Annual Report for Calendar Year 2011

USDA-Agricultural Research Service
Western Regional Plant Introduction Station (WRPIS)
59 Johnson Hall, Washington State University
Pullman, WA

Phone: (509) 335-1502 Fax: (509) 335-6654

Jinguo.hu@ars.usda.gov

Faba bean (*Vicia faba* L.) ranks number six in production among world food legume crops. We identified and produced breeding lines that could survive through the harsh winter field condition in the Palouse region and can be used for additional alternative rotation crop development (see cover story on page 3).

June 2012

Table of Contents

EXECUTIVE SUMMARY AND HIGHLIGHTS

The Western Regional Plant Introduction Station (WRPIS) is one of the four regional plant introduction stations in the United States. Activities at WRPIS focus on collecting, preserving, evaluating, documenting and distributing plant species assigned to the station and conducting research related to its primary mission. This station includes nine SYs (Scientist Year) in five curatorial programs, one DNA marker lab and three (agronomy, plant pathology and genetics) research programs. The operation is primarily funded by two CRIS projects managed through the Pullman Station; the Plant Germplasm Introduction and Testing Research Unit at Pullman, WA, and the National Temperate Forage Legume Genetic Resources Unit at Prosser, WA. The Regional Research Project (W-6) also contributes considerable (approximately 15% of the total) funding which covers the salary and fringe benefits of six full time state employees working in WRPIS, as well as partial cost of land and equipment operations for germplasm regeneration and characterization. We achieve our goals through close collaboration among sites and scientists in various disciplines such as agronomy, horticulture, plant pathology, genetics, plant physiology and botany. As part of a Regional Research Project (W-6), we work in close association and collaboration with scientists of the State Agricultural Experiment Stations, other state and federal agencies, and the private sector. Our scientists are also actively collaborating with scientists in international centers, foreign universities and research institutes as well as foreign companies. In 2011, WRPIS had the second highest number of annual distribution of seed samples to the global crop plant research community. Satisfactory progress was made in the WRPIS's mission areas. Our scientists published 18 research papers in peer-reviewed journals; one book and three book chapters; and presented 35 oral or poster presentations at various international, national and regional conferences.

The following are the 2011 high-lights:

- On December 31, 2011, there were 90,485 plant accessions belonging to 947 genera, 4,155 species and 4,630 taxa in the WRPIS collection.
- We acquired 3,103 new accessions including 2,094 native plant accessions from the SOS (Seeds of Success) project, 272 grass accessions collected from Russia by Dr. Doug Johnson, 237 Lupinus from Poland and Germany and 141 *Phaseolus* from CIAT (The International Center for Tropical Agriculture), Cali, Colombia.
- WRPIS had the second highest annual distribution number in 2011. A total of 30,033 packets of seed samples were shipped to 928 requestors from 45 countries. Year 2011 was the first year in which WRPIS germplasm was distributed to requestors from all 50 US States.
- We conducted an initial roadside survey for the presence of GMO transgene in feral alfalfa in the GMO alfalfa production areas in CA, OR and WA and detected 7-15% of the feral alfalfa populations carrying the Roundup Ready Alfalfa (RRA) transgene in the areas surveyed. This finding has significant impact on future alfalfa germplasm management. Several measures have been implemented to prevent our alfalfa germplasm from potential transgene contamination.

- We entered 35,499 observation data points into the GRIN database in 2011. These data are for 161 descriptors in 19 crop species from 9,393 accessions. Eight-eight percent of the data were collected by WRPIS staff and 12% by collaborators.
- We entered 4,349 seed viability records into GRIN in 2011. Pullman location tested 1,262 and National Center for Genetic Resources Preservation (NCGRP), Fort Collins, Colorado tested 3,049 accessions.
- We regenerated/harvested 3,750 inventories of a broad range of plant species. The seeds were packed and stored and the quantity by weight was determined for 4,737 inventories.
- We shipped 2,246 seed inventories to the National Center for Genetic Resources Preservation (NCGRP), Fort Collins, Colorado and 421 inventories to the Svalbard Global Seed Vault, Longyearbyen, Svalbard for secured backup.
- We published three first reports of plant diseases relevant to taxa curated at WRPIS. They are: (1) powdery mildew (*Erysiphe knautiae*) on Caucasian pincushion flower in North America; (2) rust (*Puccinia sherardiana*) on dwarf checkerbloom in Washington State and (3) Weedy alternative hosts for the new pea powdery mildew pathogen *Erysiphe trifolii*.
- We, in collaboration with University of California at Davis, genotyped the entire cultivated lettuce germplasm collection of 1,063 accessions available at WRPIS with Illumina's high-throughput Goldengate assay. The resulting genotype data of 384 SNP (single nucleotide polymorphism) markers revealed that there are approximately 70 accessions that were present more than once, one butterhead cultivar was collected nine times from different countries and at different time periods. Cleaning up our collection by eliminating the redundancy will save substantial resources for storage, regeneration and data management in the future.
- We completed a five-year study on genetic diversity, population structure and genome-wide marker-trait association analysis emphasizing seed nutrients of the USDA pea core collection and published the results. The significant marker-trait associations documented in this study are useful to breeders to implement marker-assisted selection, which will expedite the process of breeding superior pea cultivars.

Cover: Faba bean (*Vicia faba* L) is one of the earliest domesticated crops and is still grown in many regions of the world for use as food, feed, vegetable and a cover crop. The US faba bean germplasm collection is managed by the Cool Season Food Legume program of WRPIS. Although there are only approximately 750 accessions, this collection has captured a high level of variation within the species. Satisfactory progress has been made in screening and enhancing cold tolerance of faba bean and the resulting accessions that survived through three winter seasons in Pullman formed a foundation for developing an alternative fall-sown rotation crop for the Palouse region: 1. A snapshot showing the diversity of faba bean seeds (color, shape and size); 2 and 3. The same plot before and after the winter (sown in September 2009, pictures were taken in Nov. 2009 and March 2010, respectively); 4. Winter-hardy seedlings standing on frozen ground with little cold damage (in a F_3 family derived from a cross between a winter-hardy lines and a nonwinter-hardy vegetable-type line); and 5. A branch of a high-yielding faba bean plant (picture taken on Central Ferry Research Farm).

REPORT

ADMINISTRATION

Ralph Cavalieri (Administrative Advisor)

Ann Marie Thro (NIFA Representative)

Michael Fitzner (NIFA Representative)

Peter Bretting (ARS National Program Staff)

Andrew Hammond (ARS, PWA Area Director)

Jinguo Hu (Research Leader and Station Coordinator)

Jannis Bacani (Program Support Assistant)

PERSONNEL

There were some minor changes for the research and curatorial staff during 2011. One technician, Leslie Elberson, took the ARS' volunteer retirement option and retired at the end of 2011 after 15 years of service in ARS. This position will be filled. A new biological science technician, Alex Cornwell came on board in September filling the vacancy left by Corey Wahl, who resigned in May, 2011. The list of WRPIS staff is shown on Page 19 (Appendix 1). Due to the labor-intensive nature of our operation we hired more than 40 part time helpers (mostly WSU students) for field, greenhouse and laboratory activities throughout the year.

RESEARCH PROJECT

No change to report.

FUNDING

The FY 11 budget for WRPIS was $2,469,800 (Pullman, WA) and $271,000 (Prosser, WA) for a total ARS budget of $2,740,800. This allowed for $24,417 discretionary dollars per SY. In addition, we received $405,288 'in kind' support from a CSREES Multi-State Research Project W-6, through Washington State University. Projected discretionary funds per SY were $35,561 for FY12 and $31,829 for FY13.

Our staff scientists have received the following grant funds: 1) $150,000 of Reimbursable Agreement with Bureau of Land Management with Dr. Richard Johnson entitled "Maintenance Characterization, Storage and Distribution of Key Native Germplasm." This grant supports two temporary full time employees (a GS-11 supporting scientist and a GS-6 technician), other temporary help, supplies and travel; 2) $50,000 research grant to Dr. Clarice Coyne from the United States-Israel Binational Agricultural Research and Development (BARD) Fund to support a collaborative project entitled "Winter chickpea; towards a new winter pulse for the semiarid pacific northwest and wider adaptation in the Mediterranean Basin"; 3) $4,000 NPGS Evaluation grants to Barbara Hellier to evaluate ploidy level, morphologic characteristics, rubber and inulin content of the 2008

Kazakhstan *Taraxacum kok-saghyz* collection; 4) $2,000 from the Beet Sugar Development Foundation to Barbara Hellier in supporting Beta germplasm conservation and regeneration; and 5) $970,000 NIFA-Biotechnology Risk Assessment Grant to Stephanie Greene at Prosser and colleagues in Oregon and Washington States for studying transgene flow in alfalfa on a landscape level. A postdoctoral research associate will be hired through a specific cooperative agreement (SCA) with Washington State University to work on this project.

FACILITIES

There was no change in the WRPIS facilities during the year. There are 34,800 square feet of growth facilities (22,375 sq ft Federal, 12,425 sq ft Washington State University) and 157.3 acres of farm land (86.2 acres Federal, 71.1 acres WSU). WRPIS staff uses 12 laboratories (5 Federal, 7 WSU), and 22 offices (4 in Federal buildings, 6 in Federal mobile office building, 12 in WSU buildings). Three major projects improving the WRPIS infrastructure for preserving germplasm were paid with the base funding increase received this year: 1) Purchased 160 new insect blocking cages for alfalfa germplasm regeneration in response to USDA's coexistence plan of genetically engineered (GE) and non-GE alfalfa. 2) Replaced a 25-year old pickup with a new one for the *Phaseolus* germplasm program; and 3) Obtained a high quality Zeiss research microscope that was transferred from an ARS laboratory in Wenatchee, WA to the Plant Pathology Lab at no cost.

The dehumidifier providing conditioned air to our seed storage facility malfunctioned in August. Divco, our service contract changed the desiccant and seals to keep it running and suggested us to replace it in the near future. The estimated cost is approximately $60,000. We will try to do so by 2013.

Driven by the demand of our stakeholders and customers, our germplasm holdings have been growing at a steady pace. Currently, the total number of accessions has surpassed 91,000. We have reached nearly the full capacity of our 4 ºC seed storage facility, which was built and put in use in early 1980s. There will not be enough space for the accessions currently being regenerated on our farm next year. And we won't be able to add any new needed genetic resources to our collection for the user community. Therefore, an expansion of the facility is necessary for us to fulfill our mission. The RL has discussed the need with PWA Area Office and the NP 301 Leader who conceptually supported the project. We were instructed to enter this project into the Capital Projects and Repair Plan (CPRP) of the ARS Pullman location. The project includes adding approximately 1,000 square feet of -20 ºC seed storage space with moveable shelves. This space will be used to store the new acquired and currently regenerated seed samples. Since seeds stored at -20 ºC have longer life than those stored at 4 ºC, keeping seed samples at -20 ºC will relieve the pressure of regeneration which our curators are facing.

GERMPLASM MANAGEMENT

The crop species assigned to WRPIS by the National Plant Germplasm System (NPGS) can be roughly divided into ten groups: 1) forage and turf grasses, 2) cool season food legumes (pea, lentil, chickpea, faba bean, lupine, etc.), 3) temperate forage legume crops (alfalfa, lotus and clover) 4) beans, 5) lettuce, 6) safflower, 7) garlic, wild onion and onion relatives, 8) sugar beet, 9) selected ornamentals, and 10) medicinal plant species.

