Annual Report for Calendar Year 2009

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A flowing plant of purple false brome, *Brachypodium distachyon*, growing on WRPIS Pullman Farm. This little grass is the first WRPIS accession whose whole genome DNA sequence has been determined (see cover story on page 3).

June 2010

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EXECUTIVE SUMMARY AND HIGHLIGHTS

The Western Regional Plant Introduction Station (WRPIS) is recognized as one of the most extensive and well-established genetic resource management 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 10 SYs (Scientist Year) in six programs (five curatorial and one DNA marker lab) and four research programs (agronomy, entomology, plant pathology and genetics). 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, entomology, 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 2009, WRPIS continued to provide needed plant genetic resources and relevant information to the global crop plant research community; and satisfactory progress was made in the WRPIS's mission areas. Our scientists published 14 research papers in peer-reviewed journals and made 24 oral or poster presentations at various international, national and regional conferences.

The followings are the 2009 high-light:

- As of December 31, 2009, there were 83,566 accessions belonging to 3,631 species (3,992 taxa) in 799 genera in WRPIS.
- We distributed a record high of 36,704 seed packets (22,469 accessions) to 887 requesters from 42 countries in 1,173 seed orders. Among them, 17,114 (47%) packets were sent to addresses in the USA and 19,590 (53%) packets to foreign countries.
- We shipped 2,381 accessions that were originally collected from Mexico to Fort Collins for the repatriation of germplasm to the Mexican national center of genetic resources (Centro Nacional de Recursos Genético).
- We entered 26,988 observation data points of 125 descriptors in 21 crops on 6,182 accessions into the GRIN database in 2009.
- We acquired 2,939 new accessions including 972 *Phaseolus* from the International Center for Tropical Agriculture (CIAT), 710 from Stoney Wright's collection trips in Canada, 587 native plant accessions from the SOS (Seeds of Success) project, and 242 lettuce from Ed Ryder's collection.
- We regenerated 952 inventories from a broad range of plant species.

- We shipped 958 seed inventories to the National Center for Genetic Resources Preservation (NCGRP), Fort Collins, Colorado and 327 inventories to the Svalbard Global Seed Vault, Longyearbyen, Svalbard for secured backup.
- Published on effects of new invasive insect (cereal leaf beetle) on grass seed regeneration nursery plants and recommended ways to suppress damaging beetle populations.
- Identified Kentucky bluegrass germplasm selections with high seed yield and improved turf quality under non-burn residue management for grass seed production in the Pacific Northwest.
- Screened and identified *Allium* accessions for resistance to Penicillium decay and successfully located complete resistance to *Penicillium allii* in accessions of three species of subgenus Melanocrommyum, and one species in subgenus Allium.
- Confirmed the consistent presence of *Clonostachys rhizophaga*, recently documented in literature as causing severe wilt of chickpea in Syria, in chickpea debris in eastern Washington.
- Made crosses between winter hardy safflower lines and a commercial cultivar to introgress winter hardiness to a high oil content, high oil quality genetic background.
- Assessed the genetic diversity and relationship among 151 accessions of faba bean (*Vicia faba*) maintained in Pullman using TRAP markers.
- Completed AFLP fingerprinting and structure analysis of *Trifolium thompsonii*, *Lepidium papilliferum* and a few other species maintained at WRPIS.
- Verified with DNA markers the presence of a fungal endophyte in a wild timothy grass accession from Argentina. Preliminary experimental results showed that this grass-endophyte symbiota confers resistance to an important insect pest called the bird cherry oat aphid.

Cover: In 2001, the little known grass species purple false brome, *Brachypodium distachyon* (L.) Beauv, was proposed as a model plant for studying grass functional genomics, since it has small stature, rapid life cycle, and most importantly, a small genome. Functional genes discovered in this model plant will have immediate applications to the genetic improvement of food (wheat) and energy (switchgrass) crops.In February 2010, the complete whole genome DNA sequence of this grass was published the in the journal of Nature. The sequenced diploid inbred line Bd21, or W6 36678, was derived from PI 254867, which was collected from Iraq and maintained in WRPIS since 1959. PI 254867 became the first PI from WRPIS with a whole genome sequenced and published. By the year end of 2009, WRPIS had distributed a total of 1,601 packets of *Brachypodium* seed samples to the global research community of approximately 130 research groups in more than 20 countries. Photograph by Agronomy Curator Vicki Bradley.

REPORT

ADMINISTRATION

Ralph Cavalieri (Administrative Advisor)

Ann Marie Thro (CSREES Representative)

Michael Fitzner (CSREES 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 was no major change for the research and curatorial staff during 2009. One technician, Connie Foiles, retired in April after 31 years of service in ARS and the vacancy was filled. A postdoctoral research associate Dr. Soon-Jae Kwon came on board in October to conduct germplasm characterization work under the supervision of the Research Leader Jinguo Hu. Due to the labor-intensive nature of our operation we hired 41 part time helpers (mostly WSU students) for field, greenhouse and laboratory activities throughout the year.

Research Project

The W-6 project entitled "Plant Genetic Resource Management, Preservation, Characterization and Utilization." was approved in May 2009 by the Western Directors and by USDA-CRSEES for the period beginning October 1, 2009 through September 30, 2014.

Funding

Thanks to the support of the National Program Staff and PWA Office, WRPIS received an increase in base funds necessary for its continued operation. The FY 09 budget for WRPIS was $2,366,709 (Pullman, WA) and $271,039 (Prosser, WA) for a total ARS budget of $2,637,748. This allowed for $22,256 discretionary dollars per SY. In addition, we received $386,245 'in kind' support from a CSREES Multi-State Research Project W-6, through Washington State University. Projected discretionary funds per SY were $21,731 for FY10 and $14,786 for FY11.

Our staff scientists have received the following grant funds: Reimbursable Agreement with Bureau of Land Management of $150,000 by 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.

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) Replaced the obsolete Powers system with a new TAC Vista control system for more reliable and efficient control and monitoring the storage conditions of the seed storage facility; 2) Upgraded the *Phaseolus* Greenhouse lighting system which enables the production of high quality seeds by accommodating different day-length and light intensity requirements of a broad range of germplasm; and 3) Installed a Variable Frequency Drive to protect and water pump that irrigates the Central Ferry farm used for germplasm regeneration and evaluation. These updates are also more energy efficient. Other purchases included insect blocking cages for germplasm regeneration, a seed germinator for seed viability test and a Li-Cor Genotyper for DNA marker work.

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 2009 year end, WRPIS held approximately 16% of the total NPGS holdings of 535,000 accessions. Most WRPIS accessions are maintained as seed, with a small proportion (garlic and its relatives and some ornamentals) that is vegetatively-propagated.

As of December 31, 2009, there were 83,566 accessions belonging to 3,631 species (3,992 taxa) in 799 genera. These are managed by five curatorial programs: The Agronomy Program (Vicki Bradley) manages 22,956 accessions of grass and Safflower. The Cool Season Legume Program (Clarice Coyne) curates a total of 21,327 accessions of pea, chickpea, lentil, faba bean and lupine. The Beans Program (Molly Welsh) manages the Phaseolus germplasm of 17,062 accessions. The Temperate Forage Program (Stephanie Greene) manages the germplasm of alfalfa, clover, lotus and wild clovers with a total of 12,816 accessions. The Horticultural Program (Barbara Hellier) cares for 9,687 accessions of garlic, sugar beet, lettuce and many miscellaneous species that have potential use for ornamental or medicinal purposes. In addition, there are 2,320 accessions of native species generated by the research 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.

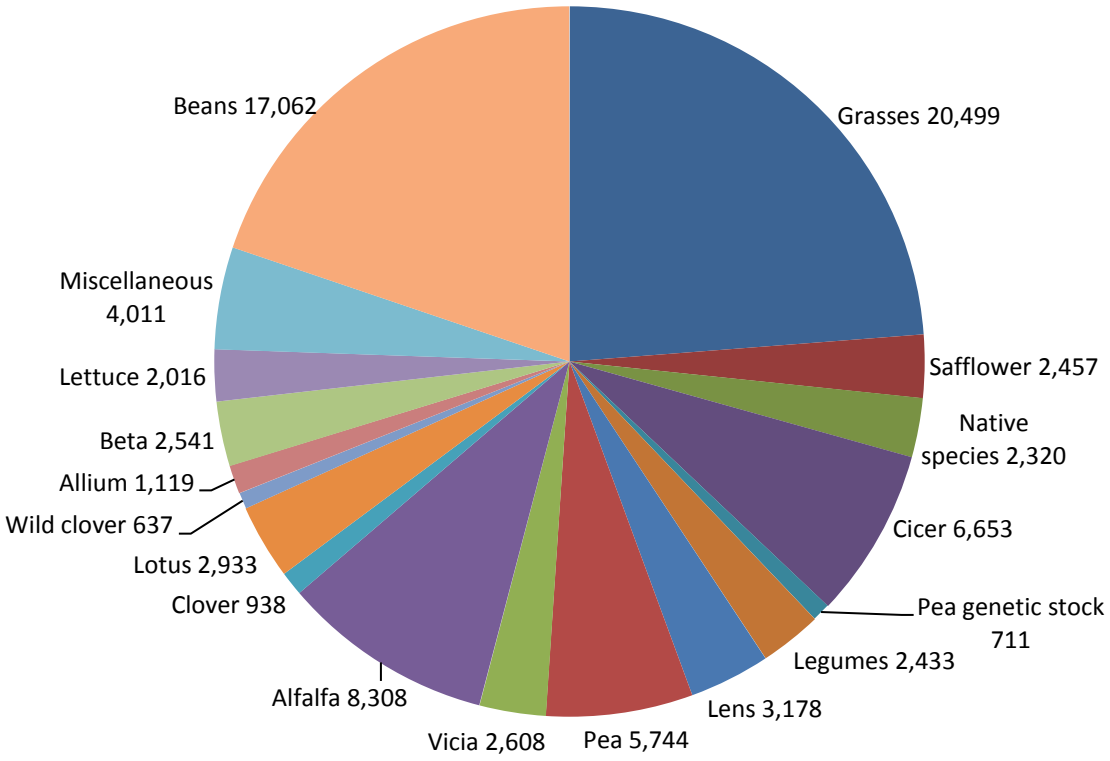


Figure 1. Number of accessions for major crop groups maintained at WRPIS (as of June 24, 2010 totaled at 86,168).

