PGOC, NRSP-6, and Regional Plant Introduction Stations Update

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Plant Germplasm Operations Committee

- About 50 attendees participated in the 2014 PGOC meeting October 28-31 at Davis, California, including international visitors from Canada, CIMMYT, China, and Colombia.

- Reports from ONP and various NPGS functional groups

  Office of National Programs Report – Peter Bretting; NGRL, CGC, and PEO update – Gary Kinard; NCGRP update- Harvey Blackburn, Stephanie Greene, and Christina Walters; ; PGPRU update – Chris Walters; GRIN Global update – GRIN Global team.

- Reports and Discussions:

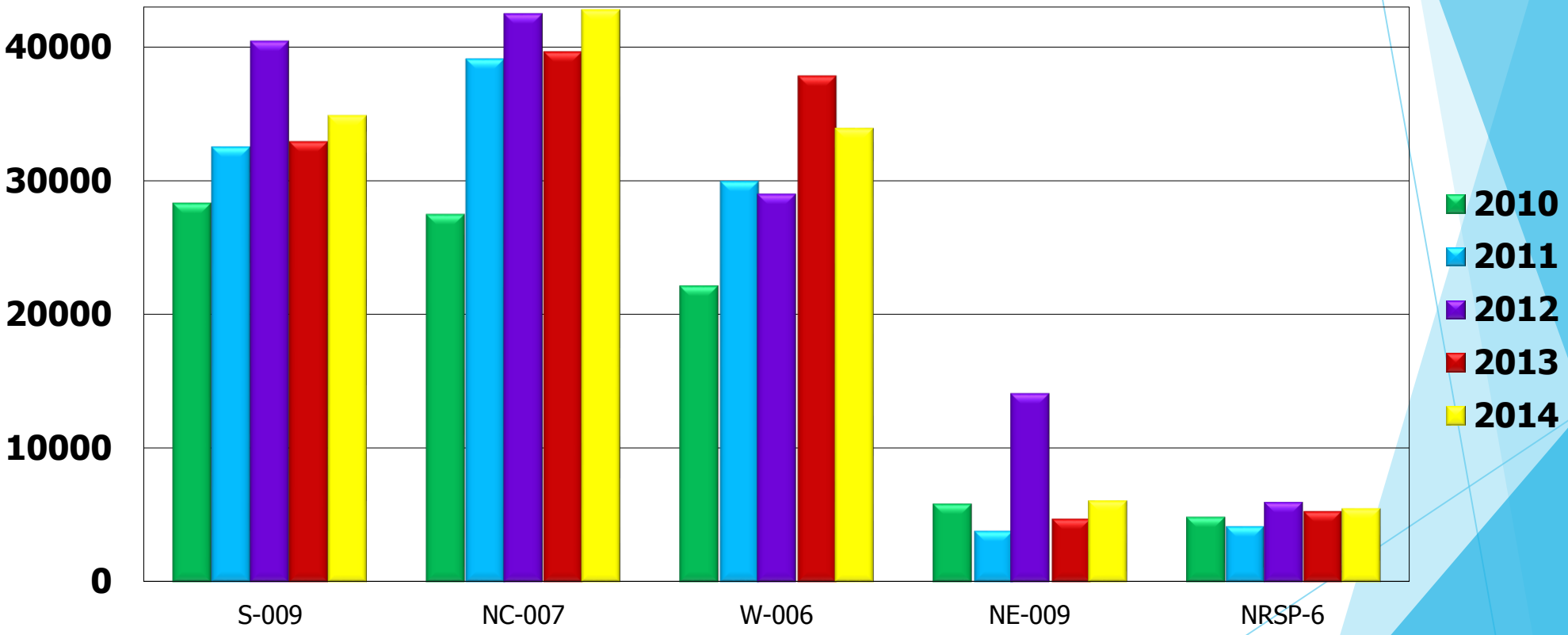
  NPGS Regional Plant introduction Station Updates;
  Critical and Emerging Issues: NPGS order processing challenges; Cat. 4 promotion; better outreach and public awareness efforts; impact of collection; guidelines for decommissioning NPGS collection; proprietary, genetically enhanced, x-PVP and other materials in the NPGS genebank;
  Subcommittee Reports: NPGS Special Achievement Award; Acquisitions & Distributions; Crop Wild Relatives; GIS and Georeferencing; Molecular Markers in GRIN; NPGS Operations Manual; Plant Exploration/Exchange Programs; Updates on "Seeds for Our Future" brochure; and Phytosanitary and Shipping.

- Next PGOC Meeting and Curator Workshop will take place in fiscal year 2016 in Fort Collins, CO.

