

# The National Plant Germplasm System: 2022 Status, Prospects, and Challenges

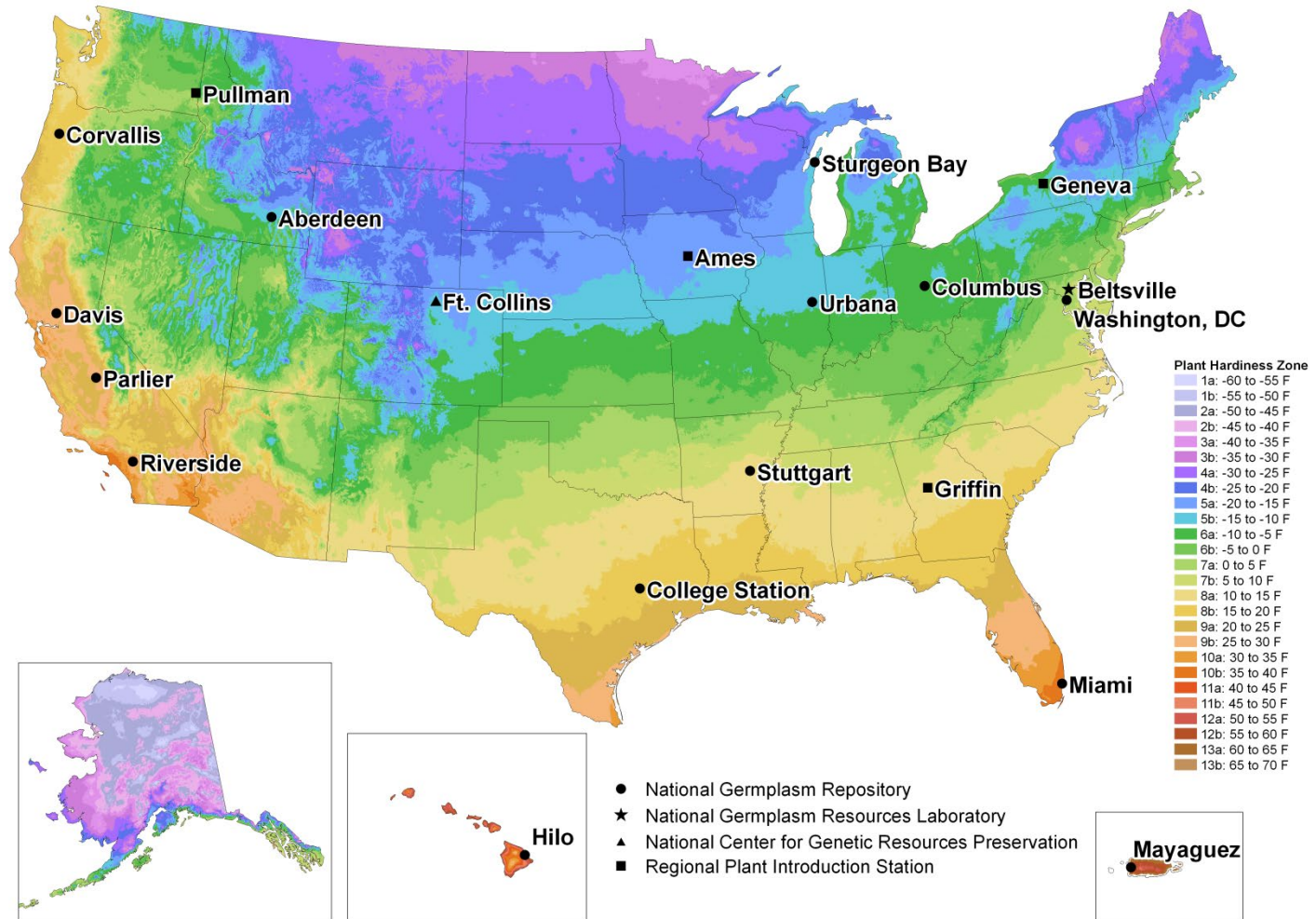
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