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Review of Disease Management Regimens for Pierce's Disease Tolerant Hybrids

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Pierce's Disease of Grapevines

Host: Major disease of *Vitis vinifera* and many hybrids

Causal Agent: *Xylella fastidiosa* subsp. *fastidiosa*

Vectors: Leafhoppers
(*Cicadellidae* spp.)

Spittlebugs (*Cercopidae* spp.)



Current management practices



- Roguing vines
- Imidicloprid insecticides through irrigation
- Foliar application of insecticides (less effective)
- Use of resistant/tolerant species or hybrids



Lomanto



- Red wine grape
- Salado X Molinera
- *V. vinifera*, *V. mustangensis*, *V. rupestris*, *V. labrusca*



Lomanto



Alternaria rot (leaf)

7

Anthracnose (leaf/shoot)

7

Cercospora (leaf)

7

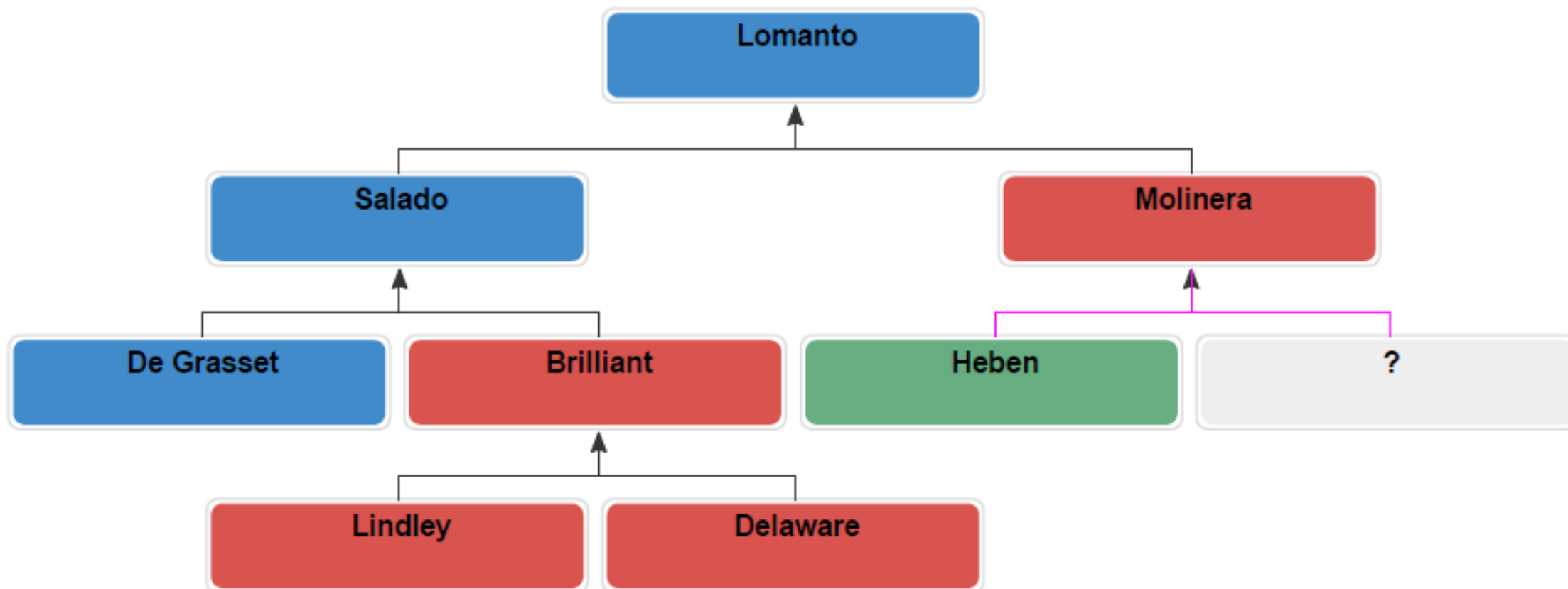
Isariopsis leaf blight (leaf)

7





Vitis International Variety Catalogue VIVC



Blanc du Bois



- White wine grape
- Florida D 6-148 X Cardinal
- *V. vinifera*, *V. smalliana*, *V. simpsonii*, and *V. labrusca*



Blanc du Bois

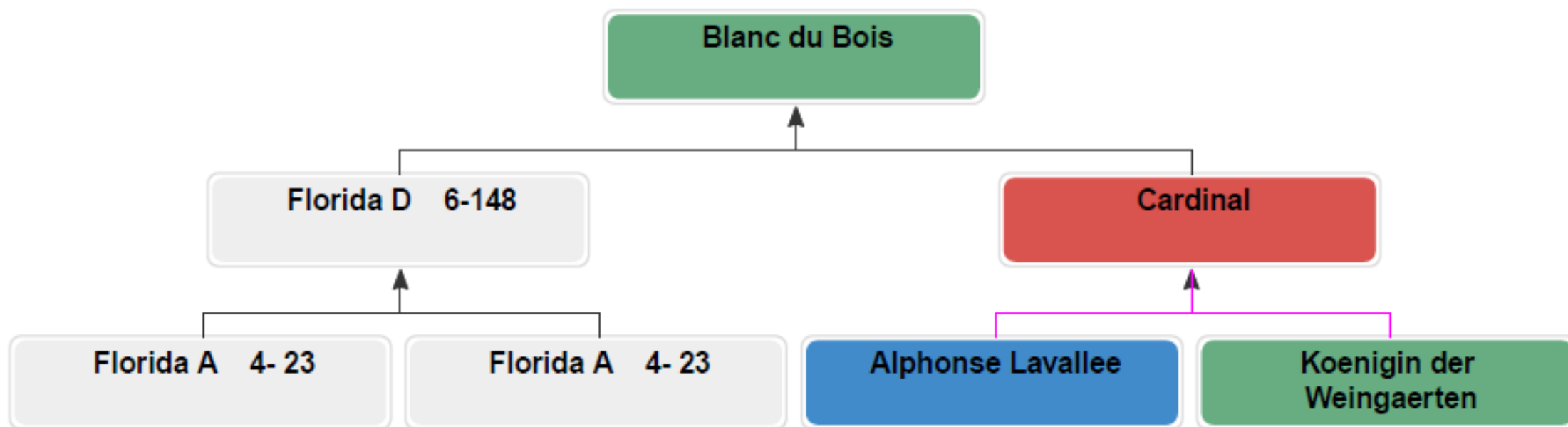


| | |
|------------------------|---|
| Pierce's Disease | 9 |
| Powdery mildew (leaf) | 3 |
| Powdery mildew (bunch) | 2 |





Vitis International Variety Catalogue VIVC



Crimson Cabernet

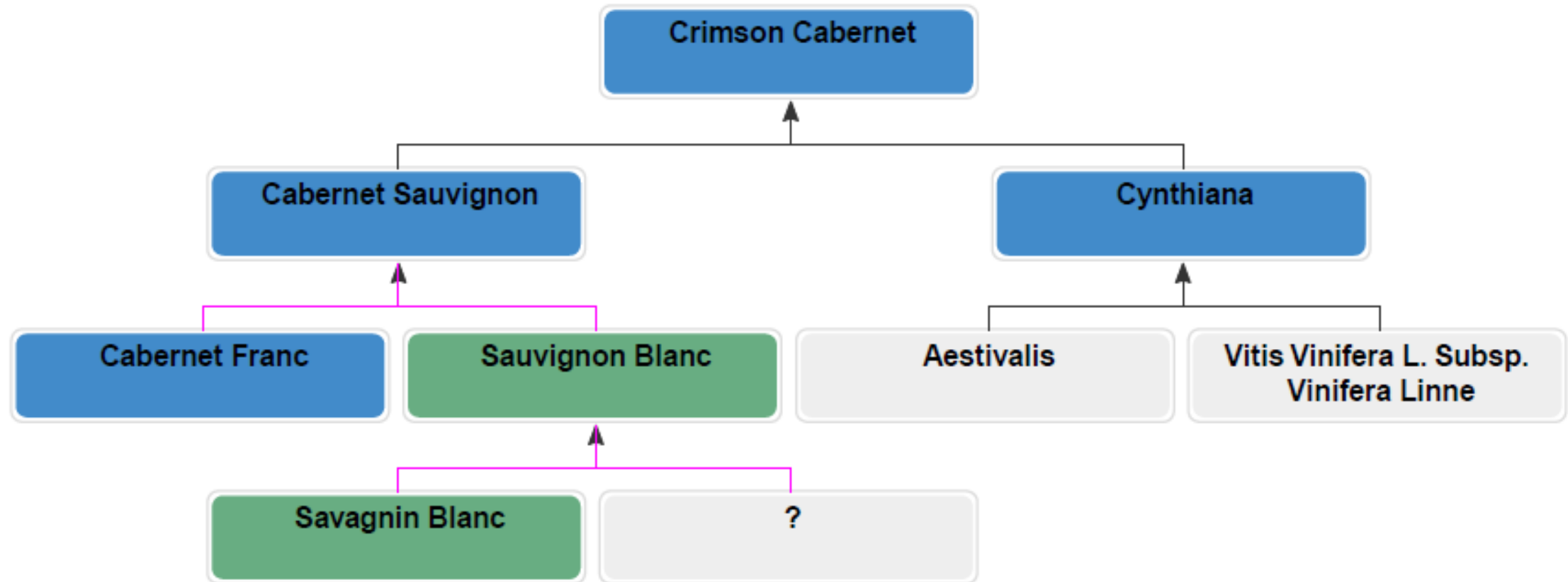


- Red wine grape
- Cabernet Sauvignon X Cynthiana
- *V. vinifera* and *V. aestivalis*





Vitis International Variety Catalogue VIVC



Camminare noir



- Red wine grape
- PD resistance (PdR1), chromosome 14.
- 50% Petite Sirah and 25% Cabernet Sauvignon
- *V. vinifera*, *V. arizonica*, and *V. rupestris*



