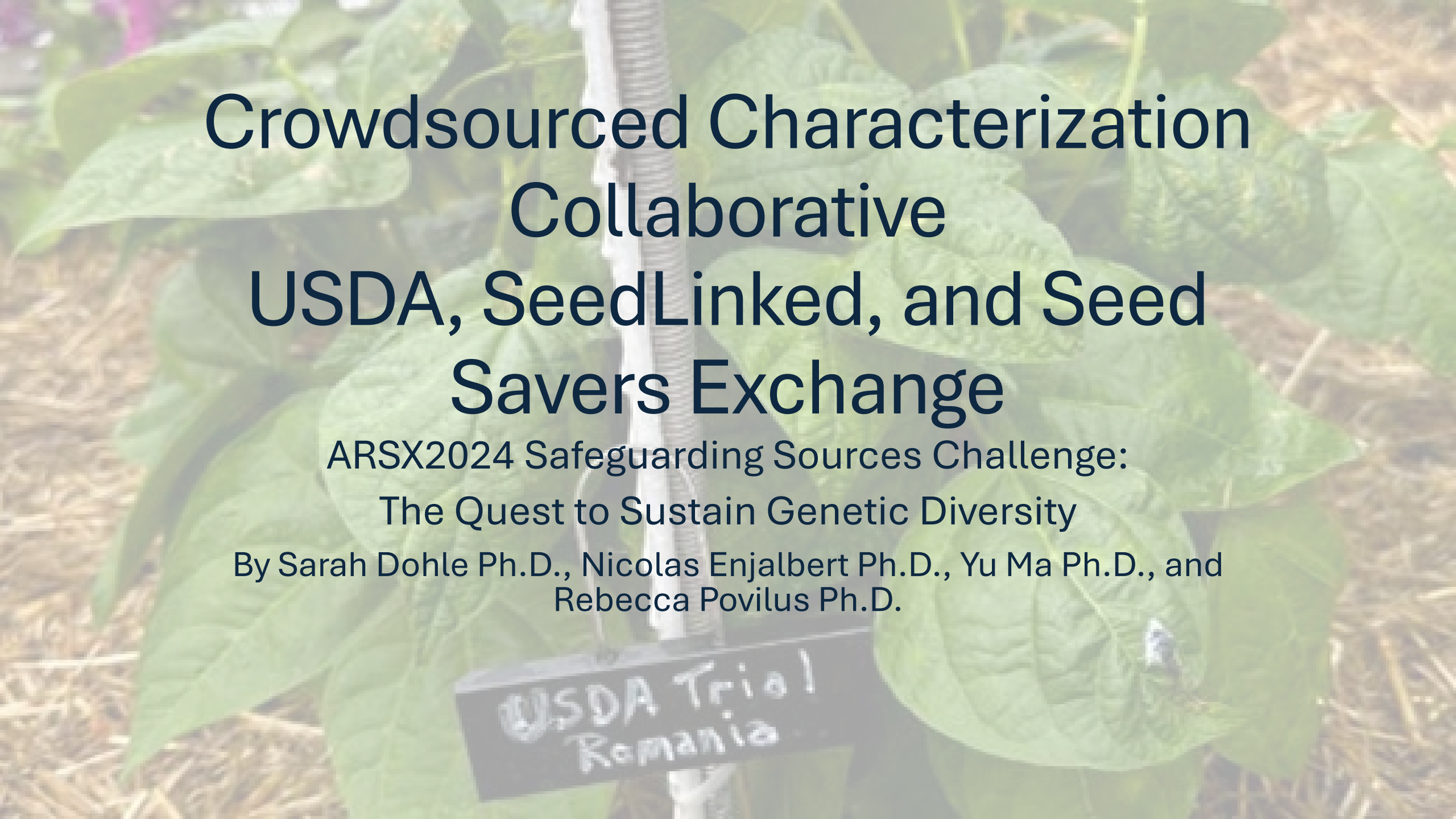
Crowdsourced Characterization Collaborative USDA, SeedLinked, and Seed Savers Exchange