Germplasm Acquisition

No international collection trip was carried out by WRPIS scientists in 2009. However, the accession numbers continued growing (Figure 2). This was achieved by bringing in useful germplasm through the established collaboration between WRPIS scientists and the scientists around the world, particularly those in the CGIAR centers like International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India and International Center for Tropical Agriculture (CIAT) in Columbia and through the general donations from the public researchers in the USA. In 2009, WRPIS received 2,939 new accessions. The larger ones were: 972 *Phaseolus* came from CIAT, 710 from Stoney Wright's (Alaska Plant Materials Center) collection trips in Canada, 587 Native accessions from the SOS (Seeds of Success) project, and 242 *Lactuca* from Ed Ryder (ARS-Salinas, retired). We also received 32 accessions of wide lettuce accessions collected in Armenia and Georgia by two local botanists through an ARS-UC Davis coordinated collection effort.

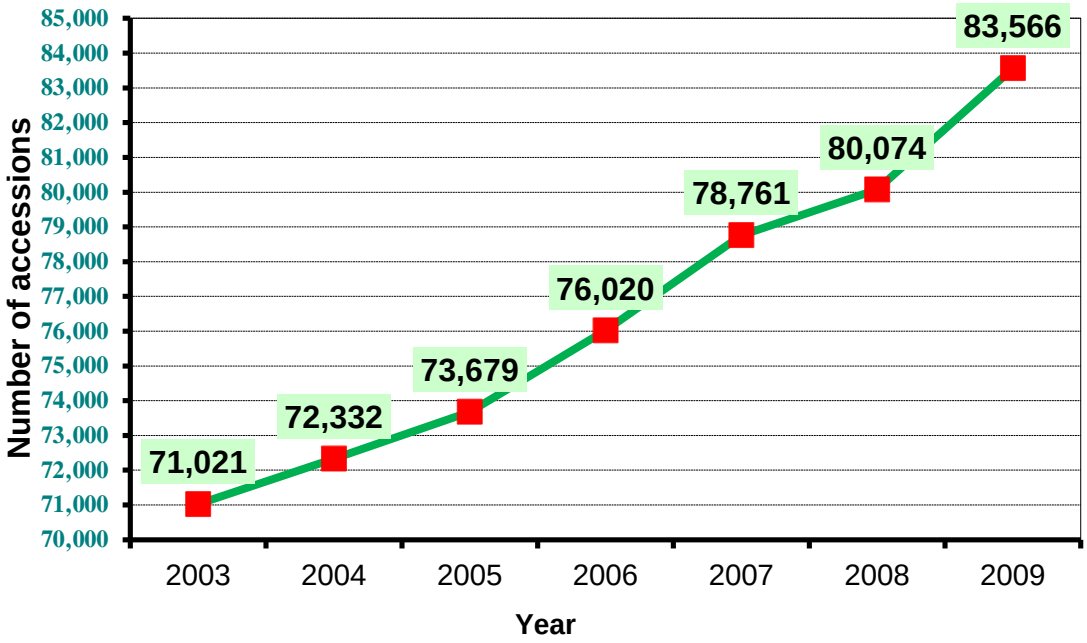


Figure 2. Changes of total number of accessions managed by WRPIS since 2003. The numbers were recorded at the end of each calendar year.

Germplasm conservation

In 2009, WRPIS curators regenerated 952 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 3,032 seed viability records were entered into the GRIN database. These data were from 2,706 inventories (WRPIS tested 931 inventories, NCGRP in Fort Collins, CO tested 1,242 inventories and our collaborators at various locations tested 533 inventories). Seed quantities of 10,862 inventories in our storage were updated by weighing and converting to number of seeds/inventory.

For security back-ups, we sent 958 inventories to NCGRP at Fort Collins, CO and 327 inventories to the Svalbard Global Seed Vault, Longyearbyen, Svalbard through the NCGRP during 2009.

Germplasm evaluation and characterization

In 2009, a total of 26,988 observation data records were entered in GRIN on 6,182 accessions on 125 descriptors of 21 different crops. Eight per cent of the data came from cooperators and the other ninety-two per cent came from personnel at our station. Data records by crop are as following: 7,949 for pea, 7,774 for medicinal plants, 3,253 for lentil, 2,376 for *Phaseolus*, 1,563 for faba bean, 883 for lettuce, 814 for lupine, 614 for pea genetic stocks, 457 for cool-season grasses, 326 for safflower, 276 for vetch, 236 for chickpea, 191 for *Lathyrus*, 59 for clover, 50 for sugar beet, 40 for *Astragalus*, 9 for trigonella, 8 for alfalfa, 7 for wild *Allium*, 3 for trefoil, and 100 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 2009 included AFLP genotyping *Lepidium papilliferum* in conjunction with the CRISSP program at the University of Idaho; AFLP analysis and structure analysis of *Trifolium thompsonii;* and TRAP genotyping 151 accessions of faba bean (*Vicia faba*) 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 36,704 packets of 22,469 (27.2% of the collection) accessions were distributed. This is a record high for distribution of packets sent out by WRPIS in one year. On average, we sent out over 100 packets each and every day. Among the distributed packets, 17,114 (47%) were sent to addresses in the USA and 19,590 (53%) were sent to foreign countries. There were 1,173 orders filled by 887 different requestors. The most requested plant groups were grasses (9,147 packets) and safflower (7,824 packets), followed by beans (5,254 packets). The number of packets for peas, alfalfa, lettuce, lentil and clover ranged from 1,000 to 3,000 packets. We shipped 2,381 accessions that were collected from Mexico to Fort Collins for the repatriation of germplasm to Mexico national center of genetic resources (Centro Nacional de Recursos Genético).

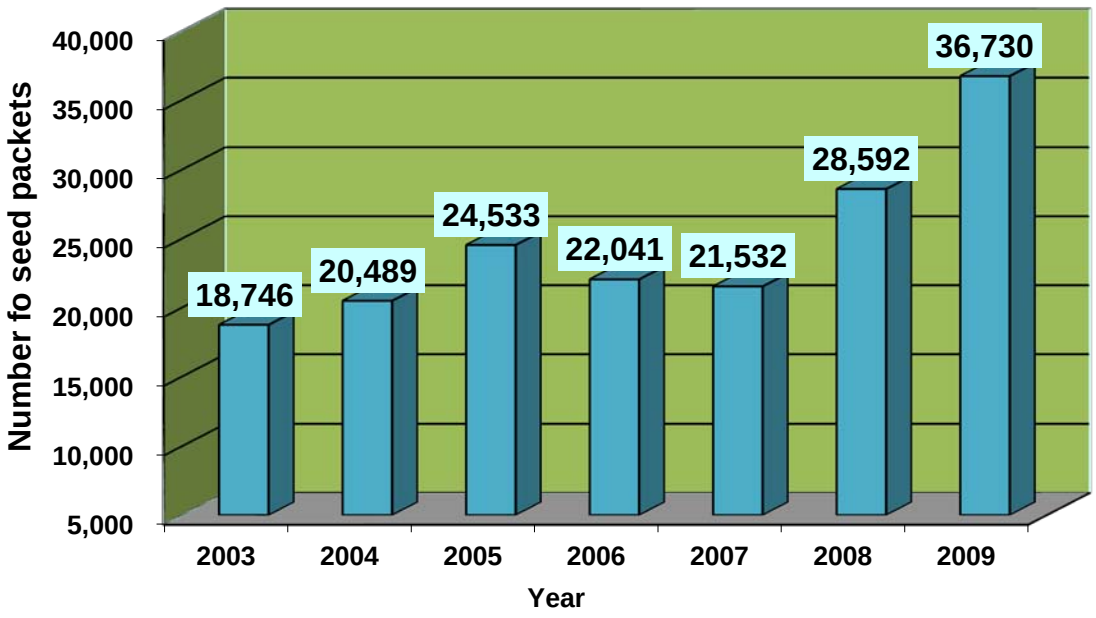


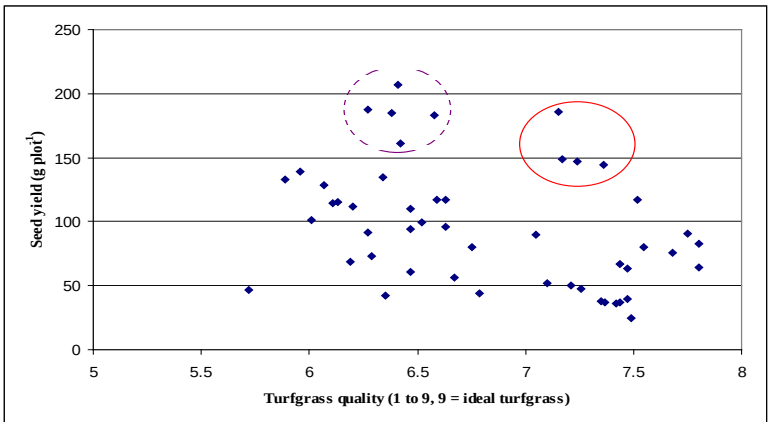
Figure 4. Number of seed packets distributed annually by WRPIS from Year 2003 to Year 2009.

