Breakout Session One: Prediction, Detection, Diagnostics, and Communication
General comments on key information that was learned in 2005, what worked, and what problems were encountered.

Symposium attendees were assigned to one of six discussion groups, each balanced by the organizing committee for diversity, representing the many facets of the agricultural industry affected by soybean rust (e.g., government, university, industry, growers).

Facilitators and Recorders for the 6 sessions were:
- Facilitator-XB Yang, Iowa State University; Recorder-Laura Sweets, University of Missouri
- Facilitator-Edward Sikora, Auburn University; Recorder- Alison Robertson, Iowa State University
- Facilitator-Robert Mulrooney, University of Delaware; Recorder-Dean Malvick, University of Minnesota
- Facilitator-Clayton Hollier, Louisiana State University; Recorder-James Kurle, University of Minnesota
- Facilitator-James English, University of Missouri; Recorder-Arv Grybauskas, University of Maryland
- Facilitator-Jason Bond, Southern Illinois University; Recorder-Carl Bradley, North Dakota State University

Surveillance and detection activities
- The sentinel plot system worked great as an early detection and fungicide recommendation system. Sentinel system gave growers something they could see and use.
- USDA's SBR-USA Map was a tremendous value, especially in situations where the neighboring county/state was infected, then the website map was monitored every two days.
- Scouting intensity and interest varied between the northern and southern production zones. There was a lot of interest in monitoring early in the production season, but interest waned later in the season in northern production zones especially the closer it got to harvest time. In the southern production region, interest levels were very high, especially in counties close to regions where rust had been found.
- In some states, the experiment stations did not have research farms in some areas for sentinel plots but found growers in these areas to ensure state had good coverage.
- Incubation of leaves in a moist chamber overnight was much better for identification of rust. Microscopic evaluation of leaves was absolutely necessary to detect early disease in field.
- Disease was always seen on early maturing varieties before median maturing varieties.
- Disease was only detected during the reproductive stages (flowering and seed development) on soybean.
- Money for each sentinel plot was not enough for weekly collection and examination of 100 leaves per plot from March to November in southern states ($2,500 per plot). Monitoring of sentinel plots was a full time job.

Sentinel Plots
As a whole the sentinel plots were an effective and efficient method of observing for soybean rust. Most finds were in commercial fields but the earliest finds were those made in sentinel plots. This was thought to be a function of intense observation. Several people mentioned the public relations value of sentinel plots. They provided increased visibility and were also a valuable educational tool both for soybean rust education and more general plant pathology training.

Plot Setup – Planting protocol should be adapted to regions.
      Planting Date. In the South "early planting" is an option while in the North planting takes place for all soybeans as early as possible. It might be more appropriate to plant a range of maturities to ensure that green, susceptible plants are present for the full season. In the south where a succession of planting dates is possible relay planting is appropriate.
      Field selection and plot arrangement. In areas where soybean is a widely planted crop it might be more appropriate to select areas of fields planted for commercial production. In the south or states with few soybean acres plots planted specifically for use as sentinel plots is appropriate. FL and GA were mentioned specifically as states where this was a more appropriate method of establishing plots to be monitored as sentinel plots.
      Alternate crops monitored for sentinel plots. Dry beans planted adjacent to soybeans in sentinel plots did not develop soybean rust indicating that (at least in this case) the dry beans were much less susceptible to soybean rust and probably not a reliable indicator plant for use in sentinel plots.
      Selecting plot locations. There was discussion of different options for choosing plot locations. For example, should sites be chosen that are adjacent to tree lines, in low spots, etc. that have more favorable conditions for soybean rust? There was disagreement on the importance of filtering effects on inoculum vs. factors favoring rust such as prolonged dews or leaf wetness.
      Uniform method of analyzing sentinel plots for disease. Is it better to sample intensely or to encourage covering all sentinel site. In areas where SBR was nearby it seemed more appropriate to emphasize intense accurate sampling sensitive enough to find 1 pustule/plant. In areas more remote from areas where rust is present, it is probably appropriate to sample less intensely. For example: GA tried for 1 pustule/100 leaves. In KY flexibility was emphasized with some samples analyzed in field and some samples taken into lab for more intense analysis. In IL emphasis was on flexibility with more detailed analysis performed later in season when likelihood of SBR was thought to be greater. In VA a two tier approach was used with an in-field vs. in-lab approach taken. In lab samples received very intense analysis.

