2nd Rosaceae Tree Fruit Joint CGC Discussion

Apple, Prunus, Pyrus

Thursday, June 26, 2014 12-2 pm, Motif Hotel, Seattle, WA

Attendees: Nahla Bassil, Susan Brown, Kate Evans, Ksenija Gasic, Amy Iezzoni, Jim Luby, Jim McFerson, Jay Norelli, Mercy Olmstead, Cameron Peace, Janet Slovin, Sujeet Verma, Gayle Volk, Mike Wisniewski, Yanmin Zhu

Updates from CGC Chairs:
Gayle Volk (Apple):

- Crop Vulnerability Statement has been submitted to Genetic Resources and Crop Evolution. Bert Abbott indicated that Tree Genetics and Genomes could also be a possible target journal, and to send it to him if we need to resubmit.
- 4 evaluation proposals were submitted for the 2014 apple evaluations. $12,000 was awarded to Steve van Nocker and Peter Hirst for their work on flowering time in the Malus core collection.

Cameron Peace (Prunus):

- Cameron's graduate student was the only Evaluation submission for Prunus. He will be running diagnostic DNA tests on the NPGS peach collection
- A Prunus CGC teleconference will be held later this year. A CGC meeting will be held at the Davis repository within the next year.
- Peach and plum trees are being repropagated at the collection.

Kate Evans (Pear, for Rachel Elkins):

- A pear evaluation proposal was funded to evaluate tree architecture in the collection (Richard Bell and Joseph Postman).
- Rachel Elkins has recently uploaded all CGC paperwork to the CGC website so minutes and reports should now be current.
- A pear pest strategic management plan has been published, which discusses issues that confront industry.

Curator Reports (see attachments):
Apple (Thomas Chao)
Jay Norelli encourages Thomas to continue to prune the G1 block.

Pear (Joseph Postman)

Prunus (John Preece)

- Are Prunus seeds from explorations being stored at the repository, or are all seed being planted out in the field?
- Amy Iezzoni may have some cherry seeds that she would like to import from European colleagues. She will coordinate this project with Cameron/Quarantine.

NPGS Program Staff Report (attached)

Project/Crop Discussion

GBS: In apple, about 5000-10,000 SNP markers were identified for each of the NPGS collection (*domestica, sieversii, orientalis, sylvestris*) and in the Gala x *sieversii* populations, which was fewer than expected. The homogeneity of peach (Ksenija Gasic's project) may be an advantage with respect to GBS data analyses for that crop.

The Pear Genomics Research Network was founded in early 2014 to attempt to link together the genomics efforts of the US Pyrus community and includes Amit Dhingra, David Neale, Nahla Bassil, and Kate Evans. Much of the pear collection is being resequenced following two industry-funded projects. www.ucanr.edu/sites/peargenomics

Kate Evans has submitted an AFRI plant breeding proposal to develop pear rootstock breeding.

UC Davis is intending to fill a breeder position for work in walnut, which will also have some responsibility for pear.

Amy Iezzoni and Ksenija Gasic are initiating some Prunus rootstock breeding projects.

RosBREED 2 will focus on additional traits (including disease resistance), more species (including apple, pear, rose, Prunus, strawberry, blackberry).

- Encouraging breeders to make crosses with diverse germplasm now, since screening tools will soon be available.
- Will also have a stronger emphasis on developing prebreeding materials.
- Develop tools to evaluate what is available.
- Will have some funding to resequence and run additional GBS to identify enough markers for GWAS. According to Riccardo Velasco, about 15,000 SNPS are needed for GWAS in apple.
- A 50K Rosaceae-wide SNP array will be available for $30 per sample if RosBREED2 is funded.
- It was requested that RosBREED phenotypic data be made available to the curators, and perhaps entered into GRIN, since a number of NPGS accessions were phenotyped. The phenotyping methods were not the same as the current descriptor list, but having multi-year replicated data in GRIN would be valuable, even if it means that additional descriptors will be added.
- RosBREED reference materials (primary breeding parents) should be available through the NPGS. Perhaps curators can work with RosBREED participants to acquire this material.

Apple cider enthusiasts have an interest in European varieties. Acquisition of these varieties is not currently being pursued by the repository. Perhaps Thomas Chao could get a list of materials that are available from the WSU Mt Vernon collection and provide that to the cider community if specific materials are requested.

Cameron provided an explanation of "Evaluation" vs "Characterization" and "Genotyping" vs "Phenotyping".

Gayle asked if there was value in assessing NPGS collections for functional diversity. In some cases, the key functional genes may not yet be identified (as in strawberry). In apple there are specific markers that are linked to regions of interest. Assessments of diversity in these regions would be useful.

A request was made that curator reports (apple) be more quantitative and specifically address the sections in the crop vulnerability statement (filling gaps, security back-up, collection maintenance, etc). Information could also be provided from the 5 year plan which indicates current repository priorities and how critical activities will be addressed giving the current funding challenges.

PROGRESS REPORT for APPLE CGC 2014 Meeting

Plant Genetic Resources Unit, USDA-ARS
Geneva, NY 14456
Prepared by C. Thomas Chao, Horticulturist/Curator
Email: c.thomas.chao@ars.usda.gov
June 26, 2014
Apple CGC meeting

The winter of 2013-2014 was very cold with heavy snow fall. The weather remained cold through May, 2014. Quick warm up in May meant short blooming season for *Malus* in 2014. The bloom period lasted for about five weeks, comparing to almost two months in 2013 with graduate warm up during the spring time. The abnormal weather in spring 2012 had an impact on this year's bloom. We had early warm up in March 2012 and late frost events in April 2012 which resulted in significant damage to the flowers. The damage in 2012 bloom led to heavy bloom and crop load in 2013. Many accessions have no flower or very few flowers this year. I believe that many *Malus* accessions are now in an alternate bearing pattern and 2014 is an "OFF" year. We also had heavy rain in April and May of this year that led to standing water in certain area of the collection and loss of some accessions.

We maintain 6,684 *Malus* accessions including 4,987 field accessions (2,643 are permanent accessions with assigned PI#) and 1,697 seed accessions. We distributed 7,151 *Malus* samples for 266 orders between 06/01/2013 and 05/31/2014. The distribution includes 16 pollen samples, 3,955 leaf or DNA samples, 132 fruit samples, 293 seed samples, and 2,755 dormant budwood samples. The orders include 227 domestic and 37 foreign requests. There were 33 domestic and 32 foreign orders for the "Botany of Desire seeds". We normally sent out four packages of seeds for each order of "Botany of Desire seeds", and each package contains 25 seeds. Each pack of seeds counts as a single sample distributed. There is an increased request in the "Botany of Desire seeds" in recent years, particularly from European countries like England, France, Germany, and Finland.