UC Davis selection 07370-84



- White wine grape
- *V. vinifera* and unreported native grapes





Research Objectives

1. Determine diseases that occur on these hybrids in the hot humid environment of Georgia
2. Determine whether we can develop lower input fungicide programs for these hybrids due to native grape species in their background



Powdery mildew



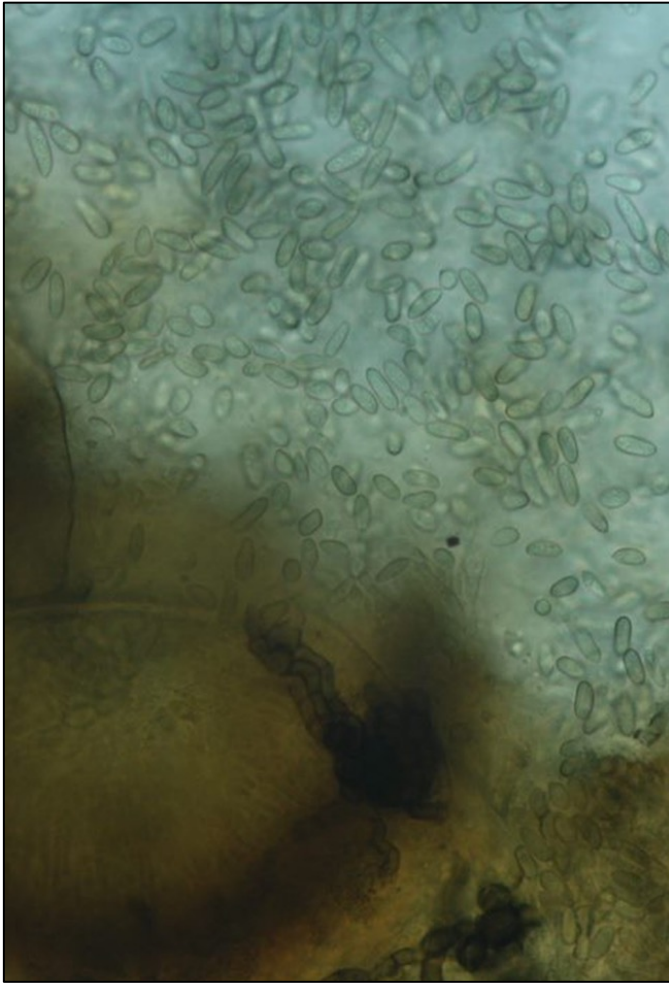
Downy mildew



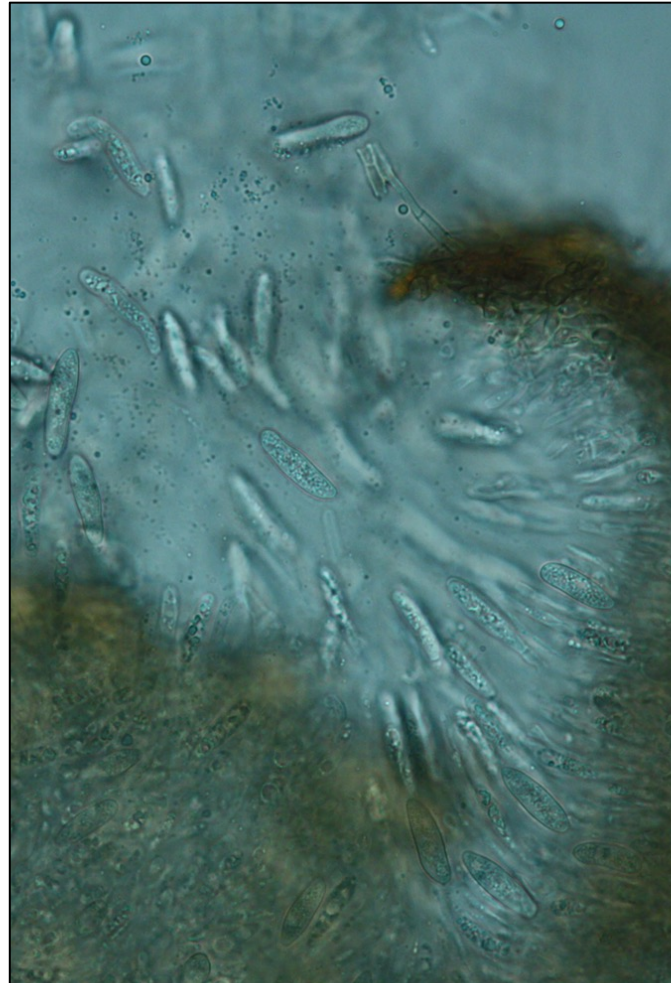
Rots



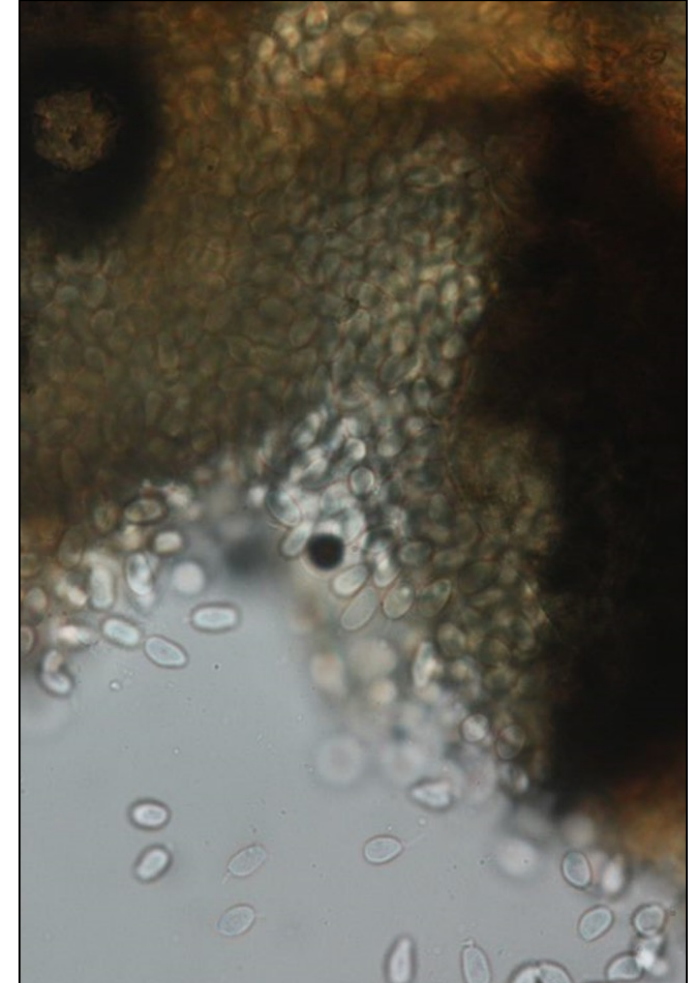
Bitter rot



Macrophoma rot



Black rot



Hybrid Susceptibility to Pathogens

| | Powdery Mildew | Downy Mildew | Fruit Rots |
|--------------------------------|----------------|--------------|------------|
| Lomanto | ++++ | ++ | +++ |
| Blanc du bois | - | ++++ | ++ |
| Crimson cabernet | +++ | ++ | ++++ |
| Camminare noir | +? | +++++ | ++++ |
| UC Davis selection 07370-84 | +? | +++++ | ++++ |

+ Susceptibility
- Resistance/Tolerance



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Fungicide Input Regimens

| Treatment and amount/A | High | Moderate | Low | Untreated check |
|--------------------------|-------|----------|-------|-----------------|
| Untreated | --- | --- | --- | ABCDEFGH |
| Abound @ 10 fl.oz | ADEFH | --- | --- | --- |
| Captan 4L @ 1.5 qts | DEFGH | DEFGH | DEFGH | --- |
| Elevate @ 1 lb | G | G | G | --- |
| Endura @ 8 oz | BE | B | B | --- |
| Malathion | H | H | H | --- |
| Manzate Prostick @ 3 lb | ABC | ABC | ABC | --- |
| Mustang Max | G | G | G | --- |
| Oxidate | GH | GH | GH | --- |
| Prophyt @ 4 pt | ACEFG | ACEFG | --- | --- |
| Rally @ 3 oz | CDG | --- | --- | --- |
| Ridomil Gold MZ @ 2.5 lb | D | D | --- | --- |
| Rovral 2 pt | H | H | H | --- |
| Switch @ 14 oz | F | F | F | --- |
| Vangard @ 10 oz | C | C | C | --- |
| Zampro @ 14 oz | B | B | --- | --- |

*Treatment dates: A = 27 Apr (prebloom) B = 8 May (bloom 1) C = 21 May (bloom 2),
D = 17 Jun (cover), E = 6 Jul (cover), F = 15 Jul (veraison), G = 30 Jul (veraison), H = 13 Aug (pre-harvest).



