

**MW & BC Funded Projects
MSU
1988-89**

TITLE: Spring Wheat Breeding and Genetics

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: Luther Talbert

PERSONNEL: Susan P. Lanning, Lori Carroll, Susan Moylan

AMOUNT FUNDED: \$80,000.00

OBJECTIVES:

- 1) To develop superior spring wheat varieties for Montana.
- 2) To pursue genetic research on wheat adaptation to Montana.
- 3) To improve end-product quality of spring wheat.
- 4) To coordinate the spring wheat testing program for Montana.

=====
===

TITLE: Value Enhancement of Barley Through Coordinated Investigations of Factors Influencing Nutritional Qualities and Food Science Applications.

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences/Animal & Range Sciences

RESEARCHERS: C.W. Newman
R.K. Newman
M.K. Petersen
C.F. McGuire
D.G. Gray

PERSONNEL: Petrea Hofer, Gayle Watts, Qui Xue, Linji Wang, Ruth Kemalyan

AMOUNT FUNDED: \$80,000.00

OBJECTIVES:

1. To identify and utilize components responsible for the cholesterol-lowering effect of barley.

- a. Mill selected barley cultivars into fractions, process barleys by cooking and extrusion, and evaluate fractions and products for degree of cholesterol-lowering property.
 - b. Extract beta-glucan and oil components from selected barley cultivars, and evaluate extracted products singly and in combination for cholesterol-lowering potential.
 - c. Utilize barley and milled fractions from selected cultivars in preparation of foods, coordinating healthful qualities with functional properties to attain acceptable products.
2. To evaluate the feed value of barley for livestock and poultry.
- a. Develop prediction equations for estimating the feed value of barley from physical characteristics and chemical composition data.
 - b. Evaluate the recommended commercial barley varieties for swine and poultry.
 - c. Evaluate the effect of varying levels of beta-glucans in barley on the feed value for swine and poultry.
 - d. Investigate the influence of the rate of digestion on the feed value of barley for ruminants.
 - e. Compare barley vs. corn as basal grains for finishing cattle.

The overall objective of the proposed research is to increase the sale of Montana barley by enhancing the end-product value, increasing the market share and developing new markets. Our research thus far has demonstrated that barley is superior in many ways to other cereal grains as a human food. In objective 1, we will further strengthen the claims made concerning the healthful benefits of barley and identify the specific fractions of barley that are most beneficial for human food products. Once this has been accomplished we will then demonstrate the

best approach to use barley in various ways, i.e., as whole grain, flakes, ground meal or as milled products. Since barley is essentially a "new" cereal to the American public, we will develop recipes and guidelines for its use.

=====

TITLE: Initial Entomological and Agronomic Investigations for Control of the Russian Wheat Aphid, Diuraphis noxia (Mordvilko)

INSTITUTION: Montana State University

DEPARTMENT: Entomology

RESEARCHERS: Allan Taylor, Ted Kisha, Linda Lewison-Hotz

COOPERATORS: Gregory Johnson
Gary Jensen

AMOUNT FUNDED: \$38,000.00

OBJECTIVES:

- 1) Establish and maintain detection and monitoring programs for the Russian wheat aphid using entomological sampling techniques.
- 2) Initiate field studies on the presence of beneficial insects (parasites and predators) and their impact on the Russian wheat aphid.
- 3) Evaluate currently registered insecticides to determine their efficacy against the Russian wheat aphid.
- 4) Study the potential impact CRP acres planted to host grasses, e.g., wheatgrasses, have on the proliferation of this pest.
- 5) Provide timely information to grain producers on the status of this pest in Montana, scouting techniques, control recommendations and other management strategies.

- 6) Initiate screening of wheat cultivars for resistance to the Russian wheat aphid and launch a breeding project aimed at resistance incorporation.
- 7) Initiate testing of barley and oats against the putative toxin produced by the Russian wheat aphid.
- 8) Evaluate a known parasitic fungus for its potential as a biological control agent against the Russian wheat aphid.

=====

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

INSTITUTION: Montana State University

DEPARTMENT: Research Centers

RESEARCHERS: Various

AMOUNT FUNDED: \$36,000.00

OBJECTIVES:

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

=====

TITLE: Winter Wheat Improvement

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: Allan Taylor
Ted Kisha

COOPERATORS: MAES Research Cener Faculty, Charles McGuire,
Luther Talbert, Tom Blake, Victor Raboy, Jarvis
Brown, Jack Martin, Hayden Ferguson, Dick Lund

AMOUNT FUNDED: \$30,000.00

OBJECTIVES:

- 1) Continue to develop improved winter wheat varieties adapted to Montana's diverse growing conditions which meet export and domestic marketing requirements.
- 2) Emphasize end-use/value added research in wheat.

