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Viticulture Technology

Advances in Viticulture Technology For Fruit Quality

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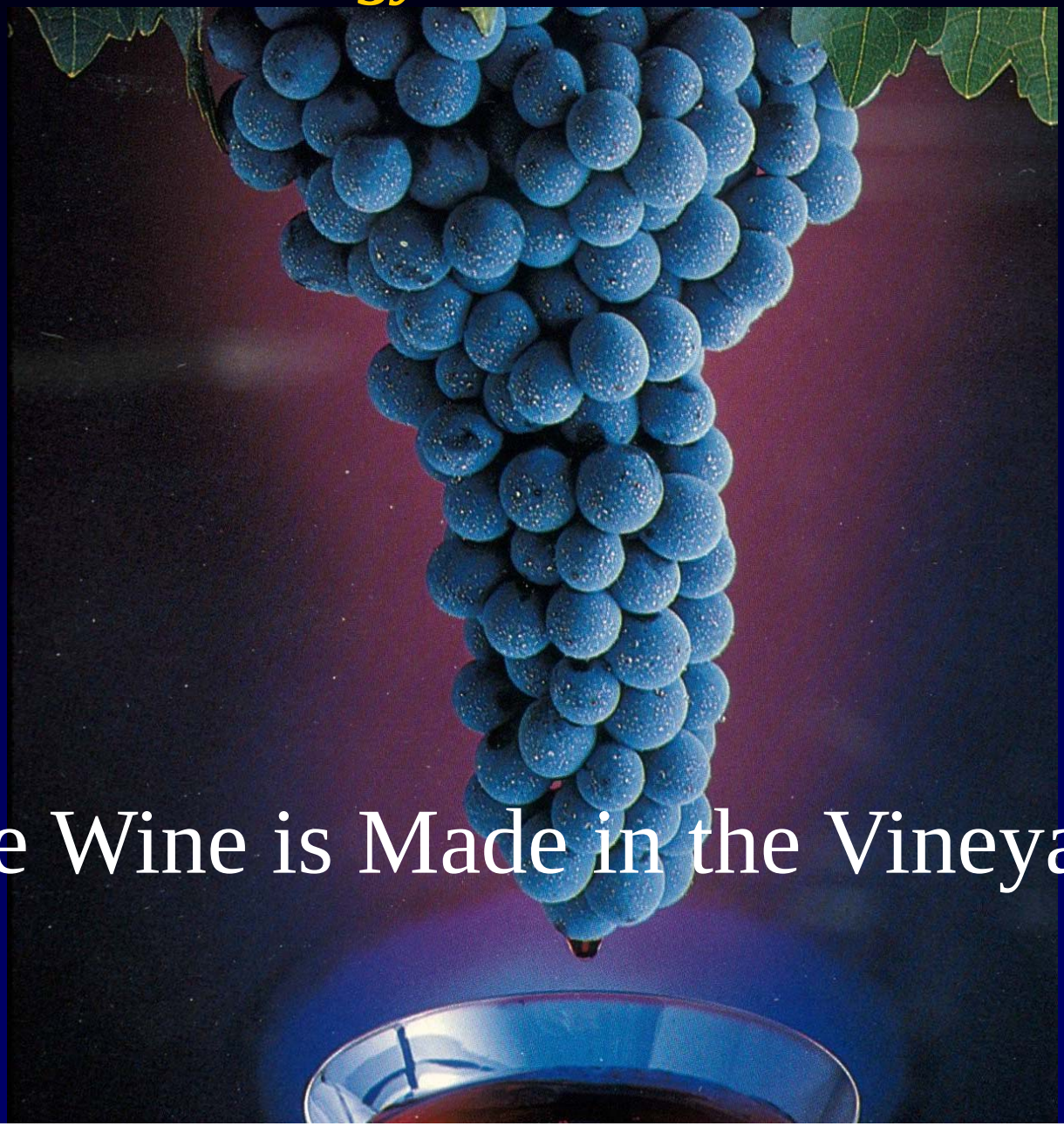

The Wine is Made in the Vineyard!

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Goal - Consistent Fruit Quality

Note: Vineyard uniformity is one the most important goals toward achieving consistent quality grape production in the Eastern US.

- missing vines - winter damage
- variable and excessive vegetative vigor
- variable fruit set and crop load
- mix of clones and rootstocks
- non-uniform ripening

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Uniform canopy
Uniformly exposed fruit

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Critical Management

- Water
- Vigor
- Crop load
- Disease and Pests

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Water Management

Note: Excess water may be the number one limiting factor to consistent quality grape production in the Eastern US.

Contributes to

- winter damage
- excess vegetative vigor
- reduced quality during ripening

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Water Management

Site selection

- **Low annual and/or seasonal precip**
  - **“rain shadows”**
- **Well drained soil type**

Site remediation

- **Tile drains**
- **Irrigation**

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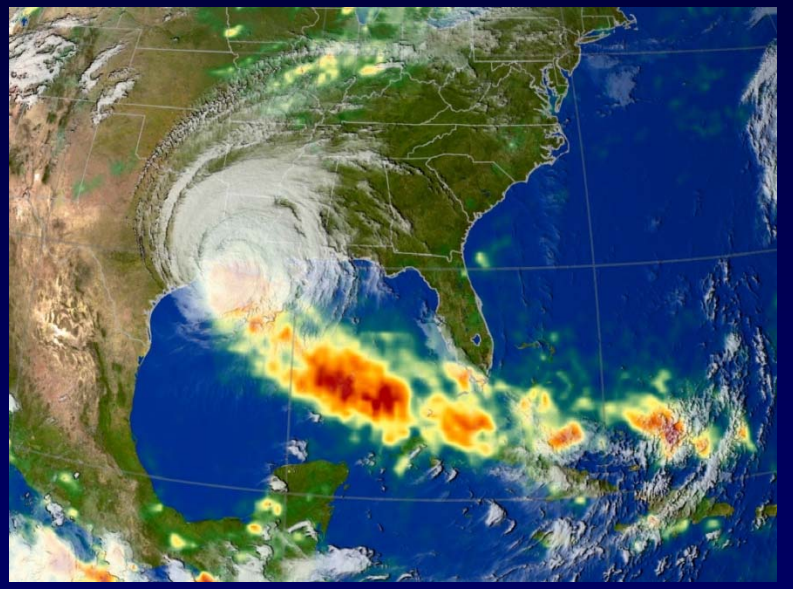
Water Management – Site Selection

- NOAA
- Weather Channel
- Weather Bug
- Sky-Bit
- University Climatology



The Weather Channel

weather.com

NOAA

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Water Management – Site Selection

NRCS – Soil Conservation Service

- NRCS County Office
  - Hard copy
  - A Person with knowledge and experience in your region
- Web Based
  http://websoilsurvey.nrcs.usda.gov/app/
  - Search by address
  - Area of interest
  - Soil types and descriptions

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Water Management – Site Selection

Figure 1-3. A dark, well structured surface soil which has high fertility.

Figure 1-4. Soil with bright colours indicating good aeration and drainage.

Figure 1-5. Pale sub-surface soil and mottling in the subsoil indicate seasonal waterlogging.

Figure 1-6. Pale coloured deep sand indicating leaching and poor fertility.

