THE NATIONAL PLANT GERMPLASM SYSTEM

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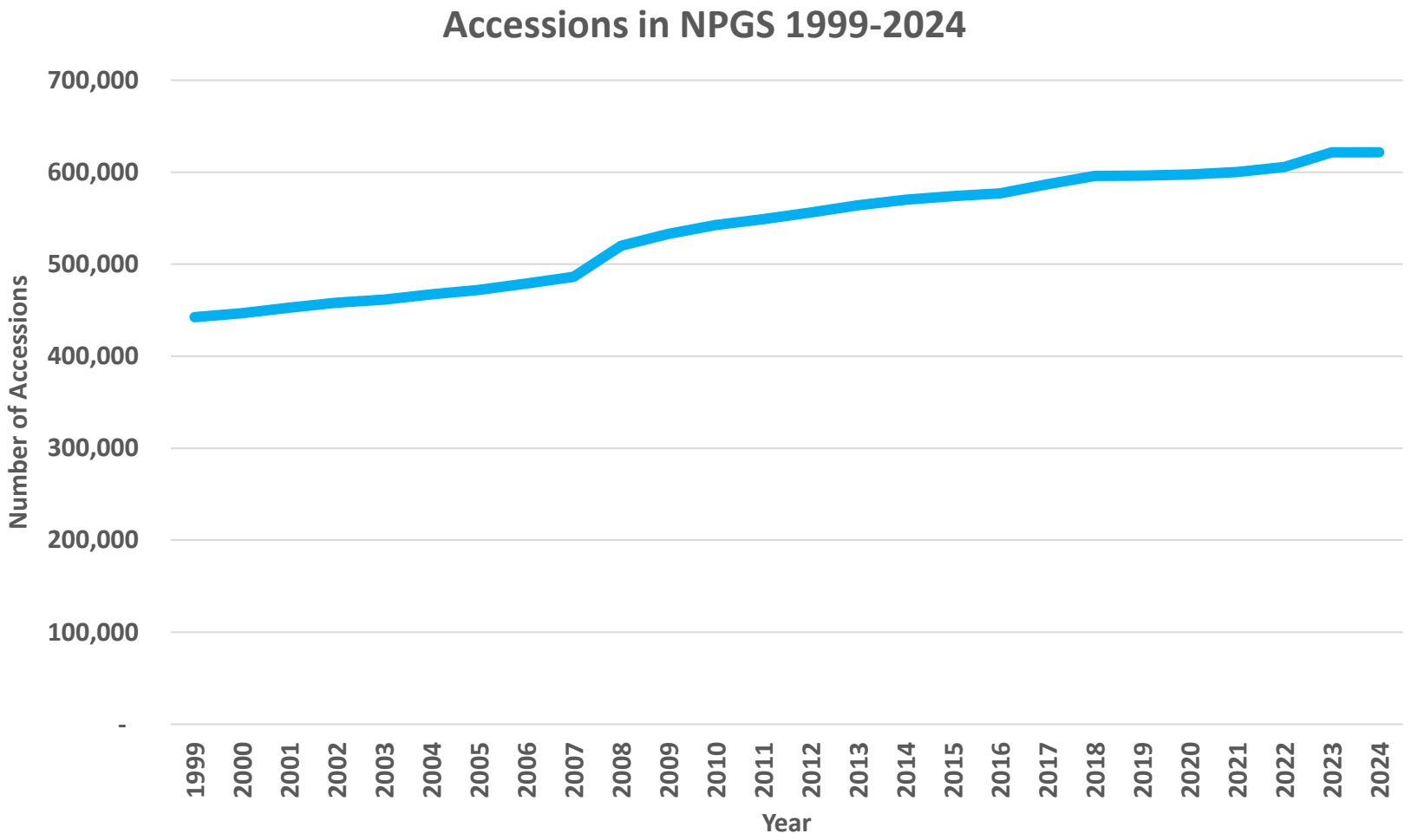
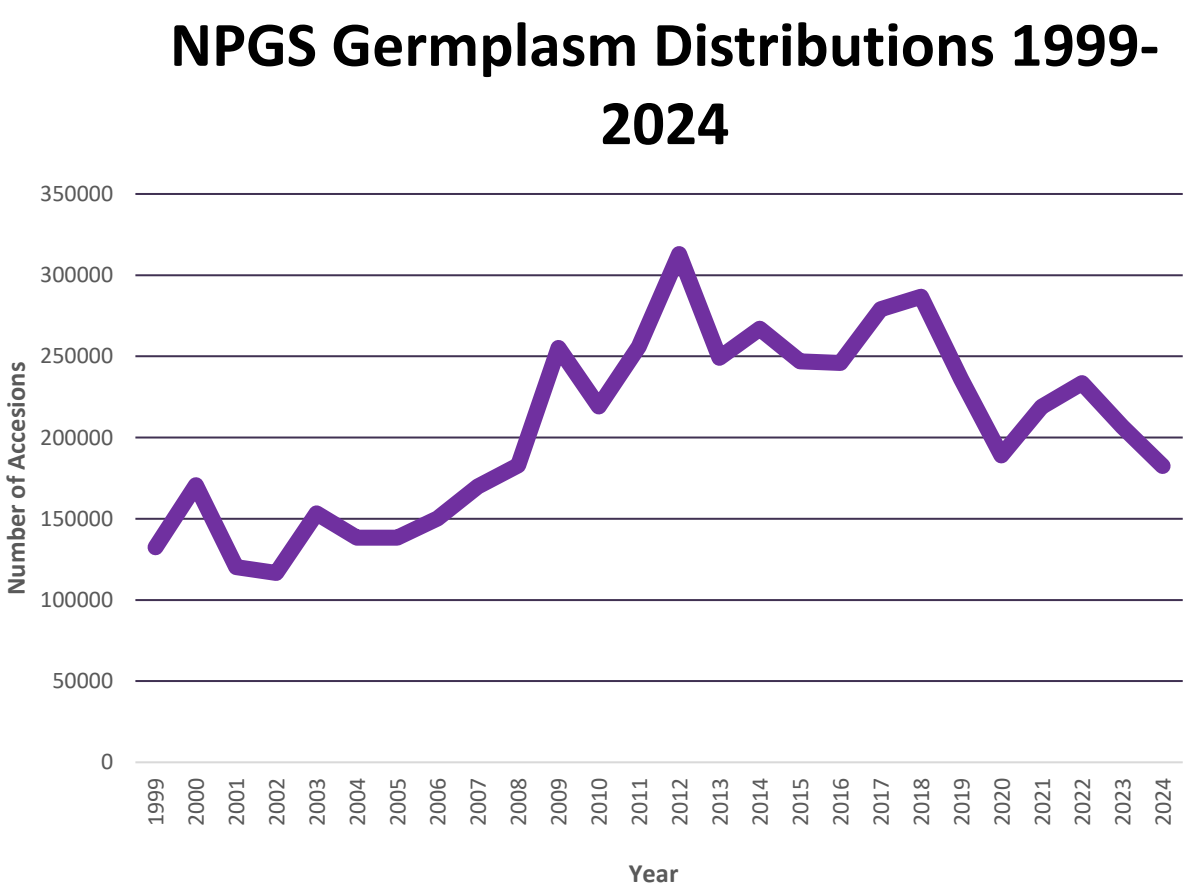
The mission of the NPGS is to support agricultural production by:

