2005 W-6 Idaho state report
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There was an increase in the number of accessions, genera and species requested in Idaho in 2005 compared to 2004. In 2005, 1,777 accessions were requested covering 28 genera and 74 species. The genera that had the most species requested was *Solanum* with 19 *Solanum* species. The two species with the most accessions requested were *Triticum aestivum* and *Hordeum vulgaris*. These results are not surprising considering these are the primary crops in Idaho and the large number of both private and public research programs working on these crops in the state. There was a total of 37 individuals requesting germplasm, split evenly between private (19) and public (18). This also was an increase over 2004 for number of individuals requesting germplasm from Idaho.

The wheat breeding program at the University of Idaho in Moscow continues its program using *Ph1* of wheat and *Gc* of jointed goatgrass (*Aegilops cylindrica*) to transfer genes from jointed goatgrass into wheat. The challenge of reduced seed set in F_1 plants lacking the *Ph1* gene still limits the usefulness of this method to transfer genes between the two species. Work on this project will continue to determine if it is possible to increase the production of the BC_1 generation. The two wheat breeding programs at the University of Idaho have developed recombinant inbred line (RIL) populations in hard red winter wheat and soft white winter wheat for the identification of molecular markers important to production of these two market classes of wheat. Two soft white winter wheat RIL populations developed from a cross between the cultivars Brundage and Coda are currently being used to identify or verify molecular markers for Pseudocercosporella foot rot resistance (*Pch1*) and stripe rust resistance. This work is being done in cooperation with Oregon State University and the USDA-ARS – Pullman. In a second collaborative program with Oregon State University, *Aegilops cylindrica* germplasm has been developed/identified that carries either the *Pch1* gene from wheat or a herbicide resistance gene from wheat. These lines will be used to study the impact of gene flow from *Triticum aestivum* to *Aegilops cylindrica*. Other programs at the University of Idaho that utilized plant germplasm in 2005 included the wheat breeding program in Aberdeen, the potato molecular biology program in Moscow, the potato improvement program in Aberdeen, the bean breeding program in Kimberly and the Nez Perce county extension program based in Lewiston. The USDA/ARS breeding and genetics programs at Aberdeen, Idaho continue to be major users of the germplasm system for *Avena*, *Hordeum*, *Solanum* and *Triticum* species.

Germplasm reports

Private

Pamela Burr, Meridian – Received one *Phaseolus vulgaris* accession for a market garden of heirloom seeds.

Michael Gerdes, Syngenta Seeds, Inc., Nampa – Received one accession of *Cynodon dactylon* for use as a reference sample in a herbarium.

Rob Maxwell, Seminis Vegetable Seeds, Payette – Received 250 *Daucus* accessions for continuation of disease screening of the *Daucus* collection.

Don Miller, Target Seed LLC, Homedale – Received 27 *Medicago sativa* accessions for use as standard checks.

John Rayapati, Archer Daniels Midland, Caldwell – Received 13 *Phaseolus vulgaris* accessions for use in their *Phaseolus* breeding program.

Ron Riley, Basin Seed Company, Nampa - There were six *Phaseolus vulgaris* accessions: PI 619387 (G2333), PI 619386 (Cornell 49242), PI 619385 (AB 136), PI 619391 (Michelite), PI 619395 (TU), and PI 619389 (MDRK). These are currently being used as anthracnose differentials for screening purposes.

Caius Rommens, J. R. Simplot Company, Boise - They received tissue culture material for the potato varieties Huckleberry and All-Blue. Both of these varieties contain high levels of the antioxidant anthocyanin. The plants are currently being used to study and modify the antioxidant pathways in potato. Their goal is to develop r potato varieties that are healthier for consumers..

Troy Weeks – J.R. Simplot Compay, Boise - Their project goal was to isolate RNA from anthocyanin-expressing young corn leaves. They were hoping that one or more of the six *Zea mays* accessions that they had acquired from the USDA/ARS/North Central Regional Plant Introduction Station would display purple leaves (anthocyanin expression) in two-week-old corn seedlings. To their dismay, only one accession (Ames 27451) showed slight purple pigmentation in the leaf area. Unfortunately they were unable to isolate any anthocyanin RNA from this accession and the project was terminated.

<u>Public</u>

Mike Bonman, USDA-ARS, Small Grains and Potato Research Unit, Aberdeen – The *Triticum turgidum* accessions were requested by Clemson University and were planted last fall. No data back yet. The interest was to find a *T. turgidum* that could be used to make specialty products by one of their local stakeholders (Anson Mills).

Anne Gillen, USDA-ARS Northwest Irrigation and Soils Research Lab, Kimberly – She used the *Beta vulgaris* lines as sources of parents for genetic crosses to investigate the inheritance of resistance to *Erwinia carotovora* subsp. *betavasculorum*. This work is ongoing. Some of these materials will be used as parents, others will not. The two *B. corolliflora* accessions were grown in a field that was inoculated with leafhoppers infected with Beet Severe Curly Top virus. Neither accession showed

any symptoms of the disease curly top. They are continuing their investigations with plants that were dug out of the field and maintained in the greenhouse.