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Water Management – Site Remediation

Increase organic matter

- **Pre-plant compost application**
- **Bio-renovation**

Site remediation

- **Tile drains**
- **Irrigation**

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Soil Preparation

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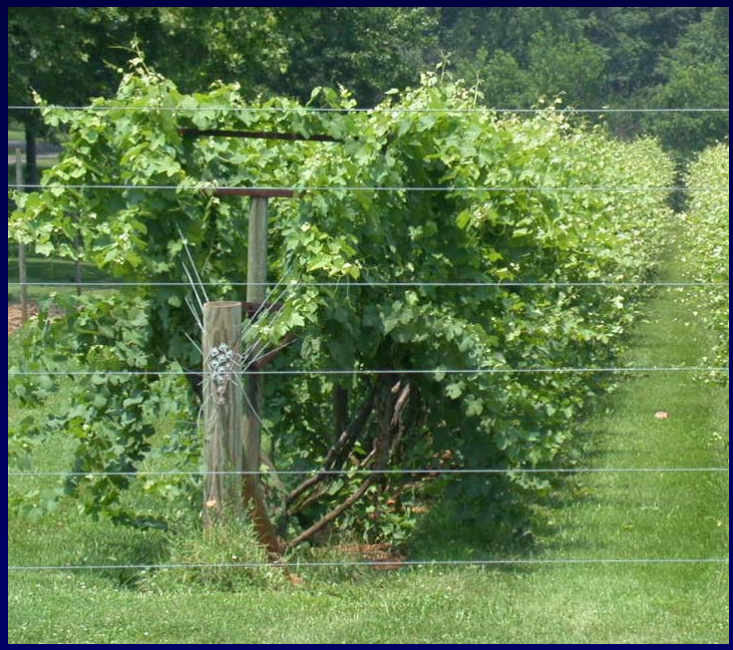
Wet sites!

- Dead vines via increased winter damage
- Increased vigor
- Reduced quality during ripening



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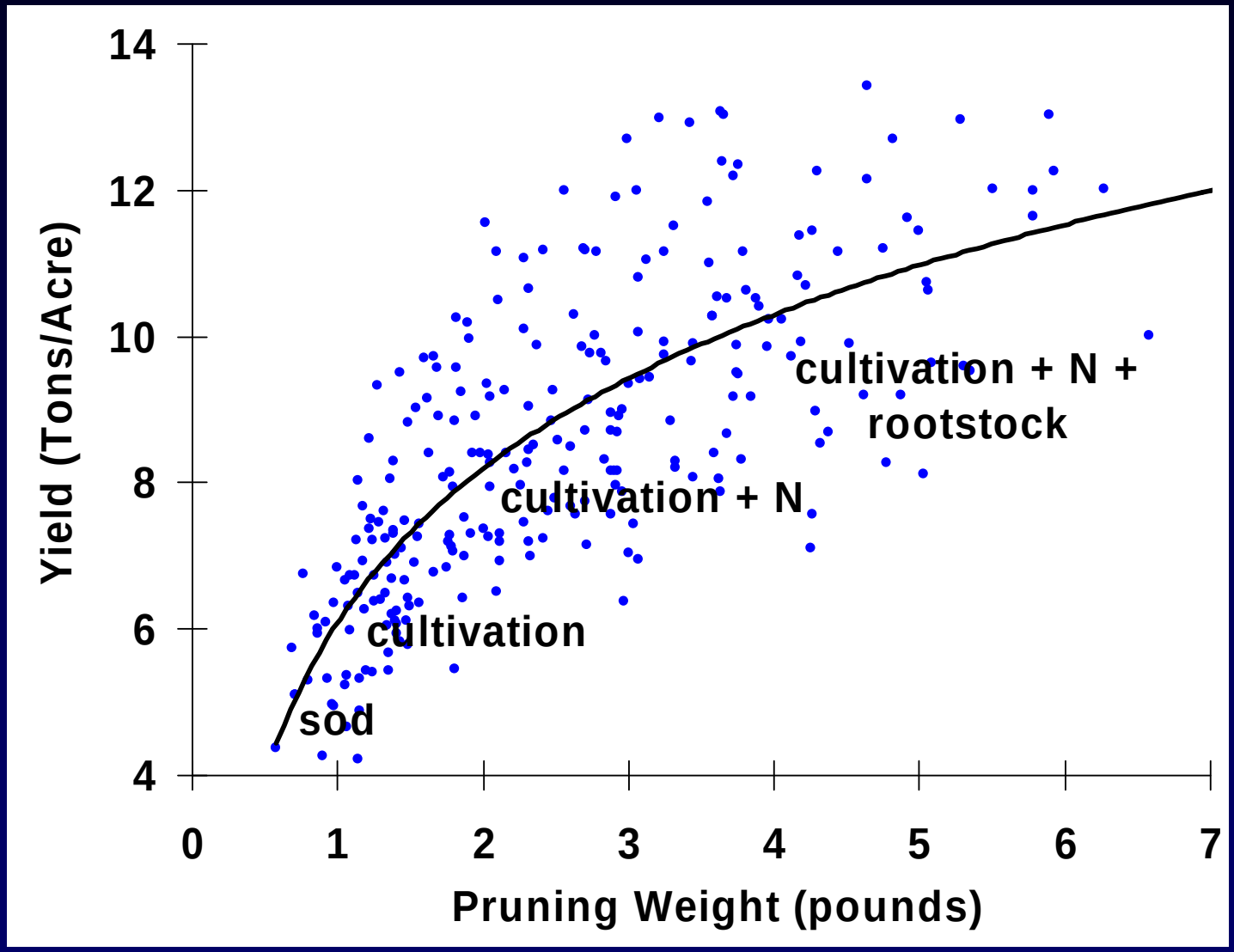
Benefits of Vigor Management



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Water Management – Site Remediation

Tall fescue between rows to absorb water

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Water Management – Site Remediation

Deep rip to augment water drainage

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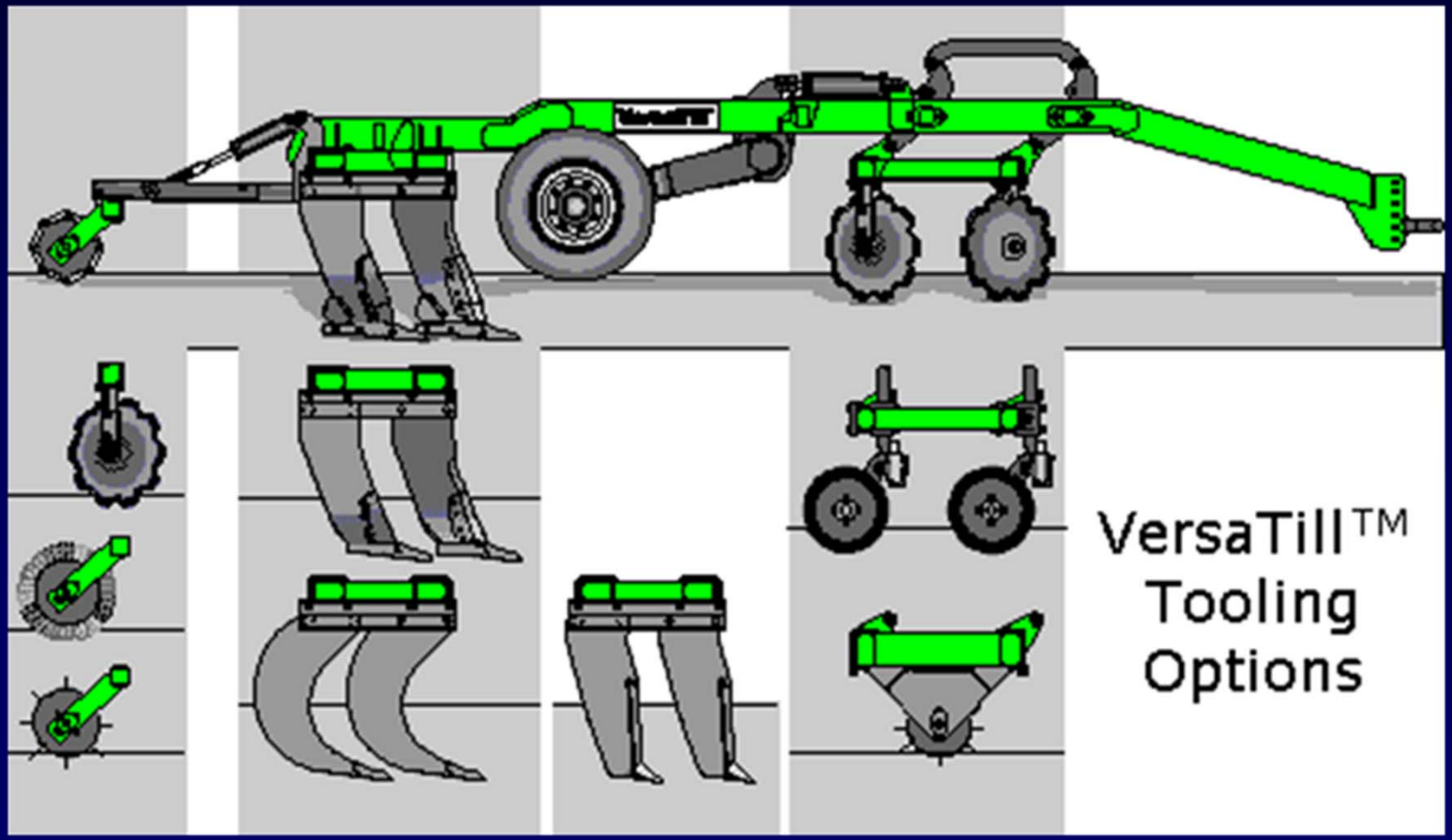
Water Management – Site Remediation

