Summary
of the
Technical Science Working Group
on
Soybean Rust (SBR) – Teleconference #5
Held on July 16, 2003

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Web resources on soybean rust:
APHIS SBR site and strategic plan - http://www.aphis.usda.gov/ppq/ep/soybean_rust/
ARS SBR news - http://www.ars.usda.gov/is/pr/2002/020627.htm
Florida SBR Pest Alert - http://www.doacs.state.fl.us/%7Epi/enpp/pathology/soybeanrust.html
Illinois facts about SBR - http://www.ag.uiuc.edu/cespubs/pest/articles/200213k.html
IPM Centers SBR website (past Working Group meeting summaries, membership, action plan, SBR fungicide efficacy trials, and useful links) - http://www.ipmcenters.org/NewsAlerts/soybeanrust/
NC504 SBR Committee - http://www.lgu.umd.edu/project/home.cfm?trackID=3154
Ohio SBR facts - http://ohioline.osu.edu/ac-fact/0048.html
United Soybean Board SBR guide – http://www.unitedsoybean.org/
Working Group on SBR website - http://www.ipmcenters.org/NewsAlerts/soybeanrust/

A. Purpose of Working Group – presented by Kent Smith, USDA/OPMP, Washington, DC

The basic purpose of this working group is to enhance communication between state and federal scientists concerning soybean rust. Specifically, we hope to better prepare state departments of agriculture and extension specialists to deal with soybean rust given that they will make the recommendations to growers concerning this disease when it arrives in the continental U.S.

B. CropLife Meeting on SBR – presented by Bev Paul, American Soybean Association, Washington, DC

On July 15, 2003, a meeting concerning SBR was held at CropLife America in Washington, DC. Twenty-seven people participated, representing the American Soybean Association, United Soybean Board, Iowa Soybean Association, Commercial Farmers Union of Zimbabwe, USDA, USEPA, CropLife America, Bayer Crop Science, Syngenta, Dow Agro Sciences, and BASF.

There was a general recognition by all those present, that while plant disease resistance would be the most desirable control strategy, it is not likely to be developed for 4 to 10 years. Fungicides will be needed to combat SBR should it arrive in the next few years.

One of the central questions of the meeting was how much fungicide currently is available to combat SBR if it arrives in the continental U.S. This includes currently registered products and products requested by the draft Emergency Exemption request. The best estimate of the group was that adequate fungicide would be available to treat about 5 million acres of soybeans given a lead-time of a few weeks. This was recognized as wholly inadequate considering the current acreage of 75 million acres of soybeans in the U.S. It was pointed out that if more fungicides were added to the Emergency Exemption request, and were approved by the EPA within the next few months, manufacturers of the approved fungicides could better meet the expected demand should SBR arrive next season. Without early acceptance, adequate quantities of fungicide will not be produced.

The EPA indicated that they have hazard concerns concerning several of the triazole fungicides, the products of choice. They requested that additional fungicides be requested so they can approve a sufficient number of products to meet the expected demand of an SBR epidemic. Marty Draper, one of the primary authors of the Emergency Exemption currently being reviewed by EPA, is working on such a list.

Soybean farmers are understandably concerned about our preparations for SBR. They want to be assured that adequate preparations have been made for the arrival of SBR including adequate supplies of registered fungicides.

C. Breeding for Resistance with Wild Perennial Relatives of Soybean – presented by Ted Hymowitz, University of Illinois, Urbana

Ted began collecting wild perennial relatives of soybean in the 1970s from several locations in Asia and the South Pacific. About 22 species were collected which represent great genetic diversity as compared to the species *Glycine max* or soybean. This was viewed as a potential source of genetic material to investigate resistance to SBR.

In 1985, screening work on this germplasm was begun at the Asian Vegetable Research and Development Center on Taiwan in cooperation with Dr. Arnold Tschanz. Three years later, Dr. Glen Hartman at the same location continued this work. The results of these studies were published in *Phytopathology* and *Crop Science*. There was promising resistance noted in *Glycine tomentella*, a close relative of soybean. Moreover, hybrids of these two species were found to be fertile plants, an unexpected result. Further work on these hybrids as a source of SBR resistance needs to be pursued but is not currently funded.

An unexpected result of the hybrids tested is the discovery of resistance to soybean cyst nematode. This discovery has been incorporated in breeding programs for this disease.

D. APHIS Detection Assessment Teams – presented by Bob Spaide, USDA/APHIS, Riverdale, MD

APHIS has initiated a program in which a team of scientists will quickly respond to the discovery of new infestations of select agents to determine the threat of each occurrence. The team of scientists will be made up of USDA and university experts that are well versed in the pest of concern.

They will arrive at the site of infestation with 24 hours following APHIS confirmation of the identity of the pest. Over 3 to 4 days they will make a site evaluation, and then report back to APHIS headquarters the nature of the infestation

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SBR is the first pest being considered for this new program. Bob has already assembled a team of interested scientists and alternates. In September, a workshop will be held to review protocols and discuss likely scenarios. Presently, scenarios being considered are infestations in: a) a port of entry, possibly on kudzu, b) a soybean production region, c) a susceptible leguminous minor crop area, and d) a wild host.

E. Experiences with SBR

a) In Africa – presented by Clive Levy, Commercial Farmers Union, Zimbabwe

SBR was first detected in Africa in Uganda in 1996 and then in Zimbabwe in 1998; it spread to South Africa by 2001. The capacity of researchers and soybean farmers in Zimbabwe to manage SBR on soybeans has risen sharply over the years. The first year in Zimbabwe, SBR was devastating to the commercial soybean crop. Following research on fungicides and the initiation of a long-term breeding program, losses abated, although still present a threat to soybean production. Triazole fungicides were found to be the most cost-effective choice available and are now exclusively used. Despite this fact, pathogen resistance development to the triazoles has not been observed. Also, ground application of fungicides was found to be more efficacious and cheaper than air application.

