

2013 OFFICE OF NATIONAL PROGRAMS REPORT
FOR THE U. S. NATIONAL PLANT GERMPLASM SYSTEM
OFFICE OF NATIONAL PROGRAMS, NATIONAL PROGRAM 301: PLANT GENETIC RESOURCES,
GENOMICS, AND GENETIC IMPROVEMENT
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1 Personnel changes:

- 1.1 Farewell and best wishes to Dave Ellis, who left the NCGRP in Ft. Collins, CO to curate the potato and sweet potato genebank in CIP, Peru; and to Molly Welsh, who retired as the Phaseolus curator at the WRPIS, Pullman, WA.
- 1.2 Welcome to Carolyn DeBuse, new Prunus curator at the NCGR-Davis; and Josef Pohl, new IT specialist at the NCGRP, Ft Collins.

2 Site developments and changes:

2.1 Researchers at the USDA/ARS NERPIS at Geneva, New York applied new statistical genetic approaches to identify, from tomato breeding stock, latent genes that originated from tomato wild relatives. They uncovered not only genes from wild relatives introduced into tomato through deliberate breeding, but also other genes genetically-linked to the target traits. Furthermore, previously-unrecognized hybridizations in nature between tomato and wild relatives were identified. These results will enable these genes from tomato wild relatives to be characterized, undesirable “hidden” variants eliminated from breeding stocks, and tomato genetic resources more effectively conserved and utilized in breeding.

2.2 USDA/ARS researchers at the NGRl Beltsville and collaborators from the University de San Carlos in Guatemala, Bioversity International, and the International Center for Tropical Agriculture (CIAT) completed the Guatemalan Atlas of Crop Wild Relatives. The Atlas provides detailed information on 105 species of wild plants--related to 29 different crops--which will support genetic resource conservation efforts. Because Guatemala and adjacent nations are very rich in plant biodiversity, these efforts will also support global efforts to conserve plant genetic resources. Available at <http://www.ars.usda.gov/ba/atlaswrguatemala>

2.3 USDA/ARS researchers at the WPRIS in Pullman, WA; Children’s Nutrition Research Center in Houston, TX; and their university collaborators analyzed the genetic diversity, population structure and genome-wide marker-trait association with seed nutrients for pea (Pisum) accessions in the NPGS pea core subset, identifying 28 significant marker-trait associations for eight of the seed mineral nutrient concentrations, including Ca, Cu, K, Mo, Ni and P. This information could help breeders implement marker-assisted selection in pea for improved mineral nutrient content.

2.4 The USDA/ARS NCRPIS, ONP, and OCIO partnered with the Oregon State University PRISM group and Esri, Inc. to deliver an updated edition of the USDA Plant Hardiness Zone Map (PHZM) on the web at

<http://planthardiness.ars.usda.gov/PHZMWeb/> Unlike prior editions, the new PHZM is GIS-based, identifies the PHZ for any zip code, and includes an interactive map for exploring variation in PHZ with the resolution of 800 m.

2

Budgets:

2.4 The current Administration's research priorities for USDA include climate change, food safety, children's nutrition/health, international food security, and bioenergy.

2.5 ARS is in the process of implementing the Consolidated and Further Continuing Appropriations Act, 2013 (FY 2013 appropriations) which includes rescissions and other reductions to the ARS's budget due to sequestration. The President's FY 2014 budget proposal, presented on 10 April 2013, would increase ARS's funding by about 2%, and specifically would increase the NPGS's budget by \$581,000. The Congress now must consider and "mark-up" the FY 2014 budget.

