

Muscadine Grape Breeding at the University of Arkansas

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UA Fruit Breeding Program History

- Established in 1964 by Arkansas native Dr. Jim Moore
- Programs for many crops
 - Apples
 - Blueberries
 - Strawberries
 - **Peaches**
 - **Grapes**
 - **Blackberries**
- John Clark took over program leadership in 1997
- **Muscadine breeding program established in 2006**



Exciting Times for the Future at Arkansas

- I joined the department in August, 2016
- Assumed peach breeding, molecular duties, co-lead muscadine grape breeding
- John Clark continues to lead the blackberry, grape, and blueberry programs
- Great opportunity and foresight by the UA Division of Agriculture and Horticulture Department



UA Table Grape Breeding



- Goals:
 - Combine flavor and adaptation with improved texture in seedless grapes
 - Build an Eastern table grape industry
- Hard to compete with California on table grape production
- Products are successful, but mostly in California...
- There's already an Eastern table grape... *The fabulous muscadine!*



Lessons Learned from Table Grape Breeding

- “Cotton Candy” grape has very fruity flavor and CA table grape texture
 - Flavor comes from an Arkansas table grape parent!
- How is it really different than other full-flavored grapes?
 - Thin skins
 - Crisp
 - No seeds
- ‘Feels’ like other CA table grapes but comes with a fruity flavor
- **Folks love full flavor can be turned off by new textures**



How to improve muscadines and expand the market?

- Make them *easier to eat*
- *Extend* the marketing season
- Broaden *where they are grown*
- Broaden *where they are marketed*
- Get the word out *better* about them



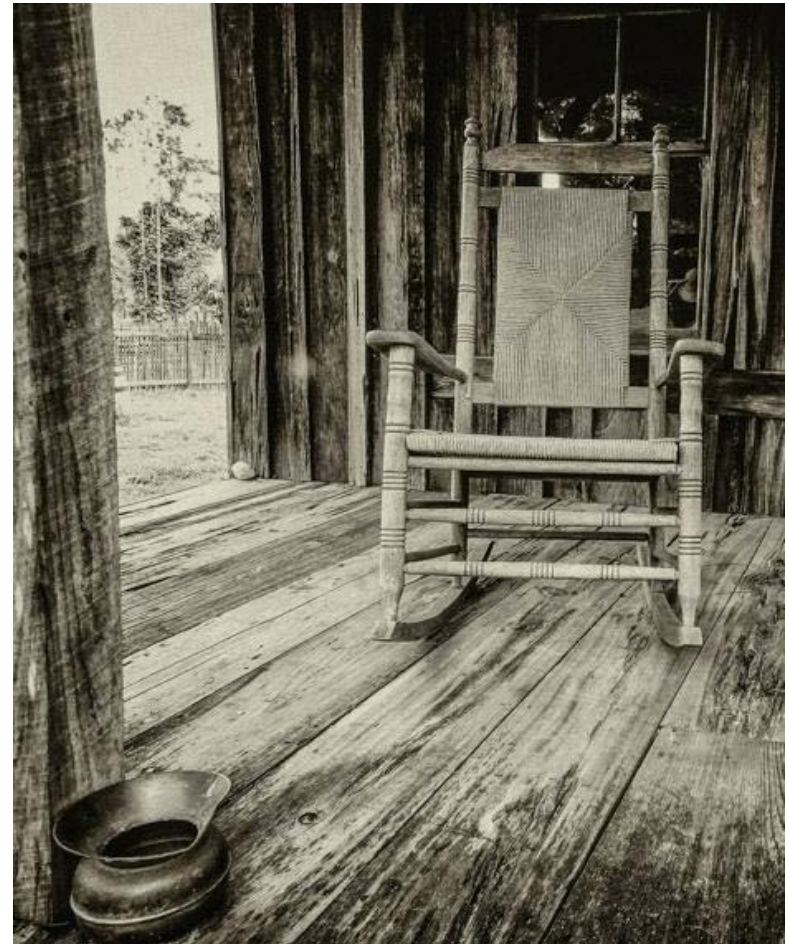
UA Muscadine Breeding

- Ongoing since 2007
- Over 15,000 seedlings planted
- 231 selections made
- A group of advanced selections moving along
- Emphasis on improving consumer quality while retaining adaptation and disease resistance



