



# Grape Cultivars for Iowa

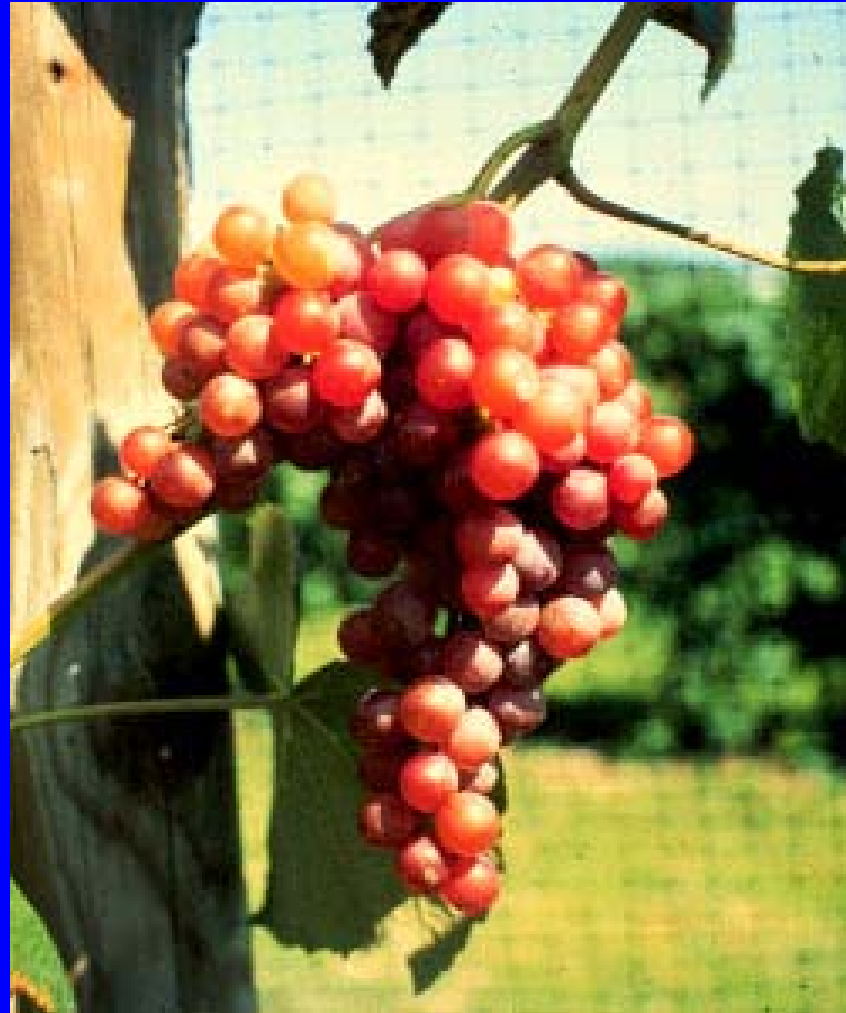
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Revised for the web by  
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# Cultivar Selection

When selecting grape cultivars to grow, one must consider the characteristics of the fruit as well as the vine. The vines have to be adapted to our growing conditions, and the fruit must meet our needs.



# Fruit Characteristics

The grapes must meet our intended use (market):

- Wine
- Juice / Jam / Jelly
- Fresh (table)

The potential for a volume market is in wine, as new wineries develop. Markets for fresh grapes and juice may be limited, but are present, locally.



# Fruit Characteristics

## – Specific characters to consider:

- **Fresh grapes**

- Color, skin thickness, skin adherence
- Seeded or seedless
- Postharvest shelf life

- **Processing grapes (juice & wine)**

- Color
- Chemical components (sugars, acids, pH)
- Flavor
- Wine quality

# Cultivar Selection for Wine

## Considerations on Marketing Strategy

### **Sell to a Winery:**

- What adapted cultivars do the wineries want?
  - Proven cultivar?
  - New cultivar?
- How much are they willing to take?
- Is a long-term contract negotiable?

### **Establish a Winery:**

- What do customers want in a wine?
- What adapted cultivars make quality wine?
- What types / styles of wine do I want to make?
- How much risk am I willing to take?
  - Cultivar adaptation
  - New cultivars

*Learn to make quality wines from a few cultivars before expanding to other cultivars.*

# Cultivar Selection

- **Vine Characteristics:**

Climatic adaptation is the most important consideration in selecting cultivars to plant.

- In Iowa, low-temperature tolerance is what determines the adaptability of a cultivar.
- Based upon the average minimum winter temperature, Iowa can be divided into 2 or 3 climatic zones

(See: "Site Considerations for Vineyards in Iowa"):

Zone 4b = -20 to -25 °F

Zone 5a = -15 to -20 °F

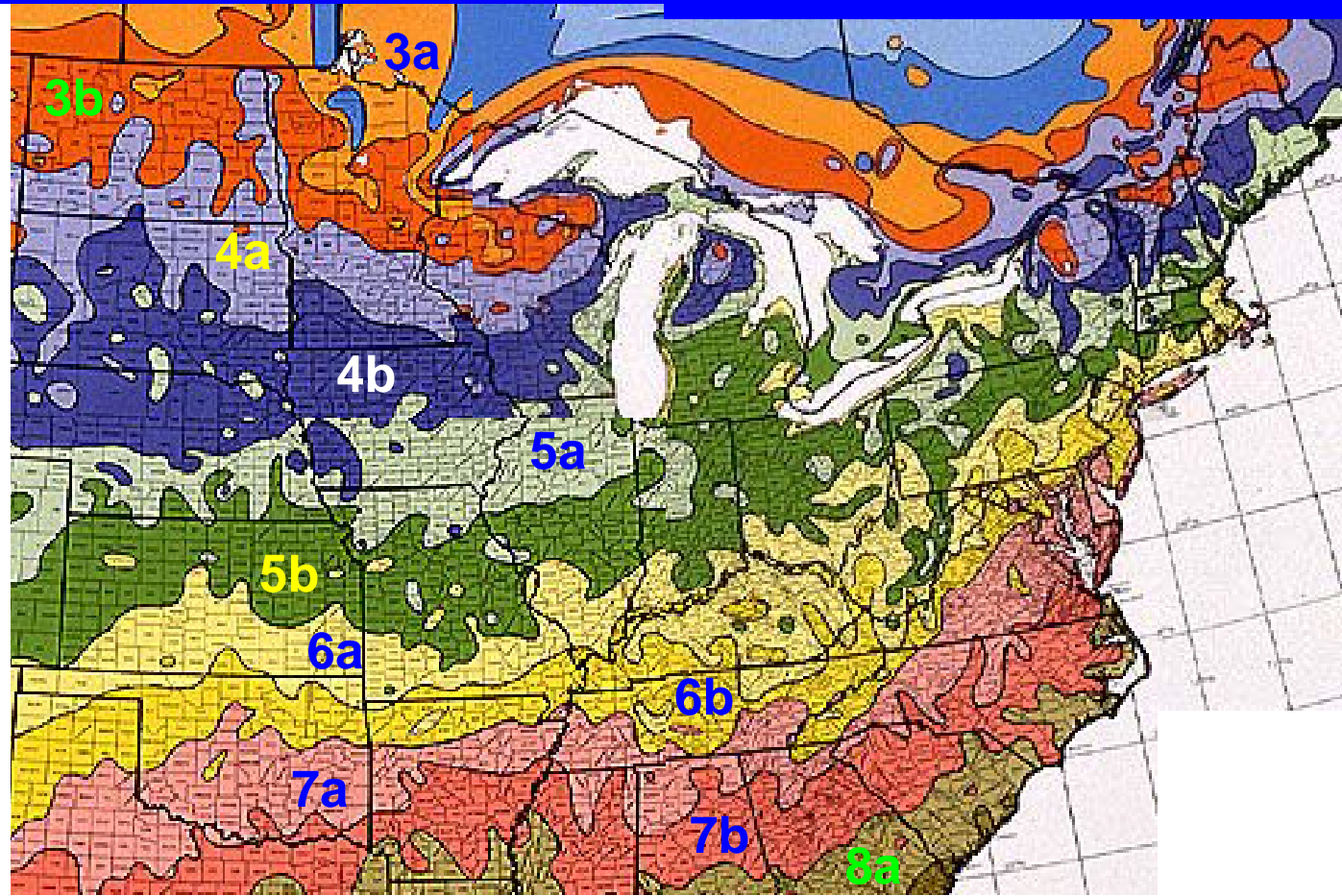
(Zone 5b = -10 to -15 °F)

