Funded Research Projects for FY 00-01

Title: Development and Implementation of Integrated Management Strategies for the Wheat Stem Sawfly

Institution: MSU

Department: MSU/Montana Ag Experiment Stations

Principal Investigator: Dr. Greg Johnson

Amount Funded: $85,335

Objectives:
1) Use novel, naturally occurring chemical resources to manage wheat stem sawfly.
2) Explore and enhance the potential role and impact of parasitic wasps on wheat stem sawfly.
3) Further evaluate the impact of selected cultural practices on the wheat stem sawfly.
4) Conduct on-farm field tours and winter meetings to discuss progress on development of wheat stem sawfly management strategies.

Title: Evaluation of Various Materials and Practices Contributing Toward Economic Crop Production Under Flexible, Continuous and Other Cropping Systems in Montana

Institution: MSU

Department: Montana Ag Experiment Stations

Amount Funded: $72,000

Objectives:
1) To evaluate the effects of differing systems on crop and variety performance under diverse environments represented across the MAES-Research Center network.
2) To evaluate the potential fit of other materials, concepts and techniques with various cropping systems employed.

Title: Winter Wheat Breeding/Genetics

Institution: MSU

Department: Plant Science

Principal Investigator: Phil Bruckner

Amount Funded: $70,000

Objectives:
1) Develop improved cultivars of winter wheat adapted to Montana climatic conditions and cropping systems, which possess superior grain yield potential, winter hardiness, adequate and durable pest resistance, stress tolerance, superior agronomic characteristics, and end-use qualities.
2) Isolate, as much as possible, our foreign wheat customers from variations in wheat 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 1999 projects: genotype and management effects on noodle and dual-purpose quality; effects of selection for low polyphenol oxidase (PPO) on disease resistance; agronomic performance, end-use quality; cultivar variability for residue production; and coleoptile length.
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: Spring Wheat Breeding and Genetics

Institution: MSU

Department: Plant Sciences

Principal Investigator: Luther Talbert

Amount Funded: $70,000

Objectives:
1) To develop spring wheat varieties that provide an economic advantage to Montana farmers.
2) To manage the varietal testing program for Montana.
3) To make a contribution to the science of wheat breeding and genetics.

Title: Selective Tests for Small Grain Quality

Institution: MSU

Department: Plant Sciences

Principal Investigator: Michael J. Giroux

Amount Funded: $35,000

Objectives:
1) Increasing seed yield of wheat and/or barley through transformation. (Incorporation of an altered SH2 gene that increases seed weight in maize by 15%.)
2) Selective tests for wheat starch quality. Development of selective tests for bread firmness and noodle quality that identify preferred starch properties, particularly amylose content.
3) Identify control of barley milling energy and genes controlling endosperm texture in barley.

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

Institution: MSU

Department: Plant Sciences

Principal Investigator: Debra Habernicht

Amount Funded: $25,000

Objectives:
1) To determine end-use quality parameters of Montana breeding lines of hard red and hard white wheat for the spring wheat and winter wheat breeding programs.
2) To develop methods of selecting for alternative end-use quality in hard red and hard white spring wheat without sacrificing bread making quality.

Title: Wheat & Barley Research Equipment Maintenance and Replacement

Institution: MSU

Department: College of Ag/Dean's Office

Principal Investigator: Dr. Sharron Quisenberry

Amount Funded: $25,000

Objective:
Provide faculty working in wheat and barley research areas with resources to maintain and replace equipment.

Title: Integrated Weed Management Diagnostic and Education Lab

Institution: MSU

Department: Land Resource and Environmental Sciences

Principal Investigator: Alvin J. Bussan

Amount Funded: $20,000

Objectives:
1) Provide an Integrated Weed Management Diagnostic Center for determining herbicide injury, detecting herbicide resistance, and management complaints to Montana farmers, ranchers, and homeowners. Develop best management recommendations for chronic problem weeds encountered through the diagnostic service.
2) Develop an integrated weed management outreach and education program that reaches a high percentage of Montana's farmers and ranchers.
3) Evaluate integrated weed management education programs for their effectiveness in leading to adoption by Montana ranchers and farmers.