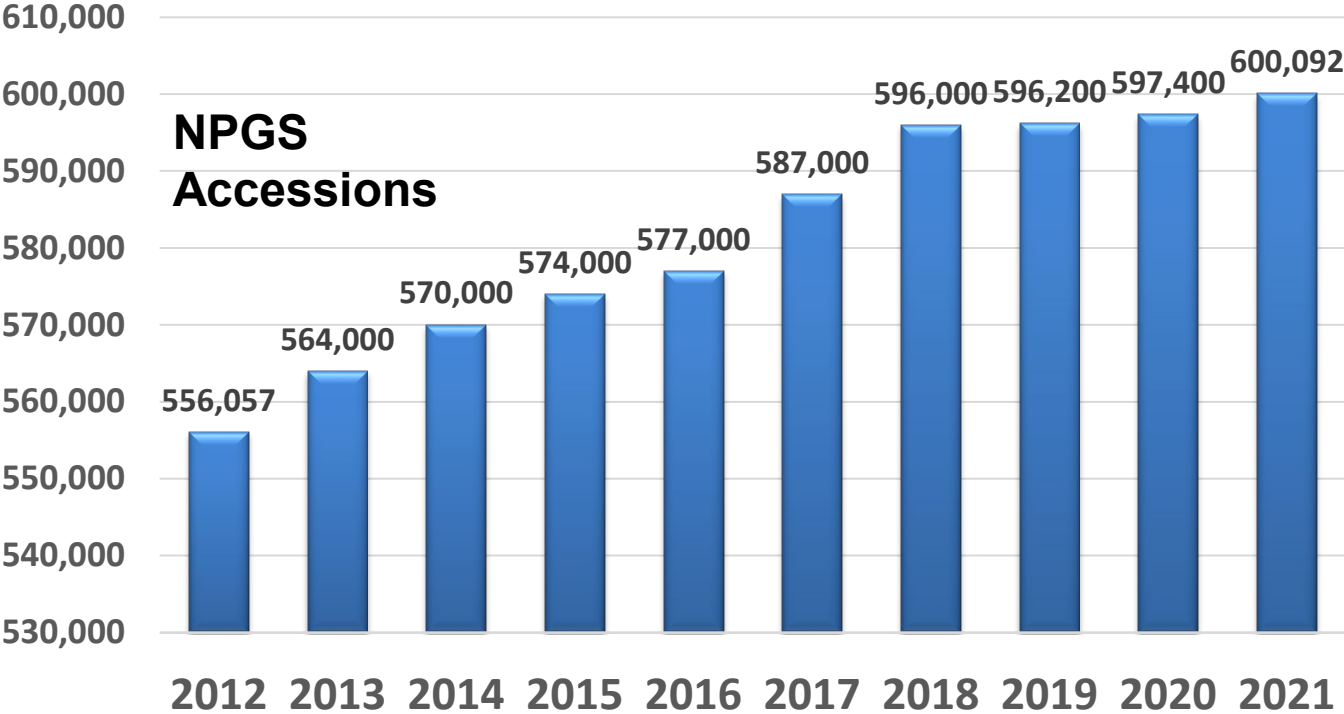
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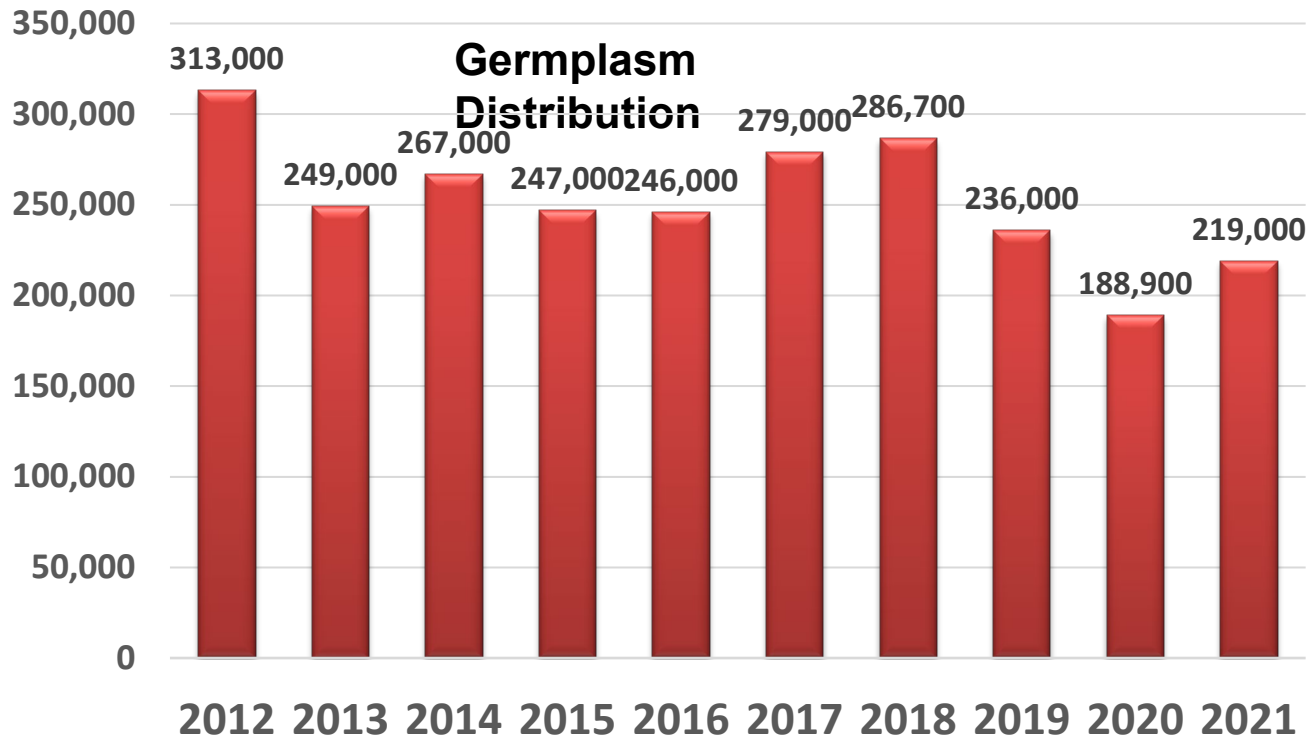
# USDA National Plant Germplasm System (NPGS)