MISSION-RELATED RESEARCH

Agronomy

Winter safflower. Safflower (*Carthamus tinctorius* L.) is normally a spring sown crop, but in many areas, fall sown safflower will provide important management alternatives and higher yield potential. Recent releases of winter safflower germplasm by R.C. Johnson are being tested at Pendleton, OR (Cooperative with Steve Petri, Oregon State University), and at W6 locations at Central Ferry and Pullman, WA. Data was collected from approximately 200 plots for winter survival, yield, and yield components. For Pendleton OR, the advantage of fall sowing winter type safflower compared to spring sowing was 66%. For Pullman, WA, the advantage was 48% and for Central Ferry, WA, 83%. Most of the yield increase came from the development of additional seeds/head in fall sown winter types. Additional studies at Pendleton included dormant planting, planting depth by date trials, and weed control. Crosses between winter type safflower and a high oleic spring type were completed to improve oil % and quality in winter types. The F_1 seeds have been produced and will be used for additional research in 2010.

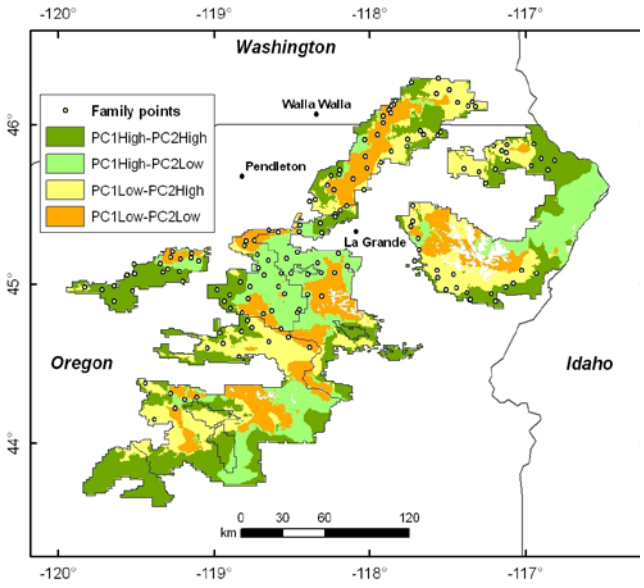
Kentucky bluegrass for no-burn management (Cooperative with WSU and Bill Johnston, WSU). Turf and seed production plots testing *Poa pratensis* selected for improved yield under no-burn residue management were established in 2007-08. For 2008 data, selections were identified that combined good to excellent turf quality with high seed production (see figure below). In 2009, a second year of data was collected on plant development, yield components and seed production on irrigated and dryland environments, and on and turf quality. The results below were verified in 2009 data. In 2010 a seed increase of the high production-turf selections will be initiated to make this germplasm available to the turf industry.



Kentucky bluegrass seed yield (2008) vs. turf quality (mean of 2007 and 2008) for entry x selection parameters at Pullman, WA. The entries in the circles represent high yielding high turf selections.

Native plant collection and evaluation. Data analysis, regression modeling, and seed zone mapping were completed on Mountain Brome (*Bromus marginatus*) for the Blue Mountains of Washington and Oregon. The seed zone maps will be used to guide

revegetation of Mountain Brome in the Blue Mountains (see map below). The U.S. Forest Service will collect and propagate mountain brome within the zones for revegetation. The NPGS will maintain diverse genetic resources for ex-situ conservation and utilization (Cooperative with Vicky Erickson, USFS).



Proposed seed zones for mountain brome in the Blue mountains of Oregon and Washington.

For sandberg bluegrass (*Poa secunda*), an important rangeland grass for western U.S., common gardens were established in 2008 and the first year of data taken in 2009. The gardens were located at Central Ferry WA, Powell Butte OR, and Sidney MT. This involved more that 12 plant traits taken on more than 1500 plants per site. The first year data showed strong differences among plants traits at different seed source locations in Idaho, Oregon and Nevada indicating genetic variation across the landscape. Numerous correlations between plant traits and temperature and precipitation variables at seed source locations suggested adaptive variation was present. After data collection in 2010 a comprehensive analysis will be completed to develop seed transfer zone for revegetation of *Poa secunda* in Idaho, Oregon and Nevada. This work is cooperative with Matt Horning (US Forest Serve Bend OR) and Erin Espeland (ARS Sidney MT)

Leymus cinereus (Basin wildrye) is a potential species for low input biomass production on marginal land. It is also a useful restoration species. More than 100 accessions of Basin wild rye were collected from diverse environments in the Great Basin of Idaho, Oregon, and Nevada. This material will be evaluated in genecology studies starting in 2010.

Phalaris arundinacea (PHAR) is a pasture grass but also an invading weed colonizing stream banks and moist sites over much of the U.S. We found that a unique cluster of PHAR in AFLP analysis. The invading PHAR is a tetraploid. Our research showed the

unique cluster was composed of an apparent hexaploid. Hexaploids are known to occur in the Iberian Peninsula and there is also a putative native PHAR. The hexaploid could be exotic or native but may be less invasive. If so, the hexaploid may be more suitable for pastures and hay than the tetraploid form (Cooperative with Mike Casler).

Entomology

Garlic mite. A new collaborative project with Barbara Hellier was initiated to address the possibility that dry bulb mite, *Aceria tulipae* Keifer (Eriophyidae), infestations of WRPIS garlic accessions are adversely affecting bulb and clove quality and viability during storage. Beyond quantifying mite densities on a series of garlic accessions, there is the potential challenge of identifying a control or management course of action to rid the collection of damaging mite infestations. Dr. Clement submitted a progress report to Dr. Hu on 7 August 2009 with the following results and recommendations: **1**. Mite-infested bulbs are harvested from regeneration nurseries at Pullman; **2.** Mite oviposition and development proceeds after infested bulbs are placed in the Pullman storage facility. Storage conditions are optimal for this to occur; **3**. Hardneck garlic accessions are better mite hosts than are softneck accessions (Tables 1 and 2); **4**. Although bulbs will normally dry-up over extended storage times, the results show that high mite infestations accelerate the dehydration process of stored bulbs, thereby adversely affecting bulb quality (Table 2); **5**. It is recommended that all stakeholders (U.S. and foreign) requesting garlic be told that WRPIS accessions are likely infested with the dry bulb mite, *Aceria tulipae* Keifer (this recommendation has been implemented); **6.** The absence of mites in bulbs harvested from plots setup in 2008 with mite-free accessions suggests that accessions in regeneration nurseries are not colonized by feral mites. This project is continuing so we can compare 2010 results with 2009 results.

Table 1 % Cloves Per Mite Density Rating

Mite Density Scale		Hardneck (n = 463)					Softneck (n = 588)				
		Nov.	Jan.	Mar.	May	July	Nov.	Jan.	Mar.	May	July
1 =	0	53	17	4	4	0	92	41	22	24	3
2 =	1-100	25	15	18	18	4	8	35	33	15	15
3 =	101-1000	1	11	7	8	15	0	8	27	17	26
4 =	>1000	21	57	71	70	81	0	16	18	44	56

Table 2

Clove Damage Rating		% Cloves Per Damage Rating									
		Hardneck (n=463)					Softneck (n=588)				
		Nov.	Jan.	Mar.	May	July	Nov.	Jan.	Mar.	May	July
1		82	39	26	29	2	100	94	70	53	14
2		2	19	6	7	22	0	6	25	25	33
3		16	41	60	26	11	0	0	5	20	43
4		0	1	8	38	65	0	0	0	2	10

A second project involving the colonization of Dr. Johnson's safflower plots in Idaho by *Larinus curtus* Hochhuth (Coleoptera: Curculionidae), a biocontrol agent of yellow starthistle, was completed by showing that this weevil is not a pest of safflower. A third project surveyed wild timothy grass accessions for *Neotyphodium* fungal endophytes, resulting in the discovery of a new 'novel strain' in the Pullman grass collection. This endophyte produces only peramine, an alkaloid that is not toxic to mammals but widely considered to have broad anti-insect activity. Finally, a joint project with Vicki Bradley and others documented the effect of feeding by cereal leaf beetle, *Oulema melanopus* (L.) (Coleoptera: Chrysomelidae), a new invasive pest in eastern Washington, on the health of plants of diverse grass accessions in seed-regeneration nurseries at Central Ferry. Beyond fulfilling this objective, this study highlighted the presence of endophyte-infected accessions among the 20, 504 grass accessions at the WRPIS and the distribution of these accessions to U.S. and foreign stakeholders for research and commercial development.

