

EPIDEMIOLOGY OF BRONZE WILT IN NORTHEAST LOUISIANA
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Abstract

Bronze wilt was first observed in several Louisiana and Mississippi cotton fields in 1995. Since then this malady has been reported in other cotton-producing states. Experiments were conducted from 2001 to 2003 to document how Bronze wilt developed over time in susceptible cultivars. Bronze wilt occurred at low levels in all varieties during each year of the study. Bronze wilt increased over time in all years and spatial distribution varied considerably. However, when data were pooled, there was a slight trend toward increased incidence on the plot end

Introduction

Bronze wilt was first observed in several Louisiana and Mississippi cotton fields in 1995. Since then this malady has been reported in other cotton-producing states, and its occurrence and impact on cotton has varied considerably. This variation is due in part to the variety and possibly the environment. Varieties respond differently to Bronze wilt (Creech, 1999; Phipps, 2000a). Some varieties are sensitive to Bronze wilt, while other varieties are relatively unaffected. It has also been suggested that high temperatures may be conducive for Bronze wilt development (Bell 1999).

Bronze wilt is also referred to as “copper top”, “sudden wilt”, and “phloem wilt”. The cause of this disorder is still a subject of debate, but initial symptoms include bronzing and wilting of the younger foliage and the plant terminal is warmer than non-effected plants (Bell et al., 2002; Phipps, 2000b). As the condition progresses, the foliage becomes red, the entire plant wilts, and the plant can abort “golf ball-sized” bolls. The symptoms are usually evident in cotton during fruit development, but have been observed in young cotton.

Considerable work has been conducted to document the cause of this condition, but research addressing the epidemiology of Bronze wilt is limited (Bell et al., 1997; Padgett et al., 2002; Phipps et al., 2001). Gaining an understanding of the conditions that favor the development of Bronze wilt and how this disorder spreads in the field may aid in managing this condition. Therefore, experiments were conducted from 2001 to 2003 to document how Bronze wilt developed over time in susceptible cultivars.

Objective

Document Bronze wilt epidemics temporally and spatially.

Materials and Methods

Experiments were conducted to monitor Bronze wilt epidemics at the Northeast Research Station, Macon Ridge Branch, located near Winnsboro, LA. Studies were initiated in 2001 and continued to 2003. Studies were planted (4.5 seed/ft) on 10 and 30 May 2001, 28 May 2002, and 1 May 2003. Plots (4-rows, 45 long, spaced 40 inches apart) were planted with cotton varieties susceptible to Bronze wilt. The varieties Stoneville 5599 B/R, Stoneville 373, and Paymaster 1218 B/R were evaluated in 2001; Stoneville 5599 B/R in 2002, and Stoneville 373 in 2003. Plots were adjacent to each other and replicates were separated by 10 foot alleys. Plants were monitored weekly for symptoms of Bronze wilt during the growing season. To document temporal occurrence of Bronze wilt, symptomatic plants were flagged the day symptoms were observed with a color unique to that rating date. Spatial distribution of Bronze wilt was recorded at the end of the growing season after plants were defoliated. Each row was subdivided into increments of five feet and the number of symptomatic plants was noted within each increment. Therefore, epidemics were documented temporally and spatially.

Results and Discussion

Bronze wilt occurred at low levels in all varieties during each year; therefore, the data is presented for each year, over years, but not for each variety. In 2001, Bronze wilt was observed on July 12 in both tests. Symptomatic plants progressed from 1.2 to 8.0 in 90 row feet in 2001 test A, and from 1.3 to 6.6 in 2001 test B (Figures 1 & 2). Similar levels of Bronze wilt suggest planting date did not affect final incidence in 2001; however, in another study incidence was higher in early planted cotton (mid-April) than late planted cotton (early June). Therefore, variability may be dependent on environmental triggers rather than planting date. While final incidence was similar in both tests, epidemics progressed differently. There was a uniform in-

crease in Bronze wilt incidence in test A, but incidence increased uniformly until July 26 and leveled off in test B. This progression was also noticed in 2002 (Figure 3). Incidence in 2002 was similar to that in 2001. Initial symptomatic plants were observed on July 12 and ranged from 3.9 to 6.0 symptomatic plants in 90 row feet. Bronze wilt incidence was lowest in 2003 and never exceeded 4.0 symptomatic plants in 90 row feet (Figure 4). However, initial symptoms in 2003 were observed in late June, compared to mid-July in 2001 and 2002.