Acquiring	acquiring crop germplasm
Conserving	conserving crop germplasm
Evaluating and characterizing	evaluating and characterizing crop germplasm
Documenting	documenting crop germplasm
Distributing	distributing crop germplasm

ACCESSIONS IN NPGS

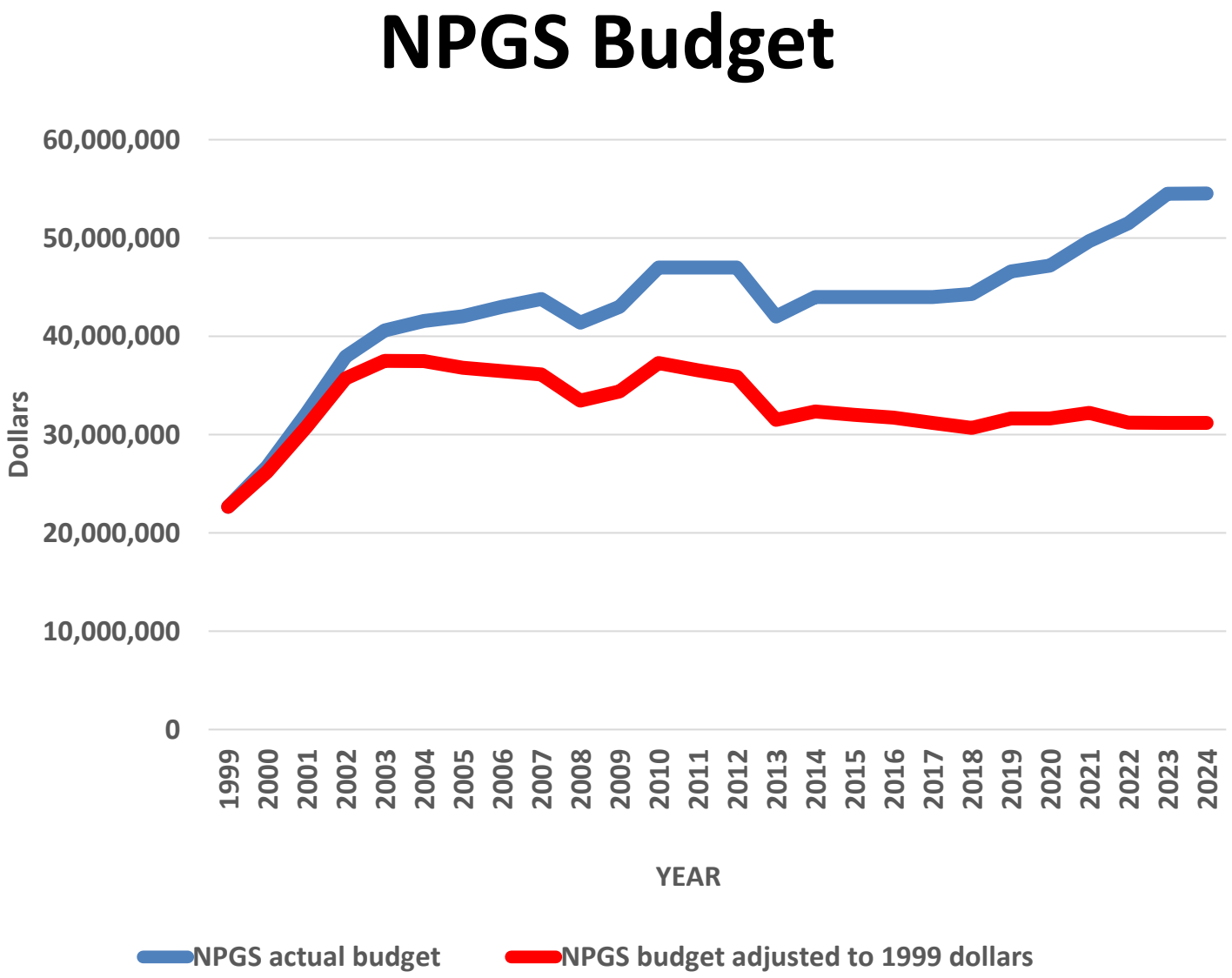


USDA NPGS Germplasm Distributions



16,737 Species
621,600 Total accessions
575,000 Seed accessions (93%)
44,000 Clonally propagated (7%)
476,000 Accessions available

NPGS Challenges



Labor

Land, rental agreements, inflation costs, especially facilities

Loss of highly trained staff at growing specialized materials

REQUEST

Data (utilization)

Sequencing, phenotyping

GRIN GLOBAL

Feedback?

Best practices + DoE characterization

Increasing Partnerships—How can we work together?

- **Help sequence our collections- Include** NPGS scientists on grants, $ for collections
- **Share your NPGS data back with us**
- **Collaborate** to help collections adopt new technologies to improve collection management and data availability
- Provide **in-kind support** for collections (regeneration, field assistance– pruning, data collection)
- **Donate** high quality novel germplasm, particularly wild relatives, to the collections
- **Join** Crop Germplasm Committees, Regional Technical Advisory Committees, and the National Genetic Resources Advisory Council to help guide collection maintenance decisions
- **Share information** about specific accessions to document impact
- State “USDA National Plant Germplasm System” as the source of materials. **Include PI numbers when you publish!!**

National Laboratory for Genetic Resources Preservation

Agricultural Genetic Resources Preservation Research Unit

(RL- Dr. Daren Harmel)

Plants Team (seed, clonal, microbe)

- **Dr. Chris Richards (Lead Scientist)**
- **Dr. Gayle Volk**
- **Dr. Christina Walters**
- **Dr. Hannah Tetreault**
- **Dr. Maria Jenderek**

National Animal Germplasm Program

- **Dr. Harvey Blackburn**
- **Dr. Phil Purdy**

Seed and microbe storage

Liquid nitrogen vapor (-165°C)

Cold storage (-18°C)