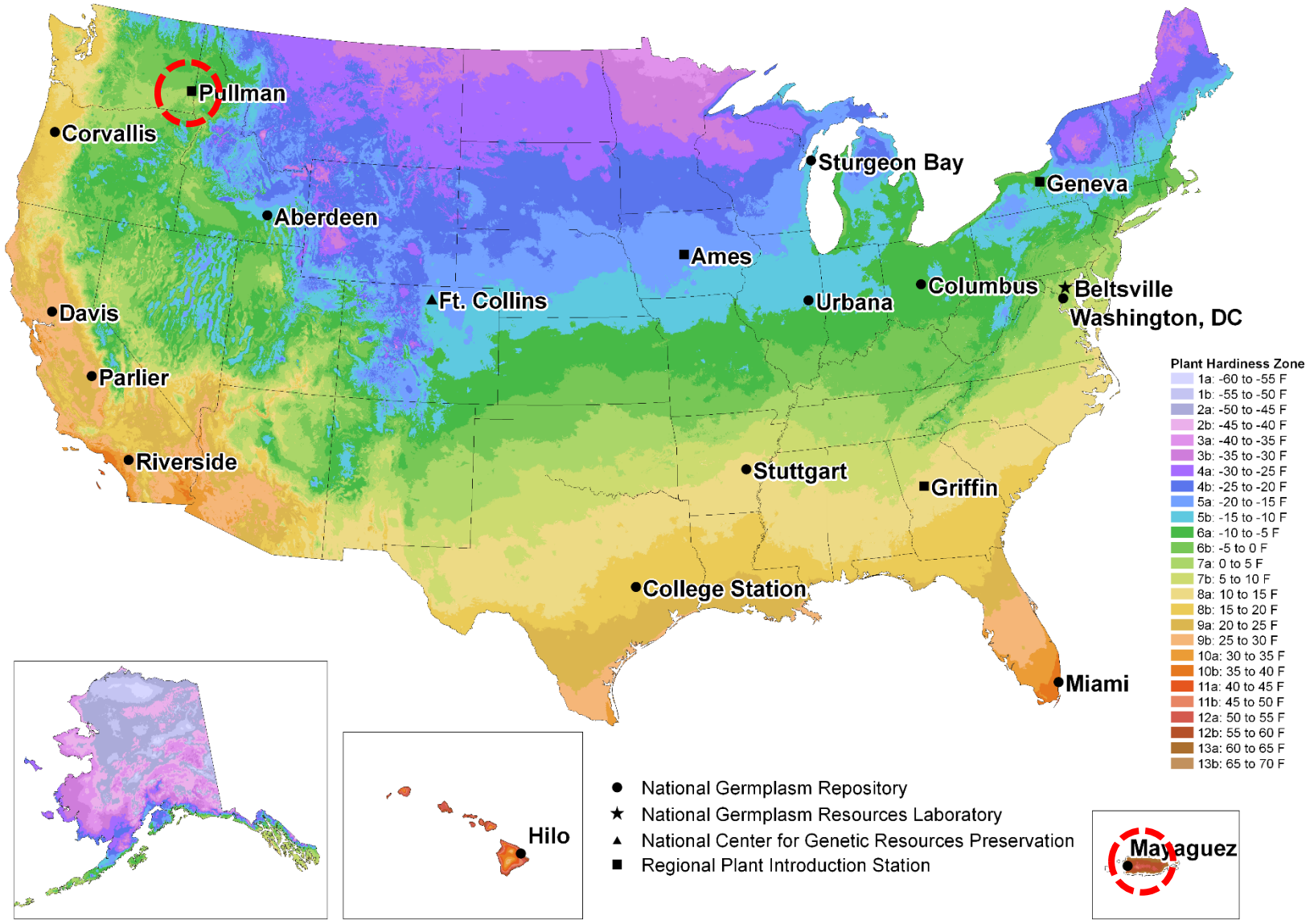
ARSX2024 Safeguarding Sources Challenge:

The Quest to Sustain Genetic Diversity

By Sarah Dohle Ph.D., Nicolas Enjalbert Ph.D., Yu Ma Ph.D., and Rebecca Povilus Ph.D.



