

## Chrysanthemum White Rust Recognition & Management

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Chrysanthemum white rust (CWR) is a serious disease of fall garden mums. While it can cause unsightly damage, the greater concern is that it is regulated by Federal Plant Quarantine Laws, which result in costly crop loss and shipping delays. This bulletin will summarize steps to prevent and manage CWR.

**Disease Cycle:** Chrysanthemum white rust is caused by the fungal pathogen *Puccinia horiana*. Effective management requires understanding the disease cycle which begins when spores (teliospores) are produced in white rust pustules on lower leaf surfaces of infected plants. These spores may survive up to two weeks on living or dried plant tissue. Under conditions of high humidity (96 – 100%) and cool temperatures (between 40 - 73°F) teliospores produce another type of spore called basidiospores. These spores spread CWR, over relatively short distances, primarily by splashing water and air movement. Since basidiospores are thin walled, they are subject to rapid desiccation and they are extremely short-lived at a relative humidity below 80%. After release and dispersal to plants, a film of free water is required for infection. Optimum temperatures for infection range from 63 to 75°F. Conditions that favor basidiospore development and spread typically begin in mid-late



Photo 1. Early symptoms of CWR appear as yellow spots on upper leaf surfaces which may appear as puckered.



Photo 2. White pustules of CWR showing on lower and yellow spotting showing on upper leaf surfaces.

summer with full expression of symptoms showing in late summer and early fall. It is possible for CWR to survive over winter in crop debris and theoretically on closely related weeds in the same family as chrysanthemums. **Symptoms:** Recognizing symptoms is essential for early detection and preventing crop losses. Symptoms first appear as faint yellow spots on leaf surfaces (photo 1). Usually this is observed in late summer and early fall,

but with unseasonably cool, wet summers, it may show up as early as late July. As disease progresses, tissue may appear puckered and yellow spots become more numerous. Eventually white-buff structures, called pustules, develop on the undersides of leaves. (Photo 2).

Teliospores, followed by basidiospores, develop within the pustules. Chrysanthemum rust is another disease that may be confused with CWR. But has no quarantine significance. Spots are much smaller and numerous and pustules are dark brown in color (photo 3).

### **Management:**

**Chemical:** (please see end of bulletin for rates and intervals) Systemic fungicides, (Heritage, Pageant), are recommended for young plants once they are rooted. This is the most economical time to apply systemic/curative products since they are more expensive and the area of treatment is relatively small. Application of DMI fungicides like Eagle or Strike should be avoided at this time to minimize potential resistance.

Once plants are potted and spaced in fields, treatments of contact fungicides should be applied based on disease risk. Remember that spore dispersal and infections occur under cool, wet conditions so applications should be applied preceding these periods. In most seasons, disease risk is low from June through mid-July. When weather forecasts indicate cool, moist conditions, it's time to apply contact/ protectant fungicides. Rotate Protect T/O with Daconil Weather-Stik or Ultrex at 7 – 14 day intervals. These products require thorough coverage since there is no penetration or movement in plant tissue. If CWR symptoms appear, notify State Plant Health Officials. Once confirmed, Federal Quarantine Regulations require the application of fungicides containing myclobutanil such as Eagle.



Photo 3. Chrysanthemum rust showing small, dark brown pustules on lower leaf surfaces.

### **Other considerations to prevent spread:**

- Stay vigilant! Early detection is critical for limiting spread and crop loss.
- Educate workers so they are familiar with symptoms.
- If CWR is suspected, State Plant Health Agency must be alerted for confirmation and regulatory requirements.
- Minimize handling of infected plants.
- Do not transport infected plants through the field
- Avoid brushing against or walking through infested areas.

### **Recommended fungicides on following page:**

Information in this bulletin is believed to be correct but it is the responsibility of the applicator to read and follow all label directions!!! Labels do change without notice. Pesticides other than those listed may be safe, legal and effective.



## **Early Applications for young plants prior to final crop spacing;**

### **Pageant** (EPA Reg. # 7969-251)

Active Ingredient: Pyraclostrobin and Boscalid

Foliar spray at a rate of 1 tsp per gallon or 12oz per 100 gallons for ornamental plants grown in greenhouses, interiorscapes, nurseries and landscapes. Do not use in conjunction with organo-silicon surfactants such as CapSil. Good plant safety. 12 hr REI , MOA 11/7.

### **Heritage WDG** - (EPA Reg. # 100-1093)

Active ingredient: Azoxystrobin

1 teas per 2.5 gallons, (4 ounces per 100 gallons), as a foliar spray. Most effective as a protectant. No visible residue and safe on most open blooms. 4 hr REI. MOA 11. Restricted use pesticide in VT. Cannot be used through ultra low volume applicators.

## **Contact Fungicides for economical applications following final crop spacing.**

### **Daconil Ultrex WDG** - (EPA Reg. # 50534-202-100)

1 TBLS per gallon or 1.4 lbs per 100 gallons, leaves some residue and is not safe on all open blooms. The label prohibits the use of mist blowers or high-pressure spray equipment in greenhouses. 12 hr REI with additional WPS requirements for the next 6.5 days. MOA M5. Restricted use pesticide in MA and RI.

### **Daconil Weather-stik**- (EPA Reg # 50534-209-100)

Foliar spray applied at 1.33 tsp per gallon or 22 oz per 100 gallons. Contains surfactant, do not add another. Leaves some visible residue and burns some open blooms. Preventative control. The label prohibits the use of mist blowers or high-pressure spray equipment in greenhouses. 12 hr REI with additional WPS requirements for the next 6.5 days. MOA M5. Restricted use pesticide in MA and RI.

### **Protect T/O WSP** - (EPA Reg. # 1001-65), Protect DF (EPA Reg # 1001-77)

1 ½ tablespoons per gallon (1 tablespoon per gallon for DF formulation), (1.5 lbs per 100 gallons), leaves a visible residue but is safe on most open blooms. Preferred use is on outdoor perennial production or early in the season on greenhouse crops when residue is not an issue. Most effective as a protectant. Never use on marigolds or geraniums due to manganese toxicity. 24 hr REI. MOA M3.

## **Curative Fungicide for confirmed infestations**

### **Eagle 20 EW**- (EPA Reg # 62719-463)

Active Ingredient: Myclobutanil

Locally systemic, curative and protectant foliar fungicide applied at ½ to ¾ tsp per gallon or 6-12 oz per 100 gallons. Good plant and bloom safety. 24 hr REI. MOA 3.