Title: Cereal Crop Yield and Quality Benefits From Diversified Cropping Sequences

Institution: MSU

Department: Land Resource and Environmental Sciences

Principal Investigator: Perry Miller

Amount Funded: $17,700

Objectives:

1) Compare rotational benefits among cool and warm season oilseed and pulse crops, related to soil water and nitrogen conservation.
2) Compare HRS wheat, durum wheat, winter wheat and barley crop response to oilseed and pulse cropping sequences.

Title: Crop Rotation Improves Production & Quality of Irrigated Malt Barley and Durum Wheat

Institution: MSU

Department: Entomology

Principal Investigator: Andrew Lenssen

Amount Funded: $14,690

Objectives:
1) Compare irrigated malt barley and durum wheat production in rotation with field peas.
2) Compare nitrogen and phosphorus dynamics of irrigated malt barley and durum wheat in rotation with pea inoculated with Rhizobium and Penicillium.
3) Determine foliar and kernel diseases of irrigated malt barley and durum wheat in rotation with field pea.

Title: Enhanced Field Selection for Wheat Stem Sawfly Resistance

Institution: MSU

Department: Plant Sciences

Principal Investigator: Phil Bruckner

Amount Funded: $10,000

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: Early Generation Durum Selection and Germplasm Improvement

Institution: MSU

Department: Ag Experiment Stations

Principal Investigator: Joyce Eckhoff

Amount Funded: $10,000

Objective:
To develop improved durum germplasm for Montana

Title: Inhibition of Fungal Infection of Wheat by Seed Hardness proteins

Institution: MSU

Department: Plant Sciences

Principal Investigator: John Sherwood

Amount Funded: $10,000

Objectives:
1) Determine the extent to which the virulence of selected fungal pathogens is affected by expression of the puroindoline genes, *pinA* and *pinB*. Plants containing *pinA* or *pinB* will be inoculated with leaf, root and seed infecting fungi of importance to Montana. These results will reveal the effectiveness of *pinA* and *pinB* in controlling infection and growth of different pathogens.
2) Analyze the mechanism(s) by which the pin proteins inhibit pathogen spread and growth.

Title: Development of Superior Wheat for Montana By Genetic Transformation

Institution: MSU

Department: Plant Sciences

Principal Investigator: Luther Talbert

Amount Funded: $10,000

Objectives:
1) Test drought tolerance of transgenic Hi-Line wheat expressing the barley *Hva1* gene under field conditions at Sidney.
2) Evaluate transgenic wheat engineered with WSMV replicase and/or coat protein genes for WSMV resistance in the field in Bozeman.

Title: Optimization of Wheat End-Use Quality for Noodle and Dual-Purpose Markets

Institution: MSU

Department: Plant Sciences

Principal Investigator: Phil Bruckner

Amount Funded: $9,600

Objective:
Quantify genetic, environmental and production variables that impact noodle qualities with plot research exploring effects of different production components, individually and in combination.

Title: Herbicide-Resistant Kochia

Institution: MSU

Department: Plant Sciences

Principal Investigator: William E. Dyer

Amount Funded: $9,100

Objectives:
1) Survey fields for kochia not controlled by Banvel and/or Starane.
2) Collect cuttings or seed and test for resistance in the greenhouse.
3) Continue studies on the mechanism of resistance.

Title: Educational Outreach Program for Stored Grain Insect Problems in Montana

Institution: MSU-MAES and MSU Extension Service

Department: Entomology

Principal Investigator: David Weaver

Amount Funded: $7,500

Objectives:
1) Prepare and deliver three 1 week programs on good grain storage practices in three major grain producing areas in Montana. Include a component on safe use of fumigants.
2) Develop outreach materials for disseminating good storage information to producers. Materials would include a Montguide, a video for county agent distribution, and a website.
3) Monitor abundance of lesser grain borer at selected locations in Montana, and screen for efficacy of diatomaceous search formulations against the population of this insect from these locations.