National Plant Germplasm System (NPGS)



- 22 sites across nation
- >620K acc. & >16K spp.
- 200 Crops and wild relatives
- 70+ year partnership Land-Grant Universities, and State Agricultural Experiment Stations
- Long-standing partnerships with commodity groups and agricultural industries





There are more than 620,000 unique kinds of plant genetic resources in the NPGS

Mission of the NPGS:

Acquire	Maintain
Evaluate	Enhance
Characterize	Document
Distribute	

...assigned genetic resources

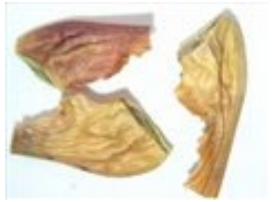
Over 200,000 of these are distributed every year

Plant germplasm is conserved in many forms and must be regenerated every so often

Curators must balance ease of maintenance, protection against loss, longevity, and accessibility

They maintain living collections as:

- Plants growing in the field, greenhouse, screenhouse, or tissue culture
- Seeds or frozen tissue in cold storage





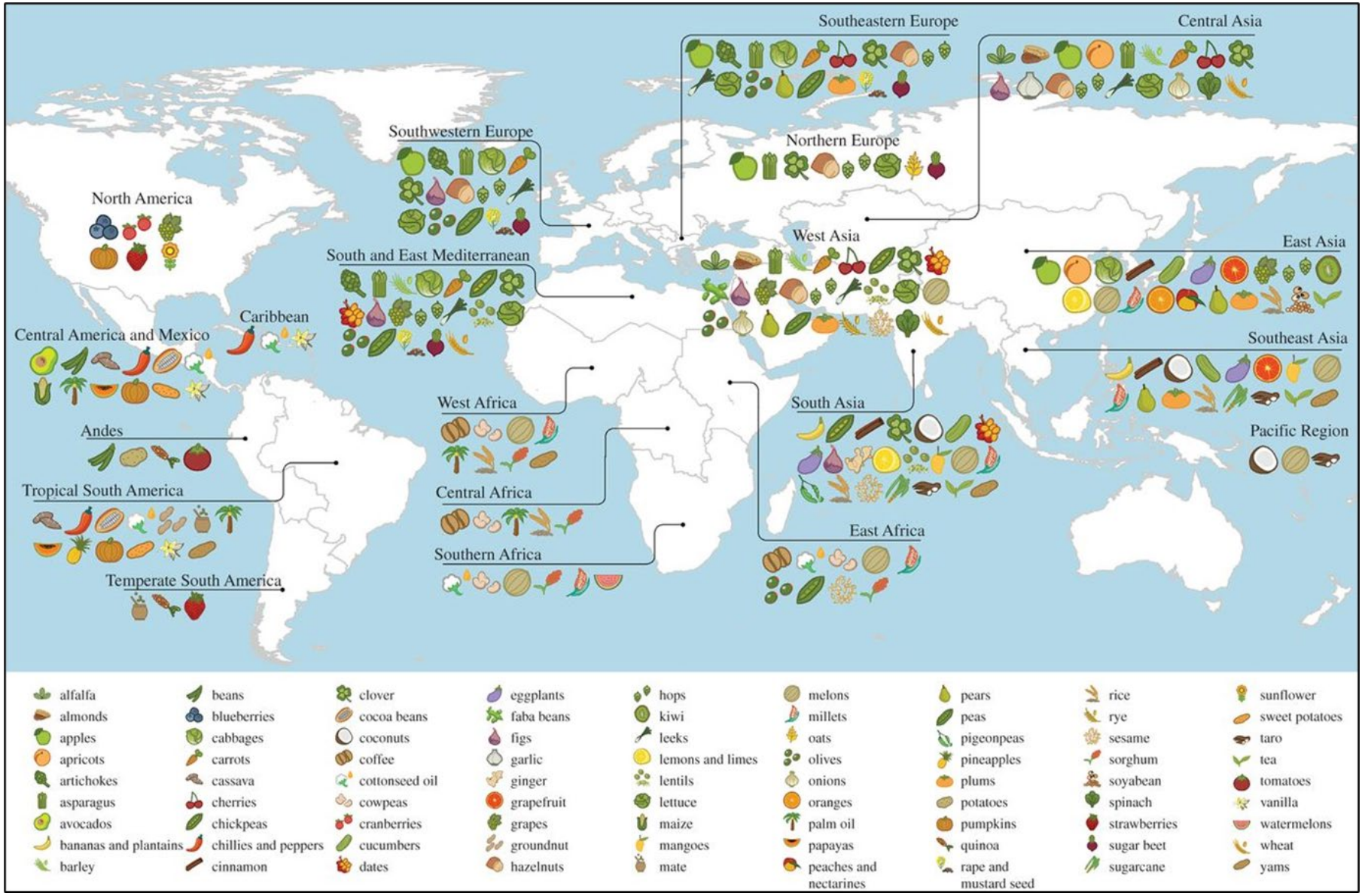




Diverse germplasm collections are key to agricultural security

Genetic diversity can be used to improve crop quality, yield, pest and disease resistance, tolerance to environmental extremes, and more.

