

Fungicide Treatment of Redbays for Prevention of Laurel Wilt

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High value redbays



Fungicides and Tree Wilt Diseases

- Macro-infusion of systemic fungicides has been used prevent other wilt diseases
- Propiconazole (Alamo®)
 - Used against Oak Wilt
 - May not provide multiple years protection
 - Can be diluted in comparatively small volume H₂O
- Thiabendazole hypophosphite (Arbotect® 20S)
 - 2-3 year rotation to protect against Dutch Elm Disease
 - Requires substantial dilution to avoid foliar toxicity

Macro-infusion

- Delivers large volume of diluted chemical solution directly into vascular system via holes drilled in stem or root flare
- Solution flows from pressurized container through tubing and tees



Effect of propiconazole on laurel wilt disease
development in redbay trees and on the pathogen
Raffaelea sp. *in vitro*

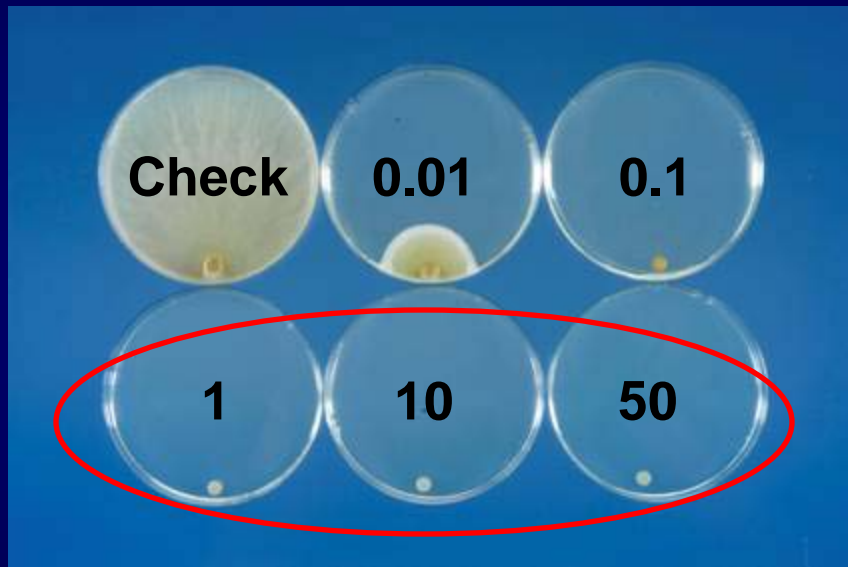
Mayfield, A.E. III, Barnard, E.L., Smith J.A, Bernick, S.
and Eickwort, J.M. 2008.

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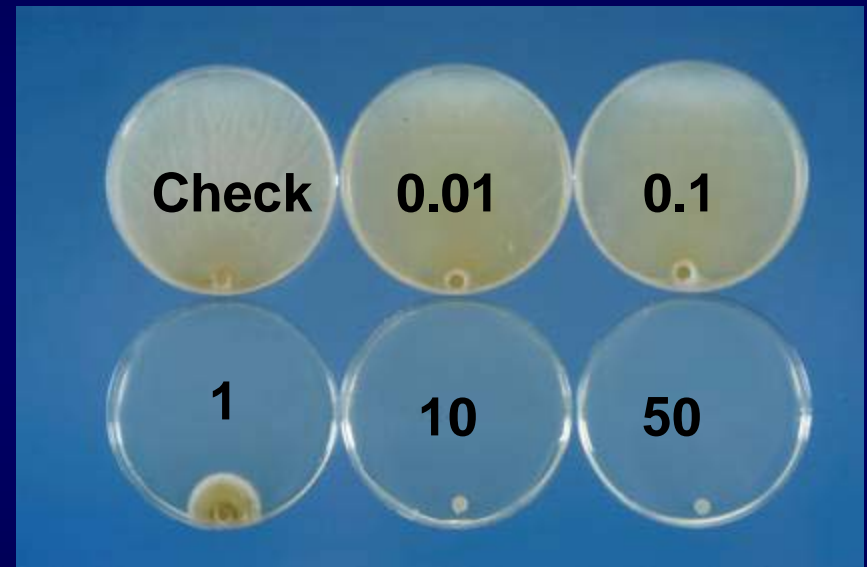
Effect of propiconazole on laurel wilt disease development in redbay trees and on the pathogen *Raffaelea* sp. *in vitro*

1. Inhibition *in vitro*: Determine minimum effective concentrations (MEC) at which fungicides inhibit *Raffaelea* sp. growth on APDA
2. Fungicide injections: Determine whether root-flare injections of propiconazole help prevent laurel wilt in mature redbays
3. Fungicide bioassay: Determine if propiconazole is retained in xylem up to 7.5 months later

1. In-vitro Tests of Fungicides on growth of *Raffaelea lauricola*



Propiconazole
(Concentration, ppm)



Thiabendazole
(Concentration, ppm)