# NUMBER OF NPGS ACCESSIONS 2012-2021



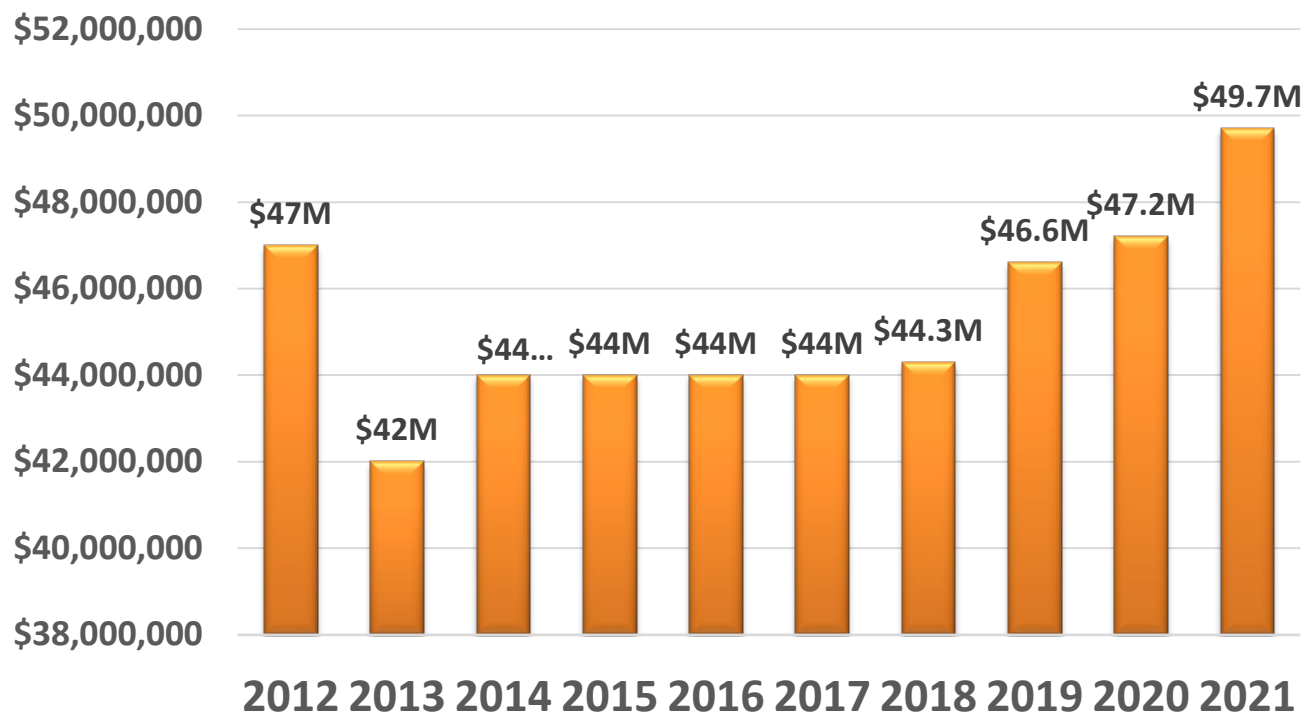
## DEMAND FOR NPGS GERMPLASM 2012-2021



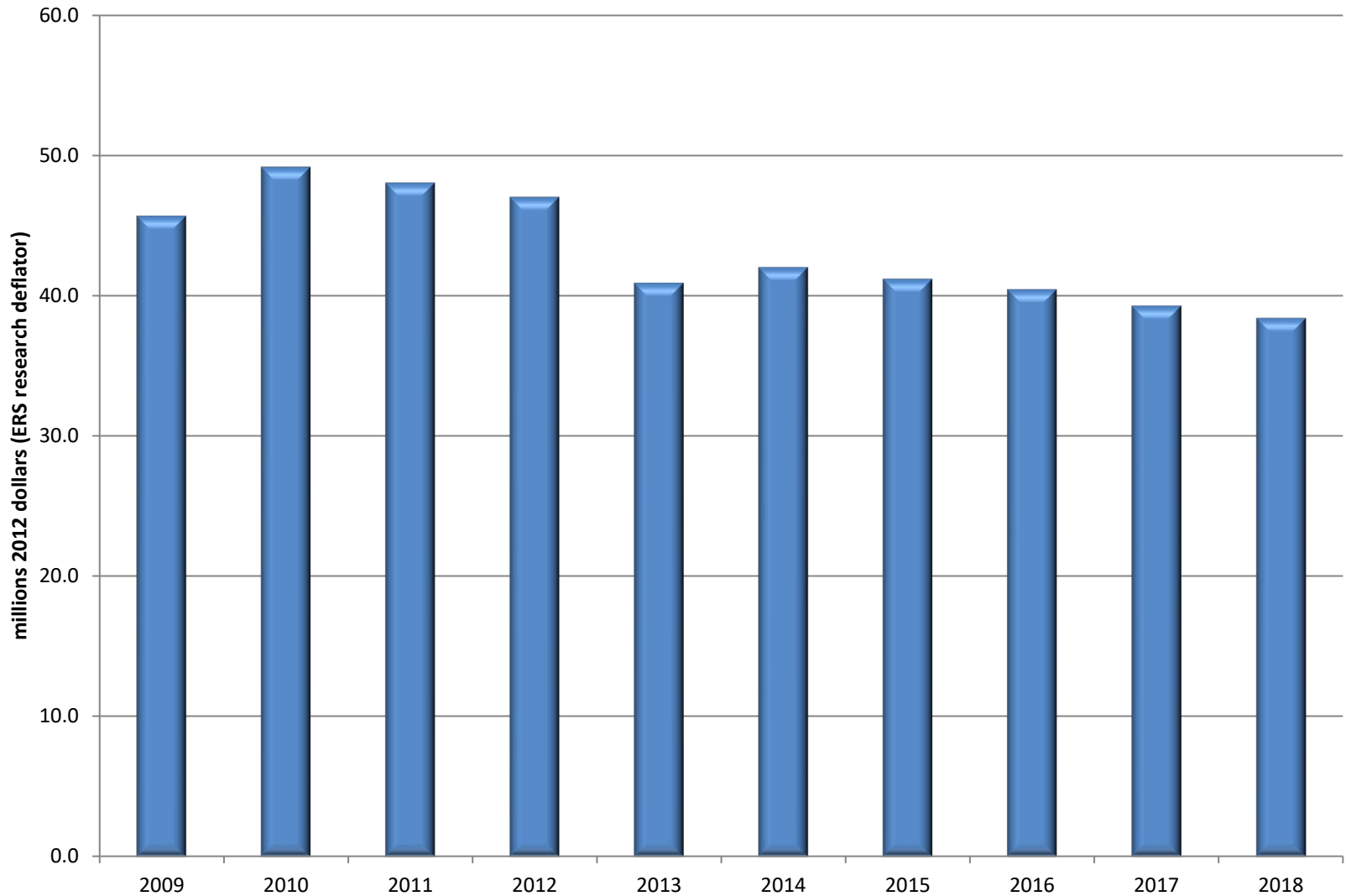
# Effects of CoVID-19 as of June 2022

- All NPGS genebanks are shipping germplasm (PGR).
- # of samples distributed fell by ca. 20% in 2020. The distribution rate increased substantially from the 2020 level in 2021 but is still a bit below the long-term average.
- Genebanks are fully operational. Some genebanks are finding it difficult to hire temporary, often student, labor, because of the low unemployment rate and demographic changes.
- GRIN-Global has functioned normally throughout the pandemic.

