-21 | 413 | 921 | 667 |
| 15 | G. Cot.-12 | 589 | 663 | 626 |
| 16 | G.N. Cot.-22 | 1311 | 2254 | 1783 |
| S Em ± (T) | | 94.26 | 118.20 | 172.61 |
| CD at 5 % (T) | | 272.20 | 341.33 | 520.20 |
| S Em ± (Y x T) | | -- | -- | 106.90 |
| CD at 5 % (Y x T) | | -- | -- | 302.36 |
| CV (%) | | 12.61 | 10.06 | 11.12 |
| Correlation coefficient ('r') | | -0.630** | -0.638** | -0.646** |

* Significant at 5 % level of significance

** Significant at 1 % level of significance

Figure.2 Seed cotton yield of different cotton varieties/genotypes and its correlation with jassid population (Pooled of 2015-16 and 2016-17)



The rest of cotton genotypes recorded seed cotton yield ranged from 844 to 1442 kg/ha. The seed cotton yield showed highly significant negative correlation with jassid population ($r = -0.630$) implying that increase in the infestation corresponds with decrease of the seed cotton yield and *vice-versa*.

Second year (2016-17)

During 2016-17, significantly the highest (2990 kg/ha) seed cotton yield was recorded in genotype GISV-272 which was statistically at par with GBHV-170 (2883 kg/ha), GISV-267 (2872 kg/ha), GSHV-159 (2815 kg/ha) and GSHV-01/1338 (2738 kg/ha); all these genotypes were found moderately resistant to *A. biguttula biguttula*. Whereas, significantly the lowest (663 kg/ha) seed cotton yield was obtained in moderately resistant genotype G.Cot.-12 and it was statistically at par with highly susceptible genotype GSB-21 (921 kg/ha). The GSB-21 was statistically at par with another highly susceptible genotype Cocker-310 (1139 kg/ha) and susceptible genotype LRA-5166 (1232 kg/ha). The rest of cotton genotypes registered intermediate range of seed cotton yield (1553 to 2645 kg/ha). The correlation study revealed that seed cotton yield showed highly significant negative correlation with jassid population ($r = -0.638$) implying that increase in the infestation corresponds with decrease of the seed cotton yield and *vice-versa*.

Pooled data (2015-16 and 2016-17)

The pooled data of year 2015-16 and 2016-17 presented in Table 3 and depicted in Figure 2 indicated that GISV-272 performed best by attaining the highest seed cotton yield (2522 kg/ha) which was statistically at par with GISV-267 (2377 kg/ha), GBHV-170 (2360 kg/ha), GSHV-159 (2215 kg/ha), GBHV-180 (2152 kg/ha), GBHV-164 (2116 kg/ha) and GSHV-01/1338 (2090 kg/ha); all these

varieties/genotypes were found moderately resistant to *A. biguttula biguttula*. However, significantly the lowest (626 kg/ha) seed cotton yield was obtained in moderately resistant genotype G.Cot.-12 and it was statistically at par with two highly susceptible genotypes *viz.*, GSB-21 (667 kg/ha) and Cocker-310 (838 kg/ha) as well as the susceptible genotype LRA-5166 (1094 kg/ha). The interaction (Year x Treatment) had significant effect which indicated non-consistent performance of seed cotton yield over the year. When the seed cotton yield was statistically correlated, it exhibited highly significant negative correlation with jassid population ($r = -0.646$) implying that increase in jassid infestation corresponds with decrease of the seed cotton yield and *vice-versa*.

In past, Pathan *et al.*, (2007) reported that CRIS-467 was highly susceptible to bollworms and jassid resulting in the lowest seed cotton yield of 530.2 kg/ha, whereas CRIS-468 was highly resistant having a maximum yield of 1021.0 kg/ha among evaluated of six cotton strains. Khan *et al.*, (2011) reflected that IR-443 proved to be the most successful genotype rendering lowest infestation of jassids (0.30 and 0.42/ leaf), thrips and whiteflies with highest yield (1628 and 1599 kg/acre) in both years as compared to other Bt cotton genotypes followed by IR-FH-901. Further, Sarwar *et al.*, (2013) observed that the N-Karishma carried minimum jassid load (1.70 per leaf) considering the best for pest resistance with highest cotton production (8.53 kg per 30 m²) in comparison to other ten released *G. hirsutum* cotton varieties. Moreover, Patel (2014) evaluated that the genotype K-3 recorded minimum jassid population and gave maximum seed cotton yield, followed by KH-121 and K-2 among fifteen *hirsutum* cotton genotypes screened. The results of present investigation are more or less in conformation with earlier investigations. The variation in

the yield of seed cotton as reported by other scientists it might be due to different varieties/genotypes as well as different climatic conditions.

In conclusion, screening studies revealed that none of the cotton variety/genotype was totally free from attack of *A. biguttula biguttula* and categorized as resistant based on population of jassid. Eleven varieties/genotypes viz., G.Cot.-12, GSHV-01/1338, GISV-267, G.N.Cot.-22, GSHV-159, GISV-272, GBHV-177, GBHV-170, GBHV-180, GBHV-164 and G.Cot.-16 were moderately resistant, whereas G.Cot.-10, LRA-5166 and G.Cot.-100 were susceptible to jassid. However, Cocker-310 and GSB-21 were categorized as highly susceptible to jassid. The seed cotton yield showed highly significant negative correlation with jassid population.

Acknowledgement

Authors are sincerely thankful to the Director of Research and Dean, Post Graduate Studies and the Principal and Dean, N. M. College of Agriculture, Navsari Agricultural University for providing necessary facilities to conducting the research work.

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How to cite this article:

Patel, R.K. and Radadia, G.G. 2018. Screening of Cotton Varieties/Genotypes against Jassid, *Amrasca biguttula biguttula* (Ishida) under Rainfed Conditions. *Int.J.Curr.Microbiol.App.Sci.* 7(12): 1099-1110. doi: <https://doi.org/10.20546/ijcmas.2018.712.136>