Hybrid Grape Trials



Experimental Design

- Randomized complete block design
- 3 fungicide program regimens and an untreated check
- Five replications of each treatment
- Each plot consisted of 4 vines:
 - 2 treated center vines and one untreated vine on each side
- Cultural practices were kept standard for the Southeast



Incidence and Severity Defined

Leaves

- Disease incidence (% infected leaves) and severity (% of leaf covered by diseased tissue)

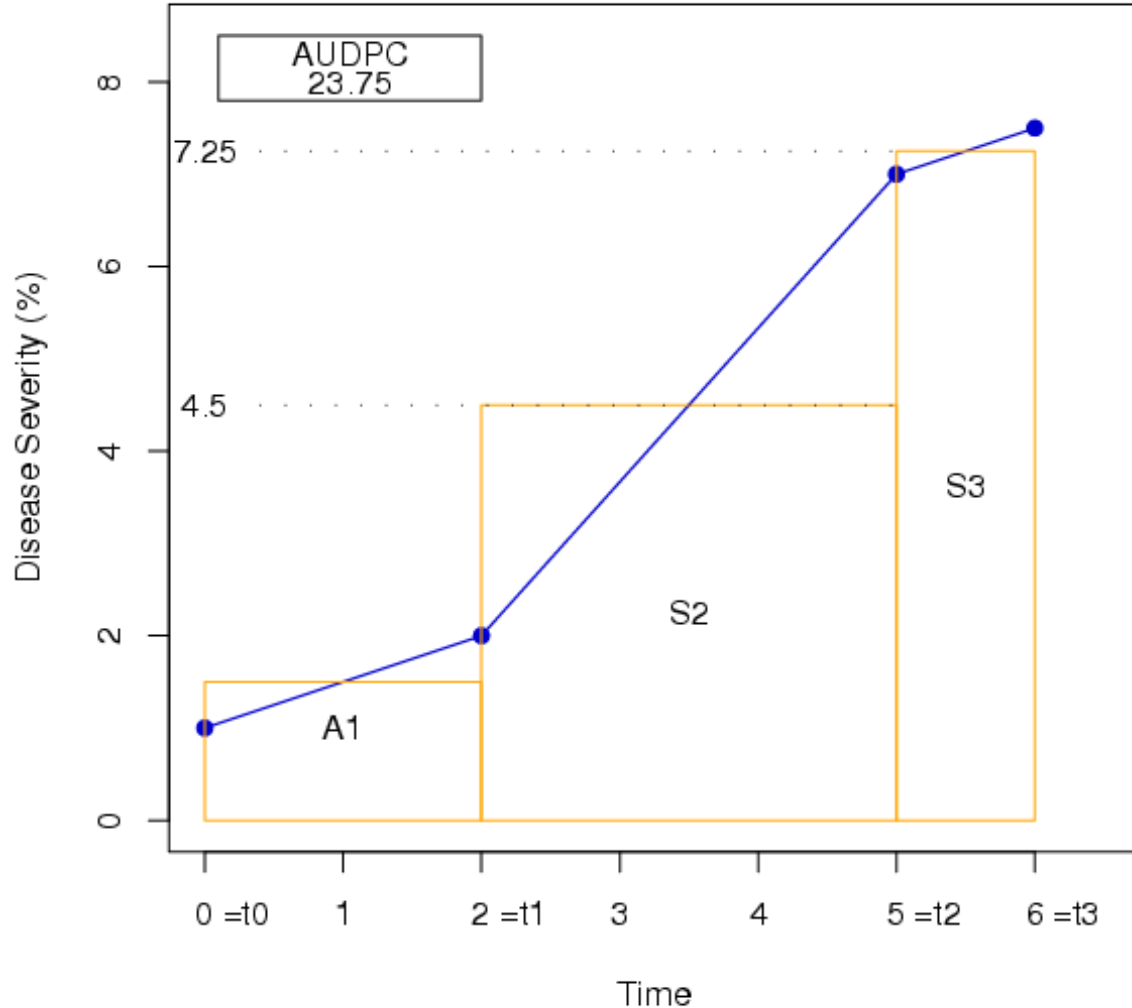
Fruit

- Disease incidence (% infected clusters) and severity (% of cluster covered by diseased tissue)



Area Under the Disease Progress Curve (AUDPC)

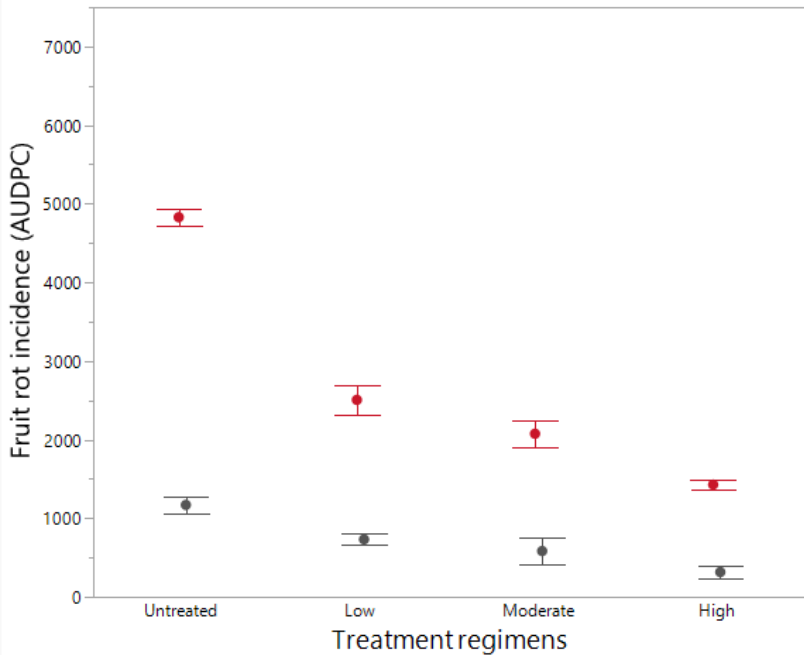
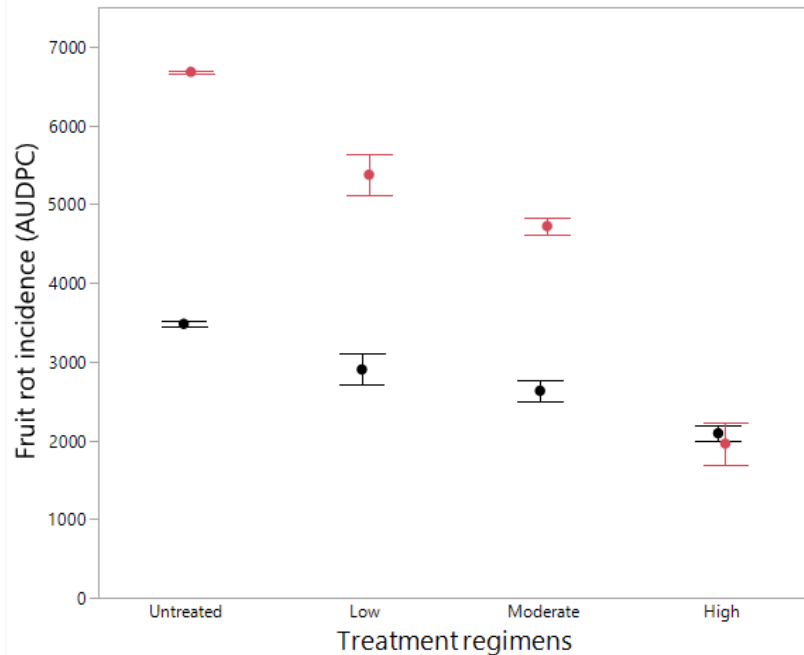
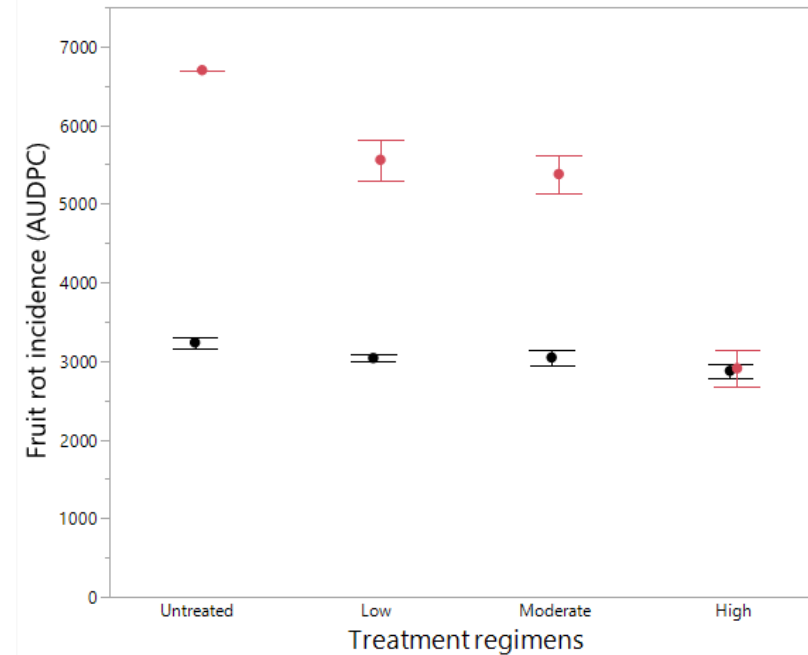
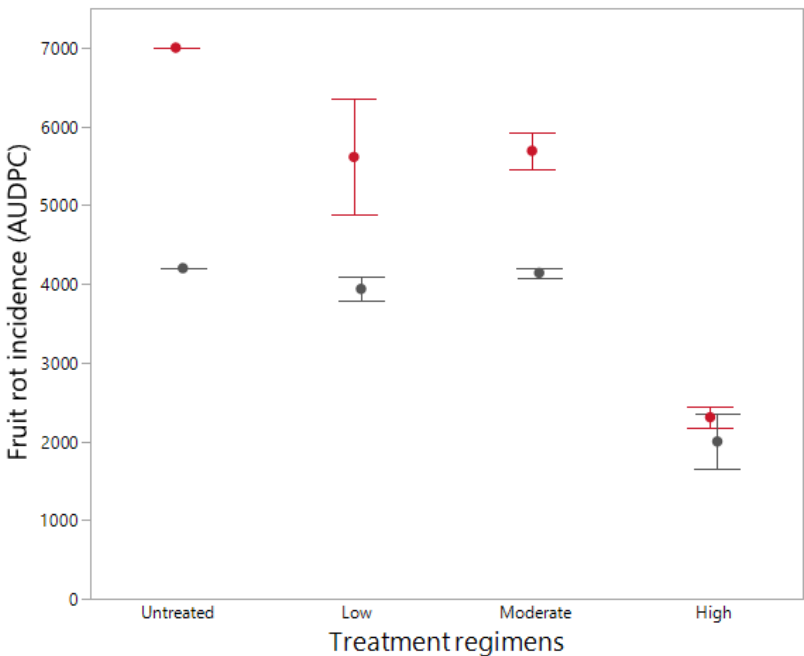
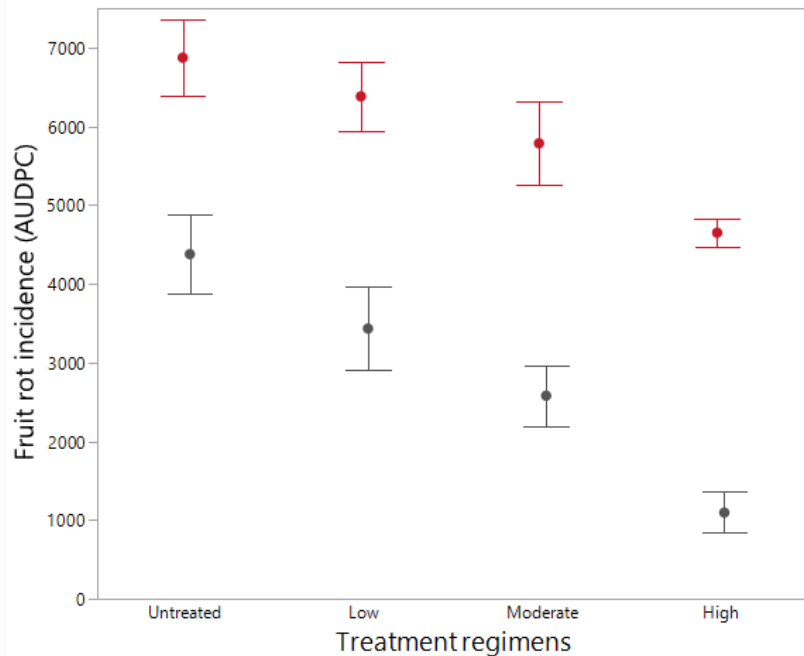
Illustration of AUDPC Calculation