3

National Programs:

ARS's research portfolio is organized as a series of 17 national programs. Plant and microbial genetic resource management, genetic improvement, genomics, molecular and biological processes, biotechnology risk assessment, bioinformatics, and genome database management are incorporated into National Program 301 (see the WWW at: <http://www.nps.ars.usda.gov/programs/programs.htm?NPNUMBER=301>). During 2011, NP 301 completed its second five year cycle. Its accomplishments are described in the 2006-2011 NP 301 Accomplishment Report available on the web at: http://www.ars.usda.gov/research/programs/programs.htm?np_code=301&docid=22191 During late October 2011, NP 301 underwent an external review which in general found that the NPGS was performing high-quality research and service programs with significant impact (see Executive Summary of the panel review at the web site above). The external review was followed by teleconferences-webinars on 8 and 9 November 2011 to inform scientists and customers-stakeholders of the review results. A customer/stakeholder workshop was held in Beltsville on November 15, 2011 to elicit input regarding future research needs and priorities. ARS leaders and researchers then developed an Action Plan for the next five years of NP 301 research (see <http://www.ars.usda.gov/SP2UserFiles/Program/301/NP%20301%20Action%20Plan%202013-2017%20FINAL.pdf> . Based on customer/stakeholder comments, the NP 301 Action Plan, and other input, ARS researchers developed individual Project Plans, which are currently being assessed by external review panels.

4 **National Plant Germplasm Coordination Committee (NPGCC):**

The NPGCC seeks to promote a stronger, more efficient, more widely-recognized and better utilized NPGS. Its goals are to facilitate the coordination of ARS, NIFA and SAES planning and assessment mechanisms for NPGS policy, organization, operations and support; promote awareness and understanding of the NPGS across ARS, NIFA, and SAES and more broadly to the scientific community; and serve as a vehicle for improving communications and discussions about issues impacting the NPGS with ARS, SAES, and NIFA. It will assess, develop and recommend to the SAES, ARS and NIFA strategies for improved coordination of NPGS activities; develop and recommend a process for improved communication of the value of the NPGS; initiate a strategic planning effort for the NPGS to better define and communicate the vision, mission and short- and long-term goals; and to evaluate the current funding models for the NPGS and report findings to the SAES directors, ARS and NIFA.

The current members of the NPGCC are T. Burr (Cornell University-SAES), Chair; E. Young (Executive Director, Southern Region), Secretary; L. Sommers (Colorado State-SAES), J. Colletti (Iowa State-SAES); G. Arkin (University of Georgia-SAES); A. M. Thro (NIFA); E. Kaleikau (NIFA); P. S. Benepal (NIFA); P. Bretting (ARS-Office of National Programs); D. Upchurch (ARS-Southern Plains Area); and G. Pederson (ARS-Griffin). Representatives of the Association of Official Seed Certifying Agencies (AOSCA--Chet Boruff); the American Seed Trade Association (ASTA—Tim Cupka); and the National Association of Plant Breeders (NAPB, David Baltensperger) attend the annual NPGCC meetings as observers.

NPGCC members made a joint presentation on the NPGS to the 2006 Experiment Station Section/State Agricultural Experiment Station/Agricultural Research Directors Workshop September 24-27, 2006. That presentation, plus testimonials from key Directors about the NPGS's value, increased the NPGS's visibility to this important group. In May 2007, the NPGCC recommended to the National Research Support Project Review Committee that it recommend restoring off-the-top funds designated for NRSP-5 (the Prosser, WA virus-free pome and stone fruit project) and NRSP-6 (the potato genebank project at Sturgeon Bay, WI) to their FY 06 levels to sustain these valuable efforts. Since then, funding for NRSP-5 has been assumed by the National Clean Plant Network. Support for NRSP-6 has been maintained at the FY 06 level since then. The NPGCC met on June 5, 2008, in conjunction with the annual PGO and biennial CGC Chairs meetings. It discussed the NPGS's budget levels, funding for NRSP-5 and NRSP-6, the location of crop collections, and mechanisms for publicizing the NPGS. Similarly, the NPGCC met on 23-24 June 2009, 9 June 2010, 16-17 June 2011, and 12 June 2012 in Beltsville, MD to continue its work on these priority issues.