We received 5 *Malus sylvestris* seed accessions from Albania. We received 9 new *Malus* accessions from APHIS Quarantine Center that includes four cider apple accessions ('Marialena', 'Peau de Chien', Repinaldo' and Xuanina') from Northern Spain, two accessions ('Lady's Finger' and 'Wallace Howard') from Tasmania, Australia, two accessions ('10/1' and 'Hasabi') from Israel, and one accession ('Rainha') from Brazil. We currently have 62,473 of open pollinated seeds from *M. sieversii* seedlings in K1 block (the "Botany of Desire seeds"). We intend to collect more OP seeds in fall of 2014 and 2015 before the removal of K1 block.

We completed the GBS genotyping of all 7 F1 populations of 'Gala' x *M. sieversii* in G1 block. We continued the fruit collection of *Malus* in summer/fall 2013 for fruit quality study. The apple GBS diversity project is moving along and currently we are at the stage of finalizing and analyzing the SNP database for meeting various project purposes. We are extracting the juice and conducting fruit quality traits analysis (fruit fresh weight, titratable acidity, anthocyanin, and 28 polyphenolic compounds). We continued our effort in characterizing the fruit polyphenolic profiles of the apple core collection in the past year. Fruit samples from 204 accessions were collected in 2013 and about 50% of them have been processed and analyzed through HPLC. We recorded the budbreak, full bloom and end of bloom of all trees in the permanent *Malus* collection on a weekly basis in spring 2014. We continued digital imaging of the fruit of

Malus collection in fall 2013, some foliage of the wild *Malus* in fall 2013, and the flower of *Malus* in spring 2014. We added 294 new photos of *Malus* to a total of 3,484 photos of *Malus* in GRIN last year. We are adding 229 photos of flowers representing all *Malus* species and hybrid species in the collection to GRIN database and the Genome Database for Rosaceae (GDR). The time for unveiling the new germplasm information database – GRIN Global is unclear right now. G. Volk and C. Richards at the USDA National Center for Genetic Resources Preservation (NCGRP) at Fort Collins, CO. are re-analyzing the SSR genetic data of three North American wild *Malus* accessions (*M. angustifolia*, *M. coronaria*, and *M. ioensis*) in the collection with newly added geographic information data for gap analysis. The gap analysis will be used for future exploration effort.

We shipped 30 *Malus* accessions to NCGRP for cryo-backup storage last winter. We are in the process of testing the viability of cryo-treated budwood. We will ship 30 *Malus* accessions to NCGRP for backup storage annually. Currently there are 2,274 *Malus* accessions in cryo-backup storage at NCGRP.

We had 11 groups of growers or college classes visited the collection in the past year. We had over 60 stakeholders visited the collection in two of our open tours in September 2013. We also had many individual or small groups of international visitors in the past year. *Malus* collection was mentioned in an article of National Geographic about the degradation of habitat of wild *Malus* germplasm in Central Asia (http://news.nationalgeographic.com/news/apples-of-eden-saving-the-wild-ancestor-of-modern-apples/).

We are cooperating and supporting several research projects using the *Malus* collections: (1) "GBS of *Malus* collection" jointly conducted by S. Myles, Dalhousie University, G. Volk and C. Richards, NCGRP, and PGRU; (2) "Development of biological system for controlling fruit decay" by M. Wisniewski and W. Janisiewicz, USDA-ARS AFRS, Kearneysville WV; (3)"Breeding apple rootstocks tolerant to abiotic stresses and resistant to pests and diseases" by G. Fazio, PGRU; (4)"Methods for rapid identification and functional analysis of fungi causing postharvest decay of pome fruit" by W. Jurick and J. Yu, Food Quality Laboratory, USDA-ARS, Beltsville, MD.; (5)"Improving stress and disease resistance in tree fruit crops" by M. Wisniewski, T. Artlip, C. Bassett, and J. Norelli, USDA-ARS AFRS Kearneysville, WV; (6)"Genetic characterization of fruit quality traits in the USDA *Malus* germplasm collection" jointly by S. Brown, Cornell University and PGRU; (7) "Evaluation of cryptic flowering in the USDA *Malus* germplasm collection" by S. van Nocker, Michigan State University and P. Hirst, Purdue University; (8) "Genetic and genomics of fruit quality traits and tree architecture traits of *Malus*" by K. Xu, Cornell University; (9) "Deep sequencing of *M. sieversii* genome" by Y. Mayshar, J. Davis, Harvard University, G. Volk, NCGRP, and others; (10) "MicroRNA related to resistance/susceptibility of *Malus* against apple stem grooving virus" by Z. Liu, USDA-ARS AFRS Kearneysville, WV; (11) "Evaluation of *Malus* collection against codling moth" by S. Whithead and K. Poveda, Cornell University.

The budget of the clonal project for 2014-2015 expects to be at the same level as that for 2013-2014, the level after the 2013 sequestration. The budget cuts due to the sequestration have resulted in a significant reduction of our operational budget for 2013-2014 and this financial challenge will likely continue in 2014-2015 and beyond. The budget reduction has significantly compromised and will continue to compromise our ability to carry out many germplasm research activities. Due to the budget cuts, we may also have to cut back on pruning for the wild *Malus* seedling blocks (K1 and W3) and the G1 block ('Gala' x *M. sieversii* F1 populations) to stay within the budget. Angela Baldo, computation biologist (0.38 FTE), was re-assigned to the USDA Dale Bumpers National Rice Research Center, Stuttgart, Arkansas as June 2, 2014. Currently we

have 1.1 FTE scientists, 1.0 FTE research support scientist, 1.0 FTE database specialist, 1.0 FTE field operation supervisor (supported by NE9 funding), 3.0 FTE field assistants (2.0 FTE supported by NE9 funding), 0.3 FTE IT specialist, and 0.5 FTE Pathway Ph.D. student working on the clonal project (*Malus*, *Prunus* and *Vitis* collection).

Publication:

PGRU *Malus* related publications:

Fazio, G., C.T. Chao, P.L. Forsline, C. Richards, and G. Volk. Tree and root architecture of *Malus sieversii* seedlings for rootstock breeding. Acta Horticulturae (In submission).

Volk G.M., C.T. Chao, J. Norelli, S.K. Brown, G. Fazio, C. Peace, J. McFerson, G.-Y. Zhong, and P. Bretting. The vulnerability of U.S. apple genetic resources. Genet. Res. Crop Evol. (In submission).

Geneva *Malus* germplasm used in the study:

Gottschalk, C. and van S. Nocker. 2013. Diversity in seasonal bloom time and floral development among apple species and hybrids. J. Amer. Soc. Hort. Sci. 138(5):367-374.

PGRU *Malus* germplasm related Abstracts:

Wisniewski, M., J. Norelli, S. Droby, and C.T. Chao. 2013. A genetic analysis of postharvest disease resistance in apple using a *Malus sieversii* mapping population. 10th International Congress of Plant Pathology, August 25-30, 2013. Beijing, China.