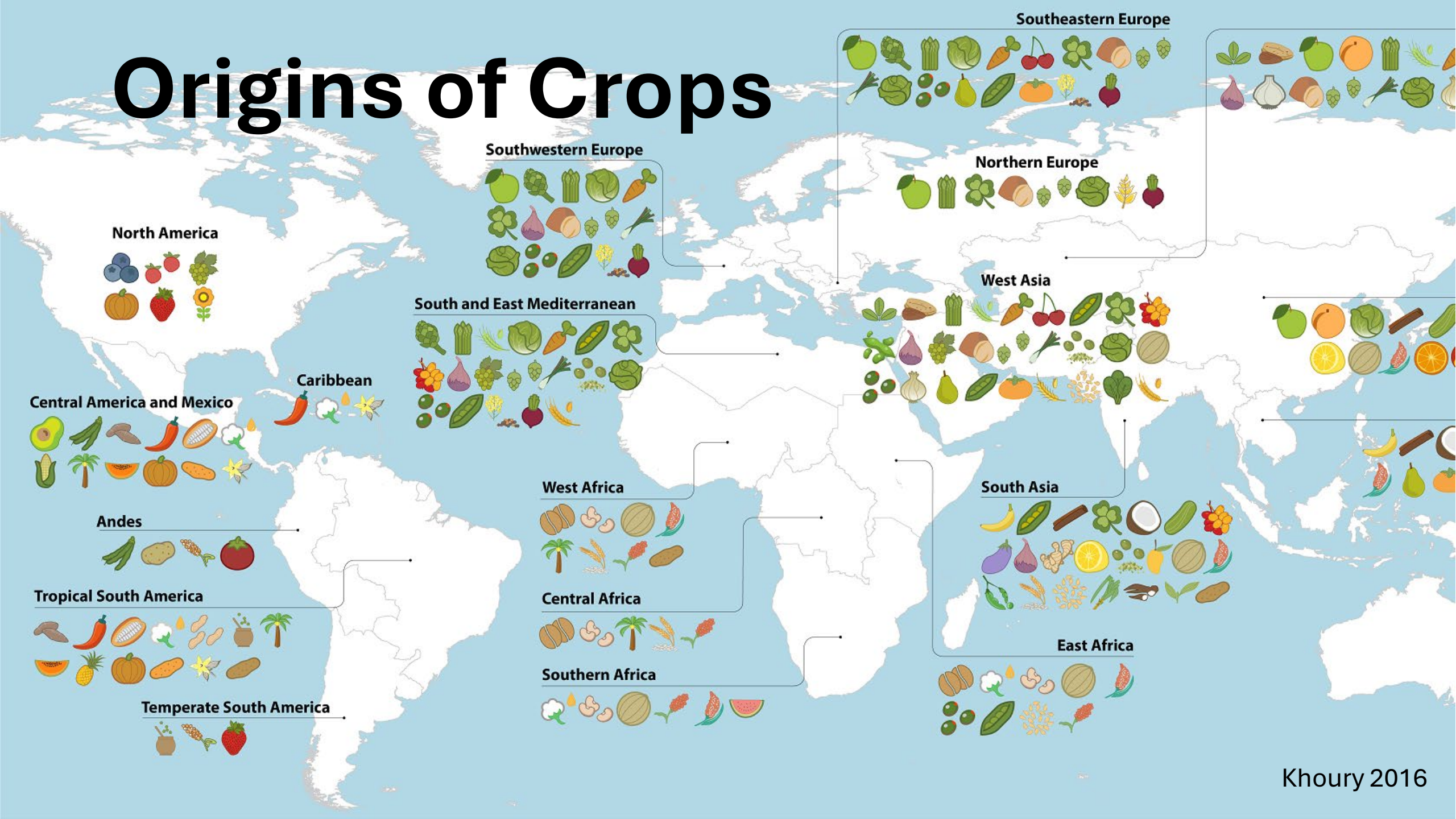
NPGS distributes living plant material to researchers and plant breeders working to develop and improve crops for a growing population and changing climate.