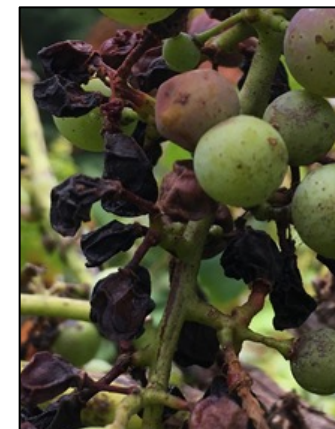
$$AUDPC = \sum_{i=1}^{n-1} \frac{y_i + y_{i+1}}{2} \times (t_{i+1} - t_i)$$

American Phytopathological Society; Calculating the area under the disease progress curve to quantify disease progress

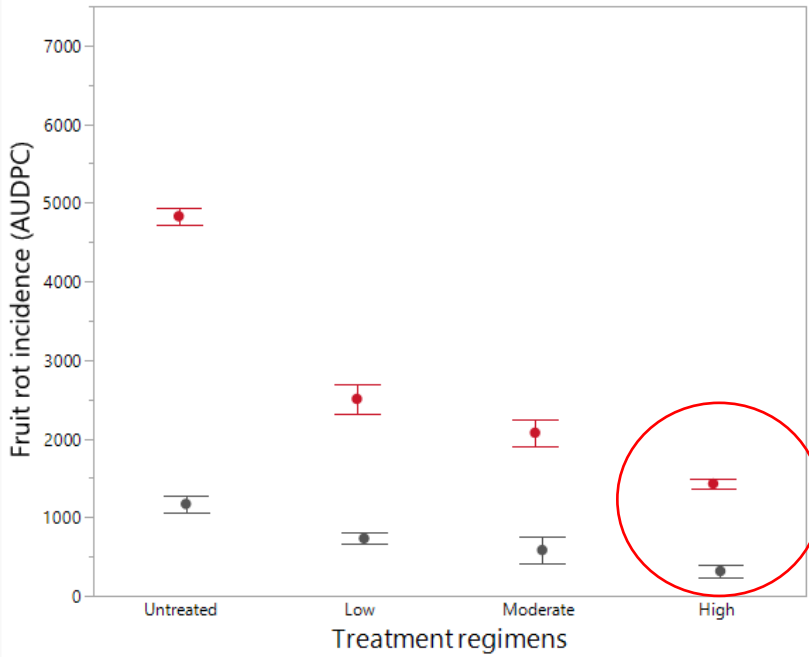
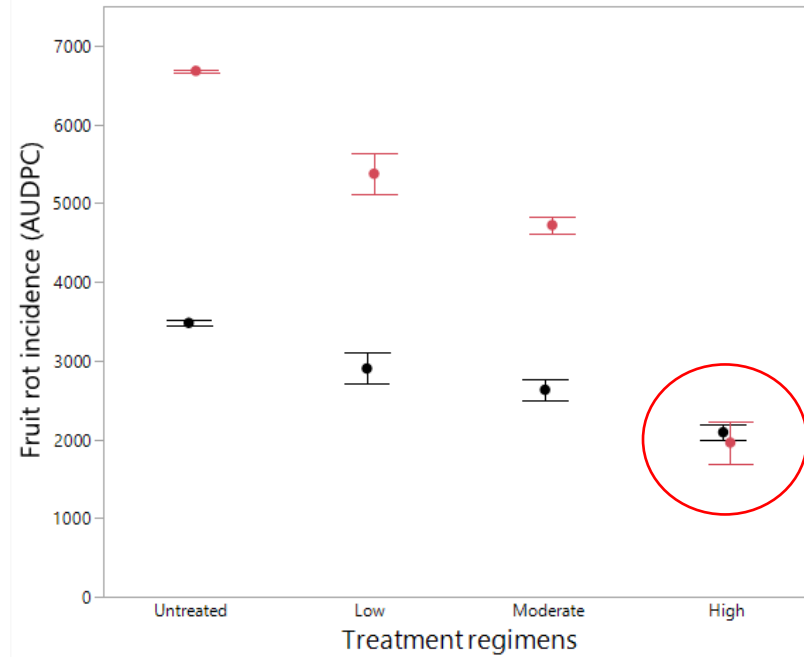
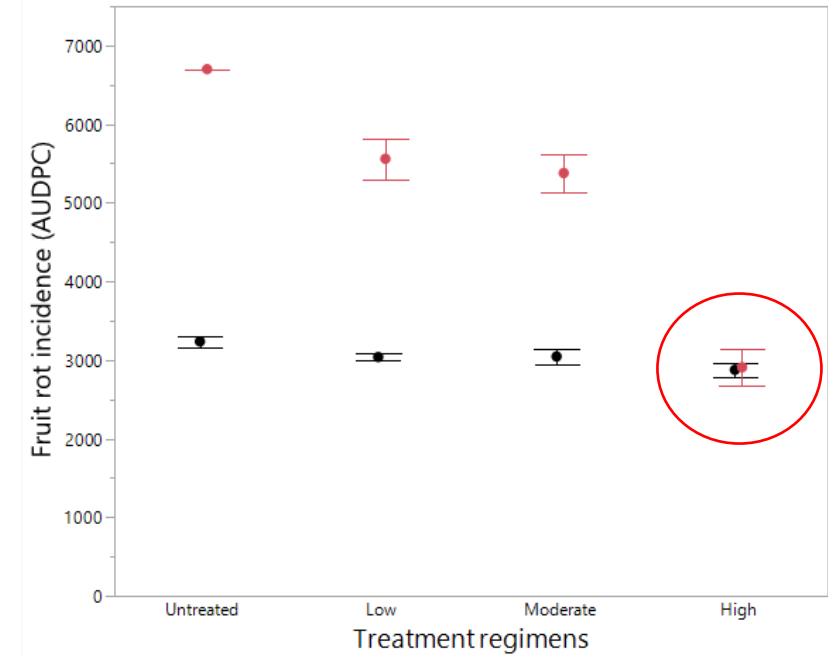
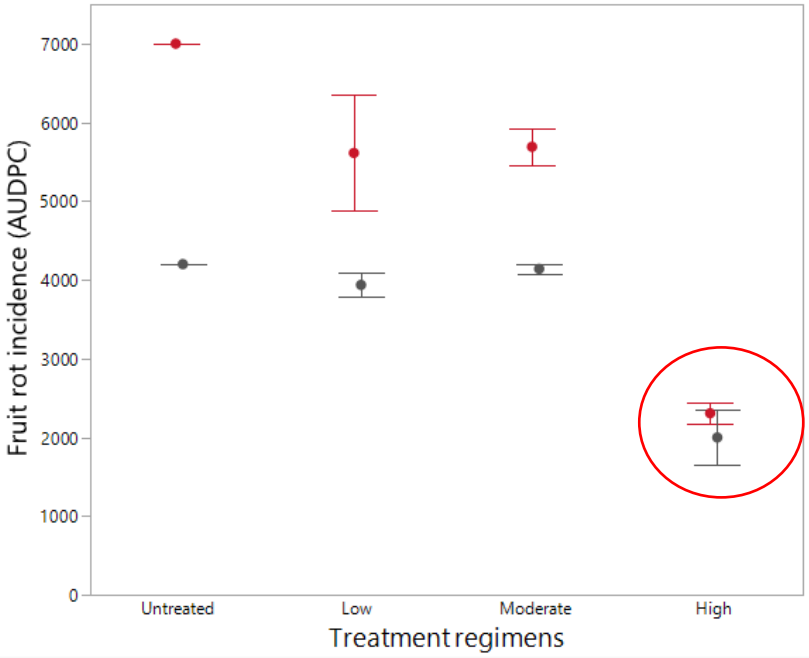
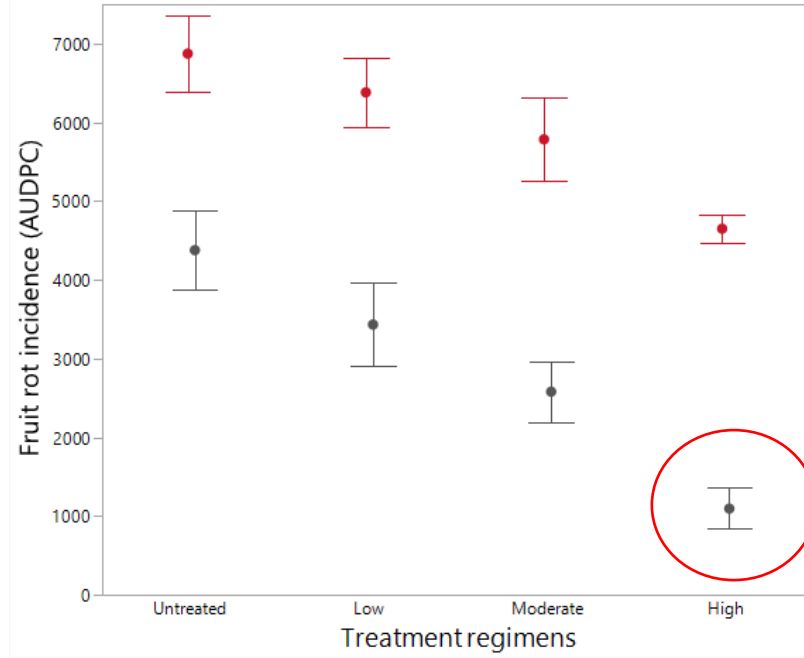