* Plugs transferred to fresh agar; fungus dead on Propiconazole 1-50 ppm

2. Fungicide Injection Field Trial



- Root-flare injections of propiconazole (Alamo®)
- 20 ml product in 0.3 L water per inch DBH
- *Raffaelea* sp. inoculum plug inserted at BH 2-3 weeks post injection



2. Fungicide Injection Field Trial

Tree Injection Treatment	Tree Inoculation Treatment ^{†††}	No. of trees	DBH (cm)	
			Mean (SE)	Range
Propiconazole [†]	Raffaelea sp. plug	10	23.8 (1.7)	16.8 - 35.8
None	Raffaelea sp. plug	10	24.8 (2.0)	16.8 - 39.4
None	Clean agar plug	5	15.1 (0.3)	14.2 - 16.0
Propiconazole ^{††}	None	7	23.4 (1.6)	16.5 - 29.2

[†] Trees injected Mar 28 – Apr 5, 2007.

^{††} Two trees injected Mar 30 – Apr 5, 2007; five trees injected Jun 27-28, 2007.

These trees were used and evaluated in the bioassay trial only.

^{†††} Trees inoculated April 19, 2007.



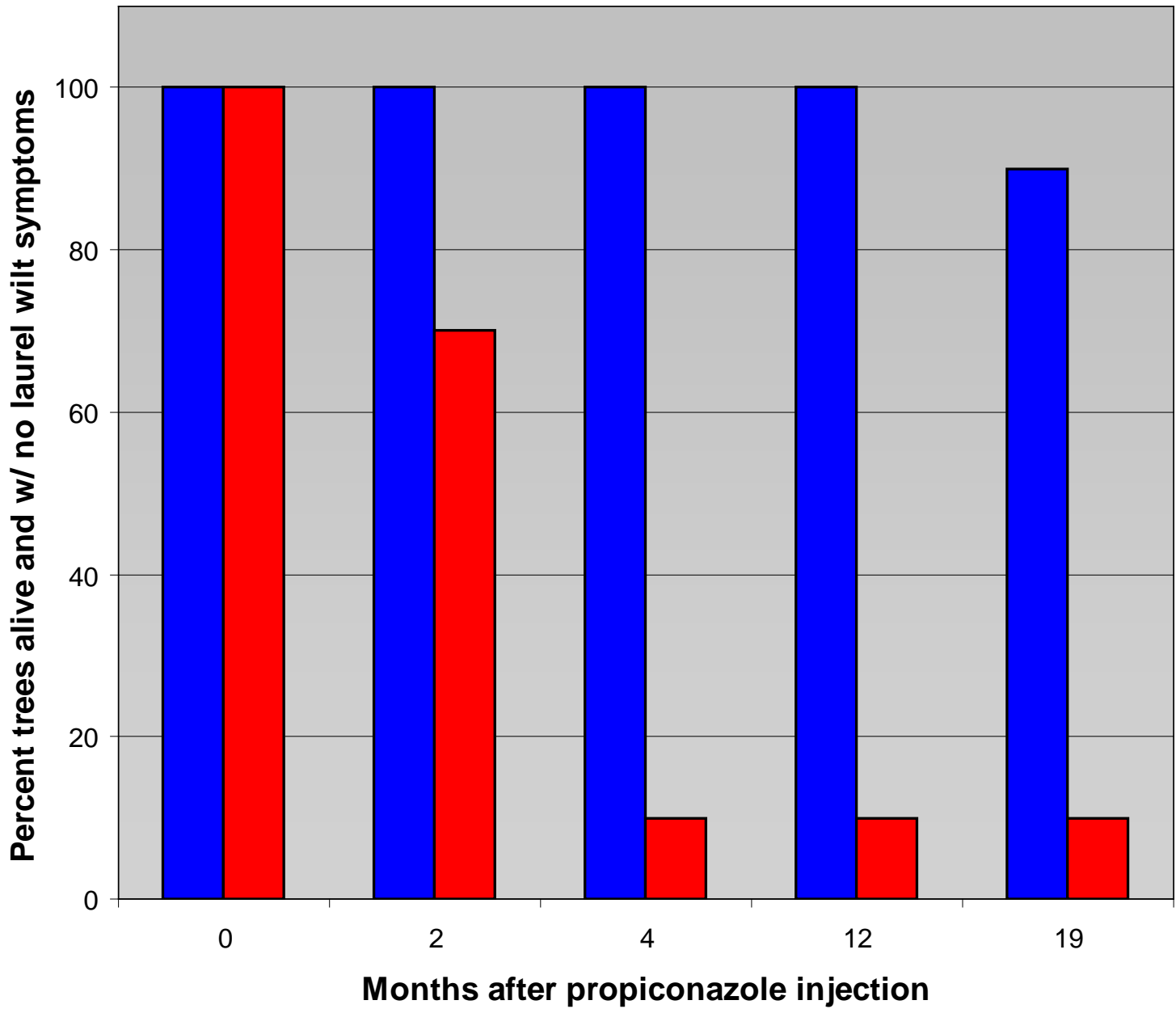


Fungicide Injection Field Trial

Percentage of redbays with greater than 1/3 crown wilt, from time of pathogen inoculation:

Weeks post inoculation	Treated (n=10) Fungicide (+) Pathogen (+)	Control (n=10) Fungicide (-) Pathogen (+)	Clean plugs (n=5) Fungicide (-) Pathogen (-)
6 weeks	0%	30%	0%
9 weeks	0%	70%	0%
12.5 weeks	0%	90%	0%
30 weeks	0%	90%*	0%

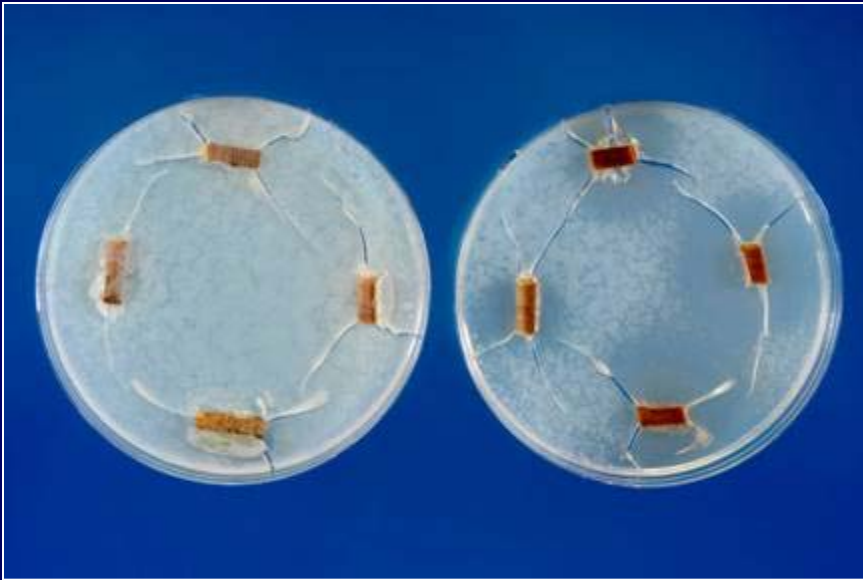
**Raffaelea* sp. recovered from 8 of the 9 wilted trees



■ Propiconazole + laurel wilt fungus (n=10)
■ Laurel wilt fungus only (n=10)

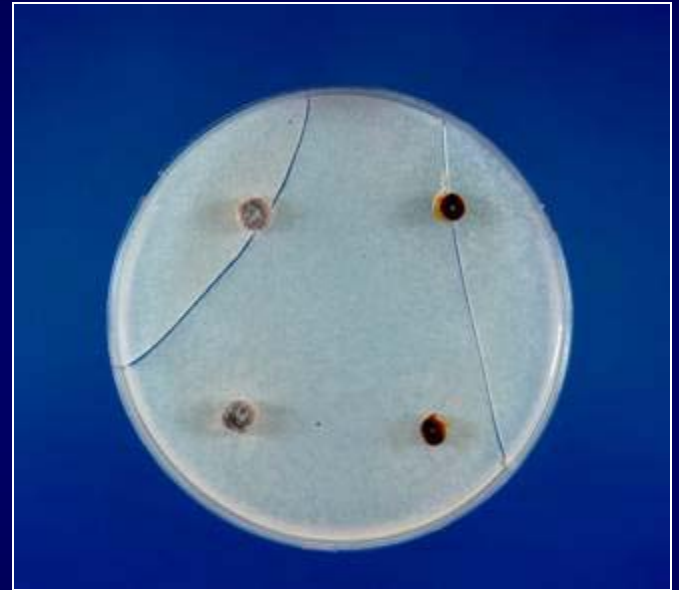
3. Fungicide Bioassay

Plugs from main stem
(4 per tree)



- Evidence of inhibition in 16 of 17 treated trees
- Usually in 3-4 samples/tree
- Inhibition zones in agar more frequent in trees injected most recently

Outer branch discs
(6 per tree)



- Evidence of inhibition in 9 of 17 treated trees
- Usually in 1-2 samples/tree
- No inhibition zones in agar

Summary

- Macro-infusion with propiconazole
 - prevented laurel wilt in 9 of 10 redbays that were inoculated with pathogen 2-3 post fungicide treatment
 - 8 trees inoculated 12-15 months post treatment still alive 3 months later, controls dead
 - Results suggest that properly-applied treatment may prevent laurel wilt in redbay for 1 year, perhaps longer
- Yet to be determined:
 - Max length of time a single treatment protects tree
 - Efficacy against heavy natural beetle pressure: treatment was not evaluated on trees repeatedly inoculated with the fungus at numerous points

Notes on propiconazole treatment of redbay

- Macro-infusion kit with hand-pump tank
- Highest label rate (20 mL Alamo per in. DBH)
 - Label dilution (1 L water) may be cut to 30%
- Should be able to apply relatively year-round (except avoid new leaf expansion)
- Trees with no laurel wilt symptoms
- Trees with good form, minimal decay: best
- Slow uptake

www.fs.fed.us/r8/foresthealth/laurelwilt



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