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Grape Powdery Mildew
Revised by Phillip Lujan and Natalie Goldberg

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SYMPTOMS
Powdery mildew, caused by the fungus Erysiphe necator (synonym Uncinula necator), is one of the most prevalent and easily recognized plant diseases afflicting grape vines in New Mexico. It appears as a dusty white-gray or greenish-white coating on leaf surfaces or other above-ground plant parts. The disease is most commonly observed on the upper surfaces of leaves (Figure 1), but can also affect the lower leaf surface, young stems, buds (Figure 2), flowers, canes, and young fruit. Severely infected leaves may exhibit mottling or deformity, including leaf curling and withering. Infected fruit turn grayish-white at first and ultimately exhibit a brown, rusted appearance. Infected fruit may crack, shrivel, or drop from clusters (Figure 3).

LIFE CYCLE
The powdery mildew fungus overwinters as hyphae inside dormant buds, or as chasmothecia (spore-bearing structures) in bark or on canes, leftover fruit, and leaves on the ground. When hyphae from dormant buds serve as the primary inoculum, the new tissue is infected when the bud breaks dormancy. When chasmothecia provide the primary inoculum, plants are infected in the spring when ascospores (sexual spores) are released from the overwintering structures. Ascospores shoot up into the air currents.

Figure 1. Infected leaf (Yuan-Min Shen, Taichung District Agricultural Research and Extension Station, Bugwood.org).

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and are wind-blown to susceptible plants, where new infections begin. During the growing season, the fungus produces conidia (asexual spores) that increase the severity of the disease on infected plants and may spread the fungus from one plant to another.

**CONDITIONS FOR DISEASE**

In New Mexico, powdery mildew is favored by warm temperatures (43–95°F, with optimum temperatures of 68–80°F) and high humidity (40–99% relative humidity). Low light also favors disease development. For this reason, powdery mildew infections are often found in dense canopies where low light conditions and low air circulation prevail.

**MANAGEMENT**

Planting locations with good airflow are preferable; canopies at these locations will dry faster. There are also several different management practices that can help reduce or prevent powdery mildew. Such practices increase light penetration and reduce relative humidity in the plant canopy. Do not crowd the plants together when planting or training vines. A high canopy designed with air ventilation in mind will be preferable to a canopy that has low ventilation and high leaf density. Airflow and ventilation will discourage mildew growth. Selectively pruning overcrowded plantings and removing leaves are recommended cultural practices to increase light penetration and the circulation of air; this also decreases relative humidity infection. Do not compost infected plant debris. Avoid nitrogen fertilizer applications in the late summer to limit the production of succulent tissue. Water early in the morning to let the tissue and soil dry as quickly as possible. Avoid overhead watering to reduce relative humidity.

Fungicides may be used for managing powdery mildew. For best results, fungicide treatments should begin before the overwintering fungus can infect new growth. The first few treatments are the most important and should be applied at appropriate intervals, starting at bud break or early shoot growth. A powdery mildew index (PMI) model may be used to determine appropriate treatment intervals because frequency will depend upon weather conditions and choice of fungicide. For more information on calculating PMI,
please see the University of California’s Agriculture and Natural Resources statewide integrated pest management program at www.ipm.ucdavis.edu. There are several different fungicides labeled to help manage powdery mildew infections. Powdery mildew fungicides are commonly divided into different groups. These groups are classified by their mode of action: amino acids and protein synthesis, glucan synthesis, mitosis and cell division, respiration, signal transduction (quinolines), sterol inhibitor, multi-site activity, biologicals, unknown mode of action, host plant defense induction, and products with mixed modes of action. For best results, rotate fungicides with different modes of action. This will help to prevent or slow the development of resistance to the fungicides.

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