Figure 1 shows the number of accessions for major crop groups maintained at WRPIS. Currently, WRPIS ranks number three among the 31 sites of NPGS for both seed and clonal germplasm repositories in terms of number of accessions managed. At the 2011 year end, WRPIS held approximately 16.5% of the total NPGS holdings of 548,692 accessions. Most WRPIS accessions are maintained as seed, with a small proportion (garlic and its relatives and some ornamentals) that is vegetatively-propagated.

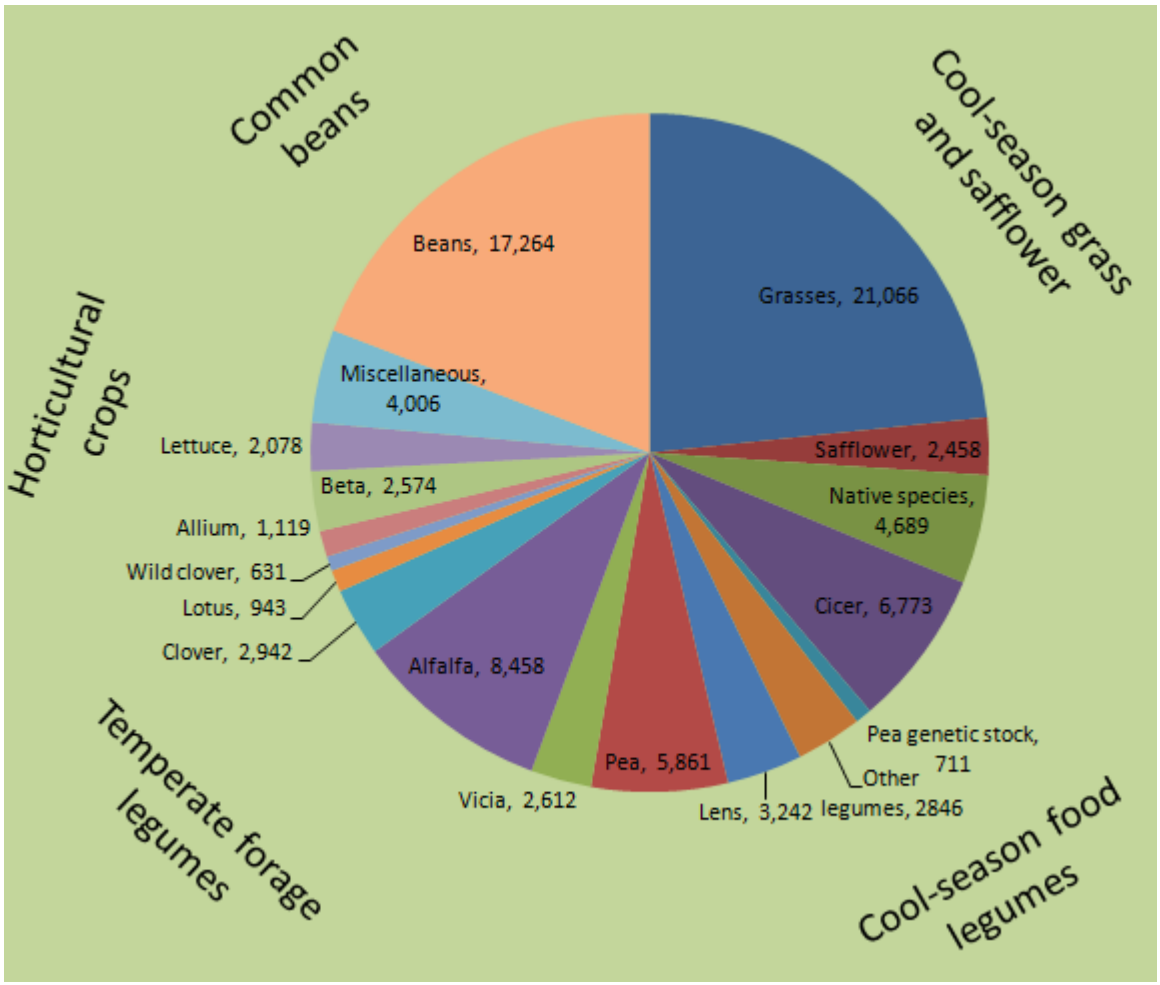

Figure 1. Number of accessions for major crop groups maintained at WRPIS (as of December 31, 2011 totaled at 90,485).

As of December 31, 2011, there were 90,485 accessions belonging to 4,155 species (4,630 taxa) in 947 genera. These are managed by five curatorial programs: The Agronomy and Safflower Program (Vicki Bradley) manages 23,524 accessions of cool season turf and forage grasses and safflower; the Cool Season Food Legume Program (Clarice Coyne) curates a total of 22,045 accessions of pea, chickpea, lentil, faba bean and lupine; the *Phaseolus* Beans Program (Molly Welsh) manages a collection of 17,264 accessions, all belonging to the *Phaseolus* genus; the Temperate Forage Program (Stephanie Greene, located in Prosser, WA) manages the germplasm of alfalfa, clover, lotus and wild clovers with a total of 12,974 accessions; and the Horticultural Crops Program (Barbara Hellier) takes care of 9,777 accessions of sugar beet, lettuce, garlic, and many miscellaneous species that have potential use for ornamental or medicinal

purposes. In addition, there are 4,689 accessions of native species generated by the collaborative activities supported by grants from the BLM's Seeds of Success (SOS) project, the Great Basin Restoration Initiative, and the Forest Service to Richard Johnson (Research Agronomist). Many of these accessions are being transferred to existing NPGS curators for permanent management and distribution.

Germplasm Acquisition

No international collection trip was carried out by WRPIS scientists in 2011. However, the accession numbers continued growing (Figure 2). More than half of the newly added accessions were from the SOS (Seeds of Success) project, which contributed 2,094 native plant accessions. The reminder was received from collaborators of WRPIS scientists around the world, 272 grass accessions collected from Russia by Dr. Doug Johnson, 237 Lupinus from Poland and Germany and 141 *Phaseolus* from CIAT(The International Center for Tropical Agriculture), Cali, Colombia.

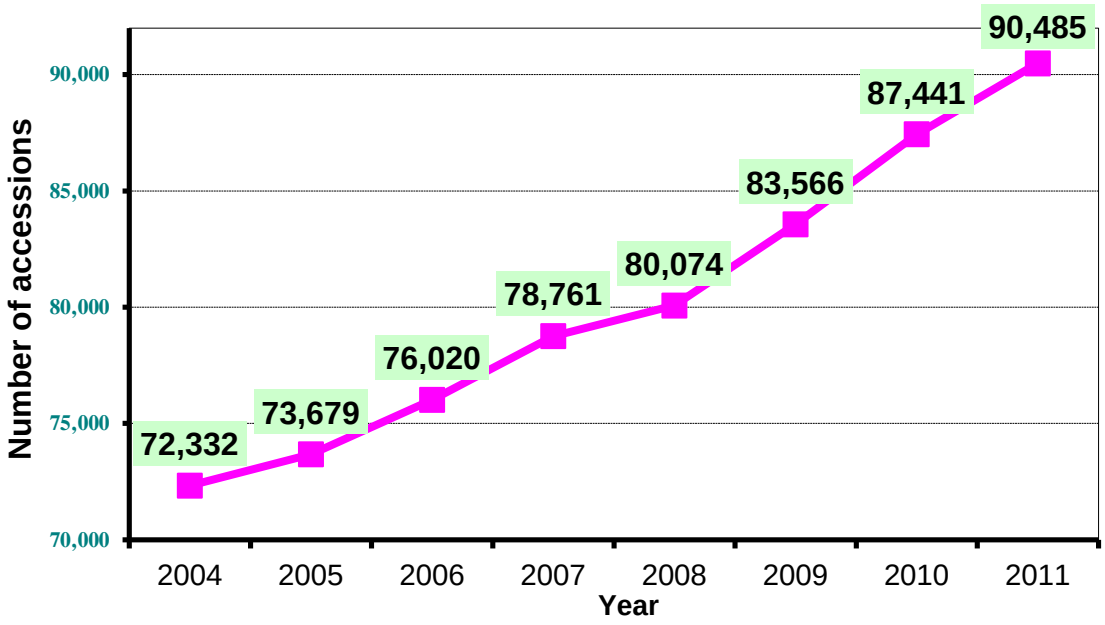

Figure 2. Changes of total number of accessions managed by WRPIS since 2004. The numbers were recorded at the end of each calendar year.

Germplasm conservation

In 2011, WRPIS curators regenerated 3,750 inventories by following our established, labor-intensive procedures and protocols for maintaining the genetic integrity and health of all germplasm collections. These included physical isolation, hand planting and transplanting, controlled hand and insect pollination, hand harvesting, cleaning and packaging for storage and distribution.

A total of 4,349 seed viability records were entered into the GRIN database. WRPIS tested 1,262 inventories and NCGRP in Fort Collins, CO tested 3,049 inventories. Seed quantities of 4,737 inventories in our storage were updated by weighing and converting to number of seeds/inventory.

For security back-ups, we sent 2,246 inventories to NCGRP at Fort Collins, CO and 421 inventories to the Svalbard Global Seed Vault, Longyearbyen, Svalbard through the NCGRP during 2011.

Germplasm evaluation and characterization

In 2011, a total of 35,499 observation data records were entered in GRIN on 9,393 accessions on 161 descriptors of 19 different crop species. Eighty-eight per cent of the data came from personnel at our station and twelve percent were from our cooperators. Data records by crop are as following: 8,500 for *Phaseolus*, 7,475 for lettuce, 5,926 for chickpea, 3,857 for pea, 3,589 for pea genetic stocks, 2,704 for sugar beet, 856 for safflower, 789 for lupine, 529 for Vetch, 476 for cool-season grasses, 413 for lentil, 214 for medicinal plants, 127 for faba bean, 23 for alfalfa, 22 for wild *Allium*, 5 for *Astragalus*, 1 for clover, I for Lathyrus, and 12 for W-6 miscellaneous species.

We have applied available DNA marker techniques to assess phylogenetic and genetic diversity of priority crop germplasm in our collection. Projects carried out in 2011 included AFLP genotyping *Trifolium thompsonii; Phalaris arundinacea*, *Poa supina* and *Eragrostis tef*. Ethiopian safflower landraces were also genotyped with TRAP, AFLP and SSR markers for diversity analysis.

Germplasm distribution

The annual distributed number of seed packets in the past seven years is shown in Figure 4. During the year 30,033 packets of 19,767 (21.8% of the collection) accessions were distributed. This is the second highest record for distribution of packets sent out by WRPIS in one year. Among the distributed packets, 11,535(38%) were sent to addresses in the USA and 18,498(62%) were sent to foreign countries. There were 1,172 orders filled by 928 different requestors. The most requested plant groups were grasses (7,800 packets), pea (4200 packets) and safflower (3,200 packets), followed by alfalfa, beans and lettuce ranging from 2,400 to 3,000 packets.