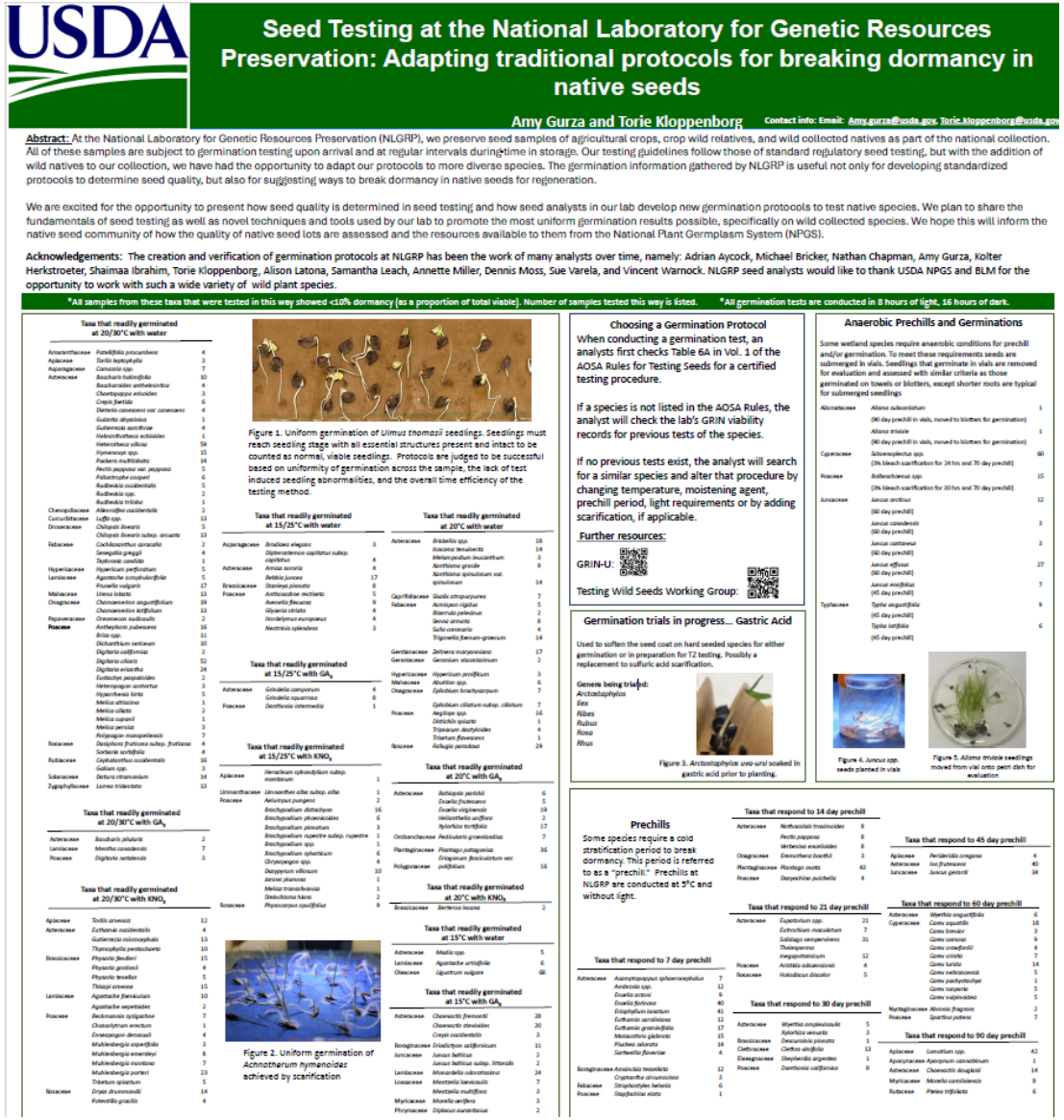
NLGRP by numbers

Germplasm	Accessions/isolates
Seed	
NPGS Base collection	498,710
Non-NPGS- PVP/ JPR	10,985
Non-NPGS (Black Box)	255,502
Microbes	
Non-NPGS	136,340

80 % of NPGS seed accessions are backed up

Seed testing program

- Analyst team currently includes 4 AOSA certified analysts and 3 will be taking their certification exams this April
- Fall 2024 fully migrated to utilizing Viability Wizard in GRIN
  - All notes, protocols and germination results are entered and immediately available after test completions
- **13,623 germination tests completed in 2024**
- Presented dormancy breaking protocols at the National Native Seed Conference in Phoenix, AZ
- Involved in a working group to get protocols (developed at NLGRP) for seeds not in the AOSA rules out to the public.



USDA

Seed Testing at the National Laboratory for Genetic Resources Preservation: Adapting traditional protocols for breaking dormancy in native seeds

Amy Gurza and Torie Kloppenborg Contact info: Email: Amy.gurza@usda.gov, Torie.kloppenborg@usda.gov

Abstract: At the National Laboratory for Genetic Resources Preservation (NLGRP), we preserve seed samples of agricultural crops, crop wild relatives, and wild collected natives as part of the national collection. All of these samples are subject to germination testing upon arrival and at regular intervals during time in storage. Our testing guidelines follow those of standard regulatory seed testing, but with the addition of wild natives to our collection, we have had the opportunity to adapt our protocols to more diverse species. The germination information gathered by NLGRP is useful not only for developing standardized protocols to determine seed quality, but also for suggesting ways to break dormancy in native seeds for regeneration.

We are excited for the opportunity to present how seed quality is determined in seed testing and how seed analysts in our lab develop new germination protocols to test native species. We plan to share the fundamentals of seed testing as well as novel techniques and tools used by our lab to promote the most uniform germination results possible, specifically on wild collected species. We hope this will inform the native seed community of how the quality of native seed lots are assessed and the resources available to them from the National Plant Germplasm System (NPGS).