Title: Potassium Fertilization for Stem Solidness and Wheat Stem Sawfly Management

Institution: MSU

Department: MAES

Principal Investigator: Bob Stougaard

Amount Funded: $4,800

Objective:
Determine if potassium additions will enhance the degree and consistency of stem solidness and reduce sawfly cutting in winter wheat cultivars differing in stem solidness.

Title: Continuing As An Underwriter for MONTANA AG LIVE!

Institution: MSU

Department: Plant Sciences

Principal Investigator: Jack Riesselman

Amount Funded: $2,500

Objectives:
1) MW & BC will receive significant public exposure at modest cost. Underwriters are listed monthly in the KUSM program guide, which is received by the 5500 members of Montana Public Television. In addition, underwriters receive on-air credits during each of the 16 weekly programs.
2) MW & BC will help to provide grain producers with timely and relevant answers to their questions in a cost-effective manner.
3) MW & BC will help interpret the day-to-day issues facing ag producers to non-ag audiences. Given the growing tensions in some sectors of Montana between producers and non-producers, a forum such as MONTANA AG LIVE! where needs of farmers are clarified and addressed, offers a rational atmosphere for increased public awareness.

Title: Ag Appreciation Weekend

Institution: MSU

Department: College of Ag/Dean's Office

Principal Investigator: Sharron Quisenberry

Amount Funded: $1,000
Objective:
Provide students in the College of Agriculture at MSU the opportunity to participate and represent MSU at judging contests, annual meetings and other important events by raising funds during MSU's Ag Appreciation Weekend, Nov. 3-4, 2000 through corporate sponsorships and donations. Showcase ag in Montana during Ag Appreciation Weekend with a Community Day of November 3 where the public is invited to view displays highlighting ag in Montana.

Current Funded Research Projects in Addition to MSU

Title: Preparation of a Summary of Composition Data of Montana Grains Generated by the Montana Agricultural Experiment Station (MAES) Nutrition Research Program

Organization: Newman Associates, Inc.

Personnel: C.W. Newman, PhD and R.K. Newman, PhD, RD

Amount Funded: $8,400

Objective:
Organize and tabulate existing data generated by the MAES nutrtition research program from 1967 to 1997 illustrating, but not limited to genetic, environmental, storage and year effects on the composition of barley and wheat grown in Montana and other areas of the Pacific Northwest.

Title: Adapting a Satellite Based Vegetation Productivity Model for Wheat Yield Prediction

Institution: University of Montana

Investigators: Steve Running, Director, NTSG, EOS Training Center
Jerry Winslow, EOS Training Center
Matt Reeves, NTSG, School of Forestry

Cooperators: 1. Montana State University-Northern/Montana Cooperative Development Center (Business plan development)

2. Montana State University - Bozeman (advisory position)

3. Mr. Chuck Merja (information support)

Amount Funded: $12,496

Objective:

1. Determine accuracy of existing model

2. Implement planned improvements
   - Improved meteorological data source
   - Delineation of Winter and Spring wheat
   - Improved delineation of dryland wheat production in Montana
   - Emergence detection program
   - Automated wheat growth stage program
   - Crop maturity detection program

3. Determine reasons for inaccuracies and perform sensitivity analysis

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Title: Business Plan to Commercialize Satellite Vegetation Productivity Model

Institution: Montana State University-Northern and the Montana Cooperative Development Center (MCDC)

Investigators: Suzanne Tilleman, Coordinator, MCDC
Sandra Erickson, Associate Professor, Department of Business, MSU-Northern
MSU-Northern Senior Business Students

Amount Funded: $12,440

Objective:

To document the benefits achieved from the research funded by the Wheat and Barley Committee as it relates to Montana. The objective is to show how the research can be commercialized, with the first intent of successful commercialization to benefit Montana. If that is not possible, the business plan will suggest the best commercialization strategy.