Reestablishing Muscadine Grape Breeding at North Carolina State University

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Introduction

- Muscadines have been an integral part of the culture and character of the southeastern US for many many years.

Introduction

- Over the years in North Carolina from a commercial standpoint, muscadine grapes have primarily been used to make wine.

Introduction

- Today muscadines are being used for and in an ever widening range of products although wine remains the major product in North Carolina.

Historical Perspective on Muscadine Breeding in NC

- **Dearing** – USDA/NCDA – Willard, NC
  -Program initiated in 1907

- **Reimer & Detjen** – NCSU – Raleigh, NC
  -Program initiated in 1908

One initial goal of both programs –

- Muscadines with “perfect flowers”

Historical Perspective on Muscadine Breeding in NC

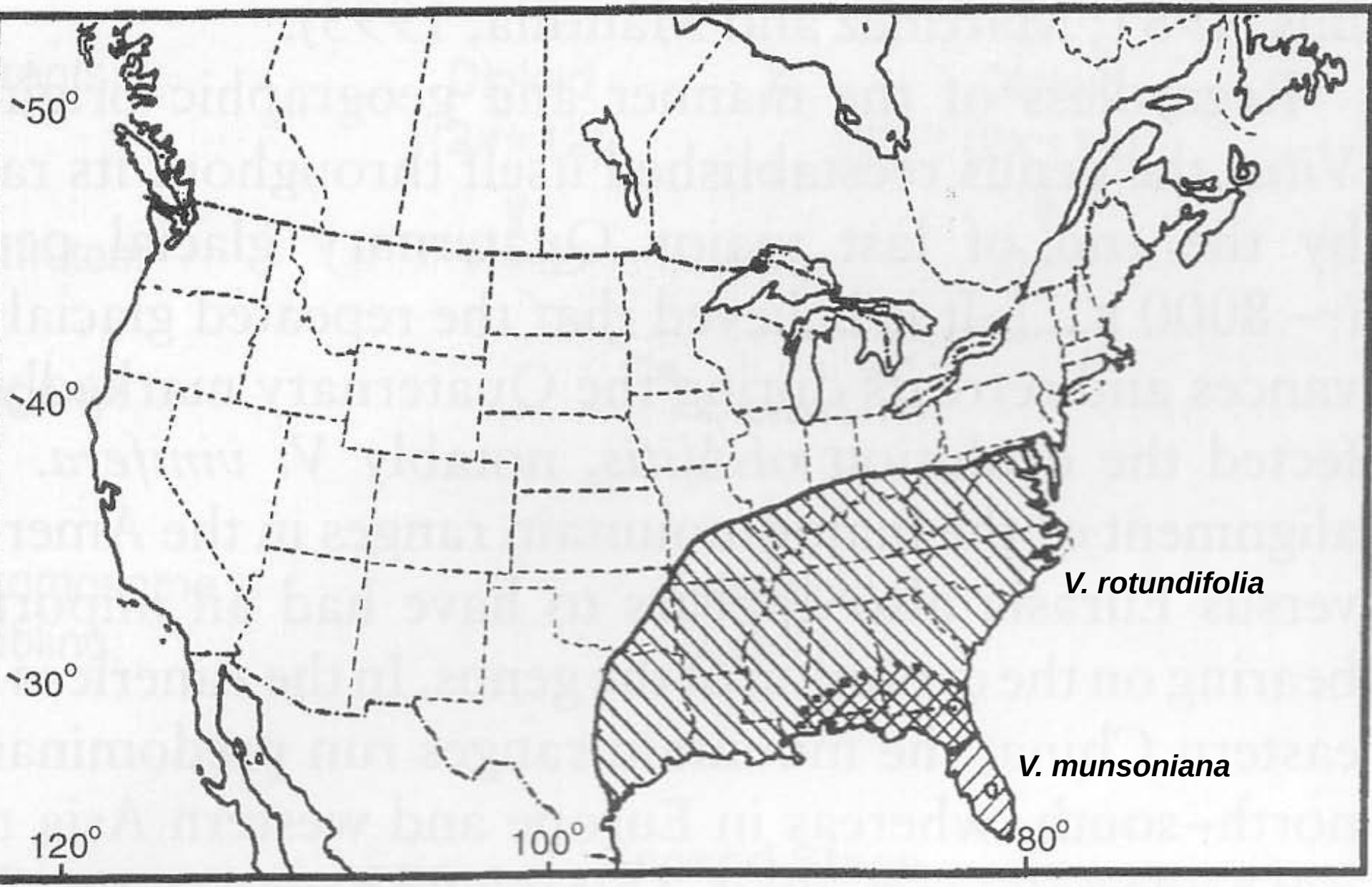
- Both Dearing and Reimer/Detjen were successful in producing several perfect flowered types.

