

ADVANCES IN MUSCADINE BREEDING EFFORTS AT THE UNIVERSITY OF GEORGIA.



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THE UNIVERSITY OF GEORGIA
COLLEGE OF AGRICULTURAL &
ENVIRONMENTAL SCIENCES

Vitis rotundifolia

- *Muscadinia*

- *V. rotundifolia*
- *V. musoniana*
- *V. popenoi*
- 40 chromosomes

- *Euvitis*

- *V. vinifera* – wine grapes
- *V. labrusca* – concord grapes
- 38 chromosomes



Native Muscadines

- Found growing wild throughout the Southeast.
- Excellent regional adaptation.
- Muscadine was the first domesticated American grape.



First Cultivars - Wild selections

Female vines

- 'Scuppernong'
- 'Thomas'
- 'Flowers'
- 'Mish'
- 'James'
- 'Memory'

Male vines

- 'White Male #1'
- 'Black Male'

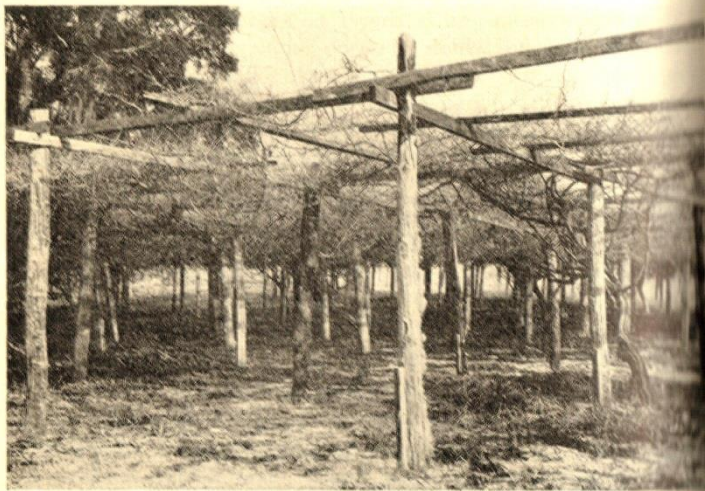


Fig. 9.—Scuppernong vines trained on an overhead arbor.

'Scuppernong' was the dominant cultivar from 1750-1947.

Several different 'Scuppernong' cultivars likely exist.

History of the UGA muscadine program

First era: 1909-1938

H.P. Stuckey and J.G. Woodroof

- 3 female vines and 2 male vines used as parents.
- 13 cultivars released (1917-1938).
- 'Hunt', 'Dulcet', 'Yuga', 'Creek' most important cultivars.
- Selected for yield, sweet tender pulp, and non-shattering berries. Often cluster picked.



History of the UGA muscadine program

Second era: 1951-1968

B.O. Fry

'Fry', 'Cowart', 'Higgins', 'Jumbo'

- Selected for large size, bronze color, high soluble solids.
- 'Higgins' created – source of large size in most muscadine cultivars.
- Lower vine vigor and increased susceptibility to fruit rots.

'Higgins' - 1955



'Fry' muscadine

'Fry' most important fresh use cultivar developed,
9.3 g / berry.

Bronze

Large Size

High soluble solids

Good green flavor

Fruit rot susceptible

Female



'Fry' - 1971

Perfect flowered cultivars developed.



Male



Perfect



Female

'Cowart', first perfect flowered cultivar with good fruit quality released.



History of the UGA muscadine program

Third era: 1969-1996

R.P. Lane

- Wanted large size of 'Fry' combined with perfect flowers.
- 'Triumph' – bronze perfect flowered.
- 'Summitt' – female with higher productivity than 'Fry'.
- 'Tara' – large size with perfect flowers.
- 'Scarlett' – new pink color.
- 'Golden Isles' – juice grape with less pronounced muscadine taste

Most of these cultivars feature 'Fry' heavily in their pedigree.



Creating the perfect muscadine.



Muscadine Breeding Techniques



Muscadine seedlings have vigorous growth.



Flowering begins in
2nd year.