Map: Primary regions of origin for major crops.

Colin K. Khoury et al. Proc. R. Soc. B 2016;283:20160792. © 2016

Origins of Crops



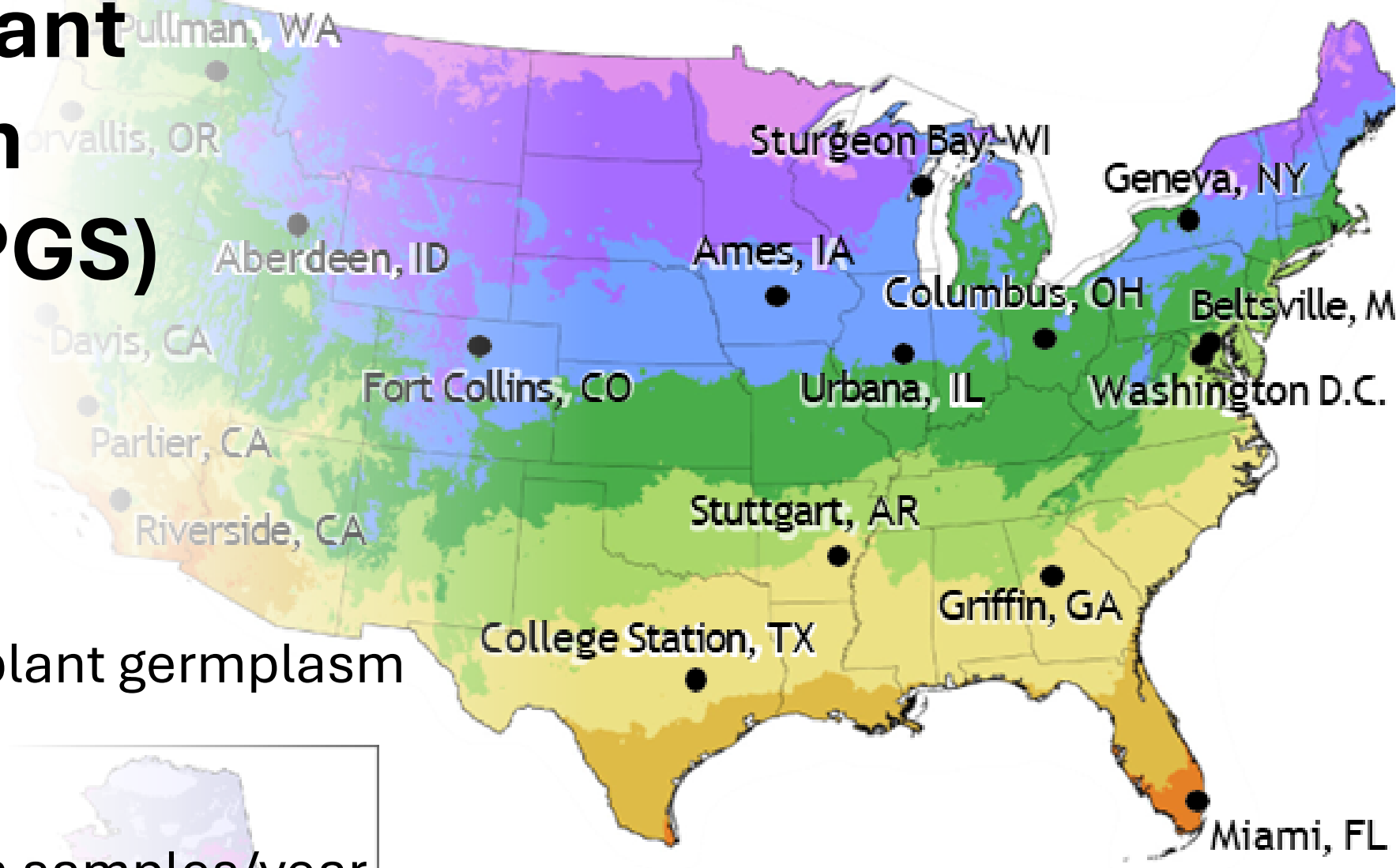
Khoury 2016

National Plant Germplasm System (NPGS)

22 genebanks

Maintain
- + 200 crops
- +600K unique plant germplasm

Distribute
- +200K research samples/year



NPGS Daunting Challenges

Collections have critical backlogs in characterizing germplasm.