Deep rip to augment water drainage



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Tile Drains

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Water Management – Site Remediation

Drip-irrigation to address deficits at critical periods

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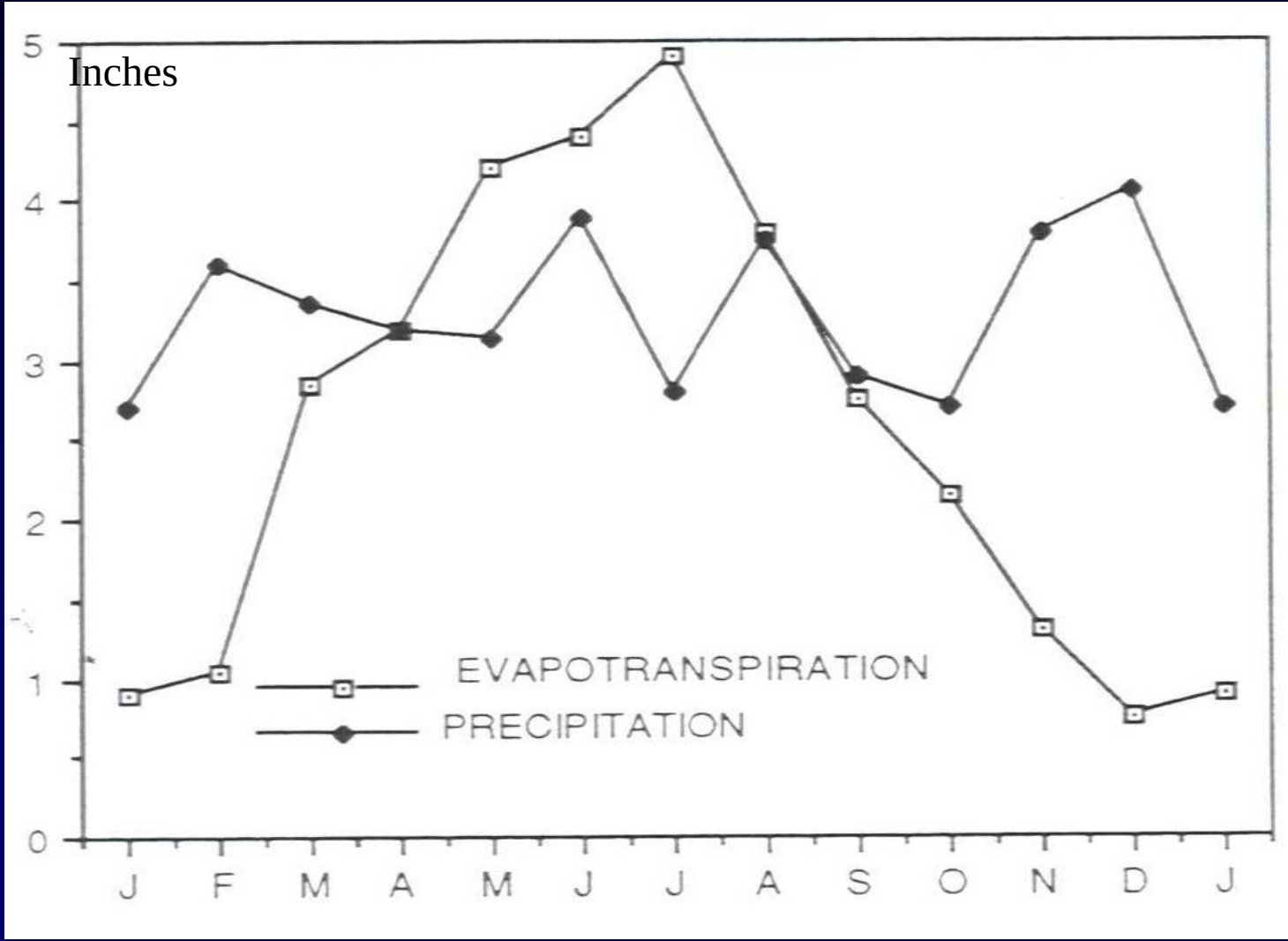
Monthly Precipitation and Evapotranspiration

Aurora, NY (averages from 1959-1975).



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Advantages of Drip Irrigation

- Use less water
  - Efficient, deliberate, economic, environmental, regulatory concerns
- Disease management
  - avoid wetting of leaves
- Weed management
  - avoid wetting broad area
- Management control and flexibility
  - location and amounts; timing
- Opportunity for fertigation
  - amounts, efficiency, timing, availability

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Vineyard Uniformity – Straight rows!

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Variety Selection

- Survive winters
- Full crop each year
- Ripen during period with diurnal fluctuations
- Ripen fully each year
- Valuable direct or indirect market
- Latest clones
  - small berry size