US Regional Plant Introduction Station Functions

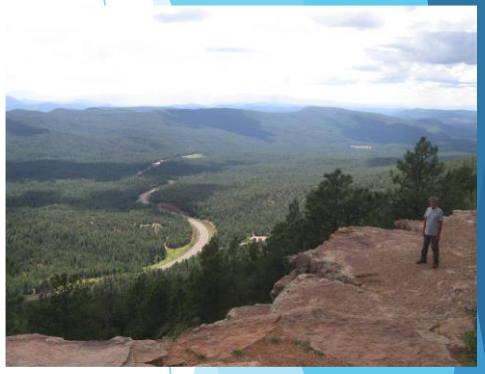
- Acquire, conserve and distribute plant genetic diversity and associated information
- Encourage use of germplasm (User-focused)
- Conduct research to improve genetic resource management programs
- Evaluate and characterize germplasm to facilitate targeted research objectives
- Prebreeding activities to facilitate utilization

Distributions



Potato Genebank (NRSP-6)

- Preservation, evaluation and distribution of 5,000 botanical seed accessions of about 100 species; 1,000 in vitro clones are also preserved.



- Collected 18 germplasm collections from Arizona and received 15 new cultivars and breeding clones from cooperators in 2014.

- Increased 218 accessions as botanical seed populations and 2,700 accessions as clones in 2014.

- Carried out virus tests of over 700 accessions, germination tests of 1523 accessions, and ploidy determination of 23 accessions in 2014.

- Distributed a total of 4,695 accessions in 2014, including 4,463 domestically and 232 internationally.

Potato Genebank (NRSP-6)

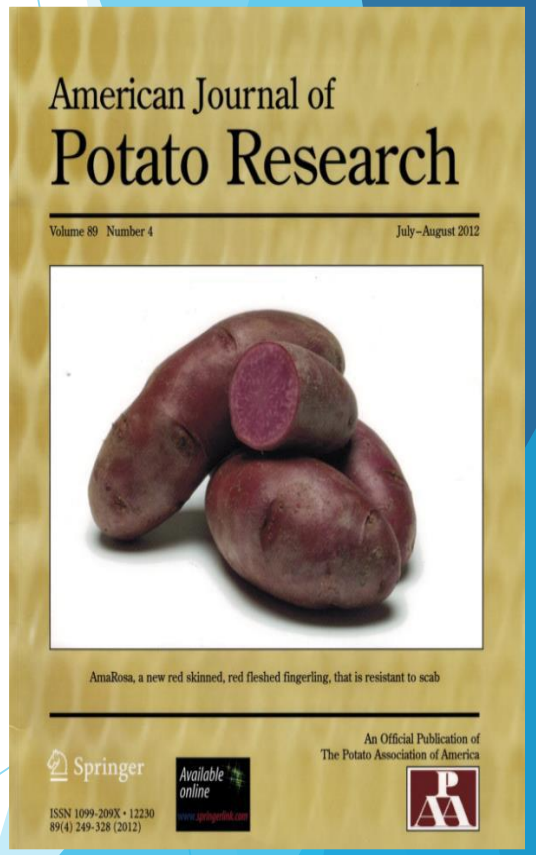
- Taxonomic classification of accessions.
- Breeding for improved *Criolla* (egg yolk) style speciality potato.
- Use of SNPs for genetic diversity study.
- Evaluation of crossability of *S. verrucosum* with *S. jamesii.*
- Cooperative research for evaluation of heat stress tolerance, glycoalkaloids, anti-obesity, new Double *Corolla* mutant, and Zebra Chip resistance.

Potato Genebank (NRSP-6)