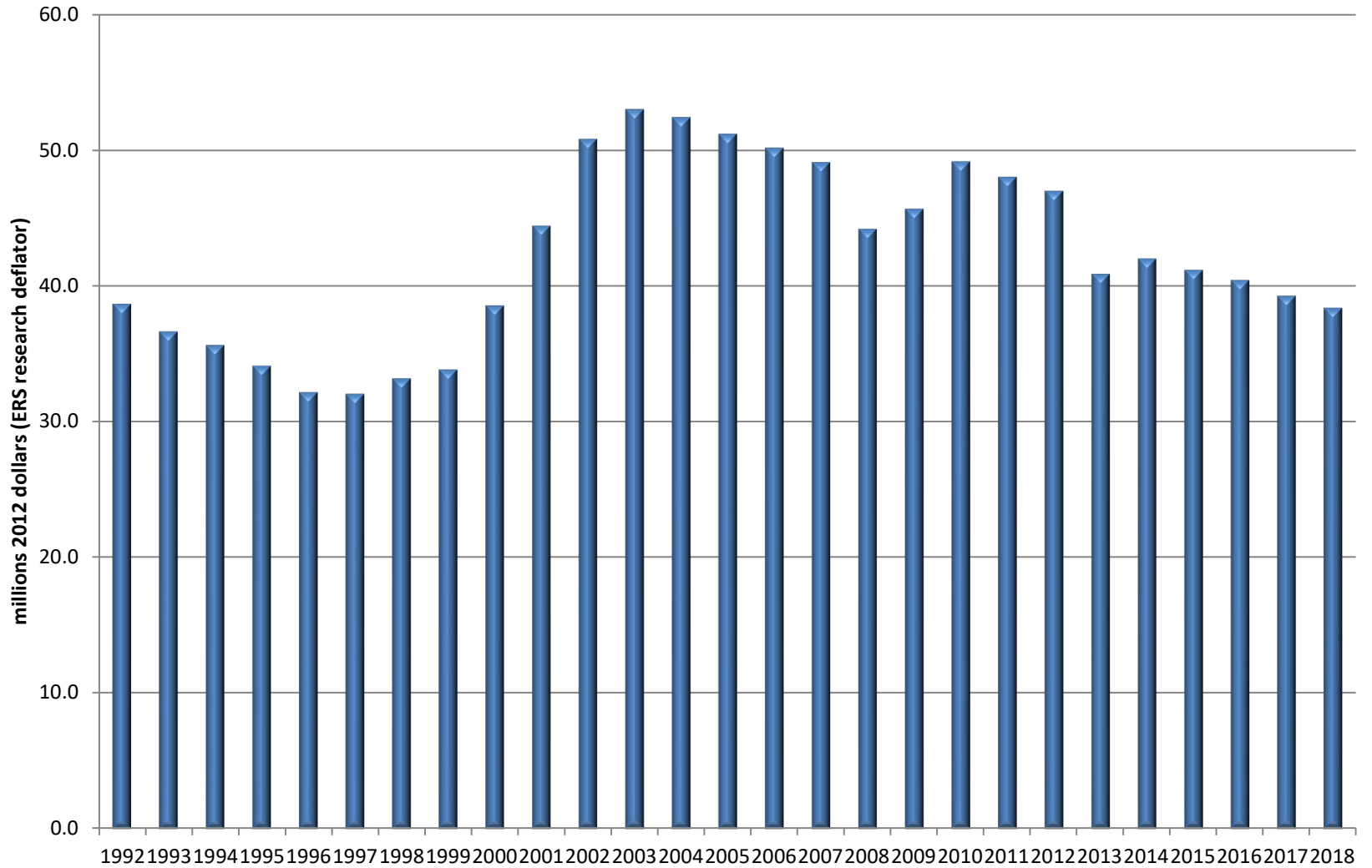
# ARS NATIONAL PLANT GERMPLASM SYSTEM BUDGET 2012-2021



## ARS NPGS real (deflated) budget, 2009-2018



## ARS NPGS real (deflated) budget, 1992-2018





# Some key challenges for the NPGS

- Expanding the NPGS operational capacity and infrastructure to reduce PGR management backlogs and meet increased demand for PGR and associated information.
- Increased operational costs (labor, inputs, overall inflation).  
See <https://www.ers.usda.gov/amber-waves/2022/june/investment-in-u-s-public-agricultural-research-and-development-has-fallen-by-a-third-over-past-two-decades-lags-major-trade-competitors/?cpid=email#>
- NPGS personnel transitions—hiring, training, etc.
- Developing and applying cryopreservation and/or in vitro conservation methods for clonal and some seed PGR.
- BMPs and procedures for managing accessions (and breeding stocks) with an increasing diversity of GE traits in more crops, the occurrence of adventitious presence (AP), and the products of gene editing.
- Acquiring and conserving additional PGR, especially of crop wild relatives.

# PGR Management Priorities: Foundations for Crop Innovation

- **Acquisition**
- **Maintenance**
- **Regeneration**
- **Documentation and Data Management**
- **Distribution**
- **Characterization**
- **Evaluation**
- **Enhancement**
- **Research in support of the preceding priorities**

# NPGS Personnel Transitions

- Farewell and best wishes to Joanne Labate, Vegetable Curator (ARS-Geneva); Lorie Bernhardt, Seed Distributions (ARS-Stuttgart); Esther Peregrine, Assistant Curator (ARS-Urbana); and Kim Hummer, RL (ARS-Corvallis).
