Distance From Sources of Herbicide Drift

• Several commonly used agricultural herbicides (notably 2,4-D and dicamba) are prone to vapor drift when the solid (salt) phase of the chemical is converted to a gaseous phase.
  – Drift (particle or vapor) onto grape vines may result in stunted primary shoot growth in vines of all ages, and direct yield loss in bearing vines.

• The most effective method of minimizing herbicide drift injury to vineyards is to select sites located the furthest possible distance away from nearby drift sources, and preferably up-wind of those sources.
Other Site Considerations

• Access to an irrigation source
  – Rapid development in first and second year vines requires adequate soil moisture, necessitating up to 1” rainfall per week (3-5 gallons/vine).

• Geometric regularity and plot shape
  – Both are determinants of row length, which influences installation costs and long-term operating efficiency.
Keys to Success

1. Carefully and honestly analyze site liabilities and assets.
   – Be willing to select an alternate site if necessary!

2. Test soil carefully before committing the site to vines.
   – Amend/correct as necessary, or select an alternate site

Photo courtesy N.R.C.S.
Cultivar Selection

Photos courtesy Bruce Reisch, Cornell University
Cultivar Selection

- **Market demand**
  - Fruit must be saleable!

- **Cold hardiness**
  - Zone 4a: -20°F
  - Zone 5b: -15°F
  - Play it safe!

- **Season length requirements**
  - Zone 4a: early, and some mid-season cultivars
  - Zone 5b: early, mid-, and some late-season cultivars (?)

Photo courtesy Bruce Reisch, Cornell University
Cultivar Selection, Cont’d

• **Disease resistance**
  – Higher resistance reduces the need for fungicide applications.

• **Cultivar ↔ soil pairing**
  – It is generally desirable to have an inverse relationship between site capacity and cultivar vigor.
  – Individual cultivars exhibit soil preferences.

• **Cultivar-specific management concerns**
  – Will aggressive cluster thinning be necessary?
  – Will aggressive shoot thinning be necessary?
  – Will very high vigor require divided trellising?
  – Will the harvest period overlap that of other cultivars in the vineyard?
## Cultivar Attributes List

### Grape Cultivars for Consideration in Iowa

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Characteristics</th>
<th>Disease Tolerance</th>
<th>Sensitivity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aurora</strong></td>
<td>FAH W W E V T N 4</td>
<td>3 2 3 3 1 3 2 3</td>
<td>N 2</td>
<td>Disease prone. Wine quality is fair; suitable for blending with American hybrids.</td>
</tr>
<tr>
<td><strong>Baco Noir</strong> (Baco #1)</td>
<td>FAH B W M VV ST N 4</td>
<td>3 1 2 1 1 2 3 2</td>
<td>N ?</td>
<td>Std: onslow with severe high alkaline tolerance; potential for blending.</td>
</tr>
<tr>
<td><strong>Bath</strong></td>
<td>A B T J M V T M 5</td>
<td>3 2 3 3 1 3 2 3</td>
<td>N 2</td>
<td><strong>Beta</strong></td>
</tr>
<tr>
<td><strong>Beta</strong></td>
<td>AH B J E V T N 6</td>
<td>1 1 1 1 1 1 1 1</td>
<td>? ? ? ? ? ? ?</td>
<td>Produce small, acidic berries; not suited for wine making.</td>
</tr>
<tr>
<td><strong>Bluebell</strong></td>
<td>AH B T J WM M V T N 6</td>
<td>2 3 2 3 3 1 3 2</td>
<td>1 1 2 1 1 2 2 2</td>
<td>? ?</td>
</tr>
<tr>
<td><strong>Buffalo</strong></td>
<td>A B T J WM M V T N 6</td>
<td>3 2 3 3 1 3 2 3</td>
<td>N 2</td>
<td>Early season concord type with plump, thin, loose clusters.</td>
</tr>
<tr>
<td><strong>Canadice</strong></td>
<td>FAH R ST E V T M* 4</td>
<td>3 1 1 2 1 2 2 2</td>
<td>N ?</td>
<td>Medium-sized clusters; dark berries; climatic.</td>
</tr>
<tr>
<td><strong>Cascade</strong></td>
<td>FAH B W E V M 4</td>
<td>1 1 1 2 1 2 2 2 1</td>
<td>N ?</td>
<td><strong>Cascade</strong></td>
</tr>
<tr>
<td><strong>Cayuga White</strong></td>
<td>FAH W W M V ST M 4</td>
<td>1 2 1 1 1 1 1 1 1</td>
<td>N 1</td>
<td>Can be made into a variety of wines: types; when fully ripened develops a banana taste.</td>
</tr>
<tr>
<td><strong>Catawba</strong></td>
<td>A R J WM MV T Y 5</td>
<td>3 1 1 1 1 1 1 1 1</td>
<td>N 2</td>
<td><strong>Catawba</strong></td>
</tr>
<tr>
<td><strong>Chambourcin</strong></td>
<td>FAH B W L MV SU Y 3</td>
<td>1 2 1 1 2 2 2 2 2</td>
<td>2 2</td>
<td><strong>Chambourcin</strong></td>
</tr>
<tr>
<td><strong>Chancellor</strong></td>
<td>FAH B W L MV ST Y 4</td>
<td>1 3 3 3 1 3 1 3 3</td>
<td>Y 3</td>
<td><strong>Chancellor</strong></td>
</tr>
<tr>
<td><strong>Chardonel</strong></td>
<td>FAH B W L V SU Y 4</td>
<td>1 1 1 1 1 1 1 1 1</td>
<td>N 1</td>
<td><strong>Chardonel</strong></td>
</tr>
<tr>
<td><strong>Cheilos</strong></td>
<td>FAH B W L V U N 4</td>
<td>1 1 1 1 1 1 1 1 1</td>
<td>? 3</td>
<td><strong>Cheilos</strong></td>
</tr>
</tbody>
</table>