Acknowledgements: The creation and verification of germination protocols at NLGRP has been the work of many analysts over time, namely: Adrian Aycock, Michael Bricker, Nathan Chapman, Amy Gurza, Kolter Herkstroeter, Shaimaa Ibrahim, Torie Kloppenborg, Alison Latona, Samantha Leach, Annette Miller, Dennis Moss, Sue Varela, and Vincent Warnock. NLGRP seed analysts would like to thank USDA NPGS and BLM for the opportunity to work with such a wide variety of wild plant species.

*All samples from these taxa that were tested in this way showed <10% dormancy (as a proportion of total viable). Number of samples tested this way is listed. *All germination tests are conducted in 8 hours of light, 16 hours of dark.

Taxa that readily germinated at 20/30°C with water

Figure 1. Uniform germination of *Ulmus thomasii* seedlings. Seedlings must reach seedling stage with all essential structures present and intact to be counted as normal, viable seedlings. Protocols are judged to be successful based on uniformity of germination across the sample, the lack of test induced seedling abnormalities, and the overall time efficiency of the testing method.

Taxa that readily germinated at 15/25°C with water

Taxa that readily germinated at 20°C with water

Taxa that readily germinated at 15/25°C with GA_3

Taxa that readily germinated at 15/25°C with KNO_3

Taxa that readily germinated at 20/30°C with GA_3

Taxa that readily germinated at 20°C with GA_3

Taxa that readily germinated at 20/30°C with KNO_3

Taxa that readily germinated at 20°C with KNO_3

Taxa that readily germinated at 15°C with water

Taxa that readily germinated at 15°C with GA_3

Figure 2. Uniform germination of *Achnatherum hymenoides* achieved by scarification

Choosing a Germination Protocol

When conducting a germination test, an analysts first checks Table 6A in Vol. 1 of the AOSA Rules for Testing Seeds for a certified testing procedure.

If a species is not listed in the AOSA Rules, the analyst will check the lab's GRIN viability records for previous tests of the species.

If no previous tests exist, the analyst will search for a similar species and alter that procedure by changing temperature, moistening agent, prechill period, light requirements or by adding scarification, if applicable.

