Grow Your Own Muscadines

North Carolina
Muscadine
GRAPE
Association

Ad from MD News

Muscadinia rotundifolia - fruit

- Small clusters (less than 12 berries and usually 6-8)
- Large berries
- Thick, slip skins
- Red fruit has diglucosylated (2-sugars) anthocyanins
- Very distinctive flavor: very floral
- Resveratrol, Polyphenols and Ellagic Acid

Muscadine Grapes

Muscadinia rotundifolia

- Originated in the humid SE US
- Tolerant of intensive rainfall and high humidity
- Resistant to most diseases and nematodes that plague *V. vinifera*
- Cultivated for over **400** years

The Mother Vine

263 Mother Vineyard Rd,
Manteo, NC 27954

Growing Grapes in North Carolina

- Basically two kinds of grapes, bunch(*Vinefera*) grapes and muscadines.
- Bunch grapes produce berries in large clusters(tags) and grow best in the mountains and piedmont areas.
- In the coastal plain, Pierce's disease kills most bunch grape varieties.
- Muscadine are not as affected by this disease and can be grown in the coastal plain and piedmont areas.

Muscadine info

- Produce fruit in 3 years
- Yield plant 25-50 lbs
- Number of plants
  - 4 people: 2
  - Acre: 200
- Life expectancy: 15-30 years
- 0-10 F minimum

some fruit in 2nd year

Overview

- **Site selection**
- **Trellis**
- **Planting**
- **Cultivars**
  - Wine
  - Fresh
  - Ornamental
- **Diseases & pests**
- **Propagation**
- **Pruning**

Site Selection - Species

Grape Varieties

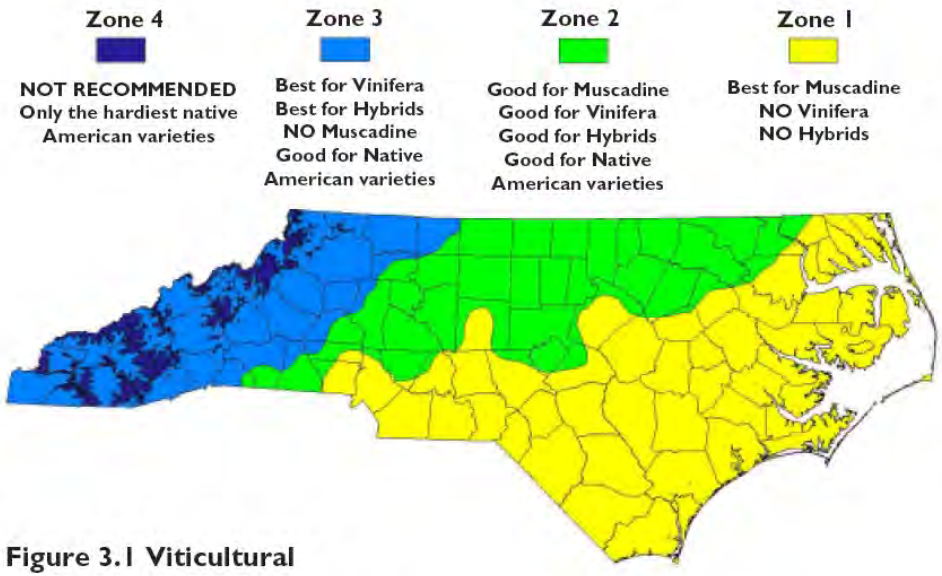


Figure 3.1 Viticultural suitability in North Carolina

If your goal is to produce premium quality *vinifera* grapes, it is best to first find a prime

North Carolina than Virginia (Wolf, 2003). In this regard, it is perhaps noteworthy that grape experts in Arkansas consider *V. vinifera* and *V. rotundifolia* (muscadines) to have comparable winter hardiness levels, and in Arkansas it is recommended that *vinifera* should be planted in regions where winter temperatures *stay above 0°F* (Noguera et al., 2005). At the North Carolina Wine and Grape Council's Web site, you will also find a North Carolina climatological map that shows the frequency of occurrence of temperatures of 0°F for the same three decades (1970-1980, 1980-1990, and 1990-2000).

The French hybrids and American hybrids (collectively referred to in this publication as 'hybrids'), are more widely adapted across Viticultural Zones 2 and 3 than *vinifera* because of

[redacted]

http://www.cals.ncsu.edu/hort_sci/fruit/winegrapes/winegrapes4.pdf

Site Selection – Pierce's Disease

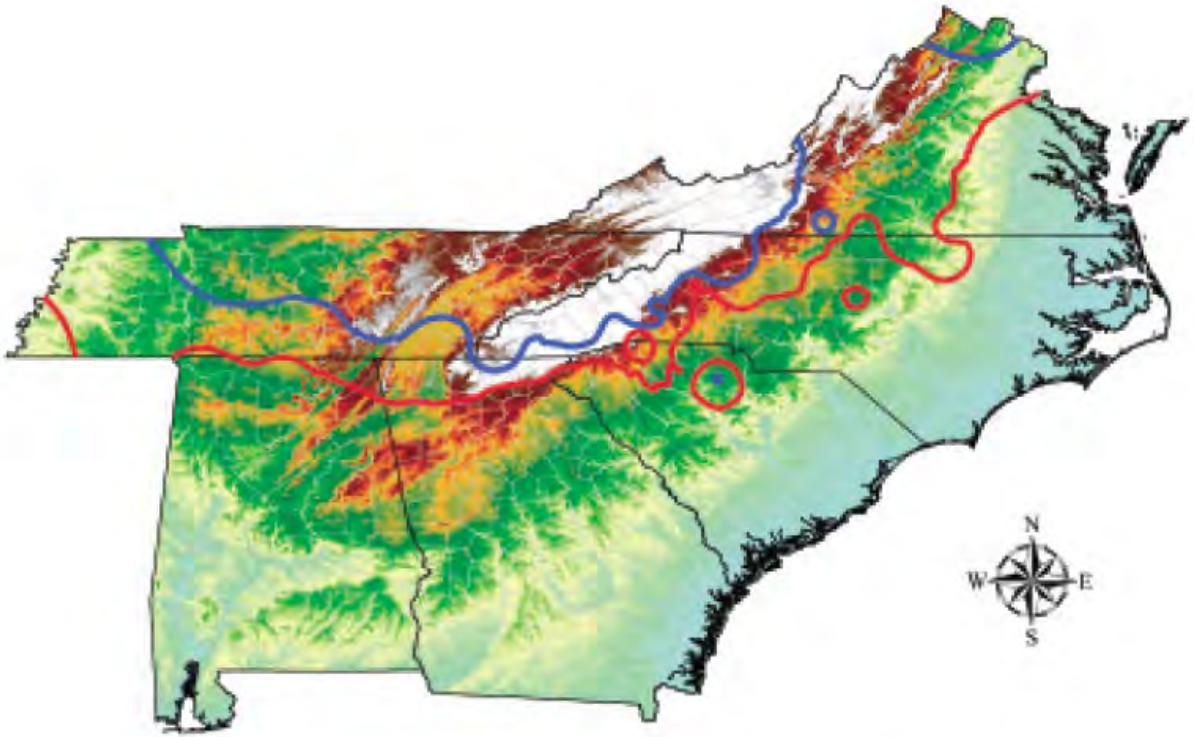


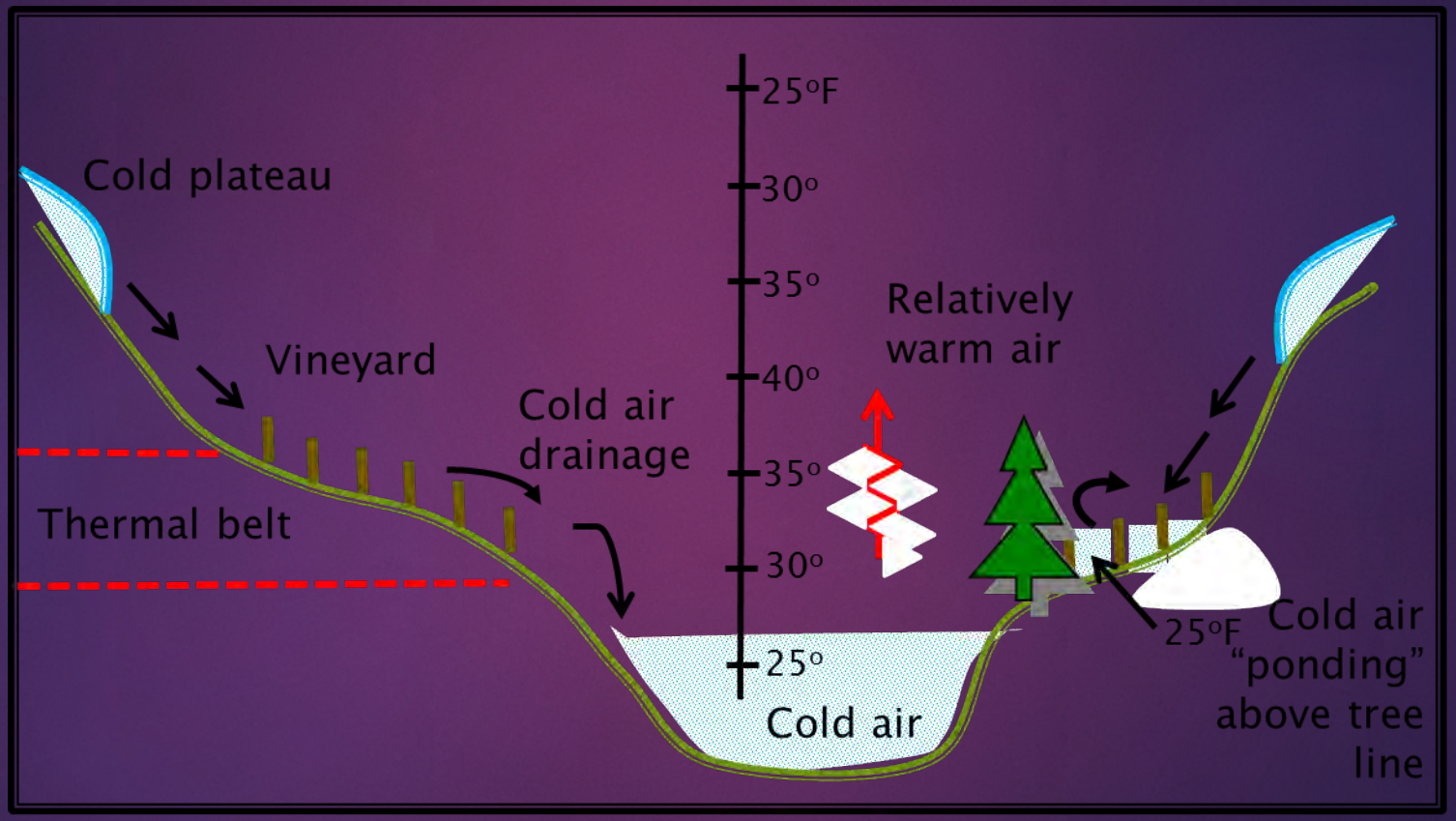
Figure 3.2 Risk of Pierce's disease is based on days during winter with temperatures at or below 10°F. There is an increasing risk south and east of the red line, less risk between the red and blue lines, and low risk north of the blue line.