- **Impact of NRSP-6 on potato industry:**

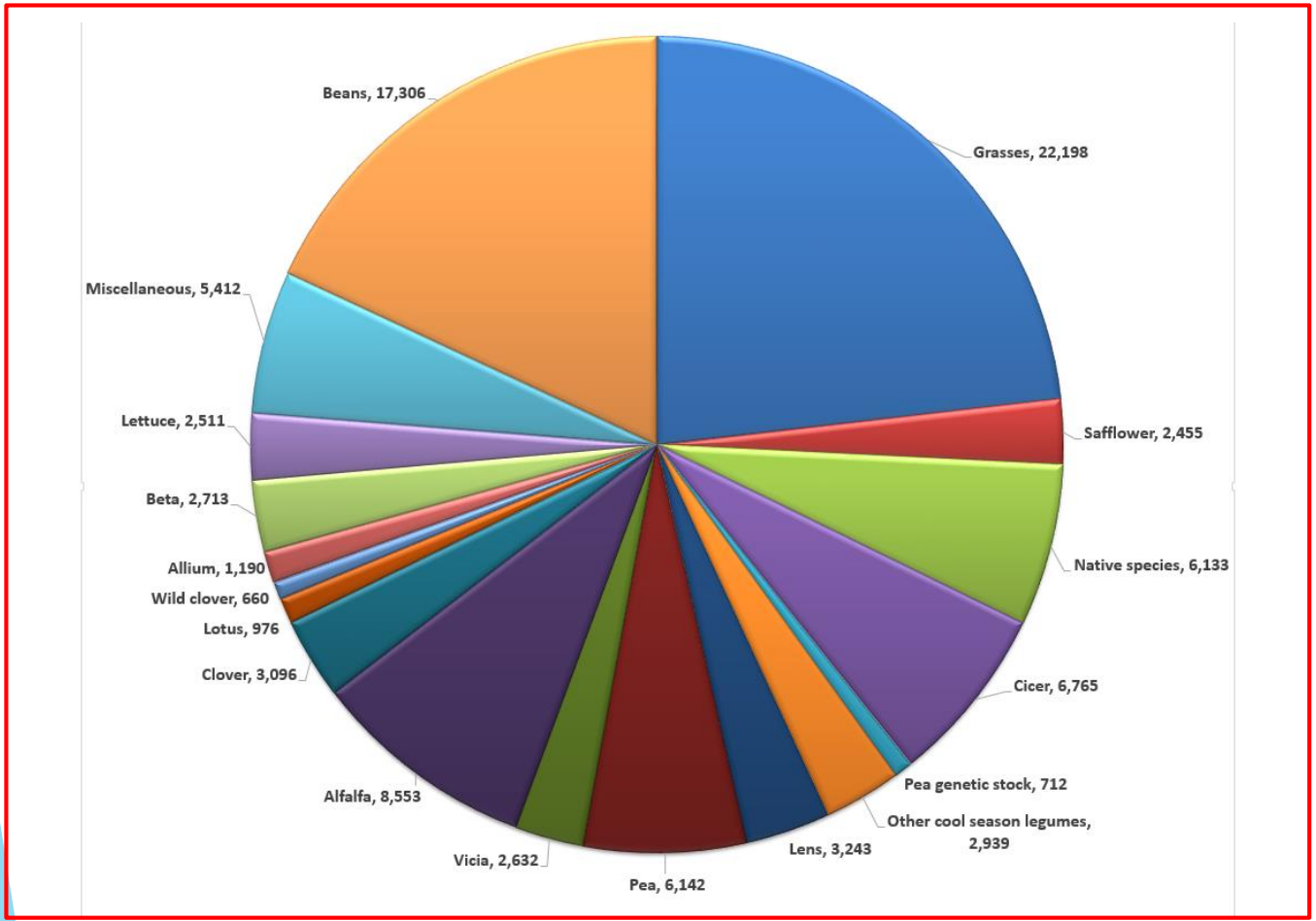
Discovering and deploying traits: better selections for golden flesh, frost resistance in Peruvian highlands, folate, potassium, resistance to tuber greening, glycoalkaloids, and a natural appetite suppressing protein.

NRSP6 exotic germplasm in the pedigrees of many new cultivars this year: Yukon Gem, Classic Russet, Clearwater Russet, Alta Crown, Cooperation-88, Alpine Russet, Sentinel, Huckleberry Gold, Teton Russet, Elkton, M7 Germplasm Release, AmaRosa, Purple Pelisse, Owyhee Russet, Palisade Russet, Saikai 35.



Western Regional (W-006)

- **Crops managed**



Five curatorial programs:

1. Agronomy and grasses (**Vicki Bradley**)
2. Beans (**Theodore Kisha**)
3. Cool season food legumes (**Clare Coyne**)
4. Temperate forage legumes (**Vacant**) located in Prosser, WA
5. Horticultural and miscellaneous crops (**Barbara Hellier**)

Four research programs:

1. Agronomy (**Richard Johnson**)
2. Plant pathology (**Frank Dugan**)
3. Genetics (**Jinguo Hu**)
4. Genetics (**Long-Xi Yu**)

Western Regional (W-006)

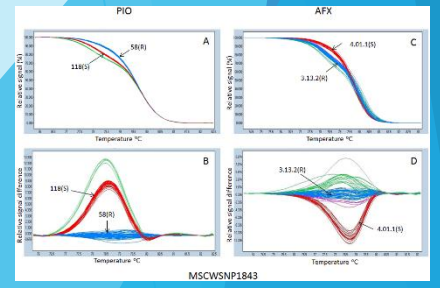
Highlights

- As of December 31, 2014, there were 95,636 accessions belonging to 1,101 genera, 4,804 species and 5,450 taxa in the WRPIS collection.
- We distributed a total of 33,536 packets of seed samples to 1,269 requestors with addresses in each of the 50 domestic states and 45 foreign countries. Approximately 38.5% (8,806 out of 22,833 packets) of the domestic distribution went to the 13 Western states.
- We uploaded 65,164 observation data points on 24,816 accessions into the Germplasm Resources Information Network (GRIN) database.
- We shipped 3,020 seed inventories to the National Center for Genetic Resources Preservation (NCGRP), Fort Collins, Colorado and 451 inventories to the Svalbard Global Seed Vault, Svalbard, Norway for secured backup.

