

Chrysanthemum White Rust



syngenta flowers



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Today's Topics

- How Chrysanthemum White Rust (CWR) can impact chrysanthemum production
- How to recognize the symptoms/signs
- How to protect your crops



■ CWR caused by *Puccinia horiana*



Importance of Chrysanthemum White Rust caused by *Puccinia horiana*

- Can spread rapidly in a greenhouse or nursery resulting in severe losses
- A quarantine disease in the United States and Canada
- Introduction from overseas has had a significant impact to the chrysanthemum industry in US and Canada

First symptoms are yellow spots on upper leaf surfaces up to 4 mm in diameter



Prominent pustules subsequently develop on lower surfaces of leaves



Pustules are pinkish buff in the beginning



Pustules become waxy white



Upper and lower leaf surfaces



LOOK!

New observation in 2010:

**Pustules can also be found
on the upper leaf surface**



Another new observation in 2010:
Purple rather than yellow spots associated
with the white pustules



A close-up photograph of a green, lobed leaf showing signs of plant disease. The leaf is covered with numerous small, raised, light-colored pustules and larger, irregular yellowish spots. A dark, brownish, necrotic lesion is visible on the left side of the leaf. The background is dark and out of focus.

**Note yellow spots and pustules
on upper leaf surface**

Brown Rust or Chrysanthemum Rust is distinct from CWR



- *Puccinia tanacetii*
(*Puccinia chrysanthemi*)
- Chocolate brown pustules
- Present in U.S.
- Rarely causes heavy losses
- Not a quarantine pest

Do not confuse White or Brown Rust with Slime Mold



Slime Mold on underside of chrysanthemum leaf



Slime Mold on underside chrysanthemum leaf with most fruiting bodies erupted

Slime Molds do not infect plants but they blemish them by growing on the surface of plants



