Grow Your Own Muscadines

North Carolina Muscadine Grape Association
Muscadine Grapes
Nutritional Superstars

The health benefits of muscadines offer priceless value to the body. Rewards are derived from eating part of, or even better, the whole grape. Why?

Resveratrol, a potent cancer-fighting substance, is found in the skin, pulp and only a muscadine grape has it within the seed.

Muscadines are among the richest sources of antioxidants found in nature.

It's believed that the assortment of antioxidants found in muscadine grapes and seeds slow the effects of aging and possibly extend life.

Free radicals, which start chain reactions that damage cells, are terminated by the antioxidants in muscadines.

Ellagic acid and resveratrol, the main antioxidants in muscadines, play a key role in preventing heart disease and high cholesterol and assist in treating ailments like arthritis, topical burns and the flu.

Please visit www.ncmuscadine.org.
You can also call 919 733 7887 x236.

Look for North Carolina muscadines at your grocery and at local farms.
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 \textit{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 \textit{V. vinifera} and \textit{V. rotundifolia} (muscadines) to have comparable winter hardiness levels, and in Arkansas it is recommended that \textit{vinifera} should be planted in regions where winter temperatures \textit{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 \textit{vinifera} because of
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.
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.
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

Good vigor

Weak vigor

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
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.
Pollination may occur in self-fertile varieties before the cap comes off. This may alleviate pollination problems due to weather.
Dry Calyptra (cap) fails to come off, preventing pollination and fruit set on some flowers.

Female

Self-fertile

Slide courtesy Bill Cline
Muscadines: Uses

- Wine
- Juice
- Fresh market
Stem Scar

Dry

Tear

Split
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
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

Summit (F)

Supreme (F)

Nesbitt (SF)

Tara (SF)

Triumph (SF)
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-UG A
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.
Continual Fruiting Seedless Edible skin Small berry Self fertile $$$$$
Oh! My!
Patent Protected

Bronze berry  \(\frac{3}{4}\) 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.
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 ft² 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
- Russetting (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

Source: 2020 NC Agriculture Chemical Manual

### Relative Effectiveness of Various Fungicides for Muscadine Grape Disease Control

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

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Angular Leafspot</th>
<th>Bitter Rot</th>
<th>Powdery Mildew</th>
<th>Ripe Rot</th>
<th>Macrophoma Rot</th>
<th>Black Rot</th>
<th>Plant Safety</th>
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<tbody>
<tr>
<td>azoxystrobin (Abound)</td>
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<td>captan (Captan, Captec)</td>
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<td>myclobutanil (Nova, Rally) 40 W</td>
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<td>pyraclostrobin + boscalid (Pristine)</td>
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<td>EBDCs (Manzate, Penncozeb, Dithane, others)</td>
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<td>sulfur (various)</td>
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<td>thiophanate-methyl (Topsin M)</td>
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<tr>
<td>trifloxystrobin (Flint)</td>
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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](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

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

A. 1st-4th instar nymphs and adult female with wings spread out
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

Photo courtesy: Lawrence Barringer, Pennsylvania Department of Agriculture
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

<table>
<thead>
<tr>
<th>PRODUCT FACTS</th>
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<tbody>
<tr>
<td>KILLS WEEDS</td>
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</table>
| 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
Propagation

- **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
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
Spurs 6” apart

Damaged cordon
Thinning spurs & Showing buds
Hedge pruning

Rejuvenating vines

February
Questions???
Mack Johnson
Horticulture Agent
mack_johnson@ncsu.edu
910-671-3276