Western Regional (W-006)

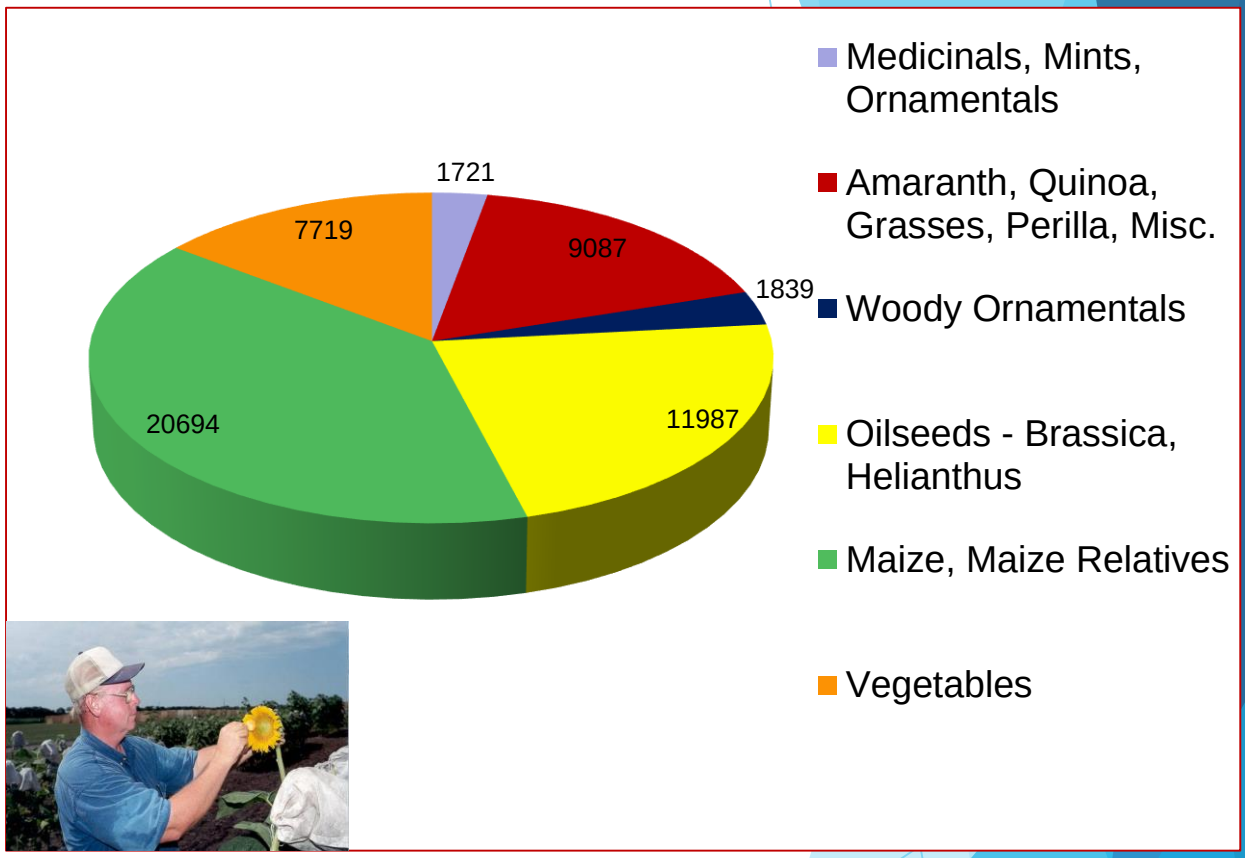
Highlights

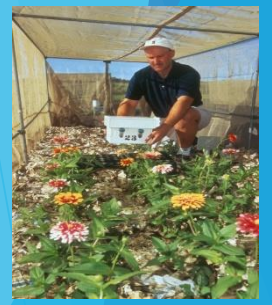
- In collaboration with DuPont Pioneer and Alforex Seeds companies, we identified SNP (single nucleotide polymorphism) markers associated with resistance to Verticillium wilt in two alfalfa populations
- We released to public four winter-hardy faba bean germplasm lines for pulse and cover crop development.
- In collaboration with University of Florida, we identified a dominant resistant gene from a NPGS accession to the Florida race of lettuce bacterial leaf spot and the associate SNP markers
- Supported by grants from the BLM's Seeds of Success (SOS) project, we developed seed zones of Sandberg bluegrass based on adaptive traits for ecological restoration.



North Central Regional (NC-007)

- Strategic collection development
- Maintain and provide high quality, true to type, well-documented germplasm for research and education objectives for primarily heterogeneous, heterozygous, out-crossing crops
- Pollinator insect management program provides six insect species on demand to support regenerations
- Characterization and evaluation to increase collection usefulness
- Provide technical expertise for completion and deployment of GRIN-Global. Facilitate interoperability of various information resources.