http://www.cals.ncsu.edu/hort_sci/fruit/winegrapes/winegrapes4.pdf

Site Selection

- The most critical consideration in choosing a planting site for muscadines is internal soil drainage
- Although wild muscadines survive on a wide variety of soils, you must select a well drained soil for optimal growth and yield
- Water should not stand on the site after a normal rain, and the subsoil should not restrict drainage

Site Selection - Topography



http://www.cals.ncsu.edu/hort_sci/fruit/winegrapes/winegrapes4.pdf

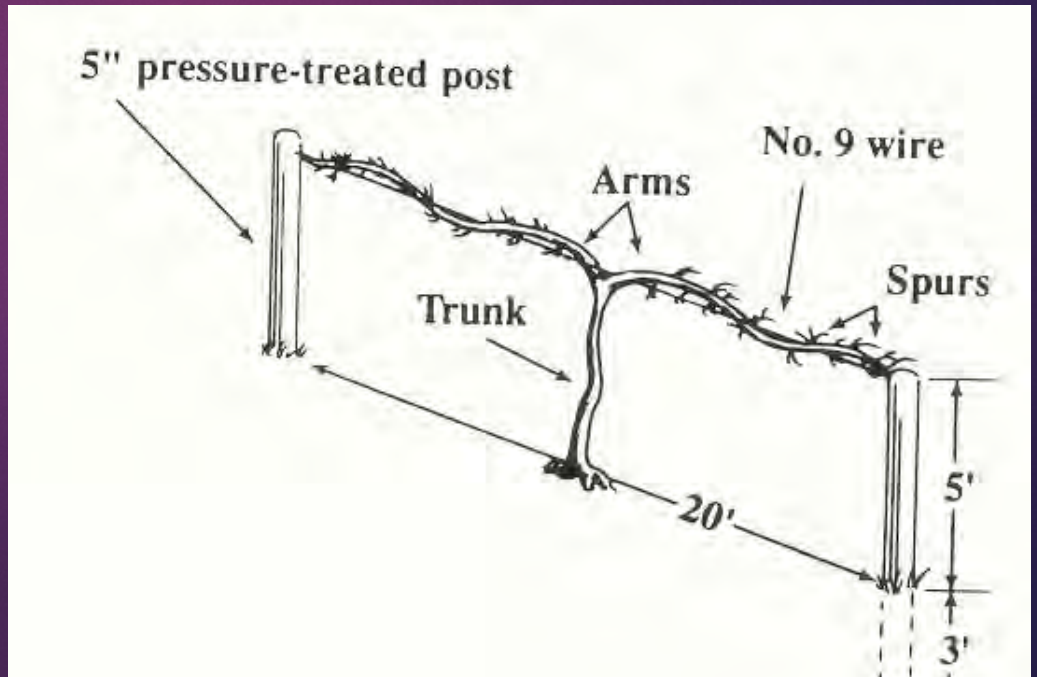
Vineyard Life

- It is not unusual for a muscadine planting to produce for more than 30 years with good pruning, spraying, and a well-constructed trellis

Trellising

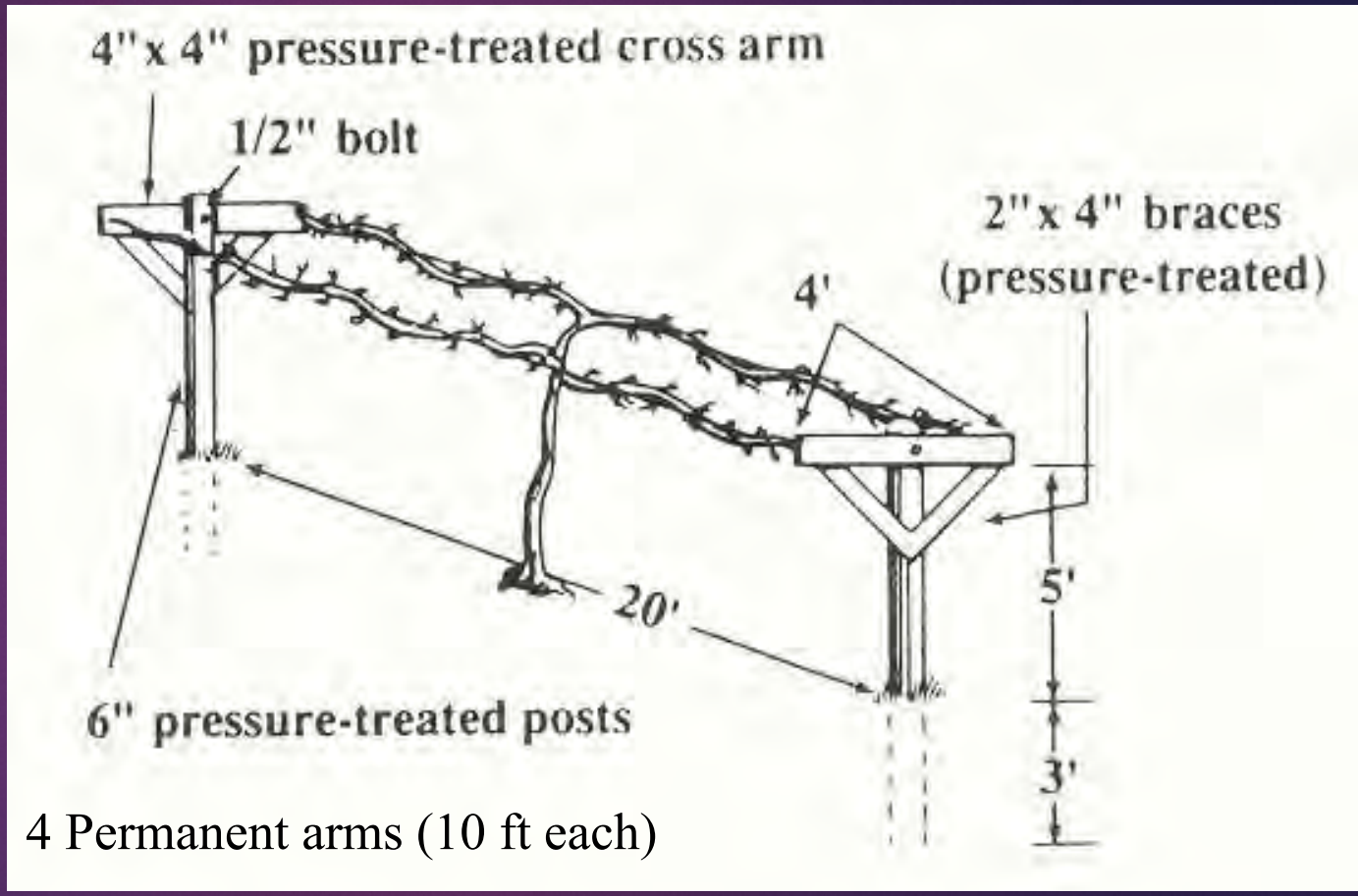
- Decide on the trellis system and complete the construction before planting
- A practical system allows for establishing permanent cordons (arms) that can be easily reached for the required annual pruning
- This requires training of the cordons to single strands of wire
  - No. 9 wire

