Evaluation of Cotton Varieties to Boll Rot Infection

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INTRODUCTION

Xanthomonas citri pv. malvacearum (Xcm) is the bacteria that causes bacterial blight in all cotton growing regions of the world. Cotton bacterial blight can cause infection in different parts of the plant causing seedling blight, black arm, angular leaf spot, and boll rot (Khan, 2000). Yield losses range from 5-35% under the right environmental conditions (Delannoy et al. 2005.) Irrigation or rainfall increases humidity, making conditions for development of disease optimal. The best management practice against bacterial blight is the use of resistant varieties (Hamid, 2012)

OBJECTIVES

The objective of this research was to evaluate disease incidence and severity for cotton boll rot.

MATERIALS & METHODS

The study was conducted at the Texas A&M University- Kingsville Farm during June and July of 2020.

Inoculation:

The inoculation mixture consisted of 300 mL of Nutrient Broth, 7.5 mL of Silwet L-77®, and 2,692.5 mL of water. All mixtures were added into a 3L bottle which was applied with a CO_2 backpack sprayer at a pressure of 20psi. Inoculation was administered during dawn at a concentration of 10^6 cfu's/mL.

Subplots:

Table 5. T2 inoculations at Candle and pink flower stages

Section	Spray fluid at Candle stage	Spray fluid at Pink flower
A	Xcm	-
B	Di water	-
C	-	Xcm
D	-	Di water

Data collection and Disease evaluation:

7 and 14 days after inoculation 15 bolls were randomly collected and were rated for disease incidence and severity expressed in percentage. Disease severity was attributed as a percentage based on the total area of the boll that has boll rot symptoms. Disease incidence is calculated using the equation.

$$\text{Disease incidence(DI)} = \frac{number\ \text{of}\ bolls\ that\ had\ symptoms}{total\ number\ of\ bolls\ evaluated}$$

Statistical analysis:

Disease incidence and severity were compared among varieties and sections in each variety using a generalized linear model (GLM) procedure of SAS v.9.4. using a significance level of $\alpha = 0.05$. A significant overall F test on the null hypothesis of variety equality was followed with a protected LSD test.

RESULTS

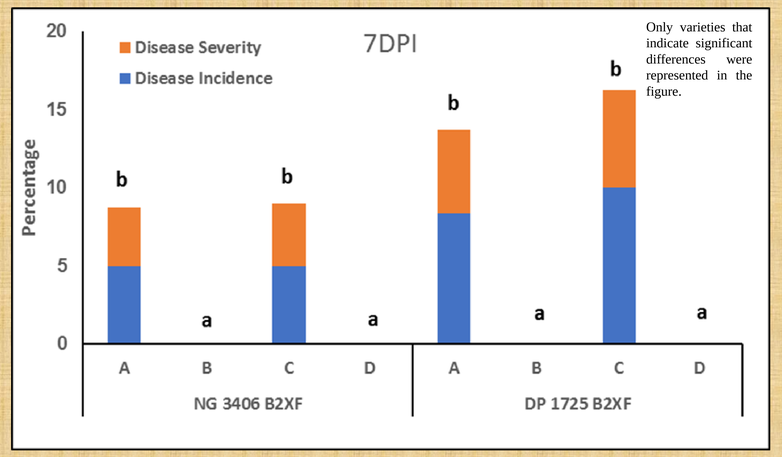

Figure 1. Disease Incidence and Severity – 7DPI (Days post inoculation). Bars with the same letter are not significant, bars with different letters are significantly different at P=0.05.

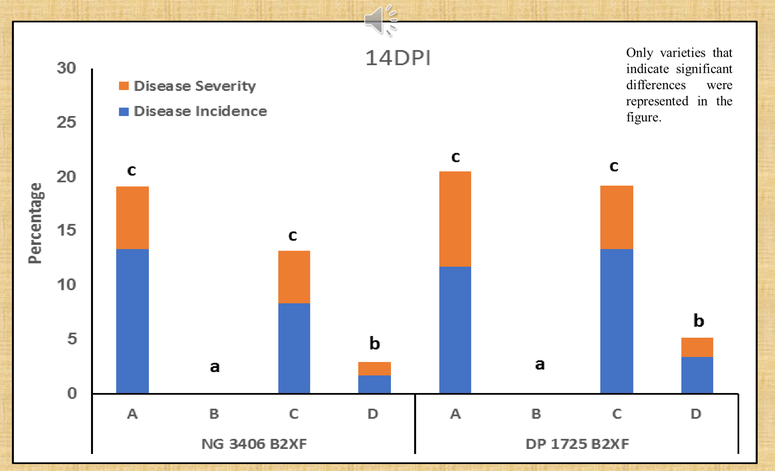

Figure 2. Disease Incidence and Severity – 14DPI (Days post inoculation). Bars with the same letter are not significant, bars with different letters are significantly different at P=0.05

Figure 3. Field inoculation with Xcm

Figure 4. Boll rot symptoms

SUMMARY

The moderate to resistant varieties tested remained resistant to boll rot. Susceptible varieties (NG3406 & DP 1725) exhibited bollrot symptoms and remained susceptible to Xcm. There was a significant difference between the treated vs nontreated at 7 dpi. At 14 dpi, there was significance differences observed between treated. The significant differences observed between the treated plots and D (water only) could be attributed to drift during inoculation. The results found in this study indicate that the commercial cotton varieties tested remain resistant to Xcm. More studies need to be conducted to evaluate the development of new Xcm races that may challenge the resistance to cotton bacterial blight.

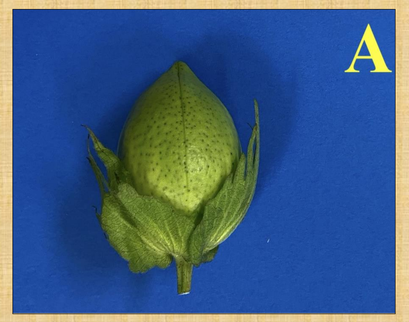

Figure 5. A). Boll with no symptoms of XCM; B). Water soaked symptoms 7 days after inoculation; C). Boll rot symptoms 14 days after inoculation

REFERENCES

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