North Central Regional (NC-007)

- **Phenotypic and genetic characterization of 2800 Maize accessions** (published in 2013)

1. Understand population structure across the genome and subgroups of germplasm. Data has been leveraged by multiple researchers to understand genetic architecture and trait expression.
2. IBS (Identity by Sequence) information made available in query-able format on MaizeGDB
3. Evaluate the use of the collection and GBS markers for genome-wide association studies.
4. Facilitate targeted use of the collection

- **Development and maintenance of a 288-member Helianthus association mapping population**

1. 250 lines were from the NPGS collection and further inbred
2. Lines were phenotyped and genotyped with research partners
3. Germplasm and data is utilized by academic and other public sector researchers

North Central Regional (NC-007)

- **Collection Development Activities**

Among many factors to consider, the importance of the species and risk of habitat loss or extinction take priorities.

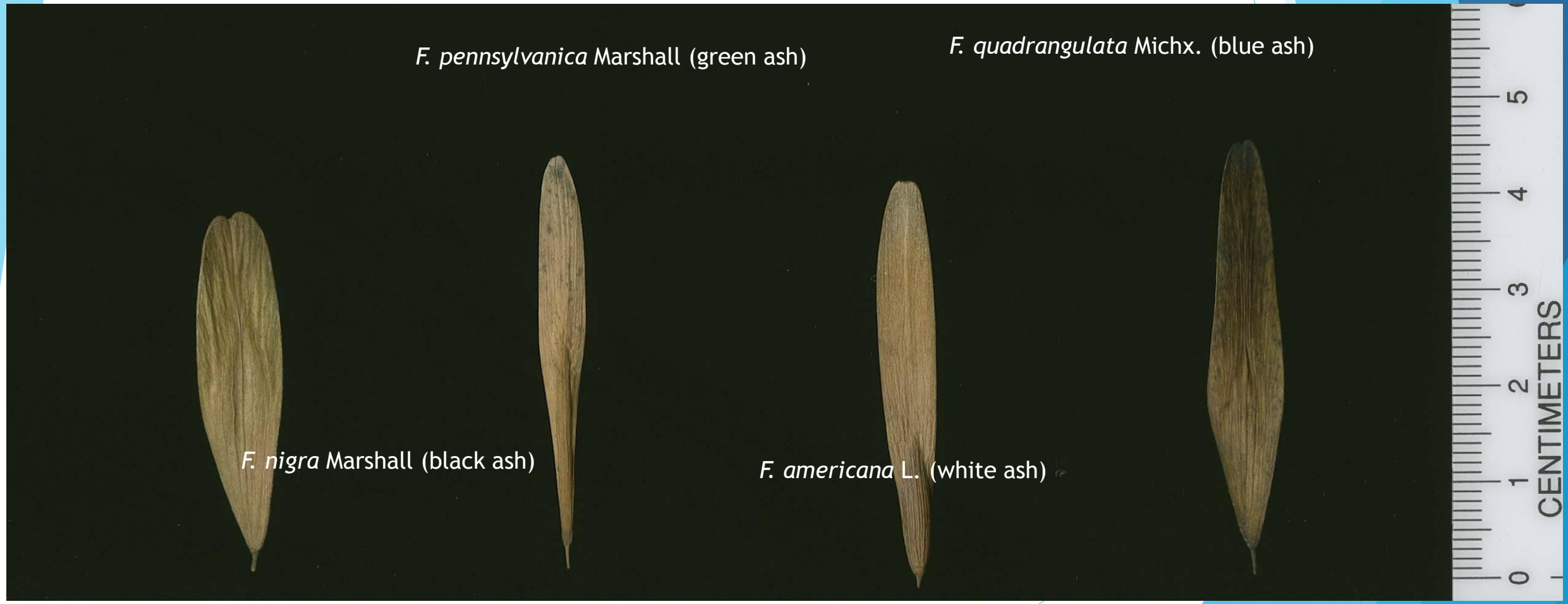
1. Continued collection of wild *Helianthus* (sunflower) across its native distribution

2. Conserving Ash Tree Germplasm for Future Re-establishment (threatened by the emerald ash borer); comprehensive collection of all native species across their range for the past 10 years.

3. Since 1999, eight NPGS sponsored collection trips acquired 525 new accessions of wild *Daucus* and related genera, of which 208 are miscellaneous Apiaceae, from Europe, Eur-Asia, Asia and Africa.

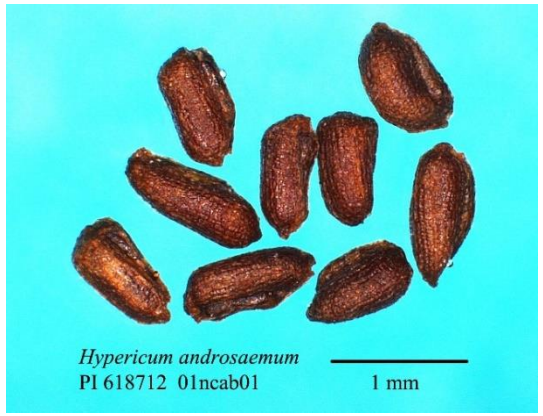
North Central Regional (NC-007)