  is recommended



Geneva Double Curtain

The cross arm at each post is needed for the double wires in a horizontal plane



4 Permanent arms (10 ft each)

The GDC system will yield about 30% more than the single-wire system

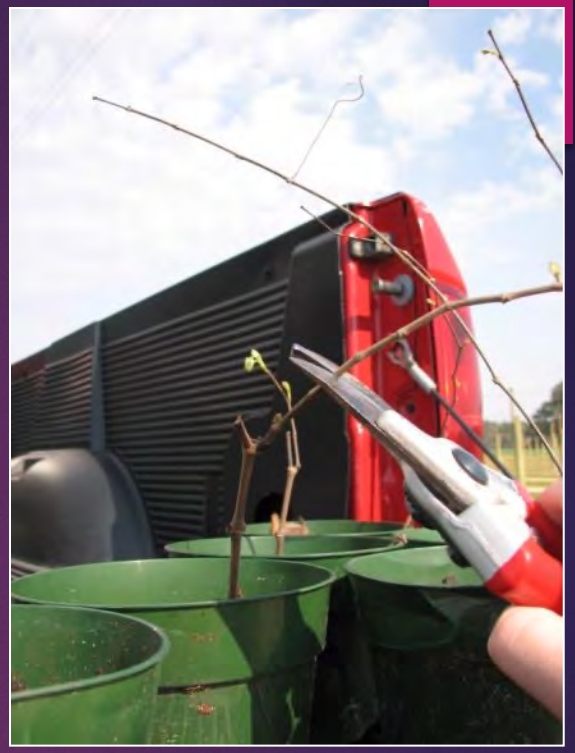
End Post Support

Planting

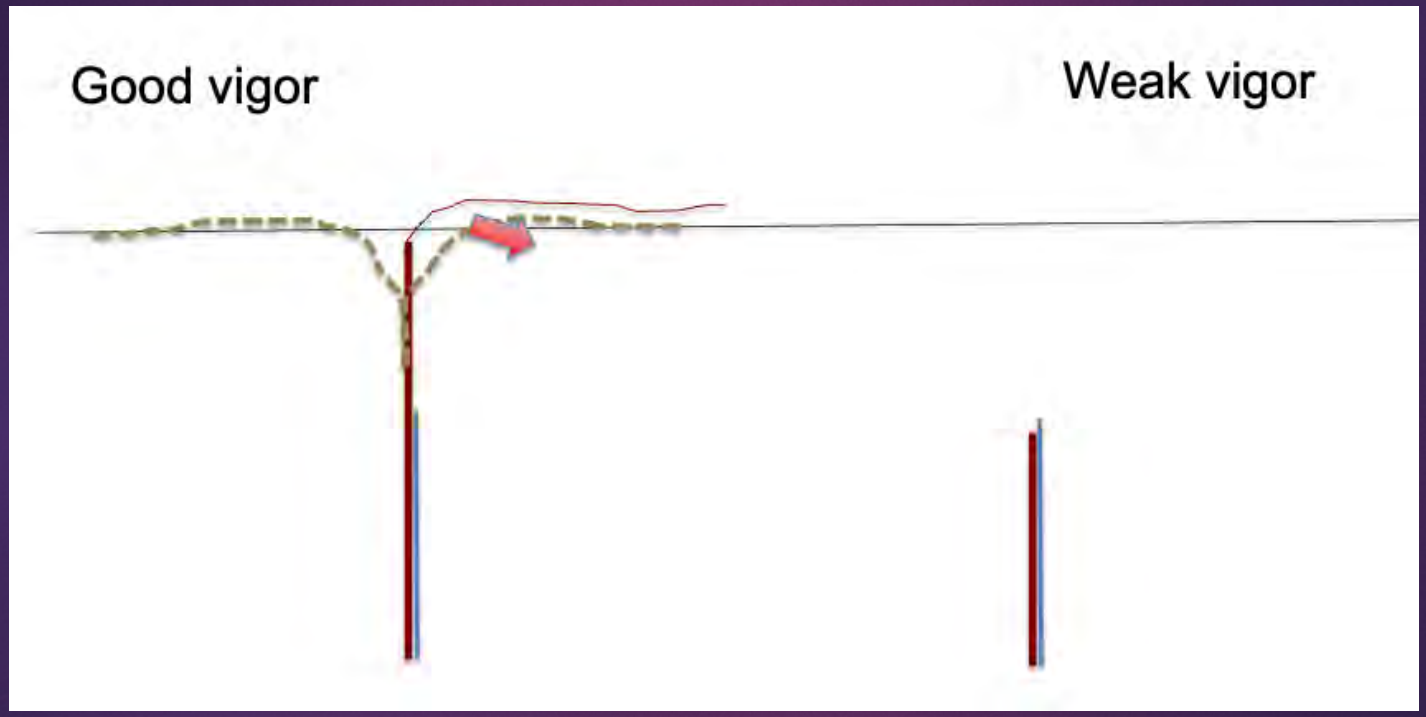
- Wait until there is little chance of sub-freezing temperatures before spring planting.(Feb./March)
- Potted plants are easier to hold until the proper planting time, but bare-root plants are satisfactory if the roots are kept moist (not wet), and the plants are refrigerated until planting time.

Planting

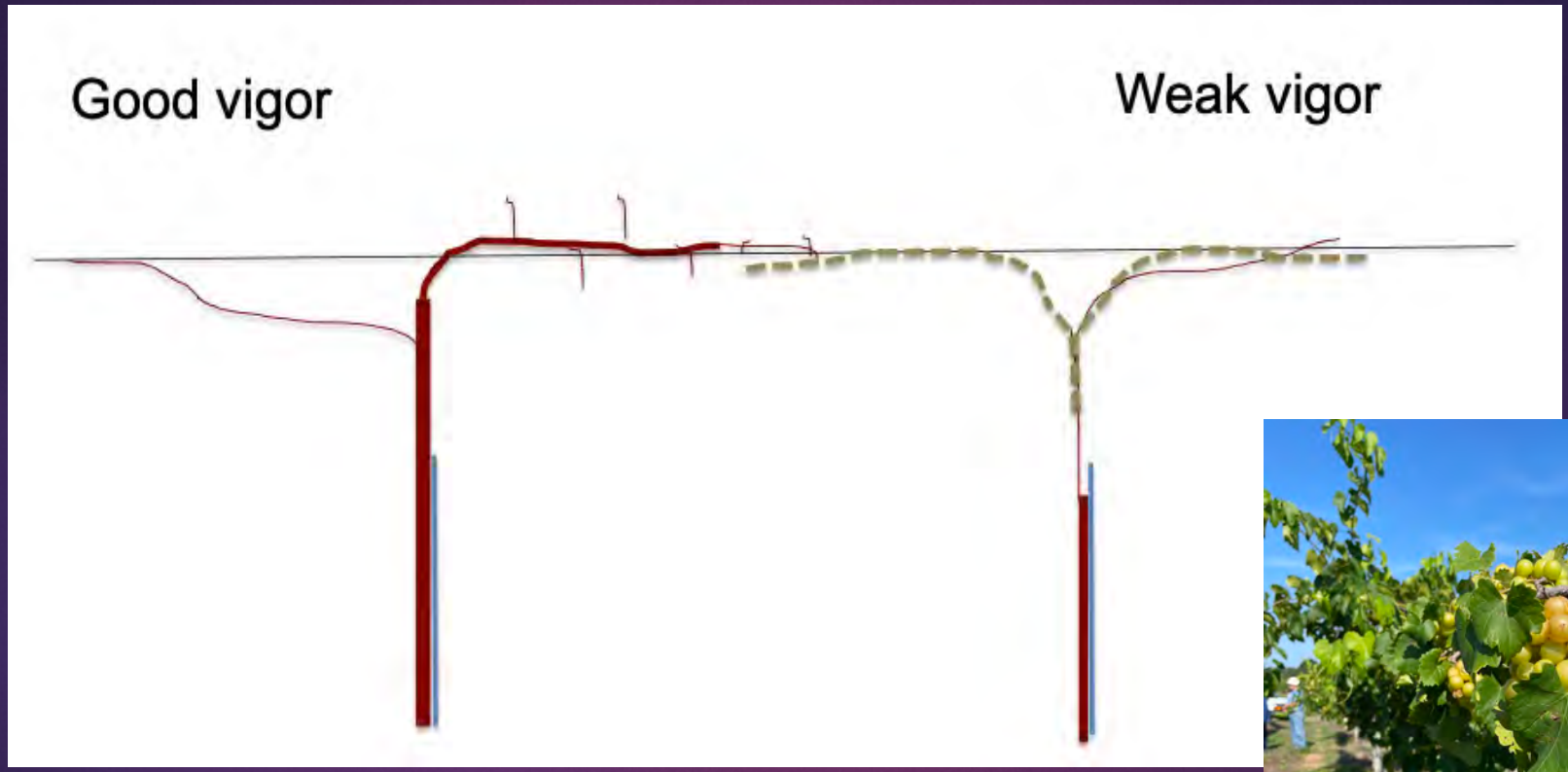
- Prune back to 2 buds.
- Plant at the same depth or slightly deeper than the previous planting depth.
- Vines should be a **minimum** of 10 feet apart in the row, but more preferably 20 feet apart.
- Distance between rows can depend on the equipment used for mowing, but 8 feet should be a minimum.