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Hardy Russian Varieties

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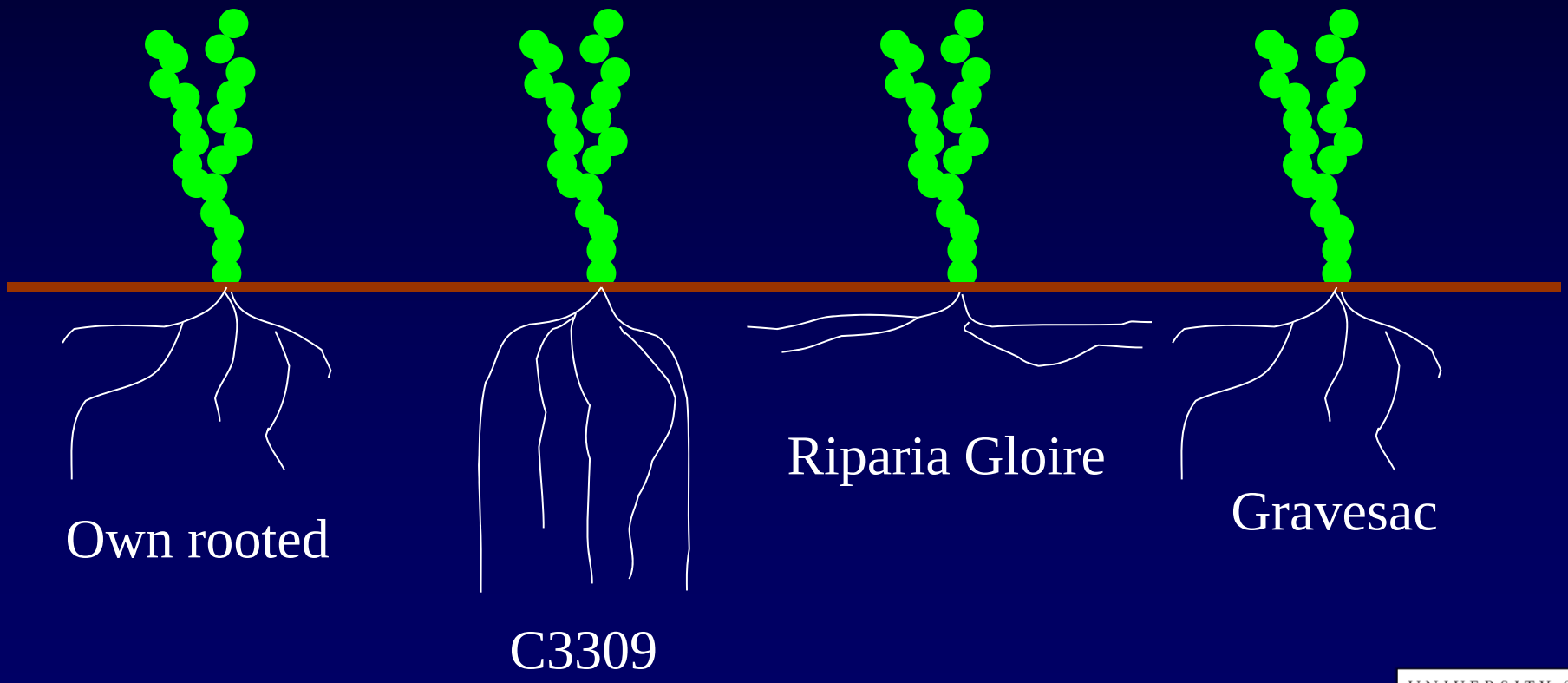
Rootstock Selection



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Rootstock Selection

- Vigor management (RG)
  - Depth of rooting
- Fit to specific soil types
  - Tolerate drought (110R)
  - Tolerate wetter soils (RG; Clay=110R)
  - Nematode resistant (SO4, 5BB, 1616)
  - Advance (RG) Retard (5BB) maturity
- Crown gall resistant
- Phyloxera resistant

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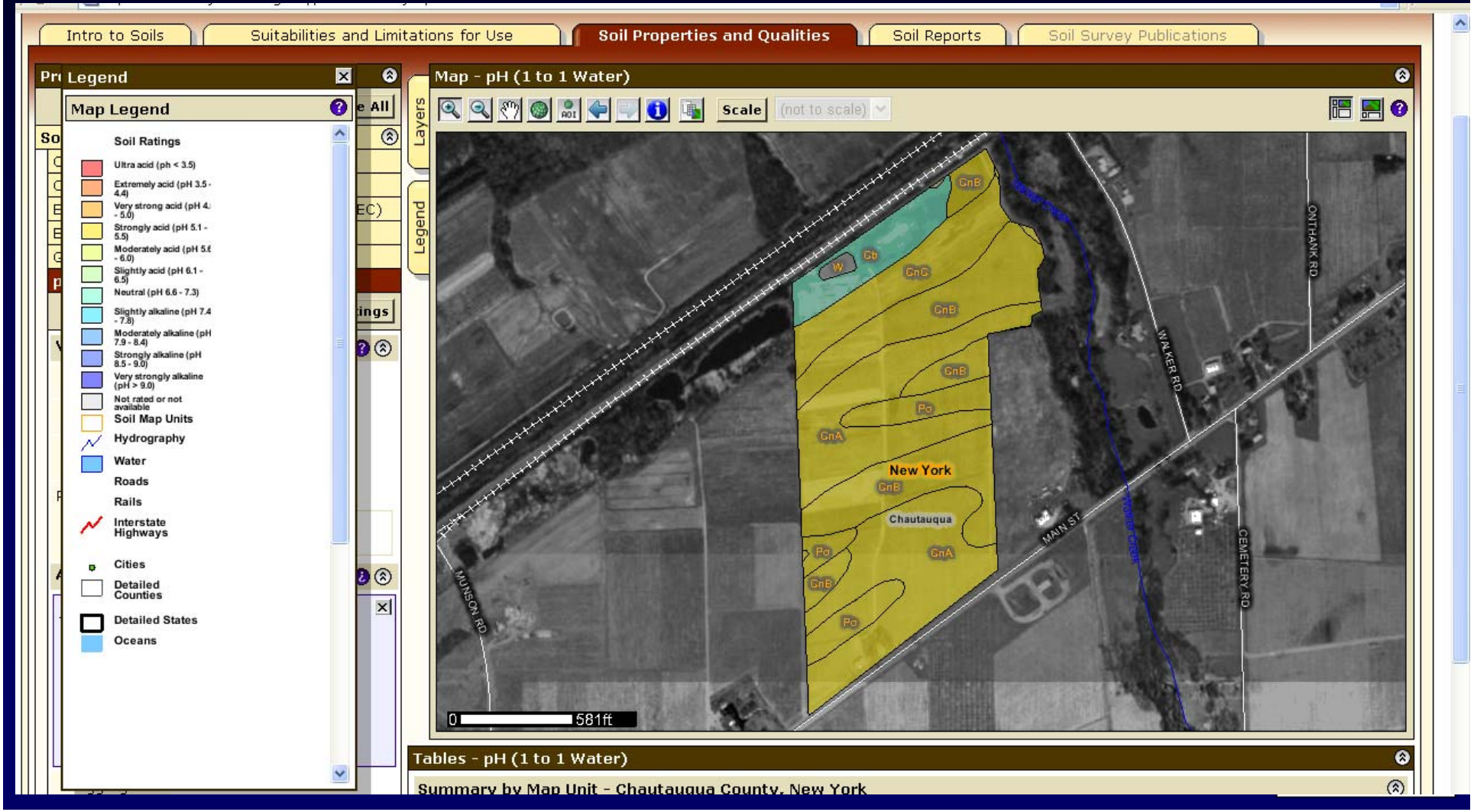
Benefits of Vigor Management



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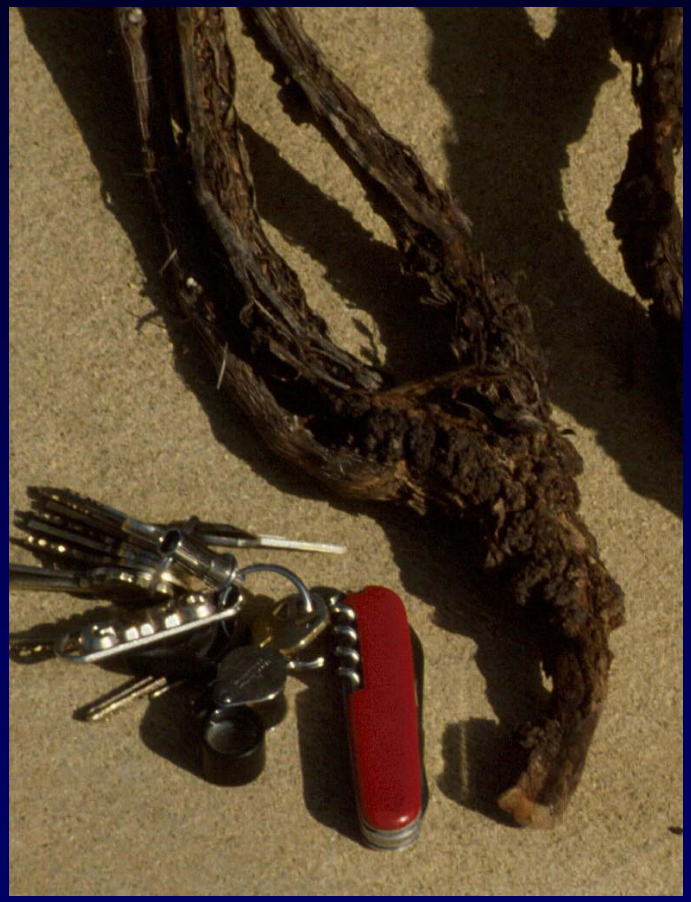
Clean vine Certification Program

Leaf Roll Virus



Crown Gall - *Agrobacterium*

Black Goo

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"Green" Planting Stock

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Vine Density and Wine Quality

- Soil capacity
- Vine size
- Vine balance: veg vs. crop
- Quality/yield relationship
  - Amount of fruit per vine
- Trellis system choice
- Training system
- Row direction and length
- Exceptions to the rule: THV, Hughs..