Turnover seedling
vineyard in 3-4
years.







- Yield trials take place on UGA farms and with a local grower.
- Observational trials take place at several grower vineyards and at cooperative universities.



Desirable Traits for a New Muscadine Cultivar

1. Good flavor: flesh and skin.

Ideally will have good flavor even when picked before fully ripe. Skin should break up when chewed and lack bitter and sour flavors.



Desirable Traits for a New Muscadine Cultivar

2. Self-fertile flowers

Yield of female vines reduced due to “capstick”, smaller cluster size, lack of pollination.



Current Goals of the Program

- Very large berry size with perfect flowers.
 - Need to replace all female cultivars.

Avg. % full crop 2004-2008

- | | |
|------------------------|--------------------------|
| • Pistillate cultivars | • Self-fertile cultivars |
| – Fry – 70 | – Alachua - 100 |
| – Supreme – 90 | – Cowart – 90 |
| – Sweet Jenny – 50 | – Nesbitt – 100 |
| – Pam – 60 | – Pollyanna – 80 |
| – Scarlett – 30 | – Tara – 90 |
| – Darlene - 40 | – Triumph - 100 |

Desirable Traits for a New Muscadine Cultivar

3. Large berry size

- Self-fertile cultivars are usually smaller than female cultivars, but more consistent in size.
- Minimum = 10-11 grams, 1 inch diameter



'Supreme'

14.7 g

Ga. 5-1-38

13.9 g

Desirable Traits for a New Muscadine Cultivar

4. Dry stem scars and firm flesh.

Torn and split berries are often juiced rather than packed. Often juice up to 1/3 of cultivars with wet scars.

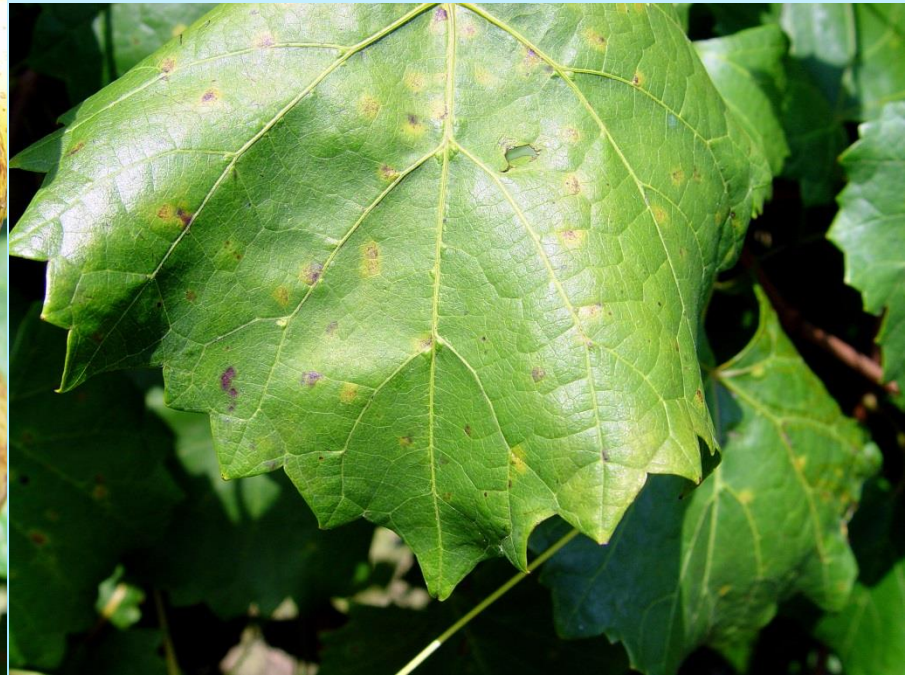


Split scar

Desirable Traits for a New Muscadine Cultivar

5. Vigorous, disease resistant vines.

Much easier in purple varieties.



Short-range goals of the program

- Very large berry size with perfect flowers.
 - Bronze and black color.
 - Early, mid, and late-season harvest.
 - Two cultivars for each category.