One year old vines



2 Year old Vines



Apical Dominance

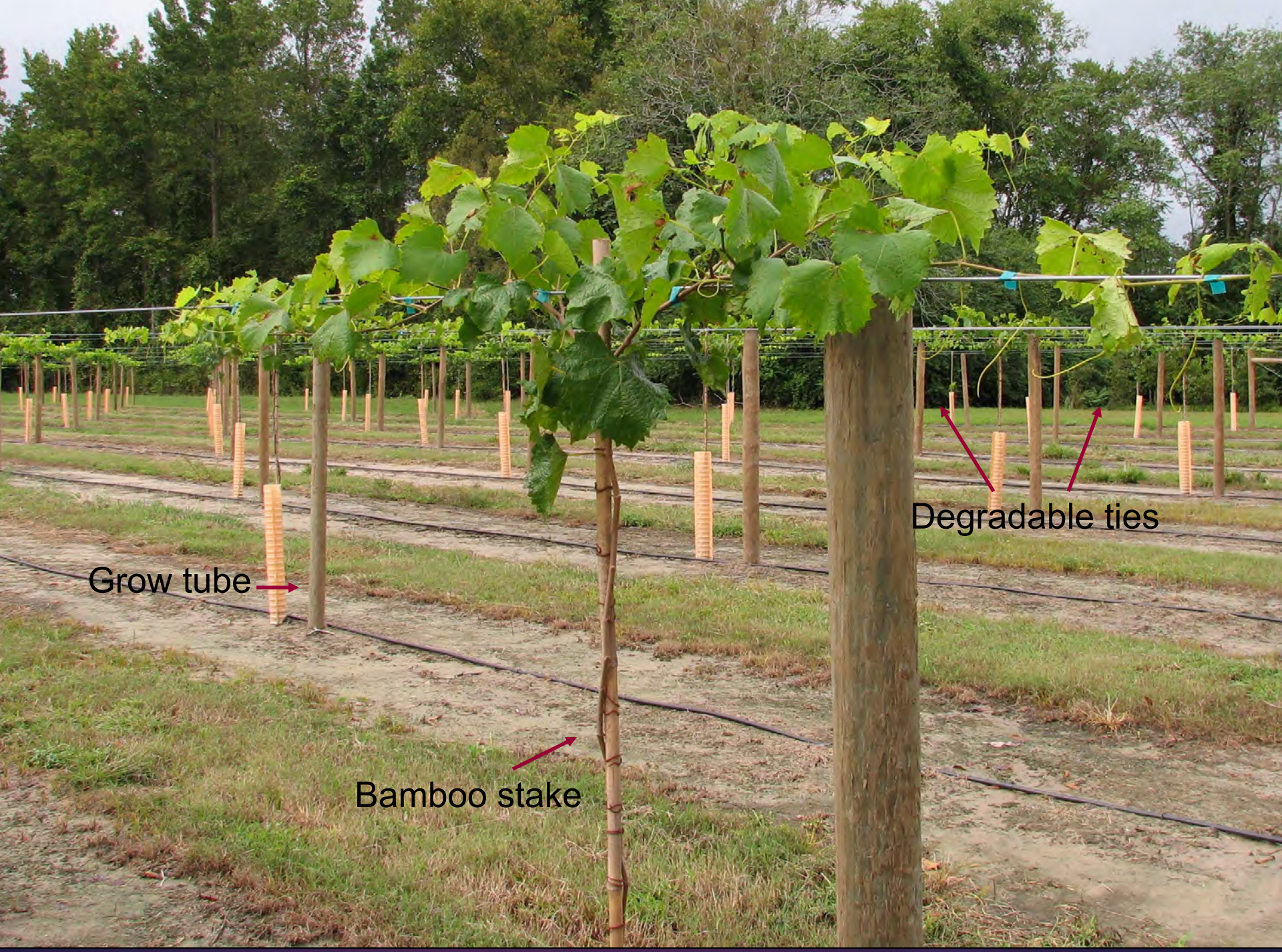
Freeze Protection

Training

- When new growth begins, select the most vigorous shoot and cut away the others
- A bamboo training stake beside the plant is convenient for attaching the growing vine
- Loosely tie the shoot to the stake with materials that will stretch or degrade so as not to girdle the growing vine
  - Max Tapener used in picture

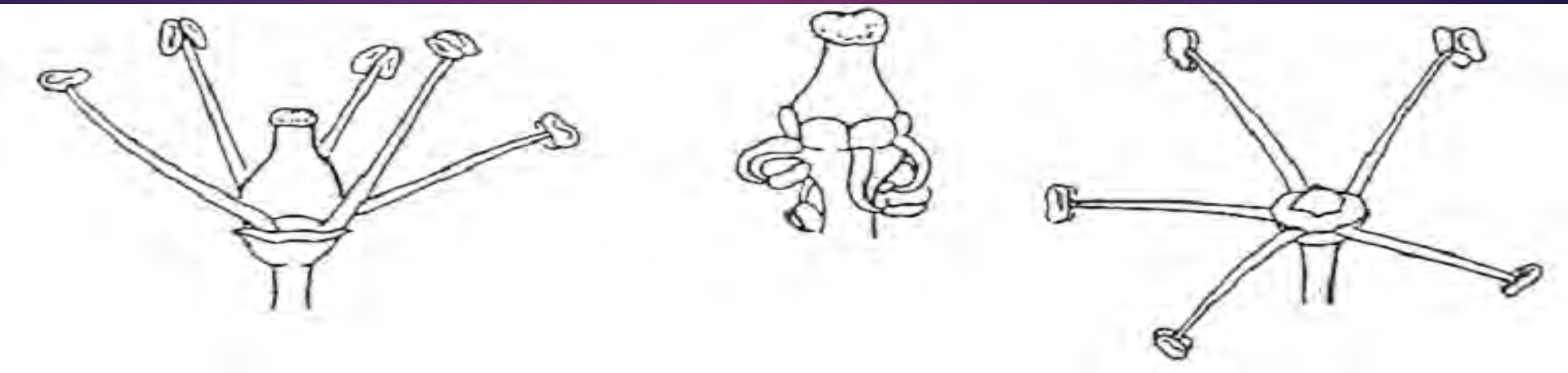
Training

- Continue tying the vine each week
- Shoots from the cordon's lateral buds should be allowed to grow
- Allow cordon to develop in steps


Degradable ties
Grow tube
Bamboo stake

Female vs. Perfect-Flowered

- Muscadine cultivars may be either female or perfect-flowered
- If a female cultivar is used, a perfect-flowered variety must also be planted in order to assure proper pollination



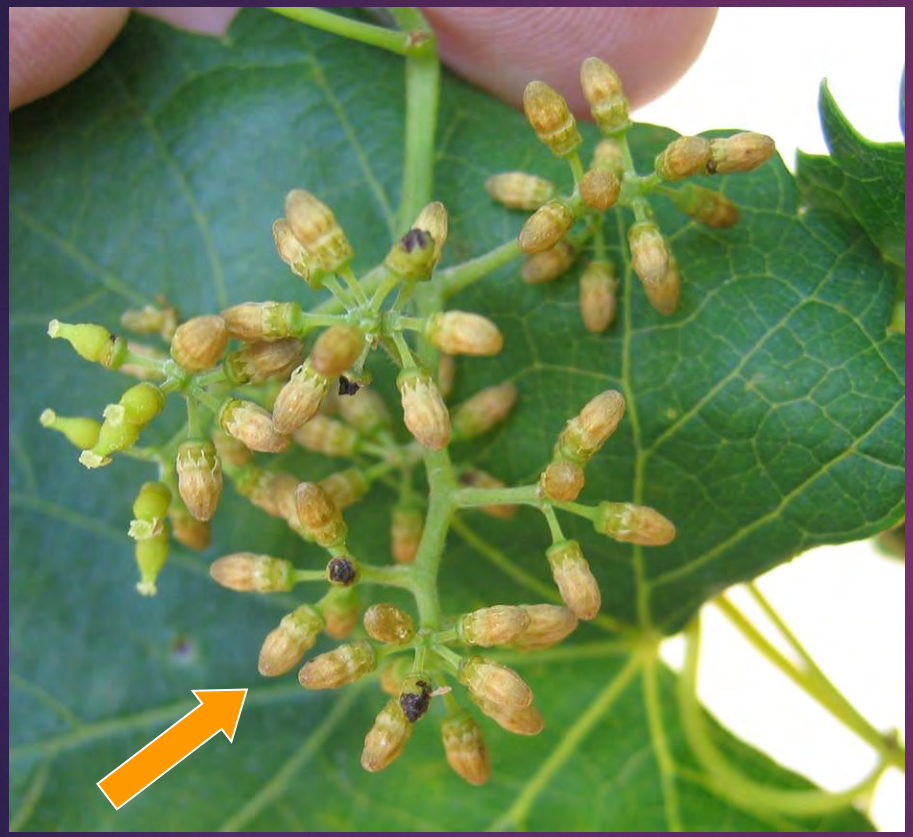
Perfect Female Male

Pollination may occur in self-fertile varieties before the cap comes off. This may alleviate pollination problems due to weather.

Flower at full bloom

Pictures from www-plb.ucdavis.edu

Flowering/Set



Dry Calyptra (cap) fails to come off, preventing pollination and fruit set on some flowers

Slide courtesy Bill Cline

Muscadines: Uses

- Wine
- Juice
- Fresh market

Stem Scar

Commercial Muscadine Cultivars

- Of the numerous muscadine grape varieties, only a few account for most of the commercial production acreage
- The leading variety, **Carlos**, represents most of the acreage in NC (>90%)
  - Carlos has excellent yield but breaks bud earliest, and therefore is at risk of damage from late spring cold events

Carlos

- Vigorous, productive, self-fertile
- Vines are high-yielding but may develop Pierce's disease, especially when roots are damaged
- 90% dry stem scar
- Uniform ripening, great for mechanical harvest
- Most useful for wine, juice
- Small berry(.5"), tough skin

Photo courtesy Bill Cline

Commercial Muscadine Cultivars

- The second most important winegrape is Noble
  - Noble is outstanding for its high yields, but is strictly a processing berry due to its small berry size, wet stem scar and deep wine color
  - Self fertile
  - 75% Dry Stem Scar

Fresh Market Varieties

The best fresh cultivars have:

- Large size
- Uniform color
- Unblemished skin
- Dry stem scar
- Acceptable yield
- Good flavor
- At least 15ºBrix
- Edible skin
- Holy Grail: **Seedless**

Slide courtesy Bill Cline

Cultivars vary widely in color, size and suitability for fresh market or wine production

Bronze
Pink
Red
Purple
Blue
Black
Near White

- Slide courtesy Bill Cline

Magnolia

- NC – USDA release 1954
- Can have uneven ripening
- Wet stem scar
- Self-fertile
- 15% Brix, wine/juice cultivar

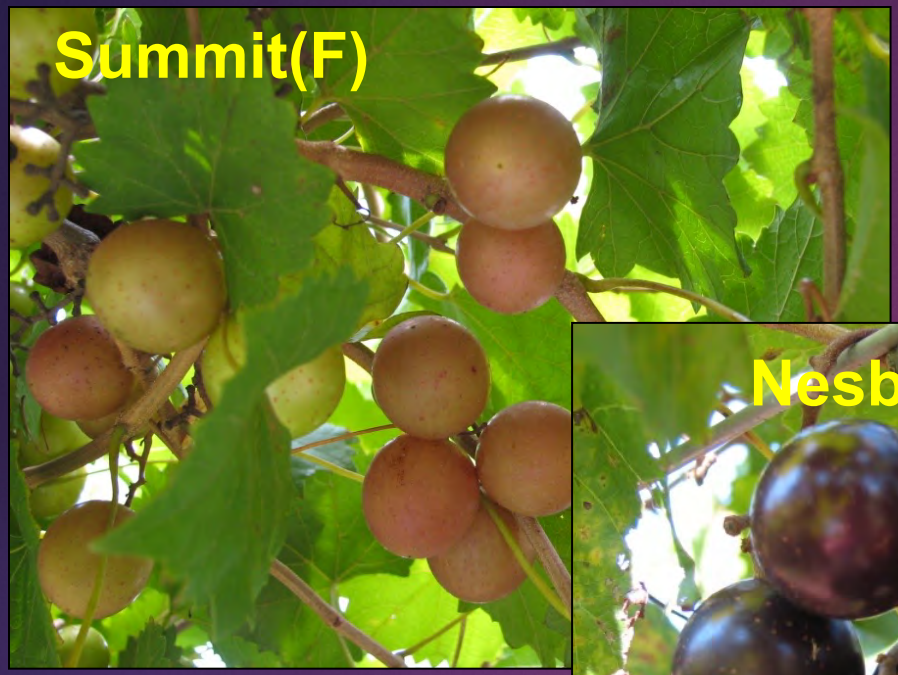
Photo: http://www.caes.uga.edu/commodities/fruits/muscadines/cultivars/magnolia/magnolia.html