Blanc du bois**'07370-84'****Camminare noir****Crimson cabernet****Lomanto**

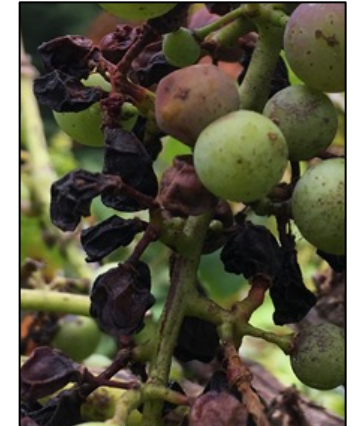
- 2020
- 2021
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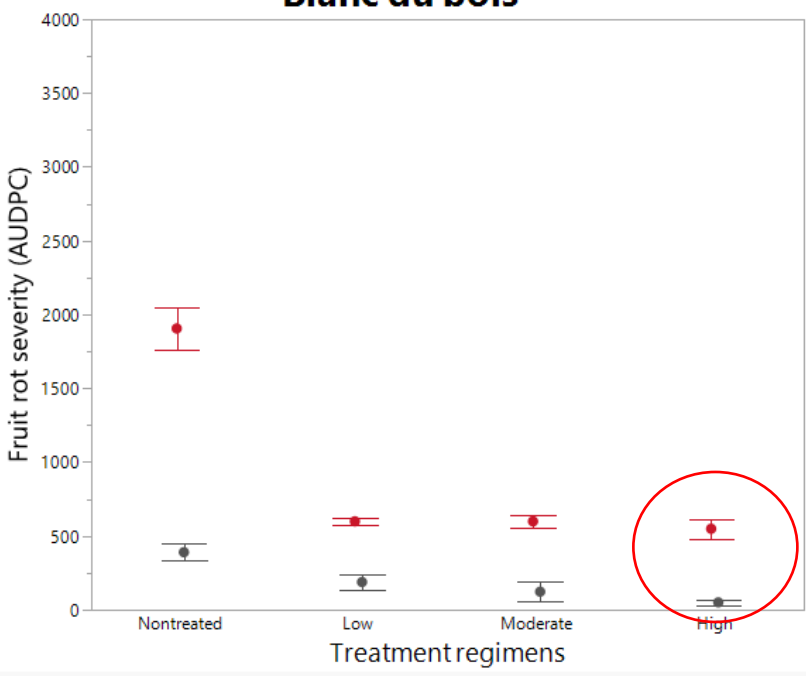
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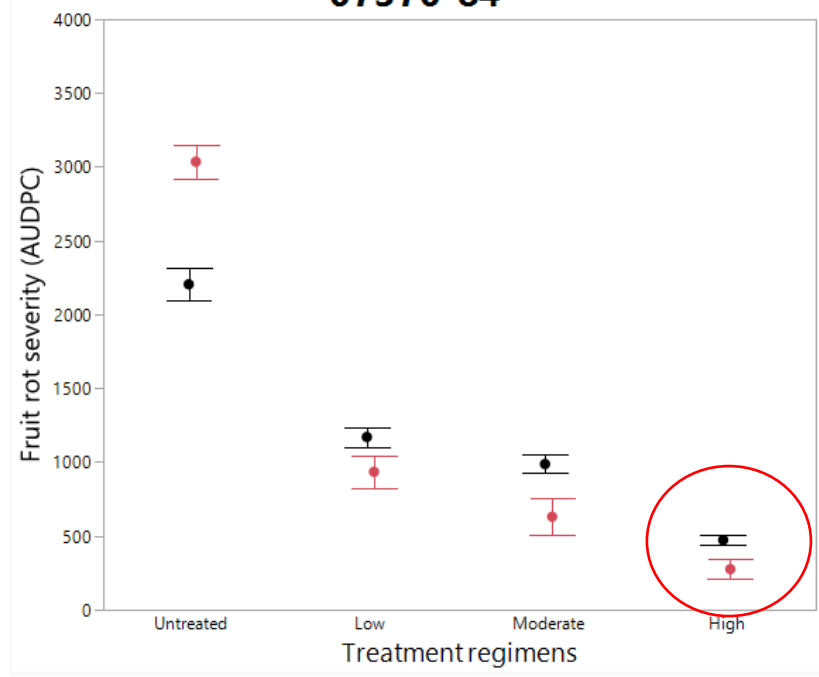


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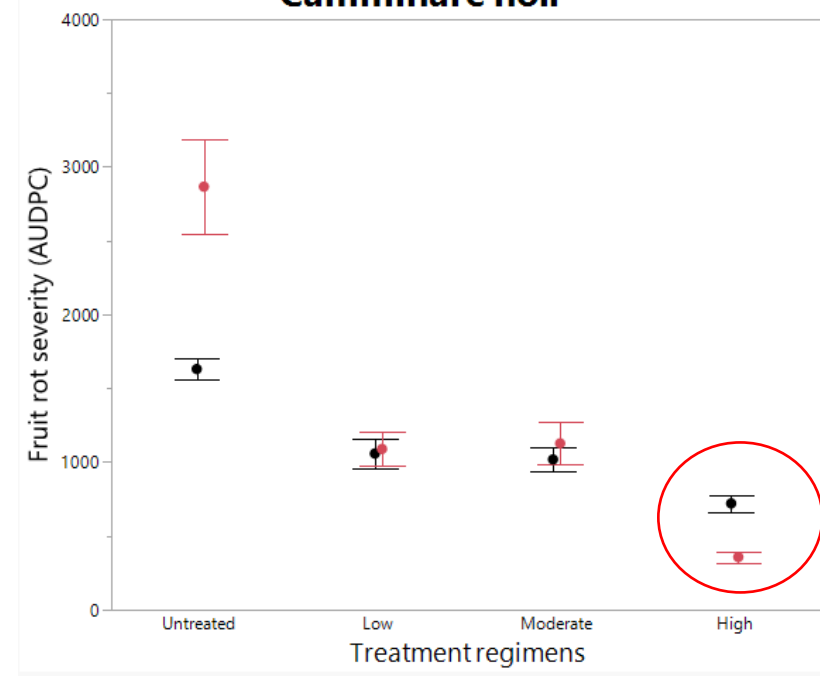
Blanc du bois



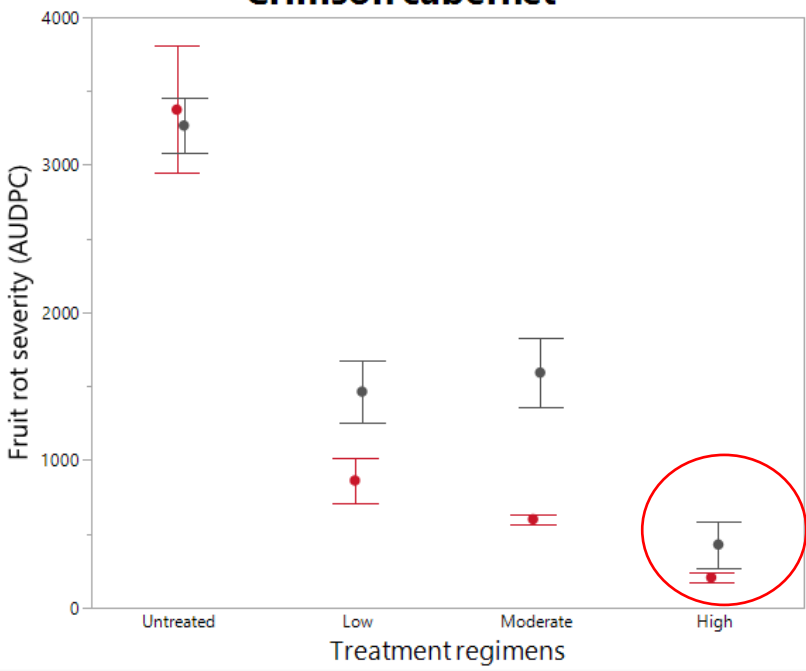
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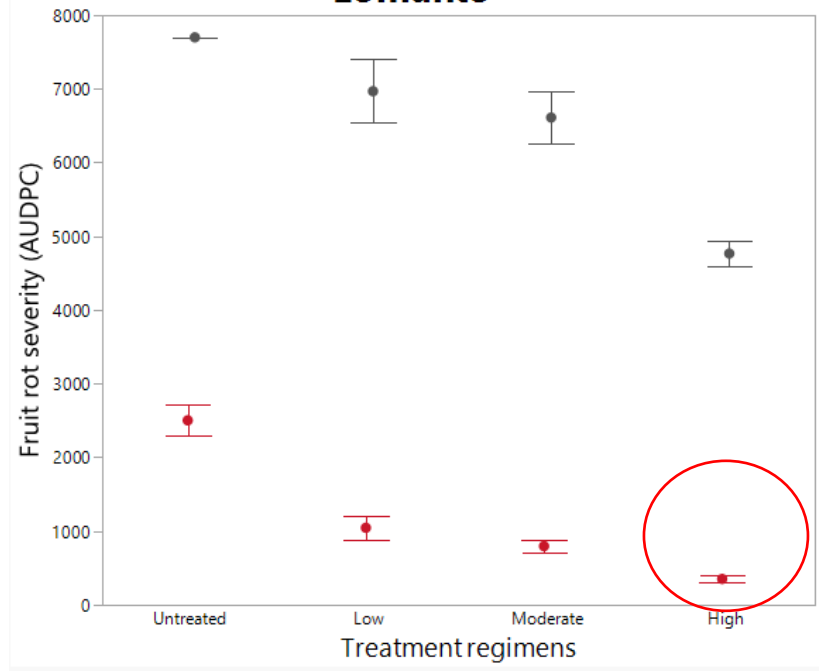
Camminare noir