Lane
13.9g

Ga. 6-2-26
15.0g

Supreme
14.7g

Short-range goals of the program

- Red berry color.
 - Flavor also seems to vary.
 - Requires shelf space in market.

HPLC analysis

Low total anthocyanins (400 ug/g)

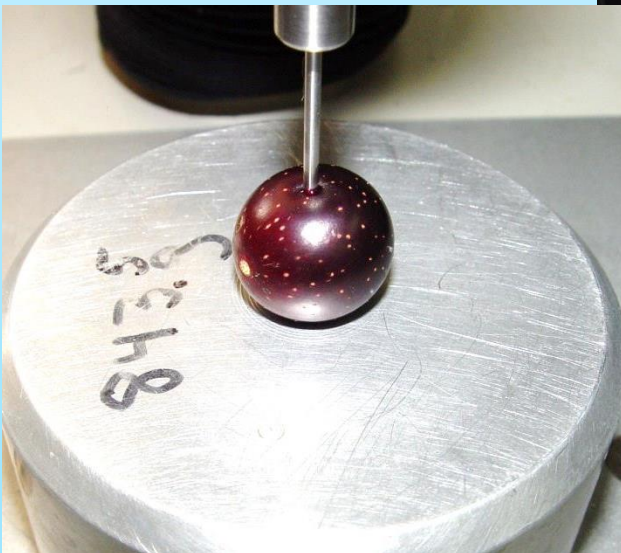
High % Cyanidin (60%)

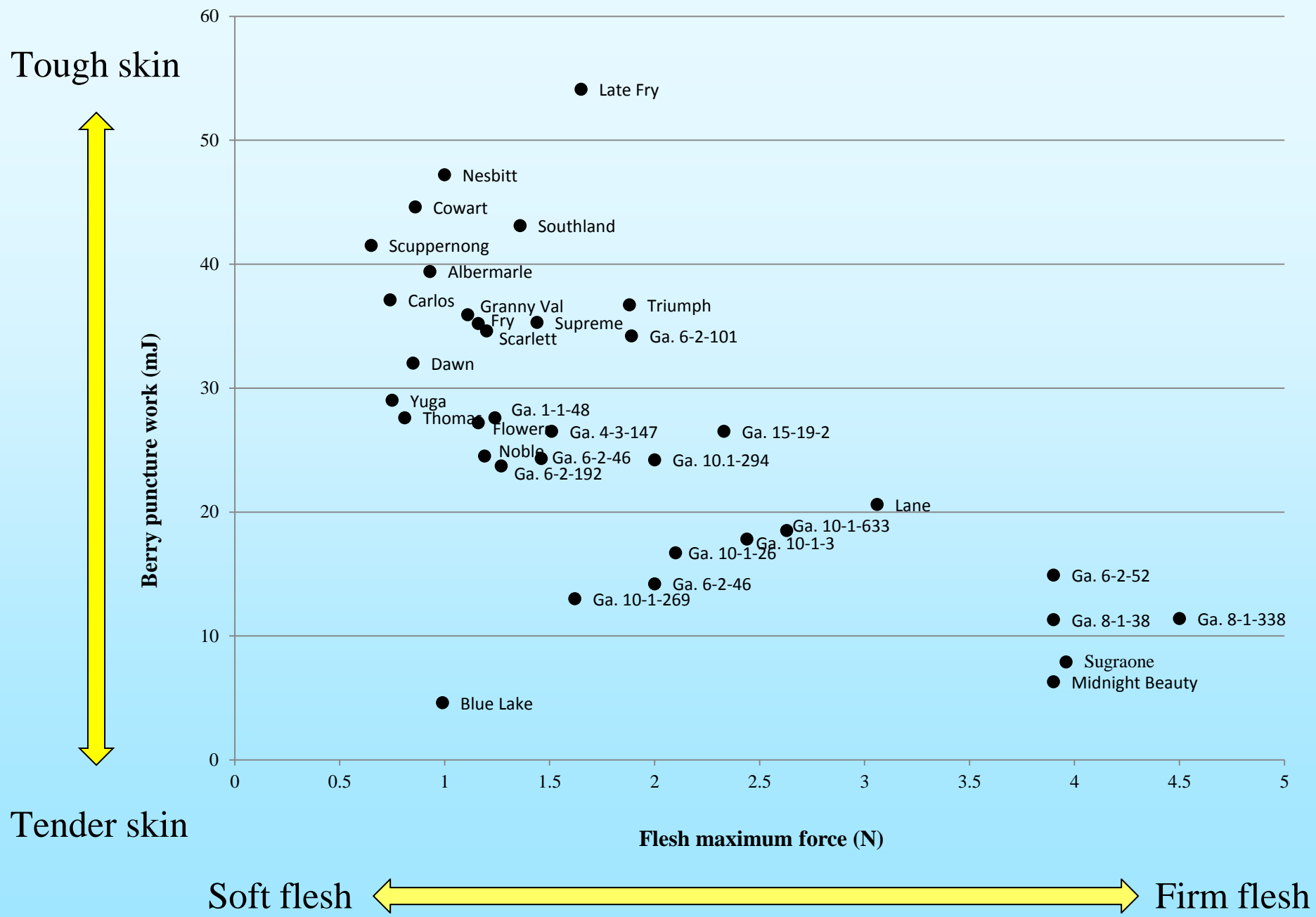
Low % Delphinidin (20%)



