



DOWNY MILDEW OF SNAPDRAGONS

Downy mildew is a common but sporadic disease of greenhouse- and nursery-grown snapdragons (*Antirrhinum majus*) in the United States, Canada, Australia, New Zealand, and most of Europe. The disease, caused by the fungus *Peronospora antirrhini*, is most common on seedlings and young plants growing in very humid, poorly ventilated greenhouses where low temperatures exist. The disease can cause local infections (leaf spots) or more destructive systemic infections that can cause stunting, yellowing, and distortion of leaves as well as an overall stunting of plants. Systemically infected seedling rarely survive.



Figure 1. Downy mildew of snapdragon; stunted, bunched, yellowish seedlings growing in a greenhouse.

SYMPTOMS

Local, nonsystemic infections commonly appear as pale, rounded spots (lesions) on the leaves up to 15 millimeters in diameter with smooth, diffuse margins that are rarely destructive. The more important systemic infections result in a downward marginal curling of the leaves and a significant reduction in growth, which causes a rosette of dwarfed, yellowish leaves at the tips of shortened shoots that give affected seedlings a stunted, bunched appearance (Figure 1). Infected leaves are a pale dull green with a lower surface covered by a mealy, grayish white to bluish purple downy fungus growth in overcast, cool, damp weather. The seedlings often wilt and die from the top of the plant down to the soil surface. Symptoms may appear from the time when the plant has two cotyledons, and continue to appear until the plants are about six inches tall. Usually, after the tips die, affected plants begin to produce secondary shoots from their base.

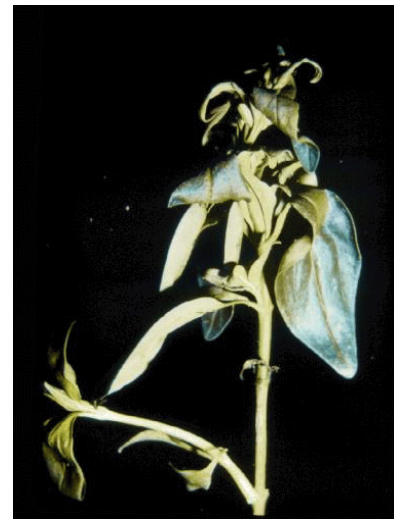


Figure 2. Close-up of an affected seedling.

On older plants (1 to 4 feet tall) the terminal shoot growth is checked and the leaves become pale green. On plants about to bloom, a rosetting of the growing point occurs. Flowering is reduced.

DISEASE CYCLE

The *Peronospora* fungus overseasons as thick-walled, rounded oospores within the cortex of petioles, stems, and roots of systemically infected plants. When temperatures are cool and the foliage is wet, spores

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(conidia or sporangia) are produced on newly infected leaves and disseminated by air currents. Conidia that land on leaves may germinate within 24 hours and infect a leaf by producing a germ tube which penetrates the leaf through a stoma on the lower leaf surface. Mycelium then spreads through the intercellular spaces of the leaf, obtaining food through branched, fingerlike haustoria (modified feeding structures) which it sends into adjacent cells. The mycelium continues to spread and eventually forms a fungal cushion in the substomatal cavities within the leaf from which the conidiophores (sporangioophores) arise and emerge through the stomatal openings. At the tips of the dichotomously branched conidiophores are produced the oval conidia, that in mass form a mealy, grayish white to bluish purple downy growth in the lower leaf surface of infected plants (Figure 2). Downy mildew is favored by high humidity and low temperatures. Conidia are produced at temperatures between 46° and 72°F (8° to 22°C), with an optimum of 55°F (13°C). Infection and disease development are favored by temperatures of 40° to 60°F (4.4° to 15.5°C). In a suitable environment, symptoms may appear in as short a period as four days after inoculation.

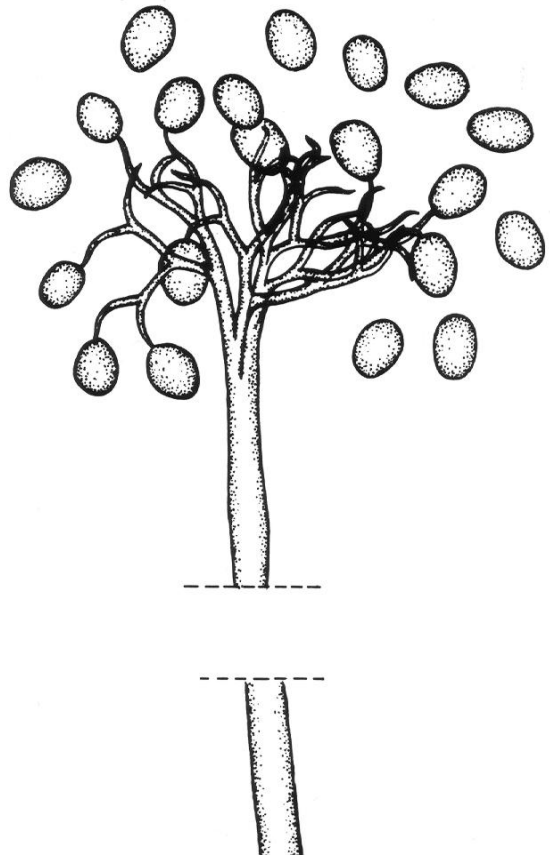


Figure 2. The downy mildew fungus, *Peronospora antirrhini*, as it appears under a high power microscope. Note the treelike dichotomously branched conidiophore (sporangioophore) and the oval conidia borne at the tips. (Drawing by L. Gray).

CONTROL

1. Greenhouses provide heat and ventilation to keep the humidity below 80 to 85 percent and thus prevent water condensing on the plants. Space plants for good air circulation. Keep night temperatures above 52°F (11°C).
2. Avoid overwatering. Practice surface watering to keep the foliage as dry as possible. Water in the morning on a rising temperature to promote rapid drying.
3. Buy seed that has been properly cleaned and seedlings grown in disease-free nurseries. Plant in soil steamed at 160°F (71°C) for one hour or 180°F (82°C) for 30 minutes at the coolest spot. Also treat all tools, seed flats, and other containers.
4. Remove and burn dead and dying plants when first seen. Carefully destroy all plant debris to eliminate possible sources of inoculum.
5. When the above cultural practices fail to control downy mildew, spray the plants with a suggested fungicide at 5- to 10-day intervals in overcast, damp or rainy weather. It is critical to cover the lower leaf surfaces with each application. Start the spray program when disease first appears. Use one of the fungicides suggested in Illinois Commercial Landscape and Turfgrass Pest Management Handbook or the Illinois Home, Yard and Garden Pest Guide.

The publications mentioned above should be available at your nearest Extension office.