

Special Research Report #116: Disease Management

Effect of the Environment on Powdery Mildew of Poinsettia

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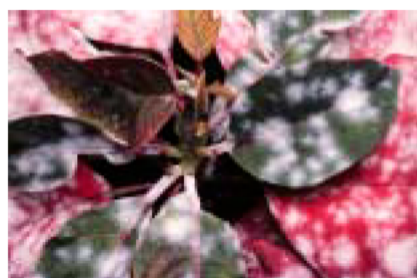
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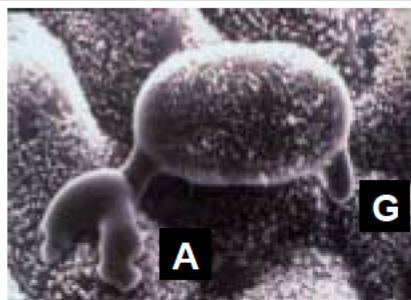
Powdery mildew on poinsettia.



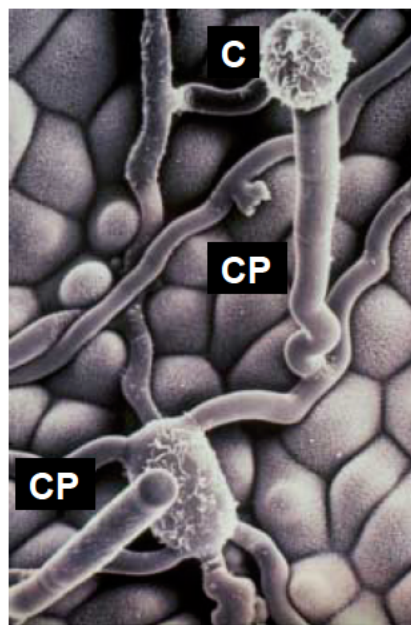
Active colonies on a leaf.

BACKGROUND

Powdery mildew of poinsettia is caused by a fungus (*Oidium* sp.) that appears as white talcum-like spots on leaves, bracts and stems. It begins with a conidium (spore) that germinates to form a germ tube. The fungus attaches itself to the plant surface through a structure that acts like a suction cup called the "appressorium." Under the appressorium, the fungus penetrates the plant via an infection peg, and a



Scanning electron micrograph of a powdery mildew conidium with appressorium (A) and germ tube (G).



Scanning electron micrograph of sporulation of the powdery mildew fungus [formation of a new conidium (C) on a conidiophore (CP)].

specialized sac, the "haustorium," forms inside the plant cell which allows the fungus to take up nutrients from the plant. Under favorable conditions, sporulation occurs as the fungus produces abundant

chains of conidia on stalks (conidiophores) which give the infected plant a white, and powdery or fluffy appearance.

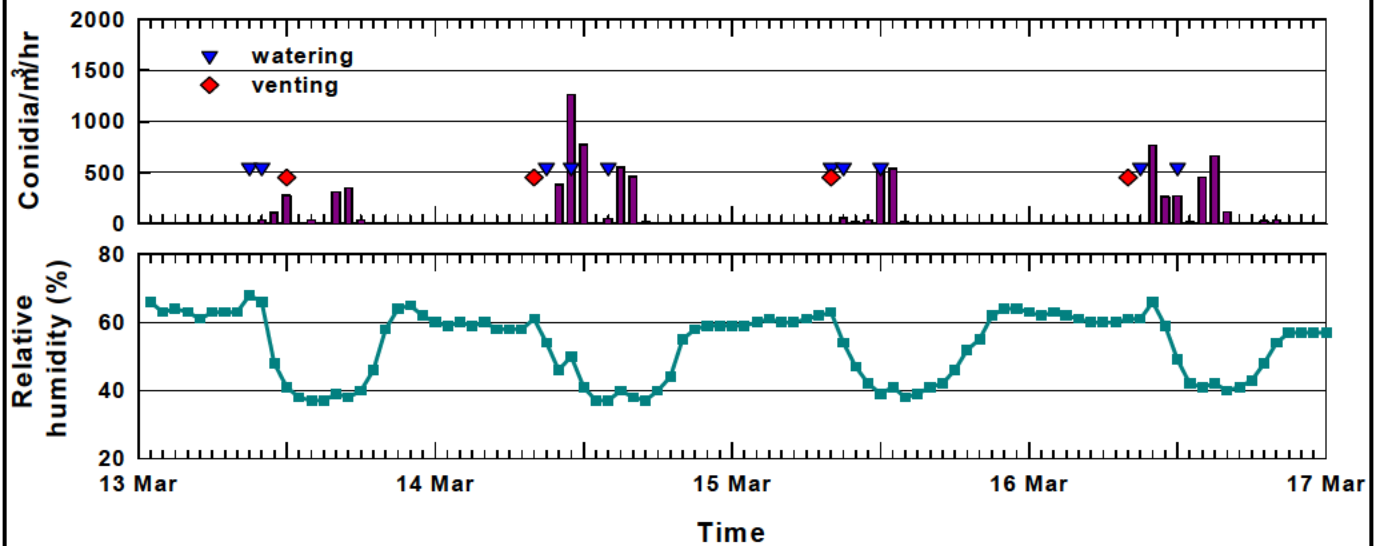
Knowing the steps of infection and how they are influenced by the environment can help growers determine when conditions are favorable for disease development and when management strategies should be implemented.

