What can we grow in Indiana?

*Indiana climate vs. varieties*

2007 Indiana Wine Grape Symposium

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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
Indiana Climate
USDA Plant Hardiness Zone Map

Indiana has zones:
5 (-10 to -20°F) green
6 (0 to -10°F) yellow
Indiana has zones:
5a (-15 to -20°F)
5b (-10 to -15°F)
6a (-5 to -10°F)
6b (0 to -5°F)
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
- **Acceptable sites 5b (-10 to -15°F)**
  - moderately hardy varieties
- **Poor sites 5a (< -15°F)**
  - only hardy varieties
Cold Damage to Buds

- Live compound bud
- Dead primary bud
Crown Gall
Crown Gall
Length of the growing season and heat accumulation

Indiana season length: 140 to 200+ days
   In general, most varieties need 160-180 days
   (Swenson varieties need less)

Heat units (GDD base 50°F): 3,800 to 2,500
   Varieties vary in adaptation to heat
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)
July-October Max-Min Temperature
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
Average Annual Rainfall in Indiana
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) much more likely to be damaged than late (e.g. Chambourcin)

- 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

- **Late**
  - Chambourcin, Vignoles, Vidal, Steuben, Traminette
Matching Varieties to Climate

1. Cold hardiness to winter cold

2. Date of bud break / frost risk

3. Date of ripening to temperature and rainfall during veraison to harvest period
Three “Regions” in Indiana

Cold winter
short season
2500 GDD
relatively cool, dry harvest season

Moderate winter
medium length season
3000 GDD
relatively cool, dry harvest season

Mild winter
long season
>3500 GDD
warm, wet harvest season
Summary of Matching Varieties to Sites

• **Temperature:**
  - Minimum winter temperature-cold hardiness
  - Temperature range during ripening period is critical for fruit quality

• **Rainfall during ripening**
  - Problems with fruit rots/quality
Red Wine Grapes for Indiana

- Chambourcin
- Foch & Leon Millot
- Norton
- Frontenac
- Corot noir
- Noiret
- Marquette
- Others?...
- DeChaunac
- Chancellor
Red Wine Grapes for Indiana

**Strengths**
- Excellent wine quality, especially if fully ripe
- Late ripening
- Large, loose clusters seldom rot

**Weaknesses**
- Only moderately cold hardy
- Needs long growing season
- Low vigor on heavy soils
- Poor nutrition, sensitive to air pollution
- May need crop control

- Chambourcin
- Foch & Leon Millot
- Norton
- Frontenac
- Corot noir
- Noiret
- Marquette
- Others?…
- DeChaunac
- Chancellor
Red Wine Grapes for Indiana

**Strengths**
- Good wine quality
- Cold hardy
- Early ripening
- Moderately disease resistant

**Weaknesses**
- Very early bud break and ripening
- Very sensitive to 2,4-D
- Low vigor on heavy soils

- Chambourcin
- Foch & Leon Millot
- Norton
- Frontenac
- Corot noir
- Noiret
- Marquette
- Others?...
- DeChaunac
- Chancellor
Red Wine Grapes for Indiana

Strengths
- Good wine quality
- Cold hardy
- Late ripening
- Very disease resistant

Weaknesses
- Needs long growing season
- Low yields, high vigor
- High acid, high pH
- Drought susceptible

Chambourcin
Foch & Leon Millot
Norton
Frontenac
corot noir
Noiret
Marquette
Others?
DeChaunac
Chancellor
Red Wine Grapes for Indiana

- Chambourcin
- Foch & Leon Millot
- Norton
- Frontenac
- Corot noir
- Noiret
- Marquette
- Others?...
- DeChaunac
- Chancellor

**Strengths**
- Good wine quality
- Very cold hardy
- Mid-season ripening
- Moderately disease resistant
- High sugar

**Weaknesses**
- Very high acid, long hang time may not help
- Bird damage
- Very susceptible to leaf phylloxera
- Poor fruit set
Red Wine Grapes for Indiana

- Chambourcin
- Foch & Leon Millot
- Norton
- Frontenac
- Corot noir
- Noiret
- Marquette
- Others?...
- DeChaunac
- Chancellor

**Strengths**
- Good wine quality
- Moderately cold hardy
- Mid-season ripening
- Loose clusters, tough skin, few rots (except Phomopsis)

**Weaknesses**
- Susceptible to downy mildew and Phomopsis
- Can be very vigorous
- Tendency to produce many “summer” clusters…. 2-4 sets
Red Wine Grapes for Indiana

- Chambourcin
- Foch & Leon Millot
- Norton
- Frontenac
- Corot noir
- Noiret
- Marquette
- Others?...
- DeChaunac
- Chancellor

**Strengths**
- Good wine quality
- Cold hardy
- Mid-late season ripening
- Loose clusters, tough skin, few rots

**Weaknesses**
- Can be very vigorous
Red Wine Grapes for Indiana

- Chambourcin
- Foch & Leon Millot
- Norton
- Frontenac
- Corot noir
- Noiret
- Marquette
- Others?
- DeChaunac
- Chancellor

Strengths
- Good wine quality
- Very cold hardy
- Early-mid season ripening

Weaknesses
- Early veraison, bird damage
- Poor fruit set?
Red Wine Grapes for Indiana

- **Chambourcin**
- **Foch & Leon Millot**
- **Norton**
- **Frontenac**
- **Corot noir**
- **Noiret**
- **Marquette**
- **Others?...**
- **DeChaunac**
- **Chancellor**