Janisiewicz, W.J., B. Evans, W.M. Jurick, K.A. Peter, G. Bauchan, and C.T. Chao. 2013. Wound response and ROS production in blue mold resistant wild apple germplasm from Kazakhstan and central Asia. American Phytopathological Society Annual meeting, August 10-14, 2013. Austin, TX.

Norelli, J.L., K.M. Evans, M.E. Wisniewski, C.T. Chao, C. Hampson, and A. Iezzoni. 2014. Characterization of resistance to fire blight (*Erwinia amylovora*) and blue mold (*Penicillium expansum*) in exotic and domesticated *Malus* (apple) germplasm. 7th International Rosaceae Genomic Conference. June 24-28, 2014. Seattle, WA.

Volk, G.M., K. Hummer, and C.T. Chao. 2014. A global conservation strategy for apple. 7th International Rosaceae Genomic Conference. June 24-28, 2014. Seattle, WA.

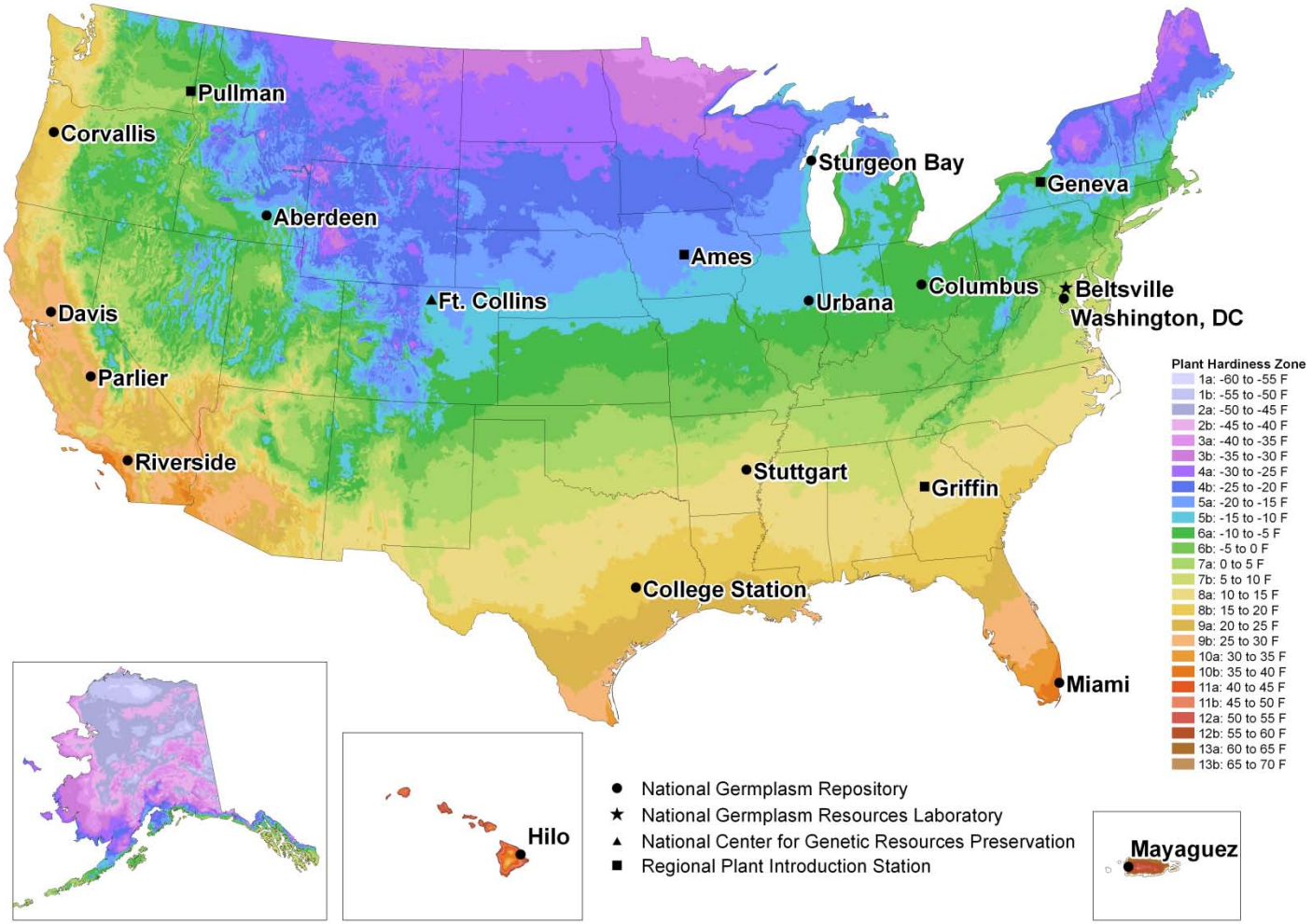
Volk G., C. Richards, A. Henk, A. Baldo, G. Fazio, C.T. Chao. 2014. Apple crop wild relatives: genetic diversity informs ecogeographic niche modeling. 7th International Rosaceae Genomic Conference. June 24-28, 2014. Seattle, WA.

