Developing a Clean Plant Program for Muscadines

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Outline:

1. MPRU Clean Plant Program
2. Funding Sources
3. NC Industry Need Assessment

MPRU Mission:

To provide clean planting stock for sweetpotatoes, berry crops and muscadine grapes

- MPRU - Established in 1996 to meet needs of growers in NC.
- NCPN - Established in 2008, under USDA umbrella.
- Association of clean plant centers, scientists, educators, state and federal regulators, and nurseries and growers from the industry concerned with the health of crops of interest.
- MPRU: Clean Center for Sweetpotatoes & Berries. Muscadine Grapes is work in progress.

Start clean, stay clean
NCPN
National Clean Plant Network

NCPN
National Clean Plant Network
SWEETPOTATO

NCPN
National Clean Plant Network
BERRIES

2015-2017 NC Specialty Crop Block Grant Program

Project:

To use micropropagation and virus testing to establish a source of disease-free, true-to-type muscadine grape vines.

Muscadine Clean Plant Program at the MPRU (2017 to now)

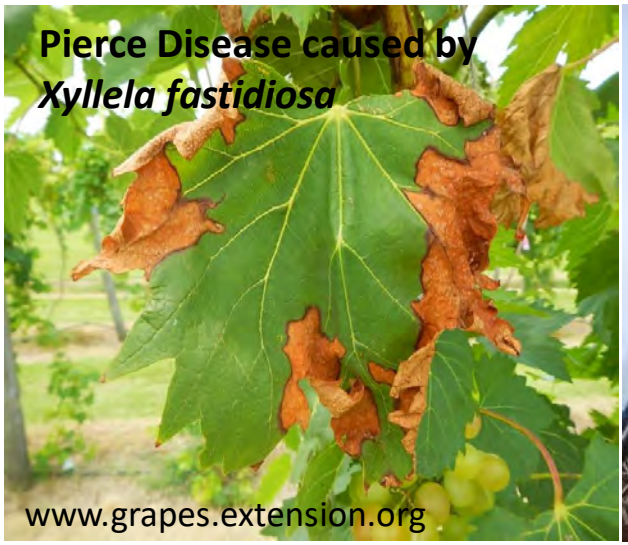
Main Problem:

- Muscadine nursery stock can harbor pathogens (viruses, bacteria, fungi) that are carried by plants to new vineyards.
- Muscadines are one of the few vegetatively propagated small fruit crops for which no clean plant source exists.

Goal 1:

To establish a source of pathogen-tested tissue culture plants

DISEASE-FREE TISSUE CULTURE MATERIAL



Reported Viruses
(Sabanadzovic et al, 2009, 2015, 2016)

GLRaV-2
GVB
GSyV-1
BVS

Muscadine Clean Plant Program at the MPRU (2017 to now)

Main Problem:

- Muscadine grapes vines are often not true-to-type (wrong cultivar, mixed cultivar)
- Trueness-to-type is very important, especially when marketers specify what cultivars they will buy.

TRUENESS-TO-TYPE

Goal 2:

To establish a source of true-to-type nuclear stock

Advantages of Tissue Culture for Muscadines

Ease of propagation:
New Cultivars
Old Cultivars

Exclude diseases:
Crown Gall
Pierce's Disease
Plant-borne fungi
Viruses

Results Goal 1: Establishment of Muscadines in Tissue Culture

Muscadine Cultivars	Number of Plants in Tissue Culture
Summit	10
Triump	12
NC 1005	16
Supreme	12
Noble	10
Carlos	10
Fry	10
Nesbitt	6
Grand Total	86