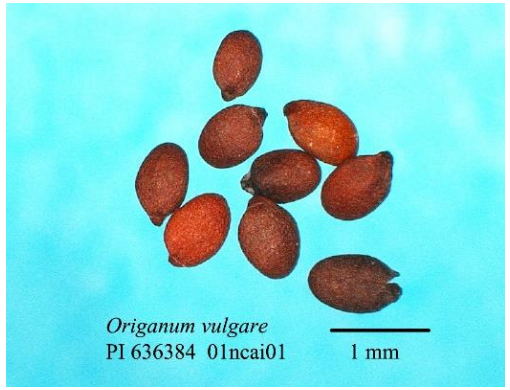
Use of digital images for species identification

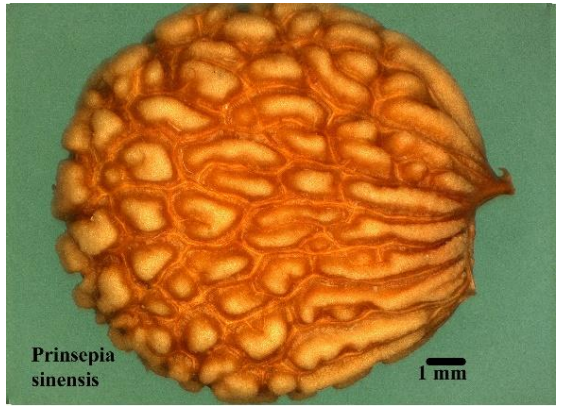


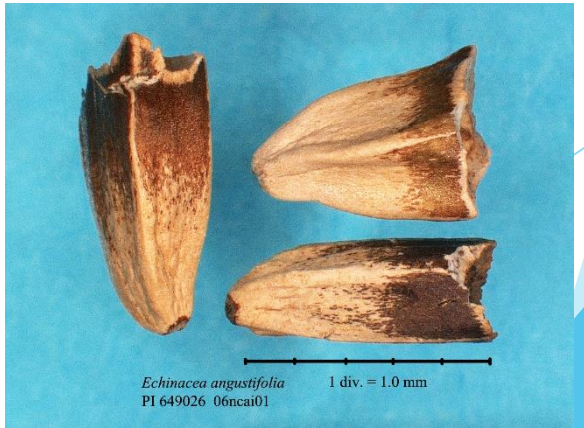
North Central Regional (NC-007)

- Development of protocols and training materials for high quality macro- and micro-photographic imaging of seeds and other plant materials, coupled with seed analyzer software.
- A series of training sessions was offered to NCRPIS curatorial personnel and to Iowa State University educators by Curator Barney. These materials and training videos will be made available on the station's repository home page.



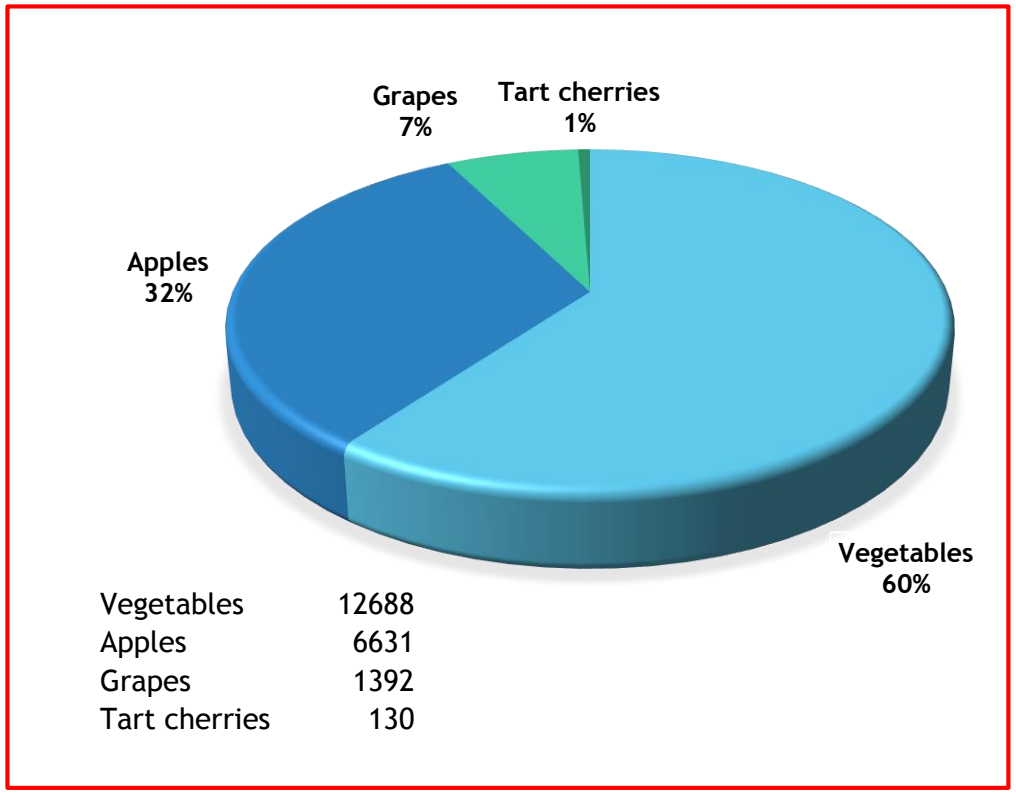






North-Eastern Regional (NE-009)