# USDA Zone Hardiness Map

## Average Annual Minimum Temperature

Temperature (F)      Zone

Below -50	1
-45 to -50	2a
-40 to -45	2b
-35 to -40	3a
-30 to -35	3b
-25 to -30	4a
-20 to -25	4b
-15 to -20	5a
-10 to -15	5b
-5 to -10	6a
0 to -5	6b
5 to 10	7a
10 to 15	7b
15 to 20	8a
20 to 25	8b
25 to 30	9a
30 to 35	9b
35 to 40	10a
40 to 45	10b
45 to 50	11



Iowa winters are much colder than those encountered in the major grape growing regions of northeastern North America. Large production areas are found along the southern and eastern shores of the Great Lakes in New York, Pennsylvania, Ohio, Michigan & Ontario.

# Grape growing region along Lake Erie Climate Zone 6



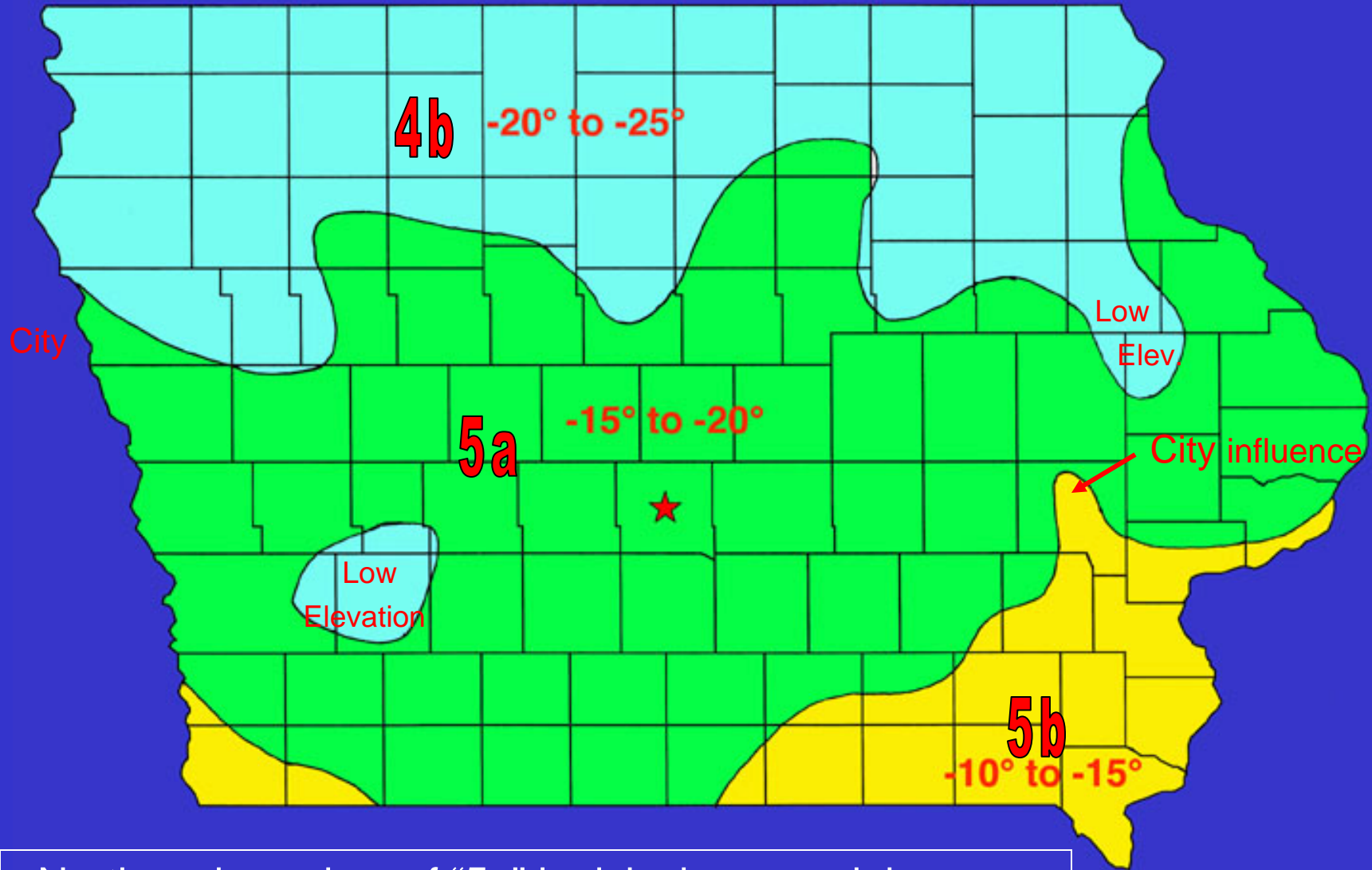
# Cultivar Selection

- Vine Characteristics:**

The classification of grapevine hardiness is base upon the temperature range at which injury begins to occur.