Making Muscadines an 'Inside' Fruit

- Currently requires a lot of spitting. Fun, but not very sophisticated...
- **Skin** must be edible
 - Already major improvements on the market (Supreme vs. Jumbo)
 - Even better stuff in the pipeline
 - Thinner skins help, but there's more to it...
 - Do analytical measurements correlate with mouthfeel?



Making Muscadines an 'Inside' Fruit

- **Flesh texture** and skin adherence also key to consumer experience
- Flesh texture described as
 - oyster
 - snot
 - eyeball
- But newer cultivars and selections have crisper, firmer flesh, non-slipskin texture



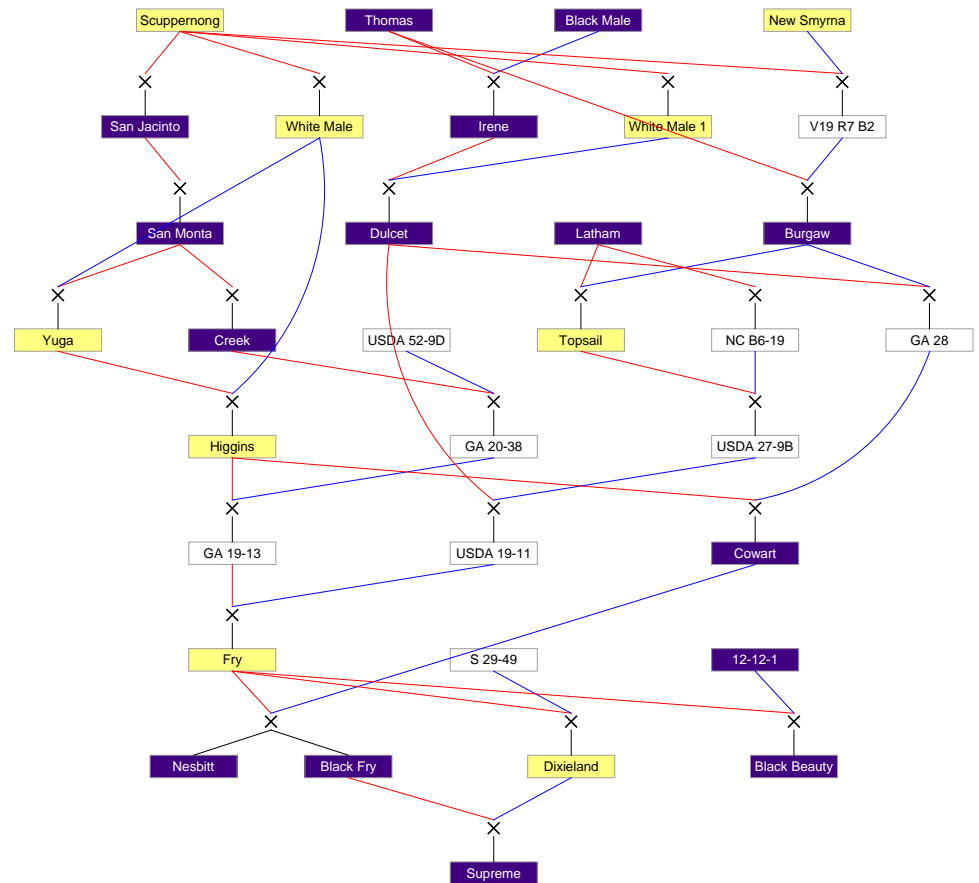
Making Muscadines an 'Inside' Fruit

- Muscadine seeds are large and very bitter
 - More spitting...
- Seedlessness has been achieved!!
 - Jeff Bloodworth and Gardens Alive!
 - Persistence pays off in this case
 - UA has breeding agreement & began crossing with Bloodworth material in 2017
 - First seedless progeny expected to fruit in 2020



Seedless Muscadines at U. Arkansas!