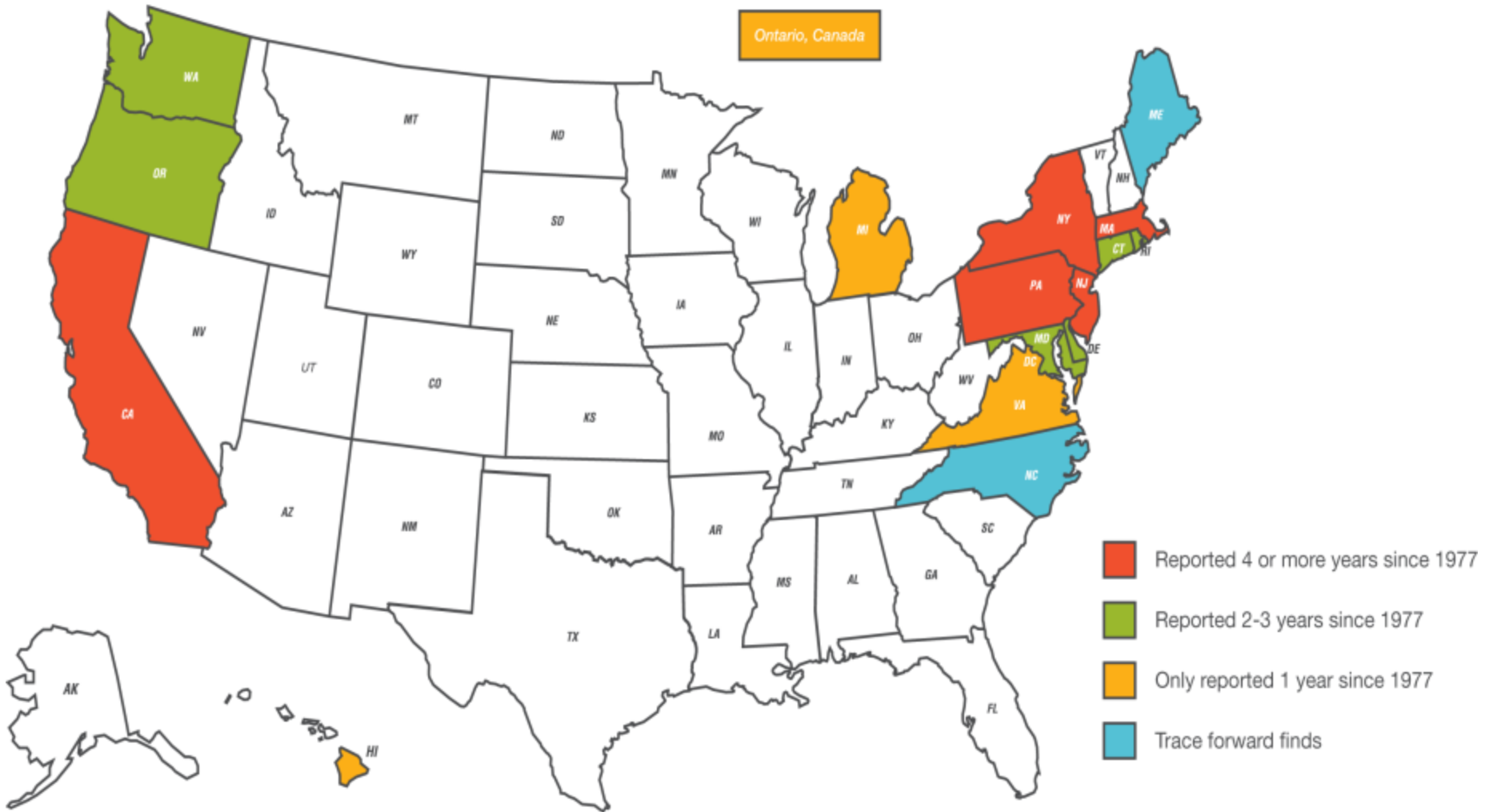
Chrysanthemum White Rust Pustules

- Most common on young leaves and flower bracts
- Can be found on any green tissue; this is a way CWR can move on cut flowers

British Columbia, Canada

REPORTS OF CWR IN US AND CANADA

Ontario, Canada



CWR

Host Range

12 species of chrysanthemum susceptible

- Pot mums, cut mums, and garden mums
Chrysanthemum morifolium
- Nippon daisy or Montauk daisy ***Nipponanthemum nipponicum***
- ***Ajania pacifica*** (syn. ***Chrysanthemum pacificum***)
- Giant daisy or High daisy ***Leucanthemella serotina***,
(syn. ***Chrysanthemum serotinum***)

[Click here for USDA Host Range \(Appendix VI\)](#) (See page 19)

Note: When opening links from this Webinar, close the link after viewing -- and before you try to open the next link!

HOW DOES CWR INFECT MUMS?

Spores are carried through the air, by humans, or by water from an infected plant to a new plant

Two kinds of spores:

- Surviving spores (teliospores)
- Infecting spores (basidiospores)

Why is that important?

The 2nd spore type (basidiospore) must be formed before there will be any appreciable spread of the disease and conditions must be correct before the 2nd spore type is formed at all

The survivors - teliospores

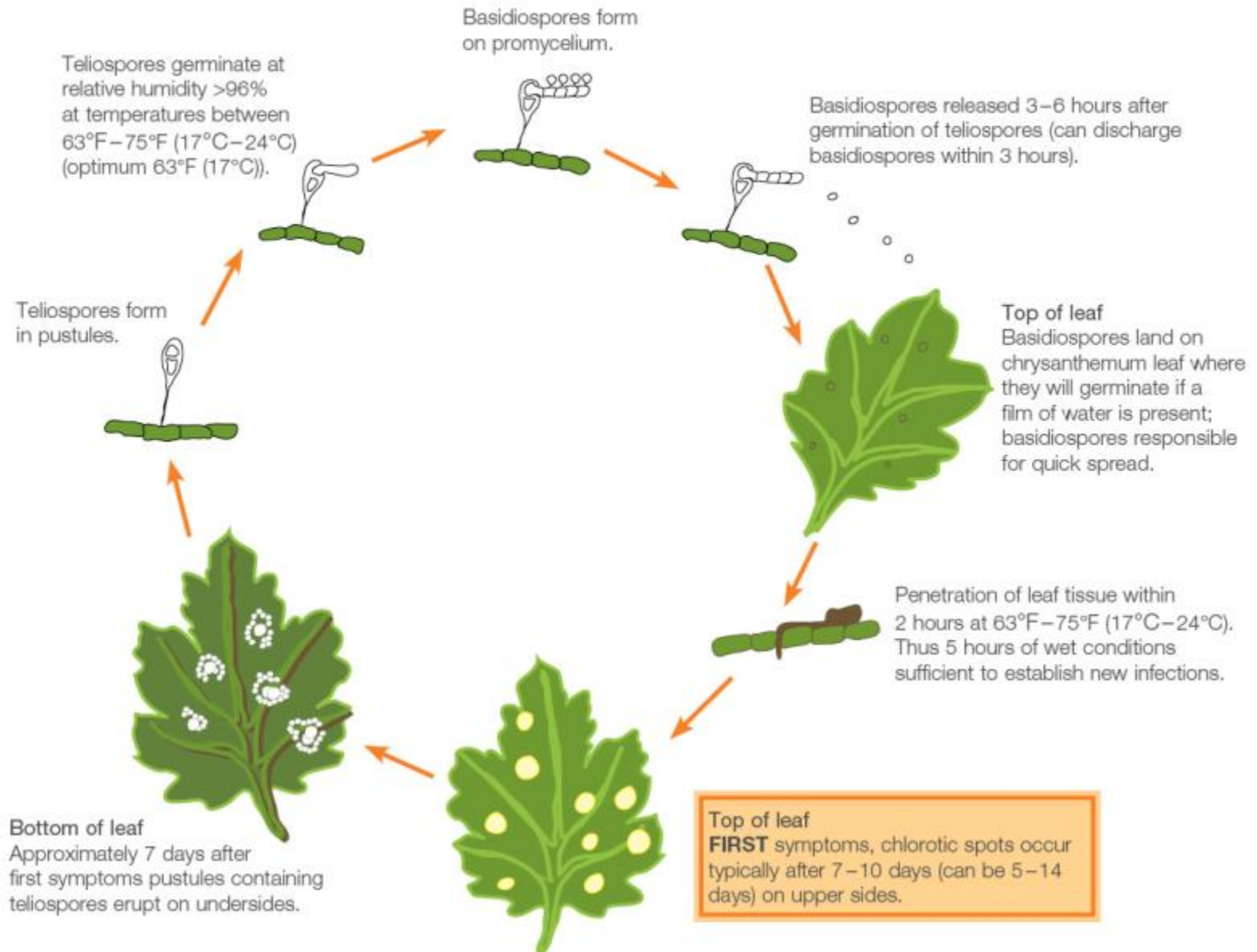
- Can last for 8 weeks on dried leaves! They survive only one to three weeks if infected tissue is buried under soil – so bury your cull piles with at least 2 inches of soil!
- Are produced in pustules and remain in pustules unless the teliospores are aggressively brushed off
- Produce the basidiospores when conditions are moist for 3 hours (optimum temperature = 63°F)