Results Goal 1:
MPRU Grapes Virus Testing Capacity

Virus Testing by Real Time Assays

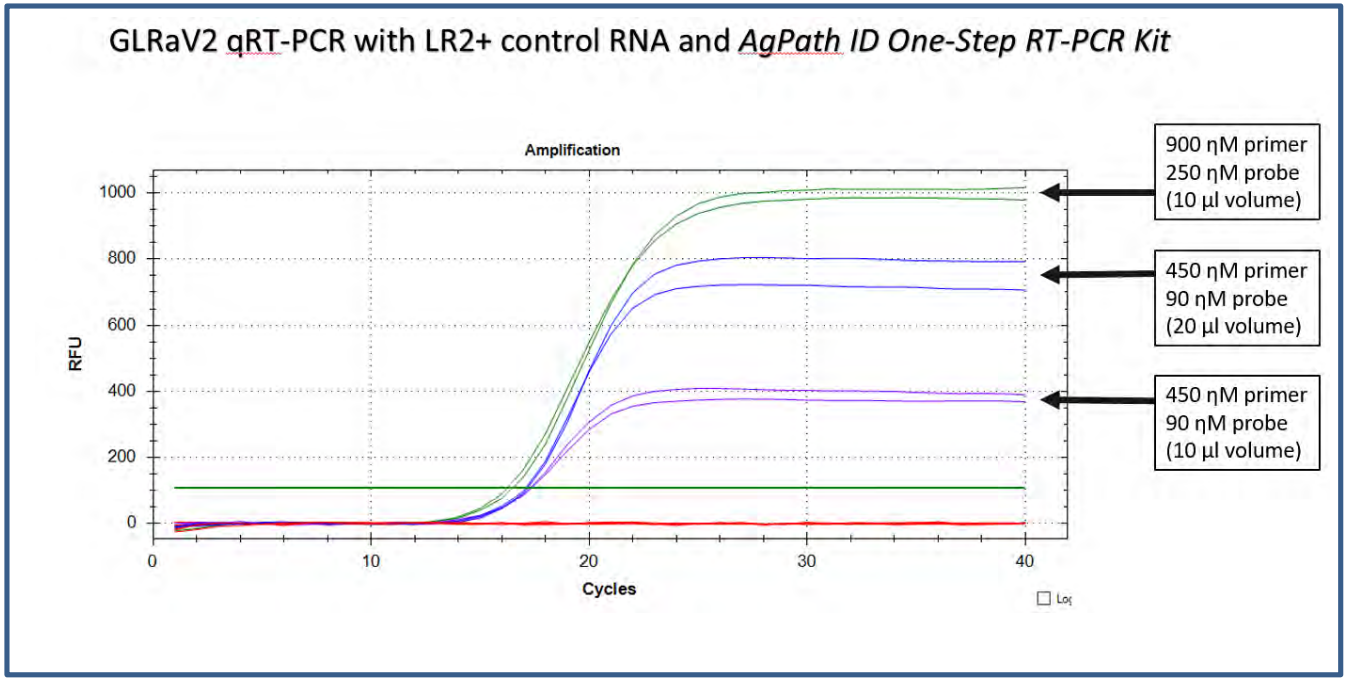
Target	Source
Grapevine Red Blotch Virus (GRBV)	FPS
Grapevine Leaf Roll associated-Virus (GLR-2,-3,-4,-7)	FPS
Grapevine Virus A & B (GVA & GVB)	FPS
Grapevine Rupestris Stem Pitting associated-Virus (GPSPaV)	FPS
Xyllela fastidiosa	FPS and Harper et al.

Reported Viruses in wild and cultivated muscadines (Sabanadzovic et al, 2009, 2015, 2016):
GLRaV-2, GVB, GSyV-1, BVS

Grape Diagnostics – Growers Samples

10 Grape RT-qPCR pathogen assays implemented at the MPRU

GLRaV-2, GLRaV-3, GLRaV-4, GLRaV-7, GRBV, GRSPaV, GVA, GVB, TRSV, and X.f.

