Wine Grape Variety Trials for the Midwest
Matching Varieties to Sites

2011 Kentucky Grape and Wine Short Course
Bruce Bordelon
Why test varieties?

• **Service to the industry**
  - Identify varieties well adapted to our region that make good wine = Sustainable production
  - Determine strengths and weaknesses to advise growers

• **Service to U.S. breeding programs**
  - Determine if selections are worthy of release
  - Performance of selections in new climates

• **New NE-1020 Multistate trials**
  - Compare performance across wide range of climates
Strengths and Weaknesses

- Cold hardiness
- Disease susceptibility
- Fruit/wine quality
  - Date or ripening, fruit chemistry
- Vigor/yield relationship
- Etc.
Strengths

- Cold hardiness
  - Frontenac, Marquette, LaCrescent
- Disease susceptibility
  - Norton, Steuben, Cayuga white
- Fruit/wine quality
  - Traminette, Valvin muscat, Chambourcin
- Vigor/yield relationship
  - Noiret, Vidal, Cayuga white
Weaknesses

• Cold hardiness
  – vinifera, Chambourcin, Cayuga white

• Disease susceptibility
  – Traminette, Vignoles, vinifera

• Fruit/wine quality
  – Norton, vinifera, Frontenac

• Vigor/yield relationship
  – Norton, Traminette, Valvin muscat
Recent Releases

• New York
  – NY 70.809.10 = Corot noir
  – NY 73.136.17 = Noiret
  – NY 62.122.1 = Valvin muscat
  – NY 65.533.13 = Traminette

• Minnesota
  – MN-1047 = Frontenac
  – MN-1166 = LaCrescent
  – MN-1211 = Marquette
Grape Varieties for Indiana (HO-221)
Midwest Grape Production Guide (OSU Bulletin 919)
Growing Grapes in Kentucky (ID-126)
Variety Adaptation to Climate

- **Temperature**
  - Minimum winter temperature
    - Cold hardiness
  - Heat accumulation and season length
    - Date of bud break and ripening
- **Rainfall**
  - Amount and distribution, especially from veraison to harvest
    - Ripening date and tendency toward rot problems
Kentucky has zones:

5b (-10 to -15°F)
6a (-5 to -10°F)
6b (0 to -5°F)
General Guidelines to Match Variety Hardiness to Site

- **Excellent sites 6b (0 to -5°F)**
  - all commercial varieties including vinifera
- **Good sites 6a (-5 to -10°F)**
  - most commercial varieties (except vinifera)
- **Acceptable sites 5b (-10 to -15°F)**
  - moderately hardy varieties (hybrids, labrusca)
2 yrs out of 10 is break even
>2 yrs out of 10 is not profitable
Cold Damage to Buds

Live compound bud

Dead primary bud
Cold damage to vine trunks
Crown Gall
Crown Gall
Disease-free Nursery Stock?

Noiret planted 2003

Date of photo: 2009

>75% crown gall
Date of bud break - Frost damage

• Cultivar’s potential to be damaged by frost is directly related to it’s date of bud break.
  – Early (e.g. Foch, Marquette. GR-7) much more likely to be damaged than late (e.g. Chambourcin, Vidal)

• Choose cultivars accordingly

• Plant late budding cultivars on most frost prone sites (elevation, slope, aspect, etc)
Frost Damage
Relative Date of Bud Break
(About 2 week range)

• Early
  – Foch, St. Croix, Marquette, LaCrescent, GR-7, DeChaunac

• Mid
  – Seyval, Chardonel, Frontenac, LaCrosse, Corot noir, Noiret, Norton, etc.

• Late
  – Chambourcin, Steuben, Traminette, Vidal, Vignoles
Temperature During Ripening

Fruit quality is best if fruit ripens under **warm** days and **cool** nights

- **Match ripening date to climate**
  - Don’t grow early ripening grapes in a long season, hot area (excess heat) **
  - Don’t grow late ripening grapes in a short season, cool area (insufficient heat)
Theories on Heat Affects

• Amerine & Winkler, 1944. California Zones I-V based on GDDs base 50°F (I<2500…..V>4000)
• Coombe, 1987. Temps >86°F day & >64°F night are detrimental to fruit quality. Optimal temperature is 68-77°F day, 59-68°F night
• Gladstones, 1992. Mean temp of 64-70°F during final month of ripening. Biologically Effective days
• Butler, 2004. Quality ripening days (GDD base 50 <22) veraison to harvest (Ave daily temp <72)
• Happ, 2004. Daily heat load (>22°C) during last 28 days
Rainfall During Ripening

Rainfall between veraison and harvest almost always leads to a reduction in fruit quality

– Occurrence of bunch/fruit rots
  Vignoles, Seyval, etc are very prone to bunch rots

– Dilution of sugar, acid, flavors
Optimum conditions
Temperature 68-77 day
59-68 night
Mthly Ave 64-70
Daily Ave <72
Minimal rainfall.