MATERIALS NEEDED

To study the impact of temperature and relative humidity on powdery mildew, disks were cut from poinsettia leaves and powdery mildew spores were applied. The tissue was maintained in the laboratory at 59, 68, and 77°F (15, 20, and 25°C) in chambers with relative humidity levels of 35, 50, 65, 80, and 92% ($\pm 2\%$). A microscope was used to determine how the different environments affected the ability of the spore to germinate and grow.

In another study, the amount of powdery mildew conidia in the air of two research greenhouses with infected poinsettias was monitored with a Burkard volumetric spore sampler. The environment and greenhouse activities were also monitored. The impact of temperature on disease development was studied by placing healthy poinsettias in each greenhouse for 7 days, removing them, and then

Association of Greenhouse Activity and Fluctuation of Relative Humidity with Concentration of Airborne Conidia of Powdery Mildew (*Oidium* sp.) in a Research Greenhouse.



recording the number of days until powdery mildew developed.

RESULTS

Many of the stages important to the development of powdery mildew were favored by 68°F (20°C) and a relative humidity level of 65% or lower. The fungus produced a new crop of conidia every 9 days. More conidia were produced at 59°F (15°C) and 68°F (20°C) compared to 77°F (25°C).

In the greenhouse, the numbers of powdery mildew conidia in the air were greatest between 12:00 noon and 1:00 P.M. Very high numbers of powdery mildew conidia occurred during time periods of either a rapid increase or decrease in relative humidity. Very often, large numbers of conidia were released following irrigation. When greenhouse temperatures were especially high (greater than

77°F [25°C]) for more than 2 weeks, the number of conidia in the air was markedly reduced.

IMPACT TO INDUSTRY

- Optimum growing temperatures for powdery mildew are generally lower than those for other plant pathogens, making this disease more likely to occur during cooler periods of the year.
- Growth and infection of poinsettia by powdery mildew is favored by 68 to 77°F (20 to 25°C). Thus, powdery mildew epidemics occur when poinsettias have colored bracts and are especially vulnerable to phytotoxicity and fungicide residues, making disease management difficult.
- Powdery mildew spores are able to germinate and infect under conditions of low relative humidity. Free moisture on host surfaces, conditions that favor germination of many

other fungal pathogens, is not favorable for powdery mildew.

- Because powdery mildew may first become established on the undersides of leaves, thorough and frequent scouting is essential to detect low levels of disease.
- There are many fungicides that can prevent and limit powdery mildew development when applied in a timely manner (consult AFE Special Research Report, No. 107 – “Management of a New Powdery Mildew on Poinsettia” and No. 1?? – “Managing Powdery Mildew on Poinsettia”).

Research cooperators were: Margery Daughtrey, Cornell University; and Larry Barnes, Texas A&M University.

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