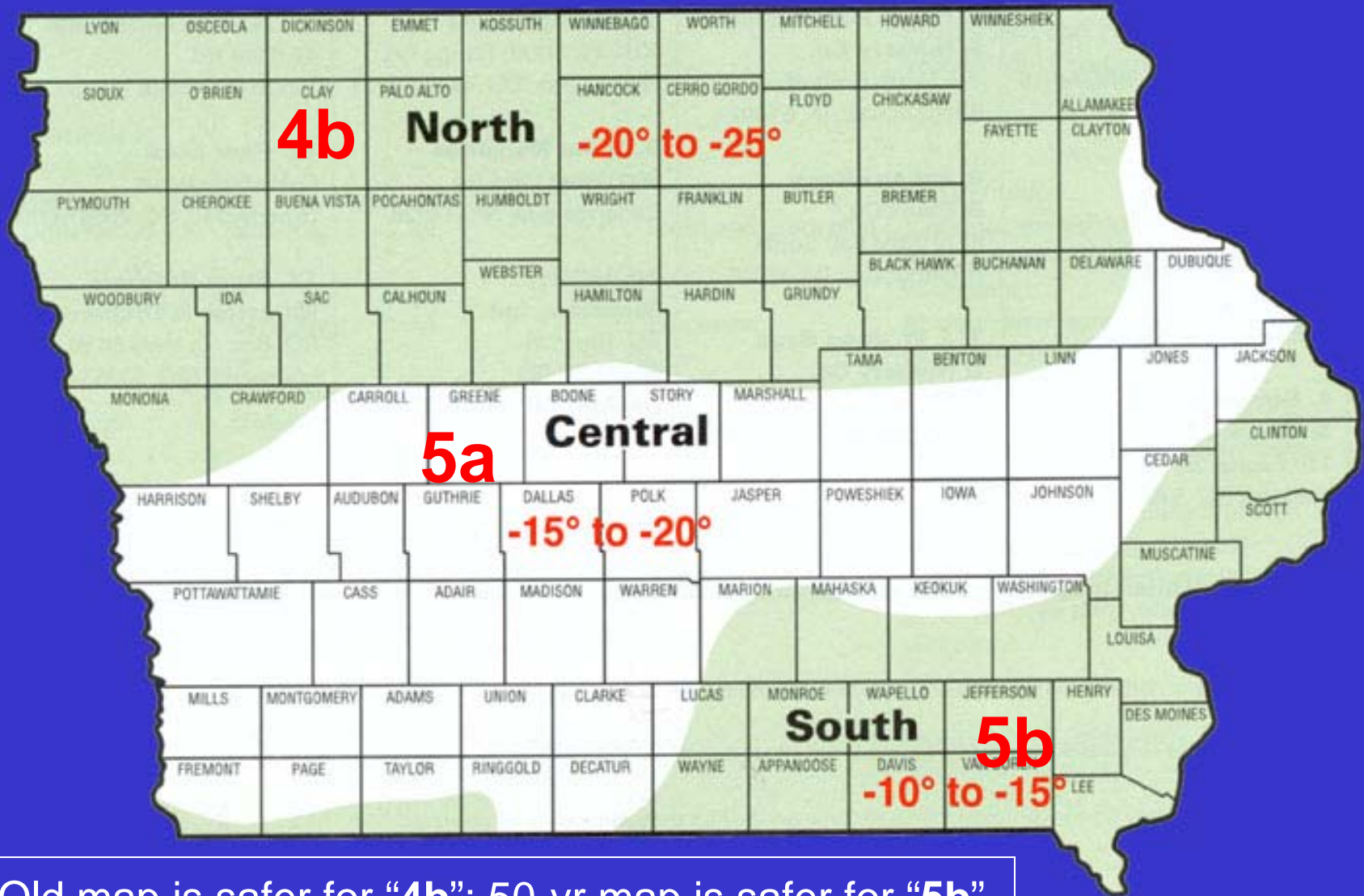
Temp. (F°)	Category	Suitable Type
$\geq 0$	Very cold tender	Almost any.
- 5	Cold tender	Most northern <i>vinifera</i> .
- 10	Moderately Hardy	Hardy <i>vinifera</i> , moderately hardy French hybrids
- 15	Hardy	Hardy French hybrids, most <i>labrusca</i> .
$\leq 20$	Very Hardy	Hardy <i>labrusca</i> , most <i>riparia</i> hybrids.

# 50-Yr Avg. Min. Temperature



Northern boundary of "5a" is risky because injury can occur when vines are not at their maximum hardiness.

# Old USDA Zone Hardiness Map



Old map is safer for “4b”; 50-yr map is safer for “5b”.  
It is best to plant “Hardy” and “Very Hardy” cultivars.

# Grapevine Cold Hardiness

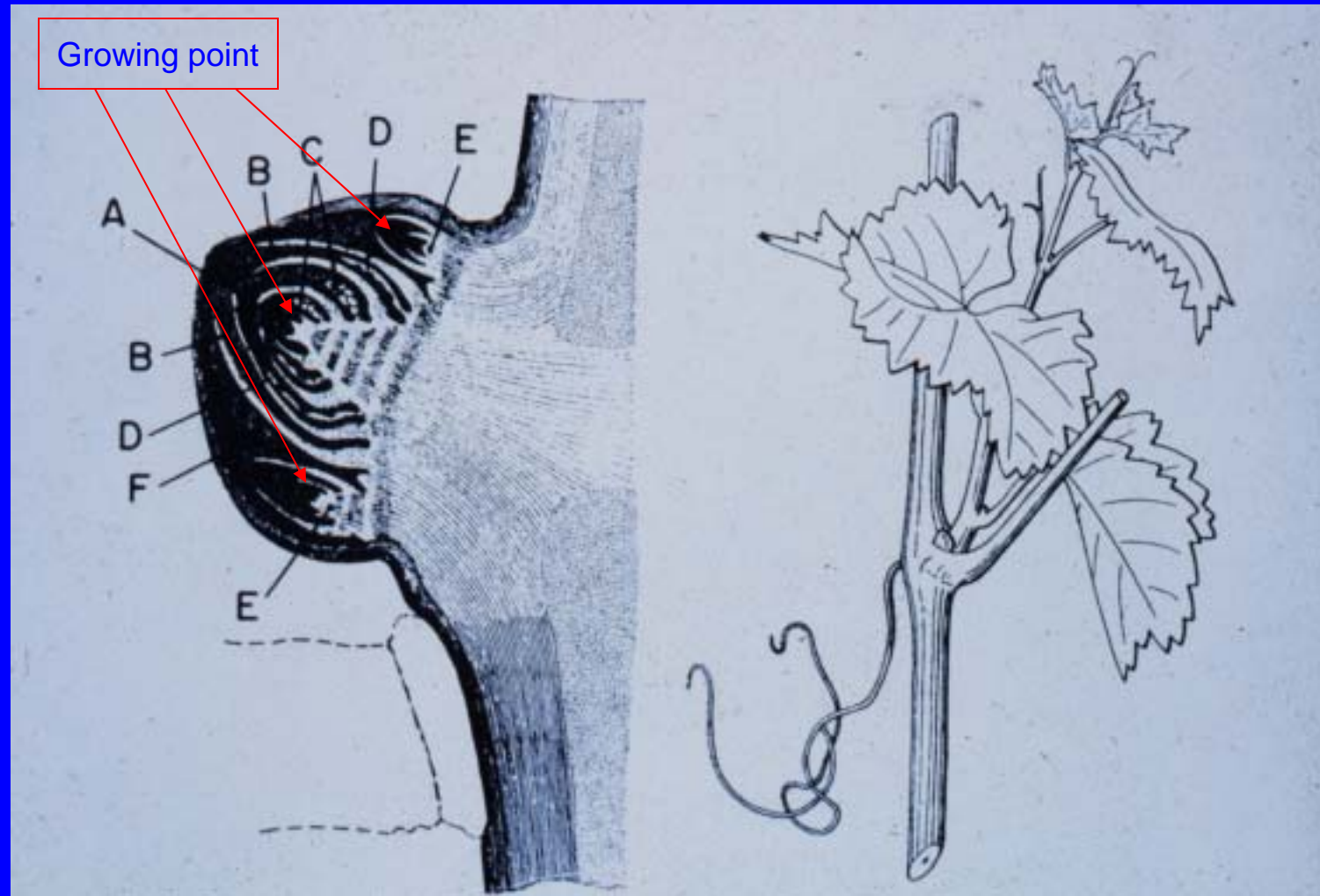
The buds on one-year-old canes (dormant current season's growth), from which new canes emerge and produce the grape clusters, are the most tender portion of the grapevine during the winter.