- Welcome and best wishes to Jeff Gustin, Maize Genetic Stock Curator and Benjamin Bartlett Soybean Assistant Curator (ARS-Urbana); Erin Galarneau, Grape Curator (ARS-Geneva); Madhugiri Nageswara-Rao, Tropical Ornamental Curator (ARS-Miami) and Gul Shad Ali, Tropical Crops Curator (ARS-Miami); Lauri Reinhold, Curator (ARS-Corvallis); Anne Frances, Botanist and Matthew Riggs, IT Specialist (ARS-Beltsville); Warren Chatwin, Pecan Curator (ARS-College Station); Jonathan Moser, Seed Distributions (ARS-Stuttgart); Harlan Svoboda, Herbarium Curator (ARS-USNA); Robert Krueger, RL (ARS-Riverside); and Marilyn Warburton, RL and Bailey Hallwachs, SOS Coordinator (ARS-Pullman).
- We are recruiting staff at Corvallis, OR; Davis, CA; Pullman, WA; and Geneva, NY.

## PGR Management Training Initiative

- Numerous NPGS PGR managers have retired recently; no formal, comprehensive program existed for training new PGR managers.
- G. Volk (ARS-Ft. Collins) and P. Byrne (CSU-Ft. C.) lead a project, supported by ARS and a NIFA grant, to design and develop a training program for PGR management to be delivered primarily through distance-learning.
- The effort has culminated in a new, three module, 3 credit hour Colorado State online course Plant Genetic Resources: Genomes, Genebanks, and Growers, to be offered for the third time in Aug.-Sept. 2022. <http://pgrcourse.colostate.edu/>
- Numerous PGR training/educational materials are freely accessible from GRIN-Global at <https://grin-u.org/>
- Infographic posters for PGR, genebanks and conservation, and PGR and food security in 6 languages; download at <http://genebanktraining.colostate.edu/trainingmaterials.html>

# FY 20-21 ARS NPGS Budgetary Increases

- **Small grains PGR (\$190,000): Aberdeen, ID.**
- ***Vaccinium* PGR (\$150,000): Corvallis, OR.**
- **Hemp PGR (\$1.35 million): Geneva, NY.**
- **Pecan PGR (\$400,000): College Station**