**Type:** A = American; AH = American hybrid; FAH = French American hybrid.  
**Color:** B = Blue / black; R = Red / rose; W = White.  
**Use:** W = Wine; T = Table; ST = Seedless table; J = Juice.  
**HS (harvest season):** E = early; M = mid-season; L = late season.  
**GH (growth habit):** T = trailing; ST = semi-trailing; SU = semi-upright; U = upright.  
**CT (cluster thinning):** N = not required; M = maybe required; Y = required; *= at bloom to improve berry size.  
**WH (water hardness, injury beginning at):** 3 = Cold tender (< 3 F), 4 = Moderately hardy (> 3 F), 5 = Hardy (< 5 F), 6 = Very Hardy (> 5 F).  

An invaluable resource for Iowa growers!
Keys to Success

• Select cultivars that are desired by your market.
  – Consult with buyers!

• Select cultivars that will mature fruit and wood in your region.

• Carefully consider individual cultivar assets and liabilities.

Photos courtesy Bruce Reisch, Cornell University
Inputs – The Three M’s

- **Money**
- **Materials**
- **Management**
  - Time!
Money

- Capital investment in materials (not including land charges) = $3,500 - $5,000 or more per acre
  - Permanent irrigation requires an additional $1,200 - $1,500 per acre. Divided trellising systems, and tiling, if necessary, increase costs as well.
- Labor costs from pre-plant through year three total $3,000 - $4,000 per acre
- Total capital investment per acre = $6,500 - $9,000 (dry farmed, not including land charges)
- With average full yield of 3.5+ ton/A anticipated in year 4 or 5, the capital recovery period is approximately 7 to 9 years.
Materials

- Planting stock
- Trellising supplies
- Hand tools
- Equipment
Planting Stock

• 1 yr. #1 or 1 yr. “X” dormant transplant are typically preferred.
  • Highly preferable that vines have no less than 16” of root growth, and similar shoot growth.
  • Deny shipment if stock is not of specified quality.

• Greenhouse vines can be used successfully, but are less forgiving of management errors.

• Striking cuttings is possible, but commonly results in a lower success rate.
Trellising

• Posts
  – High quality pine, C.C.A. treated to A.W.P.A. Standard C16 specifications; or native decay-resistant species
    • 3-4” or 4-5” dia. X 8-9’ line posts set no further than 28’ apart with a 2-3’ insertion depth
    • 5-6” dia. end posts, buried 3-4’ and set in an appropriate end-post assembly (braced or anchored; row length and trellis system dependent)
  – High quality steel vineyard posts
    • Set no further than 28’ feet apart
    • Galvanized if fertigating with nitrogen
  – “T” posts
    • No less than 1.33 lb./ft.; install at each vine
Trellising

• **Anchors** (if using tie-back assembly)
  – Many options: “dead man,” anchors, driven posts, etc.
    • Screw-in anchors: 40” length, 5/8” dia. shaft, 5” fully welded helix are minimum specifications

• **Wire**
  – High-tensile wire is greatly preferred.
    • Class 3 galvanized
    • 190,000 p.s.i. or greater
    • 12.5 ga. for cordon wires; 14 ga. acceptable for foliage or training wires

• **Terminal hardware:** tensioners, crimping sleeves, staples, etc.
  – Seek highest quality

• **Training stakes or twine**
Hand Tools

- Shovel, hand hoe, spade, rigid rake
- Hammers, pliers, HT wire cutters, crimping tool for sleeves, electric or gas drill
- HT wire dispensing unit
- Pruning shears (bypass style), vine tying tool and/or hand-tying materials
- Line trimmer? (bad sign!)
- If installing permanent irrigation: soil moisture monitoring equipment
Machinery

• For a 3 to 8 acre planting:
  – Own:
    • 35+ h.p. tractor – should be no wider than grass aisle width
    • Air-assisted or high-pressure hydraulic canopy sprayer
    • 3 pt. or belly-mounted mower
    • Weed control implement; many options:
      - Herbicide sprayer
      - Mulcher/bale shredder
      - Tillage tool
      - Flamer
    • 3 pt. mounted fertilizer spreader or trailer-type compost spreader
    • Pick-up truck (& trailer?)
    • Landscape rake, or similar implement for pruning debris removal
Machinery

