

Phytophthora Management in Citrus Nurseries

Megan M. Dewdney
and Jamie D. Burrow

GENERAL SANITATION PRACTICES

- Do not enter greenhouses after visiting citrus groves.
- Keep head house area and greenhouse walkways swept and free of debris.
- Don't use surface water as an irrigation water source.
- It is recommended to have a disinfecting copper footbath at each house entry.

TOOLS

- Shovels should be disinfested before and after each use and should NEVER touch the floor during storage.
- Hose nozzles should never contact the ground.
- Hose nozzles should remain on bench tops or hooks when stored.
- If the hose nozzle contacts the ground, decontaminate immediately (see other side).

BUCKETS, POTS, AND TUBS

- Should only be filled with clean potting media.
- If pots have sat on the floor, do not stack pots on top of one another.
- Do not store pots directly on the ground or within a splash zone.

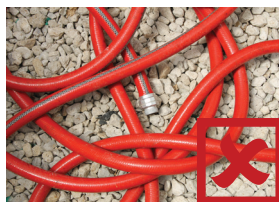
POTTING MEDIA

- Where possible, source potting media from Phytophthora-free supplier.
- Store potting media on a concrete pad and periodically disinfest the pad.
- Storage areas should be protected from wind and rain.
- Pile should be kept covered.

- Restrict access to media storage area.
- Station a copper footbath at entrance of storage area.
- Footwear should be disinfested at each entry.
- Tractor tires, scoops, and shovels used to move media should be disinfested as needed.

GENERAL SANITATION MANAGEMENT

- Sanitizing should be at the start of each workday for personnel and tools, when moving among plants within or between benches, or when moving from one house to another within the nursery.
- All equipment should be re-sanitized if dropped or if used in a non-clean area.
- When hand watering, keep water splash to a minimum.
- Nursery workers should not stand on or use tables or pots as a step.



INCORRECT! Hoses and hose nozzles should not be stored on the ground.



CORRECT! Hose nozzles should be stored on bench tops or hooks.



INCORRECT! Buckets, pots, and tubs should not be stored directly on the ground.



CORRECT! Buckets, pots, and tubs should be on a pallet, table or other storage location to prevent direct contact with the ground.



INCORRECT! Shovels and brooms should not be stored on the ground.



CORRECT! Shovels and brooms should be hung or stored off the ground.



INCORRECT! Benches should NEVER be used as a step.



CORRECT! Use a step stool to reach electrical cords or other items that are out of reach.

Photo Credits: Jamie Burrow, UF/IFAS and USDA APHIS PPQ

COMMON DISINFESTANTS AND FACTORS TO CONSIDER IN THEIR SELECTION FOR NURSERY USE

Disinfestant	Factors affecting efficacy	Corrosive to metals	Residual activity
Bleach (10%)	<ul style="list-style-type: none"> • efficacy reduced by organic matter • degrades in sunlight, solutions need to be made fresh daily • water pH (optimal pH range for maximum efficacy is 6.5–7.5) 	Yes	Low
Alcohol (70%)	<ul style="list-style-type: none"> • ineffective in the presence of organic matter • alcohol will evaporate if not kept in a closed container, which will reduce efficacy 	No	Low
Hydrogen Peroxide	<ul style="list-style-type: none"> • efficacy reduced by organic matter • degrades in sunlight 	Moderate	Low
Quaternary Ammonium	• hard water (>400 ppm Ca) reduces efficacy	No	Good

CHEMICALS APPROVED FOR USE IN CITRUS NURSERIES FOR PHYTOPHTHORA*

Fungicide ¹	Mode of Action (MOA)	Restricted Entry Interval (REI)	Postharvest Interval (PHI)	Rate	Application Method	Resistance Management
Adorn	Group 43	6 days for thinning, pruning, and pinching	365 days	1–4 fl oz/100 gal	Foliar; drench	Tank mix with another registered fungicide with different mode of action; no more than 2 applications per cropping cycle; do not apply sequentially, alternate with another fungicide registered for citrus nurseries.
Oxiphos (O), Prophyt (P), Reveille (R)	Group 33	0 hours for non-spraying application in enclosed structures (O) 4 hours (P,R)	0 days	0.5–1.0 gal/100 gal (O); 2 gal/100 gal (P, R)	Drench (O,P,R); drip irrigation (P,R)	Apply prior to appearance of disease or as disease is first observed. Initiate when environmental conditions are favorable for disease. Do not combine with other products.
Revus**	Group 40	4 hours	365 days	8–16 fl oz/100 gal	Drench	To be used preventively. Maximum of four applications during one calendar season.

* Mefenoxam and metalaxyl do not have a label for nursery use and should never be used in nurseries.

**For use in container production in nurseries and prior to transplanting.

PERSONAL PROTECTIVE EQUIPMENT (PPE) REFERENCE GUIDE FOR CITRUS NURSERY FUNGICIDES (APPLICATORS AND OTHER HANDLERS)

Fungicide ¹	Long-sleeved shirt and long pants	Chemical-resistant gloves	Shoes and socks	Comments
Adorn	Yes	Yes	Yes	Chemical-resistant gloves made of any waterproof material such as natural rubber > 14 mils.
Revus	Yes	N/R	Yes	For early entry, PPE requirements are coveralls, chemical-resistant gloves made of any waterproof material, and shoes plus socks.
Oxiphos, Prophyt, Reveille	Yes	Yes	Yes	For early entry, PPE requirements are coveralls, chemical-resistant gloves made of any waterproof material, and shoes plus socks.

¹All listed pesticides are registered and trademarked products.

Refer to label for additional information. This guide does not supersede the label. **The label is the law!**