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Screening of Cotton Strains for Resistance to *Anthonomus grandis grandis* (Boheman) (Coleoptera: Curculionidae)

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Abstract
In a cotton-strain-screening field experiment conducted at the University of Georgia, Coastal Plain Experiment Station, Tifton, GA, 31794, USA, the *Anthonomus grandis grandis* (Boheman) showed low preference to PD 0786 and intermediate to TAMCOT lines, STHG 3-1, DES 920, STHG 4-4, MISCOT TB-27-7, GATIR 84-662 LAHG 810063 and TIFCOT 56 when compared with Stoneville 213, a susceptible standard cultivar.

Key words: Screening, Cotton Strains, *Anthonomus grandis grandis* (Boheman), Resistance, Frego bract, Susceptible Check

Introduction
Cotton is worlds most important textile fiber as well as oil seed crop (Khan and Aziz, 1998). It is attacked by a tremendous number of insect pests including *Anthonomus grandis grandis* Boheman the boll weevil (BWVL). It inflicts 51 percent yield losses to cotton if not controlled (Schwartz, 1983). Various techniques have been used to screen different cotton lines for resistence to this pest. The screening of an experimental strain is usually done by comparing the strain with a cultivar known to be 'susceptible' (Painter, 1951; Namken *et al*., 1983).

Field screenings have been used very successfully to assess plant resistence to BWVL by studying feeding and oviposition punctures on the cotton squares (Niles, 1980). Maxwell *et al*. (1969) indicated that frego bract character of cotton contributed a significant degree of non-preference for oviposition by BWVL. Clower *et al*. (1970) showed higher tendency of BWVL population in plots having normal cotton than plots having either frego bract or the medium red foliage characteristic (AK Djura). He further showed more suppression of BWVL populations when these two characters were combined. Jones *et al*. (1987), in field tests, studied BWVL preference and non-preference to selected cotton lines comparing with the standard cultivars' Stoneville 213' and/or 'Deltapine 41' and showed certain genotypes several times more attractive to BWVL than Deltapine 41.

The objective of these studies is to screen cotton strains for resistence of BWVL in the field using Stoneville 213, a commercial, susceptible check.

Materials and Methods
In a cotton strain-screening field experiment conducted at the University of Georgia, Coastal Plain Experiment Station Tifton, Georgia USA, twenty strains of cotton (including Stoneville 213 as a susceptible check) were planted on May 8 at the Experimental Farm in plots maintained under three levels (A, B, C) of past management. In level A, cypermethrin (Cymbush^R 3E), a pyrethroid and broad-spectrum insecticide was applied at a rate of 0.056 kg (ai) ha^{-1} twice weekly for fourteen times from July 6 through September 1. In level B, the insecticide was applied at the same rate at two week intervals for four times from July 14 through August 25, while in level C, no insecticide was applied. The three levels were kept separate from one another to avoid drift from pesticidal applications. The cotton lines were replicated three times in each level using randomized block designs. The plots consisted of two rows, 10.67 m, in length and 1.83 m, in width. Fertilizer (5-10-15) was applied at a rate of 42.01, 84.028, 126.04 kg of N, P, K ha^{-1}, respectively. Also 33.61 kg of nitrogen ha^{-1} was side dressed four weeks after planting.

Also, during this year, due to an obligatory federal BWVL eradication program azinphosmethyl (Guthion^R 2L), an organophosphate insecticide was applied using 0.28 kg (ai) ha^{-1}, twice weekly from July 6 through November 12 for a total of 30 applications in all plots.

The infestations BWVL were recorded on twenty five squares per plot, recording weekly the number punctured by BWVL oviposition and feeding from July 9 through September 3. The observations recorded are shown as percent squares punctured by BWVL oviposition and feeding in all the lines separately to relate the oviposition and feeding preferences by this insect.

The statistical analysis was done as three randomized block designs nested with the main plots using SAS (SAS Institute 1986). T Tests (LSD) as recommended by Benedict (1983) were applied to the means.

Based on the groupings of the T Tests, the resistence of the strains to BWVL was classified as high oviposition and feeding preferences when boll weevil showed significantly higher oviposition and feeding preferences on the cotton line than on Stoneville 213; equal, when oviposition and feeding preferences by BWVL on cotton lines were not significantly different (NDS) from that on Stoneville 213; low, when BWVL showed the minimum oviposition and feeding preferences and intermediate when nature of preferences was in between equal and low.

Results and Discussion

Table 1 reveals that BWVL had a low oviposition preferences to PD-0786 and intermediate preference to TAMCOT lines, STHG 3-1, DES 920, STHG 4-4, MISCOT TB-27-7, GATIR 84-662, LAHG 810063, TIFCOT 56, STHG 6-1, LAHG 820060 and MISCOT 7913-51 when compared with Stoneville 213. It showed a low feeding preference to PD-0786, an intermediate feeding preference on TAMCOT lines, STHG 3-1, DES 920, STHG 4-4, MISCOT TB-27-7, GATIR 84-662, LAHG 810063, TIFCOT 56, ARS-TX-HIGOS1, ARS-TX-HIGOS2 and LAHG 810060 while on all other lines the feeding preferences by BWVL were not significantly different from Stoneville 213. PD-0786 was a frego bract cotton strain which is not preferred by BWVL due to the fact that it does not provide hiding place to the

Table 1: Percent squares damaged by boll weevil oviposition and feeding punctures in cotton strains, Tifton GA, USA.

Cotton Strains	Mean punctures	
	Oviposition	Feeding
PD-0786	4.3i	2.0h
STHG 4-4	15.4e-h	18.1c-g
STHG 3-1	16.8c-g	19.1c-g
STHG 601	16.7c-g	20.2a-e
LAHG 810063	13.9gh	19.6b-f
LAHG 810060	17.2b-g	20.3a-e
LAHG 810065	18.1a-e	19.7b-f
TAMCOT CAB-CS	17.6b-f	16.7efg
TAMCOT CD 3H	17.3b-g	16.2fg
ARS-TX-HIGOS1	20.4ab	18.1c-g
ARS-TX-HIGOS2	19.3a-d	15.7g
ARS-TX-HIGOS3	19.4abc	20.6a-e
MO 84-701	21.2a	20.7a-d
DES 920	15.9d-h	19.0c-g
MISCOT TB-27-7	19.1a-d	20.9abc
MISCOT 7913-835	19.5abc	23.4ab
MISCOT 7913-51	17.3b-g	20.3a-e
STONEVILLE 213	21.1a	23.8a
GATIR 84-662	14.6fgh	16.7efg
TIFCOT 56	13.1h	19.9d-g

Means within columns followed by the same letters are not different based on T Test (LSD), p = 0.05

weevil to oviposition and feed on naked cotton squares due to the shape of bracts forwarding downwards. Maxwell *et al*. (1969), also indicated that frego bract character of cotton contributed a significant degree of non-preference for oviposition by the BWVL. Clower *et al*. (1970) had also shown lower BWVL populations on frego bract cotton than on the normal cotton. Jones *et al*. (1987) had also shown BWVL preferences and non-preferences to selected cottons when compared with Stoneville 213 and/or Deltapine. Thus our findings support the conclusions of above mentioned researchers. The percentage of squares punctured by the BWVL feeding and oviposition and feeding were significantly correlated (Table 2).

Table 2: Correlation between different criteria used to screen cotton strains for resistance to boll weevil, Tifton, GA, USA.

Criteria	Correlation (r) 1	2
Percent squares Punctured by boll weevil		
Oviposition 1		
Feeding 2	x	0.80**
		x

Correlation coefficients with** are significant at significance level $p<0.01$, N = 20.

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