**Strengths**
- Moderate wine quality
- Cold hardy
- Mid-season ripening
- Very productive

**Weaknesses**
- Very susceptible to Phomopsis
- Excessive number of clusters and non-count shoots, thinning required
- Early bud break
Red Wine Grapes for Indiana

- Chambourcin
- Foch & Leon Millot
- Norton
- Frontenac
- Corot noir
- Noiret
- Marquette
- Others?...
- DeChaunac
- Chancellor

**Strengths**
- Moderate wine quality
- Cold hardy
- Mid-season ripening
- Very productive, even on secondary buds

**Weaknesses**
- Very susceptible to downy mildew
- Tight clusters
- Early-mid season maturity
Red Wine Grapes for Indiana

- Chambourcin
- Foch
- Norton
- Frontenac
- DeChaunac
- Chancellor
- Corot noir
- Noiret
- Marquette
- Leon Millot
- Others...

GR-7
St. Croix
Baco noir
Chelois
Rougeon
Rosette
.....?
Vinifera Wine Grapes for Indiana

Red vinifera

- Cabernet sauvignon
- Cabernet franc
- Lemberger
- Pinot noir?
- Petit Verdot?
- Malbec?
- Tannat?
- Marselan?

Strengths

- Excellent wine quality if fully ripe

Weaknesses

- Cold tender
- Disease susceptible
- Vigorous and difficult to manage
- Late ripening, need long season for good quality
- Lack of experience
White Wine Grapes for Indiana

- Traminette
- Chardonel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...
White Wine Grapes for Indiana

- **Traminette**
- **Chardonel**
- **Cayuga White**
- **Seyval**
- **Vidal**
- **Vignoles**
- **LaCrosse**
- **LaCrescent**
- **Valvin Muscat**
- **Others...**

**Strengths**
- Excellent wine quality
- Moderately cold hardy
- Moderate disease resistance
- Not overly productive
- Late ripening

**Weaknesses**
- Excess vigor can lead to poor fruit quality... shading
- Only moderate cold hardiness, especially trunk damage in young vines
- Moderate disease resistance... susceptible to Phomopsis
White Wine Grapes for Indiana

- Traminette
- Chardonnel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

Strengths
- Good wine quality
- Not overly productive (e.g. Seyval)
- Moderate disease resistance
- Mid to late season ripening

Weaknesses
- Only moderately cold hardy
- Moderate disease resistance... susceptible to Phomopsis
- Less prone to bunch rots than Seyval, but still a problem
White Wine Grapes for Indiana

- Traminette
- Chardonel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

Strengths
- Good wine quality
- Good disease resistance
- Large, loose clusters, large berries, not prone to bunch rots
- Mid-season ripening
- High yield potential

Weaknesses
- Only moderately cold hardy, especially canes and cordons
- Susceptible to Phomopsis on cluster stems
- Very vigorous, large upright shoots can suffer wind damage
White Wine Grapes for Indiana

- Traminette
- Chardonel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

**Strengths**
- Good wine quality
- Moderately cold hardy
- Mid-season ripening

**Weaknesses**
- Excessively productive (non-count shoots, large clusters)
- Susceptible to bunch rots
- Low vigor, especially on heavy soils or replant sites
White Wine Grapes for Indiana

- Traminette
- Chardonel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

**Strengths**
- Good wine quality
- Loose clusters, tough skin, resist fruit rots
- Late ripening

**Weaknesses**
- Only moderately cold hardy
- Large clusters may need thinning
- Late ripening
White Wine Grapes for Indiana

- Traminette
- Chardonel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

**Strengths**
- Excellent wine quality, especially as late harvest
- Moderately cold hardy
- Mid-season ripening*
- Good acidity in cool areas for late harvest

**Weaknesses**
- Very tight clusters, fruit rots common, especially Botrytis
- Fruit quality concerns in southern areas (rots, early harvest*)
- Low yields
White Wine Grapes for Indiana

- Traminette
- Chardonel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

Strengths
- Good wine quality
- Very cold hardy
- Mid-season ripening
- Good vigor and yields

Weaknesses
- Very susceptible to diseases
- Small, tight clusters
White Wine Grapes for Indiana

- Traminette
- Chardonel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

**Strengths**
- Good wine quality
- Very cold hardy
- Mid-season ripening
- Loose clusters, small berries, fruit rots not a problem

**Weaknesses**
- Very early bud break
- High acidity
- Very susceptible to leaf phylloxera
White Wine Grapes for Indiana

- Traminette
- Chardonel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

**Strengths**
- Good wine quality-clean muscat flavor
- Moderately cold hardy
- Mid-season ripening

**Weaknesses**
- Only moderately cold hardy
- Weak vines, need to be grafted
- Very tight, small clusters
- Very short internodes
- “Muscat spot” disorder
White Wine Grapes for Indiana

- Traminette
- Chardonnel
- Cayuga White
- Seyval
- Vidal
- Vignoles
- LaCrosse
- LaCrescent
- Valvin Muscat
- Others...

Melody
Horizon
Aurore
Ventura
Villard blanc
Frontenac gris
Niagara
Delaware
Dutchess
Golden muscat
.....?
Vinifera Wine Grapes for Indiana

White vinifera
   - Chardonnay
   - Riesling
   - Pinot gris

Strengths
   - Excellent wine quality

Weaknesses
   - Cold tender
   - Disease susceptible
   - Lack of experience
Summary

- Match best varieties to best sites
  - Vinifera (esp. reds) where possible

- Strive for premium quality
  - From all varieties....