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Benefits of Proper Canopy Management

- Fruit Exposure
  - Uniform Ripening
  - Decreased Disease
  - Increased Color
  - Decreased Acidity
  - Increased Volatiles
- **Vine Balance**
  - Vigor management
- **Bud Fruitfulness**
- **Uniform Bud Break**
- **Uniform Shoot Vigor**
- **Ease of harvest**

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Over-the-row technology in France

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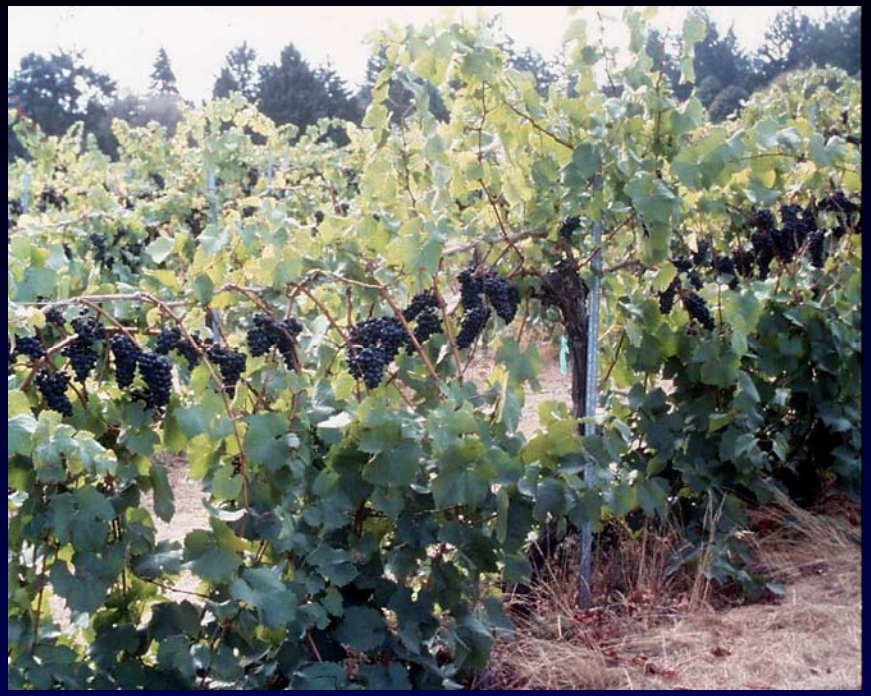

Different Trellis Systems

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Uniform canopy
Uniformly exposed fruit

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Uniform canopy?
Uniformly exposed fruit?

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Vineyard Mechanization – Pre Pruners

- Trellis to allow minimum pruning time.
- Save 20-30% on pruning / pulling of canes

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Vineyard Mechanization – Wire Lifters

- Effectiveness Trellis Dependent
  - Tractor / Harvester Mounted

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Leaf pull

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Mechanization - Leaf Removal

- 2-3 year payback on 50 acres
- Timing / Settings Incredibly Important
- Can be more consistent than manual labor!

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Shear
and
Hedge

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Vineyard Mechanization – Hedgers

- Cost effective canopy / disease control
- Do NOT do this job by hand anymore!!

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Vineyard Mechanization - Harvesting

- Harvesters – more than just harvest!

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Benefits of Vigor/Canopy Management

Decreased Disease

- Early drying of canopy
- Increased penetration and contact of pesticides
- Earlier more uniform ripening

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SV Disease Management

Cultural Practices

- Minimize disease pressure
  - Proper Canopy/Crop Management
    - shoot position
    - leaf pull
    - proper shoot/fruit balance
  - Avoid insect/bird damage

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Disease Management

- Scout
  - Early sign of disease
- Monitor
  - Weather monitors
  - Infection periods
  - Stretch or tighten
- Sanitation
  - Prune out mummies, diseased wood
  - Chop-up prunings well or remove
  - Pick-off infected leaves

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SV Disease Management

Chemical Control

- Proper pesticide for control of specific disease
- Proper timing of pesticide
  - preventative or burn-out
- "Softest" pesticide
  - phosphorous acid, bicarbonates, oils, OxiDate
- Broad spectrum
- Efficient application

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"The most important thing you can put into the vineyard is your footprints!"

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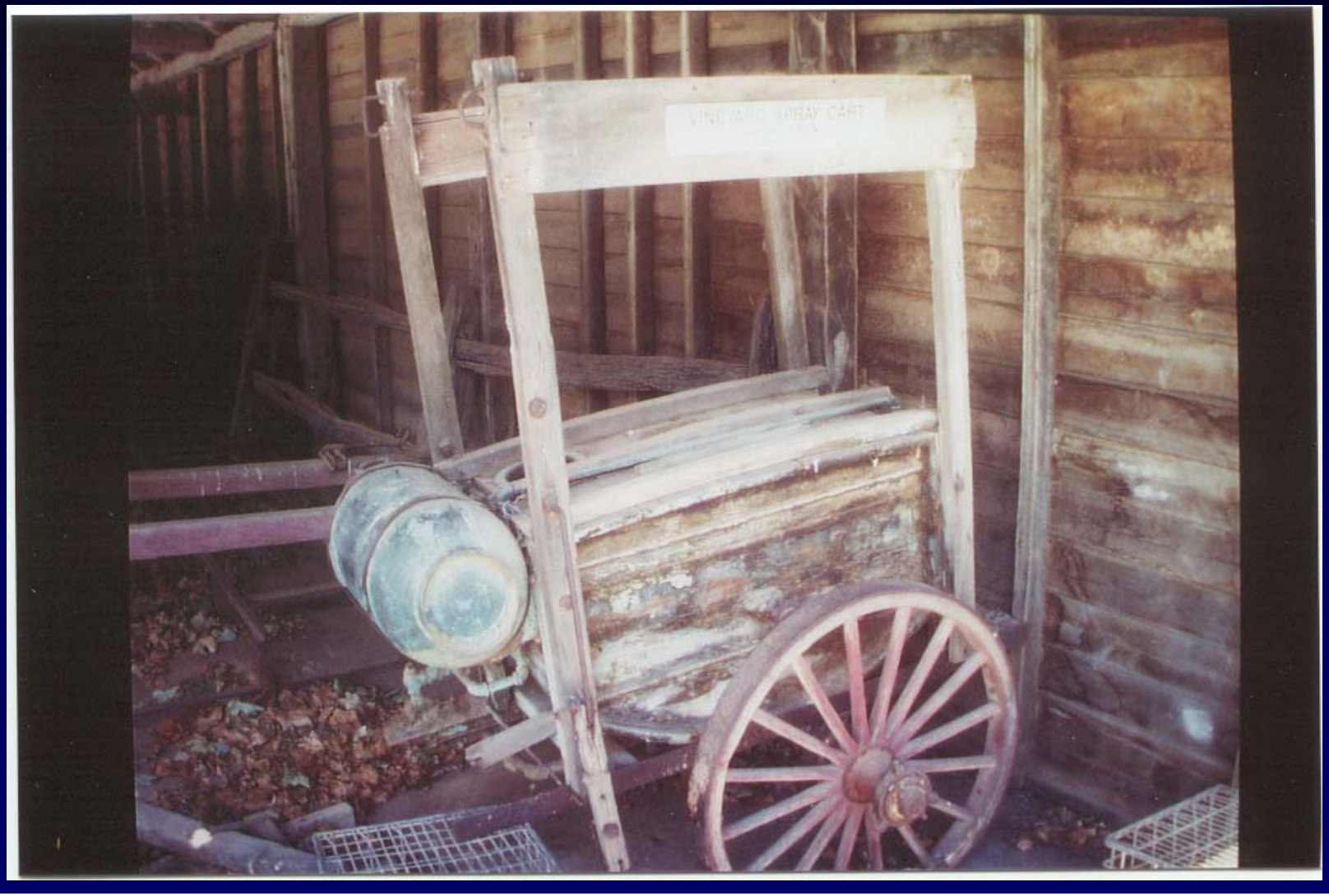
Disease Management