Bud

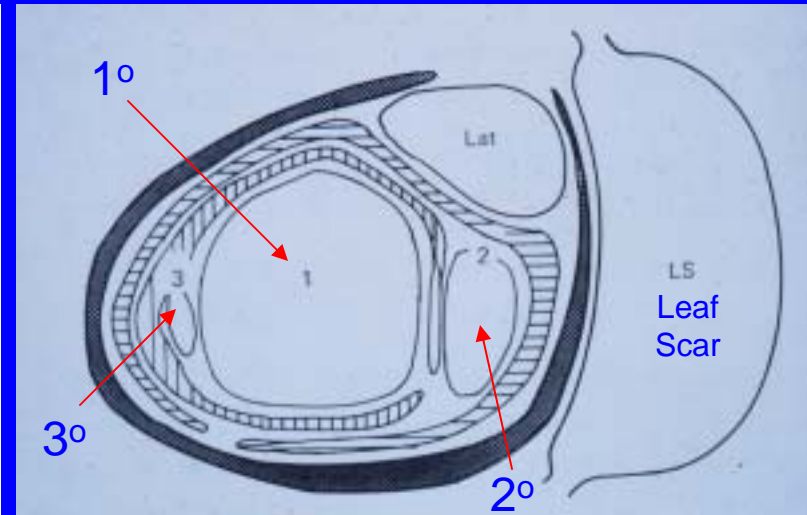
Leaf scar

Fortunately, the grape bud is a compound structure with 3 or more potential growing points from which a new cane will develop.



# Production Potential of the Compound Bud

- The Primary bud ( $1^\circ$ ) is the most productive.
  - If Primary bud is injured, the Secondary bud ( $2^\circ$ ), which is less productive, will develop.
  - If the Secondary bud is also injured, the Tertiary bud ( $3^\circ$ ), which produces few if any clusters, will develop.
- Therefore, marginally adapted cultivars may survive, but they will not be productive.
- Differences in productivity between the primary and secondary buds varies with grape cultivar.



# A Healthy Compound Grape Bud



# A Primary bud that has been killed by exposure to low winter temperatures



# Bud Growth and Shoot Elongation

- A compound bud assures that a grapevine will survive from year to year when exposed to sub-lethal temperatures.
- Because the extent of winter bud damage can have a significant influence on vine productivity, it is a good practice to inspect the buds for injury before pruning so that adjustments in pruning can be made to minimize crop loss.



# Trunk Injury w/ crown gall

- **The trunk is the next least hardy portion of a grapevine.**
- When the trunk is injured by exposure to low temperatures, crown gall often develops on those trunks that are not killed. When this occurs, it is best to cut the vine back to the ground and re-established the vine from new healthy canes.
- Developing vines with a double trunk is done to try to maintain productivity on the assumption that one of the trunks will escape injury.



# Cultivar Selection

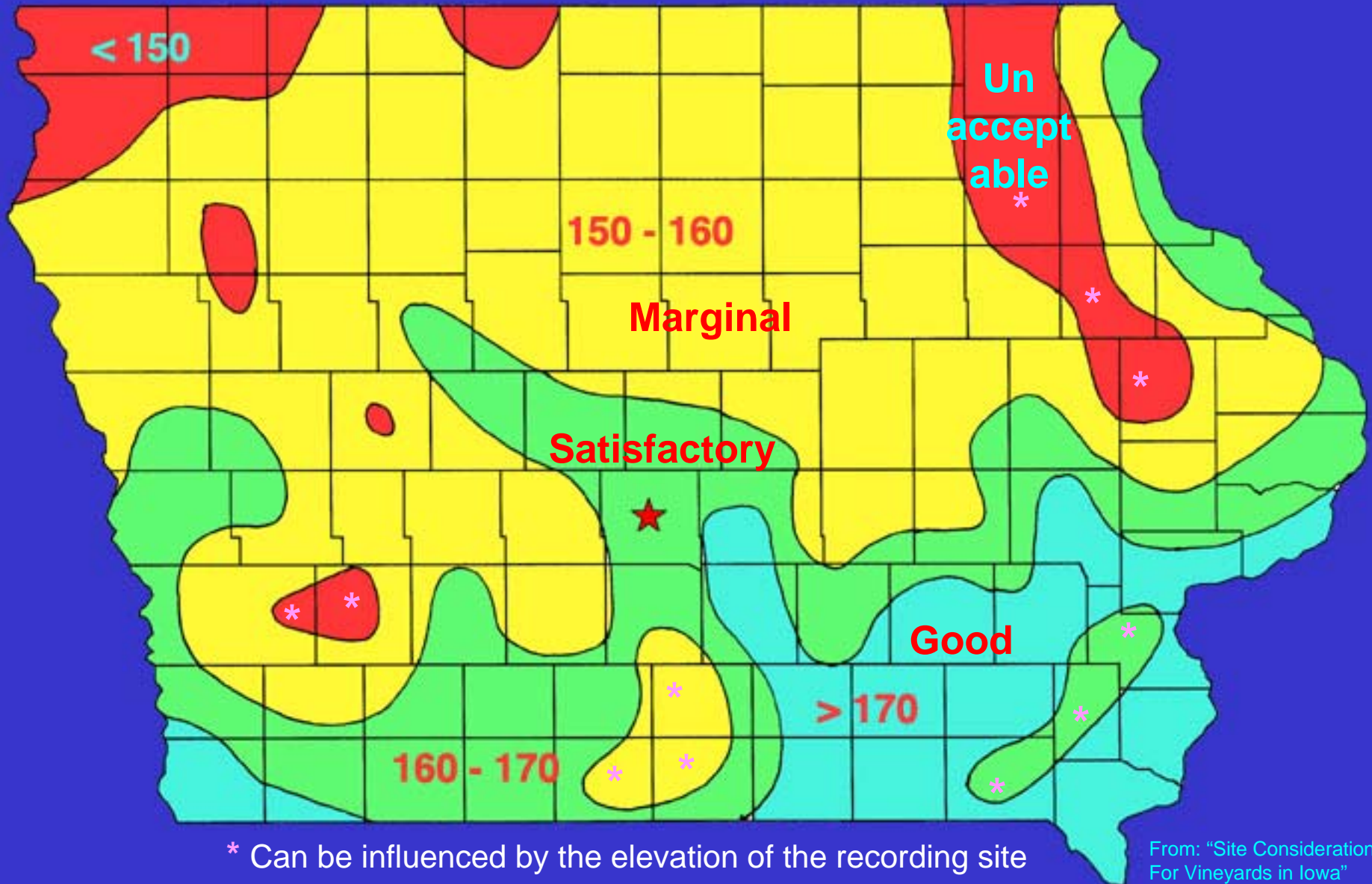
- **Vine Characteristics - climate adaptation**
  - **Season of ripening** is the second most important consideration in selecting climatically adapted cultivars.
    - Grape cultivars need a growing season that is long enough to properly mature the crop, and allow the vines to harden before going into the winter.
    - Grapes are classified as being early, mid- and late season maturing cultivars.
    - **For most of Iowa, avoid planting late season maturing cultivars.**

# Length of the Growing Season

## As it Affects Grape Cultivar Selection

Frost-Free Days	Suitability for Grapes
< 150	<b>Unacceptable</b>
150 to 160	<b>Marginal:</b> Only early season maturing cultivars.
160 to 170	<b>Satisfactory:</b> Early & most mid-season maturing cultivars.
170 to 180	<b>Good:</b> Early, mid-season & some late-season cultivars.
> 180	<b>Excellent:</b> Most cultivars.