Current recommendations are to begin applications when plants begin to flower or when the local trap crop shows evidence of SBR. These trap crops or sentinel crops are established regionally (every 20 to 100 miles), involve one half to one acre of commercial soybean hybrids, are surveyed for SBR daily after flowering, and are grown about one month ahead of the commercial crop. After the first spray, which is usually at the flowering, one or two more sprays are made at 3-week intervals. At first, initial fungicide applications for SBR relied upon waiting for the first symptoms of the disease on the commercial crop but often resulted in yield losses. Also, the first year of the disease caused panic that resulted in several inefficient means of control.

Clive indicated that one thing apparently missing from our current preparations, based on his experience in Zimbabwe, was a cohesive trap crop network. While Florida does have a very refined soybean and kudzu monitoring program, and efforts are underway for early season surveillance in the southern U.S., apparently little is being done to use trap or sentinel crops as a early warning system in most of the U.S.

b) In Brazil – presented by Hossien El-Nasharr & Paul Parker, USDA/APHIS, Raleigh, NC

Hossien visited Brazil last May and collected information on the severity and extent of SBR. It was noted that SBR was present on six-week-old volunteer soybean plants. These infected volunteers were growing in a field that was estimated to have suffered up to 40% yield losses during the 2002-2003 crop-growing season. The field contained nearly 60% volunteer soybeans and 40% weeds. There was no rust noted on any of the weeds present in the field. No efforts were made to verify the causal agent or the source of the observed rust (*Phakopsora pachyrhizi* or *P. meibomiae*). Brazilian experts, however, indicated that *P. pachyrhizi* was present and caused up to 40% yield loss during the growing season. Hossien gave a presentation to the American Soybean Association on July 12, which will be

available for viewing on a web site soon. That information will be forwarded to members of the Working Group when it is available.

The evidence Hossien collected on his trip and elsewhere has been used in a draft risk assessment document that suggests that soybean meal, grain and seed transported by man may provide a pathway for the pathogen of SBR into the U.S. This could occur before the pathogen reaches the US by natural means (wind currents). Hossien has requested that the director of the APHIS Plant Epidemiology and Risk Analysis Laboratory (PERAL) re-assess the currently accepted SBR quarantine standards, in light of this collected evidence. Because US soybean stocks are currently at a low level, and the South American stocks (Brazil in particular) are at a high level, importation of South American soybeans into the U.S. is especially likely. Bob Griffin and Ron Sequeira of APHIS, PPQ, CPHST, PERAL in Raleigh, NC, are reviewing the request submitted by Hossien, and practical measures dealing with the current quarantine standards are being evaluated. Hossien would welcome any comments or suggestions in support of or against the possible amendment of current soybean import standards.

Hossien plans to return to Brazil on August 1 to gather more information at a Brazilian national meeting of plant pathologists on the extent of damage from SBR and the most efficacious control techniques. He welcomes any questions concerning the current status of SBR in Brazil, which he will be happy to investigate on his trip.

Paul Parker is working on the development of an air sampling technique to detect the presence and viability of spores of *Phakopsora pachyrhizi*, the causal agent of SBR. Plans are to couple standard air sampling techniques with molecular identification by PCR. This is one of the many projects which APHIS, PPQ, CPHST, PERAL is conducting to safeguard US agriculture and address the concerns of US stakeholders.

F. Section 18 Emergency Exemption for SBR – presented by John Sierk, Minnesota Department of Agriculture, St. Paul & Marty Draper, South Dakota State University, Brookings

John and Marty have presented a draft Emergency Exemption for SBR to the EPA for review and comment. They are requesting the use of propiconazole (Tilt, Propimax), tebuconazole (Folicur), myclobutanil (Laredo), and propiconazole + trifloxystrobin (Stratego). The draft document was submitted on June 16, and with the help of USDA, various concerns of EPA are being addressed.

The EPA has risk concerns about the triazole fungicides requested. For this reason, they have asked for a more extensive prioritized list of unregistered but efficacious compounds, so that they can choose several compounds and thereby make available an adequate supply of fungicides to combat SBR.

Discussions will continue among the requesting states, USDA, and EPA. When a mutually agreeable solution is reached, other states will be invited to submit piggyback Emergency Exemptions for their states. Approved Emergency Exemptions will not be released until the USDA Animal Plant Health Inspection Service confirms that SBR is in the continental U.S.

G. National Plant Diagnostic Network Detection System for SBR – presented by Mary Palm, USDA/APHIS, Beltsville, MD

Mary reported on response times of the National Plant Diagnostic Network (NPDN) to suspected samples of SBR. They have recently conducted two tests through the lab in Nebraska and more are planned. In the Nebraska case, the sample was submitted to the state diagnostic clinic in Nebraska, referred to the NPDN hub in Kansas, and then sent for the final microscopic and molecular identification to the APHIS national identifier, Mary Palm, in Beltsville, Maryland. The time lapse was 36 hours from initial submittal to final sample determination. All stages of receipt, identification, and referral are logged in electronically to the NPDN system to enhance the speed of specimen movement and identification.

Molecular identification is made by a PCR test developed by Reid Frederick in Ft. Detrick, Maryland, and is currently being validated for accuracy by Laurene Levy of APHIS in Beltsville, Maryland.