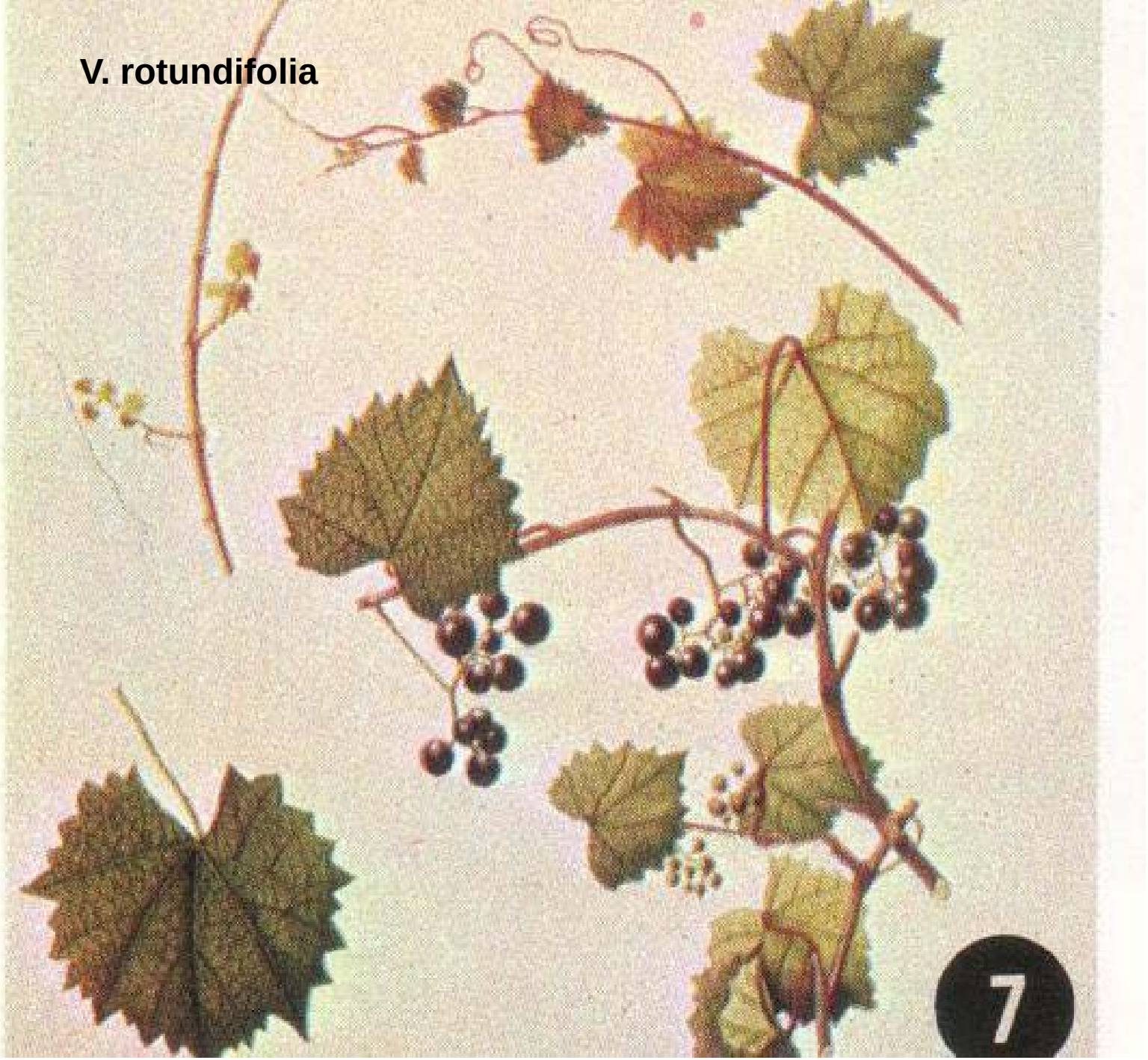
- Those developed by the USDA/ Dearing program are the main ones incorporated in current perfect flowered varieties.