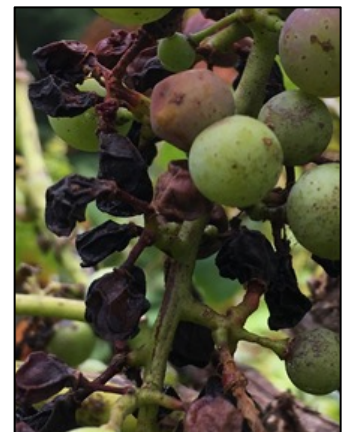
Crimson cabernet



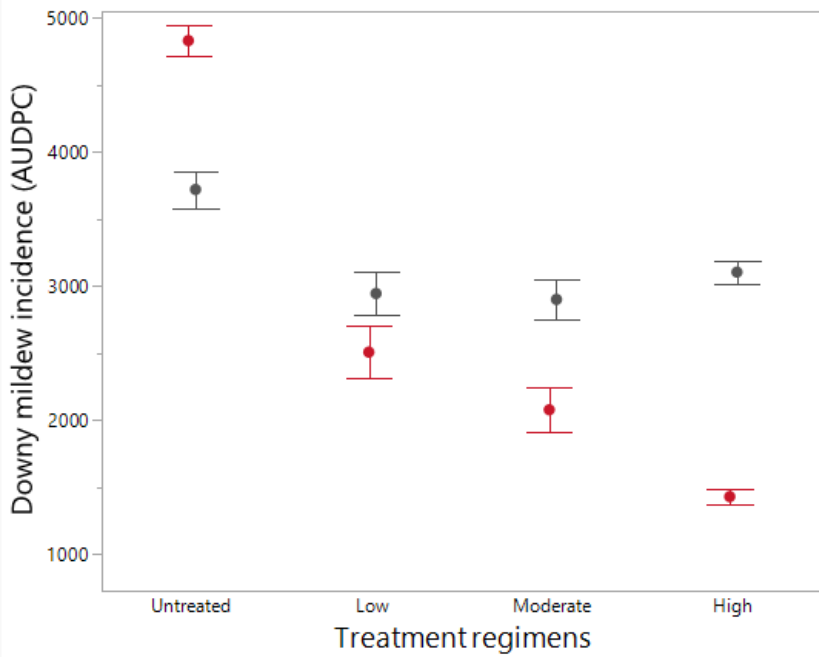
Lomanto



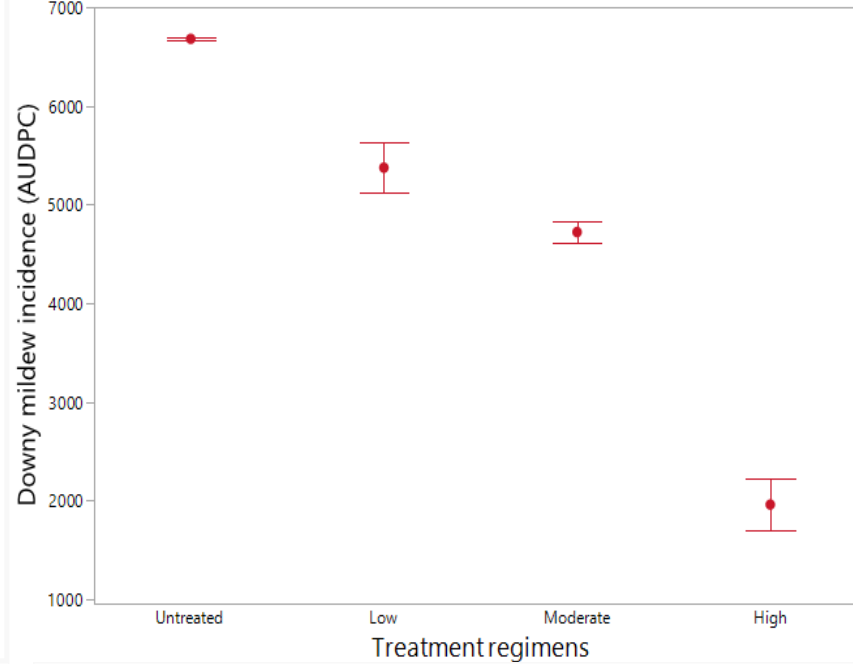
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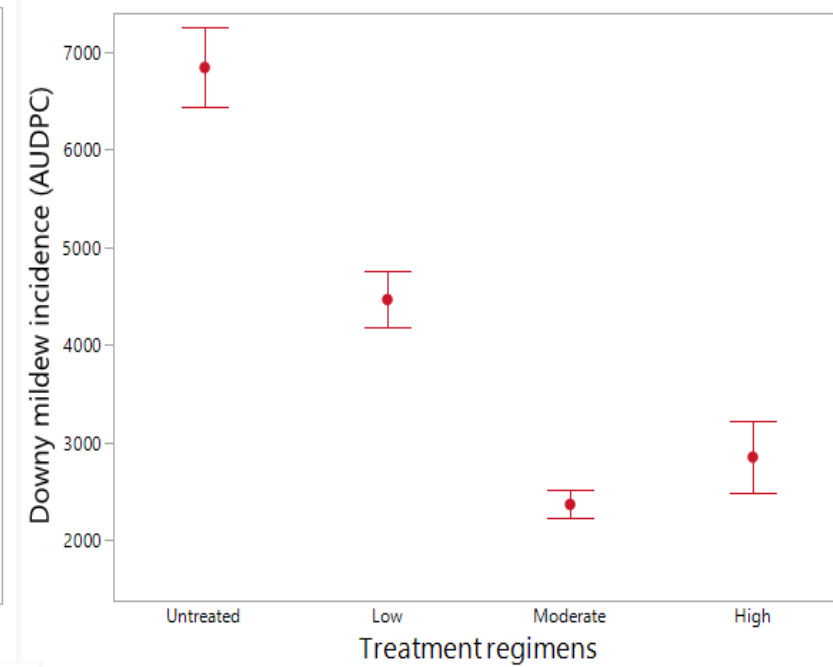
Blanc du bois



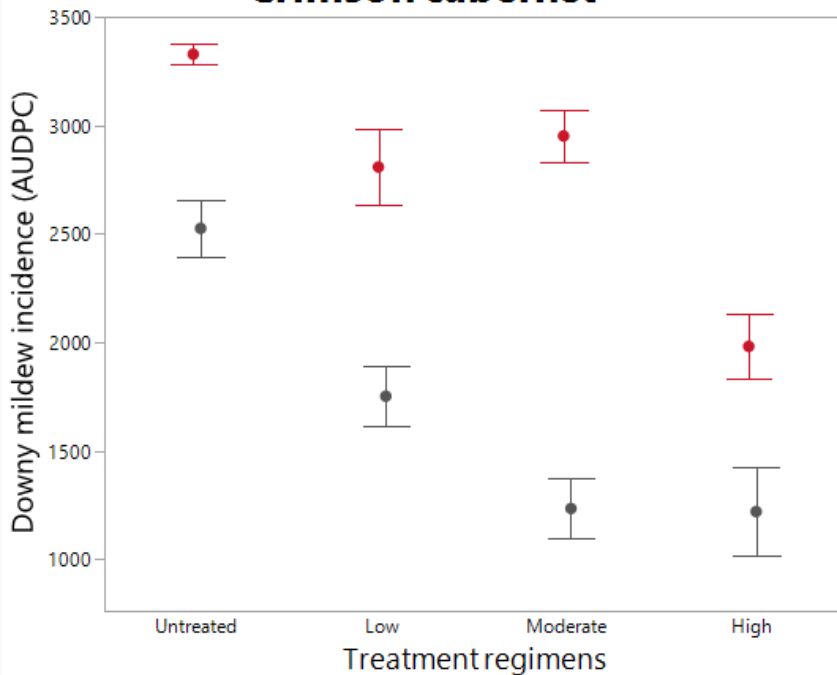
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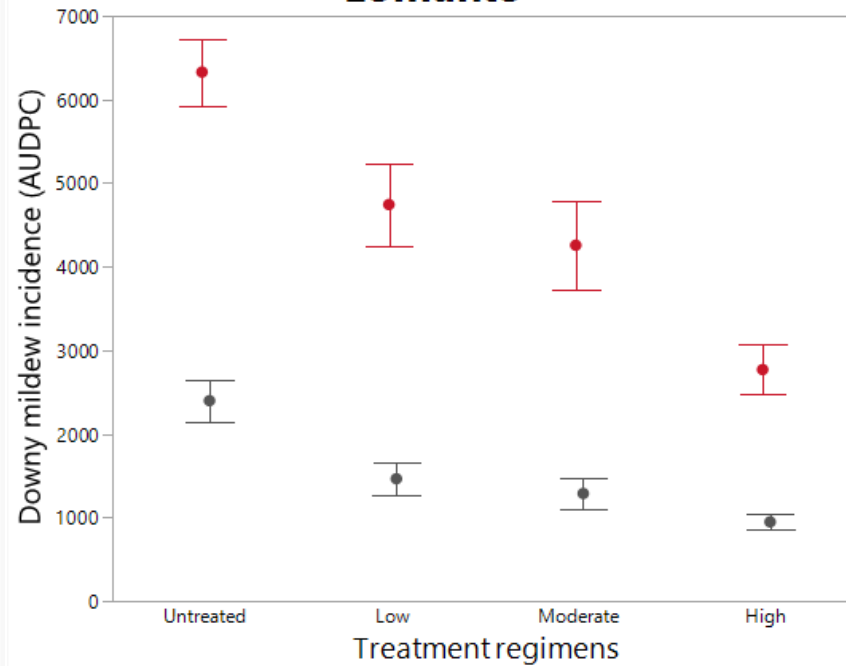
Camminare noir