# Frost Free Days



\* Can be influenced by the elevation of the recording site

From: "Site Considerations For Vineyards in Iowa"

# Grape Cultivar Adaptation

Based on Cold Hardiness, Iowa Climatic Zone & Harvest Season

Harvest Season:	Early			Mid			Late		
Iowa Climatic Zone*:	S	C	N	S	C	N	S	C	N
Cold tender (-5)	T	T?	N	T	N	N	T?	N	N
Mod. Hardy (-10)	Y?	T	T?	T	T?	N	T?	N	N
Hardy (-15)	Y	Y	T	Y	Y?	T	Y?	T	T?
Very Hardy (-20)	Y	Y	Y	Y	Y	T	Y?	Y?	T

**Y** = Should be adapted.  
**Y?** = Testing may be required  
**T** = Testing is required

**T?** = Adaptability questionable, may not warrant testing.  
**N** = Not adapted.

\* S = south (zone 5b), C = central (zone 5a), N = north (zone 4b)

# Cultivar Selection

- **Vine characteristics - growth**
  - **Vine vigor**
    - Planting distance (6, 7, 8 feet)
    - Training system (single curtain vs double curtain)
  - **Growth habit**
    - Training system (high trellis vs low level trellis)
  - **Need for cluster thinning**
    - Additional labor expense

# Growth Habit

## Trailing / Drooping



Characteristic of American species. Many French-Amer. hybrids are semi-trailing. Both do well when trained to a high trellis system.

## Upright



Characteristic of *V. vinifera* & some French-Amer. hybrids. Suitable for a low level trellis with catch wires (vertical shoot positioning).

# Cultivars Suited for Vertical Shoot Positioning

## Semi-upright:

Chambourcin  
Chardonel  
De Chaunac  
La Crosse  
Prairie Star  
Seyval Blanc  
Traminette

## Upright:

Chelois  
St. Vincent  
Vignoles

# Cultivar Selection

- **Vine Characteristics**

- **Pest resistance or tolerance**

- **Insect:** phylloxera.
    - **Disease:** black rot, downy mildew, powdery mildew and *Botrytis* bunch rot; anthracnose on a few cultivars.
    - **Other** (tolerance to 2,4-D herbicide & related compounds)

# Grape phylloxera

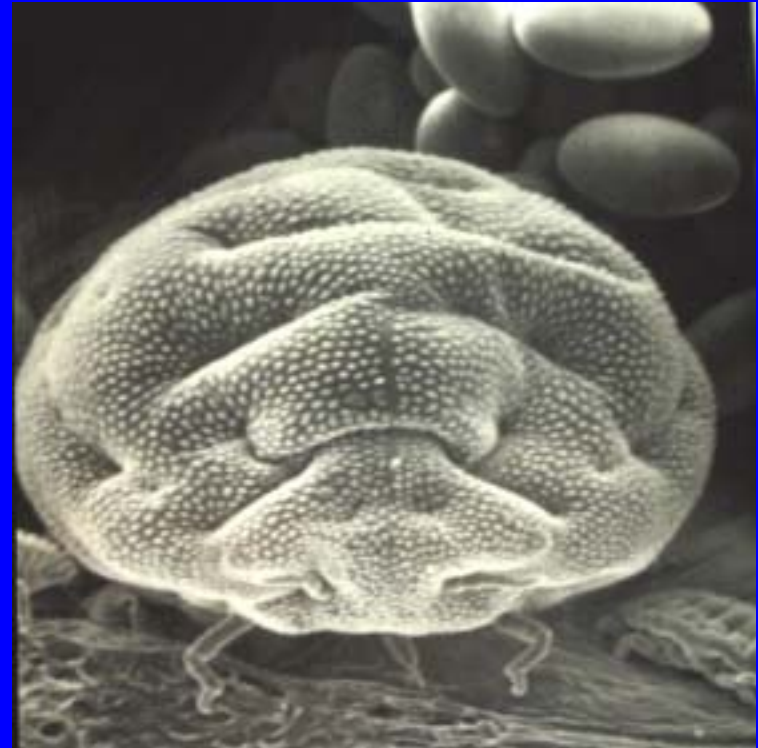


- Leaf form is not considered a problem for any type of grape.
- The root form affects *vinifera* grapes, but is not considered a problem for American & French-American hybrid grapes.

# Grape phylloxera



Eggs and adult in a leaf gall



An electron microscope picture of an adult

# Grape Diseases

- Major diseases in Iowa include black rot, downy mildew, powdery mildew, *Botrytis* bunch rot, & possibly anthracnose.
- Grape cultivars vary in their tolerance to these diseases, & this should be considered when selecting cultivars.
- For information on disease control, see:
  - “Common Grape Diseases” at <http://viticulture.hort.iastate.edu>
  - **PM-1375** “Midwest Commercial Small Fruit & Grape Spray Guide”
  - **B 861** “Midwest Small Fruit Pest Management Handbook”



Black rot



Downy mildew



Powdery mildew



*Botrytis* bunch rot



Anthracnose

# 2,4-D Injury

Grapevines are sensitive to 2,4-D and dicamba (Banvel) herbicides.

- Sensitivity varies between cultivars with Concord & Delaware being the most susceptible & Beta being the most resistant.
- 2,4-D & dicamba are volatile & can drift for several miles.
- Symptoms include abnormally shaped leaves (right), uneven berry ripening, & greater sensitivity to low winter temperatures.
- Injury to grapevines is most severe when the exposure occurs early in the growing season. Such an exposure can stop vegetative growth.
- Late season exposure will affect the leaves, but the vines generally recover.



# 2,4-D Injury

2,4-D & dicamba injury can be minimized by:

- Developing a “good neighbor” policy to let them know you are growing grapes.
- Let the local farm cooperatives know you are growing grapes.
- Ask the County road departments and railroads not to spray right-of-ways along your property.
- If you have to use 2,4-D, use a low-volitale (amine) form, & apply it before bud break in the spring or in the fall when the canes have stopped growing.





# Grape Cultivars for Wine

**Grapes for wine come from 3 groups:**

- American
  - *Vitis labrusca*
  - *Vitis aestivalis*
  - *V. labrusca* x Amer. Sp. hybrids  
(Often with *V. riparia*)
- French-American Hybrids (*V. vinifera* x an American species)
- European (*Vitis vinifera*)



# Grape Cultivars

- Traditional American wine cultivars:  
(*V. labrusca* and have the typical “foxy”  
American grape flavor).
  - **Concord**
  - **Catawba**
  - **Niagara**

# 'Concord'

- Suited for sweet juice, preserves, wine, & table.
- Season: late mid-season
- Vine vigor: vigorous
- Hardiness: "hardy"
- Highly susceptible to black rot; moderately susceptible to powdery mildew.
- Sensitive to sulfur fungicides and 2,4-D.
- Wine has the characteristic *labrusca* flavor.



