

Emerging Crops in the USDA Arid Lands Germplasm Collection



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Unique challenges and opportunities

Managing genetic resources for emerging crops presents unique challenges and opportunities – in many cases, the NPGS collections are the only publicly available source of plant material, and germplasm inventories must be carefully managed to accommodate periods of increased demand. Also, there is often limited knowledge of the best agronomic and seed production techniques. When managing emerging crops, germplasm curators have a unique role to play in working closely with breeders and researchers to develop useful descriptors, identifying agronomic challenges, and serving as a hub for collaborative research.

New crops for a new bioeconomy

NALPGRU maintains genetic resources of crops adapted to arid and otherwise “marginal” conditions. Many of these crops are being developed for the **sustainable, domestic production of industrial products** that would otherwise need to be imported or synthesized from nonrenewable resources. Growing industrial feedstocks on marginal land with minimal inputs will support the **emerging rural bioeconomy** without displacing other agricultural production.

Guayule *Parthenium argentatum*



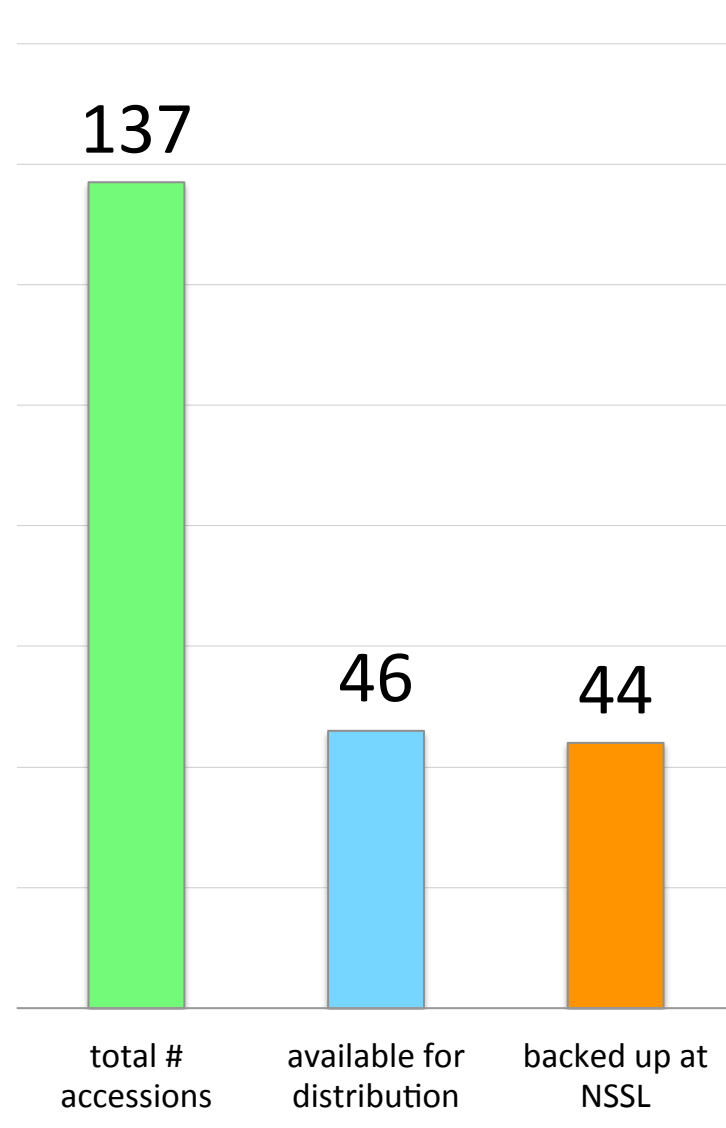
Potential Use/Products

- Natural rubber and latex (hypoallergenic)
- Resins
- Biomass for fuel (bagasse)
- Potential for bioactive compounds

Collection Origins

- Early breeding material (WWII) – Emergency Rubber Project, Manzanar War Relocation Center
- Wild material from Mexico and Texas
- Modern breeding lines – Univ. of Arizona, UC Riverside

Availability



Management

- Perennial field plots
- Seed generated by caging with pollinators
- Need basic descriptor data – phenotypic eval planned with NIFA-SBAR project
- Genotypic diversity evaluated in NIFA-BRDI project – need more diversity, esp. in diploids
- Developing techniques to increase seed quality
- Active development programs – USDA-ARS, Univ. of Arizona, Bridgestone Americas, other commercial entities

