



NATIONAL  
**GRAPE RESEARCH**  
ALLIANCE

# National Research Platforms & Project Priorities

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# Research Theme Areas

Advance research to maximize the productivity, sustainability and competitiveness of the US grape and wine industries

Genetics &  
Grapevine  
Improvement

Natural  
Resources &  
Environment

Integrated  
Production  
Systems

Extension & Outreach

# Industry Research Priorities & Platforms

*Advance research to maximize the productivity, sustainability and competitiveness of the US grape and wine industries*

## Genetics & Grapevine Improvement

- Advance our understanding of gene function & linkage to important traits
- Improve the speed & efficiency of traditional breeding
- Develop high-throughput trait phenotyping methods
- Build research capabilities for systems biology & genome editing
- Improve resistance to abiotic & biotic stresses
- Identify, establish & maintain high-performing, disease-free plant materials

## Natural Resources & Environment

- Develop integrated models for the utilization of natural resources at the vineyard-block level, including water, nutrients & sunlight
- Understand the impact of soil physical, chemical & biological factors on vine performance
- Elucidate vine physiological responses & adaptations to extreme climatic events
- Advance practices to mitigate the impact of abiotic stresses including high & low temperatures, drought & salinity

## Integrated Production Systems

- Build improved mechanization & automation systems to enhance labor efficiency
- Increase the accuracy of yield-estimation methods
- Advance tools for real-time management of water & nutrients
- Improve pest & disease detection, modeling & control systems
- Develop tools for the non-destructive measure of fruit quality traits in the vineyard
- Advance practices that improve postharvest and processing quality

## Extension & Outreach

- Unify the community of professionals who serve to extend research outcomes to industry
- Direct critical Extension/outreach projects to meet industry needs
- Improve communications to not only better serve the industry but to solicit input and ideas from growers, as well

# Genetics & Grapevine Improvement

- Advance our understanding of gene function and linkage to important traits
  - Characterize genotype to phenotype relationships for economically important traits, including productivity and fruit quality, pest and disease resistances and tolerance to environmental stresses
- Improve the speed and efficiency of traditional breeding
  - Expand the availability of molecular markers for key traits
  - Develop a fast-track traditional breeding system
- Develop high-throughput trait phenotyping methods
  - Develop rapid, automated and robust phenotyping systems for key traits, including productivity and fruit quality, pest and disease resistances and tolerance to environmental stresses
- Build research capabilities for systems biology and genome editing
  - Elucidate key biochemical pathways via omics approaches
  - Utilize modern molecular approaches to develop a gene editing platform for grapevines
- Improve resistance to abiotic and biotic stresses
  - Improve resistance to environmental stresses including cold, heat, drought and salinity in scion varieties and rootstocks
  - Improve resistance to pests and diseases in scion varieties and rootstocks
  - Determine key grapevine traits required for adaptation to mechanization
- Identify, establish and maintain quality, disease-free plant materials
  - Identify superior scion varieties and clonal selections
  - Improve methods for disease detection and elimination
  - Improve our understanding of the vectors and epidemiology of economically important grape diseases

# Natural Resources & Environment

- Develop integrated models for the utilization of key natural resources at the vineyard-block level, including water, nutrients and sunlight
  - Employ remote sensing and other methodologies to develop improved water, nutrient and atmospheric use models at the vineyard block or sub-block level
- Understand the impact of soil physical, chemical and biological factors on vine performance
  - Evaluate the impact of soil physical and chemical parameters, and their related remediation and/or management practices, on vineyard productivity and fruit quality
  - Determine the impact of the soil microbiome on vine performance, including nutrient status
  - Advance a soil quality evaluation platform, including appropriate measures and metrics for soil physical, chemical and biological constituents
  - Develop management practices to mitigate the effects of poor water quality on soil health and ultimately vine health, fruit quantity and quality
- Elucidate vine physiological responses and adaptations to extreme climatic events
  - Determine the impact of elevated carbon dioxide levels on vine productivity and fruit quality
  - Determine the effects of prolonged exposure to heat, cold, drought and salinity on vine productivity and fruit quality
- Develop practices to mitigate the impact of abiotic stresses including high and low temperatures, drought and salinity
  - Develop integrated management approaches to reduce the impact of low temperatures, prolonged heat stress, drought and soil and water salinity on vine health and fruit quality

# Integrated Production Systems

- Build improved mechanization and automation systems to enhance labor efficiency
  - Improve the accuracy, efficiency, and quality of mechanized cultural practices and platforms
  - Expand the use of automation and robotics in vineyards
  - Develop *Smart Implements* for use in vineyards
- Increase the accuracy of yield-estimation methods
  - Apply crop modeling, remote sensing and proximal sensing applications to improve the accuracy of yield estimations
- Advance tools for real-time monitoring of water and nutrients
  - Develop improved technologies for real-time monitoring of vine water status and soil moisture content
  - Develop advanced tools to quantify vine irrigation requirements
  - Improve methods to detect and quantify vine nutrient status and fertilization requirements
- Improve pest and disease detection, modeling and control systems
  - Develop next-generation pest and disease management systems including detection, monitoring and modeling
  - Advance improved biocontrol strategies and efficient treatment delivery and application systems
- Develop tools for the non-destructive measure of fruit quality traits in the vineyard
  - Develop non-destructive sensor platforms to measure and monitor key fruit quality traits, including color, aroma, sugar, and acidity
- Advance practices that improve fruit post-harvest and processing quality
  - Better understand the impact of cultural practices on fruit post-harvest life and processing quality
  - Reduce fruit losses during postharvest storage due to pests and diseases
  - Advance improved fruit harvesting, sorting and grading systems

# Extension & Outreach

- Unify the community of professionals who serve to extend research outcomes to industry
- Direct critical Extension/outreach projects to meet industry needs
- Improve communications to not only better serve the industry but to solicit input and ideas from growers, as well
  - Retool and/or develop new communications vehicles as needed

# NGRA Top Research Priorities

- Advance our understanding of **gene function and linkage** to important traits
- Identify, establish and maintain high-performing, disease-free **plant materials**
- Develop integrated models for the utilization of key **natural resources** at the vineyard-block level, including water, nutrients and sunlight
- Build improved **mechanization and automation systems** to enhance labor efficiency
- Improve **pest and disease** detection, modeling and control systems
- Strengthen and support **extension and outreach** for viticulture and enology in America





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