The “infectors” - basidiospores

- Can cause epidemic if conditions are right
- Spread from plant to plant by splashing water and human handling
- Must have film of water on plant surface for infection
- Infection (host penetration) can occur in 2 hours at optimum temperature of 63°F
- Can travel up to about 1/2 mile by wind currents during moist weather
- Survive:
 - only 5 minutes when relative humidity is 80% or below
 - and less than 60 minutes when relative humidity is 90%

Life cycle of *Puccinia horiana* Henn.

(after Firman and Martin 1968)





Possible sources of CWR for US and Canada

- Imported chrysanthemum cut flowers with infection
- Smuggled chrysanthemum material
- Overwintering (?) in environment
(currently being researched)

How do we try to keep white rust out of the US and Canada?

- White rust prevention system required by USDA in countries exporting cut mums to U.S.
- Inspection of chrysanthemum cut flowers at U.S. ports of entry (note: no inspection in Canada)
- Quarantine of imported propagation material (cuttings) into U.S.

[Click here for more details](#)

CWR Prevention within the US and Canada

- Plant ONLY cuttings from reputable commercial source
- Scout crop regularly from stick to sale
- ***Imported cut mums should never be handled in or near mum-growing facilities because spores can be moved by worker handling and by wind (up to ½ mile away)***
 - They can be infected and not yet show symptoms or signs***
- Maintain low humidity and dry foliage
- Schedule regular applications of preventive fungicides if you are in an area where CWR has been previously reported e.g. if within ½ mile of residential area or cemetery

Fungicides useful to prevent CWR

(alphabetized by brand)

- **Banner Maxx® (propiconazole)**
- **Cygnus® (kresoxim-methyl)**
- **Daconil Ultrex® (chlorothalonil)**
- **Dithane® 75 DF (mancozeb)**
- **Heritage® (azoxystrobin)**
- **Insignia® (pyraclostrobin)**
- **Pageant® (pyraclostrobin + boscalid)**
- **Strike® (triadimefon)**
- **Terraguard® (triflumizole)**

Eagle® (myclobutanil) is best used as an eradicant and not as a preventive. If you are in a high risk area and conditions are favorable for CWR, we recommend a prevention program (described in CWR Bulletin).

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[Click here for spray schedule](#) (See page 4)

If you find CWR

- Report it: *this is the law*

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- Inform USDA, CFIA, state, or county regulatory officials
- Regulatory officials will supervise eradication and treatment program



Why is it important to report chrysanthemum white rust?

- Make sure grower and retailer losses are minimized
- Try to keep it from spreading in the chrysanthemum industry
- Collect data on the location of the finds and document information about the disease spread to maximize prevention for the future

Eradication and treatment program

- Infected nursery (chrysanthemums) will receive an **E**mergency **A**ction **N**otice preventing shipment until declared “free”
- Required destruction of symptomatic plants and the surrounding one-meter radius
- Three treatments, at 5-7 day intervals, with eradicant fungicide (e.g. myclobutanil = Eagle)
- Final inspection 5-7 days after 3rd treatment; if no CWR, plants released for sale
- Can be very disruptive to normal business operations

[click here for US National Protocol](#)

You and Your Inspector

- Become familiar with the National Protocol for CWR eradication by visiting
 - http://www.aphis.usda.gov/plant_health/plant_pest_info/cwr/downloads/cwrplan.pdf
- Be aware that if a “stop shipment” has been placed on your crop and the inspections are being prolonged while CWR might be spreading, you may have the right to ask that the inspections be done in sections.
- This may then enable you to go ahead and begin the eradicant fungicide applications in completed areas thereby better protecting your yield.

In Conclusion

- EXCLUDE
- PREVENT
- ERADICATE
- [Click Here for CWR Bulletin](#)





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