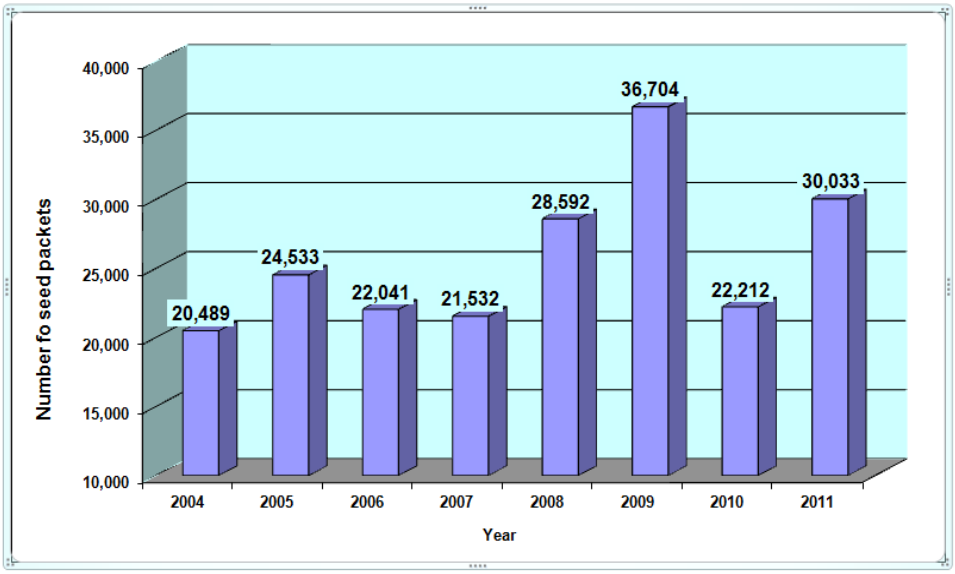

Figure 4. Number of seed packets distributed annually by WRPIS from Year 2004 to Year 2011**.**

Brief Summary of individual programs

1. Grasses and Safflower collections

We maintained 825 grass regeneration plots in the field in 2011. We planted 445 first year grass accessions at Central Ferry and Pullman, the majority of which will be harvested in 2012. Three hundred and seventy-five grass accessions were harvested from the second year grass nurseries in 2011. Fifty-eight grass accessions were assigned PI numbers in 2011 and 151 grass accessions were backed-up at NCGRP. We acquired 380 new grass accessions. One hundred and twenty-two of these were *Elymus virginicus* from the NRCS East Texas PMC and 218 accessions were from a collection trip in the Russian Federation and were donated by Dr. Douglas Johnson, USDA, ARS.

One hundred and thirty-five safflower accessions were planted for regeneration. Of these, 32 accessions had low-quantity and/or low-quality seeds that were surface sterilized and germinated in the greenhouse (special treatment). Twenty-three of the special treatment accessions produced plants and were harvested. The other 103 safflower accessions were direct seeded in the field and harvested. Rust ratings were taken on the field regenerated safflower accessions providing valuable information that is linked to the seed inventory lot. In addition, 50 accessions from the safflower core collection were planted and photographed for uploading to GRIN. We sent 165 safflower accessions to NCGRP for back-up in 2011.

Approximately 800 safflower and grass datapoints and 202 images from the 2010 nurseries were uploaded into GRIN in 2011.

Noteworthy: Updating information on germination rates for all available accessions of *Carthamus tinctorius* have been completed within the last 5 years.

2. Cool season food legumes

Field regenerations of food legumes totaled 1,734 accessions and 14,452 characterization data on agronomic traits were collected and submitted on these accessions for entry into GRIN. New germplasm sources acquired were 413 lupin accessions from Germany, Netherlands, and Poland, thus expanding the genetic diversity of the annual *Lupinus* collection.

Research on genetic resistance to Aphanomyces root rot in pea resulted in publication of consistent QTL markers for use in marker-assisted breeding. The impact of these new tools will increase breeding efficiency for selecting superior progeny with improved resistance to the most damaging root rot disease of pea.

3. *Medicago*, *Trifolium* and *Lotus* collections

During CY 2011, we grew out 160 accessions to replenish seed stocks, tested seed viability of 230 accessions and gathered over 5,000 observation data. In 2011 we distributed 89 trefoil (*Lotus*), 2,380 alfalfa (*Medicago*), and 630 clover (*Trifolium*) accessions. In February of 2011, genetically-engineered Round Up Ready alfalfa (RRA) was deregulated. This raised the concern among stakeholders that our alfalfa germplasm collection remains free of even low level adventitious presence (LLAP) of the GE trait. We received $88,000 from the USDA to purchase 160 new pollination cages. We also devised a sampling strategy to monitor the presence of the RRA transgene in the vicinity

of Prosser, WA, where the collection is grown out. A feasibility study was implemented to explore moving our seed increase site to a more isolated location at Central Ferry, WA. We found that seed production is comparable at both sites, but that a new pole barn and drying/transplant greenhouse would be needed at Central Ferry to accommodate our regeneration activities. A new collaborative project was launched in FY2011 with the N.I. Vavilov Institute of Plant Production (VIR) and the Noble Foundation in Oklahoma. VIR provided 100 accessions representing ecotypes of alfalfa wild relatives collected throughout the Former Soviet Union. We are increasing this germplasm in Prosser, and will be returning samples to VIR so it can be used to replenish stocks in the VIR genebank. We are also evaluating the germplasm in a replicated trial in Prosser. The USDA NPGS Plant Exchange Office provided funds to support the molecular characterization of the germplasm which is being conducted by the Noble Foundation. By characterizing ecotypic variation, we hope to identify useful germplasm to breed alfalfa better adapted to adverse climatic conditions.

Noteworthy: In September 2011, S. Greene and colleagues received a $970,000 NIFA-Biotechnology Risk Assessment Grant to study transgene flow in alfalfa on a landscape level. Results from this study will provide data to better inform how we can protect our germplasm collections.

4. Horticulture Crops Program and Greenhouse management

In 2011 we regenerated/increased 525 accessions producing seed, cloves, and/or bulbs. We started passing *Allium sativum* accessions through tissue culture for virus removal. A total of 9 accessions have been cultured with plants recovered from all. We modified the field increase protocol for lettuce to include caging to decrease the possibility of outcrossing. We added 24 new *Beta macrocarpa* accessions collected in the Imperial Valley, CA (B. Hellier collection). 4,000 descriptor data points for lettuce and 165 data points for *Beta, Allium* and misc. genera were added to GRIN. Preliminary results were obtained in cooperative experiments with the ARS Insect Rearing and Fumigation Unit, Parlier, CA to control dry bulb mite on the garlic collection. Methybromide treatment looks promising for post harvest control of this storage pest. Additional experiments were not carried out due to low levels of infestation in the 2011 garlic harvest.

5. Common beans

During 2011 three hundred sixty-two (362) accessions of *Phaseolus* beans were increased in the greenhouses. There were 178 accessions from 14 countries added to the collection. Seven thousand and six (7,006) data points and 1,494 images were uploaded into GRIN for the *Phaseolus* collection. Two hundred seventy-seven accessions (277) were tested for the presence of the Bean Common Mosaic Virus: 243 accessions recorded as virus-free and 34 accessions as virus infected. The use of five *Phaseolus* germplasm accessions was recorded in 4 journal citations during 2011.

6. The DNA marker lab

Screening of the *Eragrostis tef* collection with AFLP markers and TRAP markers designed from enzymes of gibberellic acid pathways. Thus far, 4 plants each in 64 of the 369 accessions have been characterized with AFLP and TRAP markers. While AFLP markers have placed these in 3 admixed populations, TRAP markers have distinguished

11 discrete populations with primers associated with the gibberellic acid pathway. Upon completion of the marker analysis, these groups will be tested for association with field data on straw strength. If correlations are found, these distinct populations could be used for selection and recombination for lodging resistance. Lodging is a major factor in grain yield reduction in Ethiopia, and the Kansas Black Farmers Association has also encountered lodging problems. Finding accessions with traits to reduce lodging will increase the usefulness of our Teff collection.

MISSION-RELATED RESEARCH

Agronomy

Reed canarygrass (*Phalaris arundinacea* L.) is an important forage crop and potential biofuel feedstock due to its wide environmental adaptation. The *P. arundinacea* 'species complex' is made up of three cytotypes, 2x, 4x, and 6x, with the 4x cytotype (*P. arundinacea* L.) most common. Active breeding programs have developed cultivars since the early 20th Century, but little is known about the genetics of the species complex. With the aid of DNA markers, we collaborated with researchers located in Madison, Wisconsin and evaluated the population structure of 83 wild accessions collected throughout Eurasia, 24 cultivars, and the genetic relationship between 4x and 6x cytotypes. Seven subpopulations were present in Europe with a high level of admixture, suggesting that reed canarygrass germplasm has spread throughout Eurasia, either naturally or by humans for use in agriculture. Our results indicate that cultivars have incorporated much of the diversity found in wild populations, although modern low-alkaloid cultivars appear to come from a relatively small gene pool. We also found some evidence that the 6x cytotype is made up of three sub-genomes that are a combination of genomes present in 4x *P. arundinacea* and 4x *P. aquatica*, although the 6x cytotype does not appear to be a direct hybrid between the species (Figure 5).

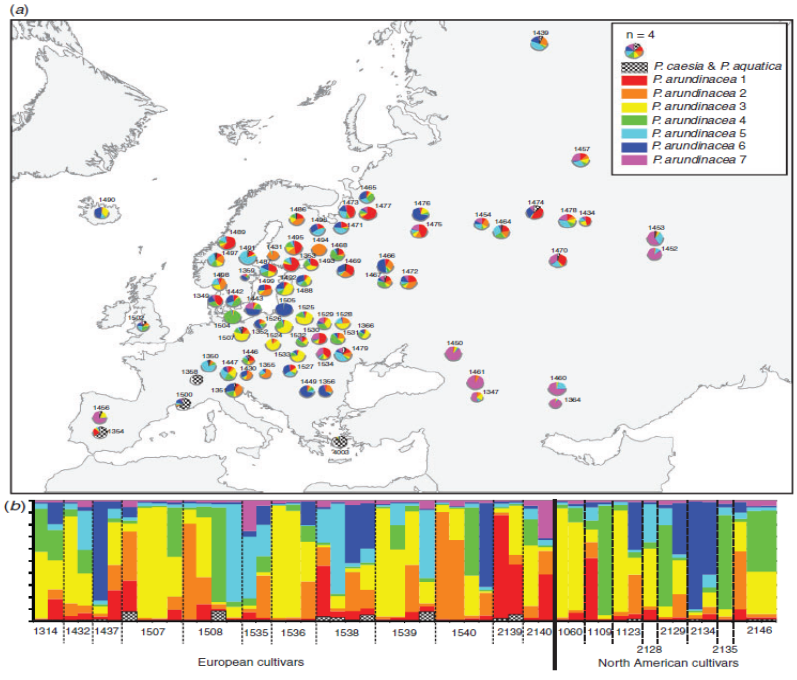

Figure 5. (*a*) Map of clustering based on a STRUCTURE analysis assuming eight subpopulations. Each pie represents the average cluster classification across all samples of an accession. The

size of each pie is proportional to the number of individual samples analyzed in each accession. (*b*) The STRUCTURE analysis for the 50 samples from 20 cultivars confirmed to be *P. arundinacea* assuming eight subpopulations split by geographic origin of the cultivar. Each sample is represented by a vertical line, with each color corresponding to the same cluster identification used in (a). Multiple colors for a single sample represent the proportion of admixture of that individual. The numbers below the Figure represent the accession number associated with each cultivar (published in Crop & Pasture Science, 2011, 62:982–991).