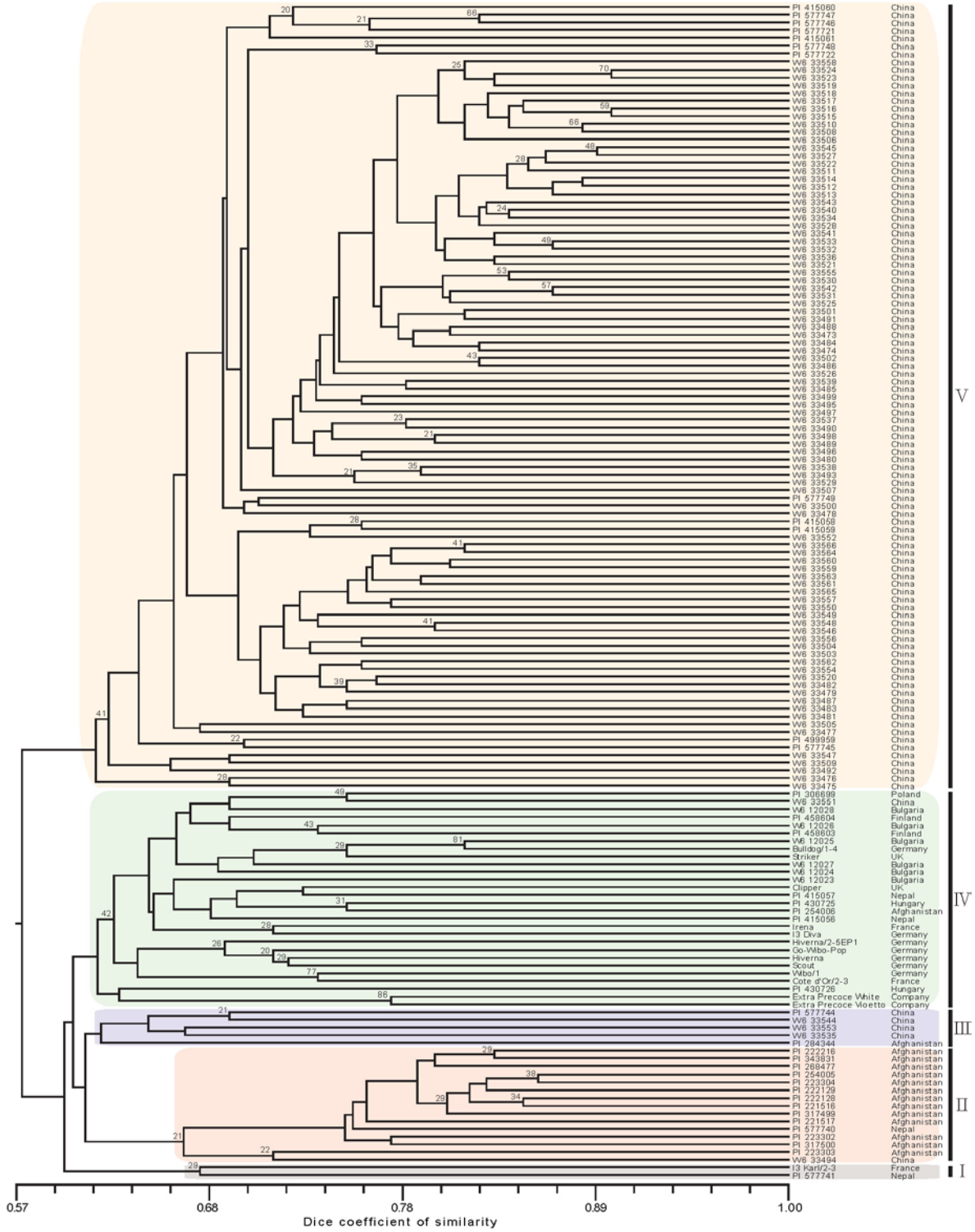
Genetics

Faba bean winter-hardiness. We evaluated the winter-hardiness of 55 faba bean accessions and identified a few winter-hardy accessions that survived through the extended freezing period and have the potential to be developed into an alternative cover crop for the U.S. Northeast wheat production region and other regions with similar climate. In a two-sites (Pullman and Central Ferry, WA) replicated field trial with 55 entries in the 2008-09 season, we observed that: 1) a high level of heritable variation in

winter hardiness among the accessions; 2) Pullman is an ideal site for differentiating faba bean germplasm with winter-hardiness since some entries were completely killed in the field by low temperature while others survived with little to various degrees of cold damages and 3) some accessions had the ability to send out shoots from the lower nodes on the stem after the leaves of the upper nodes were killed by low temperature and this ability to regrow could be used as one of the criteria to measure winter hardiness of faba bean. The difference between winter hardy and non-winter hardy is obvious as shown by the pictures below:

The two pictures on the left were taken on February 12, 2009 and the two on the right on March 12, 2009, respectively. The top two pictures are two different accessions that are winter hardy and the lower two pictures were the same accession that does not have tolerance to cold.

Genetic diversity and relationship among 151 faba bean accessions. We applied TRAP (target region amplification polymorphism) markers to the assessment of genetic diversity and relationships among 151 world-wide collected faba bean entries (137 accessions maintained at the USDA-ARS, Pullman, WA, two commercial varieties and 12 elite cultivars and advanced breeding lines obtained from W. Link of Georg-August University, Germany). TRAP markers revealed a high level of polymorphism among the accessions with an estimated average pairwise similarity of 63.2%, ranging from 36.9 to 90.2%. Cluster analysis based on 122 polymorphic markers divided the 151 accessions into five major groups with two to 101 entries each and revealed a substantial association between the molecular diversity and the geographic origin. All 101 accessions in Group V are originated from China and 13 of the 15 accessions in Group II were from Afghanistan. We also found that there are two kinds of accessions in our faba bean collection, one with high intra-accession variation and the other with very low intra-accession variation. This is consistent with previous reports that faba been landraces have a high level of out-crossing in production fields and thus contain larger amount variation within each landrace. One implication of this observation for germplasm management is that a relatively larger population is needed in regeneration to mitigate the possible loss of genetic variation due to genetic drift.



Genetic relationship among 151 faba bean entries as revealed by 122 polymorphic TRAP markers. The names of countries from which the entry was collected were denoted on the right.

Plant Pathology

Screening of the WRPIS Allium collection for resistance to Penicillium decay. We documented complete or partial resistance to Penicillium decay in accessions of several subgenera. Heretofore, there had been no documentation of substantial resistance to Penicillium decay in garlic or other *Allium* species. This was a collaborative effort between the WRPIS Plant Pathology Laboratory and the WRPIS Horticultural Crops curator, Barbara Hellier. Accessions of *Allium sativum* (garlic), *A. ampeloprasum* (elephant garlic) and *A. acuminatum*, *A. aflatunense*, *A. atroviolaceum, A. canadense*, *A. longicuspis, A. moly*, *A. ponticum*, *A. roseum, A. scorodoprasum*, *A. senescens, A. stipitatum,* and *Allium* sp. (wild or ornamental species) were screened for resistance using one to two aggressive isolates of *Penicillium allii* and *A. sativum* Rose Du Var (as a positive control). Single accessions of *A. aflatunense, A. atroviolaceum, A. stipitatum*, and *Allium* sp. remained asymptomatic. Single accessions of *A. roseum* and *A. senescens*, two accessions each of *A. acuminatum* and *A. ampeloprasum,* and a single accession of *A. moly*, displayed lesion expansion rates considerably less than rates for positive controls. Single accessions of *A. sativum* var. *ophioscordon* and *A. scorodoprasum* displayed less than rates in positive controls with deep wounding, but did not consistently differ with shallow wounding. Not differing, or differing inconsistently or insubstantially from positive controls were accessions in *A. canadense*, *A. sativum* or *A. longicuspis*. *A. acuminatum, A. ponticum* and *A. scorodoprasum* displayed rates significantly less than positive controls, but their small bulbs often rotted completely. Results are presented in the context of current *Allium* and *Penicillium* taxonomy. A manuscript has been submitted for publication.