Spatial distribution varied considerable in both tests in 2001. In test A incidence was lowest in the center of the plot and greatest adjacent to the center and on one end (Figure 5). Incidence in test B was greatest 5 to 15 feet into the plot and lowest near the center (Figure 6). In 2002 symptomatic plants were more uniformly distributed throughout the plot compared to distribution in 2001 (Figure 7). Spatial distribution of symptomatic plants varied dramatically in 2003 ranging from zero plants 15 feet into the plot to 1.0 plant on the plot ends (Figure 8). No established trends in spatial distribution were notice across years; however, when data were pooled, there was a slight trend toward increased incidence on the plot end (Figure 9).

Bronze wilt increased over time in all years and spatial distribution varied considerably. In 2001, final incidence was similar in both tests, but epidemics progressed faster in the late planted cotton. No “edge-effect” was noticed; however, this may differ in years when incidence is severe. These data suggest that this disorder is randomly distributed in fields. Therefore, when scouting for this problem individuals cannot key-in on specific areas in the field. Since incidence was low in all years, additional research is necessary to fully understand the epidemiology of Bronze wilt.

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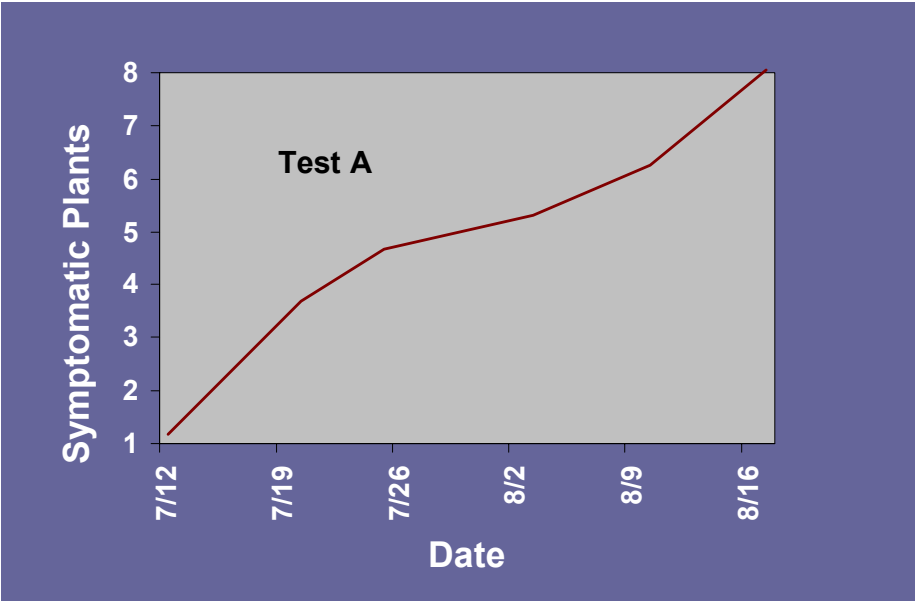


Figure 1. Bronze wilt epidemics (Symptomatic plants / 90 foot of row), Macon Ridge Research Station, 2001.

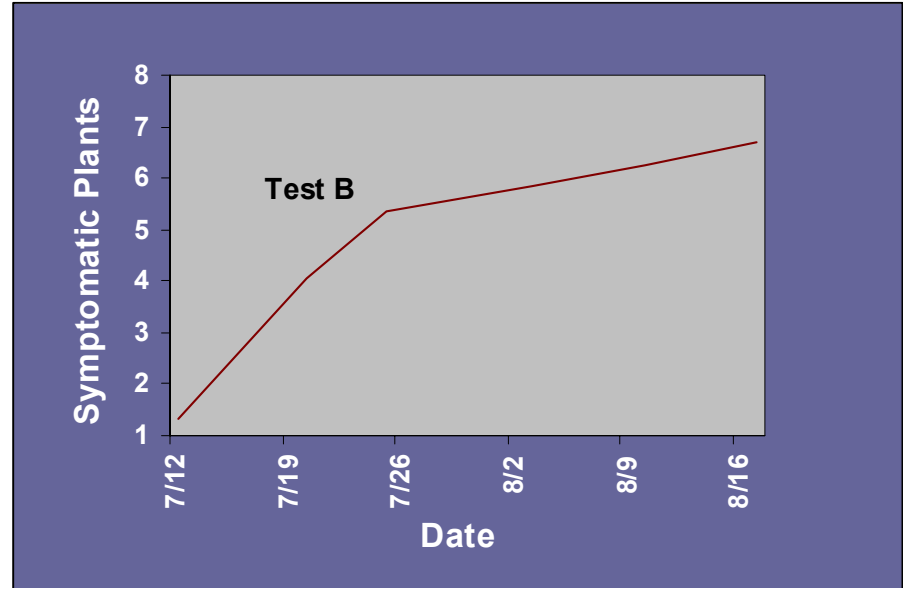


Figure 2. Bronze wilt epidemics (Symptomatic plants / 90 foot of row), Macon Ridge Research Station, 2001

