

MSU RESEARCH PROPOSALS 2011

TITLE: Producing spring wheat quality samples representing Eastern Montana.

PERSONNEL: Jerald W. Bergman, Professor and Superintendent
Luther Talbert, Professor and Spring Wheat Breeder

AMOUNT FUNDED: \$4,000

OBJECTIVES:

1. Establish, manage and eventually harvest spring wheat commercial cultivars for the Overseas Varietal Analysis (OVA) program;
2. Establish, manage and eventually harvest spring wheat experimental lines for the Wheat Quality Council (WQC);

TITLE: Identifying and Developing Improved Barley Varieties for Montana

PERSONNEL: Dr. Tom Blake, Professor, Plant Sciences and Plant Pathology;
Stan Bates, Research Assistant, Plant Sciences and Plant Pathology

AMOUNT FUNDED: \$60,000

OBJECTIVES:

- A. Identify new barley varieties adapted to Montana's rainfed production system that provide increased farmgate economic yield.
- B. Identify the most reliable malt barley varieties for Montana's rainfed production system
- C. Identify the best available genes for introgression into Montana's malt and feed barley germplasm pools, and begin introgression.

TITLE: Enhanced field selection for wheat stem sawfly resistance

PERSONNEL: Phil Bruckner, PSPP Dep., Bozeman
Jim Berg, PSPP Dep., Bozeman

AMOUNT FUNDED: \$20,000

OBJECTIVES:

1. 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.

2. 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.
3. Systematically evaluate selected germplasm for enhanced stem solidness and alternative sources of WSS resistance.
4. 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: Winter Wheat Breeding/Genetics

PERSONNEL: Phil Bruckner, Winter Wheat Breeder, PSPP Dep., Bozeman
Jim Berg, Research Associate, PSPP Dep., Bozeman
Ron Ramsfield, Agr. Res. Spec. III, PSPP Dep., Bozeman

AMOUNT FUNDED: \$80,000

OBJECTIVES:

1. 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.
2. 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 consistency for wheat produced in Montana.
3. Investigate environmental, genetic, and management factors which influence wheat productivity and end-use in Montana including 2010 projects: field evaluation of lines selected with molecular markers for backcross transfer of high amylose starch and low polyphenol oxidase.
4. 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: Wheat Pest Calendar, 2011

PERSONNEL: Mary Burrows, PSPP, David Weaver, LRES, Fabian Menalled, LRES

AMOUNT FUNDED: \$4,571

OBJECTIVES: To issue an updated wheat pest calendar to assist growers, county agents, and crop consultants to identify and manage common wheat disease, insect, and weed pests.

TITLE: Wheat virus variety trials and on-farm fungicide demonstration trials

PERSONNEL: Dr. Mary Burrows, Assistant Professor and PI, and Matt Moffet, research assistant, PSPP, Montana State University.

AMOUNT FUNDED: \$20,771

OBJECTIVES:

1. Evaluate widely planted winter wheat, spring wheat and barley varieties in Montana for susceptibility to *Wheat streak mosaic virus* and *Triticum mosaic virus*
2. Evaluate early-season fungicides in wheat in on-farm demonstration trials.
3. Disseminate the results of these studies to growers in Montana and throughout the Great Plains region.

TITLE: Management of Endemic Pathogens in Montana's Wheat Production Systems.

PERSONNEL: Project Leader: Alan Dyer, Cereal Pathologist; Andrew Hogg, Research Associate, Jeffrey Johnston, Research Associate. Dept. Plant Science and Plant Pathology.

AMOUNT FUNDED: \$18,971

OBJECTIVES:

- 1) Determine the impacts cold weather fungal pathogens have on winter wheat production.
- 2) Screen experimental wheat lines for resistance to Fusarium crown rot, common root rot, and root lesion nematode.

TITLE: Early generation durum selection and germplasm improvement

PERSONNEL: Joyce Eckhoff
Debbie Kunda

MSU Eastern Ag Research Center, 1501 N Central Ave, Sidney, MT 59270
phone: (406)433-2208 e-mail: jeckhoff@sidney.ars.usda.gov

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: Genetic mapping of the new rust resistance genes

PERSONNEL: Li Huang, Assistant professor, PSPP, Montana State University

AMOUNT FUNDED: \$17,331

OBJECTIVES:

- 1). Fine mapping of the new rust resistance gene on 5DL,
- 2). Genetic mapping of the Ug99 resistant QTLs to wheat chromosomes,
- 3). Evaluating leaf and stem rust resistance for the wheat breeding programs at Montana State University

TITLE: Producing winter wheat quality samples representing the Western Triangle area of Montana.