5 **International germplasm items:**

The FAO International Treaty (IT) for Plant Genetic Resources for Food and Agriculture came into force on 29 June 2004, and beginning in 2007 its standard material transfer agreement (SMTA) for plant genetic resource exchange was adopted by Parties to the IT

and the CGIAR Centers for distributing plant genetic resources. On 7 July 2008, the White House transmitted the IT to the Senate; ratification would require the advice and consent of a 2/3 majority of the Senate. The Senate Foreign Relations Committee (SFRC) held hearings on the IT on 10 November 2009. During their last Business Meeting of the 111th Congress (30 November 2010), the SFRC voted the IT out of committee, for consideration by the full Senate. Unfortunately, the Senate adjourned on 22 December 2010 without voting on the IT. It is hoped that the SFRC will schedule new hearings on the IT during 2013, which might enable vote for consent (or not) to IT ratification to occur during the 113th Congress.

Concurrently, the Convention on Biodiversity (CBD) adopted the voluntary, non-binding Bonn Guidelines on Access and Benefit-Sharing during the sixth Conference of Parties (COP-6) of the CBD at The Hague in April 2002. Starting in 2006, Parties to the CBD began negotiating what became the legally-binding Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization. Adopted by the COP-10 on 29 Oct. 2010, the Nagoya Protocol is quite complicated, with many ambiguous components; its ramifications are currently under analysis (see <http://ictsd.org/downloads/2010/11/abs-protocol.pdf> for the text).

The preceding developments at FAO and with the CBD will substantially affect international exchange of plant genetic resources, and the NPGS, whether or not the U. S. is ultimately a Party to either or both treaties. Precisely how these treaties will affect U. S. users of germplasm depends on the treaties' implementations.

6 **National Genetic Resources Advisory Council (NGRAC):**

The National Genetic Resources Advisory Council (NGRAC) includes nine members, was originally established by the 1990 Farm Bill, and had been inactive since 1999. Secretary of Agriculture Vilsack re-established the NGRAC in 2012 to formulate recommendations on actions and policies for the collection, maintenance, and utilization of genetic resources; to make recommendations for coordination of genetic resources plans of several domestic and international organizations; and to advise the Secretary of Agriculture and the National Genetic Resources Program (NGRP) Director of new and innovative approaches to genetic resources conservation. The NGRAC will advise on ways to ensure that the NGRP serves the needs of all farmers for high-quality and diverse seed (both genetically engineered and non-genetically engineered) for their particular farming operations. The NGRAC will also advise on how the USDA can develop a broad strategy for maintaining plant biodiversity available to agriculture, and strengthening public sector plant breeding capacities.

Last year, the NGRAC held an initial organizational teleconference, and its first meeting occurred in Beltsville 5-6 March 2013. The members of the NGRAC include Drs. Manjit Misra (Chair, Iowa State University), Jane Dever (Texas A & M), Karen Moldenhauer (University of Arkansas), Stephen Smith (DuPont Pioneer), Allison Snow (The Ohio State University), Mulumebet Worku (North Carolina A & T), Mr. Matthew Dillon (Seed

Matters, Clif Bar Family Foundation), Dr. Herman Warren (Warren and Associates Seeds), and Mr. Terry Williams (Tulalip Tribes). Ex officio members include Drs. Gary Pederson (ARS-Griffin), and Peter Bretting (ARS-ONP), and representatives from other Federal science and technology agencies.

National Germplasm Resources Laboratory
USDA-ARS
Beltsville, Maryland
2013 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), whose functions are provided below.

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 2014 is July 26, 2013.

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 2012 NPGS Plant Explorations/Exchanges

Target Crop	Country	Principal Contacts
Wild beet	Morocco	B. Hellier, C. Richards, Y. El Bahloul, N. Qariouh
Fruits and nuts	Azerbaijan, Kyrgyzstan	M. Aradhya, C. Ledbetter, Z. Akparov, T. Talibov, A. Orozumbekov, B. Toktoraliev
Wild carrot	Morocco	D. Spooner, P. Simon, H. Ouabbou, M. El Koudrim
Wild onion, beet, strawberry	Georgia	M. Mosulishvili, G. Arabuli
<i>Miscanthus</i> (perennial grass)	Russia	E. Sacks, N. Dzyubenko, E. Dzyubenko
Small fruits (exchange)	Canada	K. Hummer, A. Jamieson
Wild lettuce	Uzbekistan	F. Khassanov
Wild lettuce	Kyrgyzstan	G. Lazkov
Wild lettuce	Tajikistan	D. Navruzshoev
<i>Cornus rugosa</i> (roundleaf dogwood)	United States (IA)	J. Carstens
<i>Phlox</i> and <i>Coreopsis</i> spp. (ornamentals)	United States (NJ, PA, VA, WV)	P. Zale
Ash	United States (IA, IL, IN)	J. Carstens, J. Mahoney
Switchgrass	United States (GA, SC, NC)	M. Harrison-Dunn, G. Pederson
Wild potato	United States (NM)	J. Bamberg, A. Del Rio
Chinkapin oak	United States (IN, IA)	J. Carstens
<i>Lomatium suksdorfii</i> (perennial herb)	United States (OR, WA)	T. Kisha, B. Robinson, W. Bloch

