

Summaries for Funded Research Project at Montana State University for FY 2008

Title: Evaluation of various materials and practices contributing toward economic crop production under flexible, continuous and other cropping systems in Montana.

Principal Investigator: Superintendents of Research Centers

Amount Funded: \$108,000

Objectives:

- To evaluate the effects of differing systems on crop and variety performance under diverse environments represented across the Montana Agricultural Experiment Station – Research Center network.
- To evaluate the potential fit of other materials, concepts and techniques with various cropping systems employed.

Title: Redistribution / Monitoring of Wheat Stem Sawfly Parasitoids

Principal Investigator: David Weaver

Amount Funded: \$100,000

Objectives:

- To continue ongoing laboratory and field experiments developing new mechanisms of resistance to wheat stem sawfly.
- To continue ongoing support of efforts to utilize cropping systems and develop procedures for cultural management of the wheat stem sawfly.
- To continue ongoing projects aimed at the mass production and development of biocontrol agents for the wheat stem sawfly, including both microbial agents and insect natural enemies.
- To use the continuance of funding in these research areas to help sustain ongoing outreach efforts to alter production practices towards more effective management of this major pest.

Title: A Strategic Investment in Agricultural Research Centers for Small Grains Research in Montana

Principal Investigator: Mal Westcott

Amount Funded: \$99,500

Objectives:

- Provide Agricultural Research Center personnel with resources to replace aging equipment and/or expand wheat and barley research capabilities.

Title: Winter Wheat Breeding and Genetics

Principal Investigator: Phil Bruckner

Amount Funded: \$70,000

Objectives:

- Develop improved cultivars of winter wheat adapted to Montana climatic conditions and cropping systems, which possess superior on-farm production characteristics (grain yield, winter hardiness, adequate and durable pest resistance, stress tolerance, agronomic characteristics) and superior end-use quality characteristics.
- Isolate, as much as possible, our foreign wheat customers from variations in wheat quality performance by development and release of suitable cultivars and production research to develop strategies to maximize quality consistence for wheat produced in Montana.
- Investigate environmental, genetic, and management factors which influence wheat productivity and end-use in Montana including 2007 projects: feasibility of combining low polyphenol oxidase (PPO) and high grain protein in wheat (year 2); and field verification of molecular markers for backcross transfer of stem solidness into elite lines.
- Coordinate Montana statewide winter wheat variety testing program and provide long-term performance data necessary for cultivar release decisions, variety recommendations, and producer management decisions.

Title: Spring Wheat Breeding and Genetics

Principal Investigator: Luther Talbert

Amount Funded: \$70,000

Objectives:

- Develop spring wheat varieties for Montana producers.
- Coordinate the variety testing program.
- Conduct genetic studies to enhance our ability to develop better varieties.

Title: Developing Improved Barley Varieties for Montana Farmers and their Industries

Principal Investigator: Tom Blake

Amount Funded: \$65,000

Objectives:

- Conclude the successful release of 'Geraldine'.
- Advance 'Hockett' through second years' plant scale test production season.
- Determine whether the 'high starch gene' when introduced into our best malting barley varieties improved malting quality.
- Measure starch percentage in all of our advanced breeding lines and correlate starch yield with ethanol yield.

Title: Marker Assisted Breeding in Spring and Winter Wheat

Principal Investigator: Jamie D. Sherman

Amount Funded: \$40,000

Objectives:

- Field test inter-converted spring and winter wheat varieties that were developed using molecular markers.
- Develop white-seeded wheat through the conversion of high performing red lines using newly identified markers for white genes.
- Use markers in forward breeding to address emerging problems.

Title: Monitoring and Redistribution of Wheat Stem Sawfly Parasitoids

Principal Investigator: Deanna Nash

Amount Funded: \$33,000

Objectives:

- To continue a pilot program that is monitoring the population growth of inoculatively established sawfly parasitoids on farms where historically there was sawfly damage in the presence of negligible parasitism. This project is conducted in direct collaboration with selected wheat producers and wheat grower organizations and aims to evaluate the continuing success of these parasitoids.
- This year we also wish to establish ten new sites throughout Montana to continue the process of translating parasitoid redistribution and conservation to Montana wheat growers. Therefore, these ten new sites will be established with input from both county agents and grower organizations. These sites will not be monitored for long-term population dynamics, due to the fact that we are at maximum capacity for long-term monitoring.

Title: Improved Quality of Montana Hard Red and Hard White Wheat

Principal Investigator: Deanna Nash

Amount Funded: \$33,000

Objectives:

- Evaluate end-use quality of hard red and hard white wheat lines developed by MSU spring and winter wheat breeding programs.
- Showcase Montana's newest varietal releases for visiting trade teams as they tour the Cereal Quality Lab testing facilities.
- Participate in the milling and baking contests for the Central Montana Fair and the Chouteau County Fair.
- Promote Montana wheat quality by conducting tours and hands-on demonstrations.
- Participate in research projects designed to determine ways to improve end-use quality parameters of new wheat varieties by cooperating with Montana Agricultural Experiment Stations researchers, the general public and industry.