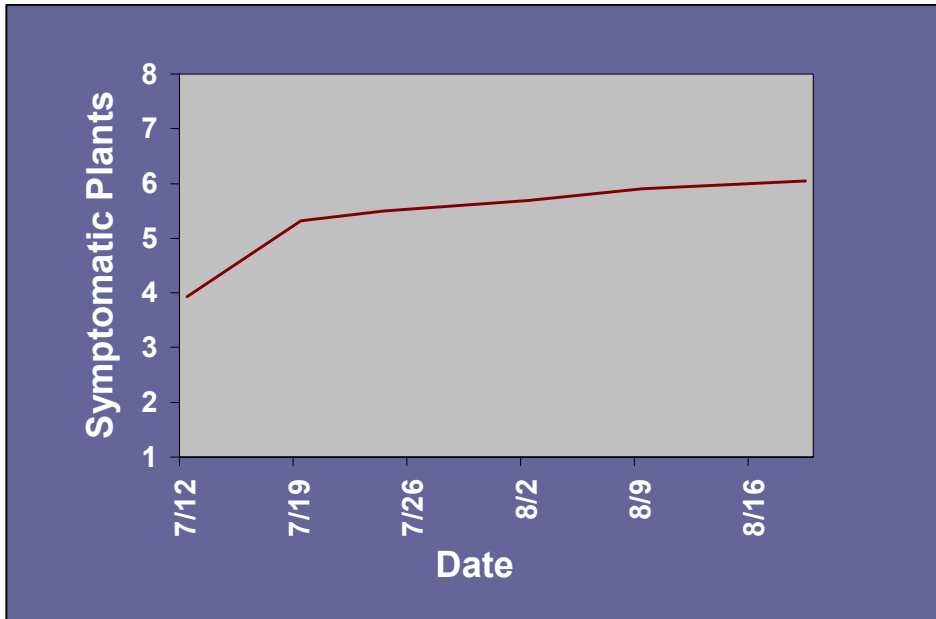


Figure 3. Bronze wilt epidemics (Symptomatic plants / 90 foot of row), Macon Ridge Research Station, 2002.

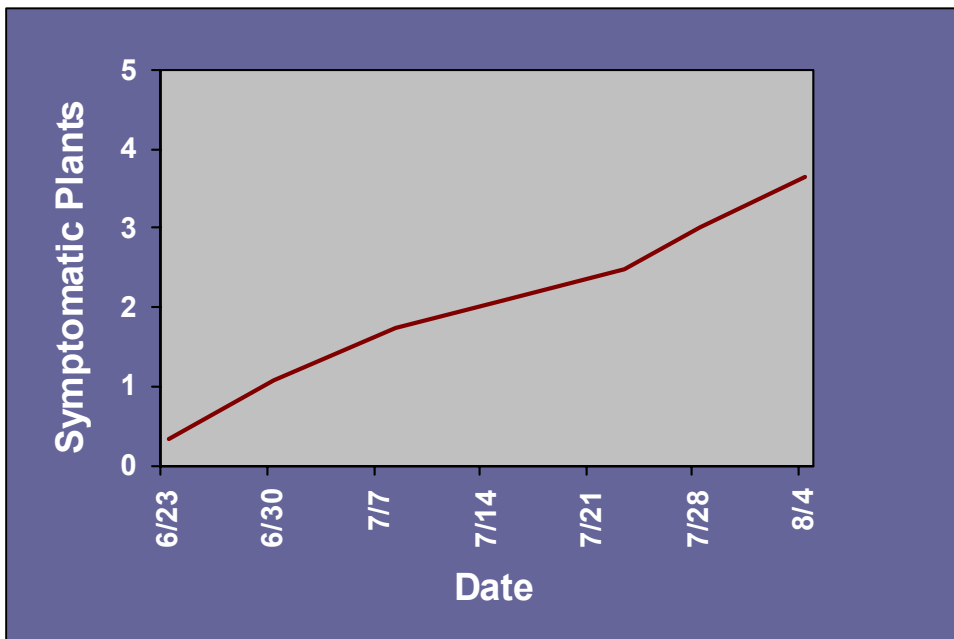


Figure 4. Bronze wilt epidemics (Symptomatic plants / 90 foot of row), Macon Ridge Research Station, 2003.