Phylogenetic studies on *Cladosporium cladosporioides* sensu lato. The fungal species *Cladosporium cladosporioides* is a cosmopolitan, ubiquitous saprophyte and opportunistic plant pathogen of numerous fruits and vegetables. Recent research utilizing isolates from various sources, including numerous isolates from WRPIS, have demonstrated that *C. cladosporioides* is a species complex consisting of *C. cladosporioides* sensu stricto plus several additional taxa. Phylogenetic analyses based on DNA sequences for ITS1, ITS2, partial actin and elongation factor regions have enabled distinction of multiple new taxa, some of which are described as new species. Morphological studies and a morphological key are presented. This was a collaborative effort involving scientists from the Netherlands, Australia, Germany, Denmark, Slovenia and the United States. A manuscript has been submitted for publication.

A species of *Clonostachys* pathogenic to chickpea documented as endemic to eastern Washington. We confirmed the consistent presence of *Clonostachys rhizophaga* in post-harvest chickpea debris, and demonstrated that high concentrations of conidia on chickpea seed will delay or inhibit emergence and, more rarely, induce wilt. (This fungus was recently reported as a pathogen, inducing wilt of chickpea in Syria.) Further research is being conducted to refine knowledge of environmental conditions specific to wilt or pre-emergence damping off. Preliminary results have been presented as a poster (Ascochyta 2009 Workshop, below) and the abstract published on line (Plant Health Management Network).

COMMITTEES, PRESENTATIONS AND RECOGNITIONS

During 2009 WRPIS scientists and curators serve 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 2009 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 the graduate student committee of the Department of Crop and Soil Sciences, Washington State University and advised a MS student on research project. Research Entomologist **Steve Clement** is a member of the International Affairs Committee, Entomological Society of America, and was Recording Secretary for the committee in 2009. He also serves as a member of one PhD graduate student committee, Department of Entomology, Washington State University. Steve's presentations in 2009 included: seminar speaker "Wild Relatives of Neolithic Founder Crops: Source of Insect-Resistant Germplasm," Department of Entomology, WSU, in February; contributed talk on *Larinus curtus* in experimental safflower at the Pacific Branch meeting of the Entomological Society of America, San Diego, California, in March; and contributed talk on the "History of Pea Aphid Outbreaks in the U.S. Pacific Northwest," Entomological Society of America meeting, Indianapolis, Indiana, in December. Dr. Clement's discovery that 'Barronesse' barley is resistant to Hessian fly, first reported in Clement et al. (2003. J. Kansas Entomol. Soc. 76:567-577), was reported in a WSU Cooperative Extension report (EB1912) that summarized accomplishments from the Western Region SARE Program. Dr. Clement's chickpea research involving ICRISAT in India and cooperators in the Department of Horticulture and Landscape Architecture, Washington State University, was summarized in a USDA-ARS Agriculture Research story ("Experimental Chickpeas Fend Off Caterpillar Pest") on 25 August 2009. Supervisory Research Geneticist and Research Leader **Jinguo Hu** continued to serve as an Associate Editor for Crop Science. Research Plant Pathologist **Frank Dugan** is a member of the American Phytopathological Society, the Canadian Phytopathological Society**,** the Mycological Society of America, the North American Mycological Association, the Western Society of Weed Science and the Northwest Scientific Association. He is a member of the Collections and Germplasm Committee of the American Phytopathological Society. He also serves as an Associate Editor for the journal of North American Fungi.Horticulture Curator **Barbara Hellier** is the Ex-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 the Ex-officio member of Forage and Turf Grass CGC (Descriptor Subcommittee Secretary) and New Crops CGC. She has membership with the following organizations: 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 the Ex-officio member of the Food Legume CGC, Pea CGC, Clover and Special Purpose CGC, 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 2009. They were invited to review research manuscripts by editors of the following scientific journals: Crop and Pasture Science, Crop Science, Ecological Restoration, European Journal of Plant Pathology, Genome, Industrial Oil Crops, Journal of Economic Entomology, Journal of Insect Science, Journal of Sugar Beet Research, Molecular Breeding, Phytopathology, Plant Breeding, Crop Science, Journal of Crop Registrations, Euphytica, Canadian Journal of Plant Science, Plant Genetic Resources and Theoretical & Applied Genetics.

PUBLICATIONS

a) Peer Reviewed Journal Papers Published in 2009

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Casler, M.D., R.C. Johnson, R.E. Barker, M.M. Jenderek, Y.A. Papadopolous and J.H. Cherney. Feasibility of Seed Production from Non-flowering Orchardgrass. Crop Sci. 50: 35-42.

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Clement, S.L., V.L.Bradley, L.R.Elberson, D.E. Bragg and T.D. Phillips. 2009. Cereal leaf beetle colonizes grass germplasm nurseries and impacts seed production activities Online. Forage and Grazinglands. doi:10.1094/FG-2009-1214-01-RS.

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Dugan, F.M. 2009. Dregs of our forgotten ancestors: fermentative microorganisms in the prehistory of Europe, the steppes and Indo-Iranian Asia, and their contemporary use in traditional and probiotic beverages. Fungi 2(4): 16-39.

Dugan, F.M., H. Akamatsu, S.L. Lupien, W. Chen, M.L. Chilvers and T.L. Peever. 2009. Ascochyta blight of chickpea reduced 38% by application of *Aureobasidium pullulans* (anamorphic Dothioraceae, Dothideales) to post-harvest debris. Biocontrol Science & Technology 19: 537-545.

Dugan, F.M., D.A. Glawe, R.N. Attanayake and W. Chen. 2009. The importance of reporting new host-fungus records for ornamental and regional crops. Plant Health Progress doi:10.1094/PHP-2009-0512-01-RV.

Johnson, R.C., W.J. Johnston, F.B. Bertoli and C.T. Golob. Yield, development, and variation in diverse *Poa pratensis* accessions. Crop Sci. 50:337-344.

Newcombe, G., R. Gaylord, J.P. Yenish, J. Mastrogiuseppe and F.M. Dugan. 2009. New records for pathogenic fungi on weedy or non-indigenous plants. North American Fungi 4(8): 1-12. doi: 10.2509/naf2009.004.008**.**

Robertson, N.L. and C.J. Coyne. 2009. Detection of seed-borne potyviruses in USDA *Lupinus* sp. collection. Plant Genetic Resources 7:227-229.

Robertson, N.L. and C.J. Coyne. 2009. First report of *Bean yellow mosaic virus* from diseased *Lupinus luteus* L. in Eastern Washington. Plant Disease 93:319.

Smýkal, P., C.J. Coyne, R. Ford, R. Redden, A.J. Flavell, B. Ta´ran, G. Vandenberg, J. Burstin, G. Duc, M. Ambrose and T.H.N. Ellis. 2009. Effort Towards a World Pea (*Pisum sativum* L.) Germplasm Core Collection: The case for common markers and data compatibility. Pisum Genetics 40:11-14.

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Wang, F., B. Yue, J. Hu, J. McD. Stewart and J. Zhang, 2009. A Targeted region amplified polymorphism (TRAP) marker for fertility restorer gene *Rf1* and chromosomal localization of *Rf1* and *Rf2* in cotton. Crop Sci. 49:1602–1608.

Yue, B., X. Cai, BA. Vick and J. Hu. 2009. Genetic diversity and relationship among 177 public sunflower inbred lines assessed by TRAP markers. Crop Sci. 49:1242-1249.

Yue, B., X. Cai, Wenge Yuan, BA. Vick and J. Hu. 2009. Mapping quantitative trait loci (QTL) controlling seed morphology and disk diameter in sunflower (*Helianthus annuus* L.). Helia 32(50):17-35.

b) Others (book chapters, conference proceedings, research progress reports and popular presses)

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Boller, B and S.L. Greene. 2009. Genetic Resources. In: Boller B, V. Posselt, F. Veronesi (eds) Handbook of Plant Breeding: Fodder Crops and Amenity Grasses. Springer, Berlin.

Bragg, D.E., and K. Tetrick. 2009. Effects of Valent seed treatment insecticides on winter wheat insects. *Research Reports of PNWIMC 2009 pp 30-32* 2009 PNWIMC, Portland OR.

Bragg, D.E., and K Tetrick. 2009. Failed IPM in spring wheat 2008. *Research Reports PNWIMC 2009 pp. 39-42*

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pages 64-75. In: W. Erskine, F. Muehlbauer, A. Sarker and B. Sharma, Editors. The Lentil: Botany, Production and Uses. CABI, Oxfordshire, UK.

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Johnson, R.C., and M. Cashman. 2009. Adapted Indian ricegrass for the Great Basin. p. 9-14. *In* N. Shaw (ed.) Great Basin Native Plant Selection and Increase Project FY 2008 Progress Report (http://www.fs.fed.us/rm/pubs_other/rmrs_2009_shaw_n001.pdf)

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Appendix 1

Western Regional Plant Introduction Station
Current Staffing List as of December, 2009

Position	Name	Federal or State	Posit. Type
Pullman Station			
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	**Scott McGee**	**Sta**	**PFT**
Research Entomologist	Steve Clement	Fed	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	John Connett	Fed	PFT
Plant Biologist	Michael Cashman	Fed	TFT
Biological Science Technician	Melissa Scholten	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	Corey Wahl	Fed	TFT
Biological Science Technician	Marie Pavelka	Fed	PFT
Phaseolus Curator	Molly Welsh	Fed	PFT
Plant Technician	**Julie Thayer**	**Sta**	**PFT**
Prosser Station			
Forage Curator	Stephanie Greene	Fed	PFT
Biological Science Technician	Martha Cervantes	Fed	PFT
Biological Science Aid	Jesus Prieto	Fed	TFT

Appendix 2

Scientific and Service Activities

January 9-14, Clarice Coyne attended the International Plant and Animal Genome Conference, San Diego, CA and presented a poster.