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Sprayers – Air Blast

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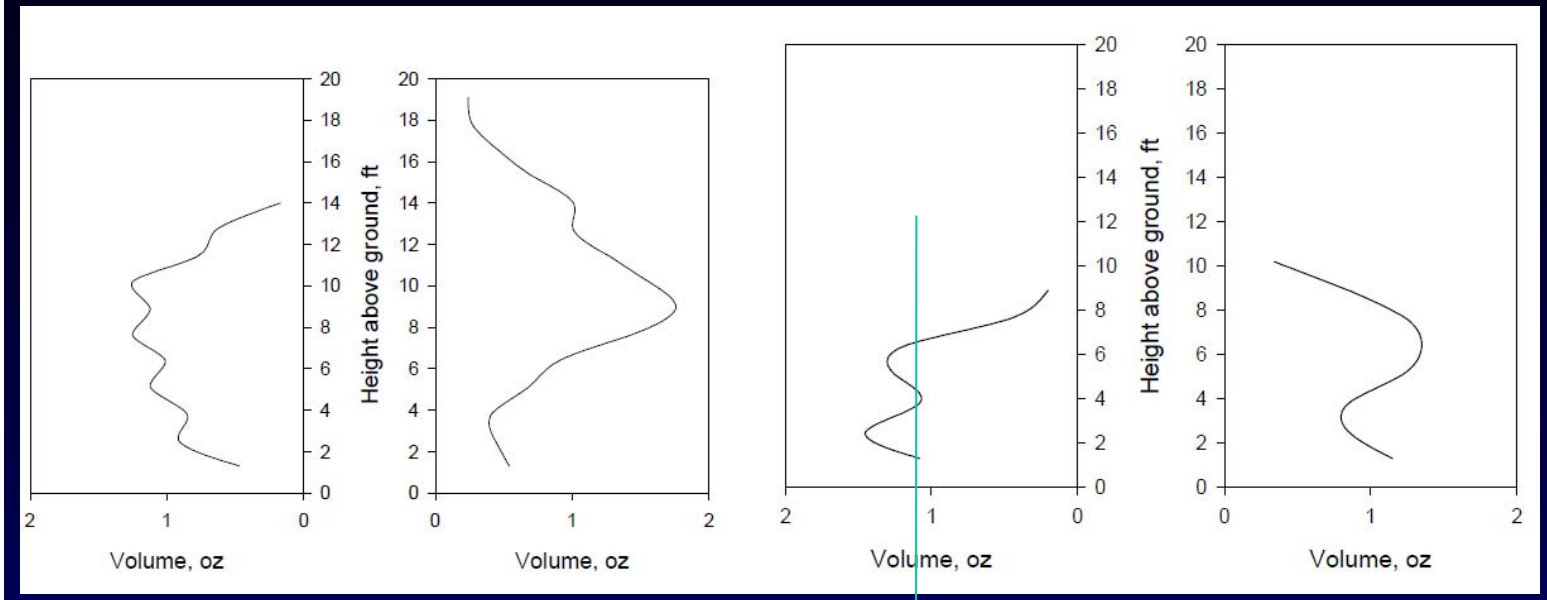
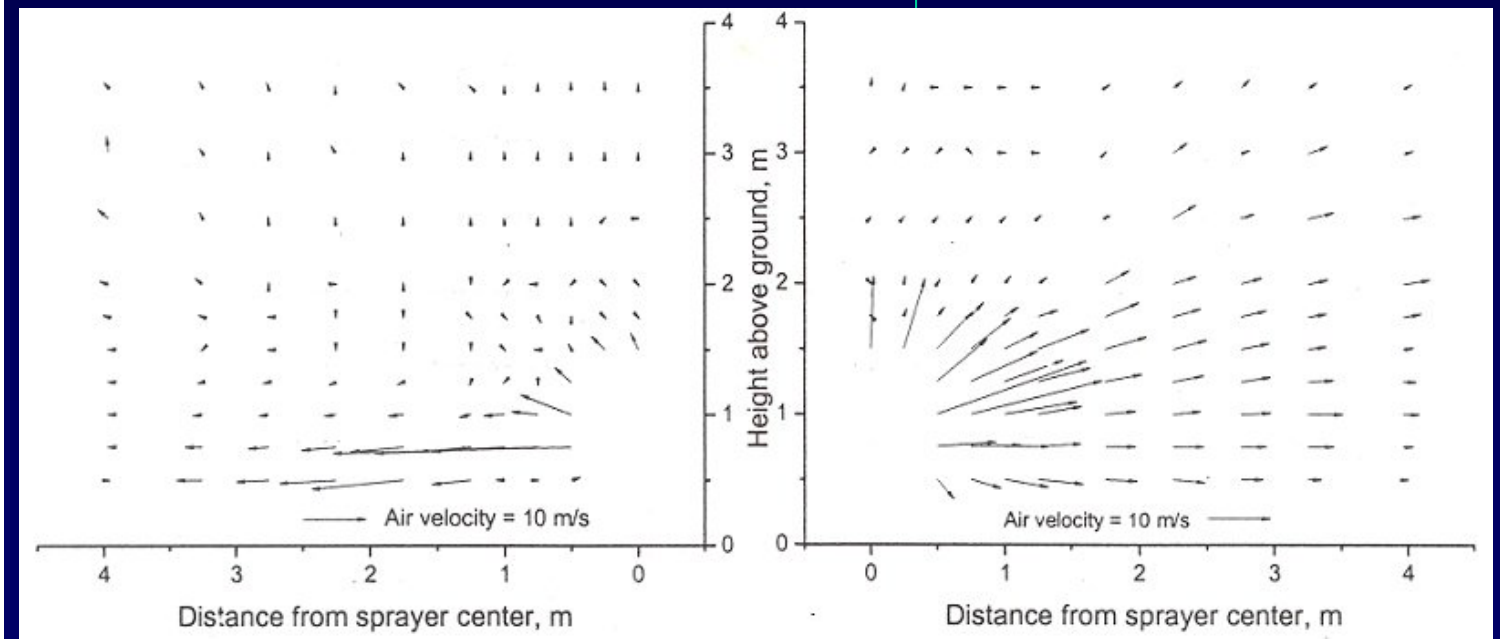
Viticulture Technology Nozzle Orientation





Dr. Andrew Landers
Cornell University

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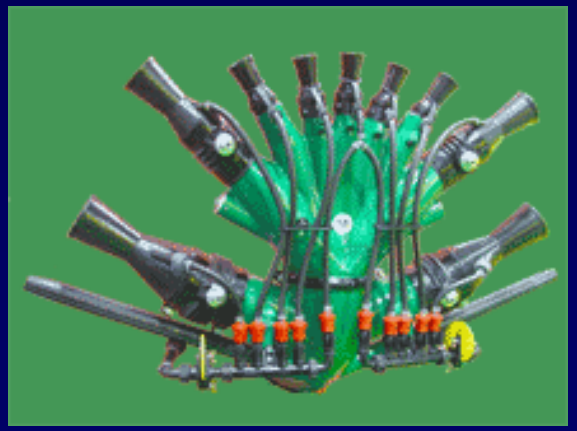
Sprayers – Cima Air Blast