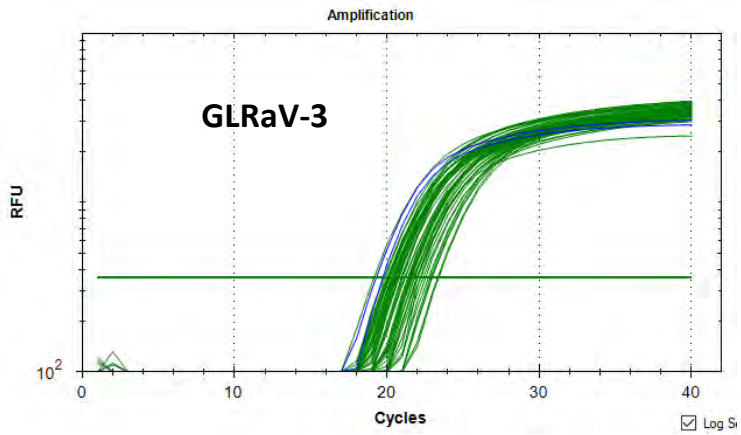


Grape Field Samples Testing

(Collaboration with Mark Hoffman, NCSU Extension)

- 80 samples tested
- 10 vines from 8 vineyards in NC
- Tested for GLRaV-2, GLRaV-3, GLRaV-4, GLRaV-7, GRBV, GRSPaV, GVA, GVB, TRSV, and *Xyllela fastidiosa*

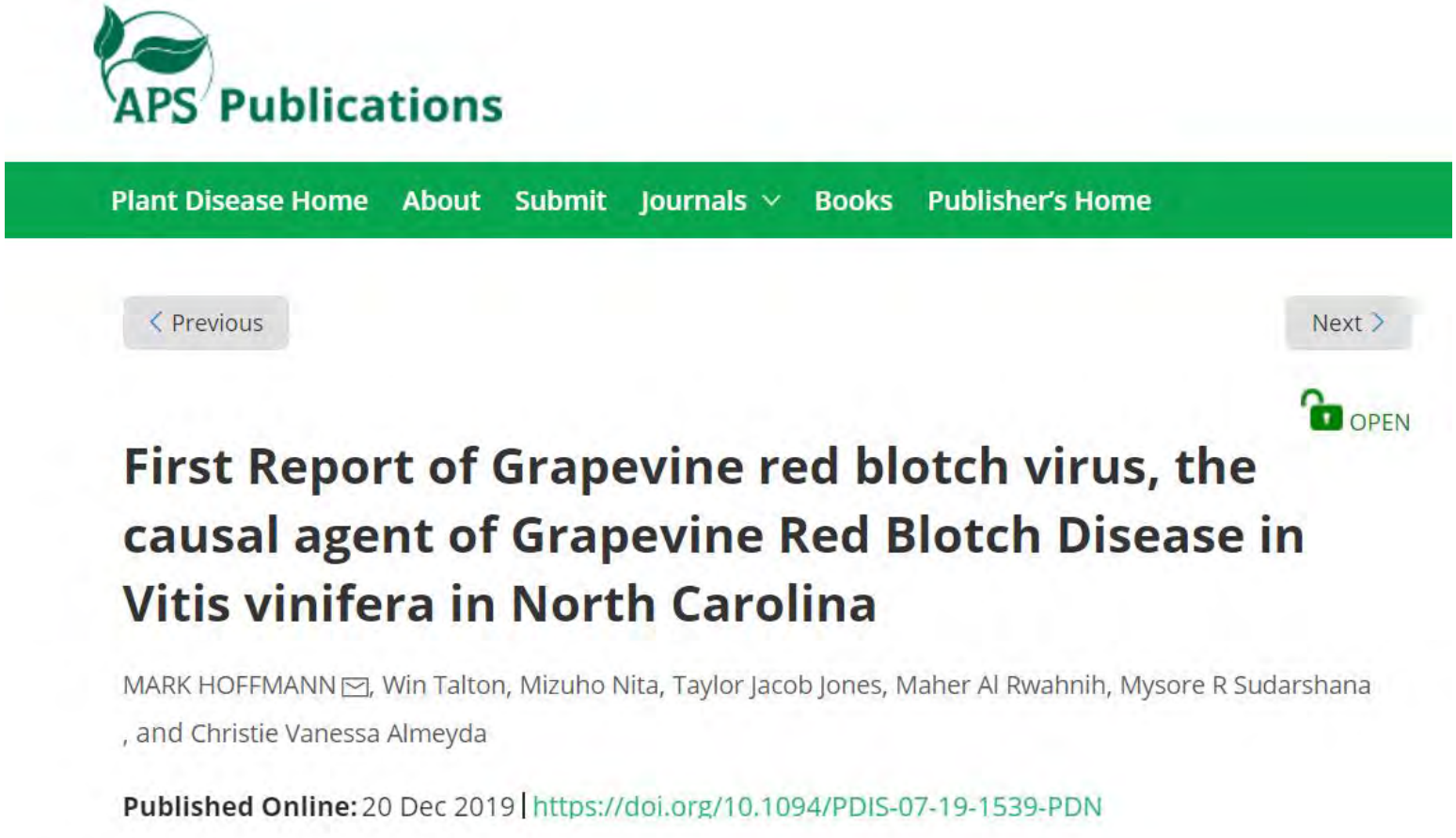
Pathogen	Positive hits by RT-qPCR
GLRaV-2	1/80 (1 vineyard)
GLRaV-3	20/80 (2 vineyards)
GLRaV-4	0/80
GRBV	21/80 (3 vineyards)
GRSPaV	65/80 (8 vineyards)
GVA	0/80
GVB	0/80
TRSV	0/80
Xyllela fastidiosa	6/80 (3 vineyards)



