

State of Montana
Annual Report for Calendar Year 2004
to the W-6 Technical Committee
Compiled by J. M. Martin

Montana received 2599 individual plant accessions during 2004. Eleven of the 16 individuals receiving plant germplasm were associated with Montana State University. These 11 individuals received 98.7% of the total accessions. Fourteen different genera were represented, with *Triticum* comprising 80.2% of the total accessions received.

Mike Giroux, Plant Sciences Department, MSU-Bozeman received 265 *Triticum aestivum* and 401 *Triticum durum* accessions. These were used to screen for mutations in amylopectin biosynthetic enzymes. He found three durum lines that carry an apparent null mutation in starch synthase IIa. These lines have been crossed to several durum varieties. He will next look at the effect of the starch synthase IIa mutation on starch content and quality in the recombinant populations.

Jack Martin, Plant Sciences Department, MSU-Bozeman received 25 *Triticum aestivum* accessions. These were soft wheats that varied in degree of grain hardness based on data from regional quality laboratories. Puroindoline b gene was sequenced from all of them to compare with the wild type puroindoline b sequence. No sequence alterations were found.

Jeremy Jewell, Plant Sciences Department, MSU-Bozeman received all of the Chinese Spring nulli-tetras and the two monosomic Chinese Spring genetic stocks to try and localize a few EST. The nullis GSTR 57, 59, 61, 63, 65, 67, 69, 71, 73, 74, 75, 76 were sprouted and DNA extracted. The two monosomics GSTR 11 and 90 were grown up for seed. One of them did not set seed at all and the other had very poor seed set.

Catlynn Swan, Plant Sciences Department, MSU-Bozeman got two *Zea mays* accessions. She used these to confirm there were no puroindoline-like homologs in corn.

Norm Weeden, Plant Sciences Department MSU-Bozeman, received two *Phaseolus vulgaris* accessions. These are the two parents of an RIL mapping population he is working with. They have been screening the two lines for CAPS polymorphisms for specific loci that have already been mapped in pea. They have found there is a significant level of polymorphism between the two lines and have mapped two genes on the linkage map for the RIL population. It appears that the two parents are sufficiently divergent to permit the comparison of regions of the pea and bean linkage maps. Another project that is ongoing in the laboratory involves pea germplasm from Afghanistan. This germplasm was received some time ago from NPGS. Funding was recently received to examine Fusarium root rot tolerance in these lines. Norm is collaborating with the people at Prosser, WA on this project. They are testing two RIL populations developed here at MSU for segregation of the Fusarium root rot tolerance. A linkage map for these populations is being developed using STS and SSR markers.

Joyce Eckhoff, Eastern Agricultural Research Center, Sidney, MT received 1145 *Triticum durum* accessions. These are being evaluated for growth habit, heading date, and amylose content.

Duane Johnson and Alice Pilgeram, both associated with the Biobased Products project, MSU-Bozeman received accessions from several different genera. Most of the germplasm accessions they acquired are oilseeds. Their intent is to develop crops that can be used for biodiesel and biolubricants. A summary of their activities is provided.

Several of the non-cultivated *Linum* species have unique fatty acid profiles and actually contain low levels of hydroxylated fatty acid. The prime source of hydroxylated fatty acid is castor oil which is expensive and demand greatly exceeds supply. We are analyzing the *Linum* sp. to see if any of them could potentially be utilized as oil crops in Montana. Once we identify promising *Linum*, we will increase the seed and evaluate the oil for biolubricant production. All of the *Linum* accessions were planted in the MSU plant growth center in late July of 2004. The germination was great. None of the plants flowered most likely due to day length or temperature. The remaining seed from each accession was planted at two Montana locations this spring.

Stokesia is another possible oil crop. The oil contains epoxy fatty acids that can be used in a wide range of industrial applications. All 38 accessions will be planted spring 2005.

Crambe is a potential source of erucic acid. The *Crambe* accessions were planted spring 2005.

Thalspi is also a possible source of erucic acid. The *Thalspi* accessions were planted in spring 2005, and levels of erucic acid will be evaluated in August 2005.

Lunaria is a source of long chain fatty acids that could have application in biolubricant production. Six plants are being maintained in the MSU greenhouse. *Lunaria* accessions were planted at two Montana locations in June 2005.

Matthiola is a rich source of omega-3 fatty acids. These accessions were planted spring 2005.

Cuphea accessions received are not adapted to Montana.

Camelina accessions were planted in the MSU greenhouses. Seed was harvested from all accessions of *microcarpa* and *sativa*. The *alyssum* and *laxa* species did not produce seed. The seed was also planted at Northwest Agricultural Research Center, Kalispell, MT in early June 2004. It should have been planted in January. Four of the accessions survived and have been included in variety trials at locations in Montana.

Piptatherum is closely related to Indian Ricegrass. These accessions were planted spring 2005. The seed from these lines will be evaluated gluten content. Gluten-free lines will be further evaluated for yield and production of flour.

William Schlegel, Ronan, MT, received three *Malus* accessions. These were scions of disease and insect resistant apples. The scions were grafted, but failed to take, so this particular project was not successful.

Dave Christensen, Big Timber, MT received one *Zea Mays* accession. He is continuing his efforts to develop corn for Northern climates.

Publications:

Berg, J.E., P.L. Bruckner, K.D. Kephart, R.N. Stougaard, G.D. Kushnak, J.L. Eckhoff, G.R. Carlson, D.M. Wichman, N. Riveland, E.A. Hockett, and D.K. Habernicht. 2004. Registration of 'NuSky' Wheat. *Crop Sci.* 2003 43: 736-737.

Blake, N.K., J.D. Sherman, J. Dvorak, and L.E. Talbert. 2004. Genome-specific primer sets for starch biosynthesis genes in wheat. *Theor. Appl. Genet.* 109:1295-1302.

Bruckner, P.L. J.E. Berg, G.R. Carlson, D.M. Wichman, N. Riveland, K.D. Kephart, R.N. Stougaard, G.D. Kushnak, J.L. Eckhoff, E.A. Hockett, and D.K. Habernicht. 2004. Registration of 'BigSky' Wheat. *Crop Sci.* 2003 43: 735-736.

Lanning, S. P., G.R. Carlson, D. Nash, D.M. Wichman, K.D. Kephart, R.N. Stougaard, G.D. Kushnak, J.L. Eckhoff, W.E. Grey, and L.E. Talbert. 2004. Registration of 'Choteau' Wheat. *Crop Sci.* 2004. 44: 2264-2265.

Sherman, J.D., L. Yan, L.E. Talbert, and J. Dubcovsky. 2004. A PCR Marker for Growth Habit in Common Wheat Based on Allelic Variation at the *VRN-A1* Gene. *Crop Sci.* 44: 1832-1838.