- Other exciting traits within seedless hybrids!
 - Colors
 - Textures
 - Flavors
 - Much needed **DIVERSITY**

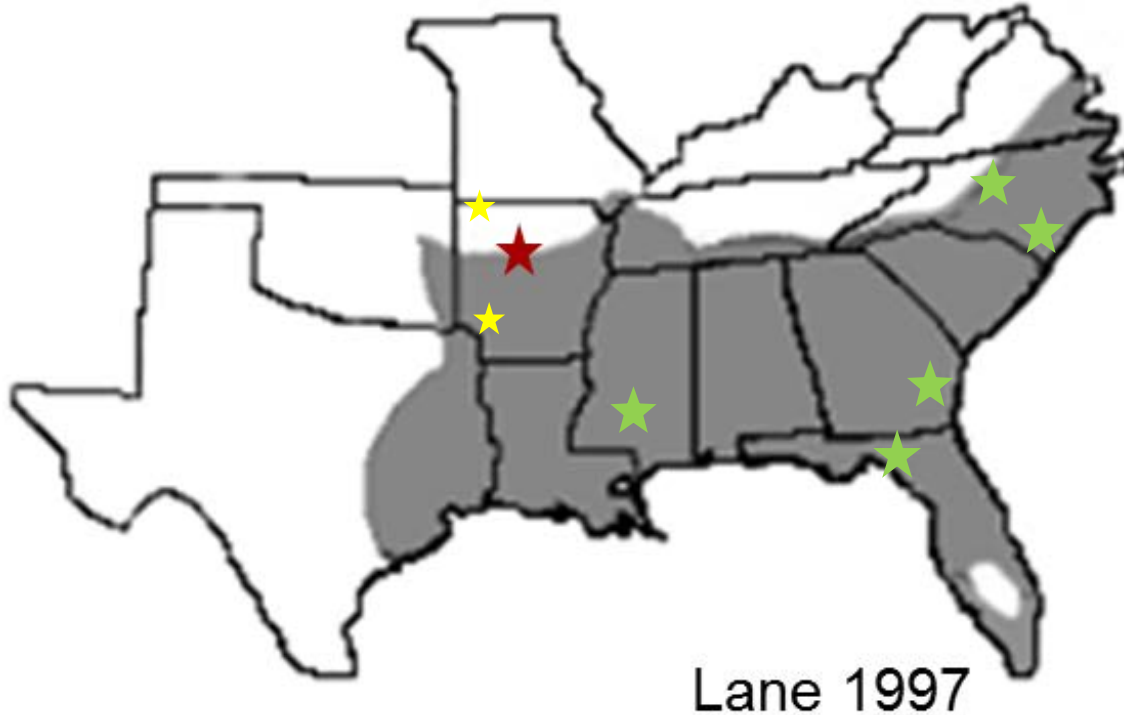


Flavor is a Strength!

- Arkansas table grapes with foxy and muscat flavor profiles have been great parents
- Market open to new flavors beyond neutral
- Distinctive muscadine flavor may be a hit if combined with a better texture
- Variation exists – new selections seen with ‘rose’, ‘pineapple’, ‘coconut’ flavors



Breeding for Cold Tolerance



UA Fruit Research Station is an excellent selection environment for cold hardiness



Breeding for Cold Tolerance



- Buds supercool to same level as bunch grapes
- Cold susceptibility due to vascular damage



Winter Injury Rating Scale



Ratings made on:
May 18-23rd 2018



Winter Injury in Selections



Supreme



Nesbitt



Black Beauty



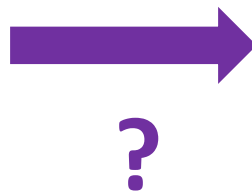
Carlos



Implications for Productivity



Fruit and Leaf Shape!