Viruses Detected	
Crop/Year	2019
Grapes	GLRaV-2, GLRaV-3, GRBV, GRSPaV, *Xyllela fastidiosa*

Grape Field Samples Testing

(Collaboration with Mark Hoffman, NCSU Extension)



Results Goal 2: Establishment of a true-to-type nuclear stock –

Evaluated at Castle Hayne

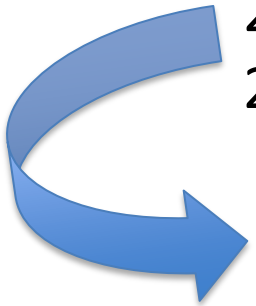
Muscadine Cultivars	Number of Pots
Summit	7
Triump	7
NC 1005	15
Supreme	6
Noble	7
Carlos	7
Fry	7
Nesbitt	2
Grand Total	58

Funding Sources:

1. NC Specialty Crop Block Grant Program.
2. NCPN – MPRU, Clean Center for Muscadine Grapes.

Funding Timeline:

2017 – Travel Support (Florida A & M University)
2018 – Funded, mainly for Virus Testing Capacity
2019 – Not funded
2020 – Submitted



Discussion: National Impact?
Not part of NCPN-Grapes
Miscellaneous?
Industry participation at NCPN board.

NC Industry - Need Assessment

1. What are the cultivars of interest for tissue culture establishment, virus testing and trueness-to-type tests? New varieties? Old varieties? Breeder program?
2. Interest in using clean material? Certification program in the long run?
3. Virus testing diagnostics? Partnership with PDIC at NCSU.
4. MPRU needs to learn/be involved more with the NC Muscadine industry. Grower meetings, conferences, etc.

Take Home Messages

1. The MPRU has the capacity for tissue culture establishment, propagation, virus/pathogen testing and release of clean muscadine material.
2. Trueness-to-type evaluation will have to include breeders/pathologists/specialists for field evaluations of specific traits.
3. MPRU and NC Muscadine industry have to establish collaborative efforts to secure funding for research and to produce clean plants.
4. A need assessment is needed for a useful and efficient program.


Thanks!
Questions?
Start clean, stay clean
NCPN
National Clean
Plant Network
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