Supina bluegrass (*Poa supina* Schrad.) has potential for expanded use as a turf grass, yet access to germplasm for breeding is limited and an understanding of its genetic variation using DNA markers is limited. Based on a USDA funded collection and study, a set of 46 *P. supina* bluegrass accessions collected across the Italian Alps were characterized for AFLP marker variation and correlated with climatic variables from collection locations. The collections differentiated into three broad genetic groups and climatic variables correlated with certain dimensions of the marker data suggesting that differences in plant phenotypes will also vary with climate. Accessions are now being increased at the ARS Plant Germplasm and Testing Unit, Pullman WA, to make collections available for continued research on supina bluegrass.

Genetics

A. Lettuce germplasm characterization: We completed the project of genotyping the entire collection of cultivated lettuce with high throughput GoldenGate assay targeting 384 single nucleotide polymorphism markers, in collaboration with the UC Davis Genome Center. Partial results were presented at the 19th International Conference of Plant and Animal Genome (Figure 6). The progeny of 180 genotyped homozygote plants

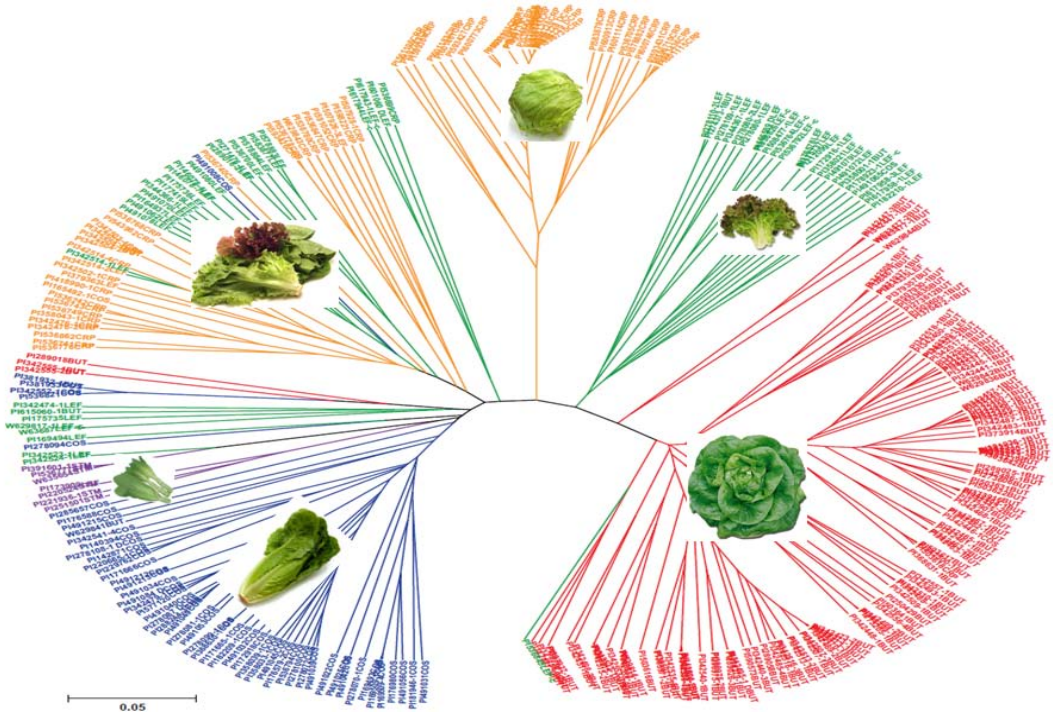

Figure 6. The UPGMA tree of 300 homozygote plants based on the genotypes of 330 SNPs using allele-sharing distance. Accessions of different horticultural types are grouped together.

were grown in Salinas, CA and 300 in Central Ferry for phenotypic data collection. Seeds from the 180 homozygote plants were sent to a lettuce researcher in Florida for screening for resistance to lettuce bacterial leaf spot.

B. Faba bean germplasm evaluation and enhancement: Funded partially by the Cool Season Food Legume CGC, we conducted our third-year, two- location field experiment of confirming the winter-hardy characters identified in the USDA faba bean germplasm in previous years. In October 2010, the selected 14 most winter-hardy accessions were planted in two locations along with nine selected F_3 families derived with a cross between a non-winter hardy vegetable type variety 'Extra Precoce Vioetto' and a winter hardy genotype 'Hiverna/2-5EP1' from Germany. All the selected accessions had plant survival at both locations and the number of surviving plants varied from 5 to 30 (30 seeds planted); the surviving plants produced an average of 75, with a range from 33 to 150, grams of seeds per plant. All nine F_3 families survived in Central Ferry while seven of them were dead in Pullman. For the remaining two families in Pullman, one had only one, and the other had two plants survived through the winter and produced seeds. These two families also had higher survival rates in Central Ferry. Among the 14 accessions above, six were from Germany, four from France and four from Bulgaria. These accessions are useful as initial materials for enhancing faba bean winter-hardiness through traditional breeding for development of a future alternative cover crop for the U.S. Northwest wheat production region and other regions with similar climate.

C. We used the white flower phenotype governed by a recessive gene in the investigation of the natural outcrossing rate of faba bean. Seeds from white flowered plants grown in Pullman in 2010 were harvested and planted plant-to-row in spring 2011. During flowering, the number of plants with white or regular (colored) flowers was recorded for each row. The percentage of plants with colored flowers was used as an estimate of natural outcrossing rate, which averaged 30.8% and ranged from 0 to 82.6 % among 50 single-plant-derived rows. This observed outcrossing rate is within the range of previous reports for faba bean grown in various locations. The high outcrossing rate is likely the result of abundant bumble bees and honey bees which visited the faba bean flowers frequently during bloom. Therefore, for germplasm management it is necessary to regenerate faba bean accessions using insect-proof cages to maintain the genetic integrity of individual accessions. For germplasm enhancement using phenotypic selection, it is also crucial to physically isolate the selected plants with insect-proof bags to prevent unwanted cross-pollinations and produce self-pollinated seeds for subsequent generations.

Plant Pathology

The prime objective was to acquire more isolates of *Penicillium* spp. ('blue mold') from ornamental and edible bulb crops (especially from North America and Washington State), and to initiate documentation of their species identity and host range. We have in 2011 expanded our collection with ~100 additional isolates from various varieties for each of the crops garlic, table onion, tulip, *Ornithogalum*, daffodil, and iris. Representative isolates have been used in pathogenecity tests against onion. We have bulb material from which we are still isolating *Penicillium* spp., and are using primers for beta-tubulin DNA

sequences to acquire data for species assignment. We collaborate with WSU Plant Pathology in an analogous project involving multiple fungal genera rotting sweet onion.

COMMITTEES, PRESENTATIONS AND RECOGNITIONS

During 2011 WRPIS scientists and curators served as committee members or chairs of the respective national Crop Germplasm Committees (CGC) and other academic or social organizations. Research Agronomist **Richard Johnson** is the Chair of the International Safflower Germplasm Committee, Member of the Technical Advisory Committee for the Special Grant, Grass Seed Cropping Systems for Sustainable Agriculture, and active Ex-officio member of the Forage and Turf grass CGC. He also serves as a member of agraduate student committee of the Department of Crop and Soil Sciences, Washington State University and advised a MS student on research project. Supervisory Research Geneticist and Research Leader **Jinguo Hu** continued to serve as an Associate Editor for Crop Science. He serves as a member of agraduate student committee of the Department of Crop and Soil Sciences, Washington State University and is the technical advisor of a PhD student working on cool season legume research project. Research Plant Pathologist **Frank Dugan** is a member of the American Phytopathological Society (APS), a Senior Editor of the APS Press Editorial Board, Vice-Chair of the APS Mycology Committee, a member of the APS Collections and Germplasm Committee, a member of the Mycological Society of America, the North American Mycological Association, the Western Society of Weed Science and the Northwest Scientific Association. He also serves as an Associate Editor for the journal North American Fungi. Horticulture Curator **Barbara Hellier** is anEx-officio member of six CGCs (Root and Bulb, Leafy Vegetable, the Herbaceous Ornamental, New Crops, the Clover and Special Purpose Legume and sugar beet) and a member of two PGOC subcommittees (Medicinal Plant and *In Situ* Conservation). Agronomy Curator **Vicki Bradley** is an Ex-officio member of Forage and Turf Grass CGC (Descriptor Subcommittee Secretary) and New Crops CGC. She has membership in the Society for Range Management, Association for the Advancement of Industrial Crops and the International Safflower Germplasm Advisory Committee (Vice Chair). She is also an Adjunct scientist with the Department of Crop and Soil Science at WSU. Cool Season Food Legumes Curator **Clarice Coyne** is an Ex-officio member of the Food Legume CGC, Pea CGC, Clover and Special Purpose CGC, a member of the Plant Germplasm Operations Committee and Molecular Marker PGOC sub-committee. She serves on the Board of Directors for the North American Pulse Improvement Association. She served as the External grant reviewer for three research programs: the OMAFRA New Directions Research Program, Oklahoma City, OK, the William Paterson University internal research program and the Binational Agricultural Research and Development Fund (BARD). Temperate Forage Legume Curator **Stephanie Greene** is the Chair and Ex-officio of the Alfalfa CGC, and Ex-officio of the Clover and Special Purpose Legume CGC and a member of the Desert Legume Program (DELEP) Advisory Committee, Tucson, AZ and the WSU Legume Variety Release Committee. *Phaseolus* Curator **Molly Welsh** serves as a member in the following organizations: *Phaseolus* CGC, Bean Improvement Cooperative Genetics Committee, W1150 Regional Project and Seed Savers Exchange. By participating in the regular meetings and other activities of these organizations we effectively outreach and interact with our stakeholders, customers and general public.

WRPIS scientists and curators were actively engaged in conducting mission-related research and in serving the scientific community. They made a total of 24 oral or poster presentations at either scientific or general public meetings, contributed three book chapters and published 19 peer reviewed scientific journal papers in 2011. They were invited to review research manuscripts by editors of the following scientific journals: African Journal of Agricultural Research, BMC Genomics, Crop Science, Crop and Pasture Science, Ecological Restoration, European Journal of Plant Pathology, Genome, Industrial Oil Crops, Journal of Sugar Beet Research, Molecular Breeding, Phytopathology, Plant Breeding, Journal of Crop Registrations, Euphytica, Canadian Journal of Plant Science, Plant Genetic Resources and Theoretical & Applied Genetics.

SCIENTIFIC PAPERS PUBLISHED IN 2011

Peer reviewed journal articles (19):

Biabani, A., Carpenter-Boggs, L., Coyne, C. J. Taylor, L., Smith J. L. and Higgins, S. 2011. Nitrogen fixation potential in global chickpea mini-core collection. Biology and Fertility of Soils 47:679–685.

Clement, S., Hu, J., Stewart, A., Wang, B. and Elberson, L. 2011. Detrimental and neutral effects of a wild grass-fungal endophyte symbiotum on insect preference and performance. Journal of Insect Science. 11:1-13.

DeCarie J., Coyne, C.J., Brumett, S., and Shultz, J. 2011. Additional pea EST-SSR markers for comparative mapping in pea (*Pisum sativum* L.). Plant Breeding DOI: 10.1111/j.1439-0523.2011.01917.x

Dugan, F. M. 2011. Three new host-fungus records for *Golovinomyces* species in Montana and Washington. North American Fungi. 6(3): 1-7.

Dugan, F. M., Hellier, B. C., and Lupien, S. L. 2011. Resistance to *Penicillium allii* in accessions from a National Plant Germplasm System *Allium* collection. Crop Protection Journal. 30: 483-488.