Jojoba *Simmondsia chinensis*



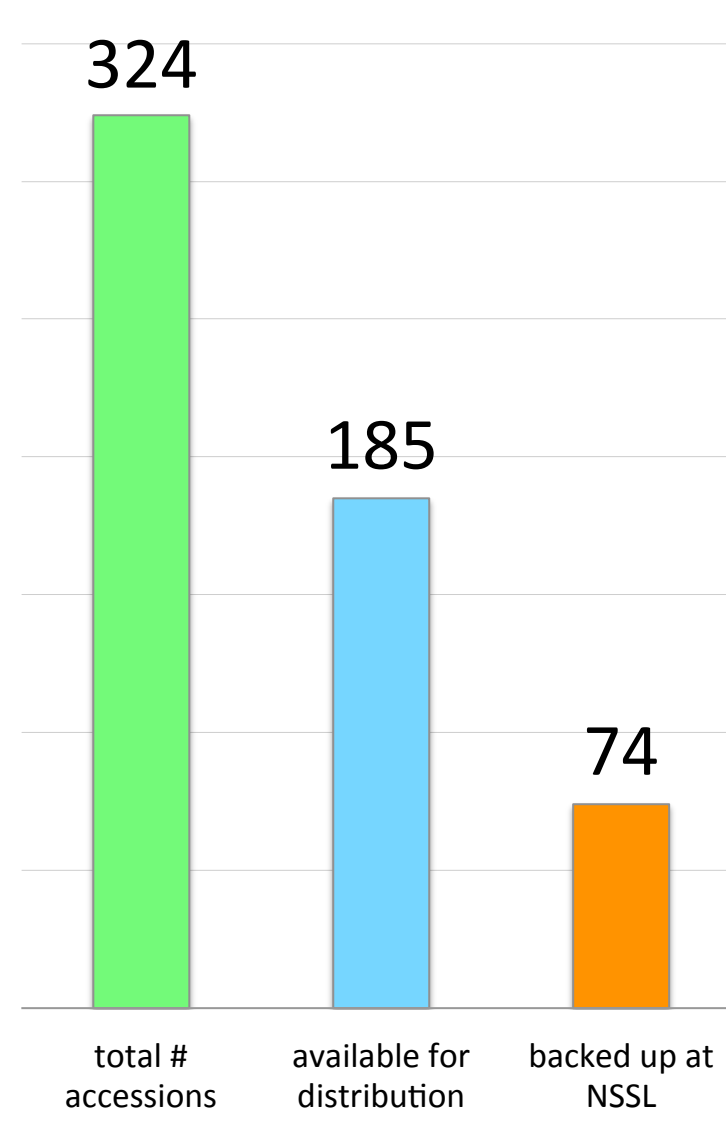
Potential Use/Products

- Jojoba oil – liquid wax (long chain esters) with similar properties to sperm whale oil
- Cosmetics
- Industrial lubricants
- Biofuel

Collection Origins

- Materials from discontinued breeding programs – Univ. of Arizona, UC Riverside
- Wild material from southwest U.S. and Mexico

Availability



Management

- Perennial field plots with 2 female, 2 male plants
- Wind-pollinated
- Distributed as open-pollinated seed and cuttings
- Phenotypic descriptors and oil profiles in GRIN-Global
- Genetic diversity analysis pending
- Bulk of collection replanted in 2016

Prickly Pear *Opuntia spp.*



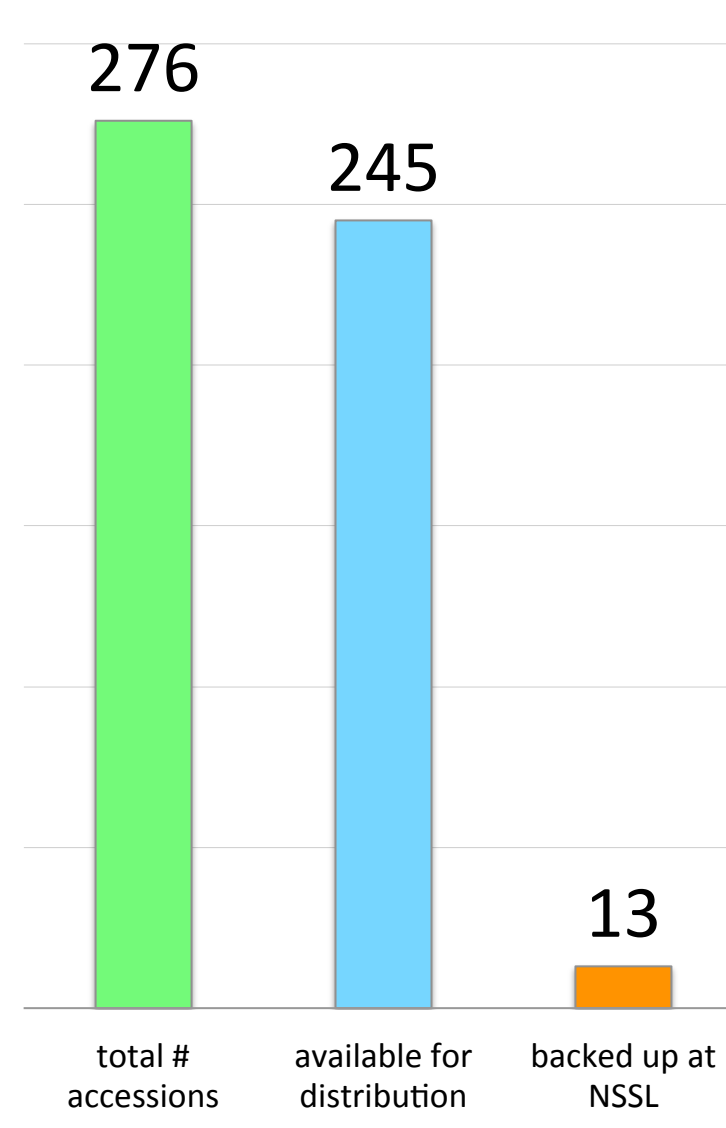
Potential Use/Products

- Fresh fruit (tuna) and vegetable (nopales)
- Processed foods – concentrate, sweeteners, dyes
- Medicinal compounds, nutraceuticals
- Livestock forage
- Seed oil
- Biomass for fuel

Collection Origins

- Breeding material from Texas A&M, UC Riverside
- Wild material from Boyce Thompson Arboretum, BLM Seeds of Success
- Donations from farmers, nurseries

Availability



Management

- Perennial field plots, fully clonal management
- Distributed as cuttings (cladodes)
- Some phenotypic descriptors in GRIN-Global
- Evaluated for salt and boron tolerance
- In need of partial repropagation due to “cladode-swelling disease”
- Active development programs – Univ. of Nevada at Reno, D’Arrigo Bros.