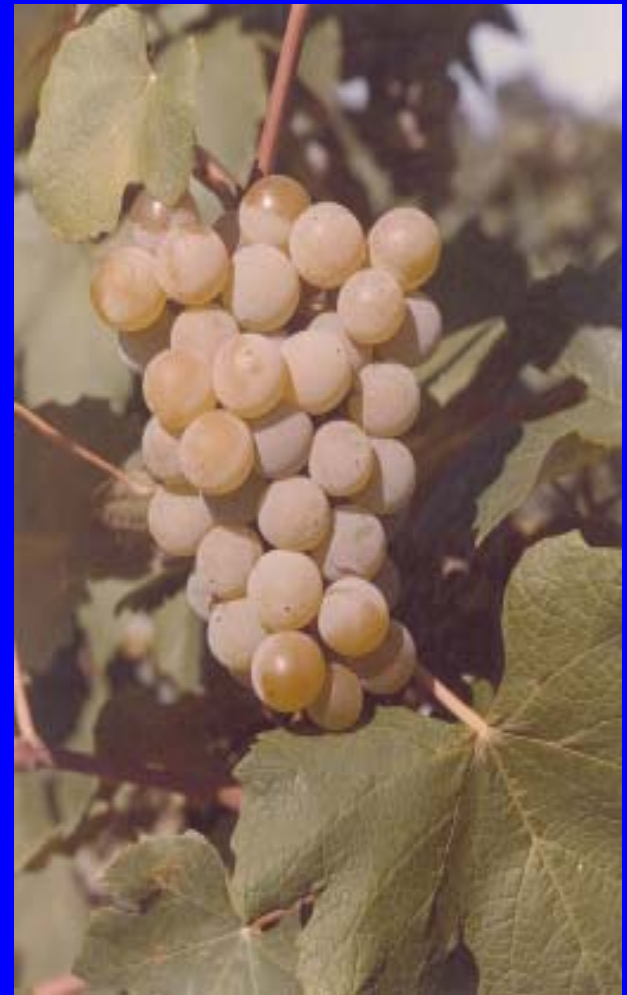
# 'Catawba'

- Suited for wine & sweet juice.
- Season: late
- Vine vigor: moderately vigorous
- Hardiness: "hardy"
- Highly susceptible to black rot & downy mildew; moderately susceptible to powdery mildew.
- Moderately sensitive to copper sprays.
- Produces high quality *labusca*-flavored white or pink dessert wines.



# 'Niagara'

- Suited for sweet juice, preserves, wine, & table.
- Season: late mid-season
- Vine vigor: vigorous
- Hardiness: “moderately hardy”
- Highly susceptible to black rot & downy mildew; moderately susceptible to powdery mildew.
- Medium-large clusters, w/ large berries.
- Pronounced *labrusca* flavor.
- Leading white juice cultivar.





# Grape Cultivars

Other American cultivars to consider:

## White / Red:

- Delaware

## Blue / Black:

- Bath
- Buffalo
- Fredonia
- Steuben
- Van Buren

# 'Delaware'

- Suited for sweet juice, preserves, wine, & table.
- Season: mid-season
- Vine vigor: low vigor
- Hardiness: "hardy"
- Highly susceptible to downy mildew; moderately susceptible to black rot & powdery mildew.
- Medium to small compact clusters, w/ small to medium berries.
- Very sensitive to 2,4-D,
- Produces a high quality American-type wine.



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# 'Buffalo'

- Considered a seeded table and juice grape, but suitable for wine.
- Season: early
- Vine vigor: vigorous
- Hardiness: "hardy"
- Highly susceptible to powdery mildew; moderately susceptible to downy mildew and *Botrytis* bunch rot.
- Characterized as an early season 'Concord'-type.



# 'Fredonia'

- Considered a seeded table and juice grape, but suitable for wine.
- Lacks characteristics of 'Concord' that are desirable for juice & jelly.
- Season: early
- Vine vigor: Moderate
- Hardiness: "hardy"
- Highly susceptible to downy mildew; moderately susceptible to powdery mildew.
- Produces a rose-style wine w/ a pronounced *labrusca* flavor.



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# 'Steuben'

- Noted as an attractive seeded table grape, but suitable for wine.
- Season: mid-season
- Vine vigor: vigorous
- Hardiness: "hardy"
- Moderately susceptible to black rot; good tolerance to downy & powdery mildew & *Botrytis* bunch rot.
- Produces a rose-style wine w/ a pronounced *labrusca* flavor.
- Require cluster thinning.



# 'Van Buren'

- An early ripening 'Concord'-type.
- Primarily a table & juice type, but can be made into wine.
- Season: early
- Vine vigor: vigorous
- Hardiness: "hardy"
- Highly susceptible to downy mildew.





# Grape Cultivars

## Other American Species

### *Vitis aestivalis*

#### **‘Cynthiana’ (‘Norton’)**

- Considered the best American grape for wine making. Lacks the *lubrusca* flavor.
- Season: late mid-season
- Vine vigor: vigorous
- Hardiness: “moderately hardy”
- Very disease resistant.
- Sensitive to 2,4-D.
- Wild growth habit that is difficult to manage.





# Grape Cultivars

*V. labrusca* x American Species Hybrids:

## White / Red:

- Edelweiss
- Elvira
- Kay Gray
- Louise Swenson
- Swenson Red

## Blue / Black:

- Bluebell

# 'Edelweiss'

- Considered a seeded table grape, but suitable for juice and wine.
- Season: early
- Vine vigor: vigorous
- Hardiness: "hardy"
- Moderately susceptible to powdery mildew & *Botrytis* bunch rot.
- Large loose clusters, w/ medium to small berries.
- Develops a strong *labrusca* flavor when fully mature.
- Wines are fruity.



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# 'Elvira'

- Primarily a wine grape.
- Season: late mid-season
- Vine vigor: very vigorous
- Hardiness: "very hardy"
- Requires cluster thinning.
- Moderately susceptible to downy & powdery mildew; highly susceptible to *Botrytis* bunch rot.
- Berries are prone to cracking.
- Must is typically high in acidity.
- Wines are *labrusca* flavored.



# 'Swenson Red'

- Primarily a seeded table grape, but suitable for wine.
- Season: mid-season
- Vine vigor: vigorous
- Hardiness: "hardy", but less hardy than other Swenson cultivars.
- Highly susceptible to downy mildew; moderately susceptible to powdery mildew & *Botrytis* bunch rot.
- Produces large clusters w/ large berries that have a meaty texture & adherent skin.



# Elmer Swenson Cultivars

## Kay Gray

- Suitable as a table and wine grape.
- White berries
- Season: early
- Vine vigor: very vigorous
- Hardiness: “very hardy”
- Exhibits good disease resistance.
- Clusters & berries are small.
- Wine characterized by low acid levels.