- Environmental adaptation (ex. short vs. long season)
- Stress tolerance (ex. drought and pests)
- Post harvest (ex. taste and processing)

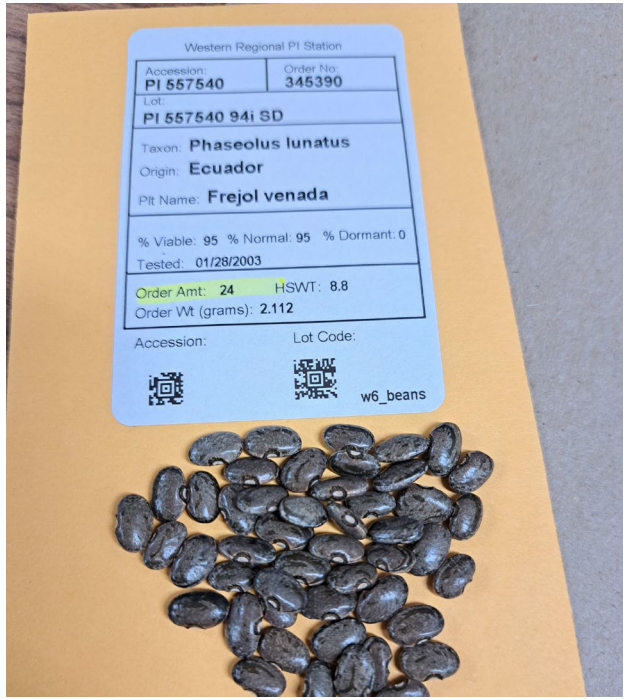
SeedLinked Volunteer Grower Network

ANDROID APP ON Google Play

AVAILABLE ON THE App Store

Phaseolus bean collection

- +17K accessions (unique samples)
- ~300 regenerations/ year
- ~5,000 distributions/ year
- All greenhouse regenerations
- NEED CHARACTERIZATION DATA



