Canopy Management for Disease Control in Wine Grapes
Grape IPM Workshop
March, 2011

Mark L. Chien
State-wide Viticulture Educator
Penn State Cooperative Extension
mlc12@psu.edu
Environmental and viticultural inputs that impact on grape quality and composition
Strive for balance, harmony and equilibrium in the vine and ecosystem
Why are canopy and fruit zone management strategies important?

- Great wine demands ripe and clean fruit
- In any given year, no viticultural practices can impact the final outcome of fruit quality more: you can do it!
- It works for all species, varieties, clones of grape vines intended to make good wine!

Merlot on VSP at Waltz Vineyard in Manheim
Benefits of a Good Canopy Microclimate

- Enhancing the microclimate of the vine: entry of light and air into the canopy environment offers...
  - Lower incidence of almost all diseases by reducing humidity levels and allowing sunlight and wind to dry out leaves and fruit
  - Improve spray penetration to interior of the canopy
  - Allows sunlight to penetrate into the canopy interior for more efficient photosynthesis
  - Affects fruit zone temperature range allowing more efficient biosynthesis of essential compounds
  - Helps to reduce levels of methoxypyrazines (green, herbal flavors in red wines) in berries
  - Looks better, makes the grapes appear/are better quality and thus wine. Wine makes like tidy canopies for their wines
Canopies are created before the vines are planted: modesty is the best policy!

• Start with knowing wine type, style and price point
• Find the correct site to grow this wine
• Site evaluation: determining potential vine size and balance
  – Soil fertility and plant available water
  – Climate: amount of sun and rainfall (annual and growing season)
    • Macro effects: rain shadows, hurricanes, low winter temperature, frost
    • Microeffects: canopy size and shape
• Local environmental factors
  – Seek convex surfaces
  – Trees are bad
  – Avoid low areas that are more damp in soil and air
Unbalanced big vine in Napa Valley
12x8 spacing, 1 wire vertical
California sprawl system

Balanced small vine at Chateau Petrus, 1.2m x 1m VSP
Vineyard Design will Affect Canopy Size and Shape

• Plant materials
  – Varieties: natives and hybrids are naturally more disease resistant
  – Vine morphology: small leaves, loose clusters, longer internodes
  – Natural vine vigor: e.g. Cabernet Sauvignon is a BIG vine
  – Rootstock effects on vine size and vigor
  – Plant healthy, certified vines and then take care of them!

• Trellis and training systems
  – Single or divided canopies
  – Head/cane vs. cordon/spur pruning and training
  – Low or high fruit position
  – Fruit wire height: effects on microclimate
  – Getting spray materials where they are needed, low or high

• Row direction: with the wind or the sun?
Vine Density: fitting the vine into the right space

• Harmony, equilibrium and balance in the canopy
• What is the correct vine size?
• How to achieve a balance vine
• Effects of size and balance on wine quality

Juan in 1m x 1m at Mondavi

Lyre system on 12x6 in Napa
Influence of vine spacing on canopy architecture

Keep it open, but not too open

From: Intrieri and Filipetti American Journal of Enology and Viticulture, 50th Anniversary
Canopy Architecture

• Regulating vine vigor: 1 to 1.5 leaf layers helps all problems with disease!
  – Dappled light.
  – The t-shirt effect.
  – Check the shadow in mid morning and afternoon

• Evenly spaced, vertical shoots (up or down)
Canopy Management Practices

- Dormant pruning: balance begins in the winter
- Manage the head and ends of the vine carefully
- Manage low and high suckers, shoot thinning
- If you have more than one cane or cordon or any combination per side of vine
- Correct timing of positioning is oh, OH so critical to success! June is crunch month: grand period of growth.
- Shoot position like you mean it. Make them stand straight and steady. Fasten wires or shoots to maintain position
- Exposure and aeration comes from leaf and lateral removal, shoot and cluster positioning. Timing and severity are important.
- Hedge as much as you need to, no more or less
Find and Emulate Good Canopies

Vertical shoot positioned Pinot Noir at Chaddsford
Marquette on high wire cane pruned at Lincoln Peak Vineyard in Vermont
Veraison and Harvest: crunch time for canopies

- Stop those shoot tips from growing!
- Late whites and reds still need good canopies for 4-6 weeks
  - Disease control, especially PM, DM and late harvest rots
  - The danger of broccoli tops
  - Complications of netting
- Getting the fruit fully mature. Fruit zone architecture
- Building up carbohydrate (flesh and fuel) for overwintering and spring growth
Fruit Zone Management for Disease Control

- Keep clusters well spaced and separated (i.e. shoots positioned)
- Fruit zone open to allow spray penetration
- Effectiveness of late season sprays
- Critical temperature needs related to fruit ripening processes
  - Photosynthesis
  - Flavors, color, tannin, methoxypyrazines

Waiting for Pinot Noir to ripen in Ontario
When to Divide (or undivide)

• Greater (or less) than 0.4 lb of pruning weight per foot of trellis
• Vertical vs. horizontal systems
  – Scott Henry, Smart-Dyson
  – Lyre (Carbonneau), Geneva Double Curtain
• Developing the divided trellis and training system
Scott Henry training at Paradocx Vineyard in Chester County
Perfectly trained Norton on Geneva Double Curtain at Chrysalis Vineyard in Virginia
Canopy Management = People

- Skilled labor and supervision
  - Have the people ready when you need them
  - Be out there working with the crew
  - Have the money available to pay the crew
- Timing is absolutely critical to successful canopy management
  - Early tasks
  - Watch the weather
  - Grand period of growth
  - Late season
- Labor costs are typically 50-60 percent of vineyard operating expenses. Be prepared!
Canopy management is not enough

- **Equipment**
  - High quality, properly sized and designed spray system for the vineyard
  - Correct tractor HP and PTO power
  - Positive pressure spray cab for operator
- **Calibration**: correct rate, speed, nozzle selection
- **Materials**
  - Chemicals
  - Water
  - Surfactant
- **Timing**
  - Time of day and conditions
  - Time of season and plant stage
- **Operator**: a skilled tractor driver and sprayer operator
Reference resources:

- Sunlight into Wine
  - 2011 NY-PA: http://ipmguidelines.org/grapes/