PERSONNEL: Grant D. Jackson, Professor and Superintendent
Phil Bruckner, Professor and Winter Wheat Breeder

AMOUNT FUNDED: \$4,000

OBJECTIVES:

1. Establish, manage and eventually harvest two winter wheat commercial cultivars for the Overseas Varietal Analysis (OVA) program;
2. Establish, manage and eventually harvest two winter wheat experimental lines for the Wheat Quality Council (WQC);

TITLE: A preliminary assessment of potential and risk of the proposed cheatgrass biocontrol agent (*Pyrenophora semeniperda*) in cereal crops and rangelands

PRINCIPAL INVESTIGATORS: Jane Mangold, Assistant Professor and

Extension Invasive Plant Specialist, Land Resources and Environmental Sciences-MSU; Zachariah Miller, Postdoctoral Research Assistant, Plant Sciences and Plant Pathology-MSU

AMOUNT FUNDED: \$12,500

OBJECTIVE:

1. Determine the current geographic distribution and disease incidence of *Pyrenophora semeniperda* on cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*) populations in crop and range lands across Montana
2. Determine the host range of Montana strains of *Pyrenophora semeniperda* and assess effects of infection on cheatgrass, Japanese brome, two cereal crops, and two native grasses.
3. Enhance research-based Extension program on cheatgrass ecology and management.

TITLE: Intensified Dryland Cropping Systems for Southern Montana

PERSONNEL: Kent A. McVay, Assistant Professor, and Qasim A. Khan, Research Associate, Department of Research Centers -- Southern Ag Research Center. Huntley, Montana.

AMOUNT FUNDED: \$12,000

OBJECTIVES:

1. Investigate crop sequence effects on agronomic performance of wheat and alternate crops, and changes to soils and ecosystems.
 - a. Yield and quality determination
 - b. Water use efficiency
 - c. Residual soil nitrogen status
 - d. Soil carbon changes
 - e. Weed shifts and competition
 - f. Crop disease incidence
2. Investigate the adaptation and agronomic performance of specific alternative crops to wheat or barley for dryland agriculture in south central Montana.
 - a. Camelina
 - b. Dry peas
 - c. Lentils
3. Determine economic feasibility of various crop sequences.
4. Share knowledge gained through professional meetings with colleagues and through scientific publications and to producers and the general public through extension outreach.

TITLE: Montana Wheat and Barley Production Guides

PERSONNEL: Kent A McVay, Extension Cropping Systems Specialist,
Department of Research Centers

AMOUNT FUNDED: \$6,950

OBJECTIVES: Develop and deliver comprehensive production guides using the most recent science based information for barley and wheat production in Montana. The production guides are written by MSU state specialists, produced by MSU Extension Publications, and printed and delivered free of charge to Montana citizens through our Extension network with the financial assistance of the Montana Wheat and Barley Committee.

TITLE: Dryland cropping systems: diversified high and low input strategies

PERSONNEL: Perry Miller, Professor – Cropping Systems, MSU-LRES;
Jeff Holmes, Research Associate, MSU-LRES; Clain Jones – Asst
Professor/Extension Specialist – Soil Nutrient Management, MSULRES;
Rick Engel, Assoc Professor – Soil Fertility, MSU-LRES;
Dave Buschena, Professor – Agricultural Economics, MSU-AgEcon

AMOUNT FUNDED: \$13,182

OBJECTIVES:

1. Crop Diversity Rotation Study (CDRS): Compare diversified no-till and organic cropping systems, including low and high input strategies, for crop yield and quality, nitrogen and water use efficiency, and weed population characteristics.
2. Greenhouse Gas Rotation Study (GGRS): Compare low and high N fertilizer levels among a series of tilled, no-till, and organic wheat only and wheat – pea cropping systems for crop productivity and quality, and nitrogen and water use efficiency.

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

PERSONNEL: Deanna Nash

AMOUNT FUNDED: \$33,000

OBJECTIVES:

1. Evaluate end-use quality of hard red and hard white wheat lines developed by MSU spring and winter wheat breeding programs.

2. Showcase Montana's newest varietal releases for visiting Trade Teams as they tour the Cereal Quality Lab (CQL) testing facilities.
3. Participate in the milling and baking contests for the Central Montana Fair and the Chouteau County Fair.
4. Promote Montana wheat quality by conducting tours and hands-on demonstrations.
5. Participate in research projects designed to determine ways to improve endues quality parameters of new wheat varieties by cooperating with Montana Agricultural Experiment Station (MAES) researchers, the general public and industry.

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

PERSONNEL: Research scientists at the following AES Research Centers:

1. Northern Agricultural Research Center (NARC) - Havre
 - a. Gregg R. Carlson, Sup't/Crop Scientist & Co-Coordinator
2. Southern Agricultural Research Center (SARC) - Huntley
 - a. Kent A. McVay, Crop Scientist & Co-Coordinator
3. Central Agricultural Research Center (CARC) - Moccasin
 - a. David M. Wichman, Superintendent/Crop Scientist
4. Eastern Agricultural Research Center (EARC) - Sidney
 - a. Jerald W. Bergman, Superintendent/Crop Scientist
 - b. Joyce L. Eckhoff, Crop Scientist
5. Northwestern Agricultural Research Center (NWARC) - Kalispell
 - a. Robert N. Stougaard, Interim Sup't/Weed Scientist
6. Western Triangle Ag Research Center (WTARC) - Conrad
 - a. Grant D. Jackson, Interim Sup't/Soil Scientist

AMOUNT FUNDED: \$132,000

OBJECTIVES:

1. 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.
2. To evaluate the potential fit of other materials, concepts and techniques with various cropping systems employed.