2024 Bean Pilot

200+ Volunteer Growers

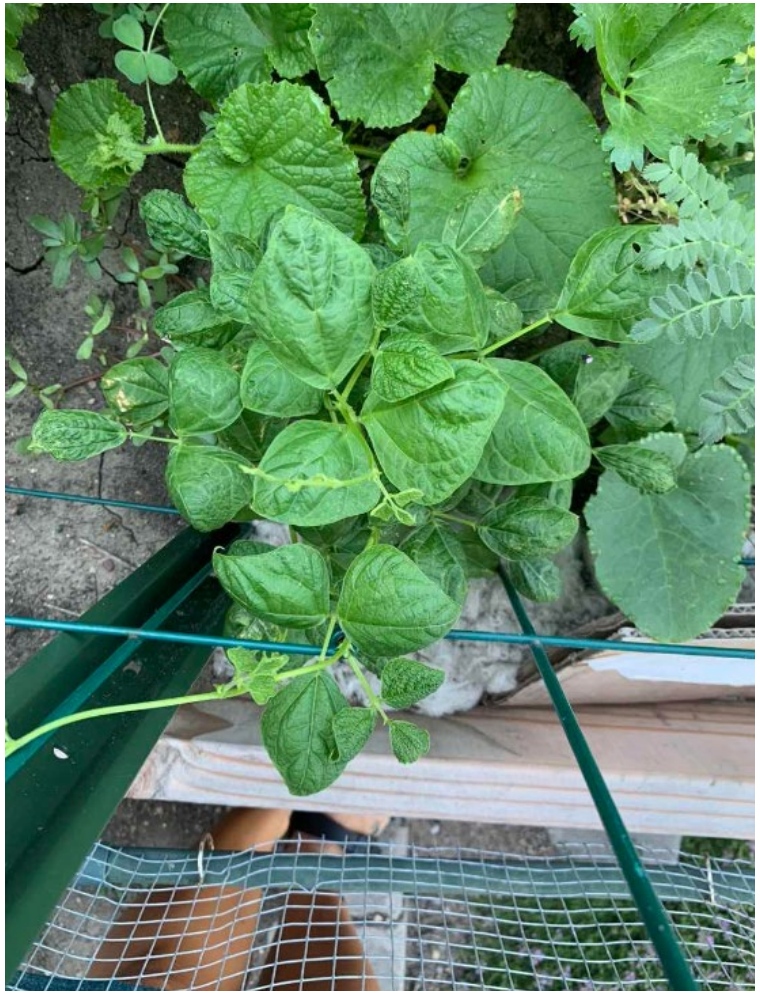
20 Bean samples

~15 Locations each

Trait data

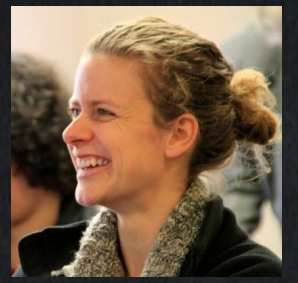
User comments

Tagged Photographs



3-NPGS Crop Collections

- Beans – human nutrition
- Ornamentals – extreme diversity
- Vegetables – garden importance



Outcomes Year-1

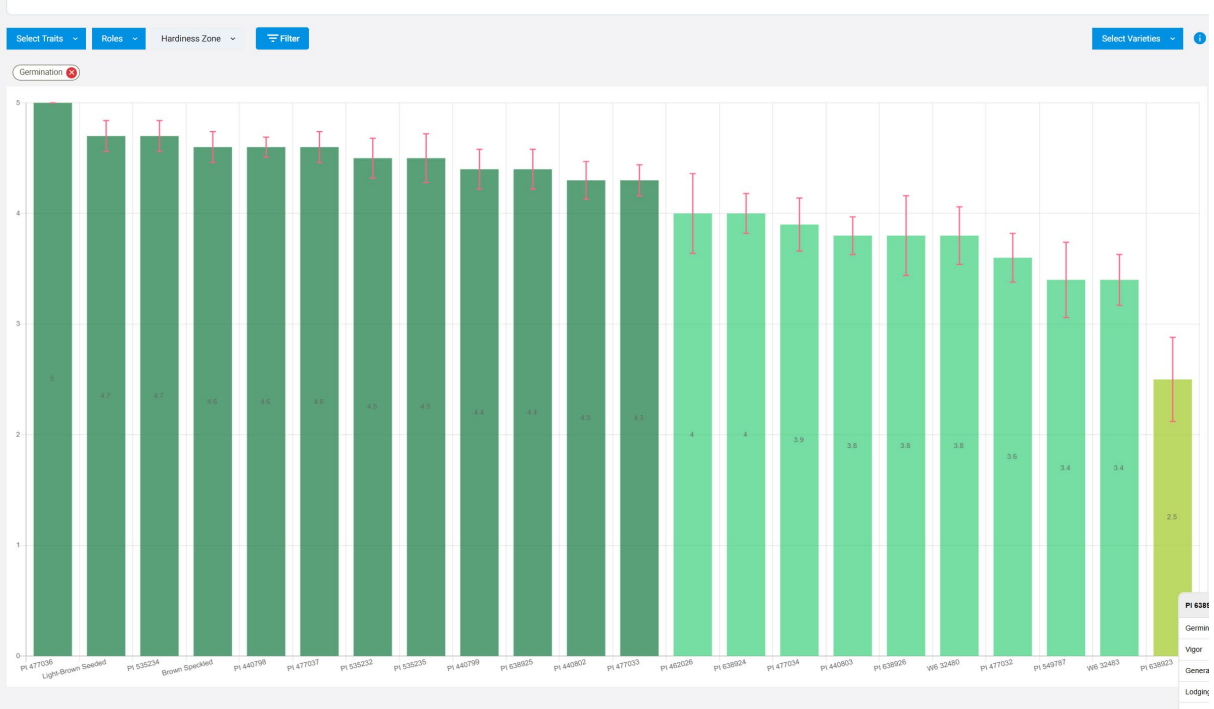
- Enhanced data collection and management application
- +150 samples
- 1,000 volunteers

Outcomes

- **<u>All</u>** genebanks will have access to SeedLinked tool
- NPGS users will have access to high quality more complete trait data
  - Hundreds of thousands of accessions
  - Field data from thousands of locations with photographs
  - Statistical models to help choose best parents to breed regional adaptation
- Public awareness
- Regionally adapted, diverse, sustainable agriculture.