Atlas of Guatemalan Crop Wild Relatives

The “Atlas of Guatemalan Crop Wild Relatives” (Atlas Guatemalteco de Parientes Silvestres de las Plantas Cultivadas), a Google Earth® application developed to study the distributions, diversity and state of conservation of native plant species closely related to cultivated plants, was recently released. The Atlas is a collaborative work of the NGRL Plant Exchange Office, Bioersivity International, the International Center for Tropical Agriculture (CIAT), and the University of San Carlos of Guatemala.

The Atlas includes information on the distribution, use, diversity, and conservation status of wild Guatemalan plants that are important agricultural resources because of their close relation to 29 different crops. The interactive maps in the Atlas draw on an extensive database of records of scientific specimens conserved in numerous national and international herbaria and seed banks. The Atlas is currently available in Spanish and an English version is in progress. Use of the maps does not require an understanding of Spanish.

For more information and to download the Atlas and the supporting database, go to <http://www.ars.usda.gov/ba/atlascwrguatemala>

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 over 14,660 taxa. GRIN taxonomic data now include scientific names for 26,900 genera (14,200 accepted) and 1,350 infra-genera and 100,500 species or infra-species (59,900 accepted) with nearly 63,700 common names, geographical distributions for 52,200 taxa, 430,400 literature references, and 28,500 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 96 crops, and an interface to query these data in various ways has been developed (<http://www.ars-grin.gov/~sbmljw/cgi-bin/taxcrop.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 ca. 800,000 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 Mark Bohning in DBMU for assignment of the next sequential number(s).

In FY 2011, the NGRL, in collaboration with the National Agricultural 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.

The digitized PI books are also available on the National Agricultural Library (NAL) website: <http://naldc.nal.usda.gov/collections>. Scroll down the page and then select the entry: Plant Inventory, U.S. Department of Agriculture. To view the digitized Plant Immigrants series go to: <http://naldc.nal.usda.gov/>, in the search box, add “Plant Immigrants” and follow the prompts.

Facilitation of Germplasm Exchange

The PEO also 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 2012, nine hundred and twelve (912) shipments containing a total of 114,824 samples of NPGS accessions were received at the USDA/APHIS Beltsville Facility for the required agricultural inspection and the issuance of the Phytosanitary Certificate, and subsequently sent to individuals in 68 countries throughout the world for research and education. In addition, PEO facilitated the agricultural inspection of 8 arriving shipments containing accessions from 6 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. There were no changes in staffing in the DBMU in 2012.

At the beginning of 2013, statistics for data in the plant database include:

- Over 100,500 taxonomic names (including synonyms)
- 557,794 accessions representing 14,661 species and 2,417 genera
- 1,929,710 inventory records
- 1,760,646 germination records
- 8,665,353 characteristic/evaluation records
- Over 254,000 images

These numbers change 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. Version 1.0 of the international component of the project was completed and released in December of 2011. The release announcement can be found at http://www.ars-grin.gov/npgs/gringlobal/docs/GRIN-Global_release_1_0_announcement_14_dec_2011.