➢ Crops managed



Vegetables	12688
Apples	6631
Grapes	1392
Tart cherries	130

➢ Two curatorial programs:

- ❖ Vegetable Crops (**Larry Robertson & Joanne Labate**) tomato, onion, radish, winter squash, cabbage, cauliflower, broccoli, other cole crops, celery, tomatillo, asparagus, buckwheat and other vegetables.
- ❖ Clonal Crops (**Thomas Chao & vacant position**) apples, grapes and tart cherries.

North-Eastern Regional (NE-009)

Highlights:

- Distribution of 69,200 germplasm samples (12,168 in 2014) of fruits and vegetables from 2010 - 2014.
- Establishment of more than 2,000 regeneration plots (479 in 2014) for seed production of vegetable germplasm to distribute and replenish stocks from 2010 - 2014.
- Cryopreserved apple (2,274 accessions, 86%) and tart cherry accessions (74 accessions, 57%) and storage and backup of high-quality vegetable seed at National Center for Genetic Resources Preservation (NCGRP).
- Increased coverage of digital images and characterization data of apple, grape, tart cherry, tomato, onion, squash, and cabbage available on GRIN Global, improved efficiency of use of germplasm.

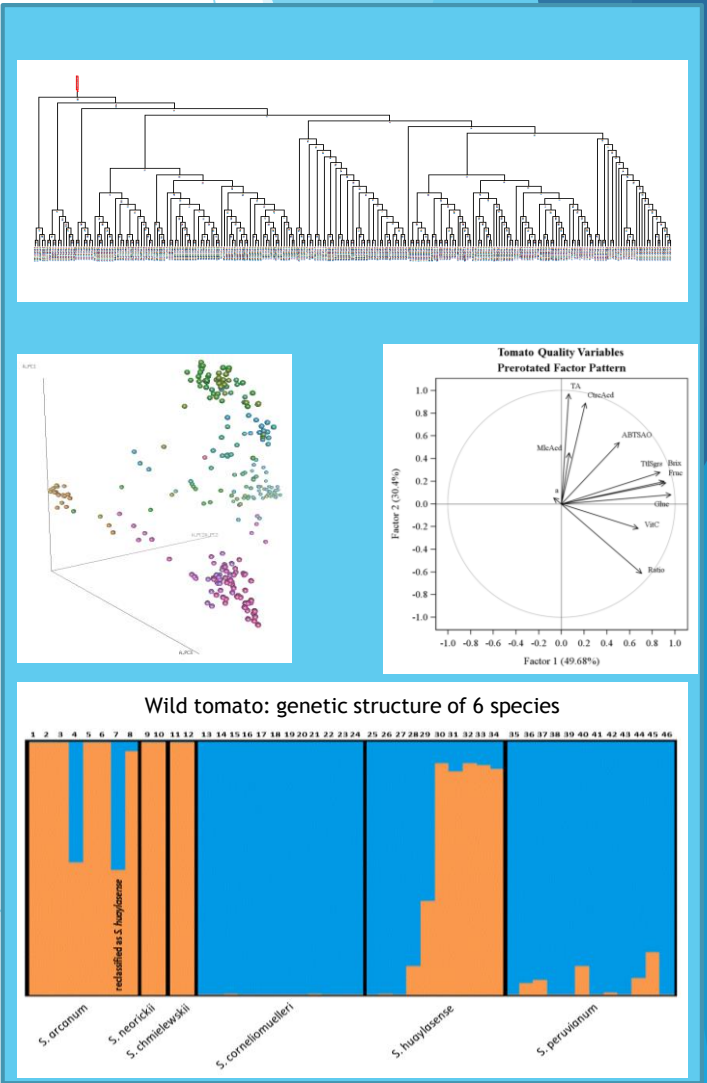
North-Eastern Regional (NE-009)

Highlights:

- Biochemical characterization of the PGRU fruit and vegetable germplasm for exploitation by breeders for enhancement of quality for flavor, texture, color, and health beneficial components such as vitamins, minerals, and cancer-preventing compounds.