Further resources:

GRIN-U:

Testing Wild Seeds Working Group:

Germination trials in progress... Gastric Acid

Used to soften the seed coat on hard seeded species for either germination or in preparation for TZ testing. Possibly a replacement to sulfuric acid scarification.

Genera being trialed:
Arctostaphylos
Ilex
Ribes
Rubus
Rosa
Rhus

Figure 3. *Arctostaphylos uva-ursi* soaked in gastric acid prior to planting.

Anaerobic Prechills and Germinations

Some wetland species require anaerobic conditions for prechill and/or germination. To meet these requirements seeds are submerged in vials. Seedlings that germinate in vials are removed for evaluation and assessed with similar criteria as those germinated on towels or blotters, except shorter roots are typical for submerged seedlings

Figure 4. *Juncus* spp. seeds planted in vials

Figure 5. *Allium tricoki* seedlings moved from vial onto petri dish for evaluation

Prechills

Some species require a cold stratification period to break dormancy. This period is referred to as a "prechill." Prechills at NLGRP are conducted at 5°C and without light.

Taxa that respond to 7 day prechill

Taxa that respond to 14 day prechill

Taxa that respond to 21 day prechill

Taxa that respond to 30 day prechill

Taxa that respond to 45 day prechill

Taxa that respond to 60 day prechill

Taxa that respond to 90 day prechill

Clonal accessions cryopreserved at NLGRP

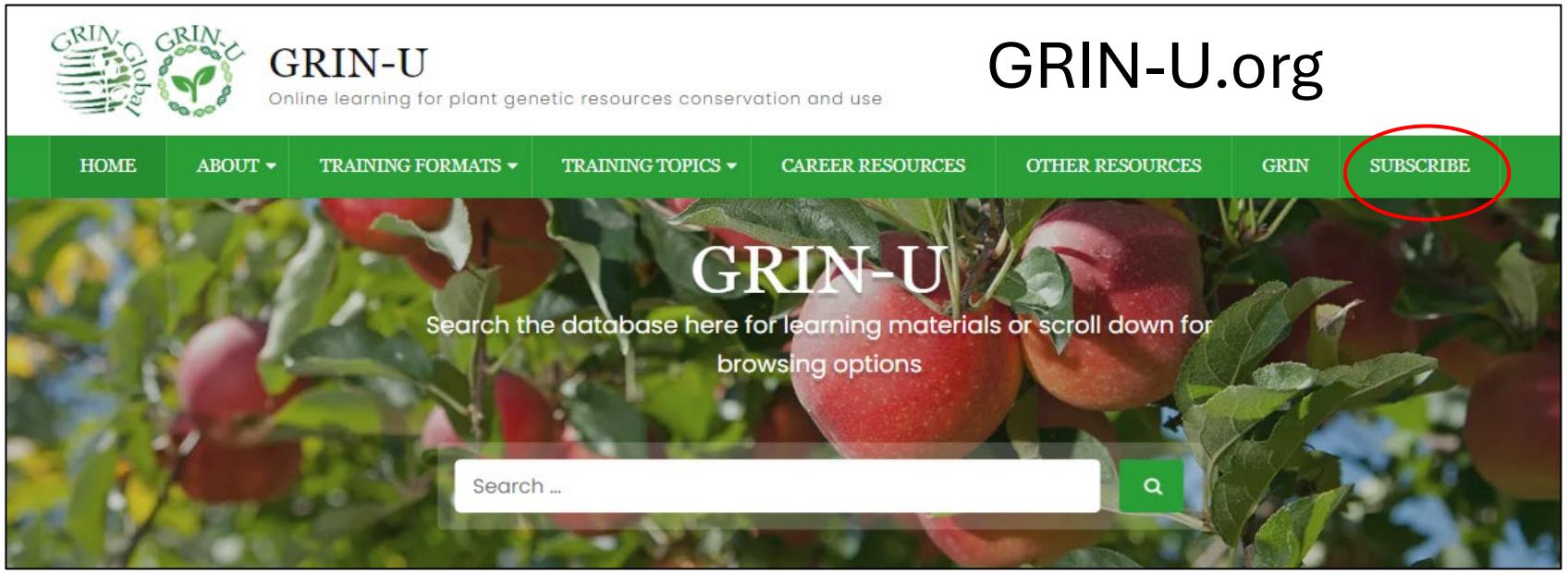
Dormant buds	2767
Shoot tips	2544
Pollen	199
Total accessions	5461

Current focus: Apple, Juglans, Prunus, Citrus, Kiwifruit, Pear, Potato, Sweet potato

Developed and released Clonal Cryopreservation Reports for Curators

- Clonal totals: Up-to-date information about cryopreserved clonal inventories at NLGRP
- Clonal accessions: Listing of accessions that are cryopreserved or in processing for specified crops