Season Extension

(photo taken Sept 10, 2018)



AM-77



Doreen



Dry Picking Scar

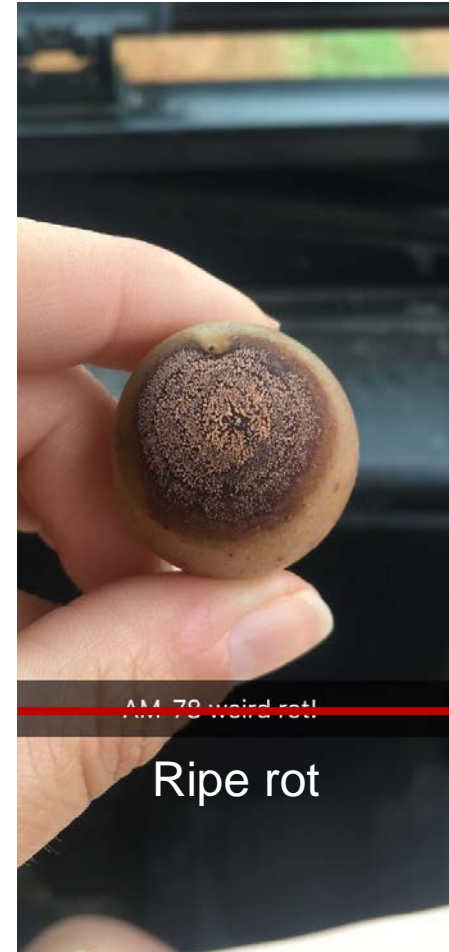


Cluster Harvest



Disease Resistance

Black rot on lvs and fruit



Processing Cultivars

- Productivity
- Consistent ripening
- Dry scar
- Stable color
- Cold hardiness
- Disease resistance
- Must make and evaluate **PRODUCTS**
 - Juice and wine