=====
=====

TITLE: Study of the New Virus-like Disease of Barley

INSTITUTION: Montana State University

DEPARTMENT: Plant Pathology

RESEARCHERS: T.W. Carroll

COOPERATORS: N.L. Robertson, S.K. Zaske

AMOUNT FUNDED: \$20,000.00

OBJECTIVES:

- 1) Continue to develop a knowledge base from field and laboratory studies with which to manage the new virus-like disease. Also determine if the disease is present in barley and/or wheat in eastern Montana.
- 2) Continue to work on the isolation, purification, and characterization of the filamentous particles which are believed to be the causal agent of the disease.
- 3) Study the internal ultrastructure of the brown wheat mite,

Petrobia latens, to determine sites of infection and/or accumulation of the virus-like agent.

=====

TITLE: Field Navigation and Mapping Utilizing the Global Positioning Satellite System

INSTITUTION: Montana State University

DEPARTMENT: Civil & Ag Engineering

RESEARCHERS: William E. Larsen
David A. Tyler
Gerry A. Nielsen

AMOUNT FUNDED: \$15,000.00

OBJECTIVES:

The general objectives are to determine the potential for use of the Global Positioning System (GPS) in agricultural operations. Emphasis will be placed on field mapping and the creation of a digital data base for decision making and machine control during farming operations. Specific objectives are as follows:

- 1) Develop a position monitoring device utilizing GPS that will define the position of a machine in a field at any time.
- 2) Determine if the position monitoring device in #1 can also be used to monitor swath width with sufficient accuracy to eliminate the need for additional swath width monitoring devices.
- 3) Determine if the device can determine actual ground speed with sufficient accuracy to eliminate the need for additional ground speed monitoring devices such as ground speed radar.
- 4) Develop a procedure using work from #2 and #3 to calculate the actual field capacity (acres/hour) at any position in the field.

5) Prepare a procedure for obtaining a mapping data base that can be interfaced with various kinds of yield data collection equipment to prepare a yield map for the field.

6) Prepare the data base derived in #5 so that the information can be interfaced with soils data and used to control machine variables such as:

Planting rates, fertilizer rates and combinations,
spray chemical concentration and chemical types, sprayer
swath width and overlap or skip control, fertilizer
swath overlap and skip control and sprayer control for
spot spraying.

7) Investigate other potential uses of the SPS in Agriculture such as irrigation ditch layout, sprinkler lines, field boundaries, etc.

=====
=====

TITLE: Computerization Project for Montana Extension Service

INSTITUTION: Montana State University

DEPARTMENT: MSU Extension Service

RESEARCHERS: Richard E. Phillips

AMOUNT FUNDED: \$15,000.00

OBJECTIVES:

The objectives for the use of these funds are to:

- 1) Serve as leverage to access and share in county funding for the purchase of computer hardware and software for those counties currently without computers, and
- 2) Use as leverage to assist in funding of computer hardware and software for several Extension specialists without computers.

=====
===

TITLE: Development of Feed, Malting and Special Use Barley
Cultivars Adapted to Montana

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: Tom Blake

COOPERATORS: Hayden Ferguson, Gene Hockett, Patrick Hayes

PERSONNEL: Patrick Hensleigh

AMOUNT FUNDED: \$50,000.00

OBJECTIVES:

The objectives for the MSU barley breeding project are:

- 1) To improve the dryland adaptation and quality stability of
2- rowed malting cultivars.
- 2) Improve straw strength, yield potential and disease
resistance of 2-rowed feed barleys.
- 3) To continue to develop a non-shattering 6-rowed barley
germplasm base.
- 4) To develop a germplasm base for several classes of special
use barley cultivars.

=====
=====

TITLE: Hard White Wheat Protein and Starch Parameters for
Oriental Noodle Manufacture and Yeast Raised Bread
Production

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: Charles McGuire
Allan Taylor

AMOUNT FUNDED: \$10,000.00

OBJECTIVES:

- 1) Determine hard white wheat starch qualities associated with noodle making and develop selection procedures for breeding.
- 2) Compare bread baking protein quality to that of noodle protein quality.
- 3) Examine protein subunits associated with noodle quality.
- 4) Compare physical dough properties of good noodle wheats to good bread baking wheats.

=====
===

TITLE: Black Medic - Sweetclover/Cereal Rotation Study

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: James R. Sims

PERSONNEL: Greg Kushnak, Grant Jackson, Gil Stallknecht, Ken Gilbertson

AMOUNT FUNDED: \$7,000.00

OBJECTIVES:

- 1) To test the performance of dryland black medic and yellow sweetclover green manures in rotation with wheat and/or barley in comparison to traditional crop fallow and continuous grain under a range of environmental conditions.