The National Plant Germplasm System: 2014 Status and Prospects

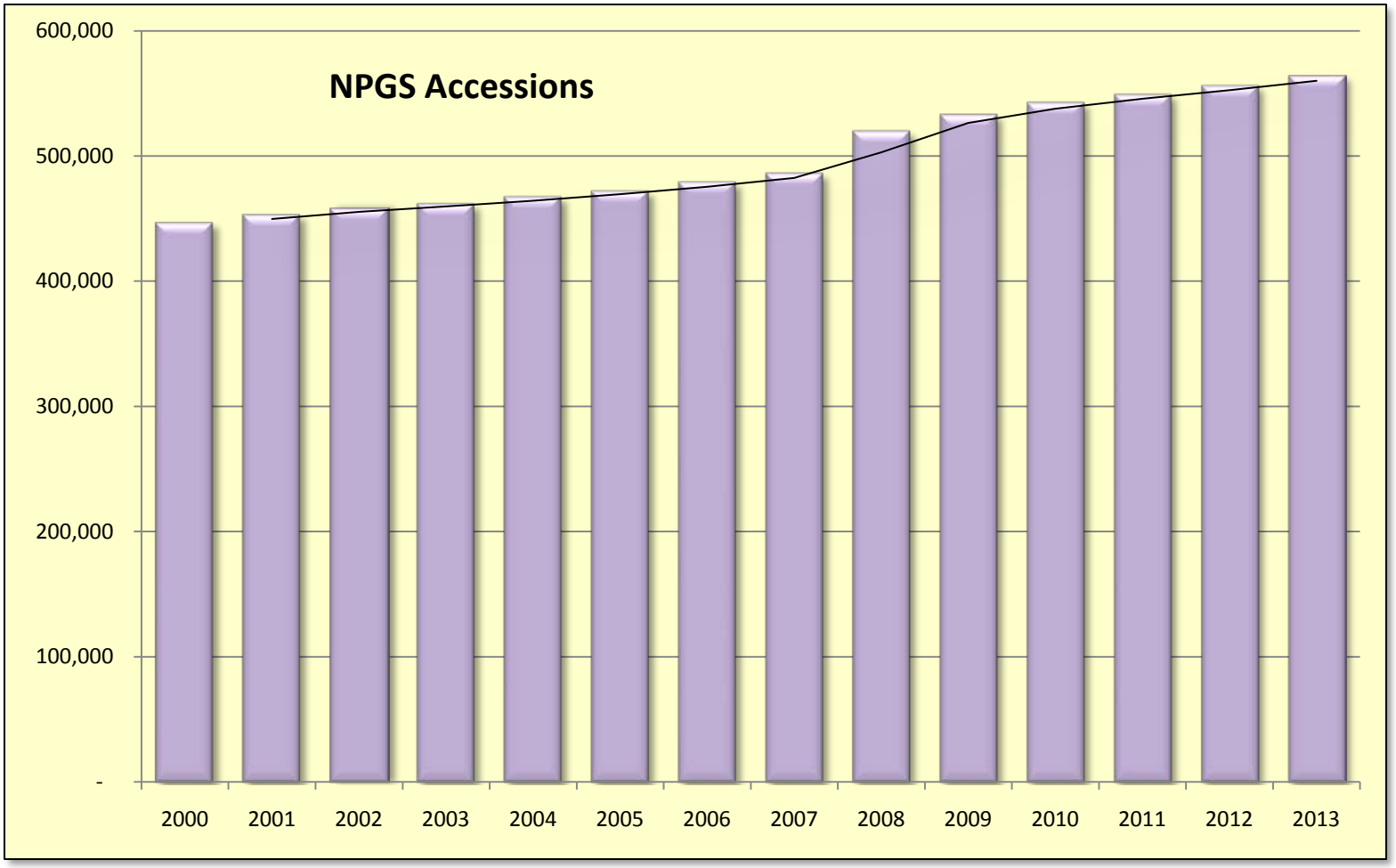
Peter Bretting

USDA/ARS Office of National Programs

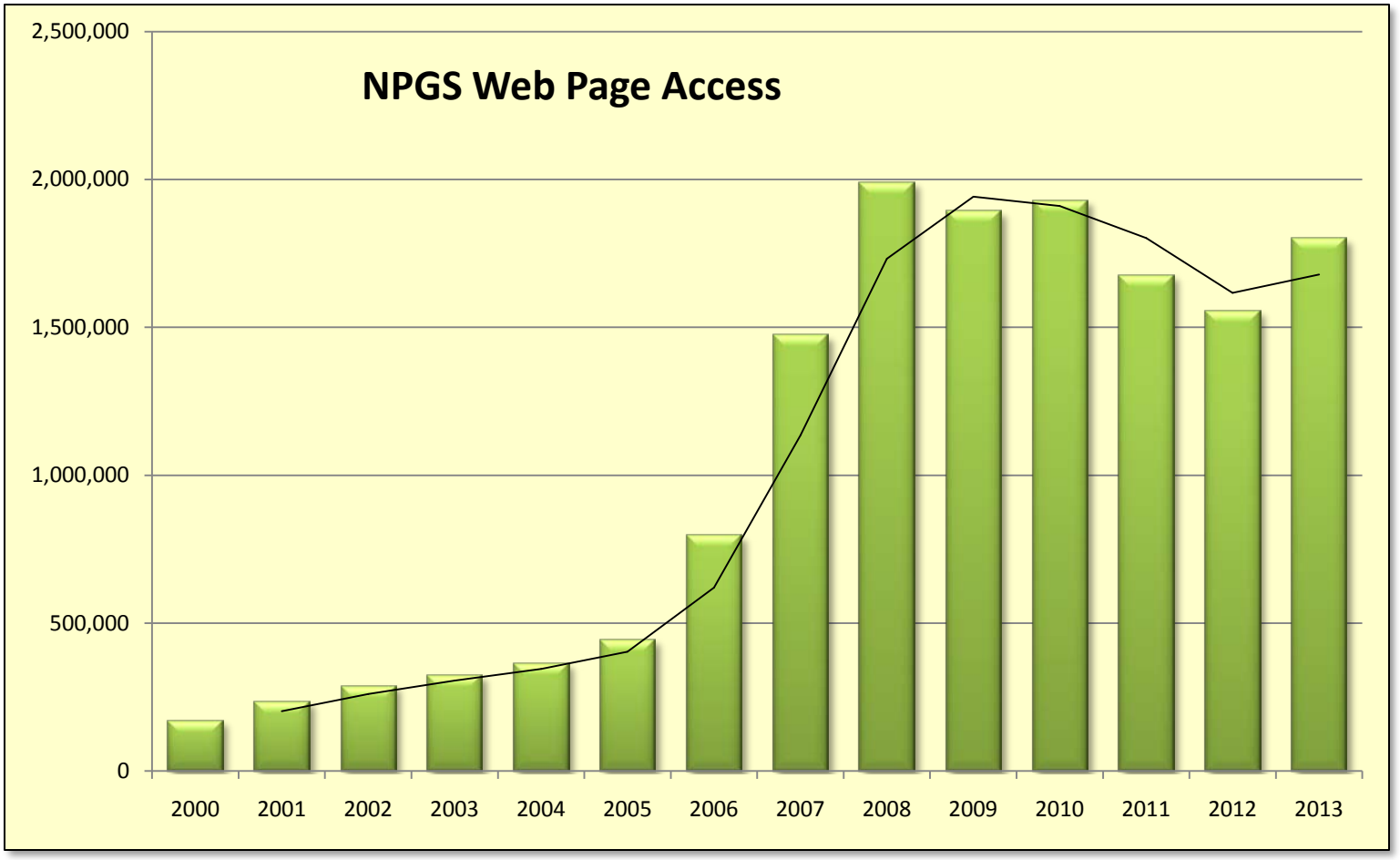
USDA National Plant Germplasm System (NPGS)