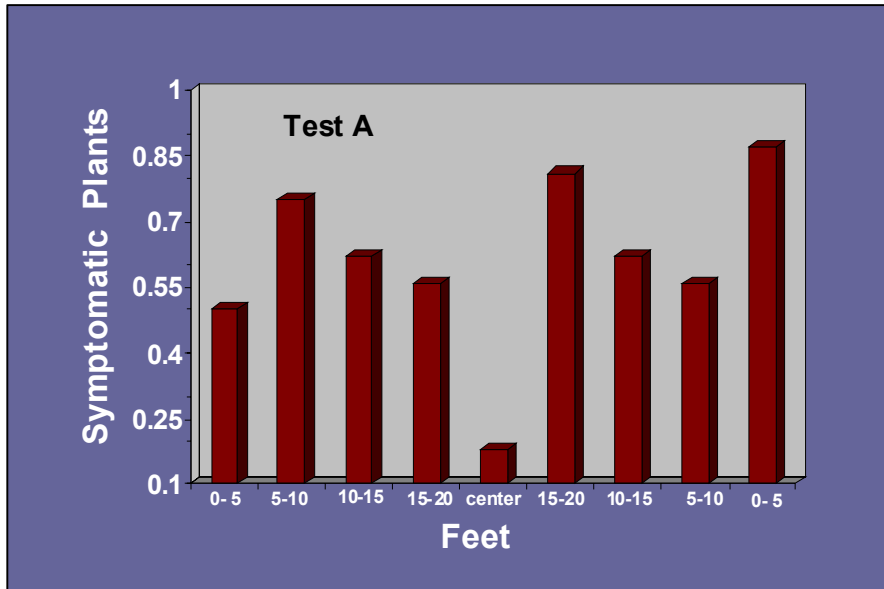


Figure 5. Spatial Distribution of symptomatic plants in 5 foot increments, Macon Ridge Research Station, 2001.

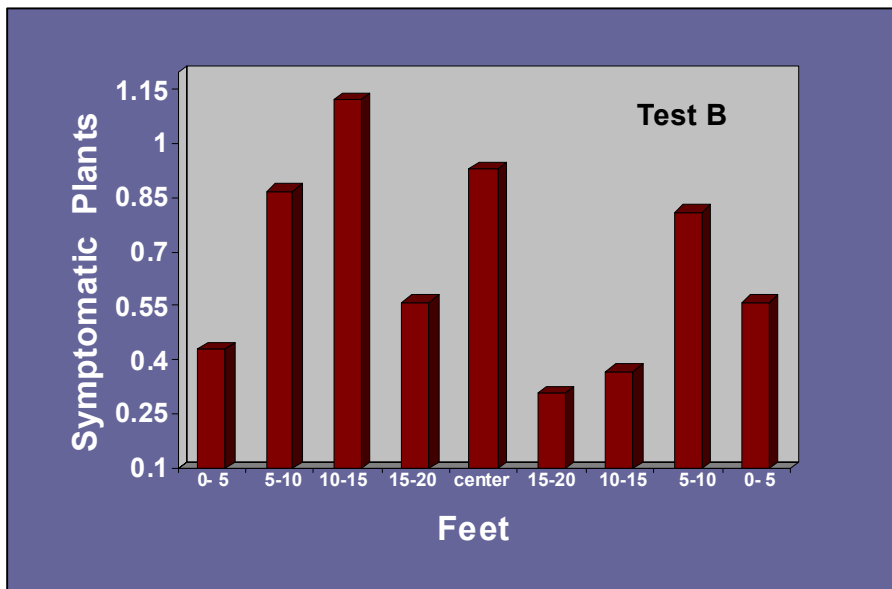


Figure 6. Spatial Distribution of symptomatic plants in 5 foot increments, Macon Ridge Research Station, 2001.

