State of Montana

Annual Report for Calendar Year 2006

to the W-6 Technical Committee

Compiled by J. M. Martin

During 2006, 2436 individual plant accessions were distributed to 21 individuals in Montana. Of that total 2050 (84%) represented small grains genera (*Tricitum* or *Hordeum*).

Tom Blake, Department of Plant Sciences and Plant Pathology, MSU-Bozeman received 2102 accessions. Of that total 1919 were *Hordeum* and the remainder were grasses with contrasting degradability. The barley accessions comprise the barley core collection. These were grown at Bozeman in 2006. Forage samples were obtained from each accession. These, along with the warm season grasses, now growing this season, will be assessed for rumen digestibility. The intent is to relate rumen digestibility with in vitro digestibility using Novozyme's cellulosic ethanol enzyme mixture.

Dennis Cash, Dep. of Animal and Range Sciences, MSU-Bozeman, received 3 *Tricitum aestivum* accessions. They will be planted Fall 2007.

Jeremy Jewell, Dept. of Plant Sciences and Plant Pathology, MSU-Bozeman, obtained 2 *Hordeum vulgare* accessions that are being used for his thesis project.

Nancy Blake, Dept. of Plant Sciences and Plant Pathology, MSU-Bozeman, received 2 *Triticum turgidum* subsp. *dicoccoides* accessions. These were used for the NSF Wheat SNP project. They were grown only for DNA extraction and sequencing so no agronomic or adaptation characteristics were determined.

Phil Bruckner, Dept. of Plant Sciences and Plant Pathology, MSU-Bozeman, received 6 *Triticum aestivum* accessions. PI377884, Gatcher, was acquired because it is reported to be susceptible to root lesion nematodes. It was used in basic research on this pest in Montana. Three accessions of Mara (PIs 244854, 259890, and 292756) were acquired as a potential source of Rht8. The gene was incorporated into Montana germplasm from an alternative source. Two accessions of Vernopolis (PIs 214401, 297008) were acquired as potential sources of Septoria tritici resistance. Several germplasm sources received in previous years are being used as sources for disease resistance in current breeding efforts. Table 1.

Jamie Sherman, Dept. of Plant Sciences and Plant Pathology received 2 *Triticum aestivum* accessions. These were both used were both used in a study to determine markers for white kernel color.

Robert Quinn, Montana Flour and Grains, Big Sandy, MT obtained the following: 3 *Triticum monococcum* subsp. *Monococcum*, 3 *Triticum turgidum* subsp. *Dicoccon*, 3 *Triticum turgidum* subsp. *Polonicum*, and 106 *Triticum turgidum* subsp. *Turanicum*. The purpose for the *polonicum*, *diccocum*, and *monococum* is for display and for pictures to contrast them to the *turgidum*. The purpose for the *turgidum* is to see how many different lines can be distinguished and pulled out from these 106 selections. Once the lines are identified and segregated, he is interested in evaluating them for disease resistance since that is the most limiting factor with the turgidum lines.

Jeff Dietz, Billings received 3 *Zea mays* accession from NC7. He observed that the Mandan varieties are more prone to corn smut than the modern hybrid varieties. He is of the opinion that the Mandan corn has greater vitality than modern hybrid sweet corn varieties giving better germination.

Seed of various pulse and cool-season oilseed entries obtained from the GRIN were included in a preliminary adaptation trial in 2005 and 2006 at the Roosevelt & Sheridan County Conservation District Farm, about7 miles south of Froid, Montana. Twenty-five seed per entry were hand-planted in mid-June each year. Ten representative plants were harvested, weighed, and seed yield determined.

Andy Lenssen, USDA-ARS Sidney, MT received several legume accessions during the past years. His interest in these is for potential forage crops in dryland rotations with cereals. He provided some data on material he has received. See Table 1. Environmental conditions varied between years, with 2005 having well distributed, normal precipitation. In 2006, precipitation was above normal precipitation prior to planting the pulses and oilseeds. However, precipitation following planting was scant, with about 3” received prior to frost in mid-September, and plants were severely drought stressed. All non-legume entries died in July 2006.

Five individuals received 74 *Vitis* (various species) accessions. David Wichman, Central Agricultural Research Center, Moccasin, MT received 8 *Vitis*. The intent was to see which if any of the grape plants would survive the winter conditions in central Montana. They received the cuttings in January. The cuttings were stored in a refrigerator till mid- May. In mid-May the cuttings were placed in water to encourage root development. This process was conducted in a cool cellar in attempt to stimulate root growth while not encouraging excessive leaf growth. Air Temperature in the cellar was 38 to 48 degrees F during this time. They still had excessive leaf growth relative to the root growth. In fact many of the cuttings did not initiate any roots. The eight cuttings that survived summer did not attain any robust growth and died over winter.

Due to lack of knowledge on how to properly handle the grape cuttings, the venture was a complete failure. Don Roberge, Rollins, MT received 37 *Vitis*. He is a he is attempting to breed his own grape varieties. David Johnson and Carl Camper, Forsyth, MT received 10 *Vitis*. They are establishing a vineyard and are also doing some hobby breeding. Ruth Wilson, Lakeside MT also received 19 *Vitis* and is evaluating them for adaptation.

