ARS Research In Support of the NPDRS

	FY06	FY07	FY08 Proposed
Base Funding	$1,402,040	$1,402,040	$1,402,040 + $4,336,000 increase

FY06 Distribution of Funds

Wheat Stem Rust (African Races) $345,191 Soybean Rust $972,679

Wheat Stripe Rust $85,000

FY07 Distribution of Funds

Wheat Stem Rust (African Races) $556,464 Soybean Rust $845,576

Wheat Stem Rust

FY06 Accomplishments

- Coordinate seed acquisition and cereal rust resistance evaluation of currently grown cultivars, advanced breeding lines, and repository accessions. Aberdeen, Idaho

  Outcome:

  Cooperation with CIMMYT and KARI. ARS established screening nursery for stem rust in Kenya. Over 1,000 lines collected from U.S. regional breeding nurseries.

Wheat Stem Rust

FY06 Accomplishments (cont.)

- Evaluation of United States Wheat Germplasm to Stem Rust in Eastern Africa. CIMMYT

  Outcome:

  NJORO Kenya Research Station. Seed distributed, vernalized, planting, data collected.

Wheat Stem Rust

FY06 Accomplishments (cont.)

Determine the relative vulnerability of present cultivars of wheat and barley, and experimental germplasm to TTKS. Cereal Disease Lab, St. Paul.

Outcomes:

Stem Rust Resistance genes – Monogenic lines of Sr genes were characterized for seedling infection types to race TTKS in greenhouse tests (St. Paul) and adult plant responses in stem rust nursery in Kenya. Level of resistance conferred by Sr genes varied between moderately resistant to moderately susceptible.

In 2006, moderately susceptible responses observed on Sr24 lines in Kenya. Results confirm presence of virulence on Sr24. Possible new variant within race TTKS that possess virulence on Sr24 and Sr31 (TTKST).

In 2006, ARS confirms presence of Ug99 (TTKS) in Sudan and Yeman.

Wheat Stem Rust

FY06 Accomplishments (cont.)

- Characterize race structure and evolution of stem rust and develop molecular markers. CDL, St. Paul, MN

Outcome:

Simple Sequence Repeat (SSR) marker analysis – SSR marker analysis indicated that Ug99 (race TTKS with virulence to Sr31) represents a distinct genetic lineage from race clusters in North America. Adaptations within TTKS linage suggests new genetic lineage (TTKST).

Wheat Stem Rust

FY06 Accomplishments

- Strengthen capacity of Ethiopian and Kenyan wheat programs to produce wheat stem rust resistant wheat germplasm. Increase inoculum collection and storage, inoculation methods, disease scoring, and physiological race surveys. Ft. Detrick, MD

Outcome:

Capacity Enhancement – ARS Jesse Dubin worked with Ethiopian and Kenyan pathologists to increase pathology skills for data collection.

Wheat Stem Rust

FY06 Accomplishments (cont.)

- **Established a dedicated web page and links on GrainGenes to provide comparative genetic maps of Ug99 and other stem rust resistance genes and identified DNA markers. Albany, Calif.**

Soybean Rust

FY06 Accomplishments

- **Develop a national sampling program through examination of rain samples as a reliable method for predicting soybean rust infections through aerial transport of urediniospores from the southern U.S. RT-PCR identificaiton., CDL, St. Paul.**

Outcome:

Rain samples from 19 NADP sites. PCR analysis 3x more P. pachyrhizi in 2006 than 2005.

Soybean Rust

FY06 Accomplishments (cont.)

- **Optimize fungicide spray programs for management of Asian soybean rust, determine efficacy of labeled and Section 18 products under U.S. conditions. Develop a list of additional Section 18 products and evaluate product application scenarios including rates, residual activity, and comparisons of combination applications. Urbana, IL.**

Outcome:

Comparison of nozzles, apertures, pressures. Canopy coverage no different between upright and bushy cultivars.

Soybean Rust

FY06 Accomplishments (cont.)

- **Develop international/domestic screening nursery for selected germplasm. Stoneville, MS, Urbana, IL.**

  Outcome:

  500 soybean accessions evaluated in Paraguay, Florida and Alabama. Differential response within two maturity groups from FL and AL. Indicates virulence differs in rust populations from FL and AL. Isolates in U.S. are as virulent as isolates from Asia, Africa and S. America.

  300 lines advanced. Segregating population for Rpp3 used to map location of this gene and identify associated molecular marker. Cooperation with Ft. Detrick.

Soybean Rust

- ARS research in common bean genetics to identify genes, develop new tools for characterizing the putative genes, and discover the function of genes that confer resistance to ASR, Beltsville, MD.

Wheat Stripe Rust

FY06 Accomplishments

- Identification of new genes in wheat and barley for stripe rust resistance, Pullman, WA.

Outcome:

Resistant wheat and barley genotypes were identified through germplasm evaluation. Molecular markers associated with R genes identified.

Wheat Stripe Rust

FY06 Accomplishments (cont.)

- Evaluate presently grown varieties and potential new varieties and breeding lines in the uniform regional wheat varietal nurseries for both seedling and adult-rust resistance to cereal rusts. Raleigh, NC.

Outcome:

Coordination with NWIC Regional Nurseries to phenotype, genotype advanced breeding lines and characterize R genes by mapping recombinant inbred populations.