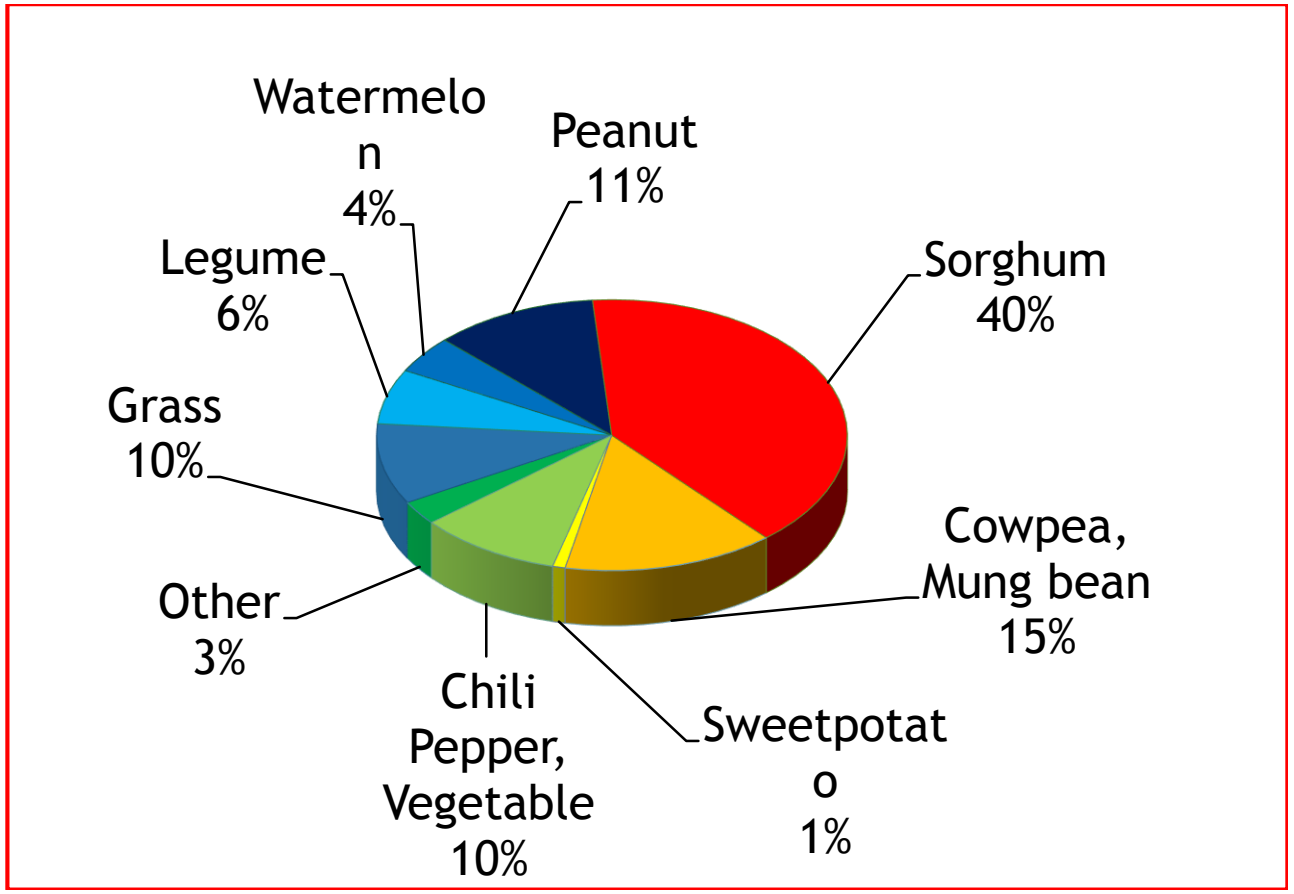
- Improved molecular genotyping (e.g. GBS) for accession identification and fingerprinting, phylogenetics, population genetics, and genetic mapping resulting in more efficient characterization and management of our collections (apple, grape, tomato, onion, winter squash and tomatillo).

- Enhanced knowledge and use of the germplasm by organic agriculture associations for varietal development via outreach activities funded through collaborative, competitive grants.



Southern Regional (S-009)

- **Crops managed**



Curators & Scientists

- Sorghum and annual clover (Gary Pederson)

- Vigna and misc. legumes (Brad Morris)

- Warm-season grasses (Melanie Harrison)

- Peanut (Vacant)
- Watermelon, pepper, sweetpotato, vegetables (Bob Jarret)

- Genetics Research (Ming Li Wang)

Southern Regional (S-009)

Highlights:

- S-009 collection had 92,238 accessions of 1,555 species with 90% available for distribution.
- About 98% of accessions are backed up at Ft. Collins and over 12% of accessions are additionally backed up at Svalbard, Norway.
- 34,884 accessions were distributed in 964 orders to users in 47 states and 40 countries in 2014.
- Germination tests, started in Griffin in 2002, have now been conducted on 90% of accessions including multiple inventories of many accessions.

Southern Regional (S-009)

Highlights:

- Bulk seed of almost 81% of the Griffin collection is stored in -18C for improved seed longevity. Sorghum (79%) and cowpea (10%) collections remain to be transferred into -18C storage.
- Evaluated sesame collection (1,232 accessions) for seed oil content and identified two accessions with over 64% oil content.

- Identified two peanut accessions with seed oil content over 54% by screening over 3000 peanut accessions.
- Collected 48 switchgrass accessions in AL, AR, FL, LA, MS, and TX and processed into the switchgrass collection.