Breeding, Genetics and Germplasm Discussion Section

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Session Objectives

• 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

• 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.
ARS Breeding Projects

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
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
ARS Gene Discovery Projects

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
ARS Fundamental Research Projects

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.
Potential Gaps

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
Additional ARS Activities relating to grape breeding and evaluation

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 Aradhya (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.
Additional Items for Discussion

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?