Breakout Session Three: Looking Towards 2006
Top recommendations, questions, or concerns (not necessarily in ranked order) for the future within each topic area.

Symposium attendees self-selected the topic area of greatest interest to them.

Facilitators and Recorders for the 5 sessions were:
- Diagnostics: Facilitator-Karen Snover-Clift, Cornell University; Recorder-Layla Sconyers, University of Georgia
- Prediction/Detection Systems: Facilitator-Erick De Wolf, Penn State University; Recorder-Julie Golod, Purdue University
- Management-Fungicides & Biocontrols: Facilitator-Bob Kemerait, University of Georgia; Recorder-Mel Newman, University of Tennessee
- Pathogen Biology: Facilitator-Mo Bonde, USDA ARS; Recorder-John Rupe, University of Arkansas
- Germplasm Enhancement: Facilitator-Greg Shaner, Purdue University; Recorder-Dechun Wang, Michigan State University
- Policy/Insurance: Facilitator-Marty Draper, South Dakota State University; Recorder-Ed Ready, United Soybean Board

Diagnostics
- Readily available funding for diagnostic personnel.
- Readily available funding for supplies (reagents, kits) and equipment – for overall preparedness to be able to respond when rust arrives in a state.
- Continued support for training of U.S. diagnosticians by USDA-APHIS and USDA-ARS scientists – for diagnosis of soybean rust as well as other pathogens that may be confused with soybean rust.
- Continued validation of protocols and development of new protocols for additional pathogens.
- Continued financial support for rust fungus systematics – lacking in Universities.
- Creation of field-level tests such as “hand held – dip sticks” that can be performed in less than 30 minutes.
- Training materials for field personnel, knowing what plant material to select, how to ship plant material, and what symptoms to look for.
- Creation of a working group of diagnosticians, industry and extension specialists to discuss and keep informed on issues.
- Need a diagnostic test for spore presence from rain water and filters from spore traps

Prediction/Detection
- Identification of source areas of inoculum and strength (level of spore production) of source areas.
- Understanding pathogen population structure – virulence (towards Rpp genes), aggressiveness, identify overwintering areas, inoculum sources and to document the movement of biotypes.
- Continued integration of risk communications.

- Develop a mechanism for user feedback – critical to hear from audiences.
- Determine the association of spore trapping with disease risk, i.e., the time of arrival of inoculum and environmental conditions encountered at that time.
- Quantify the escape of spores from crop and kudzu canopies – calibrate aerobiology models.
- Spore survival and mobility from source of inoculum through transport (movement) and deposition.
- Refine methods of spore trapping. Evaluate different types of spore traps for different dispersal mechanisms as well as placement of traps.
- Techniques for scaling up local observations to county and regional levels. Strive to provide growers with an estimate of inoculum source and strength.
- Improve mechanisms for sample submission by first detectors.

Management-Fungicides & Biocontrols

- Application timing: When is it too early? Too late? Develop a point system for growers to assess risk.
- Residual performance of products – factors that affect longevity in environment.
- Effective evaluation of tank mix partners – herbicides, fertilizer, insecticides.
- 'Plant health' applications – product effects/benefits in the absence of obvious disease pressure as well as effects on soybean diseases other than rust.
- Study application strategies for optimal coverage – by ground, chemigation, and aircraft.
- Determine baseline sensitivity of rust fungi to fungicides for resistance management.
- Evaluate the phytotoxicity of triazoles, conditions when this occurs, effects on yield and "does it matter".
- Current need to expand diversity of Section 18 products – need different modes of action beyond strobilurins and triazoles.
- Etiology of rust fungus in crop canopy – especially in the lower canopy. Why does disease develop here first? Effects of leaf age, canopy structure, shading?
- Specialty legumes need to be studied further for response of different cultivars; also application timing on specialty legumes.

Pathogen Biology

- Pathogen variability – races – developing markers – trace isolates to overwintering source to help document movement– biotypes.
- Improve and standardize disease assessment methods for rating disease.
- Better define environmental requirements for disease development– pathogen survival – environment.
- Elucidate missing parts of the rust life cycle, e.g., teliospore development- going to where the pathogen originated, overwintering sources, sources of inoculum.
- Interest in alternative and alternate hosts – particular kudzu – importance of alternative hosts as a source of inoculum.
- Management of kudzu with biological control.

Germplasm Enhancement

- Refine qualitative reaction type categories (TAN, RB, immune). Investigate effect of environment, plant age, and leaf age on expression of resistance.
- Characterize partial resistance in the field.
- Characterize and measure components of partial resistance. Investigate effect of environment, plant age, and leaf age on expression of resistance.
- Screen current varieties in the field to identify most and least susceptible. (This will provide a basis for withdrawing the most susceptible cultivars from production and will identify adapted cultivars to use as parents for crosses with new sources of resistance. Even moderate differences in the degree of susceptibility may have a large effect on the rate of disease development.)
- Screen in the field the ~800 accessions that showed seedling resistance at Fort Detrick. (Depending on the maturity group of accessions, this may require off-season testing, use of supplemental light, and variation in planting date to obtain normal growth.)
- Screen *Glycine soja* accessions in the greenhouse (Fort Detrick) with diverse isolates of *P. pachyrhizi*. Screen promising lines in the field (See point 5).
- Develop a set of differentials that include *Rpp1* through *Rpp4* and any new sources of qualitative resistance.
- Carry out allelism tests or use molecular markers to compare new sources of qualitative resistance to lines with known *Rpp* genes.
- Develop mapping populations for new sources of both qualitative and quantitative resistance. Determine inheritance and develop molecular markers for important loci that can be used by breeders.
- Screen cultivars and accessions of *Phaseolus vulgaris* and other vegetable legumes for reaction to different races of *P. pachyrhizi*.

Policy and Insurance

- What does it mean that rust is a "federally regulated pest"? What are implications for movement of plant materials and/or rust samples?
- Did any farmers make crop insurance claims for losses due to rust? None known. If any are filed, RMA will look at their documentation to determine how management tools were used.
- Is it important to confirm crop losses by, for example, a check strip? How will adjustments be made? Grower would provide documentation to adjuster. Good farming practices can be interpreted in many different ways in different parts of the country. Insurance companies may interpret differently as well.
- Are there concerns about the potential of spore movement with equipment sold in a rust area and moved to a non-rust area?
- Rust didn't develop quite as anticipated in 2005. NC 504/NCT 202 recommends for sentinel plots: Collect rust data for three weeks after rust is confirmed, and then destroy the plot. Continue discussion.
- Policy on sentinel plots will be a moving target, since each year will be different. At present decisions on plot maintenance is with the states, but group recommends this

be done by states following national guidelines. At some point it may be possible to make management recommendations based on predictive models, but not yet.

- Should there be a federal policy requiring a minimum stockpile of fungicide? Is it possible? How? Who would pay? How are needs for treating aphids with insecticide met? The need for aphid insecticides varies sharply from year to year.
- Section 18/Section 3 issues need to be resolved (triazoles).