Summary

Breakout Group 6

Influence of Production Factors on Quality

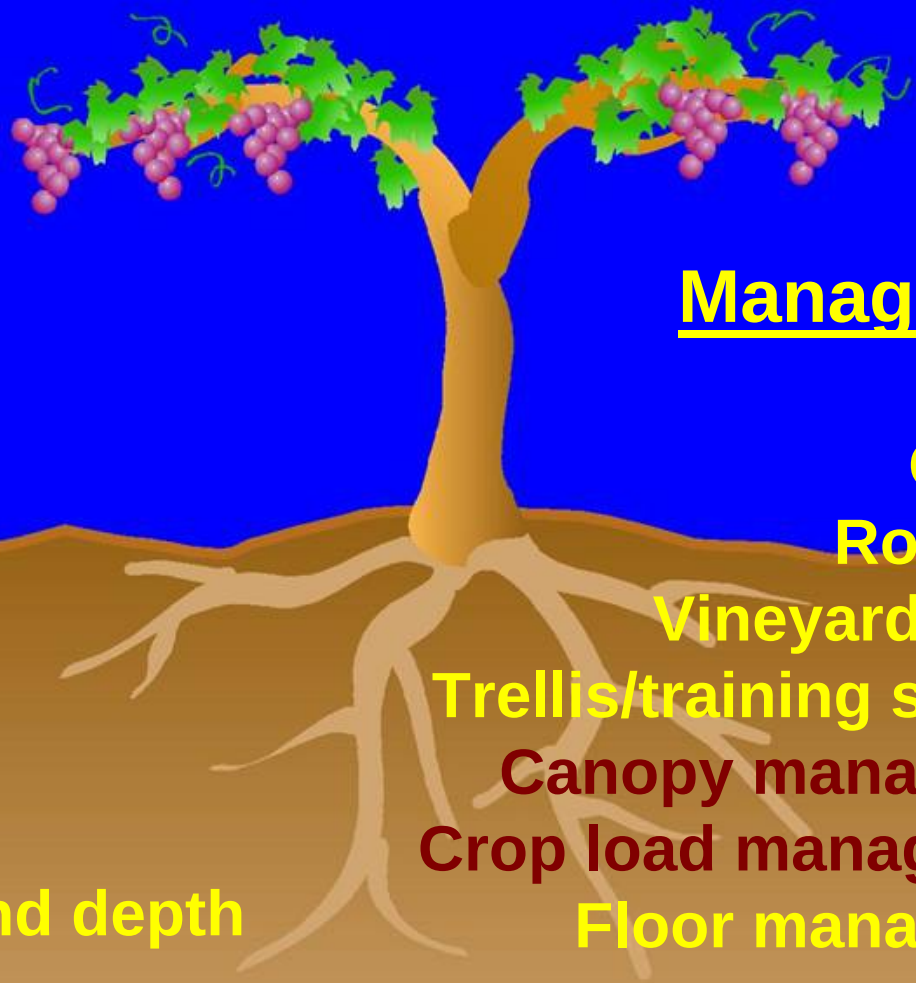
Major accomplishments since 2005

- Improved yield and fruit development monitoring techniques
- Enhanced understanding of environmental influences on fruit composition and bud fruitfulness
- Improved knowledge of nutrient uptake patterns, whole-vine nutrient partitioning, cover crop management and the impact of deficit irrigation levels