January 9-15, Ted Kisha attended the Plant & Animal Genome Meetings, San Diego, CA and presented an invited talk entitled "Genetic Diversity of the USDA Brachypodium Distachyon Collection Assessed by AFLP and TRAP Markers".

January 9-14, Jinguo Hu attended the XVIII Plant and Animal Genome Conference in San Diego, CA and chaired the Molecular Marker Workshop.

January 14, Vicki Bradley provided information on obtaining a phytosanitary certificate to Gil Stallnecht.

January 15, Steve Clement discovered fungal endophytes in *Phleum* accessions, followed by a request from AgResearch-New Zealand for endophyte-infected seed of the accessions.

January 22, William Luna attended Wilbur Ellis Professional Seminars, Spokane, WA.

January 26, Vicki Bradley presented a WSU Department of Crop and Soil Science seminar titled "Birds and Bees and Safflower Seeds: Curating the U.S. Safflower Collection".

January 27-28, Vicki Bradley organized volunteers and participated in the Washington State University and the University of Idaho Career fairs.

January 28, Barbara Hellier reviewed a paper for Journal of Sugar Beet Research.

February 5-6, Clarice Coyne presented a grant proposal USDA-CSREES, Cool Season Food Legume Special Research Grant Review, Moscow, ID.

February 8, Steve Clement received invitation to write a book chapter (focus on insect pests) for book "Climate Change and Management of Cool Season Grain Legume Crops." The invitation was issued by Dr. Shyam Yadav, National Agricultural Research Institute, Papua New Guinea. Declined.

Feb 10, R.C. Johnson presented an oral paper "Genetic Diversity Patterns and Adaptation of *Allium acuminatum* in the Great Basin", Society of Range Management Meeting in Albuquerque, NM

February 10-11, William Luna Attended Washington State Pesticide License re-certification meetings, Moscow, ID.

February 19, Steve Clement reviewed CRIS project proposal at request of Experiment Station Director, University of Idaho.

February 23-27, Barbara Hellier attended the USDA-ARS National Sugar beet Program Research Review, Sugar beet CGC meeting in conjunction with the Association for Sugar Beet Technologists meeting. Orlando, FL.

February 23-27, Jinguo Hu attended the American Society of Sugar Beet Technologists

Meeting in Orlando, FL and presented a poster entitled “Sugar beet germplasm collection in the National Plant Germplasm System”.

March 4, Vicki Bradley sent a file of locality information for *Bromus tectorum* accessions to Kendra Foote.

March 6, Steve Clement received a request from Dr. Gregg Cheplick, City University of New York, for seed of endophyte-infected ryegrass accessions.

March 9. Steve Clement received a request for information about pea weevil-resistant *Pisum* germplasm from Dr. Ranko Gunter, Croatia.

March 12, Stephanie Greene served as a Judge at Mid Columbia Science Fair

March 17, Leslie Elberson received on-site training in digital macro photography through stereomicroscopes from Henry Moore, Biomedical Communications Unit, WSU.

March 24, R.C. Johnson presented an invited talk “Adaptation of Key Native Species for the Intermountain West” at the Native Plant Summit, Boise ID

March 25-28, Frank Dugan attended the Northwest Scientific Association Annual Meeting in Seattle, WA and presented an invited talk “Rates of discovery of new host-fungus records in the Pacific Northwest: examples from the Palouse region of northern Idaho and eastern Washington”.

March 29-April 1, Barbara Hellier attended the Great Basin Restoration Plant Selection and Increase Project meeting, Boise, ID and presented a project progress report on *Allium acuminatum* seed production. She also visited the US Forest Service Lucky Peak nursery.

March 29-31, Steve Clement attended the Pacific Branch meeting of the Entomological Society of America, San Diego, California and presented a talk on his weevil-safflower research.

March 31, R.C. Johnson presented talk “Seed zones for Tapertip Onion and Indian ricegrass” for the Great Basin Restoration Project

April 1, R.C. Johnson presented an invited talk,as workshop panel member for the “Plant Materials available for Great Basin Ecoregions” session, as part of the Workshop for Developing a Successful Native Plant Program, Ontario OR.

April 8, Vicki Bradley sent a file of descriptor data for 2,012 safflower accessions to Sapinder Bali.

April 9, Steve Clement reviewed a paper for the editor of the Journal of Insect Science.

May 11, Barbara Hellier attended orientation meeting for ARS summer student interns.

May 14, Steve Clement, as request of Aaron Esser (Adams County WSU Extension Agronomist), conducted a field survey of wireworm infested wheat fields and provided information on possible control methods.

May 18-20, Clarice Coyne was invited to serve on the South Central Sun Grant Initiative Grant Review Panel, Oklahoma City, OK.

June 9, R.C. Johnson presented an invited talk, “Winter safflower, a potential crop for Eastern Oregon”, Agriculture Research Center Field Day, Pendleton OR

June 9, Barbara Hellier gave Dr. Kelley Richardson, new sugar beet breeder at the Salinas, CA ARS research station, tour of W6 facilities and field plots.

June 10, Vicki Bradley hosted a visit by Susan Samudio and Jonathan Schnore from Jacklin Seed by Simplot.

June 10, William Luna hosted and participated in Fire Extinguisher Training.

June 11, Vicki Bradley hosted a visit by Dr. Joe Kuhl from the University of Idaho.

June 15, Steve Clement reviewed a paper for the editor of the Journal of Economic Entomology.

June 16. Steve Clement reviewed a paper for the editor of the Journal of Applied Ecology.

June 16, Vicki Bradley discussed characteristics and availability of field-planted *Poa tibetica* accessions with John Hardison.

June 18, Steve Clement was invited by Dr. Israa Ahmed, Editor of Psyche: A Journal of Entomology, to write a review paper for a special issue on Foraging Biology of Neglected Social Pollinators. Declined.

June 19, Vicki Bradley gave the Washington State Report at the W6 Technical meeting at WSU, Pullman, WA.

June 19, Jinguo Hu coordinated the annual W-6 TAC Teleconference Meeting in Pullman, WA.

June 20, Steve Clement reviewed two papers for the journal Redia at request of Professor van Emden, Reading University, UK.

June 23, Vicki Bradley presented a presentation titled “The Agronomy Regeneration Program” to Russian and Chinese scientists visiting Pullman.

June 24-July 2, Jinguo Hu traveled to China. He attended the International Symposium on Seed Science &Technology and Seed Industry Development from Jun 25 to 28 in Kunming, China and made an invited oral presentation entitled “The U. S. National Plant Germplasm System: preserving plant genetic resources”. He visited Nanjing Agricultural University, Nanjing from Jun 29 to July 2 and delivered a seminar entitled “Crop molecular breeding: achievement and prospect” to graduate students.

June 28-July 2, Clarice Coyne attended the International Ascochyta Conference Pullman, WA and presented a poster.

June 28-July 2, Frank Dugan attended the Second International Ascochyta Workshop in Pullman, WA and presented a poster “Clonostachys in chickpea debris in the Palouse region of the Pacific Northwest, USA”.

July 1, Steve Clement was asked by AgResearch-New Zealand to consider entering into a confidentiality agreement re the development of an endophyte-based resistance system in wheat and barley.

July 2, Steve Clement provided a supporting letter to Dr. Chris Schardl, University of Kentucky, for his NSF proposal on endophyte diversity and preservation.

July 2-9, Barbara Hellier attended the Herbaceous Ornamental and Leafy Vegetable CGC meetings in conjunction with the American Society for Horticultural Science conference. St Louis, MO.

July 6, R.C. Johnson hosted Lucas Freshour, Univ. Tenn. Graduate student on *Poa* species genetic resources.

July 8-9. Steve Clement and Leslie Elberson hosted visiting ARS scientist from Logan, Utah and provided instruction in isolating viable endophytes from grasses.

July 9, Vicki Bradley attended Mount Vernon Research Center field day.

July 12-16, Clarice Coyne attended the Model Legume Congress, Asilomar, CA and presented a poster.

July 14-15, Jinguo Hu attended the Plant Germplasm Operations Committee (PGOC) Meeting at Sturgeon Bay, WI

July 16, William Luna participated in the USDA respiratory fit testing.

August 1-5, Frank Dugan attended the American Phytopathological Society Annual Meeting in Portland, OR and presented a poster "Preliminary screening for resistance to Penicillium decay in *Allium* accessions" and was an author on "Potential alternative hosts for a powdery mildew pathogen on pea".

