

The 2009 Southern SWW Scab Epidemic: Has the USWBSI Made a Difference?

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The southern soft winter wheat region was last hit hard by a scab epidemic in 2003. Since that time, U.S. Wheat & Barley Scab Initiative (USWBSI) breeders and pathologists have worked diligently to develop an integrated package of management tools for growers to use to reduce the impact of the disease. As the 2009 SWW season unfolds, it is evident that FHB has done some damage to wheat fields from Arkansas to the eastern shore. Until the last grain is harvested and DON tests are run, we won't know the magnitude of the damage. But based on what we know now, can we say that the USWBSI research and outreach efforts, with funding from the USDA-Agricultural Research Service, have made a difference over the past 6 years? In a word, yes.

Breeding - Resistant varieties are often regarded as the first line of defense. Anecdotal reports from across the region reinforce this notion:

Christina Cowger, North Carolina State University-based USDA-ARS small grains pathologist, "Severe scab symptoms have been observed in a number of fields of susceptible varieties, while nearby fields of moderately resistant varieties have much less severe scab... most growers did not use scab resistance as a criterion in selecting varieties..."

Don Hershman, University of Kentucky Extension Plant pathologist, "...the situation looked "ugly" in numerous fields... In those cases where fungicides were applied properly in a timely manner, fields visually seemed to be holding up well ... Resistant varieties, where used, have also made a difference..."

Jose Costa, University of Maryland wheat breeder, "... high infection levels had shown up at three Eastern Shore yield trial locations ... Differences between susceptible varieties and those with at least moderate resistance were very apparent..."



Susceptible and resistant varieties in MD variety trial.

2009 Southern SWW Scab Epidemic
USWBSI's impact

Given the importance of resistant varieties, how have USWBSI breeding programs impacted the wheat variety profile in the region? The University of Missouri has released Truman and Bess with the help of USWBSI funds. Although there are no data on which varieties are being grown in Missouri, based on seed sales, Truman is produced on more acreage in Missouri than any other public variety. Also being grown are Bess, Ernie and Roane (a Virginia Tech release) – each of which has a level of resistance that is very functional in production fields. Based on seed sales, there is some acreage of Truman outside of Missouri from southeast Kansas through to New York State. The trajectory of those sales outside Missouri is still increasing – suggesting that acreage planted to this resistant variety is also increasing.



Truman (rear) vs susceptible (foreground)

In the past three years, the University of Illinois wheat breeding program has released a number of breeding lines with moderate to high levels of FHB resistance for commercial production as licensed varieties. Some of these varieties are available from seed companies under the company's branded name. Several additional breeding lines with FHB resistance are being increased, but several seasons are required for seed multiplication before large quantities of seed will be available for producers.



Resistant IL line (right) vs susceptible line (left).

2009 Southern SWS Scab Epidemic USWBSI's impact

The Ohio State University recently released two public cultivars, Bromfield and Malabar, with high yield potential and scab resistance. These were developed with funding from the USWBSI. Both yield about 3 bushels/acre better than the standard Hopewell and have 60% less head symptoms than the susceptible check, and about 15% less head symptoms than a moderate resistant check. They have about 55% less toxin in their grain than a susceptible check, and 15% less toxin in their grain than a moderately resistant check.



Pass of Truman plots flanked by susceptibles.

The University of Kentucky recently released Pembroke wheat, a high yielding variety with moderate FHB resistance, developed with USWBSI funding. In 2009, under natural scab infection, ratings from five locations of the Kentucky wheat variety trial put Pembroke in the lowest 15% of the 88 varieties in the trial based on a 0-9 rating of FHB index.

Purdue University has released cultivars Goldfield and INW0411 among others. North Carolina State University has released the high yielding, moderately resistant Neuse and Virginia Tech has released McCormick and Tribute, both of which have excellent native resistance and have been grown on significant acreage. All of these cultivars give farmers the opportunity to use high yielding, scab resistant cultivars in their scab management programs. Further, as breeders in the region have focused heavily on scab resistance, susceptible lines in the programs are discarded. This year, for example, at least two high yielding candidate varieties were not released because they did not have the requisite scab resistance. This approach – eliminating

2009 Southern SWW Scab Epidemic USWBSI's impact

the susceptibles – is widely viewed as one of the most productive things we can do to improve overall scab resistance of the varieties available to our growers.

In spite of these breeding successes, challenges remain. The biggest breeding challenge lies in combining scab resistance with agronomic superiority and acceptable milling and baking quality. The next challenge is convincing farmers to grow resistant varieties. Once a cultivar is released, it will not have a large impact unless it is grown on significant acreage and that means that farmers must choose to plant it.



Great resistance is hard to combine with superior agronomics.