Higgins – Old Variety

- UGA variety 1955
- Female
- LARGE
- Pink/bronze
- Not patented
- Wet stem scar
- 16% Brix

- http://www.caes.uga.edu/commodities/fruits/muscadines/cultivars/higgins/higgins.html

Fresh Variety Short List

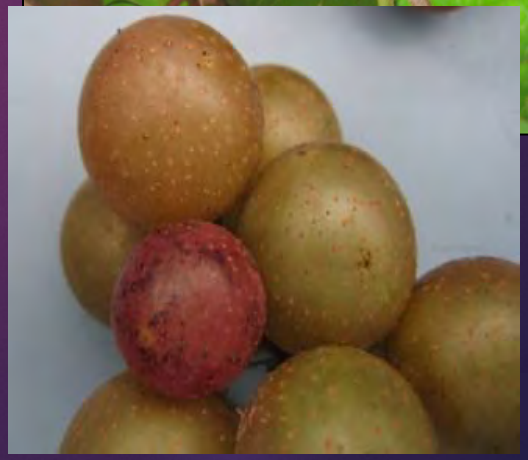


Proven Leading Cultivars in SE: Triumph

- Sister of ‘Summit’ but is self-fertile
- Early ripening, edible skin, few rots, 18% brix
- 78% dry stem scar, may fall from plant during U-pick
- Good production, vigorous
- Contains genes for crunchy pulp that are useful in developing cultivars like ‘Florida Fry’

Proven Leading Cultivars in SE: Summit

- Large, pink-bronze, female, 20% Brix
- Vines are vigorous and productive and produce fruit a year earlier than most other cultivars
- 84% dry stem scar and more uniform ripening than ‘Fry’
- Less susceptible to winter cold damage and ripe rot than ‘Fry’



Proven Leading Cultivars in SE: Nesbitt

- Large, black, self-fertile
- Good vigor, productive
- 80% Dry stem scar
- Excellent for fresh fruit use, 18% brix
- Ripens over a 3-week period
- Good for U-pick and home growers, but not suitable for mechanical harvest

Supreme

- Very large, female, black, 22% Brix
- Fresh market Mid season
- Wins in consumer preference tests
- Some vines died in years 2-4, probably due to over production. Thinning or removal of fruit is recommended in early years of production.

Newer Unpatented Cultivars: Tara

- Large, bronze, self-fertile
- Similar in size and quality to ‘Fry’
- Recommended for fresh fruit production, 17% Brix
- Excellent pollinizer

Proven Leading Cultivars in SE: Doreen

- "Football-shaped"
- Great vigor and productivity
- Main value is for wine or juice, but also flavorful fresh
- 60% dry stem scar,

  14% Brix
- Easy mechanical harvest

Proven Leading Cultivars in SE: Fry

- A favorite in fresh fruit taste panels, U-pick, and commercial fresh market
- Very large berries and excellent flavor
- Female, so requires a pollinator
- Subject to winter cold damage in NC (<15F)
- Wet stem scar
- Requires vigorous spraying with fungicides to control ripe rot

Proven Leading Cultivars in SE: Jumbo

- Large, black, female cultivar
- Vines are vigorous and productive, but fruit are astringent when under-ripe and have a strong undesirable flavor when overripe
- 32% dry stem scar, 15% Brix
- Will decline in popularity with release of self-fertile black cultivars

Scarlett(Summit x Triumph)

- Very large, self-fertile, red
- Fresh market, 17% Brix
- Good flavor and high percentage of dry stem scars
- Fresh buyers may perceive it as “over-ripe”

Granny Val

- Very large, self-fertile, bronze
- Fresh market, 18% Brix
- Good flavor and high percentage of dry stem scars
- May have a problem with a wet stem scar if picked slightly under-ripe
- Really late variety, so there may be weather issues around harvest

Lane (Supreme x Tara) UGA 2012

- Self-fertile
- Early season
- Firm Flesh
- Thin skin tends to split and tear at harvest

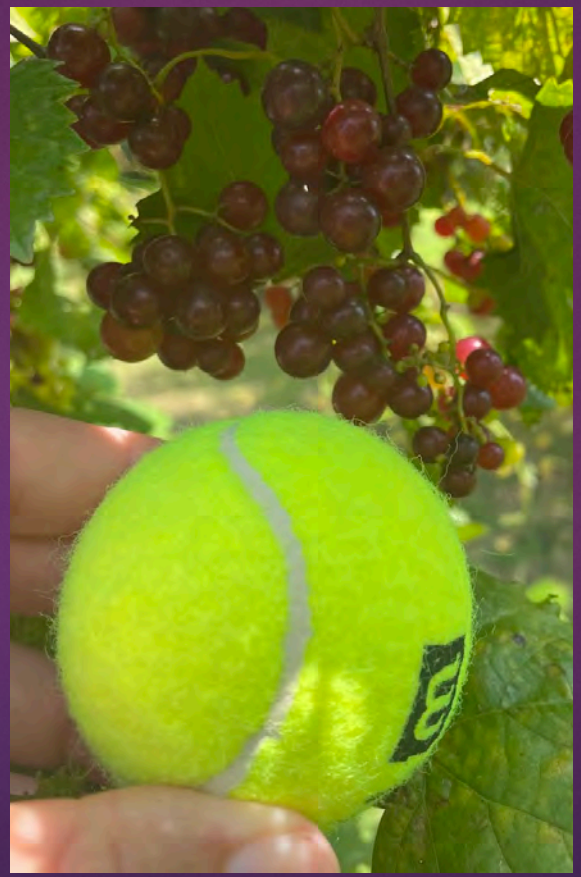
Paulk-UGA
Self-fertile, Excellent yield
released 2017(Supreme x Tara)

- Self fertile
- 85% Dry Scar
- Mid-Late Season

‘Paulk’ has long stems, helping to pick clean berries.

RAZZMATAZZ Patent Protected

Continual Fruiting
Seedless
Edible skin
Small berry
Self fertile
$$$$



Jeff Bloodworth

Oh! My!
Patent Protected

Bronze berry ¾ to 1”
Seedless
Edible Skin
Self fertile
Good Yield 40 lb/vine
Hardy Zone 7-10
$$$$

Jeff Bloodworth

Ruby Crisp(Supreme x Tara, 2019) UGA

- Self-fertile
- Excellent flavor
- Mid Season
- Tender skin, firm flesh
- Low muscadine aroma
- Excellent yield but tends to split at harvest

Ornamental Muscadines

- Southern Home (UFL, 1994) stands out for its usefulness as an ornamental
  - Interspecific *V. rotundifolia* and *V. vinifera* hybrid(Summit X UGA 19??
  - Self-fertile
  - Black berry of medium size, as many as 12 per cluster, and non-muscadine flavor, may be useful in home wine-making
  - Rapidly growing
  - Highly resistant to diseases
  - Known for fig-leaf shape, beautiful foliage color and growth

Hand Harvesting

- Fresh market muscadines have to be hand harvested, which will greatly increase labor costs.
  - A small amount of fresh production is harvested mechanically.

Slide courtesy Connie Fisk

- **Some cultivars like Black Beauty and Sugargate will split during rainy weather, attracting bees and creating a hazard for U-pick**

- Slide courtesy Bill Cline

Fertilization

Year 1

- ¼ pound 10-10-10 placed in a 18” circle around each vine 2 weeks after growth begins
- Repeat every 6 weeks up through the first week in July

Year 2

- ½ pound 10-10-10 placed in a 2-3’ circle around each vine starting mid-March
- Repeat every 6 weeks up through the first week of July

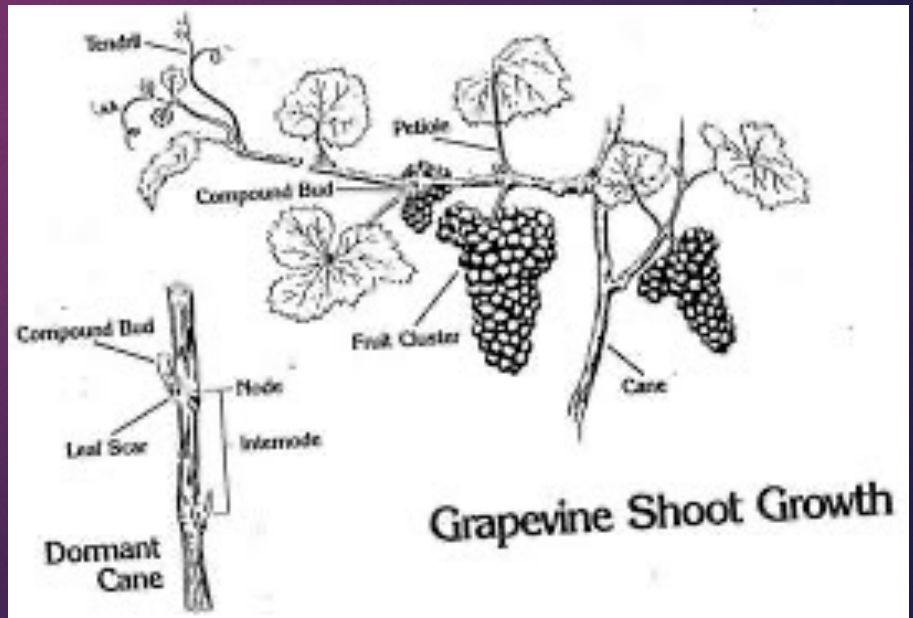
Year 3

- 1-2 pound 10-10-10 placed in a 60 ft^2 area around each vine in mid-March
- Repeat with 1lb in June