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

PERSONNEL: Dr. Kenneth Kephart, Head, Department of Research Centers

AMOUNT FUNDED: \$260,250

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

TITLE: Continuing as an Underwriter for MONTANA AG LIVE!

PERSONNEL: Jack Riesselman, Professor Emeritus, Department of Plant Sciences and Plant Pathology and Executive Producer of MONANA AG LIVE!

AMOUNT FUNDED: \$3,500

TITLE: Mining for Markers to be used in Marker-Assisted Breeding

PRINCIPLE INVESTIGATOR: Jamie D. Sherman Assistant Research Professor Department of Plant Sciences

AMOUNT FUNDED: \$40,000

OBJECTIVES:

- Utilization of existing markers to improve wheat for insect resistance, heat tolerance, herbicide tolerance, agronomic traits and end-use quality.
- Development of new markers for economically important traits particularly potential yield traits – tillering and stay green.
- Creation of new maps to identify new key yield genes.

TITLE: Montana State Seed Lab, Equipment Request

PERSONNEL: John Sherwood, Head, Dept. Plant Sciences & Plant Pathology

AMOUNT FUNDED: \$24,000

OBJECTIVES: Improve the efficiency of seed germination and increase the sample capacity at the Montana State Seed lab with the acquisition of two Seed Germinators (Double Chamber Unit and Single Chamber Unit).

TITLE: Orange Wheat Blossom Midge Management

PERSONNEL: Bob Stougaard: agronomist, Northwestern Ag Research Center

AMOUNT FUNDED: \$22,580

OBJECTIVES:

1. Screen experimental lines for antibiosis, antixenosis and volatile organic compounds
2. Evaluate spring wheat cultivars for susceptibility to the OWBM
3. Determine the effect of seed color and grain hardness on OWBM infestations
4. Monitor midge populations in the Flathead and Triangle counties

TITLE: Spring Wheat Breeding and Genetics

PERSONNEL: Luther Talbert, Susan Lanning, Nancy Blake, Yukiko Naruoka, Jay Kalous (Plant Sciences and Plant Pathology)

AMOUNT FUNDED: \$80,000

OBJECTIVES:

- 1) Develop spring wheat varieties for the Montana wheat industry.
- 2) Coordinate the variety testing program for Montana spring wheat.
- 3) Conduct research to strengthen the breeding program.

TITLE: Managing cutworm and wireworm damage to wheat and barley, a growing problem in Montana.

PERSONNEL: Dr. Kevin Wanner, Assistant Professor of Entomology & Extension Specialist, Department of Plant Sciences & Plant Pathology, Montana State University, 119 Plant BioScience Building, Bozeman, MT 59717.

AMOUNT FUNDED: \$10,000

OBJECTIVES:

1. Evaluate insecticide seed treatments for wireworm control in wheat and barley:
 - A) Using available commercial products generate efficacy data in larger scale field trials;
 - B) Establish experimental plots to evaluate new insecticides for wireworm control.
2. Determine the principal species of cutworms damaging commercial wheat and barley crops.

3. Continue to develop the MSU cutworm pheromone monitoring program, www.cutworm.org.

TITLE: Host Plant Resistance and IPM for Wheat Stem Sawfly (WSS)

PERSONNEL: David Weaver, Associate Professor of Entomology, LRES
Micaela Buteler Ph. D., Research Scientist (Entomology), LRES
Kevin Delaney Ph. D., Research Scientist (Plant Physiology), LRES

AMOUNT FUNDED: \$150,000

OBJECTIVES:

1. Conduct high throughput screening of oat and solid stem wheat extract fractions for activity against WSS larvae in an artificial diet – to ultimately develop new antibiosis
2. Evaluate spring, winter and durum wheat cultivars for susceptibility to WSS in hill plots
3. Evaluate oat cultivars for susceptibility to WSS
4. Validate link between QTL for preference and host plant compounds (VOCs)
5. Screen antixenotic varieties for potential mechanisms and for use in trap cropping
6. Validate pheromone trap based degree day models and correlate pheromone trap capture to levels of damage

TITLE: Wheat Stem Sawfly Parasitoid Redistribution, Monitoring and Conservation

PERSONNEL: David Weaver, Entomologist, LRES, Bozeman
Megan Hofland, Research Associate, LRES, Bozeman

AMOUNT FUNDED: \$38,310

OBJECTIVES:

1. 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 at the grower locations listed above. Note that we will no longer monitor the sites established in 2003.
2. To establish fifteen parasitoid release sites throughout Montana to continue the process of translating parasitoid redistribution and conservation to Montana

wheat growers. Therefore, these 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.

3. To determine if earlier swathing at a higher height and moisture content increases the potential survival of parasitoids, given the great increase in the use of swathers and high airflow bin aeration for storage.

4. To conduct training sessions on parasitoid collection for redistribution at the request of County Extension personnel

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