



# **Breeding, Genetics and Germplasm Discussion Section**

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# Session Objectives

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- To review current USDA-ARS R&D activities relating to grape and grape products
- Discuss industry research priorities and needs
- Conduct a “gap analysis” to align ARS activities with top industry needs and priorities



# Session Strategy

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- Compare industry priorities with ARS R&D activities
- Discuss alignments
  - Match industry need to research activities
  - Discuss gaps
  - Prioritization



# Industry Priority: ARS Projects

3.1. To optimize the interaction of the genotype with the environment.

3.1.2. Develop and expand scion and rootstock breeding and evaluation programs to increase commercial selections and overcome current limitations using traditional and modern analytical, biotechnological and sensory techniques



# Industry : ARS Comparison

## Scion Breeding

- *Ramming (CA)*: table and raisin grapes, including powdery mildew and Pierce's disease resistant types; rootstocks for nematode resistance
- *Stringer (MS)*: muscadine grapes for fresh market and nutritional aspects with solid disease resistance

## Rootstock Breeding

- *Ramming (CA)*: phylloxera resistance and nematode resistance, influence on scion health and fruit quality
- *Cousins (NY)*: nematode resistance, PD resistance, influence on scion health and fruit quality



# Industry : ARS Comparison

## ARS scion and rootstock evaluation

- Ramming (CA): table and raisin grape variety and selection evaluation. Rootstock evaluation for table and raisin grape varieties under various soil and climate conditions
- Cousins (NY): rootstock evaluation for wine, table, raisin, juice grapes
- Stringer (MS): evaluation of muscadine grape varieties for fresh market and for nutritional properties



# Industry : ARS Comparison

## Genetic control of important traits

- *Cadle-Davidson (NY)*: genes and proteins associated with grapevine resistance to fungal diseases, especially powdery mildew, *Phomopsis* and *Botrytis*
- *Garris (NY)*: grapevine growth and development, interactions with environment, including winter acclimation
- *Owens (NY)*: fruit ripening and quality aspects of color intensity, concentration and stability



# Industry : ARS Comparison

## Biotechnology

- *Cousins, Garris, and Owens (NY)*: Non-GMO model to accelerate studies of grapevine flowering, cluster development, and genetics (in cooperation with UCD)
- *Owens (NY)*: GMO plant material for research purposes.



# Industry : ARS Comparison

## **Industry priorities not currently addressed**

- Breeding rootstocks for cold hardiness and drought tolerance
- Scion breeding for cold hardiness and insect resistance, specific terroir requirements



# Industry : ARS Comparison

Other ARS breeding, genetics and germplasm activities not specifically listed as an industry priority

## **Grape material collections:**

- *Stover (CA) and Forsline (NY)*: jointly maintain, characterize, evaluate, and distribute the national grapevine variety collection, with almost 4000 accessions

## **Genetic relationships between grape species, varieties and clones:**

- *Simon (NY) and Aradhy (CA)*: development of molecular techniques to differentiate grapevine populations and contribute to the understanding of species definitions and population biology and genetics

## **Bioinformatics:**

- *Baldo (NY)*: Using bioinformatics (a statistical and computer-based approach) to analyze gene and protein diversity and expression patterns

## **Molecular markers and diagnostics:**

- *Cadle-Davidson (NY)*: disease resistance and susceptibility.
- *Garris (NY)*: clonal differences
- *Owens (NY)*: color
- *Ramming (NY)*: phylloxera and disease resistance.



# For Your Consideration

## How to deal with intellectual property

- How are intellectual property decisions made in ARS?
- What is the industry perspective?
- Are there ways to improve the interaction and productivity going forward?