August 2, R.C. Johnson presented an invited talk for the workshop entitled "Restoring and Sustaining Western Landscapes: Interaction with Climate Change." My Title was: "Genetic Resources and Diversity for restoration now and into the future" sponsored by the Ecological Society of America, Albuquerque, NM

August 2, R.C. Johnson served as a Co-Organizer of workshop "Restoring and Sustaining Western Landscapes: Interaction with Climate Change" sponsored by the Ecological Society of America meetings.

August 11, Vicki Bradley hosted a visit by Dr. Bruce Veit, Senior Scientist, AgResearch Grasslands, Palmerston North, New Zealand.

August 11-12, Steve Clement hosted a visiting scientist from Spain.

August 14, William Luna participated in the SHEM inspections of the P.I. facilities along with the Safety and Occupational Health Specialist.

August 24-25, Clarice Coyne visited the Arctic Germplasm Repository, Palmer, AK and conducted a pea trial evaluations.

August 25, Leslie Elberson assisted Vicki Bradley, Cool-Season Grass and Safflower Curator, in planting *Poa* grass seedling plots at the WSU Mt. Vernon Research Station.

August 25-26, Vicki Bradley traveled to Mount Vernon to plant *Poa supina* evaluation plots.

August 26, William Luna participated in the SHEM inspections of the Central Ferry facilities along with the Safety and Occupational Health Specialist.

August 31, Steve Clement was contacted by a graduate student at the University of Kentucky about research he did in the 1980s on *Bonnetia comta*. Steve provided information.

September 8-16, Stephanie Greene travel to St. Petersburg, Russia for ISTC project 6265p

September 11, R.C. Johnson hosted Brent Barrett, AgResearch Limited, New Zealand, safflower agronomy and breeding

September 22, R.C. Johnson helped María Clara Franchini for a successful fellowship application for visiting research on safflower in Pullman, WA, May-Aug 2010

October 19, Steve Clement was invited to participate in a research project involving the Colorado potato beetle and host-plant resistance. Invitation came from Dr. Erik Wenninger, University of Idaho. Declined.

October 25 to 29, Jinguo Hu attended the International Congress of Plant Molecular Biology at St. Louis, Missouri and presented a poster entitled "*Brachypodium distachyon* genetic resources for grass functional genomics research from the U.S. National Plant Germplasm System".

October 26, Barbara Hellier reviewed a manuscript on *Lactuca* collection management for Plant Genetic Resources.

October 28-31, Clarice Coyne presented a talk at the North American Pulse Improvement Association, Fort Collins, CO,

October 30-November 4, V. Bradley presented the yearly summary of the cool-season grass program to the Forage and Turfgrass CGC and attended the Crop Science Society of America meetings in Pittsburg, PA.

November 1-5, Stephanie Greene attended, ASA/CSSA/SCCA Annual Meeting, Pittsburg, PA.

November 4, Vicki Bradley attended the Turfgrass Breeders Association meeting in Pittsburgh, PA.

November 13, Barbara Hellier was invited to review NPGS plant exploration proposals for the Plant Exchange Office.

November 17-19, Steve Clement served on USDA-ARS RPES panel, Phoenix, Arizona. Steve has served on RPES panels since 1989.

December 2, William Luna participated in spill prevention training along with WSU Health and Safety technician and USDA Safety and Occupational Health Specialist.

December 11, Barbara Hellier helped with the location food drive delivery to Pullman foodbanks as member of the location EEO committee.

December 11, Clarice Coyne visited University of California, Davis and discussed possible collaboration with Professor Cook's legume research group.

December 13-16, Steve Clement attended annual meeting of the Entomological Society of America, Indianapolis, Indiana and presented a talk and served as secretary of the International Affairs Committee.

December 14. Steve Clement received an invitation from Professor C.M. Smith, Kansas State University, to co-author a review of host-plant resistance for the Annual Review of Entomology.

December 21, Steve Clement reviewed a submitted paper for the editor of Crop and Pasture Science, a CSIRO-Australia journal.

Appendix 3

Minutes of 2009 –W6 Technical Advisory Committee Meeting (pending for approval at 2010 meeting)

Report Information:

- Annual Meeting Dates: 06/19/09 to 06/19/09
- Period the Report Covers: 10/2008 to 09/2009

Participants:

- Committee members present:
- Ralph Cavalieri - Administrative Advisor, Washington State Univ.
- Dan Parfitt - California - new chair,
- Mark Brick - Colorado
- Ian Ray - New Mexico - previous chair
- Shawn Muhlenbacher - Oregon
- Jack Martin - Montana
- Bonnie Furman - Alaska
- Committee members absent:
- Robin Groose - Wyoming
- Stephen Jones - Washington - vice chair
- Kevin Jensen - Utah
- John Cho - Hawaii
- Dennis Ray - Arizona
- Guests:
- Anne Marie Thro - CSREES, Washington DC
- Peter Bretting - NPS, NPGS, Washington DC
- Andrew Hammond - USDA, ARS Western Region
- Jinguo Hu - W6
- Dave Stout - W6
- Steve Clement - W6
- Frank Dugan - W6
- Vicki Bradley - W6
- Harold Bockelman - National Small grains collection
- Kim Hummer - NCGR, Corvallis
- Joseph Postman - NCGR Corvallis
- Francis Zee - NCGR, Hilo
- Malli Aradhya - NCGR, Davis
- Richard Lee - NCGR, Riverside

Brief Summary of Minutes of Annual Meeting:

W-6 Regional TAC meeting - June 19th, 2009 Meeting started at 8:25 am

The meeting was conducted as a telephone/video conference. Some conferees used video connections, organized through the Western Regional Plant Introduction Station and the rest of the participants were connected by phone.

Review of 2008 minutes

Motion to approve minutes with minor modifications - Ian Ray Seconded - Bob Zemetra

Minutes were approved by unanimous vote

Motion - Bob Zemetra nomination to be Secretary - Shawn Muhlenbacher Seconded - Ian Ray

Motion approved by unanimous vote

Resolution committee

Kim Hummer and Shawn Muhlenbacher

- Organization resolution - National Clean Plant Network - Resolution 2 was successful - Resolution 3 repeat? Advocate increasing base funding for all NPGS stations

Directors Report and Budget - Ralph Cavalieri

Hope experiment on teleconference works due to western state budget issues this year.

Status of W-6 project - new project submitted and accepted June 16th. Duration of the new project is from October 1, 2009 to September 30, 2014.

Need to file annual report within 60 days (Dan, Bob and Jinguo). Need to emphasize impact in report.

Budget request ($395,660) that was approved last year was approved by Western State Agriculture Experiment Directors at level requested.

Report from National Program - Peter Bretting, Ann Marie Thro, Andrew Hammond

Highlights from submitted report:

Personnel changes, - Allan Brown going to NCSU so Parlier position open but search is occurring - Palmer Alaska position is filled (see report) - Davis position in open but advertised - Parlier position search has closed

Site developments - System shipped 10,000 accessions to Norway storage unit - Starting to transform GRIN to GRIN-Global through collaborative funding, will reach half way point in process this month

Budget - FY09 budget restored cuts from Bush administration, additional funds to some stations from stimulus funds to improve existing structures, some is going to Riverside - FY10 budget submitted to Congress, mark-up by House last week showed a small increase for ARS (3 million dollars). - Budgets for western regional sites were increased due to internal budget reallocation (Davis and Pullman). Funds came from other ARS projects to germplasm programs.

New Administration priorities - Nutrition - Specialty crops - Global food security - Climate change - Livestock diseases and plant pathogens - Change in CREES to National Institute for Food and Agriculture (NIFA)

National Programs - Review cycle - Next review cycle starts 2011

National Plant Germplasm Coordinating Committee - Key issue, emphasize importance of germplasm system - targeting Ag Experiment Stations - Lee Somers rep from Western Region, Dan Upchurch - New Mexico - Meets annually, last year in Fort Collins, CO and will be meeting in Beltsville MD this June

International Germplasm Exchange - FAO International Treaty still in Senate review (submitted last year), might hold hearings this summer or fall. Signed by Bush 2002 - International exchange and benefits regime on biodiversity, writing of agreement has started. U.S. is not part of the program - Key for businesses dealing with germplasm is that there be a set of accepted rules for utilization of germplasm that they can follow and not run afoul of rule variability from country to country

Report from CREES Ann Marie Thro

Highlights of Powerpoint presentation:

News from REE Mission Area - New undersecretary - Rajiv Shah - New REEO - Catherine Parks (Forest Service) News from CSREES - New institute - no new director yet (presidential appointment) starts Oct. 1, 2009 - New grant program AFRI

President's budget no increase in Hatch or AFRI, Research areas that were increasing or stable include: organic (increasing), biomass (increasing), specialty crops (stable)

Increases for small businesses (sustainable agriculture) Education - Challenge grants

W-6 Hatch funds showed increase in 2007 but major increase due to no earmarks that year

Important to communicate work especially with this administration - CRIS reports - Important to code for genetic resources and plant breeding KA 202 plus additional codes to fully describe work

Cite Hatch funds when citing support, not just citing Agricultural Experiment Station

Discussion occurred on how to cite Hatch and problems with grants.gov.