Fungicides: For the 2009 growing season, farmers have an array of fungicide choices. Thanks in part to USWBSI efforts, a number of chemicals were registered for use in 2008, including Caramba, Proline, Prosaro and Folicur (please see http://www.scabusa.org/pdfs/News-Fungicides_08-3.pdf for details). The same wet weather that brought about the 2009 epidemic made it difficult for growers to apply fungicides to wheat fields, however. Anecdotal evidence suggests that in KY and IL at least, a significant amount of product was applied (15 and 20% of the acreage, respectively), in some cases aerially. Kentucky crop consultant, Phil Needham (Needhamag.com, personal communication) reported that fungicides made a difference. Real world farm-based data from two county agents: McLean county, KY's Greg Henson (see

2009 Southern SWW Scab Epidemic
USWBSI's impact

Figures 1 and 2) and Beaufort county, NC's Gaylen Ambrose (personal communication) indicate an excellent response to Caramba fungicide in 2009. In spite of the availability and efficacy of these tools,

growers are reluctant to use them for scab because scab is not an "every year" problem, and the fungicides



represent a significant

Fungicides being applied to barley with an Air Delivery Spray System.

cost. The other valuable management tool developed by the USWBSI is the Risk Management Tool (http://www.wheatcab.psu.edu/riskTool_2009.html), which helps growers decide whether and when to spray a fungicide. In 2009 so far, the website has had 5035 hits from 1816 unique IP addresses.

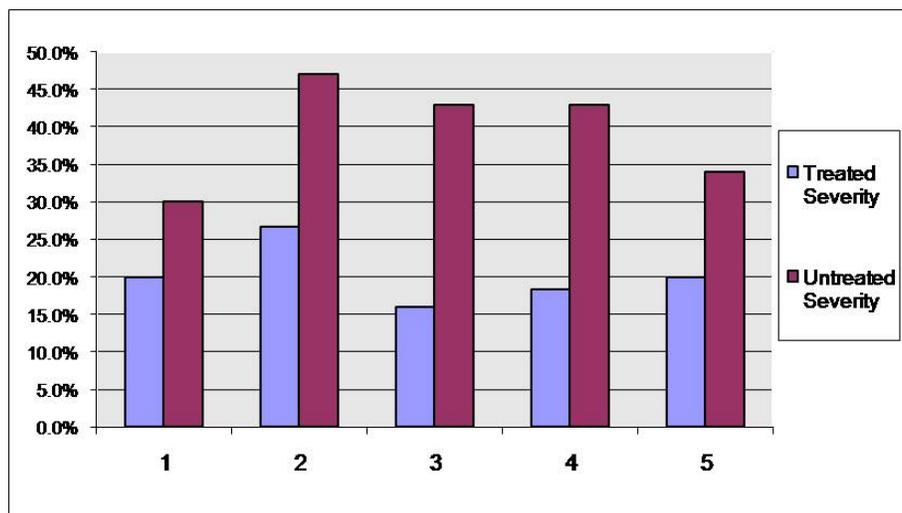


Figure 1. Effect of Caramba on FHB severity (5 reps).

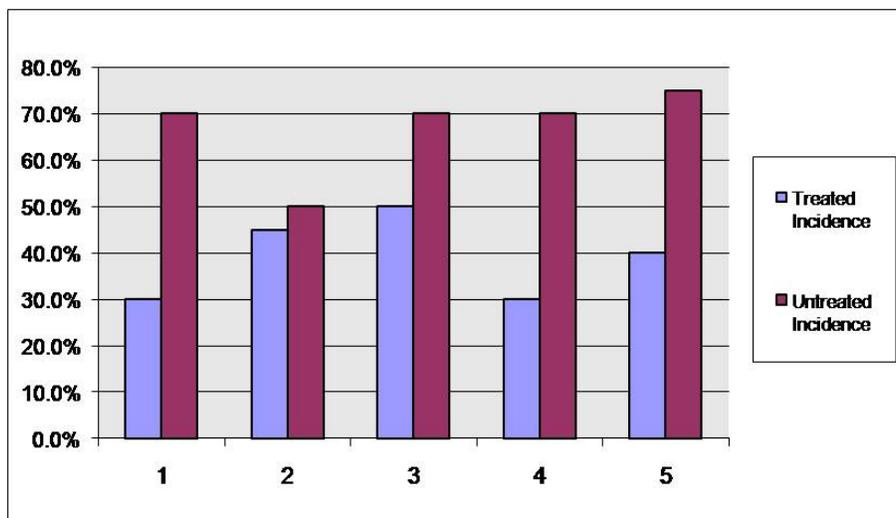


Figure 2. Effect of Caramba on FHB incidence (5 reps).

The biggest challenge that we face is one of communications. We have to communicate to growers, agents and consultants the importance of using the tools that are available to combat scab: resistant varieties, fungicides and the risk management tool. This will be the focus of Scab Smart, a website which will go live this fall. But to answer the question “Has the USWBSI made a difference ?” we only have to look at those fields that were planted to susceptible varieties and not sprayed with a fungicide to visualize what the entire region would look like if USWBSI scientists had not been focusing on head scab for the past 12 years.

Please note that the cultivars mentioned in this article are only a subset of the moderately resistant and resistant cultivars available to growers. As previously mentioned, the U.S. Wheat & Barley Scab is funded by the USDA-Agricultural Research Service.

(Contributing to this article were: Christina Cowger, Paul Murphy, Carl Griffey, Jose Costa, Fred Kolb, Anne McKendry, Herb Ohm, Clay Sneller, Pierce Paul, Carl Bradley, Don Hershman, Phil Needham, Greg Henson, Gaylen Ambrose, Gene Milus, Erick De Wolf, Paul Knight, Marcia McMullen, Scott Halley and Sue Canty)