=====
===

TITLE: Improvement of Wheat Protein by altering the levels of the aspartate derived amino acids (lysine, threonine, and methionine) - Sweet Wheat

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: Jerry Harris
Allan Taylor
David C. Sands

AMOUNT FUNDED: \$6,000.00

OBJECTIVES:

- 1) Confirm bacterial assay (established 1987-88) for sweetness enhancers using HPLC.
- 2) Survey wheat varieties for the flavor enhancing amino acid (sweetener).

=====
===

TITLE: Project Chickbar, A Barley for Use as Chicken Feed

INSTITUTION: Montana State University

DEPARTMENT: Plant Pathology/Animal & Range Sciences

RESEARCHERS: E.A. Hockett
C.F. McGuire
C.W. Newman
David C. Sands
R.K. Newman

AMOUNT FUNDED: \$4,500.00

OBJECTIVES:

To produce a high yielding, hullless, high fat, high lysine, low beta glucan, fractured starch cultivar, for use as poultry feed.

- 1) To develop a line of barley that can be fed to chickens as

an alternative to corn or sorghum.

2) To test it in nutritional tests.

3) Development of fast and inexpensive assays for lysine, oil, and B-glucan.

=====
===

TITLE: FARMS -- A Farm and Research Center Matching System

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: Jeffrey S. Jacobsen
Gerald A. Nielsen

PERSONNEL: Keary O'Dell, Alma Plantenberg, Joe Caprio, Duane Griffith, George Erickson, Joe Morris, Walt Adams

AMOUNT FUNDED: \$4,200.00

OBJECTIVES:

1) To refine FARMS program capabilities for matching field (on-farm) environments with similar research center environments.

2) To produce a FARMS User's Manual and computer software and distribute them to all Montana counties and interested individuals.

=====
===

TITLE: Satellite Broadcast Receiving Unit

INSTITUTION: Montana State University

DEPARTMENT: MSU Extension Services

RESEARCHERS: Richard E. Phillips

AMOUNT FUNDED: \$2,500.00

OBJECTIVES:

- 1) To enable MSU to receive educational and tele-conference transmissions of material dealing with federal policies and activities directly related to Extension.
- 2) To construct equipment that will allow rapid screening of winter wheat cultivars for improved winterhardiness.
- 3) To study the process of hardening, including the development of lowered potential in plant crowns and solute transformations as a function of temperature for different cultivars.
- 4) To incorporate these techniques into the breeding program for improved winterhardiness.

=====
===

TITLE: Proposed Symposium - "MONTANA AGRICULTURE -- 1990 AND BEYOND"

INSTITUTION: Montana State University

DEPARTMENT: MSU Extension Services

RESEARCHERS: Richard E. Phillips

AMOUNT FUNDED: \$2,500.00

OBJECTIVES:

Production agriculture and rural communities in Montana face a rapidly changing set of conditions, particularly in technology development and information transfer. The proposed symposium will bring together state, regional and national experts with the University and the public to explore the needs of agriculture and rural communities in the next 20 years. Special

emphasis will be placed on issues impacting the economic growth and development of agriculture and rural sectors in Montana. The information generated by the symposium will be used as an aid in shaping future programs for the Montana Agricultural Experiment Station, the Montana Extension Service and Montana State University. The symposium is proposed for late October -- early November, 1988. Primary sponsors for the symposium will be the Agricultural Experiment Station Advisory Council and the Extension Service Advisory Council. Other organizations and groups will be solicited as sponsors. The total estimated cost for this symposium will be \$10,000 which will cover speakers' fees and travel costs, social events, proceedings publication and other miscellaneous items.

=====
===

TITLE: Waxy Barley Increase/T.E.A. Project

INSTITUTION:

DEPARTMENT:

RESEARCHERS:

AMOUNT FUNDED: \$10,000.00

OBJECTIVES:

- 1) To provide, if necessary, waxy hulless barley for Targeted Export Assistance program as containerized shipping samples to foreign countries.

=====
===

TITLE: Develop New Technique for Breeding/Selection for Improved winterhardiness in Wheat

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: Hayden Ferguson, Allan Taylor, Jarvis H. Brown

MW & BC Funded Projects
MSU/1988-89
Page 14

AMOUNT FUNDED: \$15,000.00

OBJECTIVES:

- 1) To build and test a rapid "greenhouse" technique for screening winter wheat cultivars for winterhardiness
- 2) To incorporate this "greenhouse-laboratory" technique for selecting for winterhardiness in wheat.