Dugan, F. M., and Nazaire, M. 2011. First report of rust of *Sidalcea malviflora* (Dwarf Checkerbloom) caused by *Puccinia sherardiana* in Washington State. North American Fungi 6(15):1-5.

Dugan, F.M., Wiest, A., and Mccluskey, K. 2011. Public germplasm collections and revolutions in biotechnology. Online URL http://www.ias.ac.in/jbiosci/jun2011/205.pdf. Journal of Biosciences. 36(2): 205-209.

Dzyunbenko, N., Dzyunbenko, E., Afonin, A. A., and Greene, S. L. 2011. Implementing a gap analysis to conserve Caucasus Medicago species for ex situ conservation. Conference Proceedings on Problems of Conserving Biodiversity in the Caucasus Region, Suchumi botanical Garden, Abchazia, Russia, Sept. 15, 2011. p.25-29.

Ellis, T. N., Hofer, J. M., Timmerman-Vaughan, G. M., Coyne, C. J., and Hellens, R. P. 2011. Mendel, 150 years on. Trends in Plant Science. http://dx.doi.org/10.1016/j.tplants.2011.06.006.

Gao, J., Leon, F., Radwan, M. M., Dale, O. R., Manley, S. P., Lupien, S. L., Wang, X., Hill, R. A., Dugan, F. M., Cutler, H. G., and Cutler, S. J. 2011. Benzyl derivatives with in vitro binding affinity for human opioid receptors and cannabinoid receptors from the fungus *Eurotium repens*. Journal of Natural Products. 74: 1636-1639.

Hamon, C., Baranger, A., Coyne, C. J., Mcgee, R. J., Le Goff, I., L Anthoene, V., Esnault, R., Riviere, J., Klein, A., Mangin, P., Mcphee, K. E., Roux-Duparque, M., Porter, L., Miteul, H., Lesne, A., Morin, G., Onfroy, C., Moussart, A., Tivoli, B., Delourme, R., and Pilet Nayel, M. 2011. New consistent QTL in pea associated with partial resistance to *Aphanomyces euteiches* in multiple field and controlled environments from France and the United States. Theoretical and Applied Genetics. 123:261-281.

Harveson, R. M., S.G. Markell, R. Goswami, C.A. Urrea, M.E. Burrows, F. Dugan, W. Chen, and L.G. Skoglund. 2011. Ascochyta blight of chickpeas. Plant Health Progress Online. doi:10.1094/PHP-2011-0103-01-DG

Jakubowski, A. R., Jackson, R. D., Johnson, R. C., Hu, J. and Casler. M. D. 2011. Genetic diversity and population structure of Eurasian populations of reed canarygrass: Cytotypes, cultivars, and interspecific hybrids. Crop and pasture Sciences. *Crop and Pasture Science* 62(11) 982-991.

Johnson, R.C., Kisha, T.J., Pecetti, L., Romani, M. and Richter. P. 2011. Characterization of *Poa supina* from the Italian Alps with AFLP markers and correlation with climatic variables. Crop Sci. 51(4): 1627-1636.

Kisha, T. J., and Cramer, C. S. 2011. Determining redundancy of short-day onion accessions in a germplasm collection using microsatellite and targeted region amplified polymorphic markers. Journal of the American Society for Horticultural Science. 136(2):129-134.

Kwon, S. J., Truco, M. J. and Hu, J. 2011. LSGermOPA, a custom OPA of 384 EST-derived SNPs for high-throughput lettuce (*Lactuca sativa* L.) germplasm fingerprinting. Molecular Breeding. DOI: 10.1007/s11032-011-9623-5

Skoglund, L. G., Harveson, R. M., Chen, W., Dugan, F., Schwartz, H. F., Markell, S. G., Porter, L., Burrows, M. L., and Goswami, R. 2011. Ascochyta blight of peas. Plant Health Progress DOI: 10.1094/PHP-2011-0330-01-RS

Smykal, P., Kenicer, G., Flavell, A.J., Kosterin, O., Redden, R.J., Ford, R., Coyne, C.J., Maxted, N., Ambrose, M.J., Ellis, T.N. 2011. Phylogeny, phylogeography and genetic diversity of Pisum genus. Plant Genetic Resources. 1-15 doi:10.1017/S147926211000033X.

Book chapters (4):

Afonin, A.A., Greene, S.L., Dzyubenko, N., and Frolov, A. 2011. The role of international research projects in the dissemination of innovative technologies in Russia: AgroAtlas case study. Geography in Earth Sciences: modern problems of science and education. January 2011

Coyne, C. J., McGee, R. J., Redden, R. J., Ambrose, M. J., Furman, B.J., and Miles, C. A. 2011. Chapter 8. Genetic Adjustment to Changing Climates: Pea. In: S.S. Yadav, B. Redden, J.L. Hatfield, H. Lotze-Campen, and Anthony E. Hall, editors. Crop Adaptation to Climate Change, First Edition, pp. 238-249. Wiley-Blackwell Publishing Ltd., Ames, IA

Kisha, T.J. and Johnson, R.C. 2011. Safflower. In: Technological Innovations in Breeding Major World Oil Crops. Springer, New York.

Mallikarjuna, N., Coyne, C.J., Cho, S., Rynearson, S., Rajesh, P., Jadhav, D. R., and Muehlbauer, F. 2011. Cicer. Wild Crop Relatives: Genomic and Breeding Resources. In: Legume Crops and Forages. Springer, New York, N.Y. pp. 63-82.

Book (1)

Dugan, F. M. 2011. Conspectus of World Ethnomycology: Fungi in Ceremonies, Crafts, Diets, Medicines, and Myths. American Phytopathological Society Press. 151 pp.

Appendix 1

Western Regional Plant Introduction Station
Current Staffing List as of December, 2010

Position	Name	Federal or State	Posit. Type
Pullman			
Research Leader/Station Coordinator	Jinguo Hu	Fed	PFT
Research Geneticist (postdoc)	Soon-Jae Kwon	Fed	TFT
Program Support Assistant	Jannis Bacani	Fed	PFT
IT Specialist	Gwen Pentecost	Fed	PFT
Seed Manager/Computer Specialist	Dave Stout	Fed	PFT
Plant Technician	**Paula Lundt**	**Sta**	**PFT**
Farm Manager, Pullman	**Wayne Olson**	**Sta**	**PFT**
Plant Technician	**Jacqueline Cruver**	**Sta**	**PFT**
Plant Technician	**Sean Vail**	**Sta**	**PFT**
Farm Manager, Central Ferry	Kurt Tetrick	Fed	PFT
Plant Technician	**Mark McGee**	**Sta**	**PFT**
Biological Science Technician	Leslie Elberson	Fed	PFT
Research Plant Pathologist	Frank Dugan	Fed	PFT
Biological Science Technician	Shari Lupien	Fed	PFT
Research Agronomist	Richard Johnson	Fed	PFT
Biological Science Technician	Melissa Scholten	Fed	PFT
Plant Biologist	Michael Cashman	Fed	TFT
Biological Science Technician	Kelcie Mosely	Fed	TFT
Geneticist	Theodore Kisha	Fed	PFT
Biological Science Technician	Lisa Taylor	Fed	PFT
Agronomy Curator	Vicki Bradley	Fed	PFT
Biological Science Technician	Bob Guenthner	Fed	PFT
Cool Season Food Legume Curator	Clarice Coyne	Fed	PFT
Biological Science Technician	Landon Charlo	Fed	PFT
Horticultural Crops Curator	Barbara Hellier	Fed	PFT
Biological Science Technician	William Luna	Fed	PFT
Biological Science Technician	Alex Cornwall	Fed	TFT
Biological Science Technician	Marie Pavelka	Fed	PFT
Phaseolus Curator	Molly Welsh	Fed	PFT
Plant Technician	**Julie Thayer**	**Sta**	**PFT**
Prosser			
Forage Curator	Stephanie Greene	Fed	PFT
Biological Science Technician	Martha Cervantes	Fed	PFT
Biological Science Aid	Jesus Prieto	Fed	TFT

Appendix 2

Research, Service and Outreach Activities

January 4-7, Hu traveled to Albany, CA to take the mandatory, two-day course of "Managing the Federal Employee Discipline and Performance Process" offered by Brookings Institute and arranged by USDA-ARS West Pacific Area Office

January 5, Hellier provided information to Dr Richard Mack on collecting in Morocco

January 10, Bradley discussed grass taxa in NPGS for drought tolerance work with Joseph Craine, KSU

January 13, Greene provided expertise on Round Up Ready Alfalfa Deregulation discussions for Alfalfa Coexistence Committee, USDA Secretary of Agriculture's Office, Wash D.C.

January 13, Johnson was external reviewer for Vavilov-Frankel Fellowships award for 2011 for Bioversity International

January 14, Greene provided expertise- Round Up Ready Alfalfa Deregulation Teleconference Briefing Meeting with Deputy Secretary Kathleen Merrigan

January 14-19, Hu attended the 19th International conference of Plant and Animal Genome (PAG XIX) in San Diego, CA. He co-organized the Plant Molecular Breeding Workshop and gave an oral presentation entitled "Anomalous SNP patterns and their impact on genotype calling in GoldenGate assay of lettuce germplasm". This was partially contributed travel. The conference organizer offered complimentary registration and free hotel stay for six nights at the conference center

January 15-17, Coyne attended International Plant and Animal Genome meeting, San Diego, CA co-organizer Genomics of Genebanks Workshop

January 15-19, Kwon attended Plant & Animal Genome XIX**,** San Diego, CA, USA

January 18, Luna attended Wilbur-Ellis pesticide education seminar, Spokane, WA

January 20, Hellier provided information on garlic to Tracy Prost for WA crop profile database

January 21, Hu visited Professor Richard Michelmore, Director of the UC Davis Genome Center and Dr. Maria-Jose Truco, Lettuce geneticist and breeder of UC Davis and discussed the progress of the collaborative project of lettuce germplasm characterization

January 24-27, Johnson attended 2011, Boise, Idaho, meeting with USFS and BLM on implementing seed zones for Great Basin Restoration (Organized by Nancy Shaw)

January 26, Bradley sent grass germination procedures to John Lehr, Foreign Disease-Weed Science, Fort Detrick, MD

January-December, Johnson acquired more than 1,500 new native seed accessions through the BLM Seeds of Success (SOS). This year, 126 seed orders represented by 502 SOS accessions were distributed to the user community

January-December, Johnson Technology transfer, Art Weisker, CalOils, for evaluation of crosses of winter type safflower at Central Ferry for potential development of winter safflower cultivars

January-December, Kisha served as graduate committee member for graduate student Susan Canwell of the WSU Natural Resources Dept

January-May, Johnson was advisor for Feysal Mustefa, a Vavilov-Frankel Fellow, on project for molecular marker diversity in Ethiopian Landraces of safflower

February-August, Johnson had numerous contacts with Stephanie Pearl, PhD Student, Department of Plant Biology, University of Georgia, concerning selection of safflower germplasm for studies in evolutionary genetics

February 2, Kisha attended the WSU Latin America Interest Group (LAIG), Organizational meeting

February 3-4, Coyne attended USA Dry Pea and Lentil Council Research Review, Moscow ID

February 4, Bradley selected 5 safflower accessions for possible use as inducer pollen in a double haploid project with sunflower for Brent Hulke, USDA geneticist, Fargo, ND

February 8, Luna attended USDA-ARS location Health and Safety committee meeting

February 8, Luna attended WSU- CAHNRS Safety committee meeting

February 14-15, Luna attended WA Department of Agriculture Pesticide License re-certification training. Moscow, ID