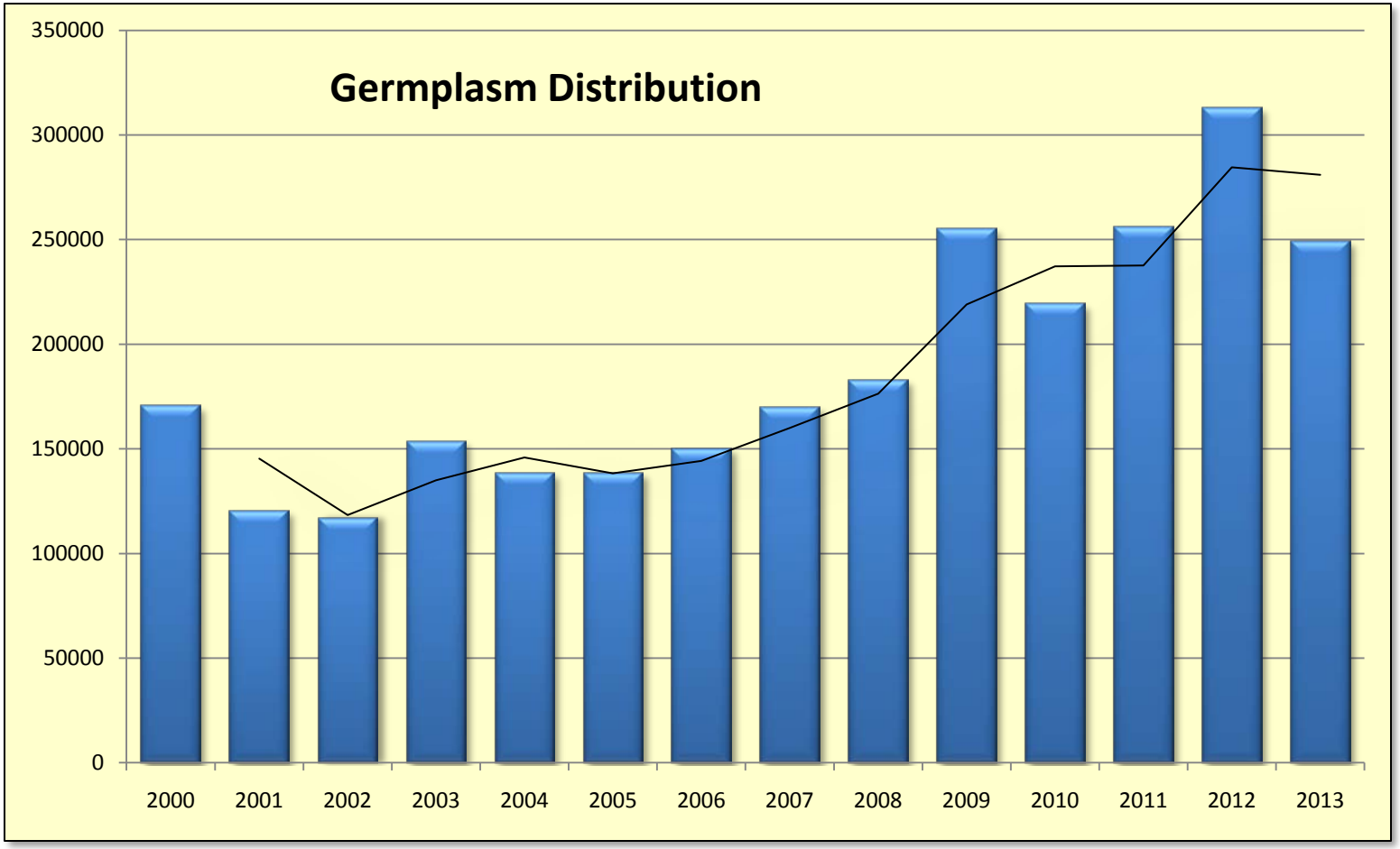
Number of NPGS Accessions 2000-2013



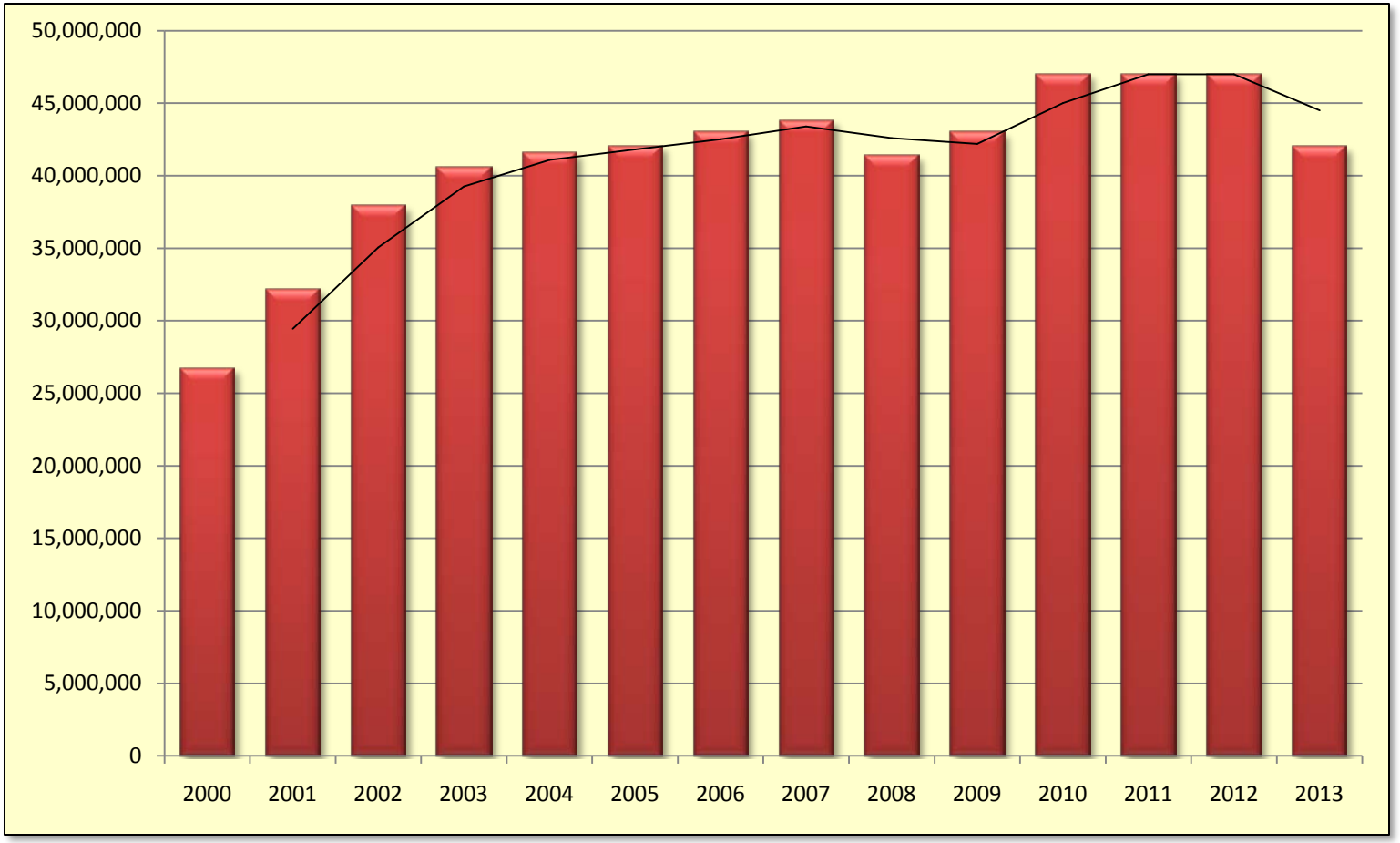
DEMAND FOR NPGS INFORMATION 2000-2013



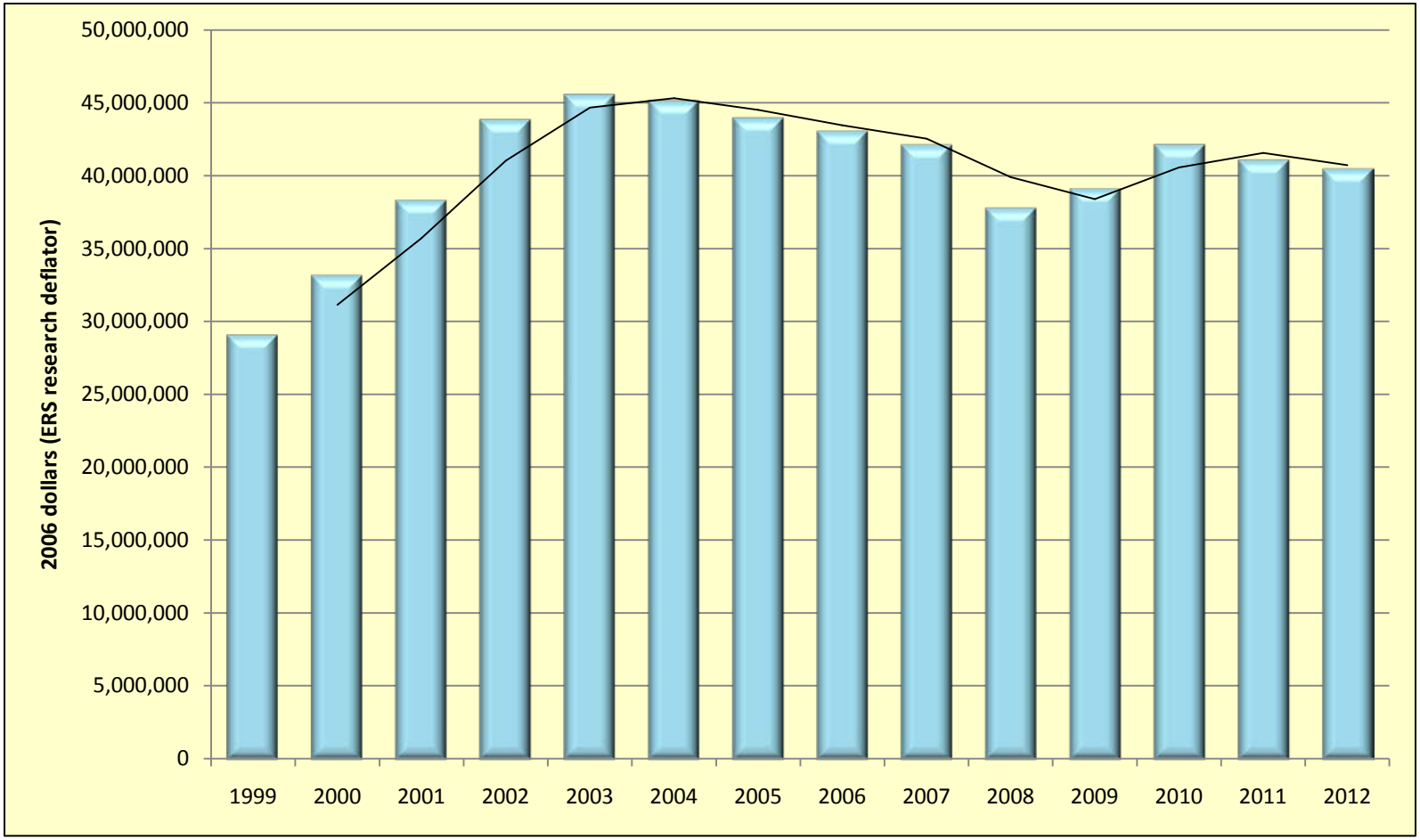
Demand for NPGS Germplasm 2000-2013



ARS National Plant Germplasm System budget 2000-2013



ARS National Plant Germplasm System Budget, Real, 1999-2012



Notable NPGS Developments

- **1-17 October 2013: Furlough**
  - **Only designated key personnel permitted to work.**
  - **No germplasm lost.**
  - **No germplasm distributed; GRIN off-line.**
  - **Delayed harvests, delayed shipments to winter nurseries.**
- **FAO International Treaty on Plant Genetic Resources for Food and Agriculture**
  - **Seed industry advocates US ratification.**

Notable NPGS Developments

- **Stronger and more extensive international partnerships**
  - **Hosted CGIAR Genebanks Annual General Meeting at NCRPIS, Ames.**
  - **Global Crop Diversity Trust: Developing international project for increasing the use of PGRFA (especially crop wild relatives)**
  - **PRC, S. Korea, Canada, Mexico, Colombia national genebanks: training at NPGS**

National Germplasm Resources Laboratory
USDA-ARS
Beltsville, Maryland
2014 Report to PGOC, RTACs and CGCs

The National Germplasm Resources Laboratory (NGRL), Beltsville, MD, supports the acquisition, introduction, documentation, evaluation, and distribution of germplasm by the National Plant Germplasm System (NPGS) and other components of the U.S. National Genetic Resources Program (NGRP). The Laboratory is comprised of the Plant Exchange Office (PEO), the Germplasm Resources Information Network/Database Management Unit (GRIN/DBMU), and the Plant Disease Research Unit (PDRU).

We were saddened by the unexpected deaths of two NGRL employees in 2013. Mark Bohning died on May 13, 2013. He had 33 years of service to USDA, almost all of it in NGRL. He was a key liaison among ARS, NGRL and the NPGS sites on many data related issues. He assigned PI numbers for the NPGS and was the coordinator for the Crop Germplasm Committees. Gorm Emberland died on July 3, 2013. He was a lead programmer on the GRIN system and had worked for ARS for 22 years. Much of the current GRIN software was developed by Gorm. Both Mark and Gorm will be greatly missed by many friends and colleagues. NGRL hopes to be able to fill both of these critical vacancies in 2014. Furthermore, another programmer (John Chung) in DBMU retired in January 2014. The technical capacity in DBMU is reduced until key positions are recruited and staffed.