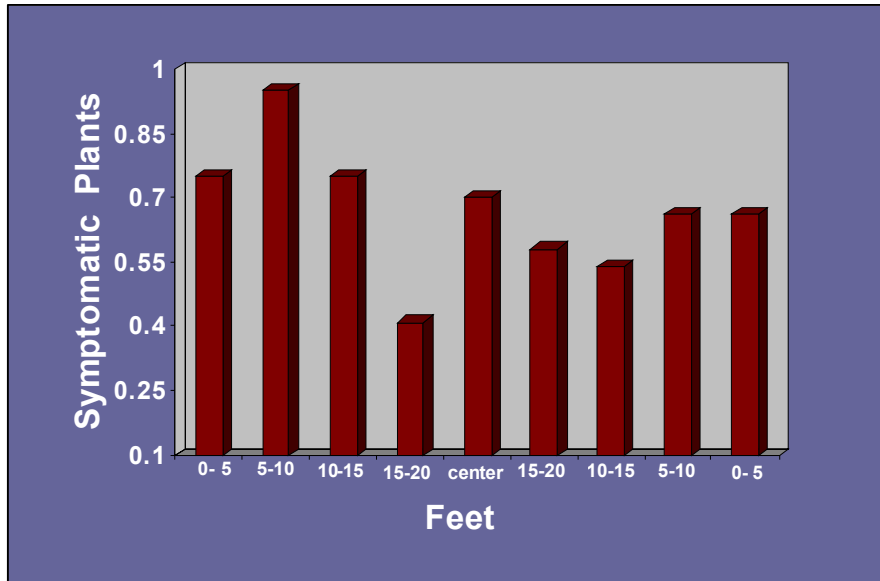


Figure 7. Spatial distribution of symptomatic plants in 5 foot increments, Macon Ridge Research Station, 2002.

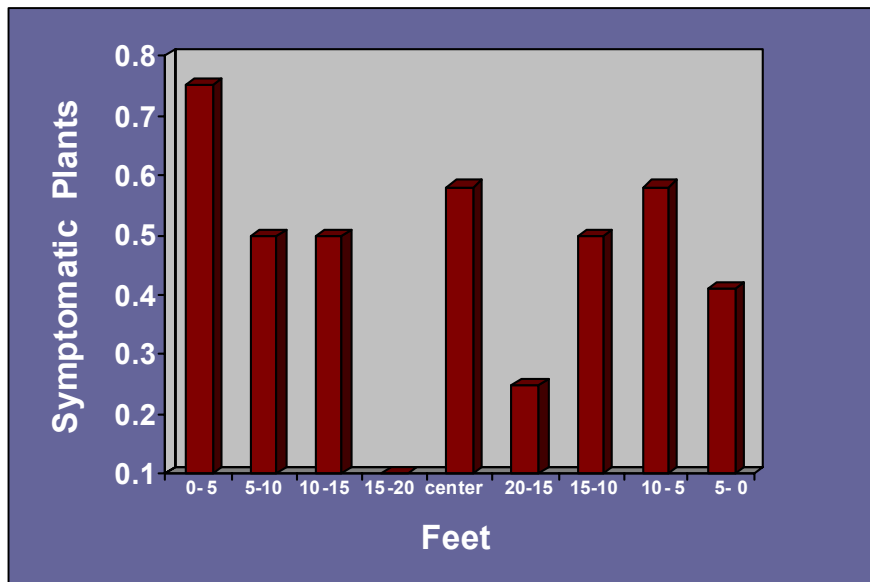


Figure 8. Spatial Distribution of symptomatic plants in 5 foot increments, Macon Ridge Research Station, 2003.

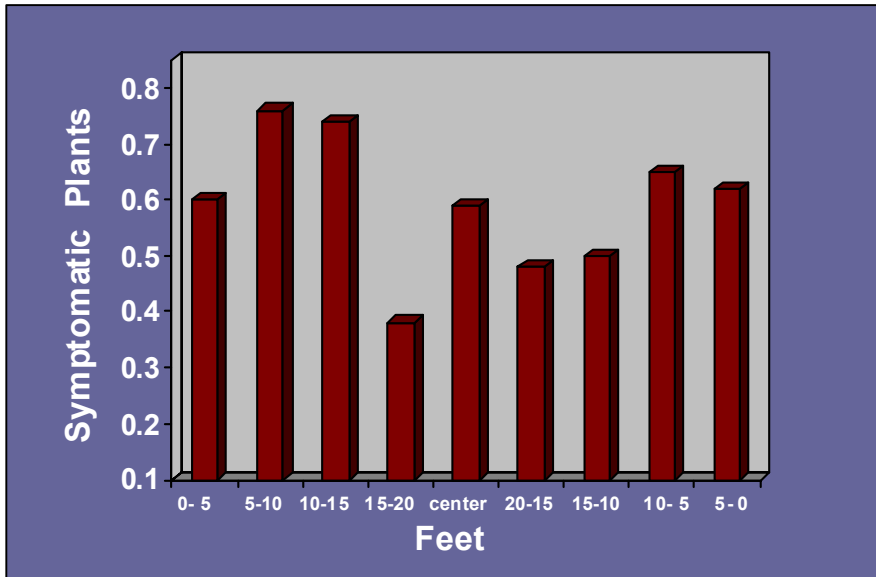


Figure 9. Spatial Distribution of symptomatic plants in 5 foot increments, Macon Ridge Research Station, 2001, 2002, 2003.