

2005 Georgia Sentinel Plot Monitoring and Management of Asian Soybean Rust

L.E. SCONYERS, R.C. Kemerait, P.H. Jost, J.M. Kichler, and D.V. Phillips
Department of Plant Pathology, University of Georgia, Tifton, GA 31793



ABSTRACT

In 2005, 3 clover, 5 kudzu and 17 soybean sentinel plots were established for monitoring the development of Asian soybean rust. For each soybean sentinel plot, maturity groups II, III and IV were planted on one planting date ranging from the first to the third week of April. On a weekly basis, rust severity (low, moderate or heavy), incidence (number of leaflets infected out of 100 leaflets collected at random), and growth stage were recorded for soybean sentinels. Of the 25 plots, rust developed in 1 kudzu plot and 13 soybean plots, while no rust developed in clover plots. Rust initially developed in discrete foci within a sentinel plot and was typically identified first in the lower canopy. The disease then moved upward within the canopy and to adjacent soybean plants within approximately 7-10 days. Based upon sentinel plots and samples submitted from grower fields, it appears that the disease was moving north at an estimated 60 miles per week. By 3 Nov, soybean rust was confirmed in 33 counties. Replicated trials were conducted at multiple sites around the state to evaluate the efficacy of different fungicides and the importance of timing of application in the control of soybean rust. Fungicides that were evaluated in these studies included strobilurins, triazoles, benzimidazoles, chlorothalonil, and various other products. From preliminary results, it is clear that growers in Georgia can effectively manage Asian soybean rust when using appropriate fungicides that are applied ahead of or very early in the epidemic.

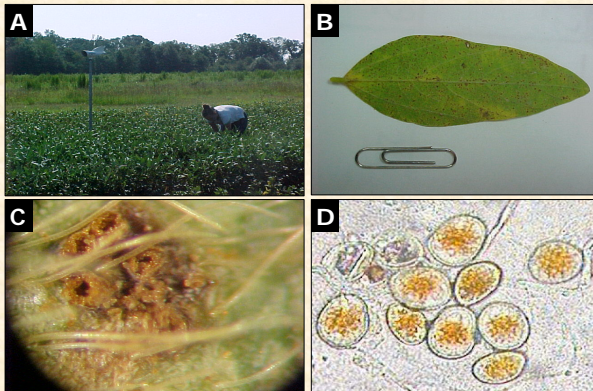


Fig. 1. Scouting and collecting leaflets in sentinel (A) for Asian soybean rust (B) which produces (C) volcano-like pustules (60X) caused by (D) *P. pachyrhizi* (400X).

ACKNOWLEDGEMENTS

This project was funded by the United States Department of Agriculture, the United Soybean Board and the North Central Soybean Research Program. We thank Dr. John Rupe of University of Arkansas for his spore trap slide analysis efforts. We also thank Caleb Clements, Michael Foster, Clint Karsten, Kimberly Landress, and Jared Walls for their technical assistance with these studies.

Sentinel and Commercial Monitoring

Asian soybean rust (*Phakopsora pachyrhizi*) (Fig. 1) progress was monitored in Georgia as part of the USDA rust scouting program. 25 sentinel plots were established in Georgia in 2005 (Fig. 2). 3 clover and 5 sentinel kudzu patches were scouted weekly for rust development by examining leaves visually and microscopically. No rust was found in clover, and 1 of 5 kudzu sites were positive for rust. 17 50' X 50' soybean sentinel plots were established for monitoring soybean rust (SBR). In each soybean sentinel, maturity groups II, III and IV were planted on one date ranging from the first to the third week of April. 1 of 10 spore traps provided by Syngenta (Fig. 1A) were placed in the center of each soybean sentinel plot in the Coastal Plain of Georgia (#6, 7, 8, 10, 16, 17, 18, 22, 23, 24 and 25 in Fig. 2) to collect rust spores that may have been traveling in the atmosphere. Spore trap slides were replaced weekly and sent to University of Arkansas for spore analysis and enumeration. Weekly, 100 leaflets were collected randomly for each sentinel (40 from lower canopy, 40 from mid canopy, 20 from upper canopy) and examined visually and microscopically for symptoms and signs of SBR (Fig. 1B-D). Severity (low, moderate or heavy), incidence (number leaflets infected for each canopy level and overall total) and growth stage were assessed for each soybean sentinel leaf sample. Results for Decatur County soybean sentinel (#8 in Fig. 2) are presented in Fig. 3. Rust-like spores were first detected on 28 Jun, and rust was first visually observed on 21 Jul. Disease incidence steadily increased to 100% by 25 Aug. Grower samples were collected by county agents, and UGA personnel evaluated samples by using ELISA, PCR or visual diagnosis. First findings for each positive county were confirmed by PCR or trained expert. SBR seemed to be spreading at a rate of 60 miles per week. By 3 Nov, soybean rust was confirmed in 33 counties (Fig. 2).