## Louise Swenson

- Suitable as a table and wine grape.
- White berries
- Season: mid-season
- Vine vigor: vigorous
- Hardiness: “very hardy”
- Disease resistance generally good; susceptible to anthracnose.
- Produces an aromatic wine, but lacks body; suitable for blending.

# Other American Hybrid Cultivars

## Bluebell

- Suitable as a table, juice & wine grape.
- Blue berries
- Season: mid-season
- Vine vigor: vigorous
- Hardiness: “very hardy”
- Exhibits good disease resistance.
- Considered a high quality *labrusca* type.
- Has better table quality than ‘Concord’, but produces a lighter juice.



# Grape Cultivars

## French-American Hybrids (interspecific)

- Hybrids of *Vitis vinifera* x *V. labrusca* or another American species
- **Have the most potential for producing quality wines in Iowa & northeastern North America.**
  - **Red** from blue or black cultivars
  - **Rose** from pink, red, blue or black cultivars
  - **White** from white or yellow cultivars



# French-American Hybrids

- Red Wine Production
- Recommended hybrids to consider:
  - **Maréchal Foch**
  - **Frontenac**
  - **St. Croix**
  - **Geneva Red (GR – 7) \***

\* For trial only

# ‘Maréchal Foch’

- Season: early
- Vine vigor: moderately vigorous
- Hardiness: “hardy”
- Moderately susceptible to black rot & powdery mildew.
- Sensitive to sulfur fungicides.
- Can be made into a wide range of wines.
- With early ripening, birds can be a problem.



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# 'Frontenac'

- Season: mid-season
- Vine vigor: very vigorous
- Hardiness: “very hardy”
- May require cluster thinning.
- Moderately susceptible to black rot, powdery mildew & *Botrytis* bunch rot.
- Fruit quality is excellent, but high acidity at harvest is common.



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# 'St. Croix'

- Season: early
- Vine vigor: very vigorous
- Hardiness: "very hardy"
- May require cluster thinning.
- Moderately susceptible to downy & powdery mildew, & *Botrytis* bunch rot.
- Wine tends to be bland & neutral in character; suitable for blending.



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# 'Geneva Red' (GR-7)

- Season: mid-season
- Vine vigor: very vigorous
- Hardiness: "hardy"
- Grapes are relatively low in acids; wines are rated good to very good.
- Consider for trial only at this time.



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# French-American Hybrids

- Red Wine Production
- Others to consider:
  - Chancellor \*
  - Chambourcin \*
  - Léon Millot
  - De Chaunac \*
  - Baco Noir \*

\* For trial only

# ‘Chancellor’

- Season: late
- Vine vigor: moderately vigorous
- Hardiness: “moderately hardy”
- Requires cluster thinning.
- Highly susceptible to downy & powdery mildew.
- Sensitive to sulfur & copper fungicides.
- Very productive secondary buds.
- Produces high quality wines.
- Consider for trial only.



# ‘Baco Noir’ (‘Baco #1’)

- Season: mid-season
- Vine vigor: very vigorous
- Hardiness: “moderately hardy”
- Highly susceptible to black rot; moderately susceptible to powdery mildew.
- Does best on heavy soils.
- Berries are high in acids, but low in tannins; potential for blending.
- Consider for trial only.



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# 'Chambourcin'

- Season: late
- Vine vigor: moderately vigorous
- Hardiness: "cold tender"
- Semi-upright growth habit.
- Requires cluster thinning.
- Highly susceptible to black rot; moderately susceptible to powdery mildew.
- Sensitive to sulfur fungicides.
- High in tannins; produces high quality varietal wines & blends.
- For trial only in the warmest regions of Iowa.



# 'De Chaunac'

- Season: mid-season
- Vine vigor: vigorous
- Hardiness: “moderately hardy”
- Semi-upright growth habit.
- Requires cluster thinning.
- Moderately susceptible to downy & powdery mildew.
- Sensitive to sulfur fungicides.
- Wine quality varies with region; fair to excellent; local testing is required.
- Consider for trial only.



# Léon Millot

Sister seedling of 'Maréchal Foch'.

- Season: early
- Vine vigor: moderately vigorous
- Hardiness: "hardy"
- Highly susceptible to powdery mildew; moderately susceptible to downy mildew.
- Vines tend to be more vigorous, & more productive than 'Foch'.
- Wines are similar to 'Foch', with distinct berry aromas, but not as popular.



# French-American Hybrids

- White Wine Production
- Recommended hybrids to consider:
  - Seyval Blanc\*
  - La Crosse
  - La Crescent
  - Vignoles (Ravat 51)\*
  - Traminette\*

\* For trial only

# 'Seyval Blanc'

- Season: mid-season
- Vine vigor: moderately vigorous
- Hardiness: “moderately hardy”
- Semi-upright growth habit.
- Requires cluster thinning.
- Highly susceptible to powdery mildew & *Botrytis* bunch rot; moderately susceptible to black rot & downy mildew.
- Wine quality is very good w/ an attractive aroma, but body is somewhat thin.
- Consider for trial only.



# 'Traminette'

- Season: late
- Vine vigor: moderately vigorous
- Hardiness: “moderately hardy”; trunk injury can be a problem.
- Semi-upright growth habit.
- Moderately susceptible to downy mildew.
- Very good balance between sugars, acids & pH; produces an excellent wine.
- Consider for trial only.



# 'Vignoles'

- Season: mid-season
- Vine vigor: moderately vigorous
- Hardiness: “moderately hardy”
- Upright growth habit.
- Highly susceptible to powdery mildew & *Botrytis* bunch rot; moderately susceptible to downy mildew.
- Can develop a high sugar content while retaining high acidity. Suitable for a variety of wines.
- Consider for trial only.

# Elmer Swenson Cultivars

## La Crosse

- Season: early
- Vine vigor: moderately vigorous
- Hardiness: “hardy”
- Semi-upright growth habit.
- Highly susceptible to black rot & *Botrytis* bunch rot; moderately susceptible to downy & powdery mildew.
- Excellent wine with a fruity character, slightly “foxy” if fully ripe.

## La Crescent

- Season: early
- Vine vigor: moderately vigorous
- Hardiness: “very hardy”
- Promising new cultivar.



# French-American Hybrids

- White Wine Production
- Recent Introductions to consider for trial

	<u>Season</u>	<u>Hardiness</u>
– <b>Esprit</b>	mid	moderate
– <b>Melody</b>	mid	moderate
– <b>Prairie Star</b>	mid	v. hardy
– <b>Swenson White</b>	late	v. hardy

# Table Grape Cultivars





# Table (fresh) Cultivars

- Consider for Trial
  - Many of the seeded American types  
(see American wine cultivars)
  - Many of E. Swenson's selections
  - Many of Univ. of Arkansas selections
  - Some Cornell Univ. (NY) selections