Educational Resources for PGR Conservation and Use

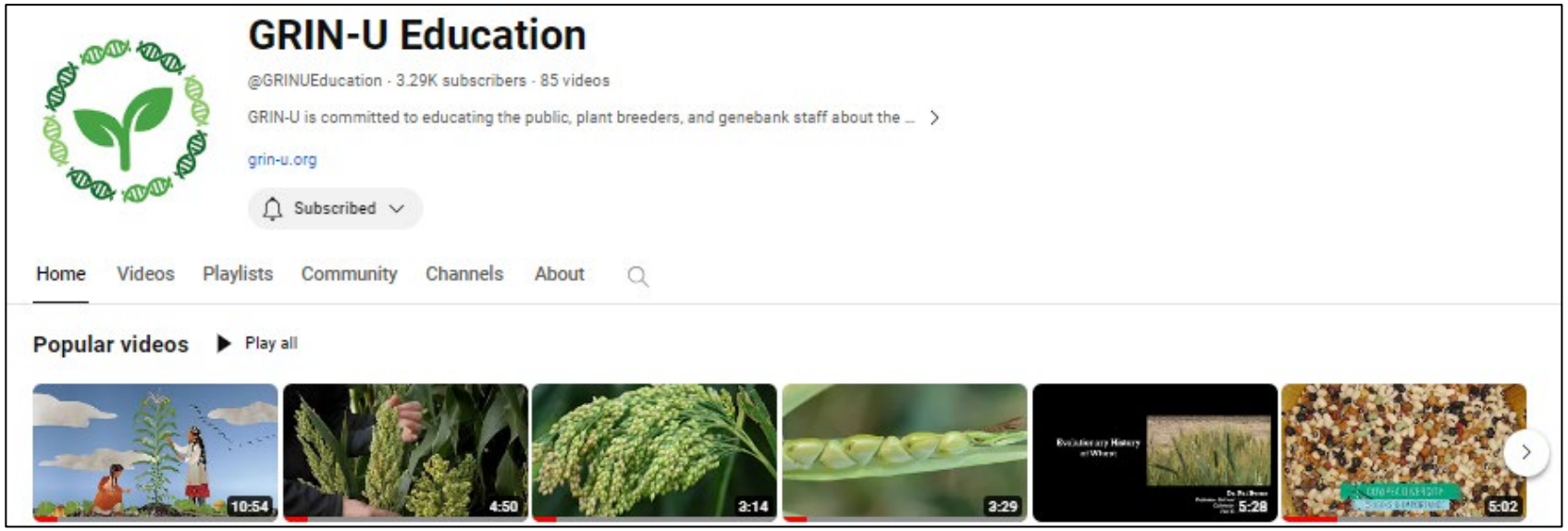


GRIN-U.org

eBooks
Videos
Infographics
Webinars
Links

GRIN-U Education YouTube

120 videos



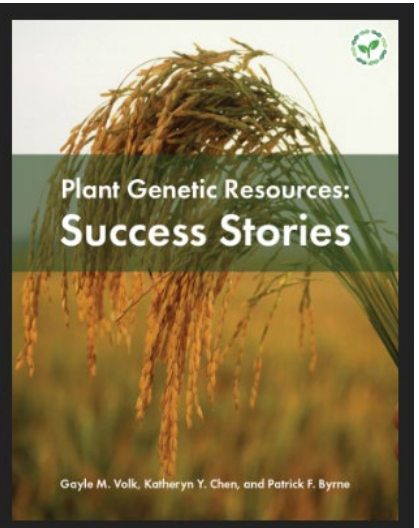
Compiling NPGS Success Stories

Plant Genetic Resources: Success Stories

Eds. Gayle Volk; Katheryn Chen; and Patrick Byrne

Public Domain

READ BOOK



Plant Genetic Resources Success Story Submission Template

Documenting Success Stories

Documenting success stories and making them available to the public are important for ensuring continued support for plant genetic resources conservation and plant breeding efforts. Our goal is to document successes, broadly defined, that relate to plant genetic resources conservation and use, and crop improvement activities.

To ensure this information is accessible to the broadest possible audience, please keep content concise, minimize the use of jargon and acronyms, and write with a general audience in mind. It is the contributors' responsibility to seek permissions to share success stories from other researchers and breeders. Content may be edited and formatted before being posted on the public GRIN-U website and/or the National Association of Plant Breeders website. All edits will be shared with the contributor for final approval before posting to websites.

Once completed, email this form and 1-3 high-quality images to PGRSuccesses@gmail.com. For questions or comments, please contact Pat Byrne (Patrick.byrne@colostate.edu) or Gayle Volk (Gayle.Volk@usda.gov).

*Required fields

Contributor Information

***Contributor(s) name:** Author1 and Author2

Strawberry 'Cordial' - Late Season, Long Shelf Life

USDA-ARS Genetic Improvement for Fruits & Vegetables Laboratory

Strawberry cultivar 'Cordial', released in 2020 by the USDA, is a late-season cultivar for planting during the late part of the growing season in the Mid-Atlantic region of the U.S. It is a short-day strawberry, meaning that plants will flower as the daylength grows shorter in the northern hemisphere. 'Cordial' has large attractive fruits that are tough enough for rough handling, have increased shelf life, minimal proportion of produce lost to degradation, and possesses consistently high yields with low rot when grown in plasticulture production systems without fumigation/fungicide.

Cordial strawberries produced in plasticulture.

Photo from Lewers and Enns, 2022 (CC BY-NC-ND 4.0)

PROJECT GOALS

- ✓ Develop non-tart strawberries with increased shelf life
- ✓ Improve resistance to rot and provide consistent high yields

Problems Addressed

U.S. Department of Agriculture-Agricultural Research Service strawberry research efforts at Beltsville, MD, have resulted in release of several cultivars with high yields and good fruit flavor: 'Keepsake', 'Flavorfest', 'Allstar', 'Galletta', 'Ovation', 'Earlyglow', 'Chandler', etc. Decayed fruit, poor handling and refrigeration tolerance, foliar and fruit disease incidence, and reduced shelf life remained a production problem. The project therefore focused efforts on increasing shelf life, tolerance to rough handling, resistance to diseases, as well as reducing tartness and maintaining consistently high yields.