Training sessions for GRIN-Global international plant genetic resource trainers and information technology professionals (Train-the-Trainers) were held April 12-23, 2010 in Beltsville, Maryland and November 15-22, 2010 in Ames, IA. Eighteen international participants attended the Beltsville session and 10 attended the Ames session. They all learned how to use the GRIN-Global application and offered their comments and suggestions. An additional workshop for international partners was sponsored by NORGEN/Procinorte at the new Mexican genebank (Centro Nacional de Recursos Genéticos) in Jalisco, Mexico from October 31-November 10, 2011. The workshop included 27 trainees from 5 different countries. These international collaborators will assist in deploying the system to the international community.

Throughout 2012 major schema changes were incorporated into the GRIN-Global software and these will be deployed to the international community early in 2013. Also, progress was steadily made during 2012 in developing/refining the features and functions of the Curator Tool, which will be used by genebank staff, and the Public Website, which will be accessible worldwide to query collections and place requests for samples of germplasm.

The phase of the project to implement GRIN-Global for the NPGS started in January 2012. GRIN-Global will replace the current GRIN system with new site maintenance and public retrieval software. From May through October 2012, teleconference or in-person meetings were conducted with all the NPGS sites to ensure site specific software will be considered and/or incorporated into the new system and to discuss site-specific issues related to the implementation of GRIN-Global. Preliminary training began for key site personnel on GRIN-Global through a series of Introduction to GRIN Global web conferences, with accompanying self paced work assignments for participants, that were completed in February through May of 2012. The purpose of these sessions was to give site personnel basic proficiency in the software. This will allow them to provide valuable feedback about the system, especially for any additional features and functions that will be needed to support their operations. Additional training sessions along with one-on-one assistance will be scheduled as we move toward deploying GRIN Global for the NPGS. Although the exact date for the switch over from GRIN to GRIN-Global has not yet been determined, it will occur during fiscal year 2013.

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. Access to the database through the web pages continues at a brisk pace. In 2012, there were 1,557,265 visits to the NPGS pages of the GRIN database.

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, including one set at Ft. Collins, CO for long term storage. A new back-up generator to supply electricity during power outages to Building 003 at BARC, where the GRIN hardware is housed, was installed in late 2012. The building is secured with access permitted only by proximity card. The GRIN server room is locked with further limited proximity card access and the room is monitored for temperature fluctuations 24/7/365.

Crop Germplasm Committees

Since June 1, 2011, over 30 of the 42 Crop Germplasm Committees (CGC) have met. An NGRL representative or National Program Leader was present at most of the meetings, or participated via teleconference, to help facilitate their activities. Summaries of each meeting are prepared and distributed to appropriate National Program Leaders, NGRL staff and other NPGS personnel. The committees continue to provide advice 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 reports. A virtual meeting/web conference was held for CGC Chairs on November 15, 2012 with more than 30 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.

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 and international exchange of valuable plant germplasm.

Ray Mock, who had extensive experience working with germplasm quarantine and phytosanitary issues on numerous crops, retired on December 31, 2011 after more than 37 years of service to USDA. We hope to recruit a new scientist to fill this vacancy in early 2013. 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). Four International Visiting Research Scholars are also currently working in NGRL-PDRU: Dr. Jun Won Kang (a citizen of Korea and 2012 PhD graduate from the University of Washington-Seattle), Lingling Pu (South China Agricultural University), Mingqiang Wang (South China Agricultural University), and Pingxiu Lan (Yunnan Agricultural University, China).

The NGRL-PDRU performs research on viral pathogens of quarantine significance infecting clonally propagated prohibited crop genera, with an emphasis on deciduous tree and small fruits, sugarcane, grasses, and sweet potatoes. The mission is to characterize and investigate the etiology of poorly described diseases and pathogens of quarantine significance, and to develop more reliable detection and elimination methods. Once complete, these protocols will be submitted to the USDA, APHIS quarantine for validation and inclusion in the quarantine testing program. The project was recently reviewed by an anonymous non-ARS peer review panel, as coordinated by the ARS Office of Scientific Quality Review, as part of the 5-year cycle of ARS National Program 303 (Plant Diseases). The project received a good score and an overall rating of “Minor Revisions” needed by the review panel. Favorable comments from the panel included: “The reviewers applaud the evidence for dialog and cooperation between this project and the APHIS team that will intercept the methodologies and protocols for downstream applications.” 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.