Title: Orange Wheat Blossom Midge Management

Principal Investigator: Bob Stougaard

Amount Funded: \$21,913

Objectives:

- Validate a degree-day model for the Montana midge population.
- Screen spring wheat varieties for midge resistance.
- Introduce biological control agents from North Dakota.
- Monitor potential midge populations in Triangle counties.

Title: Addressing plant disease and communication needs in Montana

Principal Investigator: Mary Burrows

Amount Funded: \$20,000

Objectives:

- Determine the most effective fungicide timing for control of *Fusarium* head scab in wheat.
- Determine the most effective fungicide timing for control of stripe rust in wheat.
- Determine if there is an economic advantage provided by tank mixing a fungicide with the standard herbicide application.
- Develop methods for rapid and accurate wheat virus identification.
- Determine potential for seed transmission of *Wheat streak mosaic virus*.
- Develop a radio program for distribution of information on plant disease.

Title: Comparing Input Strategies for Diversified Cropping Systems

Principal Investigator: Perry Miller

Amount Funded: \$19,741

Objectives:

- Compare diversified no-till and organic cropping systems for crop productivity and quality and resource use efficiency.
- Compare low and high input strategies for crop productivity and quality and resource use efficiency.
- Quantify crop yield loss due to residual soil herbicides in a favorable environment.
- Quantify the effects of wheat management (field environment, wheat type, variety, row spacing and seeding rate) on sawfly-induced yield losses and parasitoid interactions.

Title: Managing Root Diseases for Montana's Wheat

Principal Investigator: Alan T. Dyer

Amount Funded: \$19,680

Objectives:

- Determine the relationship between root lesion nematode populations and nematode related yield losses for tolerant and intolerant spring wheat cultivars.
- Evaluate tolerance and performance of top wheat cultivars to root lesion nematodes, *Fusarium* crown rot and Cephalosporium stripe.

Title: Alternative Strategies For Controlling Herbicide-Resistant Wild Oats

Principal Investigator: William E. Dyer

Amount Funded: \$16,500

Objectives:

- Assess herbicide treatments for wild oat and broadleaf weed control in malting barley fields.
- Determine the potential for carryover herbicide injury on representative crops planted the year after treatment.
- Determine the physiological mechanism of resistance to multiple herbicide families in wild oat biotypes from the Fairfield Bench.
- Develop an extension publication to disseminate our results to producers.

Title: Development of Germplasm in Winter and Spring Wheat With Resistance to Newly Developing Races of Stem Rust

Principal Investigator: Mareike R. Johnston

Amount Funded: \$15,400

Objectives:

- Evaluate pedigrees of currently grown wheat cultivars and breeding lines from the area for potential resistance to newly developing races of stem rust. Recommend screening procedures and isolates to be used to breeders.
- Determine virulence types of endemic stem rust cultures maintained at MSU. Determine suitability of cultures for proposed seedling screening program.
- Screen selected cultivars and lines at the seedling stage at MSU to identify potentially useful resistance genes.
- Participate in Global Rust Initiative.

Title: Enhanced Field Selection for Wheat Stem Sawfly Resistance

Principal Investigator: Phil Bruckner

Amount Funded: \$15,000

Objectives:

- Subject early-generation segregating winter wheat bulk populations and derived lines to heavy selection pressure for wheat stem sawfly (WSS) resistance and select plant phenotypes resistant to WSS infestation and cutting damage.
- Evaluate spring and winter wheat cultivars and advanced lines for resistance to infestation and cutting damage by WSS and for yield performance under heavy infestation by WSS.
- Systematically evaluate selected germplasm for enhanced stem solidness and alternative sources of WSS resistance.
- Provide field sites, representative of sawfly-infested production regions, for research and demonstration to producers of effective sawfly management strategies including use of resistant cultivars.

Title: Response of Spring Wheat with and without "Stay-Green" Trait to Nitrogen Fertilizer under Irrigated and Dryland Conditions

Principal Investigator: Chengci Chen

Amount Funded: \$11,261

Objectives:

- Investigate the different yield responses of spring wheat cultivars with and without "stay-green" trait to nitrogen fertilizer under irrigated and dryland conditions.
- Investigate retranslocation of soluble carbohydrates and proteins from leaves and stems of "stay-green" and non "stay-green" cultivars to grains under irrigated and dryland conditions.

Title: Early generation durum selection and germplasm improvement

Principal Investigator: Joyce Eckhoff

Amount Funded: \$10,000

Objectives:

- To produce improved durum germplasm for development of varieties for Montana producers.
- To develop value-added characteristics in durum for manufacture of specialty products.

Title: Continuing as an Underwriter for MONTANA AG LIVE!

Principal Investigator: Jack Riesselman

Amount Funded: \$3,000

Objectives:

- Continue the weekly live, call-in television program designed to address the needs of agricultural producers in Montana. Address legislative issues impacting agriculture, genetically-modified crops, mountain snow pack and surface water run-off, food safety issues, and how renewable energy impacts all segments of Montana's agriculture.

Title: Ag Appreciation Weekend

Principal Investigator: Jeff Jacobsen

Amount Funded: \$1,000

Objectives:

- Showcase agriculture and outstanding agriculturists in Montana during Ag Appreciation Weekend. Provide an opportunity for the agricultural community of Montana to gather together and celebrate agriculture.