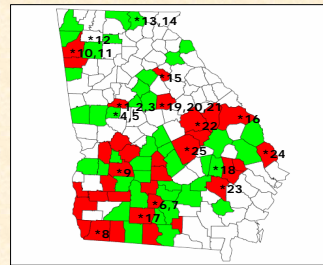


Fig. 2. Distribution of soybean rust positive sites in Georgia as of 3 Nov 2005. Numbers correspond to clover, kudzu or soybean sentinel plots.

Management

Ten replicated trials were conducted to find products that provided the best SBR control and also determine optimal application timings. Strobilurins, triazoles, benzimidazoles, chlorothalonil and various other products were evaluated. Results for the Macon County trial are presented in Fig. 4. 8 treatments were arranged in a randomized complete block design with 3 replicates. Fungicides were applied on 26 Aug (R1 stage) and 9 Sep at a rate of 25 GPA at 50 psi. On 20 Oct, 20 leaflets were collected from the lower canopy of each plot and were examined for SBR. Severity and number of infected leaflets were evaluated. All leaflets in untreated plots were infected with SBR. None of the treatments except Headline SBR varied significantly from untreated plots for total leaf infection. However, severity of all treatments were significantly less than untreated plots. Folicur, Stratego, Headline, Laredo, Headline SBR plots had the lowest severity, while Echo 720 and Quadris had low to moderate severity (Fig. 4). Based on our findings, rust can be managed with appropriate products applied in a timely manner (Fig. 5).

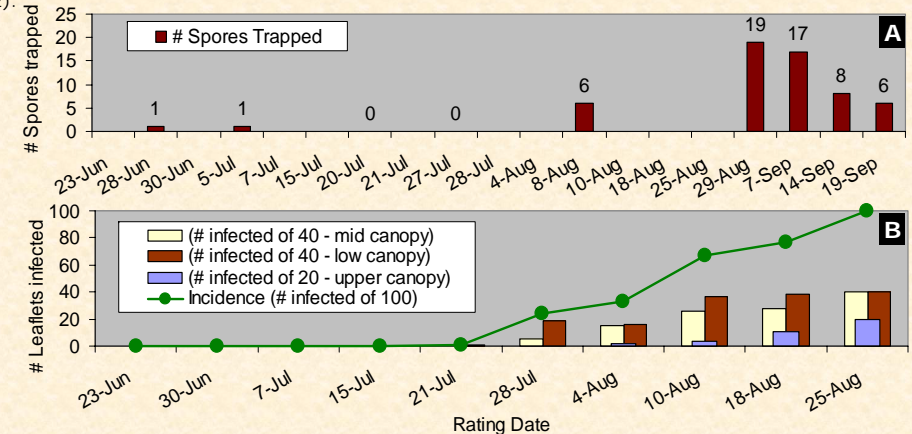


Fig. 3. First detection of rust-like spores (A) and progress (B) in number of soybean leaflets infected with soybean rust in Attapulgus, GA, 2005.

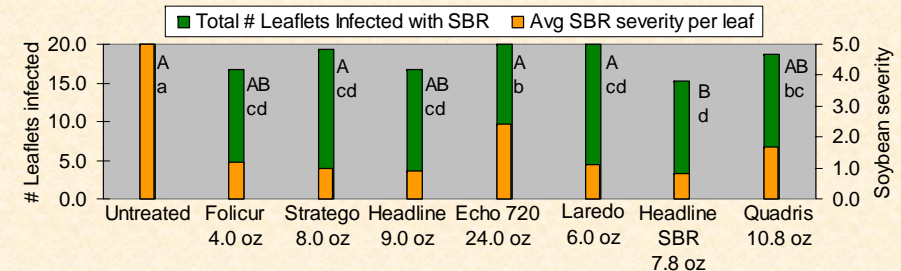


Fig. 4. Fungicide trial results for Macon County, Georgia. Similar upper case letters indicate no significant difference among treatments for leaflets infected. Similar lower case letter indicate no significant difference among treatments for severity. (Fisher's Least Significant Difference t-test ; $P=0.05$)



Fig. 5. Aerial photograph of a fungicide trial in Attapulgus, GA. Photo was taken as natural defoliation was beginning to occur. Illustrates effect of spraying fungicides for managing SBR. Notice the sprayed plots which have green leaves, while the less effective applications and unsprayed plots are brown and defoliated.