Blair Goates, USDA-ARS, Small Grains and Potato Research Unit, Aberdeen - Received 466 *Triticum aestivum* accessions for inclusion in the stem rust screening nursery in Kenya.

Saad Hafez, University of Idaho, Parma - Received 10 *Beta vulgaris* accessions to be included in a nematode (BCN) evaluation nursery.

Gongshe Hu, USDA-ARS, Small Grains and Potato Research Unit, Aberdeen – The *Hordeum* accessions have been used to evaluate the grain morphology of high lysine mutants. They validated the reports that all the high lysine mutants have shrunken endosperm and are difficult to use in the breeding program. The observation made them design a new strategy to investigate the lysine metabolisms in barley. They will be testing the new strategy for high lysine and normal endosperm mutations. The *Aegilops*, *Triticum*, and *Avena* species are being used for studies of genomic relationships in *in situ* hybridization experiments.

Jungmin Lee, USDA-ARS – HCRL, Parma - His lab is a worksite of the Corvallis, OR USDA and he had received the accessions to analyze for Dr. Kim Hummer (USDA-ARS). The accessions were analyzed for berry composition (soluble solids, titratable acidity, pH, berry size, total anthocyanin and total phenolics analyses) for Dr. Hummer's germplasm release notice.

Larry Smith, UI Extension, Lewiston – Evaluated 15 *Zea mays* accessions for common smut resistance in Nez Perce County. The accessions were screened in two locations, Shriner's corn garden in Lewiston, Idaho, where a highly significant residual of corn smut disease was present due to mono-cropping of corn for several years and on the Nez Perce Reservation near Lewiston in Lapwai, Idaho, located in a garden setting where corn had never been grown. Information and data for the accessions can be seen in Tables 1 – 3 at the end of the report.

Paul Zambino, USDA Forest Service, Moscow - The accession "Blackdown" (*Ribes nigrum*) was requested because it is reported to be resistant to powdery mildew, susceptible to white pine blister rust, and not under plant patent protection. He has increased cuttings of the accession to send to several of the USDA Forest Service screening centers that identify resistance in five-needled pines, where the accession will be tested for its ability to produce inoculum for inoculations of different white pine species: western white pine, eastern white pine, sugar pine, and whitebark pine. It would be a replacement for the highly rust-susceptible "Heimberger clone" developed in the 1950, which unfortunately, is also highly susceptible to mildew. If the accession proves useful, it will reduce worker hours and fungicide use, and allow for fewer plants to produce a more reliable inoculum source for the screening programs.

Publications

Ghandi, H., M.I. Vales, C. Watson, C. Mallory-Smith, N. Mori, M. Rehman, R.S. Zemetra, and O. Riera-Lizarazu. 2005. Chloroplast and nuclear microsatellite analysis of *Aegilops cylindrica*. *TAG* 111:561-572.

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Hanson, B.D., C.A. Mallory-Smith, W.J. Price, B. Shafii, D.C. Thill, R.S. Zemetra. 2005. Interspecific hybridization: Potential for movement of herbicide resistance from wheat (*Triticum aestivum*) to jointed goatgrass (*Aegilops cylindrica*). *Weed Tech*. 19: 674-682.

Souza, E.J., N. Bosque-Pérez, M.J. Guttieri, D.J. Schotzko, S.O. Guy, B. Brown, and R. Zemetra. 2005. Registration of 'Jerome' wheat. *Crop Sci*. 45: 1161-1162.

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Rehman, M., J. Hansen, C. Mallory-Smith, O. Riera-Lizarazu, and R. Zemetra. 2005. Potential for gamophytic and/or sporophytic selection for herbicide resistance in wheat x jointed goatgrass backcrosses. WSCS Abstracts – 2005 ASA abstract CD.

Hansen, J., M. Rehman, C. Mallory-Smith, O. Riera-Lizarazu, and R. Zemetra. 2005 Determining the potential for migration of a herbicide resistance gene via pollen from jointed goatgrass backcrosses. WSCS Abstracts – 2005 ASA abstract CD.

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Riera-Lizarazu, O., C.J.W. Watson, R.S. Zemetra, C. Mallory-Smith, and M. Isabel Vales. 2005 Development of a molecular marker linkage map of jointed goatgrass (*Aegilops cylindrica*). 2005 ASA abstract CD.

Carter, A., J. Hansen, T. Koehler, X.M. Chen, and R. Zemetra. 2005. Development of a recombinant inbred line (RIL) population in soft white winter wheat. 2005 ASA abstract CD.

Table 1. Numerical Rating System for Corn Smut Disease and description of corn varieties planted in the common smut trial in 2005.