Brian Kelly and Melisa Maggrio, two undergraduate students at the University of Montana, Missoula, MT used *Bromus tectorum* and *Pseudoroegneria spicata* accessions they received to study root competition between the two species. This was part of an NSF EPsCOR funded research project.

Jeff Littlefield, Dept. of Land Resources and Environmental Sciences received accession of
Brassica, Erysimum, Lepidium, Sinapis, Tanacetum, and Crepis species. The majority of the plants species obtained is currently being used for host specificity testing for biological control agents of weeds - the mustards for weedy *Lepidiums* and dyers woad, and the *Crepis* for rush skeletonweed agents. Seeds were also provided to project cooperators, e.g. USDA-ARS European Biological Control Laboratory and CABI Bioscience Switzerland Centre. The exception is *Tanacetum huronense*. This species was sent to cooperators with USDA-ARS, Sidney, MT and CABI Bioscience - CH and will be (or currently) used for phylogenetic analysis on the *Tantacetum* and related genera, as well as plant chemistry studies. Plants grown will eventually be used for host specificity studies of potential biocontrol agents for common tansy.

Heather Cook, Butte, MT received 7 *Lycopersicon esculentum* accessions. She is a part of the "Butteification" in Butte Mt. Their goal is to encourage local production of vegetables for local consumption and sale. They are evaluating the tomato accessions for adaptation. They hope do breed locally adapted varieties.

Table 1. Productivity of selected pulse entries, 2005-2006. Froid, Montana.

Species	PI/NSL	Binomial	Harvestdate	dw/plant	seedwt_plant
pigeonpea	Mn8	Cajunus Cajun	16septo5	6.5	0
pigeonpea	Ga2	Cajunus Cajun	16septo5	8.5	0
pigeonpea	183295	Cajunus Cajun	16septo5	0	0
horsegram	Grif173901	Macrotyloma uniflorum	16septo5	7.7	0
horsegram	PI365425	Macrotyloma uniflorum	16septo5	10.9	0
hyacinthbean	PI596358	Lablab purpureus	16septo5	42.1	2.21
Azuki	PI358734	Vigna angularis	16septo5	5	0

mothbean	PI164419	Vigna aconitifolia	16septo5	42.7	0
mungbean	PI378020	Vigna radiata	16septo5	24	0
mungbean	PI378022	Vigna radiata	16septo5	22.9	3.36
Cowpea	PI578892	Vigna unguiculata	16septo5	16.6	8.49
Cowpea	NSL67981	Vigna unguiculata	16septo5	6.6	0.42
soybean	Surge	Glycine max	16septo5	18.3	5.73
soybean	Parker	Glycine max	16septo5	17.1	6.42
hyacinthbean	AbSeed	Lablab purpureus	21-Sep-06	22.6	6.47
horsegram	PI365425	Macrotyloma uniflorum	21-Sep-06	12.2	0
horsegram	PI639026	Macrotyloma uniflorum	21-Sep-06	7.6	0
mothbean	PI164419	Vigna aconitifolia	21-Sep-06	20.2	0
azuki	PI358734	Vigna angularis	21-Sep-06	3.7	0
mungbean	PI378022	Vigna radiata	21-Sep-06	8.1	2.81
cowpea	PI548784	Vigna unguiculata	21-Sep-06	13	3.47
cowpea	PI578892	Vigna unguiculata	21-Sep-06	7.2	0
soybean	Surge	Glycine max	21-Sep-06	4.9	3.48
soybean	Parker	Glycine max	21-Sep-06	5.1	2.61

Table 2. Wheat accessions being used as sources of disease resistance in MSU winter wheat breeding program.

Accession No.	Purpose
PI 476849	Tan spot
PI 559560	Root rot complex
CItr 2401	Russian wheat aphid
PI 366589	Russian wheat aphid
PI 323638	Photoperiod insensitivity
PI 518648	Photoperiod insensitivity

PI 323606	Photoperiod insensitivity
PI 220077	Photoperiod insensitivity
PI 572701	Root lesion nematode (neglectus)
PI 629120	Root lesion nematode (neglectus)
PI 591918	Stem rust (adult plant)

Publications:

Berg, J.E., R.N. Stougaard, C.R. Cook, K.D. Kephart, G.R. Carlson, D.M. Wichman, J.L. Eckhoff, N. Riveland, G.D. Kushnak, D.L. Nash, and P.L. Bruckner. 2006. Registration of 'MT1159CL' wheat. Crop Sci. 46:1395-1396.

Bruckner, P.L., J.E. Berg, G.R. Carlson, N. Riveland, D.M. Wichman, K.D. Kephart, G.D. Kushnak, R.N. Stougaard, J.L. Eckhoff, E.A. Hockett, and D.L. Nash. 2006. Registration of 'Paul' wheat. Crop Sci. 46:981-982.

Bruckner, P.L., J.E. Berg, G.D. Kushnak, R.N. Stougaard, J.L. Eckhoff, G.R. Carlson, D.M. Wichman, K.D. Kephart, N. Riveland, and D.L. Nash. 2006. Registration of 'Genou' wheat. Crop Sci. 46:982-983.

Singh M., K. Chabane, J. Valkoun, and T.K. Blake. 2006. Optimum sample size for estimating gene diversity in wild wheat using AFLP markers. Genetic Resources Crop Evolution 53:23-33.