AM-77

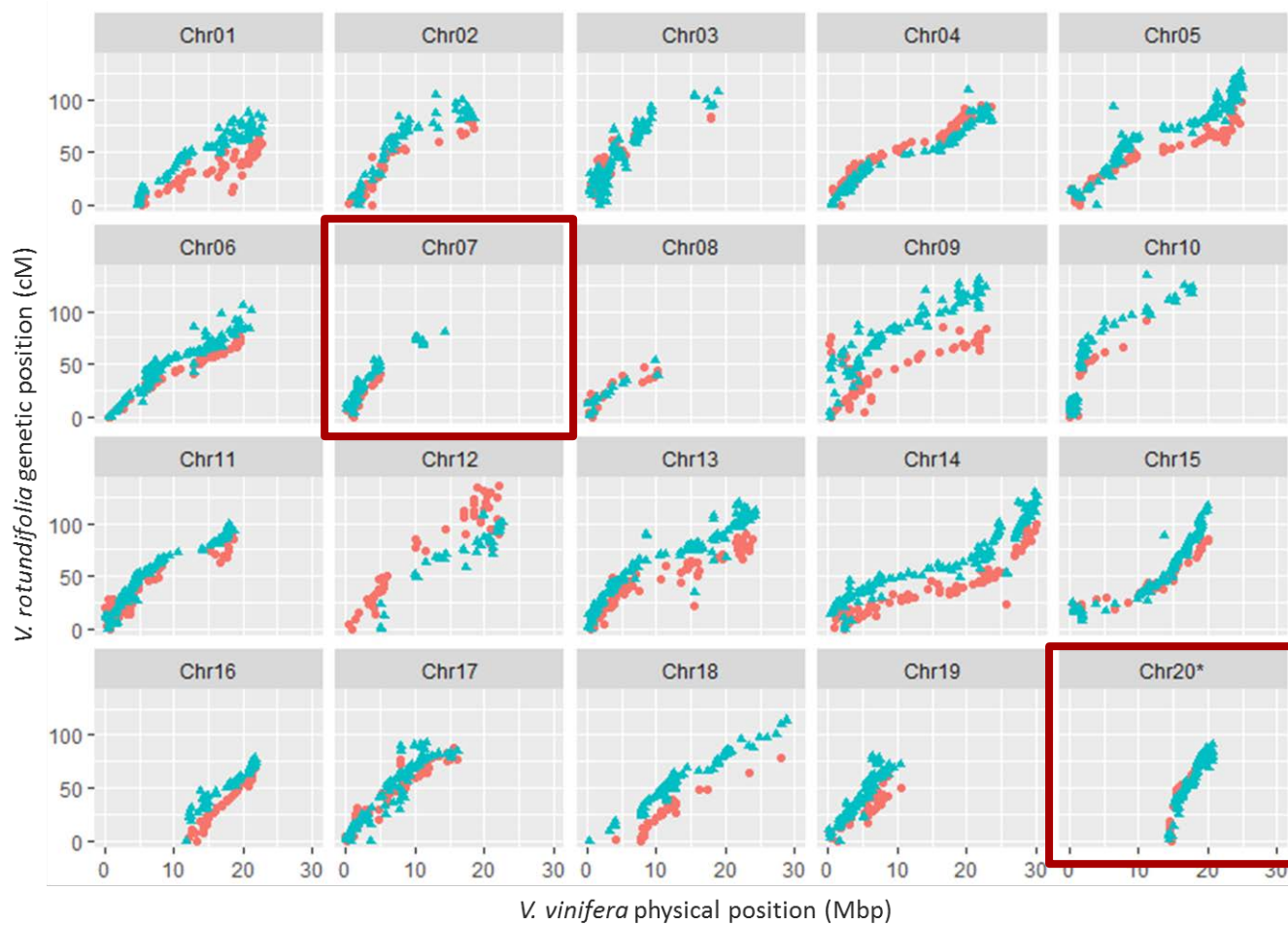
Noble and am-77



Harvesting Noble and AM-77 this AM for
Renee Threlfall to make wine and juice



Molecular Breeding in Muscadine

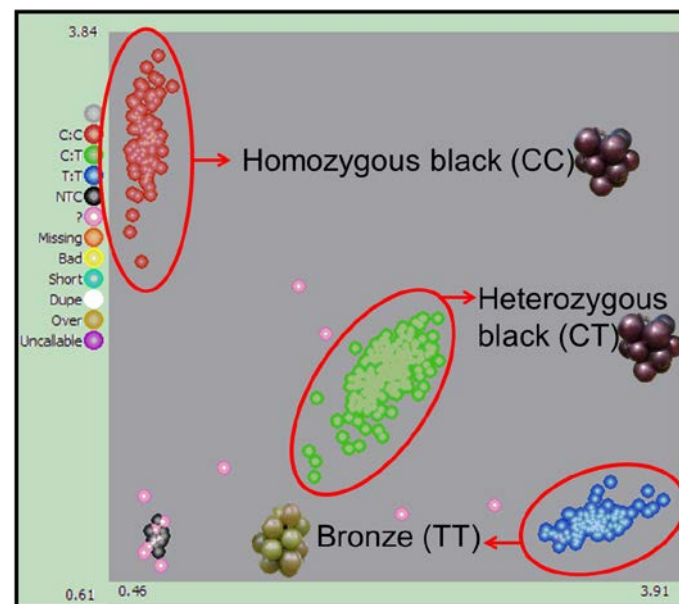


Molecular Breeding Horizon

- New markers developed for:
 - Sex (led by Patrick Conner)
 - Color

Future research directions:

- Sex inheritance and relationship to fruit size and productivity
- Mapping cold hardiness in Carlos progeny
- Tracking introgressions from bunch grapes to muscadine in wide hybrids
- This is just one more tool. Going to the field and having healthy plants is the most important part of fruit breeding



When is the first release coming?

- Soon we hope!
- Now in our 12th year of breeding muscadines
- Exciting advanced selections moving down the pipeline!



Thank you!