# **NPGS Hemp Genetic Resource Collection**

- **NPGS active collection at ARS Plant Genetic Resources Research Unit (PGRRU), co-located at Cornell AgriTech Campus, Geneva, NY; back-up and PVP samples at National Laboratory for Genetic Resources Preservation, co-located at Colorado State campus, Ft. Collins.**
- **PGRRU staff for hemp includes Curator/Plant Genetic Resource Manager Zach Stansell; Research Geneticist Tyler Gordon; Post-doctoral Researcher Nick Genna.**

# **NPGS Hemp Genetic Resource Collection**

- **NY State license for hemp production and DEA registration for Schedule 1 drugs at PGRRU, and DEA registration for Schedule 1 drugs at Ft. Collins.**
- **9 PVP-protected hemp accessions in secure long-term storage at Ft. Collins.**
- **179 hemp accessions at PGRRU undergoing evaluation for regulatory compliance. 7 hemp accessions available for distribution.**
- **Successful hemp webinar series, focused on 1890 LGU audiences, but open to research, educational, and commercial participants, jointly presented by PGRRU and Cornell, Winter 2022.**

# **NPGS Hemp Genetic Resource Collection**

- **Collaborative research with ARS, Cornell, Oregon State, UC Davis, Washington State, and Wisconsin to develop a consensus hemp genotyping protocol.**
- **Fiber phenotyping evaluation with ARS-New Orleans research center.**
- **Secondary metabolite phenotyping with ARS-Peoria research center.**
- **Morphological phenotyping and germplasm regeneration with Alabama A & M.**



# **NPGS Hemp Genetic Resource Collection**

- **USDA/NIFA Supplemental and Alternative Crop grants with UC Davis and Wisconsin to collect hemp breeding materials and feral populations for potential incorporation into NPGS hemp genetic resource collection.**
- **Research on hemp seed dormancy and emergence; stand emergence is a major problem with fiber cultivars.**

# Current Objectives for NPGS Hemp Genetic Resource Collection

- **Objective 1: Efficiently and effectively acquire and maintain the safety, genetic integrity, health, and viability of priority hemp genetic resources, and distribute them and associated information worldwide.**
- **Objective 2: Develop effective and regulatory compliant genetic resource maintenance, evaluation, testing, and characterization methods and apply them to priority hemp genetic resources. Record and disseminate hemp evaluation and characterization data via GRIN-Global and other data sources.**
- **Objective 3: With other National Plant Germplasm System (NPGS) genebanks and Crop Germplasm Committees, develop, update, document, and implement best management practices and a Crop Vulnerability Statement for priority hemp genetic resources and information management.**
- **Objective 4: Develop and apply research tools, knowledge of hemp genetics, the genetic control of priority traits, and genetic resources for hemp research, breeding, and crop improvement.**

# **NPGS Potato Genetic Resource Collection**

- **NPGS Potato Genetic Resource Collection currently located at University of Wisconsin, Peninsular Agricultural Research Station, Sturgeon Bay, WI.**
- **For 70+ years supported by ARS, UW, and the SAES of the 50 States through IR-1, initially, then NRSP-6.**
- **NRSP-6 support of \$135,000 was discontinued at the end of FY21.**

# **NPGS Potato Genetic Resource Collection**

**Adaptation to loss of NRSP-6 budgetary support:**

- 30+ year NRSP-6-supported employee Max Martin retired from UW in 2021; position was abolished.**
- Coincidentally, 30+ year ARS-Madison potato researcher David Spooner retired in 2021 and passed away on 8 June 2022. His position and research project were abolished. Most of the unencumbered funding was re-directed to support the NPGS Potato Genetic Resource Collection.**
- A temporary, term-limited ARS technician was hired for the NPGS Potato Genetic Resource Collection.**

# **NPGS Potato Genetic Resource Collection**

- **Results: NPGS Potato Genetic Resource Collection budgetary support stabilized. One fewer ARS potato researcher and adjunct UW faculty member.**
- **Congress in FY 22 appropriated \$37.9 million to the ARS budget for a new Plant Germplasm Research Facility to be located at the UW West Madison Agricultural Research Station.**
- **The NPGS Potato Genetic Resource Collection will likely re-locate to the new facility, once constructed.**