Don’t forget to soil test and tissue sample

- Dolomitic Lime will add 138 pounds of Magnesium/ton
- 2-4 ounces Magnesium Sulfate Late June
- Boron- 2 TBS Borax to each mature vine in area 20’x20’ Pre-bloom(May)

- Tissue Sample @ Bloom and 90 days later



DISEASES, PESTS and OTHER ISSUES

Black Rot

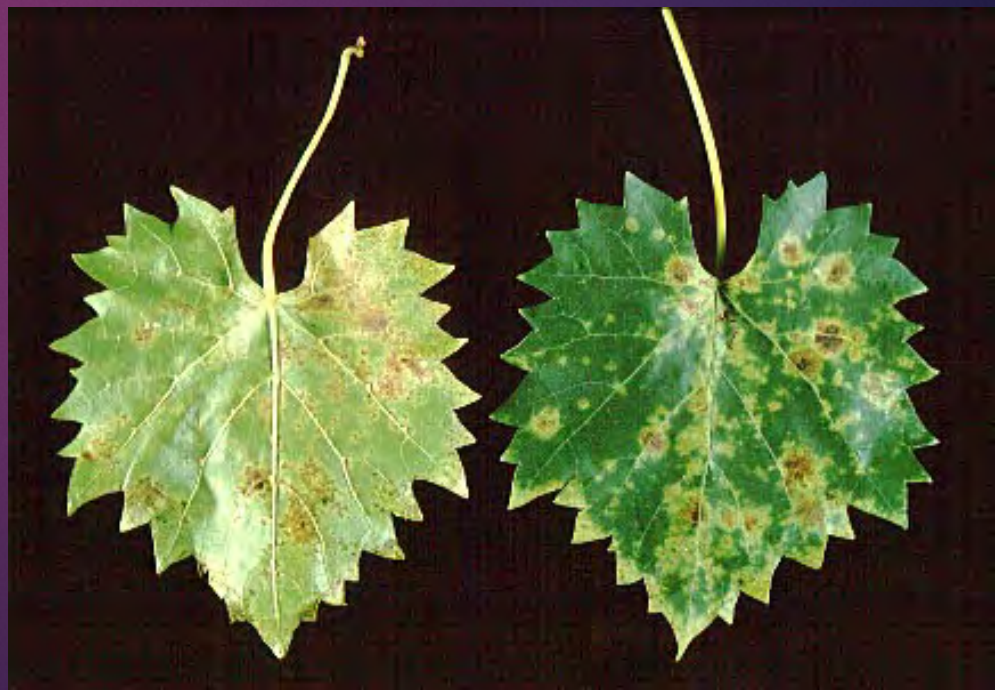
- Earliest leaf disease of the season
- Not a problem if spray program followed
- No organic control
- Initially reddish brown spots ¼ inch then turning brown
- Appears as dry, scabby, black spots on fruit

Powdery Mildew

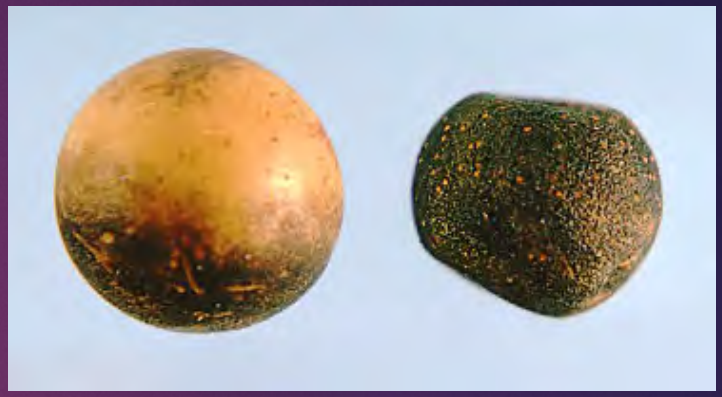
- Attacks young clusters and berries after flowering
- White fungus (appears as faint white powder)
- Causes scarring
- Russeting (rough skin) which may lead to cracking

Angular Leaf Spot

- First appear as faint, light yellow spots becoming dark brown surrounded by lighter halo
- As season progresses, if not controlled, can cause severe defoliation
- Infects only foliage



Bitter Rot



- Infection as early as bloom
- Fruit turns black with spores erupting through the skins
- Infects fruits, stems and leaves

Macrophoma Rot

- Small sunken lesions early in seasons
- Lesions become larger and "greasy" as fruit ripens
- May not be apparent until reaches soft rot stage
- Common with Carlos and Triumph

Ripe Rot

- Probably most important fruit rot
- Early infection occurs at bloom – latent
- Once fruit begin to ripen, spores spread infecting other berries (appears in hotspots)
- Bronze cultivars more susceptible
- Overwinters in mummified berries

Disease Control - Timing

- **Shoots 6 to 10 inches long**
  - Black rot
  - Angular leaf spot
  - Powdery mildew

- **Bloom**
  - Black rot
  - Bitter rot
  - Angular leaf spot
  - Powdery mildew
  - Fruit rots

Fungicides

- Be sure to follow spray guidelines
- Alternate mode of action
  - Do not make more than 2 sequential applications of strobilurin fungicides (Abound, Flint, Pristine)

Effectiveness of Fungicides

Chapter VI—2020 N.C. Agricultural Chemicals Manual

Relative Effectiveness of Various Fungicides for Muscadine Grape Disease Control

Table 6-7B. Relative Effectiveness of Various Fungicides for Muscadine Grape Disease Control

(— = ineffective or injurious; +++++ = very effective or very safe)

Fungicide	Angular Leafspot	Bitter Rot	Powdery Mildew	Ripe Rot	Macrophoma Rot	Black Rot	Plant Safety
azoxystrobin (Abound)	++++	+++	+++	++++	++++	++++	+++++
captan (Captan, Captec)	+++	+	++	+++	+++	+++	+++++
myclobutanil (Nova, Rally) 40 W	++	++	++++	–	+	++++	+++++
pyraclostrobin + boscalid (Pristine)	++++	+++	+++	++++	++++	++++	+++++
EBDCs (Manzate, Penncozeb, Dithane, others)	+++	+++	++	+++	+++	+++	++++
sulfur (various)	–	–	++++	–	–	–	+++
thiophanate-methyl (Topsin M)	+++	++	+++	–	+	+++	+++++
trifloxystrobin (Flint)	+++	+++	++++	++++	++++	++++	+++++

Source: 2020 NC Agriculture Chemical Manual

Pierce's Disease

- Not as much an issue with muscadines
  - Exceptions
    - Carlos
    - Pride

Diseases – Crowngall

- *Agrobacterium vitis (bacterium)*
- *Associated with freeze injury*
- *Fall planting increase winter injury*

Dead Arm Disease

- Fungal Infections thought to occur at pruning
- Discolored or dark tissue
- May be several pathogens
- *Botryoshaeria*

Photo credit Plant Health Progress

Insects

- Grape root borer
- Japanese beetle
- Stink bugs

Biology of Grape Root Borer

- From 15 June – early September:
  - Moth emergence (pupal skin)
  - Moth flight
  - Female moths release sex pheromone
  - Mating occurs in grape canopy
  - Eggs laid on underside of *Vitis* leaves
  - Larva enters soil and feeds inside vine root or trunk at or below ground level

- http://comp.uark.edu/~dtjohnso/Muscadine_PM_15_Jan_09.pdf

Grape Root Borer

Emerge late July-August

- Monitor with Pheromone traps
- Manage with Pheromone mating disruptors

Pupal casing at Soil line

100 per acre
or 1 per every
2 vines

Japanese Beetles

- Mainly an issue in young or low vigor vineyards
- Remember that pheromone traps **lure** Japanese Beetles **TO** the trap

Milky Spore
Neem oil, Spinosad

Carbaryl, bifenthrin, malathion

Brown Marmorated Stink Bug

- Externally, fruit may have multiple reddish dents at feeding sites, resembling hail strikes.
- Possible site for fungal infections
- Stink bug "taint" in processed products

Spotted Lanternfly

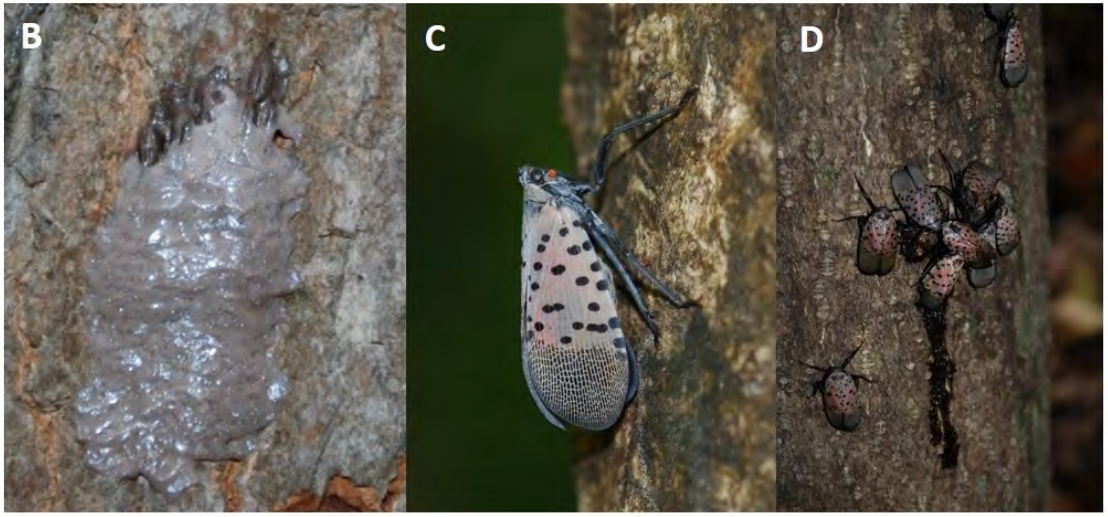


Photo courtesy: Lawrence Barringer, Pennsylvania Department of Agriculture

A. 1st-4th instar nymphs and adult female with wings spreadout
B. Egg masses in oothecae (egg cases) covered in a waxy deposit
C. Lateral view of a resting adult
D. Adult congregation on a tree trunk and plant sap oozing from damaged area

