

Viburnum is an extremely popular landscape shrub throughout Florida. In











under common overhead irrigation production settings.

ic sustainability.

# **Materials and Methods**

collected from local nurseries for pathogen identification throughout the growing seasons of viburnum (spring, summer, and fall).

Viburnum suspensum plants grown in 3-gallon containers at a commercial production plant nursery. The trial was designed in completely randomized blocks with 6 replicates including 13 fungicide treatments representing 12 Modes of Action (MOA) and water control (Table 1).

same setup as the first trial. This trial focused on 7 fungicides with a water control (Table 2). All fungicide spray treatments in both trials were applied twice at a 14-day interval. Plants were fertilized and overhead irrigated according to grower regular production standards. Foliar symptomatic leaf area percentage was rated weekly for six weeks to calculate the Area Under the Disease Proregression Curve (AUDPC). Data analysis was conducted using GLIMMIX model in R software.

# Viburnum Downy Mildew Control; An Action Plan for Growers

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Figure 4: Area Under Disease Progression Curve (AUDPC) of the fungicide treatments applied in the second trial conducted in September thru October 2020. Lower numbers represent less disease severity.

FRAC	Rate/100 gal	AUDPC <sup>X, Y</sup>
M3	2 lbs	1586 a
M1	1.9 lbs	1857 a
4	2 floz	1277 ab
40	8 floz	1594 a
0 + 45	14 floz	1360 ab
3	14 floz	1855 a
43	4 floz	1069 abc
40	12.25 floz	1045 abc
49	3 floz	1213 ab
21	6 floz	968 abc
33	64 floz	836 abc
11 + 7	10 floz	649 bc
7 + 3	28 floz	521 c
_	_	1716 2

FRAC	Rate/100 gal	AUDPC <sup>X, Y</sup>
M3	2 lbs	139 c
33	2 qt	193 abc
M1	1.9 lbs	160 bc
11 + 7	10 floz	144 bc
7 + 3	28 floz	90 c
3	14 floz	290 a
49	3 floz	261 ab
-		172 abc

# **Results and Discussion**

Identification of isolated fungi, revealed the presence of multiple pathogens throughout the growing seasons (spring, summer, and fall), including Plasmopara sp., Cercospora sp., Corynespora sp., Colletotrichum sp., Phoma sp., Phylosticta sp., and Pestalotiopsis sp.

In the first trial testing 13 fungicides (Table 1 & Fig 3), initial foliar sampling of viburnum showed DM pathogen *Plasmopara* sp., *Cercospora* sp. and Colletotrichum sp. as the primary pathogens present. Leaf symptoms were similar to those commonly associated with downy mildew. However, additional subsequent sampling failed to find any sign of DM pathogen. Rather, isolations recovered Colletotrichum sp., Corynespora sp., Phylosticta sp., Phoma sp., and a *Pestalotiopsis* sp. Not surprisingly, fungicides that target oomycetes (i.e., *Plasmopara* sp.), containing ametoctradin, cyazofamid, dimethomorph, fluopicolide, mandipropamid, mefenoxam, and oxathiapiprolin, failed to statistically reduce disease severity relative to the non-treated control based on AUDPC. While benzovindiflupyr, difenoconazole, fluxapyroxad, and pyraclostrobin fungicides that typically target true fungi, statistically reduced disease severity.

In the second trial testing 7 fungicides (Table 2 & Fig 4), copper sulfate and mancozeb, or a systemic fungicide, flutriafol, failed to reduce disease severity, while a generic phosphite gave an intermediate level of control. These results stress the importance of correct disease and pathogen diagnosis to select the appropriate fungicide treatments.



Colletotrichum



Pestalotiopsis



Cercospora

Figure 5: Pathogens identified under 16X zoom from a variety of leafspots collected from local viburnum nurseries in Hillsborough County, FL

## Conclusions

Our findings align with the growers' reports of challenges with foliar disease management in viburnum while shedding a light on the components of this management puzzle. Growing season and environmental conditions play a key role in management decisions as a result of the multiple foliar diseases of Viburnum sp. occurring throughout the year. Recommendations for foliar disease management of viburnum can be adjusted based on this research which includes correct disease identification, the timing of preventative broad-spectrum, and pathogen-specific fungicide treatments based on environment and season, and fungicide rotations. Our research was awarded a Florida Nursery Growers and Landscapers Association (FNGLA) grant to assist and extend our research efforts to offer clear disease management solutions to viburnum growers.

Future research will include pathogenicity testing of isolated fungi, repeating efficacy testing for some of the previously tested chemistries, and studying the seasonality of the different diseases.

## References

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Phylosticta

Corynespora

