

Chrysanthemum White Rust

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Chrysanthemum white rust is a serious disease of chrysanthemum caused by a fungus called *Puccinia horiana*. It is a quarantine disease in Canada and many other countries, including the United States. Therefore, any occurrence of the disease in Canada must be reported to the Canadian Food Inspection Agency (CFIA) or provincial Ministry of Agriculture for the implementation of appropriate eradication and quarantine measures.

Chrysanthemum white rust originated in eastern Asia. It is now established in Europe, Africa, Australia, Central America, South America and the Far East. It has not established in Canada or the United States. Although the disease has appeared in Canada and the United States, it has been eradicated or is being eradicated.

Symptoms

White rust in chrysanthemum appears as small white to yellow spots up to 4 mm wide on the upper surface of the leaf (Figure 1). These spots may be slightly dimpled and become brown as the disease progresses. Pustules form on the underside of the leaf, beneath the small spots observed on the upper surface of the leaf (Figure 2). These pustules originally appear as buff to pink-coloured (Figure 3). As they age, they become white (Figure 4). Pustules are most common on young leaves and flower bracts but can be found on any part of the foliage including flowers.

Infected plants can be symptomless, especially during hot and dry conditions. Symptoms usually appear during cooler, wet weather and it may take up to 8 weeks before infected plants show symptoms during periods of hot weather. Fungicide applications may also suppress the symptoms while the pathogen remains active in the plant.



Figure 1. Early symptoms of yellow-white, dimpled spots on the upper leaf surface.



Figure 2. Young pink-brown pustules on the under leaf surface.

Twelve species of chrysanthemum are known to be susceptible to white rust. These include pot mums, spray mums, and garden mums (*Dendranthema X grandiflorum* = *Chrysanthemum morifolium*), Nippon daisy (*Nipponicanthemum nipponicum* = *C. nipponicum*) and High daisy (*C. pacificum* = *Ajania pacifica*). Species that appear to be resistant to white rust include the annual chrysanthemum (*C. carinatum*), crown (*C. coronarium*), pyrethrum (*Tanacetum coccineum* = *C. coccineum*), marguerite daisy (*Argyanthemum frutescens*), ox-eye daisy (*Leucanthemum vulgare*), shasta daisy (*Leucanthemum X superbum* = *C. maximum*), and the corn marigold (*C. segetum*).



Figure 3. Young pink-brown pustules on the under leaf surface.



Figure 4. Mature white pustules on the under leaf surface

Spread

The casual organism is an obligate pathogen and will only grow and reproduce on susceptible live plants. It does not live outside the plant.

The fungus produces two types of spores, teliospores and basidiospores. Teliospores are produced on the pustule and remain on the pustule unless they are aggressively brushed off. Teliospores can survive up to 8 weeks if they remain in pustules on detached leaves at 50% RH or less. Teliospores germinate to produce basidiospores.

New infections are initiated by basidiospores, released from pustules under moist conditions and relative humidity of 96% to 100%. Basidiospores germinate on the plant surface and penetrate within 2 hours at the optimal temperature of 17°C. They need a film of water on the plant surface to cause infection. Basidiospores are quite fragile in comparison to other fungal spores. Basidiospores can survive for only 5 minutes when the relative humidity is 80% or below and for 60 minutes when the relative humidity is 81 to 90%. They spread from plant to plant by splashing water. Basidiospores can also travel short distances (700 metres) by wind currents during moist weather. The disease can spread quickly and cause substantial crop losses under greenhouse and nursery environments. Symptoms usually develop within 5 to 14 days after infection.

Basidiospores are fragile and do not survive long. However, it is possible to spread the disease if you have walked through a wet infected crop, and then walk into a healthy crop. It is recommended to wear coveralls and booties when going into an infested greenhouse. Change clothes, wash hands, and wash or change footwear before going into a clean greenhouse if you must go in. To minimize potential spread within greenhouse blocks, use separate staff for propagation areas, for rooting areas and for different growing areas where feasible.

Disease Prevention

New infections occur when symptomless infected cuttings are brought into a greenhouse or when viable spores are introduced. Buy healthy cuttings from reliable sources and regularly inspect them for symptoms, especially when the weather becomes cooler and wetter. In British Columbia's Fraser Valley, cool and wet weather usually starts in late August to early September. Infected plants start to show symptoms around this time.

Educate greenhouse staff and workers on monitoring for early disease symptoms and disease management strategies. Emphasize the importance of early detection in eradicating/controlling the disease. Since infected garden mums grown in the home could be a source of inoculum for the greenhouse extreme care should be taken when moving between the two sites.

Follow best management practices, including sanitation and disinfection procedures. Place a footbath with appropriate disinfectant at the entrance and exist of each greenhouse. Please refer to the factsheet on "On-Farm and Greenhouse Sanitation and Disinfection Practices" for information on sanitation/disinfection products and procedures. Adopt and implement biosecurity measures that are applicable to your production facility. For information, please refer to the factsheet on "Biosecurity Guidelines".

Disease Prevention & Eradication

- Verify that imported chrysanthemum cuttings originate from *P. horiana*-free production facilities.
- Thoroughly inspect imported cuttings before bringing in them into an isolated area of the greenhouse where they can be frequently monitored and handled last.
- Do not wet the foliage and controlled the greenhouse environment so that plant surfaces remain dry.
- Between crops, remove debris from the greenhouse. Power-wash the structure and glass with a cleaner. Wash down benches, floors, walkways and header-house with an appropriate detergent/disinfectant. Disinfect all crop support wires, watering lines, heating pipes, poles, equipment, flats, and tanks. Disinfect carts/tools/tractor tires etc. Use registered disinfectants/detergents and follow label directions.
- If you detect white rust contact immediately the CFIA office in your area. Follow the instructions and protocols on eradication of white rust as directed and advised by the CFIA. Strictly adhere to the eradication and quarantine measures proposed and imposed by the CFIA.

Note: For the selection of appropriate disinfectants please refer to the factsheet on "On-Farm and Greenhouse Sanitation and Disinfection Practices".

Contact the Plant Pathologist or Floriculture Specialist at the British Columbia Ministry of Agriculture at 604 556-3001 or a CFIA staff in your area for information on fungicides that are registered for the control of white rust in greenhouse and nursery production.

Resources

- [Chrysanthemum White Rust - USDA-APHIS](#)

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