Chemical Weed Control

- Cautions
  - Follow the manual and the label recommendations
  - No 2,4-D applications in vicinity of vines
  - Cautious with glyphosate around green tissues particularly late summer and fall

Glyphosate

2,4-D

Chemical Weed Control Near Vineyards

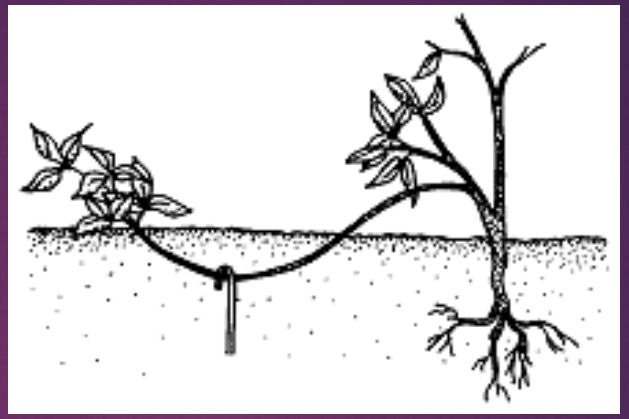
- Brush killers
  - **DO NOT USE** any brush killer formulations that include:
    - Triclopyr
    - 2,4-D
  - Commercial products
    - Brush-B-Gone
    - Brush Killer/Stump Killer

Chemical Weed Control Near Vineyards

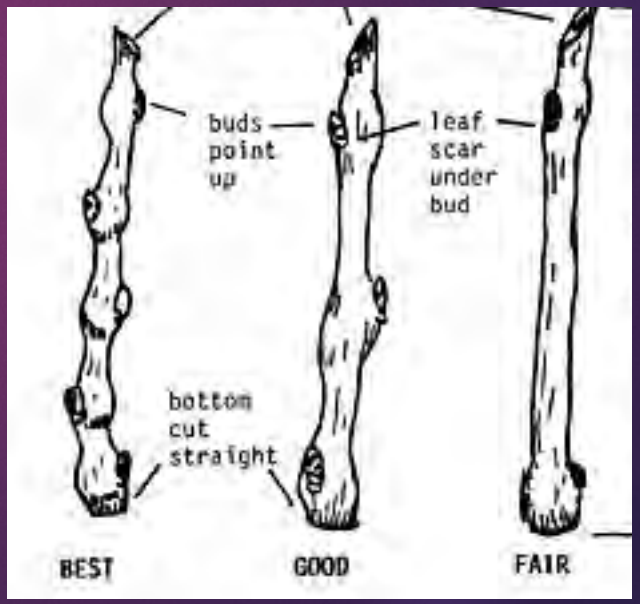
PRODUCT FACTS	
KILLS WEEDS	Including: [Blackberries, Black Cottonwood, Choke Cherry, Elderberry, Elm, Honeysuckle, Horsetail Rush, Kudzu, Maples, Mesquite, Oak, Persimmon, Poison Ivy, Poison Oak, Ragweeds, Raspberry, Red Alder, Sassafras, Sweet Gum, Trumpet Creeper, Virginia Creeper, Wild Grape, Wild Rose & Willows] [as listed] [any or all weeds listed]
WHERE TO USE	• Around homes, cabins & other buildings • Along fences & trails
AMOUNT TO USE	4 fl. oz. (1/2 cup) per gal of water [Makes [XX] gallons]
[Reentry icon]	Do not enter or allow people or pets to enter treated areas until spray has dried.
[phone icon] Questions, Comments or Medical Information Call 1-800-225-2883 www.ortho.com	

Propogation

- Layering-
- (Late June/July)