Mid-range goals of the program

- Improved fruit texture
 - Firm crisp flesh.
 - Friable skin.





Long-range goals of the program

Euvitis × *Muscadinia* hybrids

– Expanding the germplasm

Possible traits from *Euvitis*

- **Seedless berries**
- Stable juice color
- Pigmented flesh
- Improved berry flesh
- New flavors
- Larger clusters



Where we are now.

- Crosses between bridge hybrids and several seedless *Euvitis* clones starting in 2011.
- We have flowering and self-fertile flowers, potential seedless selections being crossed to female muscadines next year.



New UGA Muscadine Cultivars

‘Lane’ and ‘Hall’ are harvestable last week of July in Tifton, at the beginning of the harvest season.

Cultivar	Avg. day of first harvest (day of year) ^z	Percent of total yield of first harvest	Percent soluble solids of first harvest
Fry	Aug. 14	74	14.9
Hall	July 30	66	15.7
Lane	Aug. 1	72	16.0
Supreme	Aug. 12	59	14.8
Tara	July 30	51	14.6
Triumph	Aug. 5	52	16.1

New UGA Muscadine Cultivars

‘Lane’ and ‘Hall’ have similar size to other self-fertile cultivars and ‘Lane’ has particularly good sugar content.

Cultivar	Flower type	Berry color	Berry weight (g)	Berry diameter (mm)	Percent soluble solids of all harvests
Fry	F	Bronze	11.9	27.2	14.6
Hall	SF	Bronze	10.6	26.2	14.5
Lane	SF	Black	10.1	25.9	16.3
Supreme	F	Black	15.2	29.5	14.6
Tara	SF	Bronze	10.3	25.7	12.7
Triumph	SF	Bronze	9.4	25.1	15.5

‘Lane’ muscadine

‘Lane’ has moderate yields and can split at the stem scar. We currently recommend planting ‘Lane’ for early season black production and transitioning into ‘Supreme’ for main season black production.



‘Hall’ muscadine

‘Hall’ has good yields with very low stem scar split and tear.

‘Hall’ berries are similar to ‘Tara’ with a better flavor and higher brix.



‘Hall’ muscadine

‘Hall’ is more yellow in color than many other bronze cultivars.

‘Hall’ should be sprayed and picked promptly to minimize ripe rot infection. ‘Hall’ is recommended as a replacement for ‘Tara’ and as an early season, self-fertile bronze cultivar.



Coming Attractions : Ga 6-2-26

- Self-fertile flowers with a size similar to female cultivars.
- Main-season self-fertile replacement for 'Supreme'.
- Excellent storage ability.
- Excellent picking scar.





Questions?