February 16, Greene chaired Alfalfa CGC Teleconference

February 16, Greene presented the project entitled "Got Crop Biodiversity?" to WSU-IAREC Departmental Seminar

February 16-17, Welsh attended the 2011 annual *Phaseolus* Crop Germplasm Committee, the W2150 Project and the BIC Genetic Committee meetings in Tucson, AZ

February 17-19, Hu was invited to attend and give an oral presentation entitled "Rapid pyramiding major resistance genes into parental lines in tomato hybrid breeding employing marker-assisted backcrossing" at the 2011 International Conference on Solanaceae Resistance Breeding, Chiang Mai, Thailand. This was an all-expense paid invitation

February 22-24, Hellier attend the Great Basin Restoration Plant Selection and Increase annual meeting, Salt Lake City, UT

February 23, Hellier presented final report on project titled "*Allium acuminatum* Seed Production: First Look at Cultural Parameters" at the Great Basin Restoration Plant Selection and Increase annual meeting, Salt Lake City, UT

February 25-26, Coyne attended Washington State University 2011 Plant Science retreat, Pullman, WA

February 28, Kisha attended the WSU Latin America Interest Group follow-up meeting guest: Craig Hastings, Fulbright/LASPAU (Latin America Academic and Special Programs for the Americas); Craig is visiting Pullman for the day (Host: Dr. Pat Sturko). Group discussion: LAIG Priority activities -- Consolidation of ideas from the 2/2 meeting and selection of 2-4 priority topics and the faculty lead for each priority

February 28-March 5, Hu traveled to New Mexico. He visited Professor Ian Ray of New Mexico State University at Las Cruces, NM on March 1 and attended the Association of Sugar beet

technologists meeting and the Sugarbeet CGC meeting in Albuquerque, NM. Professor Ray is the New Mexico State representative on the W-6 Technical Advisory Committee

March 1-8, Hellier attended the Association of Sugar Beet Technologists meeting in Albuquerque, NM

March 2, Dugan made presentation at Department of Plant Pathology WSU, Special seminar (sponsored by USDA-ARS EEO Committee for Women's History Month): The herb-wives of Reformation Europe: midwives to the birth of scientific mycology

March 2, Hellier attended the Sugar Beet CGC meeting, Albuquerque, NM, and presented a collection update

March 8, Luna attended WSU- CAHNRS Safety committee meeting

March 8-9, Dugan went to Spokane, WA to present Poster: Western Society of Weed Science Annual Meeting. Published abstract: Dugan, F.M., R. Attanayake, D.A. Glawe, and W. Chen. 2011. New host-fungus records for powdery mildews on weedy plants of the Pacific Northwest. Proceedings of the Western Society of Weed Science 64: 51-52

March 10, Welsh attended a webinar on LED lighting in greenhouses

March 14, Bradley attended first aid, CPR, and AED refresher course

March 14 to 16, Hu visited ARS–Parlier, CA, following up the garlic mite project with Drs. Steve Tebbets and Gabriela Romano; on March 15, he attended the California Leafy Greens Research Program Annual Meeting in Harris Ranch Inn, Coalinga, CA

March 15, Kisha traveled to Ephrata to present USDA research to perspective "Pipeline program" interns

March 21, Kisha reviewed applications for the University of Idaho Center for Research on Invasive Species and Small Populations (CRISSP) Research Experience for Undergraduates (REU) Internship Committee and Faculty review applications

March 24, Kisha volunteered as a judge for the Jefferson Elementary School Science Fair

March 24, Bradley was a judge for the Jefferson Elementary School Science and Technology Fair

March 28 to April 3, Hu traveled to China to attend the 2011 Workshop and Regional Cooperation Meeting on Genetic Improvement and Breeding of Cool Season Legume Crops in Kunming, Yunnan Province, China. This was an all-expense paid invitation

March 28-31, Johnson presented "Seeds of Success: Interagency partnership for conservation and use of native plant germplasm" presented by Mike Cashman as a poster at the Native Plant Summit Boise, ID

April 2-8, Johnson presented "Genecology and Seed Zones for Key North American Rangeland Species," invited oral presentation at the IX International Rangeland Congress, Rosario, Argentina

April 4-6, Johnson consulted with Ivone Lindström and Maria Clara Franchini, Universidad dul Sur, Bahía Blanca, Argentina, on planning safflower research in Buenos Aires Province

April 4-8, Hellier travelled to the Imperial Valley, CA to collect wild and weedy beets. Industry funded collecting trip

April 12, Johnson presented "Gene-banking with Safflower: Past, Present, and Future," Invited seminar at Universidad del Sur, Bahia Blanca, Argentina

April 12, Luna attended WSU-CAHNRS Safety committee meeting

April 13, Kisha met with Dr Thomas Gorman of the University of Idaho Forest Products program to discuss assistance to the Forestry Commission in Guyana regarding testing of Guyana's unique forest resources. This was at the request of the Guyana Commissioner of Forestry as a follow-up to Kisha's visit to NARI in Guyana under the auspices of the Norman Borlaug Fellowship Program

April 14, Hellier provided information to stakeholder on *Taraxacum* pollination biology

April 16, Johnson was asked to review "Variation for canopy morphology in little bluestem" for Crop Science

April 20, Bradley provided collection information and site photographs to Gabriela Romano for an accession of *Physaria thamnophila* Vicki collected from the Hanford Reach

April 21, Johnson was asked to review "Estimation of oil, linoleic and oleic acid content and seed hull fraction in a safflower breeding program by NIRS" for Journal of the American Oil Chemists Society

April 28, Hellier attended WSU Land Use committee meeting

May 5, Luna attended USDA-ARS location Health and Safety committee meeting

May 6, Kisha attended the grand opening of the Hamilton Community Garden in Moscow, Idaho. The garden is a project he developed as a volunteer on the Moscow, ID Parks and Recreation Commission

May 10, Luna attended WSU- CAHNRS Safety committee meeting

May 10, Hellier provided information on wild Alliums to stakeholder

May 11, Bradley consulted with Wayne Simpson, AgResearch, New Zealand, to provide information and germplasm of Elymus and Hordeum species for their Cereal Endophyte Programme

May 11, Welsh had a phone consultation with Berlin Nelson of North Dakota State University concerning a study about determining nematode resistance in *Phaseolus* bean

May 13, Welsh submitted a statement for an ARS news article or magazine article to Jan Suszkiw, Public Affairs Specialist/Writer, USDA-Agricultural Research Service

May 23, Luna provided Worker Protection Safety training for 4 WRPIS temporary employees

June 1-4, Hu traveled to Fargo, ND. He visited the ARS Sunflower Research Unit and discussed with Dr. Lili Qi and Brady Vick on possible release of a long-seeded confection sunflower breeding line that he initiated in developing in 2006. Hu also worked on setting the Collaborative Research Agreement with two bean researchers at North Dakota State University at Fargo, ND. The project is entitled "Screening of the USDA Core Collection of Common Bean for Resistance to Halo Blight" and is funded by Common Bean Germplasm Committee

June 1-August 4, Kisha began mentorship of CRISSP REU Intern. REU seminars were conducted on 6/8, 6/15, 6/22, 6/29, 7/6, 7/13, 7/20, and 7/27

June 6, Hellier attended WSU Land Use committee meeting

June 6, Bradley hosted an APHIS inspection of facilities to obtain a noxious weed permit

June 8, Bradley attended a meeting with Dr. Carol Miles, the new W6 Washington state representative

June 8, Johnson asked to participate as Co-PI in two pre-proposals submitted to Competitive Grants Research Agencies: "Genetic characterization and enhancement of winter hardiness, stress tolerance and oil content in safflower, with Dick Auld, lead PI (Texas Tech University), and "Enhancement of functional property of meat and milk and feed efficiency and mitigation of enteric methane emissions of beef and dairy cattle by supplementing whole safflower seeds in cattle diets**,** with Jong-Su Eun, lead PI (Utah State University)

June 13-15, Bradley drove to Mount Vernon, Washington to work in Poa supina plots

June 16, Hellier attended WSU Land Use committee meeting

June 17, Bradley hosted visit by Jacklin Seed by Simplot breeders, Doug Brede, Susan Samudio, and Jonathan Schnore to walk grass nurseries

June 20, Bradley toured the USDA, APHIS, PPQ Plant Germplasm Quarantine Program in Beltsville, MD

June 21-22, Bradley attended the PGOC meetings in Beltsville, MD

June 21, Greene attended USDA NPGS Plant Genetic Operations Committee Meeting and presented “Report for the CWR Subcommittee,” “Report for the GIS and Georeferencing Subcommittee,” Beltsville, MD

June 21-22, Hu attended the 2011 PGOC (Plant Germplasm Operations Committee) meeting in Beltsville, MD

June 30, Kisha volunteered as an escort for the SKWANT (Skwant is translated “Waterfalls”) Life Science Camp (5^{th}-8^{th} graders) to various locations on the WSU campus and watch for the safety of the students. (Part of the “pipeline program”)

July 6, Kisha began mentorship of a graduating high school student under the “Pipeline Program”

July 7, Luna provided Worker Protection Safety training for 1 WRPIS temporary employees

July 8, Johnson was interviewed for Capitol press article "Seeds of past protect future of ag"

July 8, Kisha began serving on the graduate committee of André Sanfiornez, a student from the University of Idaho *Integrative Graduate Education and Research Traineeship (*IGERT) program, the National Science Foundation’s flagship interdisciplinary training program, conducting research in Costa Rica

July 11, Bradley provided a Crop Curator statement to Dr. Erik Sacks and Dr. Douglas Johnson for a proposed collection trip for Miscanthus

July 14-15, Hu traveled to Salinas, CA taking field evaluation data of 180 genotyped homozygote lettuce accessions

July 21, Kisha co-hosted the farewell BBQ for the “Pipeline Program” summer interns

July 22-25, Kisha took annual leave and participated in the REU river rafting trip and ethics in science workshop

July 25-28, Johnson presented "Relating climate and genetic variation for seed zone development in arid landscapers". Genetics of Forest and Wildland Conservation and Restoration (WFCA) conference July 25-28, 2011, Portland OR

July 28-29, Hu visited the lettuce evaluation field in Salinas, CA and the UC Davis Genome Center to discuss the manuscript on lettuce SNP fingerprinting with Dr. Maria-Jose Trocu

August 3, Kisha attended final REU presentations of their summer research experience

August 3, Bradley provided endophyte viability information to Graham Girdwood, Heritage Seeds, Australia

August 6-9, Dugan presented Poster, Honolulu HI. American Phytopathological Society Annual Meeting. Published abstract: Dugan, F.M., S.L. Lupien, and W. Chen. 2011. *Clonostachys rhizophaga* can delay and reduce emergence of chickpea but does not consistently induce wilt in Washington State. Phytopathology 101: S46

August 9, Luna attended USDA-ARS location Health and Safety committee meeting

August 12, Johnson consulted with Rod Lanier, Never Idle Farms Ltd., Alberta, Canada, concerning winter safflower for the Canadian Prairies and provided germplasm for experiments with AgCanada

August 13-16, Hellier hosted Dr. Ales Lebeda from Palacky University, Czech Republic

August 24, Johnson presented "Genecology for seed zones and maintaining plant diversity" for the Symposium "Seed zones, climate change, and utilization of native plants for ecological restoration" at the Society for Ecological Restoration 4th World Conference Aug 21-26 2011, Mérida, Mexico