Crimson cabernet



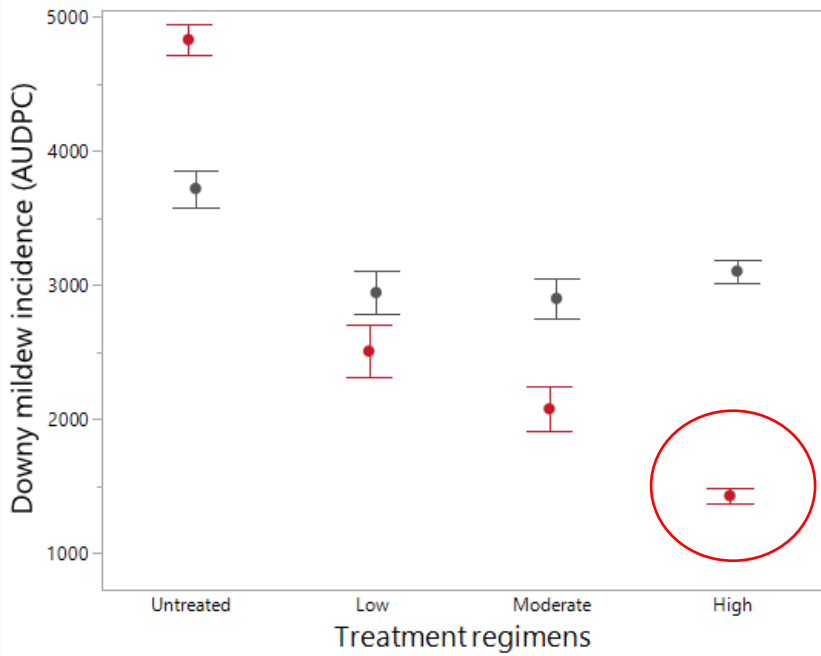
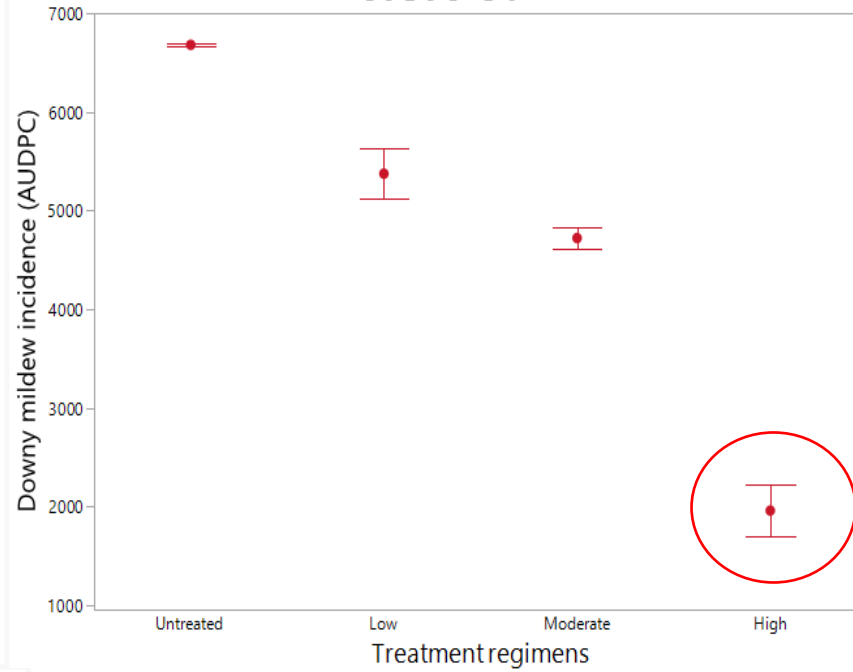
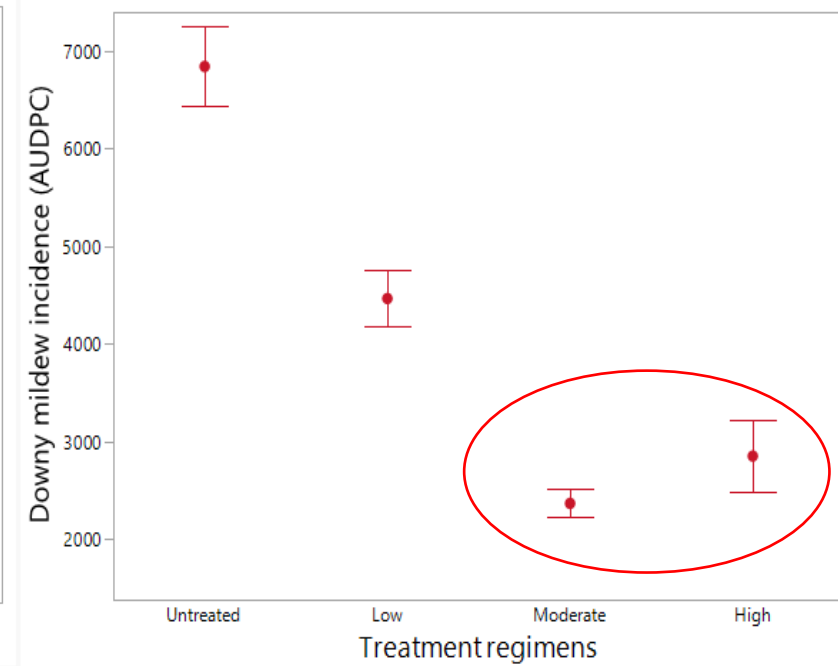
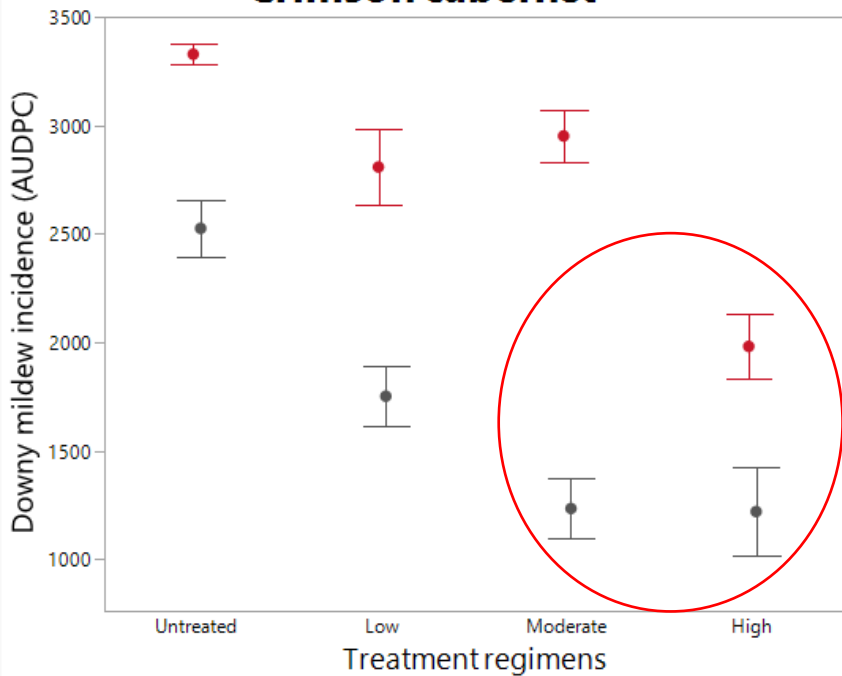
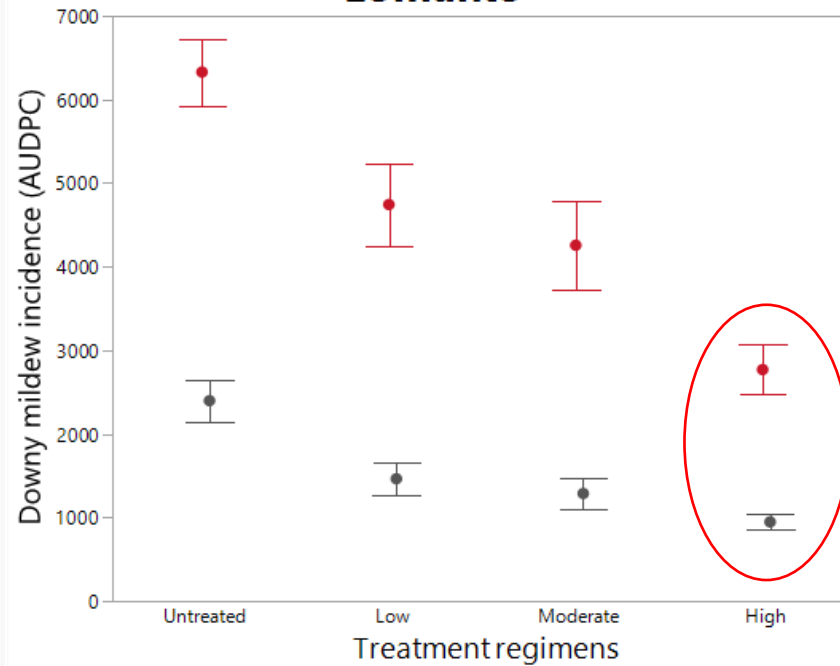
Lomanto