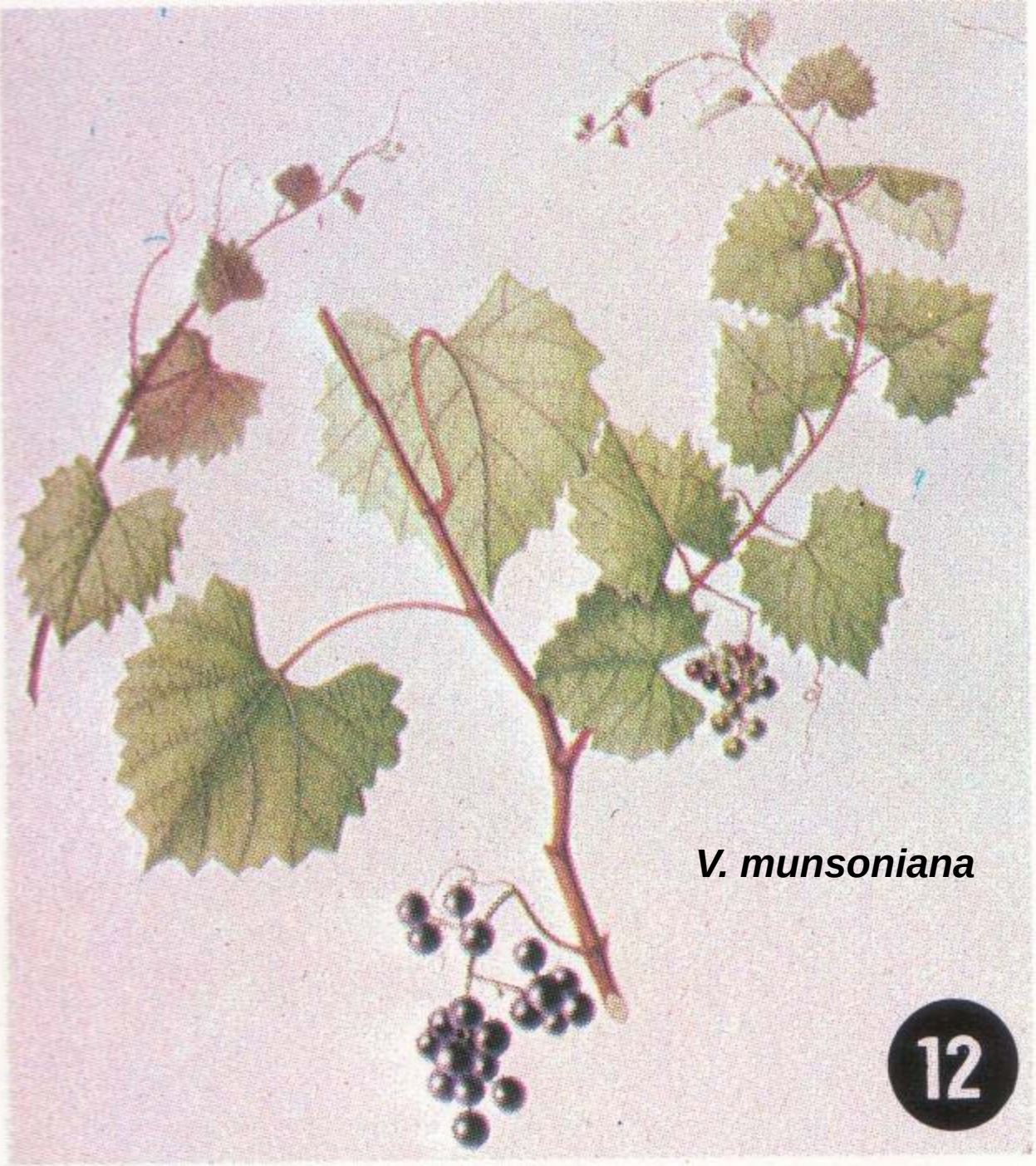
Historical Perspective on Muscadine Breeding in NC

- The USDA selection of greatest value, H1, was a cross between the two main muscadine species, *Vitis rotundifolia* and *Vitis munsoniana*.