August 26, Bradley received Federal Noxious Weed Permit to maintain and distribute *Carthamus oxyacanthus*

September 1, Kisha and Hellier travel to Asotin, WA to identify and assess populations of *Glycyrrhiza lepidota* for future collection

September 6, Bradley sent the New Crops CGC safflower report to Dr. Dave Dierig

September 9, Bradley discussed grass accessions with Steve Stilson and Bill Ruchert from Dye Seed, Pomeroy, Washington

September 10-12, Hellier attended the New Crops CGC meeting, Fargo, ND and presented a collection update

September 14, Bradley hosted a visit from Ken and Gail Nickel-Kailing, GoodFood World, Seattle, Washington, to discuss Tef

September 20, Kisha received the Citation of merit Individual Award from the Idaho Recreation and Parks Assn for the establishment of the Hamilton Community garden in Moscow, ID

September 24-30, Bradley attended the American Society for Horticultural Science annual conference in Waikoloa, Hawaii and presented a poster titled, The U.S. Cool-season Grass Collection: A Source for Novel Ornamental Grass Germplasm

September 24-30, Hellier attended the American Society for Horticultural Science conference Waikoloa, HI

September 25, Hellier attended the Leafy Vegetable and Root and Bulb CGC meetings, Waikoloa, HI and presented collection updates

September 27, Hellier made an oral presentation for Kisha, "Comparison of matK sequences and TRAP molecular markers for the taxonomic characterization of six species of the Allium L. section Cepa complex." ASHS 2011, Waikoloa, HI. Kisha who was denied travel due to budgetary constraints

September 27, Kisha had an oral presentation given by Chris Cramer of New Mexico State University “Genetic relatedness among entries within short-day onion germplasm” at the ASHS 2011, Waikoloa, HI. Co-author Kisha was denied travel due to budgetary constraints

September 27, Hellier made an oral presentation "Comparison of matK sequences and TRAP molecular markers for the taxonomic characterization of six species of the *Allium* L. section Cepa complex." ASHS 2011, Waikoloa, HI

September 29, Hellier visited the Hilo, HI NPGS repository. Met the staff and toured the facilities

October 8, Dugan gave a talk on mushrooms to participants in a mushroom foray sponsored by Lutherhaven Ministries and the North Idaho Mycological Association in Prichard, Idaho

October 11, Luna attended WSU-CAHNRS Safety committee meeting

October 11, Hu attended the California Leafy Greens Research Meeting in Seaside, CA

October 11, Kisha met with Dr. Jose Joaquin Campos Arce, Director General of the Tropical Agricultural Research and Higher Education Center (CATIÉ), Costa Rica to discuss collaboration on analysis of *Brachypodium mexicanum*

October 12, Bradley submitted the Cool-Season Grass annual report to the Chair of the Forage and Turfgrass CGC

October 15-19, Hellier attended the Crop Science Society of America conference. San Antonio, TX

October 16-19, Coyne attended ASA-CSSA-SSSA Annual meeting, organized Bioinformatics Symposium, San Antonio, TX

October 16, Hellier attended the Clover and Special Purpose Legume CGC meeting and presented a collection update

October 16, Greene gave a report and attended to Clover and Special Purpose Legume CGC, San Antonio, TX

October 18, Bradley provided seed of *Eremopyrum triticeum* to Graduate Research Assistant Julie Larson, OSU

October 18, Johnson presented invited talk "Native Plant Conservation Partnerships with BLM and Development of Seed Zones for Restoration," for Symposium "Native U.S. Germplasm Conservation –Current Status and Future Development at
the Crop Sceince Socieity International Meeting, 16-19 Oct., San Antonio, TX.

October 19, Greene presented “What's In Our Back Yard?” at Developing An Inventory of U.S. Native and Naturalized Crop Germplasm. Symposium on Native Plants, ASA-CSSA-SSSA Annual Meeting, San Antonio, TX

October 19, Bradley arranged a meeting with Crop Science Department graduate student Adam Peterson and the WRPIS seed cleaning technician, Jacqueline Cruver, to discuss the use of WRPIS equipment to clean quinoa seed

October 19, Hellier presented an invited talk titled "Collection and seed production of *Allium acuminatum*" in Symposium 335-Plant Genetic Resources-Native Plants. CSSA conference, San Antonio, TX

October 20, Hu attended the Compsitae Research Whitepaper meeting in Davis, CA. This meeting was organized by Professor Richard Michelmore, Director of the UC Davis Genome Center

October 24, Bradley helped host a Delegation of scientists from China

October 24-27, Johnson presented "Genecology and Seed Zones for Indian ricegrass in the Southwest," for the Symposium "Native Plant Restoration" at the Biennial Colorado Plateau Conferences, 24-27 Oct 2011, Flagstaff, AZ

October 26, Johnson presented invited talk "Genecology and Seed Zones for Indian ricegrass in the Southwest," for the Symposium "Native Plant Restoration" at the Biennial Colorado Plateau Conferences, 24-27 Oct 2011, Flagstaff, AZ

October 27, Kisha met with Dr. Jose Joaquin Campos Arce, Director General of the Tropical Agricultural Research and Higher Education Center (CATIÉ), Costa Rica to discuss collaboration on analysis of *Brachypodium mexicanum*

October 30-November 2, Welsh attended the biennial Bean Improvement Co-operative (BIC) meetings, and the 2012 annual *Phaseolus* Crop Germplasm Committee, W2150 Project, and BIC Genetic Committee meetings in San Juan, Puerto Rico

October 31-November 5, Hu traveled to San Juan PR. He visited the USDA-ARS TARS (Tropical Agriculture Research Station) which has a plant germplasm program in Mayaguez, PR, attended and gave an oral presentationand a poster presentation at the North American Pulse Improvement Association (NAPIA) Biannual Meeting in San Juan, PR

November 2, Hellier travelled to Asotin, WA to collect seed and tissue samples of Glycyrrhiza lepidota

November 2, Hellier, Kisha, Taylor, and Vail travelled to Asotin, WA to collect seed and tissue samples of *Glycyrrhiza lepidota*

November 2-4, Coyne attended North American Pulse Improvement Association Biannual meeting, co-organizer, San Juan, Puerto Rico

November 8, Luna attended USDA-ARS location Health and Safety committee meeting

November 9, Bradley organized the annual Veterans Day potluck celebration

November 15, Luna attended WSU- CAHNRS Safety committee meeting

December 8, Hellier provided Beta pollination information to stakeholder

December 15, Hellier provided garlic cultivar information to stakeholders

Appendix 3

Minutes of 2011 –W6 Technical Advisory Committee Meeting (pending for approval at 2012 meeting)

Report Information:

Annual Meeting Dates: 06/07/11 to 06/07/11
Period the Report Covers: 10/2010 to 09/2011

Participants:

- Participants:

  Committee Members Present:

- Ralph Cavalieri - Administrative Advisor, Washington State University
- Robert Zemetra - Idaho - Chair
- Mark Brick - Colorado - Vice Chair
- Shawn Mehlenbacher - Oregon - Secretary
- Carol Miles - Washington
- Dan Barney - Alaska
- Dan Parfitt - California
- Ian Ray - New Mexico
- Jack Martin - Montana
- Joseph Kuhl - Idaho

  Committee Members Absent:

- Robin Groose - Wyoming
- Kevin Jensen - Utah
- Dennis Tray - Arizona
- Vacant - Hawaii

  Guests:

- Peter Bretting - NPS, NPGS, Washington DC
- Andrew Hammond - USDA, ARS Western Region
- Jinguo Hu - W6, Pullman
- Dave Stout - W6, Pullman
- Vicki Bradley - W6, Pullman
- Clarice Coyne - W6, Pullman
- Gwen Pentecost - W6, Pullman
- Theodore Kisha - W6, Pullman
- Harold Bockelman - NSGC, Aberdeen (written report submitted)
- Kim Hummer - NCGR, Corvallis
- Joseph Postman - NCGR Corvallis
- Francis Zee - NCGR, Hilo
- John Preece- NCGR, Davis
- Richard Lee - NCGR, Riverside (written report submitted)
- Gabriela Romano - NCGR, Parlier

Brief Summary of Minutes of Annual Meeting:

The meeting was held by teleconference on 07 June 2011 with officers Robert Zemetra (chair), Mark Brick (vice-chair) and Shawn Mehlenbacher (secretary).

The meeting was called to order at 8:25 am by chair Bob Zemetra.

Administrative Advisor's Report

(8:30 am) Ralph Cavalieri, W-6 administrative advisor (WSU)

The W-6 project is a multi-state project. Agricultural research has many unique responsibilities, in light of the international movement of pests and pathogens. The Directors of Agricultural Experiment Stations in the Western Region voted to maintain current-level funding for W-6, and expressed strong support for the project. The Washington legislature reduced funding of its state universities. At the federal level, a continuing resolution included an increase in Hatch funds. However the proposed budget from the president was lower, as was that of the U.S. House. The proposed budget for NIFA was 16% less than the current year.

(8:38 am) Andy Hammond, area director, USDA Pacific West Area (Albany, CA)

Germplasm and research are important to USDA, although resources will always be limiting for such a broad mandate. Many ARS stations are involved in germplasm research and preservation. Research is conducted in partnership with ARS and universities.

With the release of Roundup-Ready alfalfa cultivars, seed increase of alfalfa accessions in Prosser will be in insect-proof cages. Seed increase in the alfalfa collection may be moved to Central Ferry, which is an isolated location.

The president's proposed budget includes new initiatives as well as budget cuts. Proposed for cuts are $44 million in earmarks in the current (FY11) budget. The new station in Palmer, AK is proposed for closure. The budget proposed by the U.S. House of Representatives calls for $140 million (12%) in cuts. The U.S. Senate has not yet revealed a budget proposal.

Dan Parfitt asked about the Tomato Genetic Stocks Collection in Davis, which is funded by a special grant through NIFA. Ralph Cavalieri noted that the federal budget for FY12 cut all Specific Cooperative Agreements, and that administrators of such programs should make a case for retaining important programs, including demonstrated impacts of the programs.

(8:57 am) Peter Bretting, National Program Staff

Peter welcomed Dan Barney, the new curator of the collection in Palmer, AK. He also noted the medical retirement of Chuck Simon as curator of the grape collection in Geneva, NY. Chuck had previously worked for NPGS in Pullman and Davis. He further acknowledged the retirements of Steve Clement in Pullman and Doug Cook in Corvallis.

The switch to GRIN Global and its web interface is underway. It will be possible to upload and download data using Excel files.

The Citrus collection in Riverside is only in the field, and is vulnerable to attack by the very serious disease "citrus greening", also known as Huanglongbing or HLB, caused by a bacterium. There is a need to back up the collection. Research in Ft. Collins is in progress to cryopreserve citrus germplasm, and then use micrografting to recover plants. Disease therapy research is also in progress.

Peter noted the expanding collection of Brachypodium accessions in Pullman. Brachypodium is a model for the grasses and widely used in genomic studies. It has a small genome and a short life cycle.

National program 301 includes the National Plant Germplasm system. Project reviews, conducted every five years, were recently completed.