Plant Exchange Office

Plant Exploration and Exchange Program

The PEO supports the collection of germplasm for the NPGS through the management of a Plant Exploration and Exchange Grant Program. Plant explorations involve field collection of germplasm not available in any germplasm repositories, while plant exchanges are expeditions to facilitate the transfer of germplasm already conserved in foreign genebanks. Annual guidelines for developing plant exploration and exchange proposals are prepared by the PEO and distributed to the CGC chairs for circulation to their members. Proposals must be endorsed by the appropriate CGC or other crop experts. They are reviewed by a subcommittee of the NPGS Plant Germplasm Operations Committee (PGOC) and also sent by the PEO to the ARS Office of National Programs (ONP) for their comments and recommendations. The deadline for submitting proposals for explorations or exchanges to be conducted in fiscal year 2015 is July 25, 2014.

All foreign explorations supported by PEO comply with the provisions of the Convention on Biological Diversity on access and benefit sharing related to genetic resources. Prior informed consent to collect genetic resources is obtained from the appropriate host country before the exploration occurs. The permission includes agreement on the benefits to the host country associated with access to genetic resources. The PEO is involved in

most requests to foreign governments for permission to collect and negotiates the terms of agreements when necessary. Foreign explorations are always conducted in cooperation with scientists from the host country and cooperation with their national genetic resources programs is strongly encouraged. Germplasm obtained on explorations is shared by the NPGS and the host country.

FY 2013 NPGS Plant Explorations

Target Crop	Country	Principal Contacts
Fruits, nuts and woody ornamentals	Albania	E. Kullaj, V. Tafa, I. Gjana
Walnut	Kyrgyzstan	G. Lazkov
Wild carrot	Morocco	D. Spooner, H. Ouabbou
Walnut, pear	Tajikistan	D. Navruzshoev
Kentucky coffeetree	United States (IL, IN, KY)	J. Carstens, A. Schmitz
Begonia cucullata	United States (FL)	S. Haba, P. Jourdan
Spinach wild relatives	United States (WY)	D. Brenner, R. Palmer
Ash	United States (MN, ND)	J. Zeleznik
Wild sunflower	United States (NM, TX)	L. Marek, G. Seiler
Wild potato	United States (CO)	J. Bamberg, C. Fernandez, A. Del Rio
Switchgrass	United States (AL, MS, LA)	M. Harrison-Dunn, G. Pederson
Wild sunflower	United States (CA)	L. Marek, G. Seiler
Magnolia asheii	United States (FL)	K. Conrad, R. Lewandowski

GRIN Taxonomy for Plants

GRIN Taxonomy provides online current and accurate scientific names and other taxonomic data for the ARS National Plant Germplasm System and other worldwide users. This standard set of plant names is essential for effective management of ARS plant germplasm collections, which now represent ca. 14,740 taxa. GRIN taxonomic data now include scientific names for 26,927 genera (14,252 accepted) and 1,365 infra-genera and 101,970 species or infra-species (60,764 accepted) with nearly 64,000 common names, geographical distributions for 53,089 taxa, 438,715 literature references, and

30,245 economic impacts. A broad range of economically important plants are supported by GRIN nomenclature, including food or spice, timber, fiber, drug, forage, soil-building or erosion-control, genetic resource, poisonous, weedy, and ornamental plants. Most or all species of important agricultural crop genera are represented. Information about the systematic relationships of species is provided, which is critical for optimally determining the disposition or use of individual germplasm samples. Included in GRIN Taxonomy are federal- and state-regulated noxious weeds and federally and internationally listed threatened and endangered plants, with links to information on noxious weed and conservation regulations to ensure unimpeded interstate and international exchange of plant genetic resources. The scientific names are verified, in accordance with the international rules of botanical nomenclature by taxonomists of the National Germplasm Resources Laboratory using all available taxonomic literature and consultations with taxonomic specialists. Generally recognized taxonomic database standards have been adopted in GRIN Taxonomy.

The current focus of GRIN taxonomic work is to ensure that scientific plant names in GRIN continue to reflect recent plant taxonomic and nomenclatural literature, and that new data on classification, synonymy, native and naturalized distribution, economic impacts, and common names for plants and economic use categories currently treated in GRIN are incorporated. Recent efforts have focused on improving the documentation of sources for the information provided in GRIN Taxonomy. We also seek to expand the nomenclatural, classificatory, and ecogeographical information for crop taxa and their relatives. In late 2008 a project to provide thorough coverage in GRIN-Taxonomy to wild relatives of all major and minor crops was initiated. We have now completed our initial work on 121 major and minor crops, and an interface to query these data in various ways has been developed (www.ars-grin.gov/~sbmljw/cgi-bin/taxcwr.pl). We invite feedback from NPGS curators and CGC members for those crop wild relative classifications already developed. The breadth of coverage and quality of GRIN taxonomic data has encouraged usage of GRIN-Taxonomy data among genetic resource managers and other agricultural workers worldwide. GRIN taxonomic data are the most requested item on public GRIN, with over 1,200,000 of these reports retrieved monthly.

PI Documentation

Since 1898, Plant Introduction (PI) numbers have been used as unique identifiers for accessions incorporated into the NPGS. In earlier times, PI numbers were automatically assigned to all plant material received by the Plant Introduction Office, a predecessor of the PEO. Currently, before PI numbers are assigned, NPGS curators first evaluate the passport data, and if possible grow and observe new accessions to verify uniqueness and rationale for preservation in the NPGS. For this reason, curators usually assign a local identifying number to an accession until a decision is made to assign a PI number. When the decision is reached to assign a PI number to an accession, the curators contact Quinn Sinnott in DBMU for assignment of the next sequential number(s).

In FY 2011, the NGRL in collaboration with the National Agriculture Library completed the digitization of all volumes of the PI Books (Volumes 1-206, 1898-1997) and the

eight-volume Plant Immigrant series. The digitized PI Book volumes along with electronic copies of the PI books dating from 1998 – present, are accessible from the NGRL webpage: National Germplasm Resources Products and Services. In addition, each accession record in GRIN has a link (*View original Plant Inventory data*) to the appropriate page in the PI Book.

Facilitation of Germplasm Exchange

The PEO assists NPGS personnel and other scientists with acquiring germplasm from scientists, foreign national and international genebanks, domestic and foreign explorations, and special projects and agreements. The PEO also helps to expedite the distribution of germplasm from the NPGS to foreign scientists and other international genebanks. Through close collaboration with USDA/APHIS and the Maryland Department of Agriculture (MDA), PEO facilitated the agricultural inspection for the international distribution of NPGS germplasm. In FY 2013, germplasm for eight hundred and eighty eight (888) public orders containing a total of 70,223 samples of NPGS accessions were received at the USDA/APHIS Beltsville Facility for the required agricultural inspection and the issuance of the Phytosanitary Certificate. These orders were subsequently shipped to individuals in 75 countries throughout the world for research and education. In addition, PEO facilitated the agricultural inspection of 8 arriving germplasm shipments containing accessions from 5 different foreign countries to researchers and curators at several NPGS sites in the United States.