Area Director Pacific West Area ARS Andrew Hammond

- Partnership between ARS and Experiment Stations - ARS redirected some funds to Pullman $250,000 and $90,000 to Davis - Closing date on Davis position - July 6th

Break - 9:50

Harold Bockelman - Aberdeen

- 135,000 samples in collection - still growing - Distributed 56,000 samples - 703 requests June 2008 to June 2009 - Increase in number of requests from non-researchers - 30% go to researchers outside of U.S. - Contributed large samples to Norway seed vault (18,000 samples) - Effort to respond to UG99 stem rust - coordinating large Kenya screening nursery - Working on GRIN-Global - funding from Global Crop Diversity Trust

Kim Hummer - Corvallis

Highlights of submitted report:

- Record number of requests over the last four years - Increased 150% this year - Increase in number of requests from non-researchers - At limit of ability to handle requests - Number of accessions are increasing (ex. 150 new hop accessions) - Funding and staffing are increasingly challenging (flat line of funding = reduced staffing) - Accomplishments (check first page of report) - Received two SCRI grants - Joseph Postman - National Clean Plant Network - new program to preserve small fruit and grape germplasm (20 million dollars - 5 million per year, first year funded but remaining 3 years may be lost) - Excellent outreach events

Malli Aradhya - Davis report

Highlights of submitted report:

- Dozen genera in collection - Grape phenotyping and genotyping 1300 - Germplasm collection on walnut and other species - Genotyping walnut collection - develop juvenile selection method (SNP's) - Uploaded large amount of data into GRIN - Work on olive, genotyping and established a new block of olive germplasm - Screening of wild walnut germplasm for disease resistance - Molecular fingerprinting Prunus species (dozen micro-satellites) - Field days held on fig, pomegranate and persimmons - The Research Leader position has been vacant since April 2008 and Dr. Daniel Kluepfel (RL of the Crops Pathology and Genetics Research Unit, ARS Davis, CA) has been serving as acting RL/Curator since April 2008. The RL position has been advertized as a category 1 scientist position with a closing date of July 6, 2009. - The management responsibility for Parlier was added to Davis in October 2008 - The recruitment for the Parlier curator is underway - Funding for the Davis program has been static. A $90,000 increase was

approved in 2009 to support the new research leader. - Facilities are currently full (greenhouse, screen house and field) - New security system has been installed - All field collections are now under irrigation - Accession increase shown on pages 4 and 5 - Has put an emphasis on phenotyping

Francis Zee - Hilo report

Highlights of submitted report:

- Work has been progressing at the station - PBARC site is progressing, adding 3 new scientists (pathologist, entomologist and molecular geneticist) - In process of regenerating collection (program nearing 20 years) - Cacoa and Avocado collections being established, avocado using root stocks and will serve as a back-up for Miami - Working on developing cooperative agreement with China - Medicinal herbal collection potentially available from China - SCRI grant with Corvallis and UH on Ohelo berry

Bonnie Furman - Alaska report

Highlights of submitted report:

- Seed collection not well organized and had poor germination (40% non-viable) with 20% possibly had dormancy issues - Issues with seed handling have been corrected - 85 accessions now available - Clonal collections in better shape (rhubarb) - Low number of requests

Jinguo Hu - W-6 Pullman

Highlights of submitted report:

- As of May 29, 2009, there were 80,914 accessions comprising 797 genera, 3,642 species (3,970 taxa) in the WRPIS collection - Distributions increased to a record high number of 28,592 seed packets (17,740 accessions) to 730 requesters in 983 seed orders. Among them, 17,433 (61%) packets were sent to addresses in the USA and 11,159 (39%) packets to foreign countries - 30,194 observation data points of 161 descriptors of 21 crops on 5,457 accessions were entered into GRIN in 2008. Ninety-eight percent of the data came from personnel at our station and the remaining two percent came from our cooperators - Three international collection trips were conducted and 1,136 new inventories were acquired - 852 seed inventories were shipped to the NCGRP, Fort Collins, Colorado and 2,343 inventories were sent to the Svalbard Global Seed Vault, Longyearbyen, Svalbard for secured backup

Richard Lee- Riverside

Highlights of submitted report:

- Powerpoint presentation (similar to written report) - Adding a support technician, and a new administrative assistant - Collection of collections - 1,100 accessions - most diverse

collection in the world - Protected collection in screen house - 425 accessions - Date palm collection, Brawley site coming to end of its usefulness - 564 distributions in 2008, lower than 2007 but 2009 already above 2008 numbers - Adding information to GRIN - Doing survey for HLB - Murraya paniculata plant carries disease (greening disease) spread by cyllid

Discussion on how to address number of non-research and foreign requests overloading the system. Ideas included limiting number of requests, adding a handling charge, though some people who do make requests cover some of the shipping costs. The NPGS can't, by rule, assess a charge on filling germplasm request. So is it a question concerning the balance of research verses service? Rate of shipment could be slowed or prioritized?

W-6 Budget

Proposed FY 11 funding increase (about $9,600), is this feasible with the current budget situation? Will federal funds be increased as proposed in budget for FY-11?

Motion to approve FY 11 W-6 budget request - S. Mulhenbacher Second - Ian Ray Vote - unanimous

State Reports

California - Dan Parfitt (See start report for specific information) 162 requesters - similar to previous years Responses - about 15% See report - Concerns about funding to maintain clonal collections

Colorado - Mark Brick (See start report for specific information) - 724 accessions - 29 individuals slight decrease over previous year

Hawaii - John Cho - no report, he has retired and has requested that the Experiment Station Director appoint a new representative.

Idaho - Bob Zemetra (See start report for specific information) - 7,487 accessions were requested covering 57 genera and 109 species an increase in accessions, genera and species over the previous year - Requests came from 31 individuals with 14 being from the public sector and 17 from the private sector - The species with the largest request was Triticum aestivum - The most requested crop species mirrored the predominant crops in the state, barley, wheat, sugarbeets, dry beans and potatoes

Montana - Jack Martin (See start report for specific information) - 969 accessions/13 individuals 9 associated with Montana State University/ARS - Mostly wheat and oats - Wheat for vernalization gene research - Oat core collection - looking at resistance to sawfly in oats - Wheat isolines for puroindoline gene research - Corn - for disease research, foliar diseases and transgenics

New Mexico - Ian Ray (See start report for specific information) - 216 accessions - 11 individuals (70% associated with breeding companies) - Primary requests peanuts and

cotton - Chili pepper research - disease resistance and extended shelf life - Biofuel crops - amaranth - Seeds of Change company - organic ag market - See report

Oregon - Shawn Muhlenbacher (See start report for specific information) - Material requests are from plant breeders - White mold in beans, anthrocyanin production in tomatoes J. Myers - Hazelnut program has released a few cultivars and pollenizers (resistance to Eastern Filbert blight) - See report

Utah - Kevin Jensen - See report (not present)

Washington - Stephen Jones - See report (not present) - 155 orders received 27 responses (20%) - 19 of the responses from WSU

Wyoming - Robin Groose - No report

Old Business

Future Meeting Locations: - Geneva, New York August 16th - August 23th, 2010 - Motion to accept the invitation by NE Region PI station to host a joint meeting of the 4 regional projects - moved by S. Muhlenbacher - Second - B. Zemetra - Discussion - can we have a teleconference from Geneva for the Western Region meeting? For the members that cannot attend the meeting in person? - Resolution passed unanimously - -- 2011 meeting in Pullman, WA in July, 2011 - Motion by Bob Zemetra - Second Mark Brick - Passed unanimously

Resolutions -

1st resolution - The W-6 Technical Committee thanks Jinguo Hu, and the W-6 staff, including Jannis Bacani, Gwen Pentecost, and Dave Tibbals for organizing, coordinating and providing technical-support for the first W-6 annual meeting as a video/teleconference.

Move to accept the first resolution - R. Zemetra Seconded - S. Mulhenbacher Passed unanimously

2nd resolution - Be it resolved that the W6 Technical Committee advocates increasing the level of federal base funding of all units of the National Plant Germplasm system to ensure adequate funding to pursue its obligations of distribution and maintenance of plant germplasm.

Moved - Ian Ray Seconded - Jack Martin Passed unanimously

3rd resolution - Whereas clonal germplasm conservation is a critical component of the U.S. National Clean Plant Network, and pathogen tested germplasm enhances the security and productivity of U.S. nurseries and fruit producers, the W-6 Technical Advisory Committee encourages continued funding for this important multi-agency

USDA program which benefits our National Plant Germplasm System as well as its stakeholders

Moved - Ian Ray Seconded - R. Zemetra Passed unanimously

Discussion centered on whether the Clean Plant Networks activities fell within the purview of the W-6 Technical Committee. Dr. Parfitt had significant reservations concerning this point, noting that the Clean Plant Network is not part of the National Plant Germplasm System and is funded through several channels, separate from NPGS.

New Business - none

- Ian Ray suggested that it would be useful to survey the meeting participants on their observations re: the video/teleconference. - Dave Stout will prepare a template for solicitation for information from germplasm program users.

Motion to adjourn Moved - M. Brick Seconded - S. Mulhenbacher Passed unanimously

Meeting adjourned at 3:40 pm