

A large, woven wicker basket filled with a cluster of ripe, dark purple grapes. The basket is placed on a ground covered with wood chips or mulch. The background shows some green foliage, likely from a grapevine.

USDA/ARS-Industry Grape Research Workshop



ARS Viticulture Research, Nation-Wide

Physiology, Cultural Practices/Sustainability

Pest and Disease Management

Genetics, Breeding and Germplasm

Quality and Health

Pest and Disease Management

Location of Research:

- **ARS-Administrative Areas** 8
- **Contributing States** 11
- **Participating Locations** 13
- **Number of Scientists** (10-100%) ~30
- ARS locations/scientists

Pest and Disease Management

Pests: Organisms that adversely affect plant health

Microorganisms (14)

Bacteria, Fungi

Viruses, Nematodes

Insects (16)

Weeds (2)

Grape Pathology

Bacteria (5)

- Xylella: genetics, ecology, biology
- Rhizosphere microbiology
- Replant Disease: soil micro-ecology

Viruses (2)

- ID new graft transmissible agents
- Viral involvement in graft incompatibility
- Development of diagnostic tools

Fungi (4)

- Powdery Mildew
- Gray Mold (*Botrytis cinerea*)
- Armillaria Root Disease
- Phytophthora crown rot

Nematodes (3)

- Root Knot
- Ring Nematode
- MeBr alternatives

Total: 14 scientists engaged, full or part time
in Viticulture-related Pathology

Bacteria

Xylella:

- Cell wall structure LPS (lipopolysaccharide), antibodies for grape-Xylella LPS (Niel Price)
- *X. fastidiosa* behavior in-planta, in sap
biofilm in sap from resist. and suscept. plants
antimicrobial activity of sap from resistant plants
(Hong Lin)
- SNP genotyping, diversity, genetic structure of populations (J.C. Chen/H. Lin)

Bacteria

Other

Rhizosphere microbiology, community analysis, culturable & nonculturable components (Kluepfel/Steenwerth)

Replant Disease: soil micro-ecology, replant vs healthy soil (Browne/Kluepfel)

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Powdery Mildew

(Erysiphe necator)

Biology; temp. & leaf wetness effects epidemiology, refinement of Gubler -Thomas P.M. Model (wet climates) (Walt Mahaffee)

Develop molecular markers for DMI resistance, (*cyp51*) (W.Mahaffee)

Quantification of airborne inoculum & characterize (W.Mahaffee)

Identification of powdery mildew resistant cultivars in collaboration with grape breeders (Joe Smilanick)

Gray Mold

(*Botrytis cinerea*)

Postharvest control using chemical, physical, or biocontrol agents (table grapes) (Joe Smilanick)

Identify and characterize Gray Mold resistant cultivars in collaboration with breeders (Joe Smilanick)

ID and characterize biocontrol agents for botrytis bunch rot, enhanced delivery systems (W.Mahaffee)

Characterize the colonization/infection of grapes by *B. cinerea*, GFP marked (W.Mahaffee)

Other Fungal Pathogens of interest

Armillaria Root Disease-development of cultural and biological control mechanisms

(Kendra Baumgartner)

Phytophthora Root/Crown rot of grape, St. George root stock **(Greg Browne)**

Bitter Rot / Ripe Rot of Muscadine; fungicide timing, rates, eval. germplasm for resistance. When control disease, decrease resveritrol conc. **(Barbara Smith)**

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Virus Projects

Causes of Young vine decline, characterizes new GTA
ID/characterize Red globe virus, table grape
Discovery of new viruses. Syrah decline (Jerry Uyemoto)

Virus surveys of OR and WA, (Bob Martin)

Rupestris stem pitting virus (St. George root stock),
grapevine leaf roll 1, 2 & 3); insect transmission
w/vine mealy bug (Bob Martin)

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Nematology

Large scale surveys identify economically important spp (e.g. Ring Nematode); Breeding root stock for root knot nematode resistance (Joe Pinkerton)

Evaluate cover crops known to suppress root knot nematode (Inga Zasada)

MeBr Alternatives (i.e. fumigants) for use in Nurseries, develop for nematode-free certification; examine replant disease (Sally Schnider)

Develop new application methods for fumigants. (Tom Trout)

Insects

GWSS (15)

Parasitoids (6)

Biology/Ecology (6)

Pathology (3)

Other (2)

Phylloxera
Blue-Green Sharpshooter

Glassy-Winged Sharpshooter

Insect Pathology

- Search/screen for fungal pathogens (Mickey McGuire)
- Search/screen for viral pathogens; molecular characterization (Wayne Hunter)

Glassy-Winged Sharpshooter

Parasitoids

- Natural enemies of nymphs (John Goolsby)
- Continue search/evaluation of new egg parasitoids (Goolsby)
- Compatibility of insecticides with Natural Enemies of GWSS (Steve Naranjo)
- Mass rearing of *Gonatocerus* (wasp) on GWSS eggs (Roger Leopold)
- Develop artificial diet for *Gonatocerus* (wasp) (Tom Coudron)

Glassy-Winged Sharpshooter

Biology

- Chemical ecology/volatile attractants
(Joe Patt, Mamoudou Sétamou, & Rosa Ruiz)
- Feeding mechanisms/X.f. transmission (Elaine Backus)
- Host finding behavior, movement, overwintering
(Russ Groves)
- Pop. Genetics/molec. Systematics (Jesse de Leon)
- DNA fingerprinting to distinguish 10 *spp* of GWSS egg parasitoids (Jesse de Leon)

Glassy-Winged Sharpshooter

Biology

- cDNA libraries as function of life stage/tissue, examine gene response to biotic and abiotic stresses (20K EST's); GWSS response to temp, viral infect., tissue, development. (Wayne Hunter)
- Development of artificial diet for GWSS (Tom Coudron)
- Mass rearing of *Gonatocerus* (wasp parasitoid of GWSS) (Roger Leopold)

Glassy-Winged Sharpshooter

Biology

- Develop protein marking system for GWSS, (James Hagler)
- Ecology/host-plant quality impacts on GWSS pop. dynamics, dispersal (Jacquelyn Blackmer)
- Chemical control/resistance development (Tom Henneberry)
- Seasonal X. f. transmission rates (Steve Castle)

“Other” Insects

- Examines effect of temp. soil type, H₂O potential on ecology of Phylloxera in Oregon and Washington; Spread, from OR to WA (Jim Fisher)
- Involvement of riparian hosts in BGSS mediated X. f. transmission and PD incidence (Kendra Baumgartner)