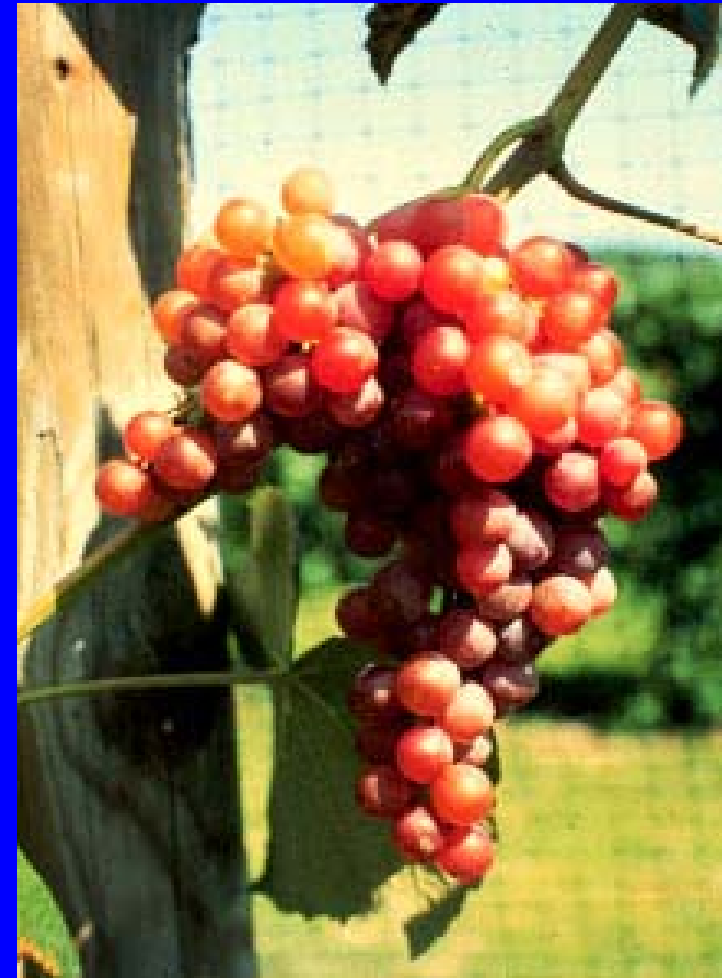
# Table (fresh) Cultivars

Swenson & seedless cultivars to consider for trial:

- **Edelweiss** White, seeded (See: wine cultivars)
- **Kay Gray** White, seeded (See: wine cultivars)
- **Swenson Red** Red, seeded (See: wine cultivars)
- **Marquis** White, seedless
- **Vanessa** Red, seedless
- **Reliance** Red, seedless
- **Mars** Blue, seedless
- **Jupiter** Blue, seedless

# 'Reliance'

- Season: early
- Vine vigor: moderately vigorous
- Hardiness: “moderately hardy”; the hardiest seedless cultivar, has done well at Ames.
- Highly susceptible to black rot & downy mildew; moderately susceptible to powdery mildew.
- Produces large clusters of round, red, medium-sized berries.
- Berries are very thin skinned, & are of excellent quality.



# 'Mars'

- Season: mid-season
- Vine vigor: vigorous
- Hardiness: “moderately hardy”; almost as hardy as ‘Reliance’.
- Very good disease tolerance.
- Large berries borne in medium sized clusters.
- Berries are slipskin w/ a mild *labusca* flavor.
- May require cluster thinning.



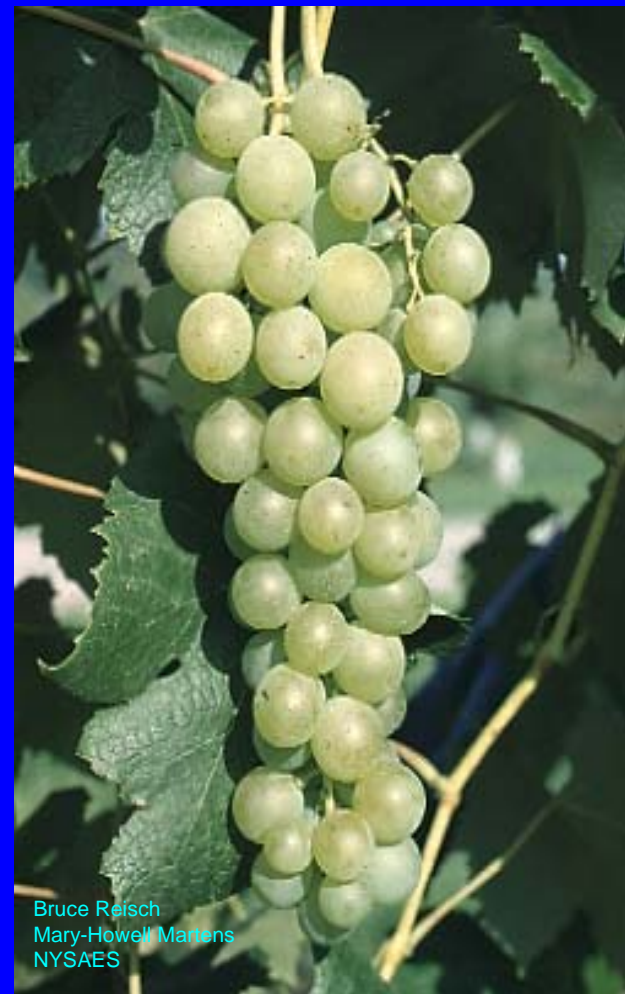
# ‘Jupiter’

- Season: mid-season
- Vine vigor: moderately vigorous
- Hardiness: “moderately hardy”; almost as hardy as ‘Mars’.
- Highly susceptible to powdery mildew; moderately susceptible to black rot.
- Produces medium -large cluster of large berries.
- Berries have a semi-crisp texture and adherent skin.
- Requires cluster thinning.



# 'Marquis'

- Season: mid-season
- Vine vigor: moderately vigorous
- Hardiness: “moderately hardy”; almost as hardy as ‘Mars’.
- Highly susceptible to downy and powdery mildew.
- Produces very large, medium compact clusters w/ large, round, berries.
- Berries have a melting texture & are flavorful.



# 'Vanessa'

- Season: early
- Vine vigor: moderately vigorous
- Hardiness: “moderately hardy”; almost as hardy as ‘Mars’.
- Highly susceptible to black rot; moderately susceptible to downy & powdery mildew.
- Produces medium sized, crisp textured berries on medium filled clusters.
- Berry texture is firm to crisp.





# Grape Cultivars

- American
- French-American Hybrids (interspecific)
- **European (*Vitis vinifera*)**
  - European cultivars are Not Hardy for Iowa.



# Selecting Grape Cultivars for Iowa

## Summary:

1. Determine the market you want to grow grapes for, and the quality of grapes you want to supply to that market.
2. Consider the winter hardiness of cultivars in relation to your growing conditions.
3. Consider the season of ripening of cultivars in relation to the length of growing season under your conditions.
4. Consider the disease and insect tolerance of cultivars, and need for other special cultural requirements.
5. Conduct trials on your farm to determine if cultivars are adapted, and productive under your conditions.
6. Visit with other growers, wineries, field research stations to learn more about the cultivars.

# Sources of Information on Grape Cultivars

- **Cornell Viticulture**

<http://www.nysaes.cornell.edu/hort/faculty/pool/GrapePagesIndex.html>

- **Wine Grape Varieties for Michigan**

<http://www.msue.msu.edu/msue/imp/modfr/26439701.html>

- **Arkansas Grape Varieties**

<http://www.aragriculture.org/commhort/fruits/Grapes/default.asp>

- **Grape Varieties for Indiana**

<http://www.hort.purdue.edu/ext/HO-221.pdf>