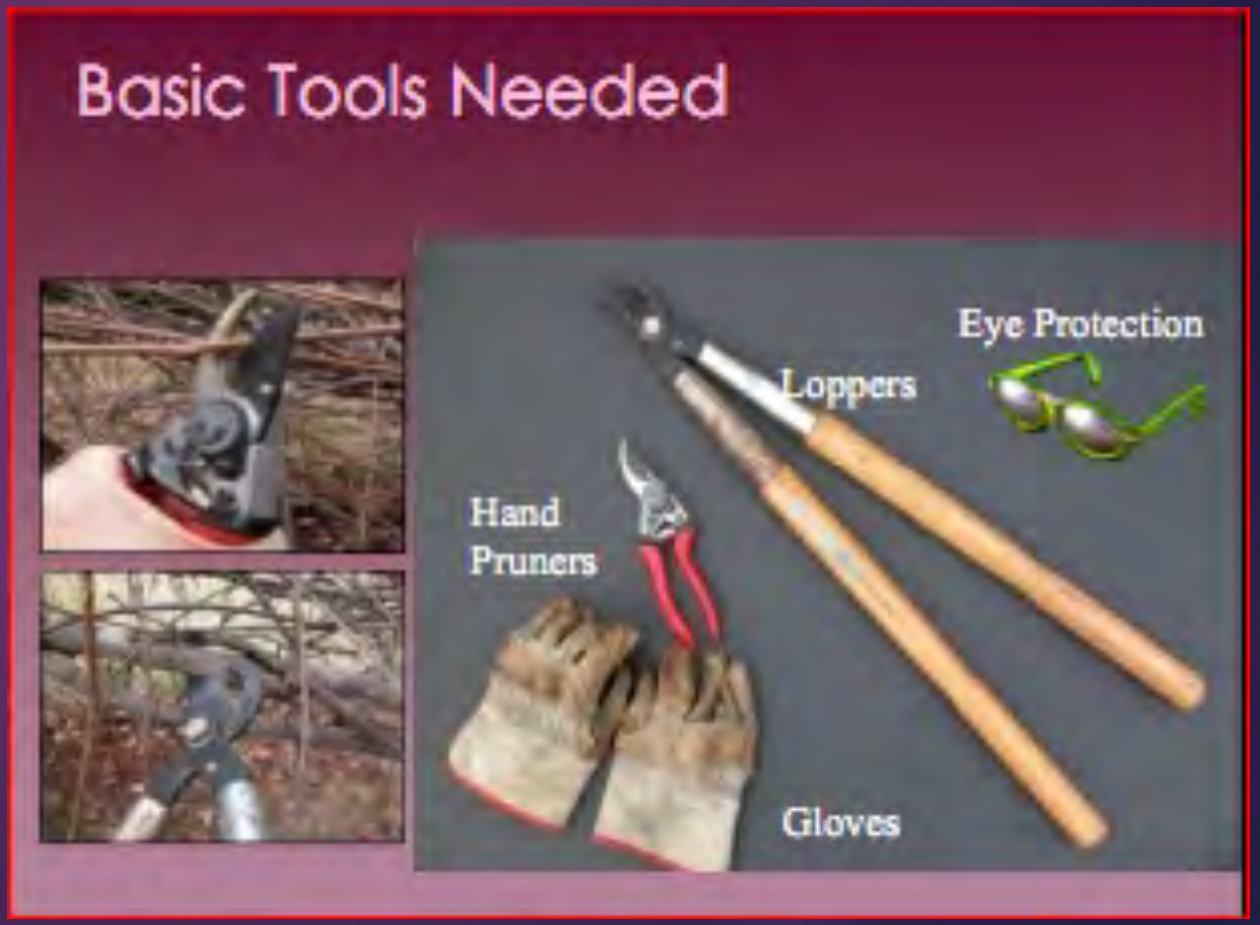


- Softwood Cutting
- (right after bloom)
- 6” cutting with at least 4 buds



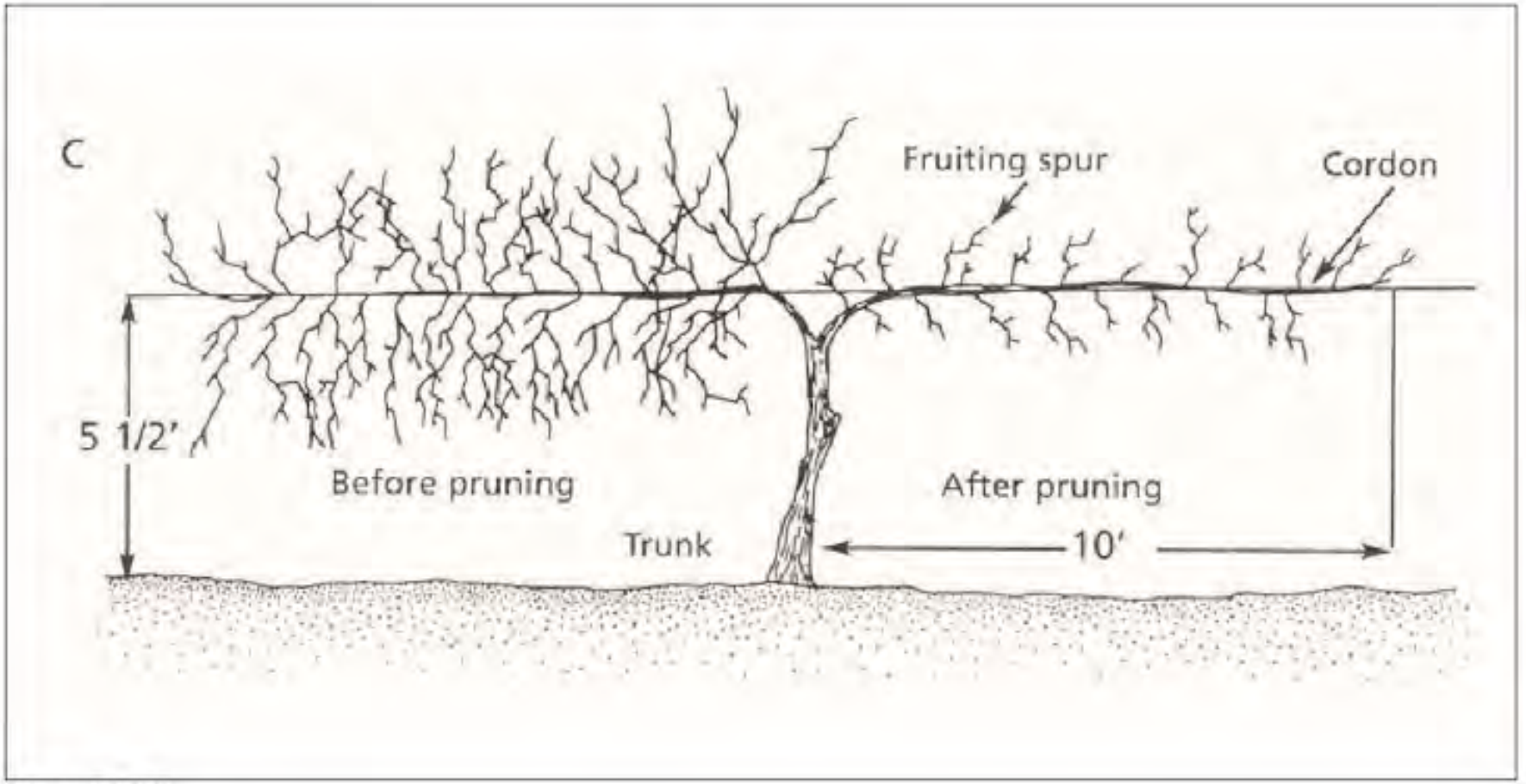
Pruning

- Tools
  - Good pair of pruning shears
  - Loppers
  - Hedger
  - Gloves
  - Eye protection



Why prune?

- Manage crop level
- Reduce crowding
- Remove diseased wood
- Generate next Years wood
- Force fruiting zone



Poling et al. (2016)

Pruning

- Fruiting habit
  - Fruit is borne on current season's growth arising from 1-year-old (last year's) wood
- Best wood has diameter of a number two pencil
- Smaller wood is weak
- Larger wood is more likely to have lower bud fertility and will be more vegetative
- **Think #2 Pencil**

Pruning

- Timing – as late in the season as possible (January-February)
- Leave Carlos for last
- Even if vines are bleeding when pruning will not harm

Bud forms in leaf axil

Growing season

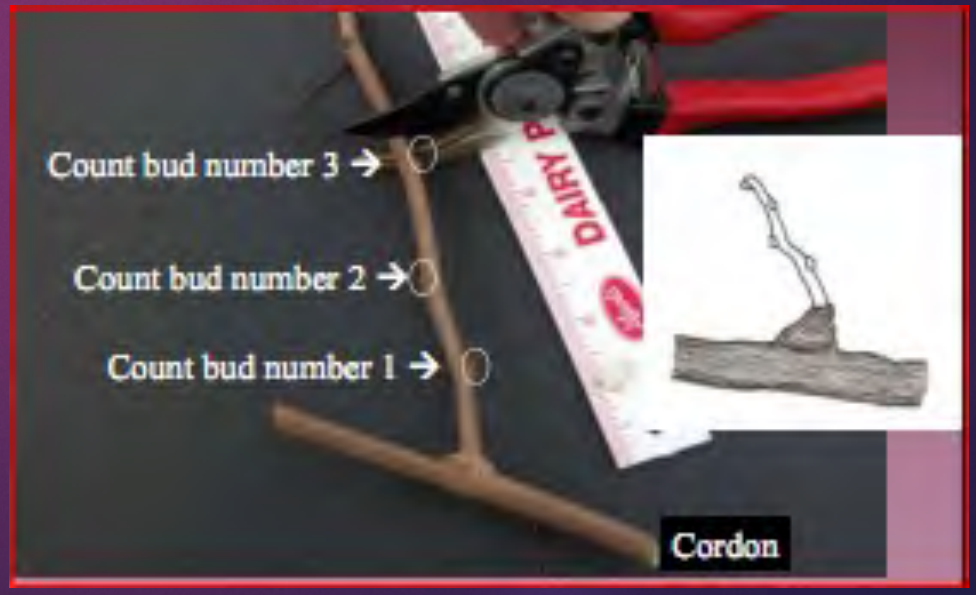
Dormant season

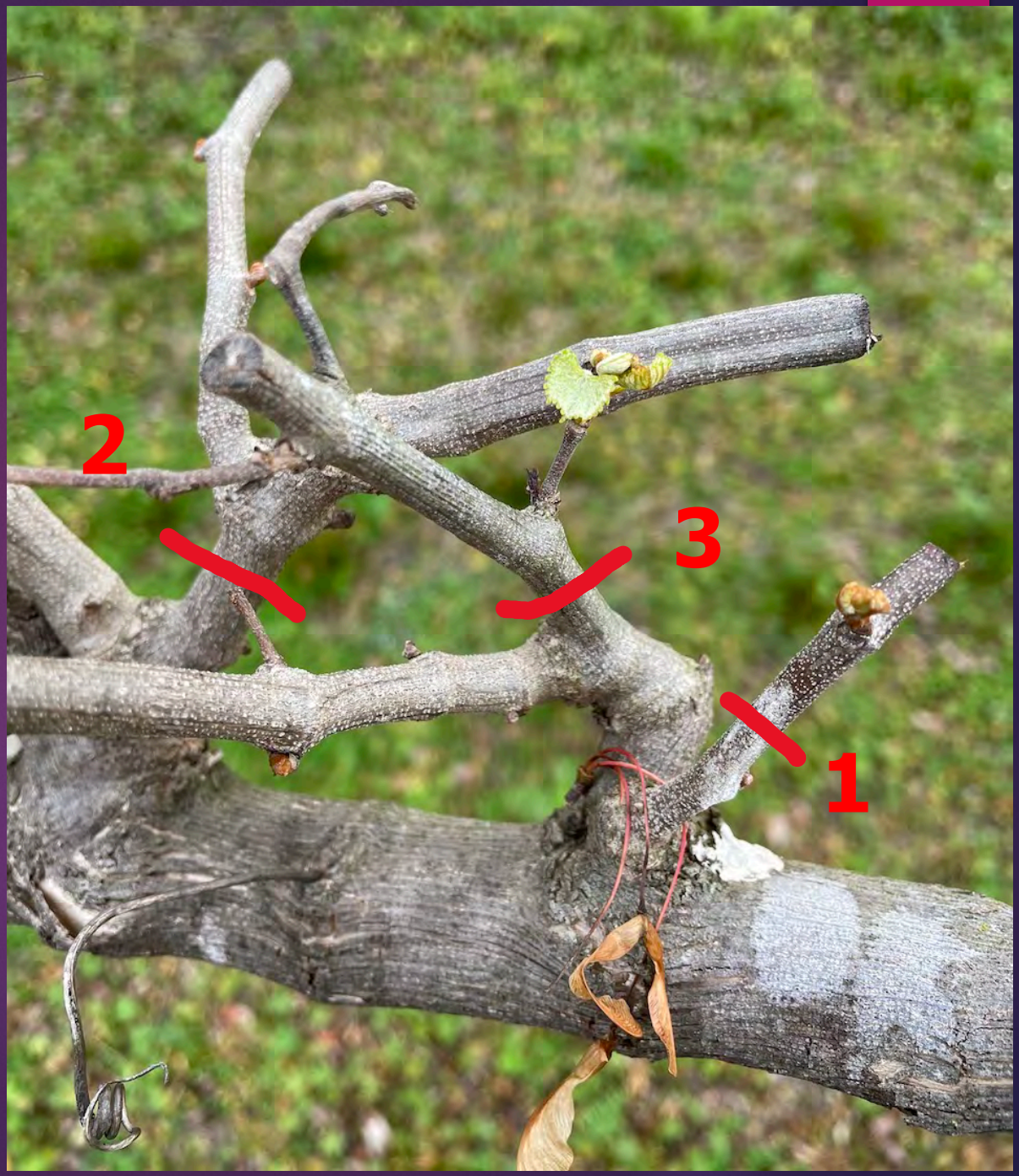
1-Year Old Vines

- Prune to 1-bud spurs

2nd Year

- Leave a 4” spur
- every 4 to 6 inches




2
3
1

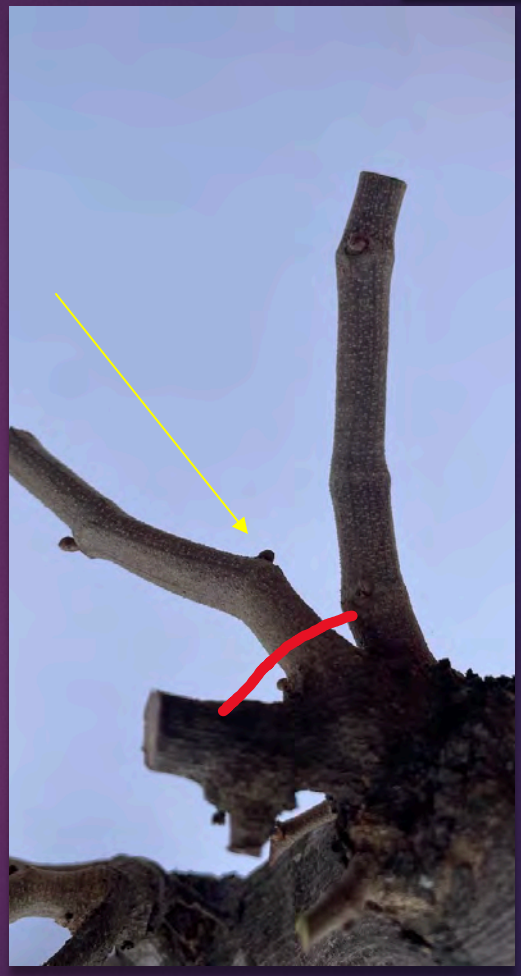
Spurs 6” apart

Damaged cordon

- BEFORE

AFTER

Thinning spurs & Showing buds



Hedge pruning

Rejuvenating vines

February

Questions???

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