Key NGRL Contacts

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PROGRESS REPORT for APPLE CGC 2013 Meeting

Plant Genetic Resources Unit, USDA-ARS

Geneva, NY 14456

Prepared by C. Thomas Chao, Horticulturist/Curator

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May 3, 2013

Apple CGC meeting

The weather at Geneva, NY is normal so far this year. There is no extreme warm weather early in the season like last year and no damaging freeze event. The temperature was colder in April and *Prunus* started to flower late since 4th week of April. The precipitation is below average so far but with more severe thunderstorms. We had some soil erosion problem at the collections.

We distributed 6,349 samples of 2,313 *Malus* accessions based on 233 domestic and 46 foreign requests between April 1, 2012 and March 31, 2013. We distributed 96 samples of 72 *Prunus* accessions based on 11 domestic requests and 1,818 samples of 638 *Vitis* accessions based on 78 domestic and 3 foreign requests at the same time period.

We received 7 *Malus* accessions in August, 2012 and 13 *Malus* accessions in February, 2013 from APHIS Quarantine Center. These accessions include 9 cider apples from Northern Spain, one *M. sieversii* from 1996 exploration and other varieties from different countries. We received one *M. paradisiac* seed accession from Azerbaijan in October, 2012 from Joe Foster and Mali Aradhya exploration. We received 4 *M. sylvestris* seed accessions from Albania in November, 2012. We also received 84 *M. fusca* seed accessions from Gayle Volk in March, 2013 [J. Amer. Soc. Hort. Sci. 137(5):325-332. 2012].

We continued the fruit collection of *Malus* and *Prunus* in fall 2012. We are extracting the juice and conducting fruit quality traits analysis (titratable acidity, anthocyanin and metabolic compounds). We continued digital imaging of fruit of *Malus* accessions and some foliage images of wild *Malus* accessions last fall. We will take flower images of wild *Malus* species in the next few weeks and additional foliage images and foliage measurements of wild *Malus* species later in the season. We received phenological data of our *Malus* accessions from 2010 and 2012 recorded by Steve van Nocker, Michigan State University and we will upload the data to GRIN. For our genotype by sequencing (GBS) effort, in collaboration with Sean Meyer of Nova Scotia Agricultural College and Christopher Richards and Gayle Volk of National Center for Genetic Resource Conservation (NCGRP), USDA-ARS, Fort Collins, CO, we GBS over 2,000 *Malus* samples and 130 tart cherry accessions so far. We are analyzing the data to determine the genetic relationships among species and accessions, and answer questions related to domestication and evolution issues. Angela Baldo, computation biologist, is carrying out allele mining of the data for interesting traits such as self-incompatibility and disease resistance. I assembled a list of publications related to Geneva clonal collections. The list includes 91 publications that PGRU personnel involved directly and 32 publications that Geneva accessions were used in the research.

We restarted the backup cryo-storage of *Malus* and *Prunus* accessions last winter. We shipped 22 *Malus* accessions to NCGRP for backup storage in January, 2013. We received the cryo-treated budwood

last month and we are testing the viability of the budwood by budding since last week. We will ship accessions to NCGRP for backup storage annually.

Related Publications of clonal collections from August 2012-April 2013:

Gardiner, S.E., J.L. Norelli, N. de Silva, G. Fazio, A. Peil, M. Malnoy, M. Horner, D. Bowatte, C. Carlisle, C. Wiedow, Y. Wan, C.L. Bassett, A.M. Baldo, J.-M. Celton, K. Richter, H.S. Aldwinckle, and V.G.M. Bus. 2012. Putative resistance gene markers associated with quantitative trait loci for fire blight resistance in *Malus* 'Robusta 5' accessions. *BMC Genetics* 12:25 doi:10.1186/1471-2156-13-25

Abstracts:

Fazio, G., C.T. Chao., P. Forsline, C. Richards, and G. Volk. 2012. Characterization of tree and root architecture of *Malus sieversii* seedlings for rootstock breeding. X International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems. Stellenbosch, South Africa.