- **Increased dialogue between ARS and grape industry stakeholders**

Grape Production & Fruit Quality

Advances in this area require multidisciplinary, cross-functional research teams



Site Factors

Temperature
Sunlight
Rainfall
Wind

Topography

Soil texture and depth

Soil chemistry

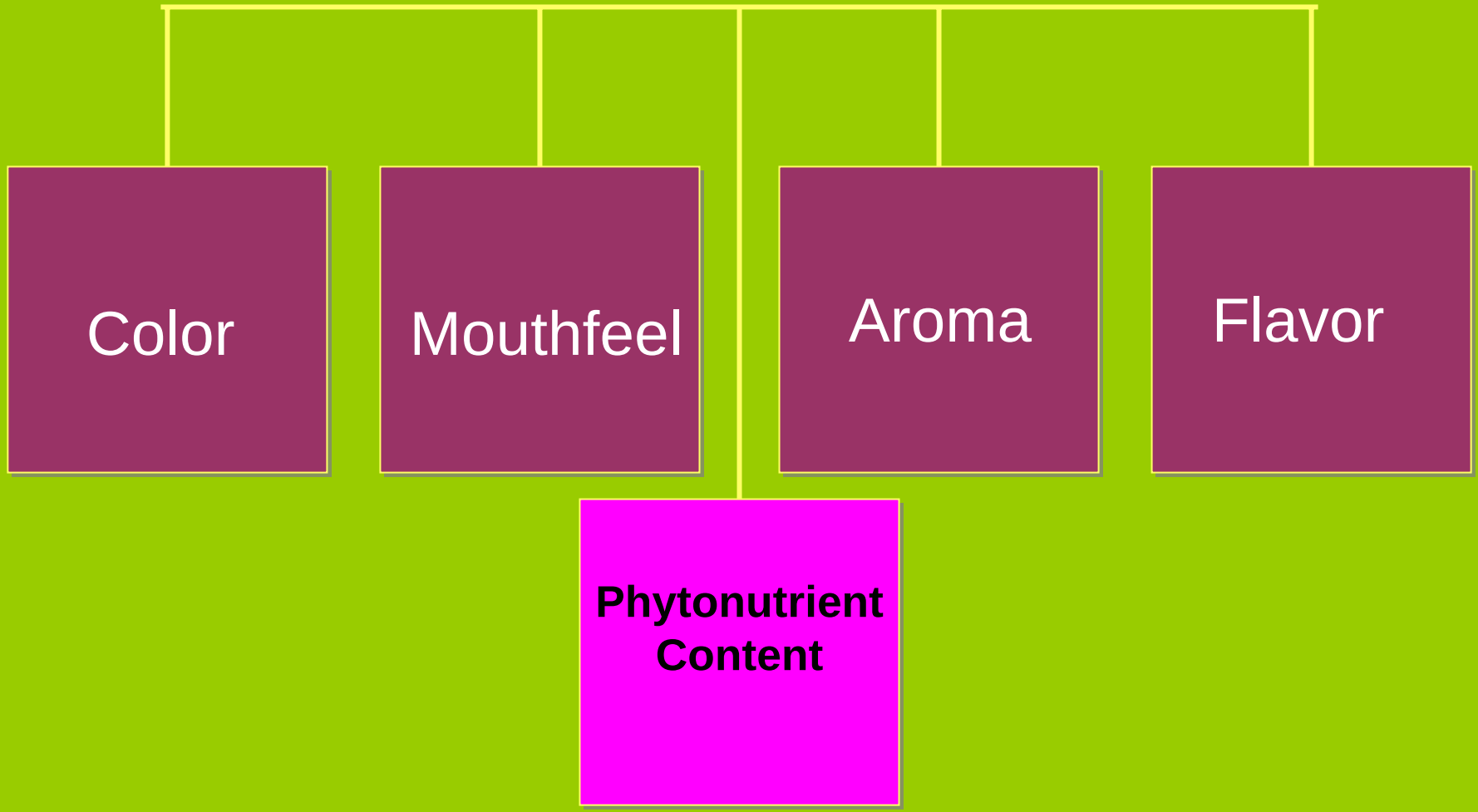
Management

Cultivar
Rootstock
Vineyard design
Trellis/training systems
Canopy management
Crop load management
Floor management
Pre-plant soil preparation
Irrigation & fertility management

How do we evaluate quality?

Grape Quality

Development of chemical metrics around each quality bucket are necessary for evaluating vineyard practices



Wine and juice grape production and quality

Vineyard treatments must be followed into juice and wine!

- **<u>Winemaking infrastructure</u>**
  - Methodologies
  - Regional ARS facilities
  - Partnerships with industry and Land Grant Universities
- **Wine chemistry – linking grape composition with product quality**
  - Existing ARS, Land Grant facilities
- **Sensory evaluation**
  - Existing ARS & Land Grant facilities

Raisin production and quality

- **Raisin quality on new production systems must be evaluated:**
  - **Composition**
  - **Texture & physical properties**
  - **Processing quality**
  - **Storage**
  - **Sensory quality**
- **ARS – Albany**

Table grape production and quality

- **Table grape quality evaluations:**
  - **Composition**
  - **Color**
  - **Aroma**
  - **Flavor**
  - **Phytonutrients**
  - **Texture**
  - **Postharvest quality**
  - **Sensory quality**
- **ARS – Albany**

Key knowledge gaps in production and quality

- How do production practices influence grape berry development and the accumulation of aroma, flavor, color, mouth feel and phytonutrient compounds?
- Can we improve our ability to maintain (or improve) fruit quality under environmental stress?
- Can we manipulate the relationship between fruit sugar accumulation and flavor development in order to synchronize ripening?
- What are the mechanisms for water and photoassimilate transport into grape berries during the final stages of ripening?

Key project areas in production and quality

- Irrigation management
  - Irrigation amounts and timing; methods for evaluating vine water status
  - **Water quality**
- Nutrition management
  - Vine nutrient status
  - Soil x vine nutrient interactions
  - Irrigation x vine nutrient interactions
- Canopy and crop load management
  - Canopy management - optimum fruit exposure
  - Training and trellising
- Cultural practices
  - Pruning
  - Crop load management

Key resource gaps in production and quality

- ARS production and quality research team
  - Current scientists
    - **Diverse, multidisciplinary core**
    - Expand regional focus
  - Additional staffing/discipline needs
    - Whole-plant, eco-physiology
    - Soil science
    - **Fruit development – biochemistry**
    - Analytical and flavor chemistry
    - Statistics, modeling and sensory
    - **Project management**
  - Additional facilities
    - **Winemaking – including support staff!**
    - Fruit processing and postharvest biology

Key resource gaps in production and quality

- ***Multidisciplinary, cross-functional teams are essential to make progress in this area***
  - How do we (ARS & industry) coordinate and fund projects that integrate scientists from multiple National Programs, regional facilities, universities and other agencies?
  - How do draft cross-functional research teams and how to we reward these scientists?
  - **How do we develop the analytical and processing facilities necessary for this work?**
    - **Land grant and industry partnerships/coordination**
  - How can industry provide ongoing input and coordination for these research efforts?