• For a 3 - 8 acre planting:
  – Rent/Hire:
    • Heavy equipment for pre-plant site preparation ops.
    • Auger or tree planter for vine installation
    • Post driver or auger for trellis installation
    • Narrow disk or rotovator for pre-plant vine row tillage

Above: air-assisted sprayer – a valuable tool
Pre-Plant Management

• Proper site layout
  – Vine X row spacing selection
    • 7’ X 9’, 8’ X 10’ most common
    • Vine spacing determined by cultivar vigor, site capacity, and trellis selection
    • Row spacing determined primarily by tractor width and trellis selection
  – Head-land allowance
    • 30’ minimum; 35-40’ if using larger equipment (esp. trailer-type sprayers or harvesters)
  – Access aisle allowance
    • Need determined by row length
Pre-Plant Management, Cont’d

• Proper site preparation
  – Soil analysis: depth, percolation, nutrient concentrations
  – Perennial weed removal
  – Tree/rock/root removal
  – Removal of nearby pest host species (wild vines, etc.)
  – Land leveling?
  – Subsoiling?
  – Tiling?
  – Application and incorporation of needed soil amendments
  – Irrigation head-line installation?
  – Cover crop establishment
  – Predator exclusion fence installation?
First Year Management

• Correct planting technique and conditions
  – 7-10 days prior to frost-free date if planting dormant vines; after danger of frost has passed if planting green-growing vines
  – Proper soil conditions
  – Proper vine planting depth; root pruning?
  – Proper transplant methods

• Irrigation
  – Irrigate each vine with 5 gallons of water as soon after planting as possible.
  – Maintain weekly moisture receipts equivalent to 1” rain per acre (3-5 gallons per vine), or maintain soil moisture at approximately 70% of capacity, through mid-August.
First Year Management, Cont’d

• Pruning
  – Retain two, 3-bud spurs after adjusting vine height. It is preferable that both originate from below ground.

• Fertilization
  – Apply 45 lbs./A nitrogen broadcast, or 30 lbs./A side-dressed after soil has settled around vines.
  – Annual tissue analysis should begin in the second season of growth to facilitate proper fertility management in future years.

• Grow tubes
  – Helpful if utilizing herbicides for weed control; practically necessary if planting green-growing vines or striking cuttings
First Year Management, Cont’d

• Thinning
  – Retain the two best shoots at 3-4” shoot growth if using grow tubes; retain 3 or 4 shoots if training without grow tubes.
  – Remove all flower clusters, or retain 1 cluster per vine to identify “error vines” (wrong cultivar).

• Predator exclusion: deer, rabbits, etc.
  – Install fencing if predator populations are high; apply/install repellants if populations are low.

• Weed control
  – Number one cause of failure in young vineyards!
First Year Management, Cont’d

• Trellising
  – Facilitates proper and efficient training if installed in the first season
  – Must be:
    • Properly sized
    • Properly designed
    • Properly installed

• Training
  – Retain two separate trunks originating from below ground whenever possible.
  – Distribute foliage over the largest possible area of the trellis to maximize exposed leaf area; don’t train more than two shoots immediately adjacent to one another.
First Year Management, Cont’d

• Insect Management
  – Understand the principles of Integrated Pest Management, and employ them.
  – Many potential predators in young vineyards; most common in IA:
    • Grasshopper
    • Japanese Beetle
    • Eight-Spotted Forester
    • Eastern Grape or Potato Leafhopper
  – Scout no less frequently than every third day.
  – Be prepared to employ control tactics quickly.
First Year Management, Cont’d

• Disease management
  – Maintenance of a large, healthy leaf canopy is paramount to rapid vine development.
  – Prevention of leaf and shoot infection is essential.
    • Primary offenders in young plantings:
      – Powdery Mildew
      – Downy Mildew
      – Anthracnose (sporadic)
  – Applications of preventative fungicides are an important component of a successful disease management program.
Keys to Success

- Have adequate finances to properly care for the vineyard.
- Select appropriate, high quality materials for the vineyard which will offer long service life and good performance.
- Manage and maintain the vineyard in a timely and diligent fashion.

Photo courtesy Mike White, I.S.U. Extension
Resources for Industry Newcomers

• People:
  – Dr. Paul Domoto; I.S.U. Professor of Horticulture and Extension Fruit Specialist
    • domoto@iastate.edu or (515) 294-0035
  – Dr. Gail Nonnecke; I.S.U. Professor of Horticulture
    • nonnecke@iastate.edu or (515) 294-0037
  – Mike White; I.S.U. Extension Field Crop and Viticulture Specialist
    • mlwhite@iastate.edu or (515) 961-6237
  – Eli Bergmeier, Viticulture Technician, Golden Hills RC&D
    • eli.bergmeier@goldenhillsrcd.org or (712) 482-3029

• Internet:
  – ISU Viticulture: http://viticulture.hort.iastate.edu
Thank You!