Gardner, K.M., H. Schwaninger, S. Cann, A. Baldo, T. Chao, G. Fazio, G. Volk, C. Richards, G.-Y. Zhong, and S. Myles. 2012. Genome-wide survey of genetic diversity in apple using genotyping-by-sequencing. Sixth Rosaceous Genomics Conference, September 2012, Trento, Italy.

Gardner, K.M., H. Schwaninger, S. Cann, A. Baldo, T. Chao, G. Fazio, G. Volk, C. Richards, G.-Y. Zhong, and S. Myles. 2013. Genome-wide survey of genetic diversity in apple using genotyping-by-sequencing. Plant and Animal Genome XXI, January 12-16, 2013. San Diego, CA. (Abstract #W248).

Norelli, J.L., M.E. Wisniewski, S. Droby, V. Hershkovitz, and C.T. Chao. 2013. Genetic analysis of *Malus sieversii* PI613981 for resistance to postharvest apple fruit decay caused by *Penicillium expansum* (blue mold). Plant and Animal Genome XXI. January 12-16, 2013. San Diego, CA. (Abstract # P0418).

Volk, G., C. Richards, B. Gross, P. Forsline, G. Fazio, and C.T. Chao. 2012. The USDA-ARS National Plant Germplasm System *Malus* collection: diversity of cultivars and wild species. Sixth Rosaceous Genomics Conference, September 2012, Trento, Italy.

Importation of Temperate Fruit Trees Roles and Responsibilities

Dr. Joseph A Foster

Program Director-USDA-APHIS-PPQ- Field Operations

IMPORTER/REPOSITORY will decide which cultivars/breeding lines/species/germplasm that they wish to import.

IMPORTER/REPOSITORY will request importation by APHIS and provide APHIS with the name, address and phone number of each foreign source for each requested introduction before September 30.

APHIS will send the foreign source a request letter with the proper permit and mailing labels. APHIS will also provide explorers with the proper permit and mailing labels so they can ship seed, budwood or plants back to APHIS during their trip.

FOREIGN SOURCE or **EXPLORER** will place budwood, bare-rooted plants or *Prunus* seed in a package with an APHIS mailing label on the outside of the package. The label will direct the package to the APHIS Beltsville Inspection Station.

APHIS will pay the cost of shipment.

APHIS will inspect the germplasm for large pests and treat, if necessary, the imported seed, budwood or plants at the Beltsville Inspection Station.

APHIS will transfer the inspected germplasm to the APHIS Plant Germplasm Quarantine Program (PGQP).

APHIS will germinate *Prunus* seed, plant bare-rooted plants, root cuttings, or propagate budwood on purchased domestic rootstocks.

APHIS will grow the germplasm in a quarantine greenhouse or screenhouse.

APHIS will inspect and test one clone of each introduction for pathogens.

APHIS will provisionally release clones that test negative in initial testing.

IMPORTER/REPOSITORY is responsible for obtaining a valid permit to receive and grow provisionally released trees. This permit must be renewed before expiration.

IMPORTER/REPOSITORY is responsible for purchasing and growing rootstocks necessary to propagate the shipped budwood of provisionally released fruit trees.

IMPORTER/REPOSITORY is responsible for maintaining the propagated provisionally released germplasm under the conditions specified in their permit.

APHIS will complete pathogen testing. **APHIS** will perform therapy on infected introductions to eliminate detected pathogens. **APHIS** may conditionally release some introductions infected with common pathogens.

IMPORTER/REPOSITORY is responsible for obtaining permission from their State Department of Agriculture to receive conditionally released fruit trees. Proof must be provided to APHIS before shipment.

IMPORTER/REPOSITORY is responsible for purchasing and growing the rootstocks necessary to propagate the shipped budwood of conditionally released fruit trees.

IMPORTER/REPOSITORY is responsible for maintaining the conditionally released introductions in a manner specified by their State Department of Agriculture.

APHIS will approve final release of fruit trees after testing is complete and negative for all known pathogens. There are no further federal restrictions on how these finally released trees may be used.

APHIS will distribute budwood or bare-rooted plants or seedlings of released fruit trees only to the importer if the germplasm is restricted and only to the importer and appropriate Repository if germplasm is for general distribution. APHIS will pay for these shipments.