Solutions Developed

'Cordial' was developed by cross-pollinating B1893 × B1805. This new cultivar's average total yield was significantly higher than all cultivars tested, with one of the highest marketable yields. 'Cordial' showed significant resistance to crown rot, very mild bacterial angular leafspot disease symptoms, and mild powdery mildew disease symptoms. 'Cordial' fruit skin toughness rating was very high, and it exhibited fruit sweetness similar to 'Flavorfest', 'Keepsake', and 'Earliglow'. Due to its longer shelf life, less tartness, and disease resistance, 'Cordial' has the potential for a greater market share.

Written by: A. Mahama, S. Gray, W. Suza, K. Chen (editor)

To learn more about this and other success stories, visit colostate.pressbooks.pub/pgrsuccessstories

National Germplasm Resources Laboratory

Plant Exchange Office

Anne Frances
Melanie Schori
Jennifer Friedman
Karen Williams (Contractor)

Crop Germplasm Committee Chairs Meeting
March 6, 2025

Plant Exchange Office Updates

- NPGS Plant Exploration & Exchange Program
- International Distributions (with USDA-APHIS)
- GRIN Taxonomy

Vitis ripara, Hedrick and Booth 1908

NPGS Plant Exploration & Exchange Program

Anne Frances
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NPGS Plant Explorations FY 2024

Species	Location
Phaseolus acutifolius, P. filiformis	New Mexico, U.S.
Vitis labrusca, V. aestivalis	Eastern U.S.
Fraxinus cuspidata	Arizona and Nevada, U.S.
Salix pellita	Minnesota, U.S.
Fraxinus nigra	Northeastern U.S.
Malus coronoria	Michigan, U.S.
Fragaria, Vaccinium, Rubus	Quebec, New Brunswick, Nova Scotia, Canada

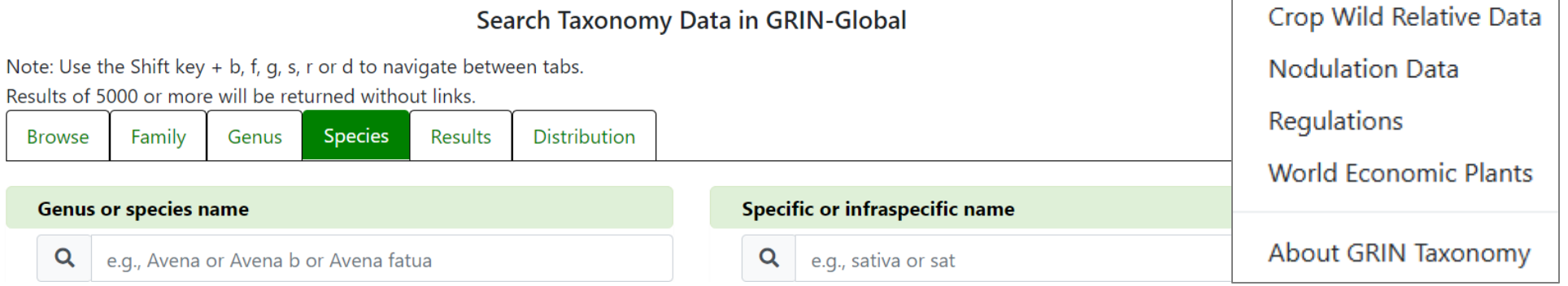
NPGS International Distributions
(Jennifer Friedman)

National Cotton Germplasm Collection (COT)	Woody Landscape Repository (NA)
Griffin Plant Introduction Station (S9)	Potato Germplasm Introduction Station (NR6)
National Small Grains Collection (NSGC)	Ornamental Plant Germplasm Center (OPGC)
Western Regional Plant Introduction Station (W6)	Desert Legume Program (DLEG)
National Arid Land Plant Genetic Resources Unit (Parlier)	North Central Regional Plant Introduction Station (NC7)
U.S. Nicotiana Germplasm Collection (TOB)	Soybean/Maize Germplasm, Pathology, & Genetics Research Unit (SOY)
Plant Genetic Resources Unit, Geneva*	National Laboratory for Genetic Resources Preservation*

*Occasional

FY24: 26,549 samples to 55 countries
Significant decrease in backlog of orders
Contact: jennifer.friedman@usda.gov

GRIN Taxonomy



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Taxonomy Queries & Assistance

- Adding scientific names
- Updating taxonomic classifications
- Adding literature sources and citations
- Citation formatting questions
- Shipping regulated material

Habitat for *Fraxinus anomala*, Ames 35908, Andy Sherwood

Thank you!

Questions?