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Disease Management

Recirculating Sprayers

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Disease Management

Electrostatic Sprayers

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Disease Management

Multi-row technology in France

Over-the-row technology in France

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Sprayers – Multi Row Options

- One, Two, Three, & Four Row Models
- Increased Infrastructure / Increased Efficiency

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Fungicide "Types"

- **PROTECTIVE**
  - Cover Spray
  - "Preventative"
  - Applied *prior* to disease development
  - Must be there when disease develops
- **POST INFECTION**
  - "Reactive"
  - *Only* when needed
  - Fungicide which can be applied *after* a disease infection period
  - short time frame

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Insect Management

- Scout
  - Early signs of insects
  - Threshold – “economic impact”
- Monitor
  - Critical timing – vine phenology or GDD model
- Sanitation
  - Physical - Pick-off insects
- Promote beneficials
  - meadows, edgerows, in-between the row
- Pheromones
  - traps, mating disruption “ties”

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Monitor/Sample Your Vineyard

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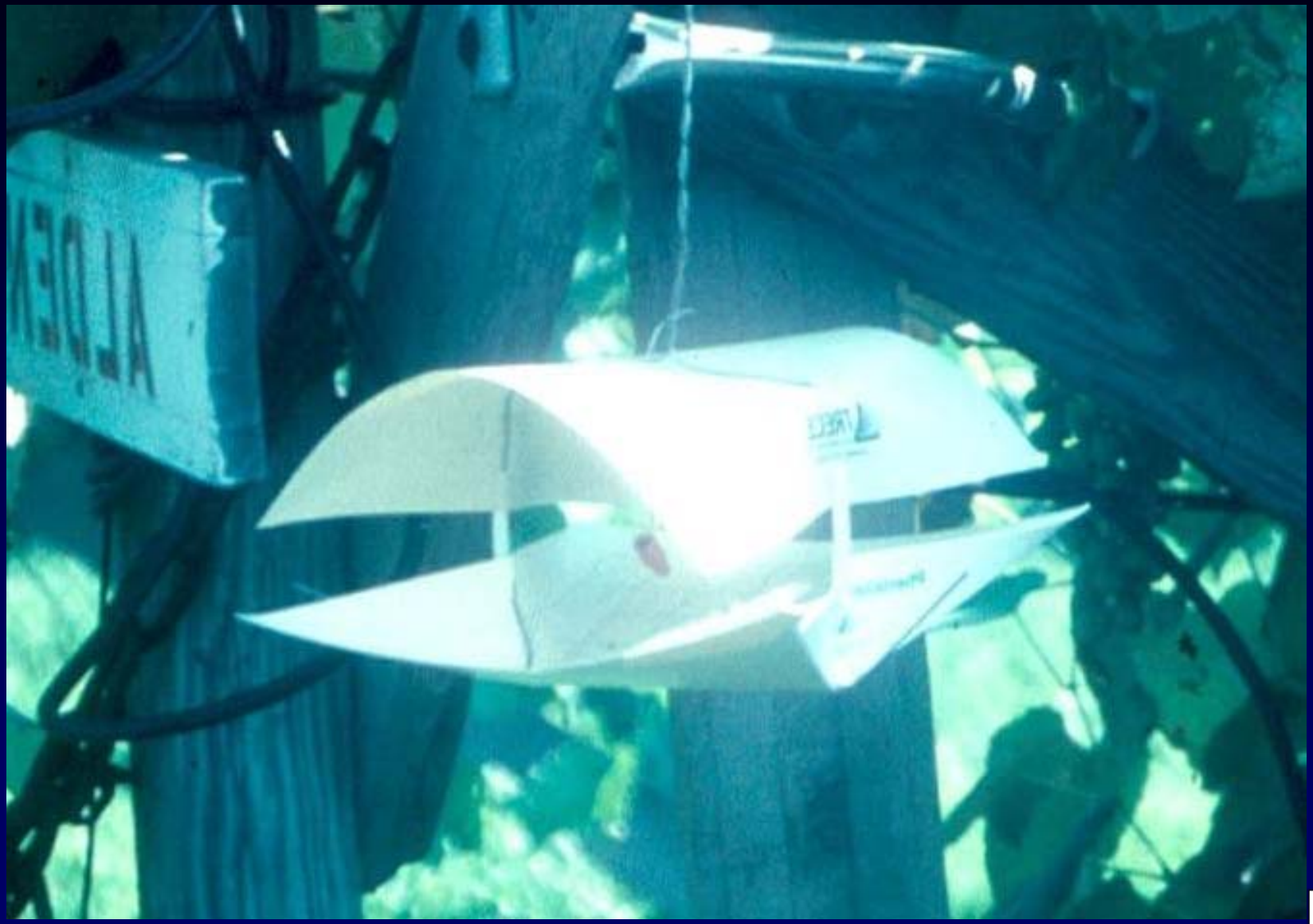

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SV Insect Management

Chemical Control

- Proper pesticide for control of specific insect
  - Broad spectrum – hard on beneficials
- Proper timing of pesticide – vulnerable life stage
- "Softest" pesticide
  - Efficient application
    - border rows
    - spot treatment

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Promote beneficials!
Do not harm!
“natural insectories”

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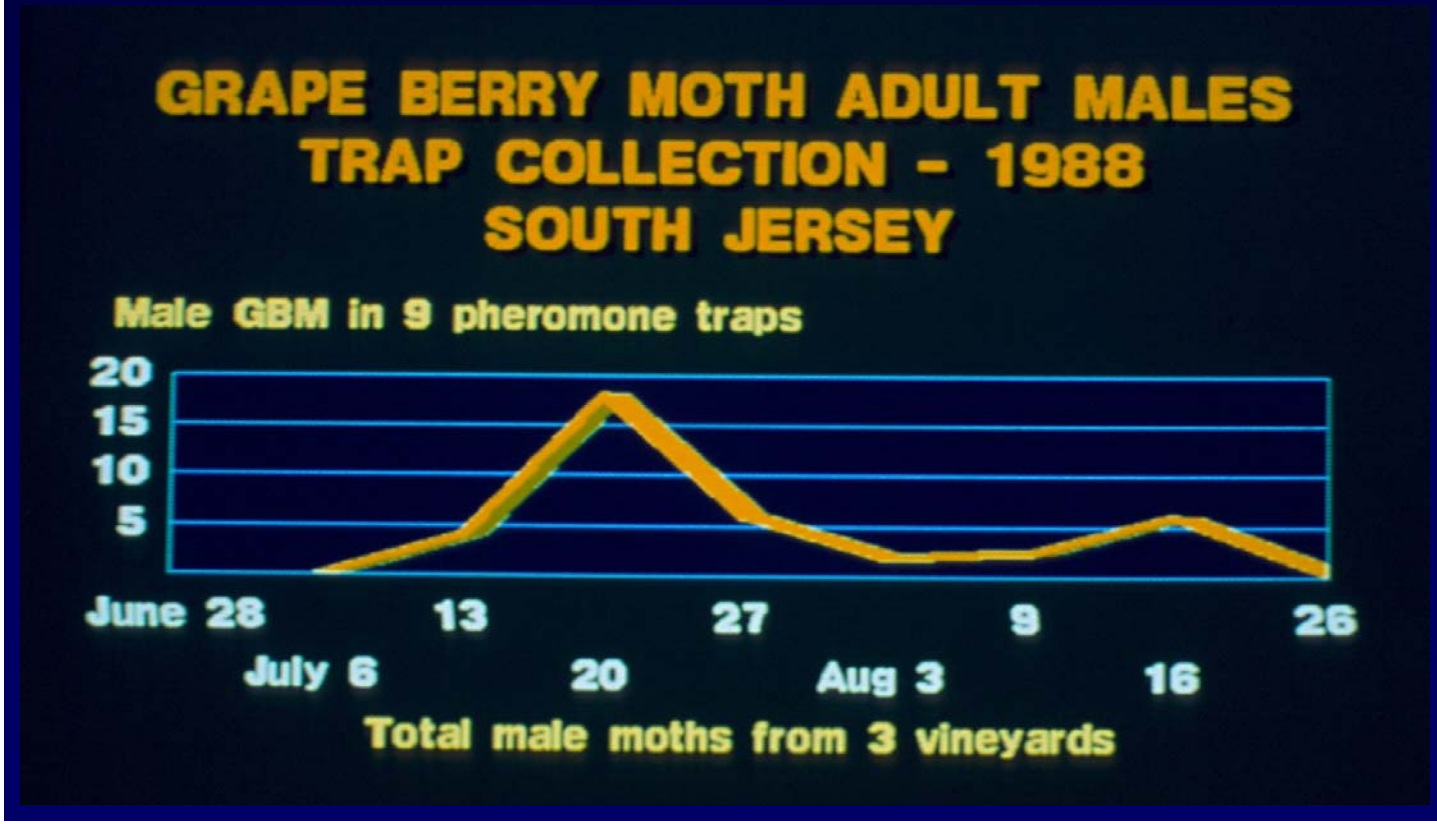
Grape
Berry
Moth