Database Management Unit

GRIN and GRIN-Global

The mission of the Database Management Unit (DBMU) is to develop and maintain information systems for the National Genetics Resources Program comprised of plants, animals, microbes, and invertebrates. The primary emphasis is on the plant GRIN that supports the NPGS.

In addition to the two unexpected and untimely deaths of DBMU staff in 2013 discussed above, John Chung (IT Specialist) retired from DBMU on January 10, 2014. John's specializations included working on a database used by the invertebrate programs and the reports section of GRIN/GRIN-Global. The reduction in staffing over a short duration in DBMU has created a challenging situation.

At the beginning of 2014, statistics for data in the plant database include:

101,981 taxonomic names (including synonyms)
564,347 accessions representing 14,739 species and 2,363 genera
1,976,766 inventory records
1,799,863 germination records
8,740,621 characteristic/evaluation records
Over 295,377 images

These numbers increase almost every day.
Germplasm accessions acquired by the National Plant Germplasm System (NPGS) since the effective date of the Convention on Biological Diversity continue to be flagged in the database with appropriate disclaimers and MTAs. The SMTA issued under the International Treaty on Plant Genetic Resources for Food and Agriculture is also flagged and tracked through the system. These agreements are displayed with accession passport data and automatically printed on GRIN generated packing slips when accessions are distributed. During the past year, the DBMU continued to provide support to NPGS site personnel and assisted NPGS sites in loading passport data, evaluation data, distribution information and images into the database

The GRIN-Global project is a cooperative effort between the Global Crop Diversity Trust (GCDT), USDA-ARS and Bioversity International to develop a powerful, easy-to-use plant genetic information system that will be freely available to any country throughout the world. NPGS personnel at Ames, IA and Beltsville, MD are leading the project.

Throughout 2013, the emphasis was almost entirely on preparing for the conversion of the NPGS from GRIN to GRIN-Global. Numerous training sessions for NPGS staff have been conducted and will continue to be offered before and after the conversion. Both the Curator Tool and Public Website are being continually enhanced based on feedback from users and testers. The development team is committed to new features and improvements after deployment to the maximum extent that time and other resources allow.

We had set a target date earlier in 2013 of October 1, 2013 to make the switch from GRIN to GRIN-Global. However, several factors made that unattainable. NPGS staff believed more training/testing time was warranted and that the software needed various minor adjustments. Also, the partial government shutdown due to a lapse in funding was disruptive to our progress and plans. We now anticipate the conversion in the spring of 2014, although the exact date has not yet been set. We will ensure there is at least a one month notification before we transition from GRIN to GRIN-Global.

The development team is always interested in receiving feedback from the user community on the GRIN-Global NPGS public website. A beta version of the GRIN-Global public website can be found at:

http://www.ars-grin.gov/npgs/gringlobal/webpages/publicwebsite.html

Comments, ideas and suggestions on GRIN-Global can be sent to the entire development team at feedback@grin.barc.usda.gov.

Although most of the emphasis has been on developing GRIN-Global, current GRIN is still actively supported as a resource for international plant genetic resource research. The GRIN system was available 98% of the time on a 24 hour a day and 7 day a week schedule. However, the entire system was shut down for an unprecedented 16 days from October 1-16, 2013 due to a lapse in funding from the federal government. Despite the

period when GRIN was offline, access to the database through the web pages continues at a brisk pace. In 2013, there were 1,805,933 visits to the NPGS pages of GRIN.

Security measures for the hardware and databases are regularly reviewed and constantly monitored for intrusion by those who may attempt to corrupt web pages or to destroy data. New security patches are implemented as soon as they become available. The system is protected by several firewalls and all data are backed up at onsite and offsite locations. Backup tapes are kept at several local offsite locations.

Crop Germplasm Committees

About 21 of the Crop Germplasm Committees (CGC) met in 2013. An NGRL representative or National Program Leader was present at many of the meetings, or participated via teleconference, to help facilitate their activities. The committees continue to provide support on all aspects of the NPGS including identifying gaps and duplications in the collections, germplasm maintenance and evaluation, quarantine issues and maintaining updated versions of the Crop Vulnerability Statements. A virtual meeting/web conference was held for CGC Chairs on November 21, 2013 with about 34 participants. Updates were provided on the activities of ARS and the NPGS, international issues related to plant genetic resource exploration and exchange, GRIN-Global, and the activities of the CGCs. Given the limitations on travel funds that are widespread throughout the research community, it is likely that this technology will be used more frequently to maintain active participation and productivity among our committees. NGRL also has a conferencing account with AT&T that is available to the CGCs to host virtual meetings.

The coordination of the CGCs was shifted from the DBMU project to the PEO project, both in NGRL, during the last cycle of reviews of ARS 5-year project plans by external panels convened by the ARS Office of Scientific Quality Review. This change serves several administrative purposes and should not impact the operations of the CGCs. The primary contacts in NGRL to assist the CGC are Gary Kinard and Ned Garvey, especially while the position occupied by the late Mark Bohning is vacant.

Plant Disease Research Unit

Since October 1, 2005, the responsibilities for the quarantine indexing and distribution of prohibited genera germplasm that were performed by the former ARS Plant Germplasm Quarantine Office were transferred to APHIS-Plant Germplasm Quarantine Program (APHIS-PGQP). The quarantine program manager for APHIS-PGQP is Dr. Joseph Foster. The mission of NGRL-PDRU is to conduct research to understand the biology of pathogens that infect economically important prohibited genera plant germplasm, including their etiology, detection, and elimination by therapeutic procedures. These projects provide support to the APHIS quarantine programs and help facilitate the safe introduction, conservation, and international exchange of valuable plant germplasm.

NGRL was fortunate to hire a new Plant Pathologist to replace the position vacated when Ray Mock retired in 2012. Dr. Dimitre Mollov joined ARS and NGRL in late October 2013. Dr. Mollov received his MS and PhD degrees from the University of Minnesota and was recently director of the Plant Disease Clinic at that university. He brings an abundance of highly relevant experience in the characterization and detection of plant pathogens, especially virus and virus-like organisms, which is applicable to the quarantine pathology work in this lab. Dr. Ruhui Li conducts molecular pathology research with multiple projects and works more intensively on sugarcane, sweet potato, grasses, and stone fruits. Additional permanent staff includes Whitney Hymes and Sam Grinstead (Biological Science Research Technicians) and Dr. Eun Ju Cheong (Support Scientist). Two International Visiting Research Scholars are also currently working in NGRL-PDRU: Lingling Pu (South China Agricultural University), and Pingxiu Lan (Yunnan Agricultural University, China).

PDRU provides regular updates about its research projects to the CGCs that deal with prohibited genera crops. The staff regularly confers and collaborates with APHIS scientists on matters pertaining to the quarantine of plant germplasm. NGRL-PDRU personnel are glad to discuss potential collaborations with colleagues and stakeholders in the NPGS.

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