

Chrysanthemum White Rust

Chrysanthemum white rust

(CWR), a fungal disease of chrysanthemums and related plants, was detected at one wholesale and multiple retail nurseries in the Fall of 2001 in the Portland metro area. This disease has the potential to be extremely damaging to the commercial horticulture and florist industries if it becomes established in the United States. The disease is indigenous to China and Japan, but has since spread to Europe, Australia, South America and Africa. To date, aggressive eradication programs have successfully prevented establishment in Oregon, but the disease appears to be gaining a foothold in several areas on the west coast.

Hosts

Twelve species of chrysanthemum (*Dendranthema*) have been shown to be hosts for the rust. Major susceptible varieties include *C. morifolium* x *C. spp.* hybrids (Florists chrysanthemum and Garden or Hardy mums), Nippon daisy, High daisy and *C. pacificum*. Species that have not developed symptoms when inoculated include the Annual chrysanthemum, the Crown, Pyrethrum, Marguerite, Ox-eye and Shasta daisies, Dalmatian pyrethrum and the Corn marigold.

Symptoms

Light green to yellow spots (which may be dimpled) appear on the upper surface of infected leaves. Eventually the spots turn brown and become necrotic. Spore forming pustules appear on the lower surface of the leaves and are buff to pink color. As these pustules mature, they become white (see photos). These symptoms most commonly occur on younger leaves and flower bracts, but can occur on other green tissue and on petals. Symptom development is limited or absent during hot and dry weather and may be suppressed by fungicide applications. Some mum varieties have resistance to some races of the CWR fungus.

Disease Movement

The disease is moved from infected stock to healthy plants primarily by splashing water that contains spores. Free water on the leaves is necessary for spore development. Under optimal conditions, new infection can be established in as little as five hours. CWR spores can travel 1/4 mile under high humidity conditions or during a rain storm. CWR can also spread to uninfected plants on contaminated soil, litter, dead leaves, gardening equipment, clothes, shoes and hands. Infectious spores can live for up to eight weeks on contaminated objects.



Garden Chrysanthemum var. Symphony with CWR. White pustules on underside of leaf (left) are the source of infectious spores. Early symptoms of CWR include small, round, whitish to yellowish lesions on upper surface of the leaf (right).

CWR Spore Viability & Establishment

Local spread of CWR occurs primarily by the aerial dispersal of specialized spores called basidiospores. These spores require a film of water for germination. This leaf wetting must be continuous for at least five hours in the presence of at least 95% humidity for the spores to initiate a viable infection. Some other key factors reported by researchers are:

- **Basidiospores suffer 100% mortality if subjected to 80% or less relative humidity (rH) for 5 or more minutes.**
- **Basidiospores suffer 100% mortality if subjected to 90% or less (rH) for 1 hour or more.**
- **Aerial spread between greenhouses has not been demonstrated in distances over 100 meters.**
- **Aerial spread between outdoor plantings has not been demonstrated to exceed 700 meters.**
- **Full symptom expression takes from 5-35 days (d) post-infection; 7-10 d at 72 F, 13 d @ 50 F.**

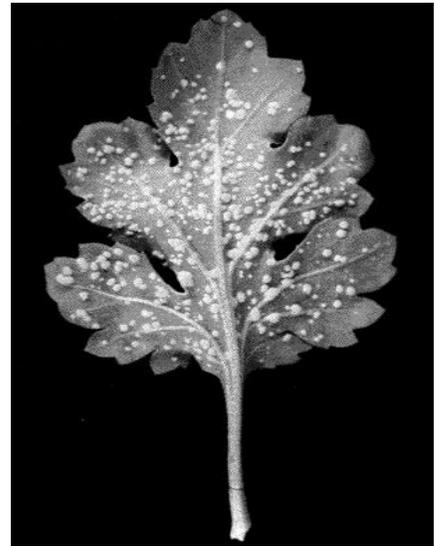
CWR can spread over long distances on infected cuttings and stools. This is why imported material must go through USDA quarantines. Also, the CWR pustules themselves can remain infective for up to eight weeks.

CWR Exclusion & Control Strategies

The spread of CWR has been checked primarily by exclusion (quarantines). When CWR has entered the United States, survey, sanitation, modified cultural practices, plant destruction and fungicides have been employed to eradicate the disease. Since infectious spores can only live up to eight weeks, the disease cycle can be broken by a mum-free period of equal duration. Management of humidity and irrigation can also limit disease establishment and subsequent spread. Additionally, several fungicides are registered to control CWR. Contact your ODA Horticulturist or Extension Agent for current recommendations. **Note: Always follow product label directions and use all pesticides in a safe and responsible manner.**

The complete eradication of this plant pathogen from Oregon is extremely important. The Oregon Department of Agriculture is cooperating with the USDA, APHIS, PPQ to contain and eradicate this disease. A Federal quarantine in effect to eradicate this disease in the U.S.A.

We need your valuable assistance in our survey and detection efforts. Please immediately contact the Plant Division at 1(800) 525-0137 if you have seen CWR on chrysanthemums in Oregon.



Underside of a heavily infected leaf. CWR can easily be distinguished from the native brown rust by its cream to buff color.

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