On the international scene, 1) the FAO treaty for Plant Genetic Resources for Food and

Agriculture was signed in 2008 by President G.W. Bush. Hearings were conducted by a Senate committee, who later endorsed the treaty. But the Senate adjourned without voting on the treaty, and the procedure must be repeated. 2) The US is not a signatory of the Convention on Biological Diversity (CBD), which is an instrument for access to plant germplasm and the sharing of benefits. The CBD covers everything not covered in the FAO treaty, and will formalize procedures for germplasm exchange. The Nagoya Protocol's "Guidelines on Access and Benefit-Sharing" is complicated and the wording ambiguous. Many countries are represented in these negotiations by Ministries of Environment. Brazil and Canada have Agriculture representatives. Andy Hammond confirmed that the House subcommittee report agrees with the president's proposal to close facilities in ten locations, including Palmer, AK. Kim Hummer noted that the National Arboretum is supported, in part, by a foundation, and suggested that other parts of the NPGS could consider this.

Review and Approve 2010 Minutes
The minutes from the previous meeting in Geneva, NY were reviewed and discussed by the committee. After the correction, the minutes were approved unanimously.

Germplasm Repository Reports: (see attachments on the W-6 Homepage in the Additional Documents section for complete reports)

Aberdeen, ID. National Small Grains Collection.
Harold Bockelman did not participate in the meeting. A brief report was made available to the committee. The collection holds nearly 140,000 accessions. 44,000 samples were distributed in the past 12 months, one-third to foreign scientists. The ploidy levels of thousands of accessions are being estimated by flow cytometry. Wheat landraces are being evaluated in Kenya for reaction to the Ug99 race of stem rust. The Triticeae CAP is evaluating the core collections of wheat and barley.

Corvallis, OR. Joseph Postman and Kim Hummer. Doug Cook retired. Part of his work will be continued by a part-time IT person. Other staff will take over other responsibilities.
SCRI projects were approved for Ohelo berry, blueberry genetics, and black raspberry. The large RosBREED project was also funded; Nahla Bassil provides the genotyping data for the project. An SCRI proposal for peony was not funded.
Kim Hummer has been acting administrator for the station in Palmer, AK. The collections of Ribes and Mentha were transferred to Palmer AK, where 9 FTE are located. The Palmer site is co-located with a research station of the University of Alaska. If the USDA station in Palmer is closed, USDA will attempt to place permanent employees elsewhere in the system.
Joseph Postman presented a report for other activities at the Corvallis gene bank. The field collections of Pyrus and Corylus are being rejuvenated, and plants given new labels. The Cydonia collection (90 accessions) was genotyped. Evaluation identified 13 very cold-hardy accessions. Graduate student Wambui Njuguna defended her Ph.D. thesis research on diversity in Fragaria. Graduate student Michael Dossett defended his Ph.D. thesis research on black raspberry.

Davis, CA John Preece
Prunus (2450 trees) was tested for presence of plumpox (sharka) virus. Cold-hardy kiwifruit (Actinidia arguta) accessions are growing well in Davis. In light of this, hardy kiwifruit accessions will be relocated from Corvallis to Davis. Grape accessions received from Foundation Plant Materials are being added to the screenhouse collection.
Research activities emphasize phenotyping and genotyping the collections. The fig collection is being repropagated. Many collections are being pruned. Almond germplasm was collected in Azerbaijan. When seedlings fruit, selections will be made for horticultural traits and genetic

diversity.
The Davis Repository hosted an ISHS-sponsored meeting on Mediterraneean Crops.

Hilo, HI Francis Zee
Carol Riley was recognized by NPGS. New accessions of Vasconcellea, a relative of payapa, were added to the collection. They are maintained in the screenhouse. A study is underway on oriental fruit fly susceptibility in the guava collection.
Laurel wilt affects avocado in Florida. The avocado collection is being moved from Miami to Fort Detrick, and then to the field Hilo. The first shipment of avocado scions was received in 2010.
The SCRI-funded ohelo project is nearing completion. Three clones were selected for release, and were fingerprinted and cryopreserved in Corvallis. Two extension articles describe propagation, culture and management of ohelo. The selected ornamental clones were micropropagated by North American Plants (McMinnville, OR) and sent to a commercial nursery in Volcano, HI.

Palmer, AK Dan Barney
Dan moved to Alaska and started working on 27 Sept. 2010. State seed collections are now held at -20C. The in vitro collection of Mentha was moved to Palmer. Collections in Palmer include peony, rhubarb, Ribes, and 27 other genera. Mint, peony and rhubarb are maintained as clones, while others are maintained as seed. Half-high blueberry cultivars appear to be performing well on the Kenai peninsula. A study of peonies using SSR markers is in progress.

Parlier, CA Gabriela Romano
The Parlier station has increased its activity in the regeneration of seed lots: cereal grains, garlic, sunflower, cucurbits and lupines. Much of the work is on seed germination testing, updating records, and regenerating collections. For jojoba, seed collected in 1957-58 in Mexico was dead. For seed collected in the 1980's and 1990's, testing is continuing. The jojoba seeds were stored in Fort Collins, then in Pullman, and finally in Parlier. In previous years there was no site designated for regeneration in the field.
Parlier is the primary site for collections of Atriplex (saltbush), buffalo gourd, meadowfoam, pladderpod, devil's claw and Yucca.
A study on Brix in cactus fruits, and the data entered into GRIN.

Pullman, WA Jinguo Hu
The W-6 regional project provides about 15% of the Pullman station's budget. In 2010, the station shipped 22,000 seed packets to many countries. The station received the Phaseolus core collection from CIAT. There has been tremendous interest in the Brachypopdium collection housed at Pullman. Expansion of the Pullman airport jeopardizes some of the fields used to increase seed. Entomologist Steve Clement retired after more than two decades of research. The position was cut after Steve's retirement, and some of the salary savings used to purchase pollination tents for alfalfa seed increase in Prosser.

Riverside, CA Richard Lee
Richard Lee did not participate in the meeting, but his report was made available. As noted above, the citrus collection is vulnerable to citrus greening disease (HLB) and its psyllid vector. So far, greening has not been detected in California. Facilities improvements were noted. Research activities included the construction of BAC libraries for the greening bacterium and its insect vector. A taxonomic study was conducted in Citrus using DNA sequences at the malate dehydrogenase locus.

After lunch, state reports were presented.

State Reports: (see attachments on the W-6 project Homepage in the Additional Documents section for complete reports)

AK Dan Barney
State seed collections are now held at -20C. Days are very long in the summer. Alaska agriculture consists of small diversified farms and local markets. There is considerable interest in peonies - to sell to cruise ship passengers and as cut flowers for weddings.

CA Dan Parfitt
As usual, the list of germplasm users in California is long, and activities are very diverse. Request numbers and recipient responses were similar to prior years. The University of California is experiencing budget cuts. Funding to maintain the Tomato Genetic Stock Collection in Davis is uncertain. The California Genetic Resources Program led by Cal Qualset was closed 1.5 years ago. There was some recipient interest in castor bean for genomics research, and as a biofuel crop. The California Rare Fruit Growers continue to be active users of fruit germplasm. Unusual germplasm uses include the use of seed samples as archival standards for archeological research.

CO Mark Brick
Two-thirds of the orders are for the seed lab in Ft. Collins. Lee Panella is evaluating sugar beet germplasm for resistance to curly top and Rhizoctonia. Abdel Berrada is evaluating safflower as a winter crop. Researchers at the NCGRP are conducting research on cryopreservation methods, and studying genetic relationships among species. Walter Messier received many accessions of Brassica and Glycine for genomics research.

ID Robert Zemetra
Joseph Kuhl will represent Idaho at the next W-6 meeting, as Dr. Zemetra is moving to a faculty position at Oregon State University (wheat breeding). Bob has served as Idaho's representative on the W-6 committee for 26 years. A large number of accessions of wheat and barley were requested in 2010, spurred by the Triticeae CAP which involves collection of phenotype data. Other studies in the cereal grains focus on disease susceptibility evaluations. J. Chen is evaluating wheat accessions for drought tolerance and nitrogen use efficiency. Gene flow between wheat and goatgrass continues to be studied. S. Hafez continues to evaluate sugar beet accessions for resistance to beet cyst nematodes.

MT Jack Martin
Triticum accessions represented 95% of the accessions requested in 2010. Many users were connected to the Triticeae CAP. Luther Talbert is mapping genes for drought tolerance in wheat. Nancy Blake is recording phenotype data of wheat accessions. Mike Giroux requested representatives of each of the three genome donors of hexaploid wheat for a study of the evolution of the Ha locus.

OR Shawn Mehlenbacher
In the hazelnut breeding and genetics program, Shawn Mehlenbacher's Ph.D. student Kahraman Gürcan developed 180 new microsatellite markers for hazelnut. Twenty years of eastern filbert blight susceptibility data were summarized. Ph.D. student Vidyasagar Sathuvalli identified new sources of eastern filbert blight resistance. The incompatibility alleles in new selections from southern Russia, Crimea (Ukraine), Armenia, Iran, and Turkey were identified.
Patrick Hayes requested a large number of barley accessions for stripe rust susceptibility evaluation.
Jim Myers released a tomato line with purple skin as new cultivar 'Indigo Rose'. White mold resistance research continues. Shawna Zimmerman's M.S. thesis research was on the transfer of

resistance from Phaseolus coccineus to P. vulgaris. Severe segregation distortion was observed in segregating progenies.
Chad Finn's Ph.D. student Micahel Dossett surveyed black raspberry accessions and identified sources of resistance to the aphid Amphorophora agathonica, a virus vector. Genetic diversity in newly-collected wild germplasm shows tremendous potential for breeding improved cultivars.
Chad Finn is evaluating strawberry germplasm as part of the RosBREED project.
Several seed companies used the NPGS as sources of parent material for their breeding programs and as standards in PVP trials.

WA Carol Miles
Carol is the new Washington State University W-6 committee representative and this was her first meeting. Of the germplasm recipients in Washington state (total of 169 requests and approx. 6,000 samples received), 85% are researchers. Only 2 germplasm recipients reported publications that included germplasm they received in 2010; recipients are more likely to have publications from material received in previous years, and letter to recipients next year will include this revision. One recipient (Markus Keller) requested permission to distribute propagation material of Actinidia arguta to interested parties once he has sufficient/adequate data; the committee indicated this is permissible as the material is in the public domain and has no restrictions.

The W-6 committee plans to meet in Corvallis during the third week of June 2012. Kim Hummer and Joseph Postman are the hosts.

Resolutions (sent by Bob Zemetra to the W-6 committee by e-mail on July 6)

Resolution 1. The W-6 Technical Committee thanks Dr. Jinguo Hu and the staff of theW-6 Plant introduction Station in Pullman, Washington especially Gwen Pentecost and Jannis Bacani for their efforts in organizing the W-6 teleconference/meeting.
Motion to approve by Jack Martin. Second by Shawn Mehlenbacher. Passed unanimously.

Resolution 2. The W-6 Technical Committee thanks Dr. Steve Clement for his many years of service as the entomologist for the W-6 Plant Introduction Station.
Motion to approve by Jack Martin. Second by Carol Miles. Passed unanimously.

Resolution 3. The W-6 Technical Committee is concerned that the current and proposed reduction in federal funding will negatively impact the National Plant Germplasm Systems ability to fulfill its mission and compromise the food security of the United States by reducing its ability to respond to future biotic and abiotic stresses. Furthermore, it will retard the development of new crops, thereby limiting America's ability to remain competitive in the global market. Be it resolved that all efforts be made to minimize any reduction in funding for the National Plant Germplasm System.
Motion to approve by Mark Brick. Second by Shawn Mehlenbacher. Passed 6 in favor, 1 opposed.

Motion to adjourn by Dan Parfitt, seconded by Shawn Mehlenbacher. Passed unanimously

Meeting adjourned at 5:00 pm