Crop Vulnerability Update for Vitis

2025

Vulnerabilities & Threats

- Narrow genetic varieties used for US and worldwide grapevine production.
- Crop wild relatives (CWR) threatened in all centers of origin.
- Key production traits lacking: rootstocks for drought and mineral tolerances, and vigor control; traits preventing mechanization; late bloom & early ripeness
- Vulnerabilities to pests, diseases, and abiotic stressors: smoke taint; late spring frosts; emerging pathogens (e.g., Spotted Lantern Fly); resistant cultivars for high-pesticide input diseases (e.g., Powdery and Downy Mildews); resistant cultivars to endemic pathogens (Pierce's Disease, viruses (Leafroll & Fanleaf Degeneration), trunk diseases, phylloxera and nematodes)
- Limited resources for plant genetic resource (PGR) management and intake characterization (genetic ID and general traits), threatening the health and efficient utilization of the collections in the National Clonal Germplasm Repository (NCGR) in Davis, CA and in the Plant Genetic Resources Unit in Geneva, NY.

NPGS Plant Genetic Resources Status & Impacts

- **Status:** Primary site NCGR – Davis (3000+ accessions; about 75% are cultivated *V. vinifera* or *Vitis* hybrids; contains ~30 species of approx. 80 taxa within Vitis, some species have very few accessions). PGRU – Geneva (1400+ accessions; contains cold hardy vines, 50% are *Vitis* hybrids; contains ~20 species (no unique species from NCGR Davis but differences in habitat requirements; some species have very few accessions). The majority of both collections are not backed up.
- **Impacts:** Protects capacity to genetically improve all grapevine production, valued at over $6.5 billon/year. The wine industry alone contributes $276 billion to the U.S. economy per year. PGR are a source of key horticultural traits for more efficient crop production, higher yields, new flavors, and protection against pathogens and environmental factors.

Genetic Research & Breeding Capacities

- ARS breeding for wine and table grapes in Parlier, CA; pre-breeding for numerous scion traits and speed-breeding in Geneva, NY; breeding for wine grapes in Kearneysville, WV. ARS genetic research in grapes in CA and NY.
- University breeding programs in AR, CA, MN, MO, NY, TX. Grapevine genetic research ongoing in numerous other programs across the US.
- Substantial private-sector breeding (CA, NY, MN) focused on elite breeding stock for various products. Includes industries focused on wine, table, juice, and raisin grape products, and nurseries.
- Public PGR collections in Europe and Canada; private PGR collections in Europe, Canada, Asia, Australia, and the United States. Breeding in Europe, South America, New Zealand, Asia, and Australia.

Priority Issues

- Expand management capacity: land availability and quality, increase Integrative Pest Management and mechanization programs of collection vineyards, comprehensive genetic characterizations for true-to-type identifications.
- Comprehensive phenotyping and genetic testing to link desired traits.
- Collections must be backed up.
- Acquire strategically CWR in Asia and North America to collect under-represented unique genotypes.
- Expand quarantine capacity and remove obstacles for a faster processing of imported PGR, including virus testing and clean material for intake.