Codes for COMMON SMUT of MAIZE

Code	Definition
0	No disease symptoms observed
1	Very few plants with small galls
2	(0 = no symptoms, 9 = severe disease development)
3	Few plants with moderate sized galls
4	(0 = no symptoms, 9 = severe disease development)
5	Moderate number of galls; some large
6	(0 = no symptoms, 9 = severe disease development)
7	Many plants infected; most galls large
8	(0 = no symptoms, 9 = severe disease development)
9	Most plants infected; large galls; severe injury

Corn varieties planted 2005 (origin of variety):

Item	Accession	Country, State	Plant name
1	PI 345571	Former Soviet Union	Tiraspolskaya Skorospe.
2	PI 345569	Former Soviet Union	Zaria 123
3	PI 345570	Former Soviet Union	Kubanskaya Konservnaya
4	PI 255975	United States, Massachusetts	West Brookfield White Sweet
5	PI 255982	United States, Maine	Baxter's Golden Bantam
6	PI 231301	United States, Iowa	Whipple's Yellow
7	PI 231740	Turkey	Separation from 177589
8	PI 231298	United States, Iowa	Howling Mob
9	PI 231299	United States, Iowa	Oregon Evergreen
10	PI 219894	United States, North Dakota	Sunshine
11	PI 228182	Former Soviet Union	No. 1577
12	PI 219879	United States, North Dakota	Golden Bantam
13	PI 219886	United States, North Dakota	Nueta
14	PI 219872	United States, North Dakota	Baby Orchard
15	PI 219876	United States, North Dakota	Early June

Table 2. Corn smut rating data from Shriner's Corn Garden Project, data taken September 2005.

Corn variety	Smut disease rating	Maturity	Plant height	Production	Eating quality
1. Baby Orchard, North Dakota	3	VE (very early)	4.0 (short)	P (small ear)	P
2. Early June, North Dakota	1	L	5.5	M	P
3. Golden Bantam, North Dakota	3	M	5.5	M	P
4. Nueta, North Dakota	3	E	5.5	M	M
5. Sunshine,** North Dakota	3	E	6.0	M+	M
6. No.1577, former Soviet Union	3	M	6.0	M	M
7. Howling Mob, Iowa	3	L	7.0	M	M
8. Oregon Evergreen, Iowa	1	L	7.0	M	M
9. Whipple's Yellow, Iowa	1	M	5.5	M	M
10. Sep. from 177589, Turkey	1	L	6.5	M	M
11. West Brookfield, Massachusetts	2	L	6.5	M	M
12. Baxter's Golden Bantam, Maine	3	L	5.5	M	M
13. Zaria 123, former Soviet Union	3	M	6.0	G (large ear)	P
14. Kubanskaya Konservnaya, former Soviet Union	2	L	5.0	G (large ear)	M
15. Tiraspolskaya Skorospe., former Soviet Union	1*	L	5.0	G (large ear)	M

*Best—least smut infection **Kathleen's favorite

Smut disease rating	Definition
1	Low—Very few symptoms per variety
2	Medium—Moderate number smut galls, some large
3	High—Many plants infected, large, severe smut galls

Table 3. Corn smut rating data from Lapwai Demonstration Garden. Data collected September 20, 2005 Shriner's Corn Garden Project, data taken September 2005.

Entry	# of Hills	# Hills infected	Location of infection	Smut Score*	Height in feet	Maturity
16. Baby Orchard, North Dakota	9	0	n/a	1	4.0	ME
17. Early June, North Dakota	4	0	n/a	1	5.5	ME
18. Golden Bantam, North Dakota	3	0	n/a	1	5.5	ML
19. Nueta, North Dakota	6	0	n/a	1	5.5	ML
20. Sunshine, North Dakota	5	1	ear	1	6.0	E
21. No.1577, former Soviet Union	12	0	n/a	1	6.0	L
22. Howling Mob, Iowa	12	3	ears/stalk	2	7.0	L
23. Oregon Evergreen, Iowa	12	0	n/a	1	7.0	L
24. Whipple's Yellow, Iowa	12	1	ear	1	5.5	L
25. Sep. from 177589, Turkey	12	0	n/a	1	6.5	L
26. West Brookfield, Massachusetts	12	3	ears/stalk	2	6.5	ML
27. Baxter's Golden Bantam, Maine	12	1	ear	1	5.5	ME
28. Zaria 123, former Soviet Union	12	3	ears	2	6.5	ML
29. Kubanskaya Konservnaya, former Soviet Union	12	1	ear	1	5.0	E
30. Tiraspolskaya Skorospe., former Soviet Union	12	2	ear	2	5.0	E

Garden grown under plastic and watered under plastic with drip soaker hose.

*Generally, smut infections were directly related to hills that had large openings in the plastic for planting and/or were planted beyond the plastic mulch in bare ground. The more soil surface exposed and the resulting spore liberation equated to an increase in common smut symptoms.

Smut Score Code	Definition
1	Low—Very few symptoms per variety
2	Medium—Moderate number smut galls, some large
3	High—Many plants infected, large, severe smut galls