Spray timing based on pheromone trap counts, timing, and thresholds

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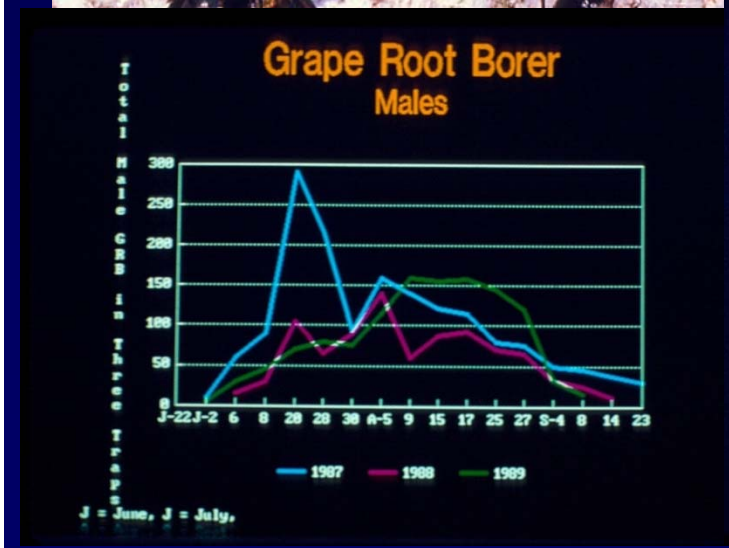
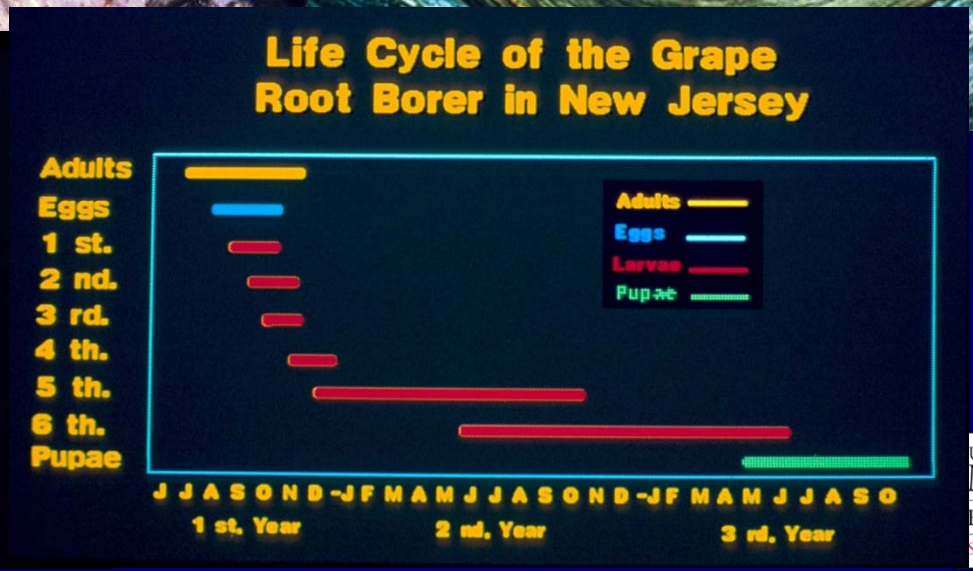
Grape Root Borer





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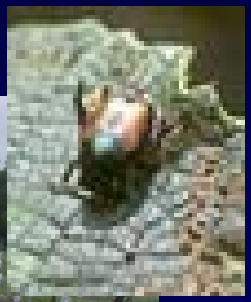
Japanese Beetles



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KAOLIN

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Weed Management

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Weed Management

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Weed Management

Vidal at Butler's Vineyard – Composting trial by Dr. Jim Travis

No Treatment

Composted

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Weed Management

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Mechanical weed management
and hilling-up

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Weed Management

Over-the-row Technology in France

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Enviromist sprayer

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Mechanical Harvrsting

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Mechanical Harvrsters
New vs. Used

- 60 acre operation
  - Total hand harvesting costs, 2006 - $49,000
  - Purchase price – 1983 Harvester: $42,000
- Used Mechanical harvesters from $14,000
- KNOW what to look for, what questions to ask.

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Pellenc Over-the-Row System

Sprayer
Pruner
Wire lifter
Shoot comber
Hedge/Shearer
Leaf puller
Harvester

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Bird management

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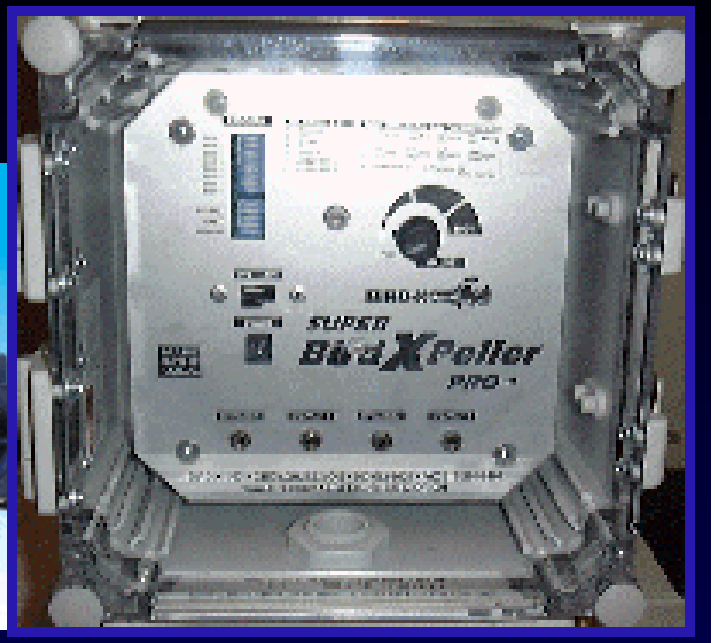
Birds



Deer

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Bird Netting in fruit zone

Fruit shading also?

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The “Ultimate” Exclusion Deer Fence

No Nation is drunken where wine is cheap, and none sober, where the dearness of wine substitutes ardent spirits as the common beverage...

Thomas Jefferson

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