IMPORTER/REPOSITORY in California is responsible for obtaining a permit from CDFA to receive released *Prunus* germplasm from PGQP. A copy must be provided to APHIS before shipment.

IMPORTER/REPOSITORY is responsible for purchasing and growing the rootstocks necessary to propagate the shipped budwood of released fruit trees.

APHIS will contact each recipient of released fruit trees within the next year to check on establishment success and request permission to destroy the released trees at PGQP.

IMPORTER/REPOSITORY is responsible for establishing each released introduction. One or more shipments from PGQP may be necessary. APHIS cannot hold released introductions for many years waiting for recipients to carry out this responsibility. PGQP is not a repository.

APHIS will destroy released fruit trees held at PGQP upon receipt of the Importer's or Repository's written permission to destroy. APHIS will maintain a file of these permissions.

**New Guidelines for the Release of
Pomes/*Prunus* Material at the Beltsville Quarantine Program**

Release of Material to Importer

Dr. M.L. Bateman

Plant Pathologist/Team Leader

Pomes and *Prunus* Quarantine Program-USDA-APHIS-PPQ-FieldOperations

Provisional releases- This type of release has restrictions .These are defined as clones that test negative in initial testing. The IMPORTER/REPOSITORY is responsible for obtaining a valid permit to receive and grow provisionally released trees. This permit must be renewed before expiration. The IMPORTER/REPOSITORY is responsible for purchasing and growing rootstocks necessary to propagate the shipped budwood of provisionally released fruit trees. The IMPORTER/REPOSITORY is responsible for maintaining the propagated provisionally released germplasm **under the conditions specified in their permit**. APHIS will complete pathogen testing. Only once the material is clean, then it can be given a Final Release

Final releases- This type of release has no restrictions. These are defined as clones that have tested negative for all pathogens quarantine significance they have been tested for, as per International Pomes/*Prunus* Agreements. APHIS will approve final release of fruit trees after testing is complete and negative for all known pathogens. There are no further federal restrictions on how these finally released trees may be used.

Responsibilities of the importer when receiving released material

1. **Receive** the budwood sent by the Quarantine Program.
2. **Establish** in a timely manner (within 6 months of receiving it).
3. **Multiply** and propagate many copies of each clone received.
4. Confirm establishment of the material to Quarantine program contact person-6 months to the day the material was received.
5. **If no confirmation is received** from the importer that the material has been propagated then the APHIS will proceed to:
 - a. Continue testing if it is a provisional release or
 - b. **Destroy** the material and all its copies if it is a final release since the material should have been established when it was provisionally released.
6. If the importer fails to establish the material and it is destroyed at our facilities they will have to import it again.

Releases 2012

Dr. M.L. Bateman

Plant Pathologist/Team Leader

Pomes and Prunus Quarantine Program-USDA-APHIS-PPQ-Field Operations

<i>Crop Type</i>	<i>Final Release</i>	<i>Provisional Release</i>	<i>Conditional Release</i>	Total Released 2012
Pomes-accessions	<i>Malus</i> - 8 <i>Pyrus</i> - 16 <i>Cydonia</i> -8 Total: 32	<i>Malus</i> -27 <i>Pyrus</i> -12 <i>Cydonia</i> -1 Total: 40	0	<i>Malus</i> -35 <i>Pyrus</i> - 28 <i>Cydonia</i> -9 Total: 72
<i>Prunus-accessions</i>	<i>Prunus</i> -8	<i>Prunus</i> -27	0	<i>Prunus</i> -35
<i>Prunus-seedlings</i>	332	0	0	332
Total	40	67	0	439

Releases by APHIS since 2007

Dr. M.L. Bateman

Plant Pathologist/Team Leader

Pomes and Prunus Quarantine Program-USDA-APHIS-PPQ-Field Operations

Crop	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Pome Fruits	2	0	23	57	48	100	72
<i>Prunus</i> clones	6	17	33	16	50	41	35
<i>Prunus</i> seedlings	31	70	138	196	111	107	332
Total per year	39	87	194	269	209	248	439