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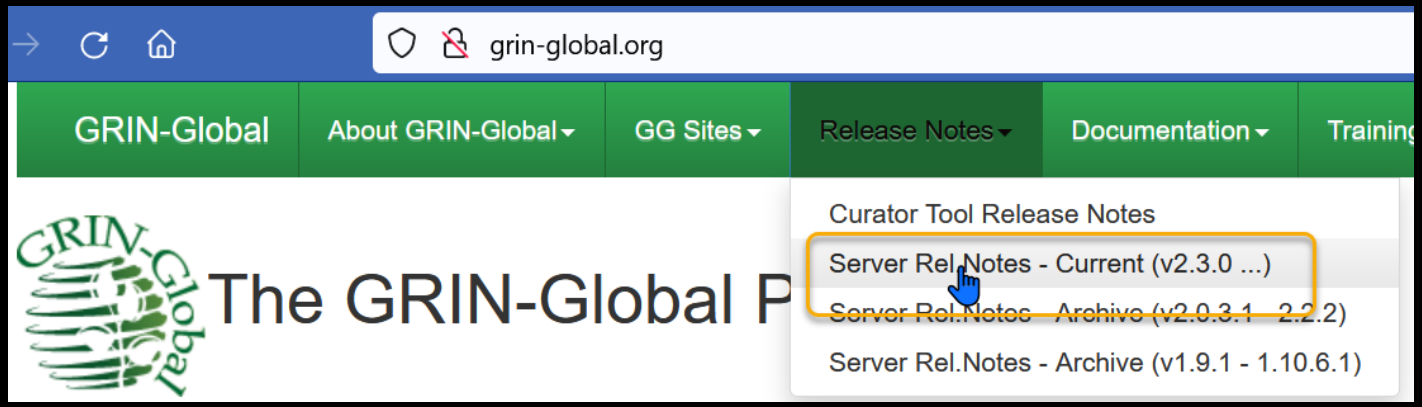
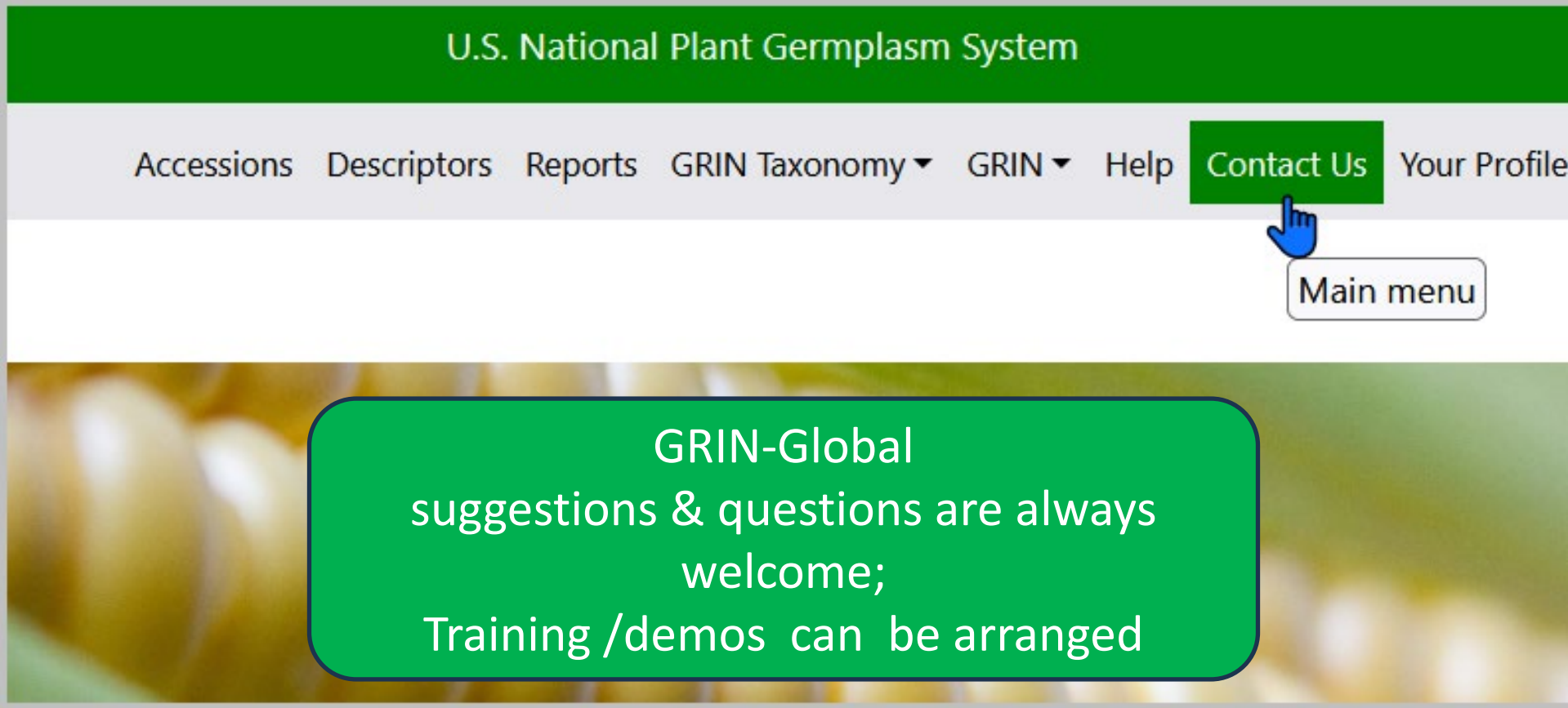
GRIN-Global

Public Website
& Server Changes

Releases…

5 releases since last CGC





Contact Us

Please do!