Spore trapping
- Ten Syngenta spore traps in Tennessee and many possible SBR spores trapped, yet we could not find a pustule. Can't really predict from spore traps what will happen (not SBR, alive, dead, environment, etc.). Take these phenotypic spore trapping data with a grain of salt. Always remember that presence of a pathogen does not equal disease; need to remember the disease triangle.

- What is the minimum threshold (of spores) needed for disease? We don't know this and we must get this information to develop predictive systems based on spore trapping.
- Several discussions on how to present the spore trapping data to the public, especially since little disease was found near many of the spore traps.
- Important for bordering states for reporting of spores within another state.
- IL – growers liked spore trapping system, but would like to follow up with confirmation (PCR, etc)
- 'rust-like' spore is a "made-up word" and confused growers; inappropriate applications were made even though education on implications of the finds were given. More information is required, i.e., fact sheet; if this will be continued during 2006. (Note: NCDC-202 (formerly NC504 committee) will write a fact sheet pertaining to this subject).

Resources needed for sentinel plots
- How many sentinel plots are actually needed?
  - Lots of value in sentinel plots rather than soybean rust…
    - Farmer interest
    - Greater awareness of other foliar diseases
    - Greater awareness of insects (aphids, mites, foliar feeders)
- Sentinel plots are needed in both northern and southern US, majority of acres are in the North. Sentinel plots will be able to monitor rate of movement but also provide system if rust "jumps" several states.

Diagnosis
- Numerous training sessions were held through National Plant Diagnostic Network for diagnosticians.
- Growers didn't like that the leaf samples required incubation and wanted to know "now", and wanted the plant diagnostic lab to run PCR or ELISA procedures.
- Some plant diagnostic labs liked the ELISA procedure because they could do other things while ELISA was running compared to the RT PCR procedure which needed too much attention, and they could not do other things.
- Farmers were worried that they would not be able to spray quickly enough if diagnosis took too long. ……"by the time you see it; it's too late" mentality.
- Would like an easy tool to diagnose in field at early stages of disease development.
- Immunoassay for the field is needed for quick, on-site diagnosis.
- SBR symptoms can vary greatly (from large lesions to no lesions w/ spores)

How many sentinel plots are planned for states during 2006?
- More sentinel plots are needed in the southern production region than the north.
- Earlier funding will help states manage and monitor sentinel plots, hire people, train people, etc.
- More funding is needed if more lab time will be required.

Information dissemination
- Keep listserves and other coordination between specialists, state leadership for interpretation and posting of comments, recommendations critical to the whole process.
- Soybean rust bulletin in e-mail (stopsoybeanrust.com) was helpful; to let people know what is going on.
- Some states implemented a local hotline. The producer can use the cell phone to dial-up while in the field. For example, the KY SBR hotline was very useful to producers in that state and neighboring states. It was updated frequently.
- The USDA website (sbrusa.com) may be more useful to the Extension contact in each state, but less useful to producers. In some states the blown-up map was sent out to producers by email; they got accustomed to this and used it to track rust movement and make spray decisions.
- The weekly Monday conference call among southern state sentinel plot coordinators was invaluable.
- Hard to find the North American Plant Disease Forecast Center site, unless bookmarked.
- Concerns were raised about information flow to those without an internet connection. If agronomist, or consultants, then internet should be reaching clientele.
- The information put out by NC-504 was wonderful and used extensively.

Prediction models
- With the current information on the biology - prediction of date/time/location is probably impossible at this time.