- In addition to being perfect flowered, H1 contributed to increased productivity due to increased cluster size (from *Vitis munsoniana*).


50°
40°
30°
120°
100°
80°
V. rotundifolia
V. munsoniana


V. rotundifolia
7


V. munsoniana
12

Historical Perspective on Muscadine Breeding in NC

- **USDA** (**Dearing**) program released 15 varieties in 1946, and 1 in 1957.

  -Eight of these were perfect flowered.

  (Burgaw, Cape Fear, Duplin, Pender, Tarheel, Wallace, Willard, Dearing)

  -All had significant shortcomings and none became commercially important.

Historical Perspective on Muscadine Breeding in NC

- **Williams** – **NCSU/USDA** – 1949-1961
  -Released five perfect flowered varieties (Albemarle, Chowan, **Magnolia**, Pamlico, Roanoke)

- **Magnolia** was the first perfect flowered muscadine to be widely planted.

‘Magnolia’ with torn wet stem scar

Historical Perspective on Muscadine Breeding in NC

- **Nesbitt** – **NCSU** – 1966-1983

  -Released six perfect flowered varieties;

  Carlos (1970) – “replaced Magnolia”

  Noble (1974)

  Dixie (1976)

  Sterling & Regale (1978)

  Doreen (1981)

Carlos

Noble

Historical Perspective on Muscadine Breeding in NC

- **Goldy** – **NCSU** – 1984-1990

  -Released **Nesbitt** in 1985

  (Nesbitt was the last release from North Carolina public breeding programs)

Nesbitt

- **Muscadine Grape Breeding was Officially Reestablished at North Carolina State University on January one, 2009.**

Objectives of the New NCSU Muscadine Breeding Program

- Most immediate need !!!

- Several new varieties with all the good characteristics of Carlos, but with later budbreak in spring, better cold hardiness, improved disease resistance and larger berry size.

Objectives of the NCSU Breeding Program

- High vigor and productivity
- Cold hardy in the coastal plain and piedmont
- Delayed bloom to escape frosts/freezes

Objectives of the NCSU Breeding Program

- Perfect flowers
- Increased cluster size

- Uniform ripening for shipping and wine and unfermented juice
- Extended ripening for PYO

- Dry stem scar and low percent shelling
- Adaptation to mechanical harvest

Objectives of the NCSU Breeding Program

Excellent fresh fruit quality

- Large, attractive berries
- Uniform size & ripening
- Typical muscadine flavor
- Pleasing sugar/acid ratio
- Tender, thin, edible skin
- Firm edible flesh
- **Seedlessness**

Seedlessness

- Private grape breeder**Jeff Bloodworth** has successfully transferred **seedlessness** from Vinifera grapes to Muscadines.

- Seedlessness is a long term goal of the NCSU muscadine breeding program.

Difficulties in Developing Seedless Muscadines

- **Hybrids between *V. vinifera* and *V. rotundifolia* are very difficult to make because the two species are not closely related.**

Seedless Muscadines

- Jeff Bloodworth facilitated development of seedless muscadines through the use of several quasi-F_1 hybrids that produced fertile seedlings when backcrossed to either bunch grapes or muscadines.

Quasi-F_1 Hybrid

DRX-60-40

Quasi-F_1 Hybrid NC 74C049-10

JB03-20-1-21 Seedless Backcross to Muscadine

Objectives of the NCSU Breeding Program

- Excellent processing quality for wine, unfermented juice, neutraceuticals and other products.

- Improved pigment color quality for red wines and unfermented juice.

Improving Pigment Profile and Quality in Muscadine Fruit

- Monoglucoside pigments, and higher total pigment concentration, inherited from *V. vinifera* in *V. vinifera X V. rotundifolia* backcrosses to *V. rotundifolia* may be the best overall means to improve pigment stability and quality in muscadines in the long run (Goldy et al., 1987).

Additional Objectives of the NCSU Breeding Program

- Improved pest tolerance/resistance

- Resistance to major diseases:
  -Ripe rot
  -Macrophoma rot
  -Powdery mildew
  -Bitter rot
  -Black rot
  -Angular leaf spot
  -Marginal leaf burn

Questions