Sept is the best month for varieties to ripen in the Louisville area.
Summary of Matching Varieties to Climate

• Choose varieties that:
  – have adequate cold hardiness
  – ripen during the appropriate time
  – can tolerate some rainfall during ripening
# Viticultural Regions of Kentucky

<table>
<thead>
<tr>
<th>Feature</th>
<th>Region I</th>
<th>Region II</th>
<th>Region III</th>
<th>Region IV</th>
<th>Region V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurrence of -15°F: percent of time</td>
<td>Hardly at all</td>
<td>Rarely</td>
<td>Frequently</td>
<td>Very frequently</td>
<td>Extremely frequently</td>
</tr>
<tr>
<td>Winter severity index: January mean temperature</td>
<td>Mildly cold (23°F to 32°F)</td>
<td>Cold (14°F to 23°F)</td>
<td>Very cold (5°F to 14°F)</td>
<td>Extremely cold (&lt;5°F)</td>
<td>Extremely cold (&lt;5°F)</td>
</tr>
<tr>
<td>Spring frost index (SPI): difference between average mean and average minimum for April</td>
<td>Very low risk</td>
<td>Low risk</td>
<td>Moderate risk</td>
<td>Moderate risk</td>
<td>High risk</td>
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<tr>
<td>Growing degree days: 50°F base temperature from 1 April through 30 October</td>
<td>3000-4000</td>
<td>3000-4000</td>
<td>3500-4000</td>
<td>3500-4000</td>
<td>&gt;4000</td>
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<tr>
<td>Frost free days: between last spring frost occurrence at 32°F and first fall frost occurrence at 32°F</td>
<td>&gt;181</td>
<td>&gt;181</td>
<td>171-180</td>
<td>160-170</td>
<td>160-170</td>
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<tr>
<td>Growing season mean temperature: mean of daily maximum temperatures between 1 April and 30 October</td>
<td>Coolest</td>
<td>Cool</td>
<td>Intermediate</td>
<td>Warm</td>
<td>Hot</td>
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</table>

Source: UK HO-87
Viticultural Regions of Kentucky

Figure 1. Viticultural regions of Kentucky.

Source: UK HO-87
# Suggested Varieties for Kentucky

**Table 4. Summary of commercial grapes cultivars suitable for planting in Kentucky based on macroclimatic regions.**

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Region I</th>
<th>Region II</th>
<th>Region III</th>
<th>Region IV</th>
<th>Region V</th>
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</thead>
<tbody>
<tr>
<td>Vinifera</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
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<tr>
<td>Hybrid reds</td>
<td>Chambourcin</td>
<td>Chancellor</td>
<td>Chambourcin</td>
<td>DeChaunac</td>
<td>Frontenac</td>
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<tr>
<td></td>
<td>Chancellor</td>
<td>Corot Noir</td>
<td>DeChaunac</td>
<td>GR-7M</td>
<td>Leon Millot</td>
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<tr>
<td></td>
<td>Corot Noir</td>
<td>Noiret</td>
<td>GR-7M</td>
<td>Frontenac</td>
<td>Marechal Foch</td>
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<tr>
<td></td>
<td>Noiret</td>
<td>St. Croix</td>
<td>Leonard</td>
<td>Leon Millot</td>
<td>St. Croix</td>
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<tr>
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<td>St. Croix</td>
<td>St. Vincent</td>
<td>Marechal Foch</td>
<td>Marquette</td>
<td>St. Croix</td>
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<td></td>
<td></td>
<td>Marquette</td>
<td>St. Croix</td>
<td>St. Vincent</td>
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<tr>
<td>Hybrid whites</td>
<td>Cayuga white</td>
<td>Cayuga white</td>
<td>Frontenac gris</td>
<td>Frontenac gris</td>
<td>Edelweiss</td>
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<td></td>
<td>Chardonnel</td>
<td>Frontenac gris</td>
<td>LaCrescent</td>
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<td></td>
<td>Seyval blanc</td>
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<td>LaCrescent</td>
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<td>Frontenac gris</td>
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<tr>
<td></td>
<td>Traminette</td>
<td>Valvin Muscat</td>
<td>Seyval blanc</td>
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<td></td>
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<td>Vidal blanc</td>
<td>Vignoles</td>
<td>Vignoles</td>
<td>LaCrescent</td>
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<tr>
<td></td>
<td>Norton</td>
<td>Fredonia</td>
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<tr>
<td>American whites</td>
<td>Niagara</td>
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Source: UK HO-88
## Wine Grape Acreage in Kentucky, 2008

<table>
<thead>
<tr>
<th>Variety</th>
<th>Acreage</th>
<th>Rank</th>
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<tbody>
<tr>
<td>Vidal</td>
<td>53</td>
<td>1</td>
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<tr>
<td>Cabernet Sauvignon</td>
<td>47</td>
<td>2</td>
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<tr>
<td>Chambourcin</td>
<td>47</td>
<td>3</td>
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<td>Norton</td>
<td>43</td>
<td>4</td>
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<tr>
<td>Cabernet Franc</td>
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<td>5</td>
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<td>Traminette</td>
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<td>Chardonnay</td>
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<td>Riesling</td>
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<td>Seyval</td>
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<td>Syrah</td>
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<td>11</td>
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<tr>
<td>Cayuga White</td>
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<td>12</td>
</tr>
<tr>
<td>Foch</td>
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<td>13</td>
</tr>
<tr>
<td>Vignoles</td>
<td>9</td>
<td>14</td>
</tr>
</tbody>
</table>
Kentucky Grape Trends

• Late ripening hybrids make most sense
  – Vidal, Chambourcin, Norton, Traminette

• About 50% vinifera is risky

• Little “new” varieties
  – Noiret, Valvin muscat, Marquette etc.

• Suggest grower coordinated trials
  – Share experiences with new varieties
Summary

• Match best varieties to best sites

• Strive for premium quality
  – From all varieties....