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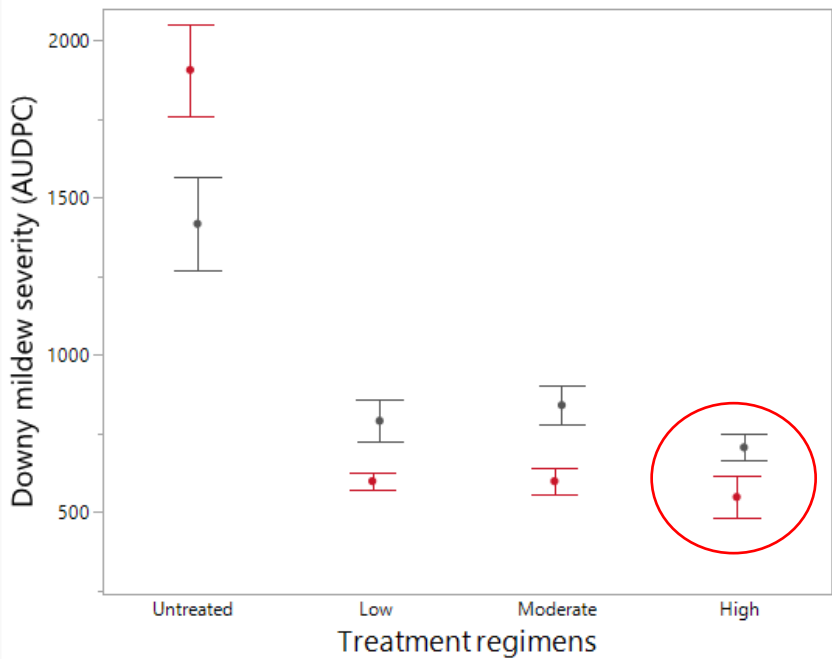
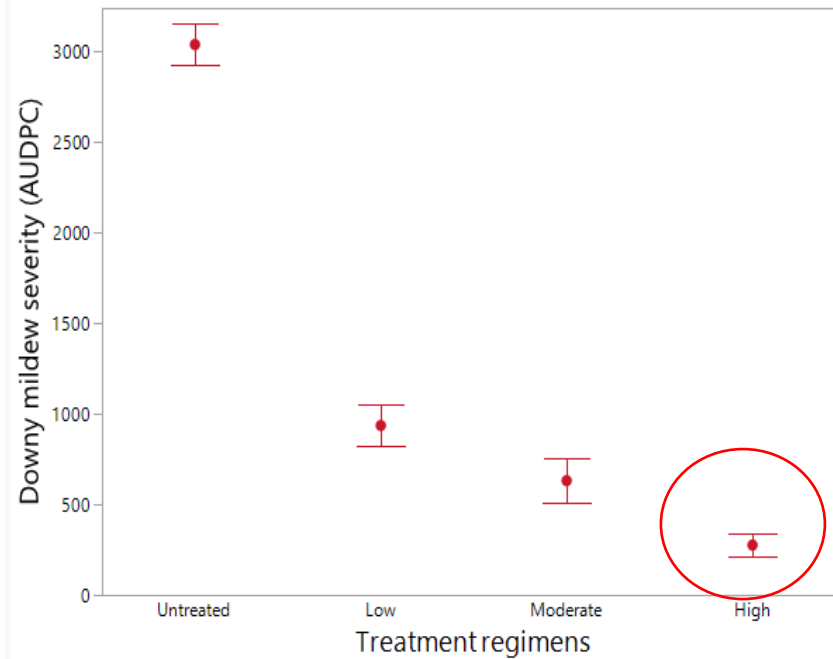
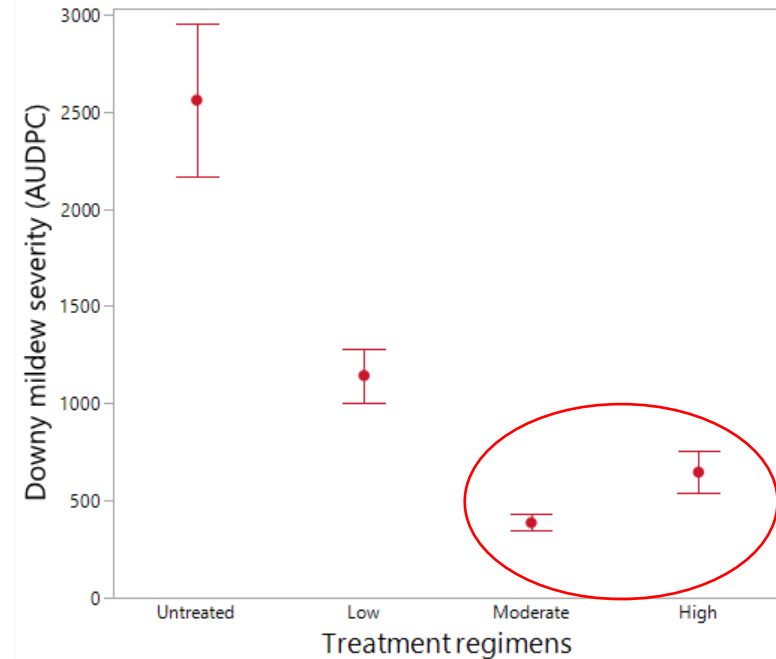
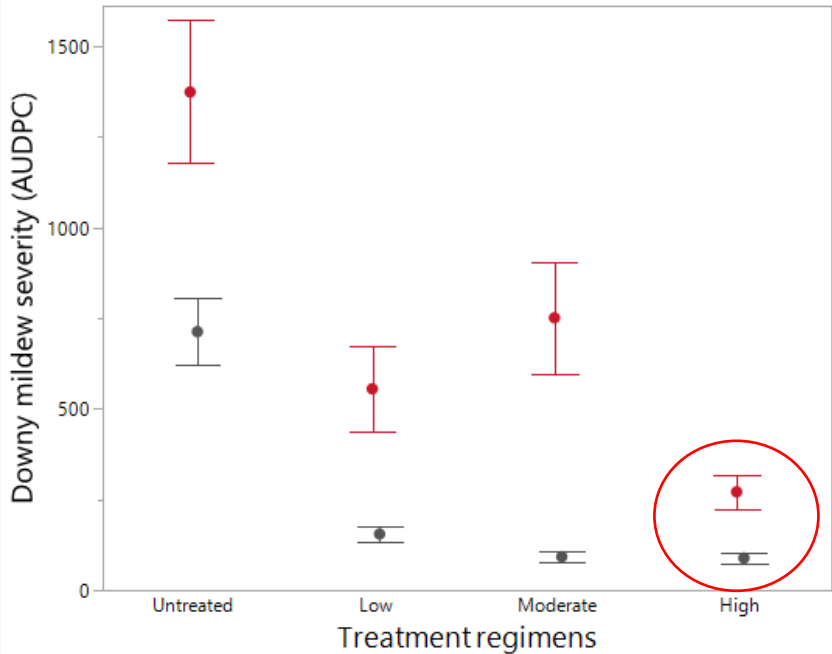
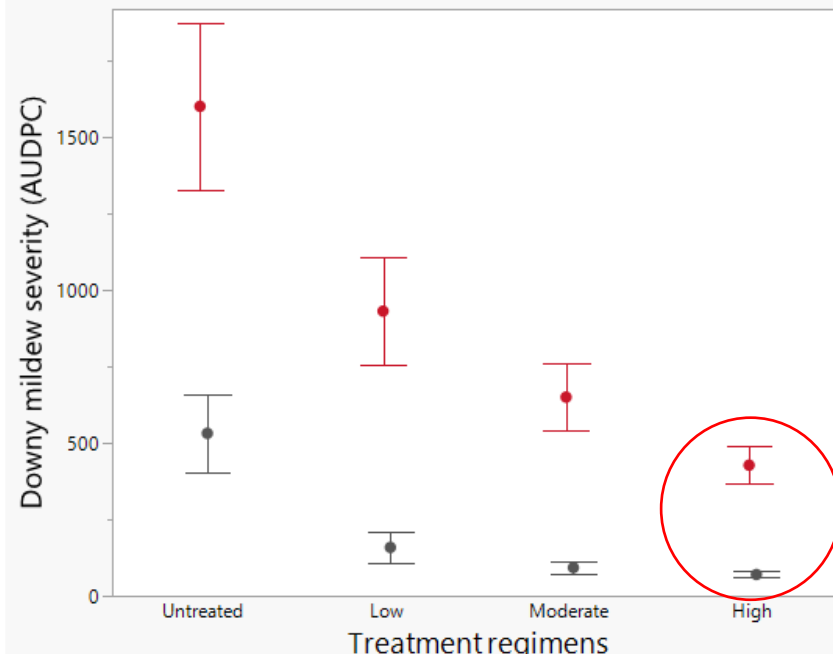
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Blanc du bois**'07370-84'****Camminare noir****Crimson cabernet****Lomanto**

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Conclusions

1. All hybrids were susceptible to downy mildew and rots though the degree may vary.
2. Blanc du bois did not show powdery mildew, whereas the other hybrids did show some degree of powdery mildew susceptibility, and would require additional powdery mildew active materials.
3. Rots observed were Macrophoma rot, bitter rot, and black rot.
4. A full spray program is generally required for hybrids due to rots. Unfortunately, limited cost savings could be realized in the Georgia environment.





Questions?



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