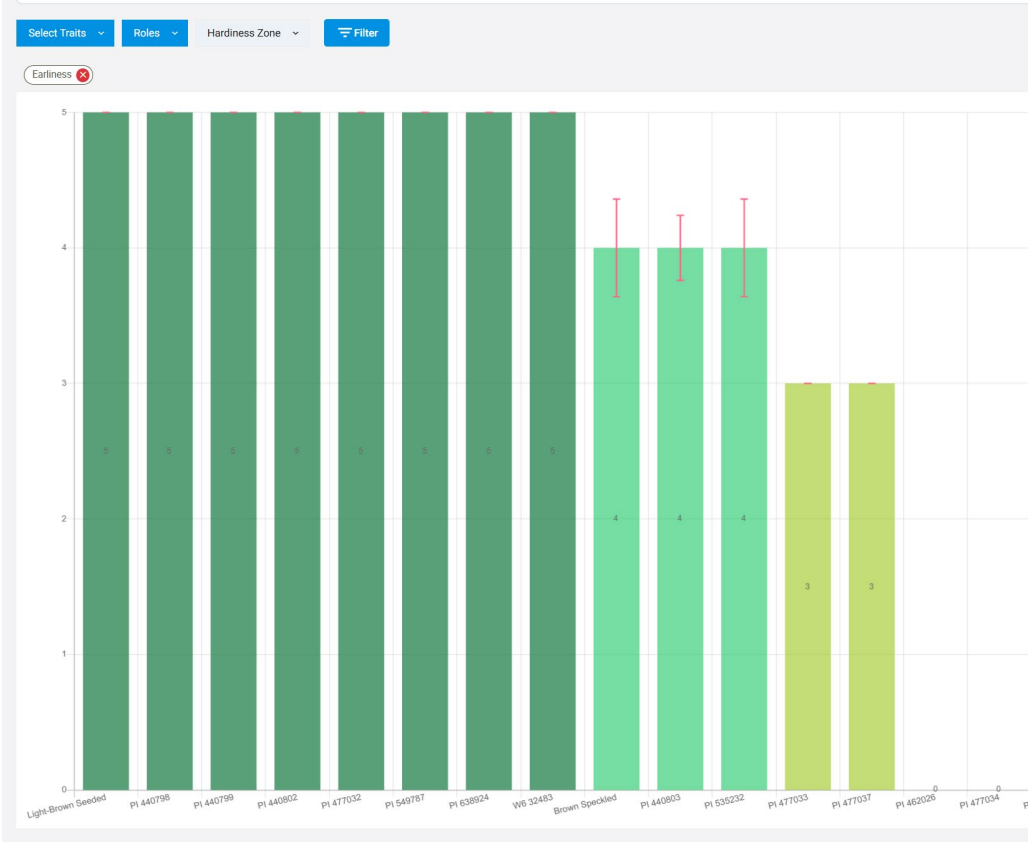
Tepary accession performance 2025

Germination rate



PI 477036, Light-Brown Seeded, PI 535234

Earliness



Light-Brown Seeded, PI 440798, PI 440799, PI 440802, PI 477032, PI 549787, PI 638924, W6 32483

Bend, OR 7/11/25
14 inches tall, no blooms yet
By minnichj

Selha, WA 7/11/25
The 3 plants are growing very well. Starting to flower
By ann_bullis

June 2, 2025
Las Vegas NV
June 2, Showing signs of stress.
Look at leaves up close in photo.
Both plants look like this.
By sfinfrock

July 12, 2025
Lubbock, TX
growth very strong and vigorous, bushy
By DevonBroyles

June 7, 2025
Tucson, AZ
By KAntieau

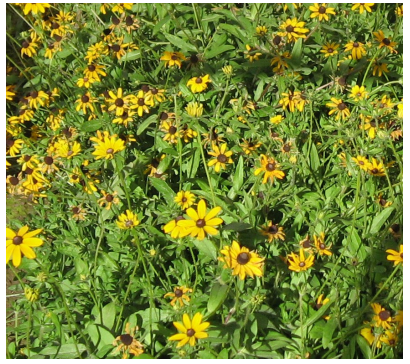
April 29, 2025
Lubbock, TX
Germination date 4/25/2025
By DevonBroyles

Thank you for keeping agriculture diverse!!







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