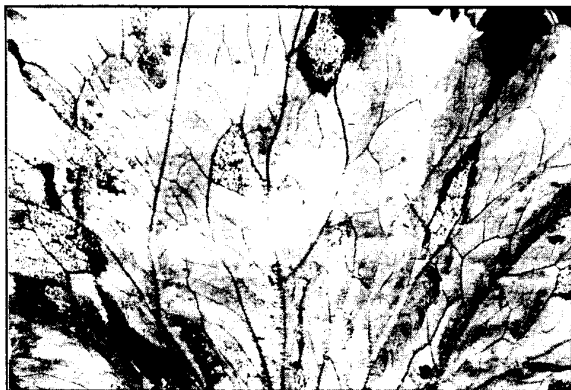


DOWNY MILDEW

A FUNGUS DISEASE OF LETTUCE



Mildew symptoms on upperside of lettuce leaf.



Symptoms on underside of lettuce leaf.

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Downy mildew, caused by the fungus *Bremia lactucae* Regel, may be found in all lettuce growing districts in California. The disease is most damaging in coastal areas during spring and fall, and only on rare occasions does it cause economic loss in the San Joaquin Valley or in desert production areas.

Symptoms

Pale yellow areas on the upper side of lettuce leaves constitute the most common first symptom. These may enlarge and join together to form large areas, but usually the affected areas are smaller and limited by leaf veins. A white, fluffy fungus develops on affected areas on the lower side of the leaf that consists of stalks (sporangiophores) and spores (sporangia) of the fungus. Spores may be produced on both upper and lower leaf surfaces during cool, moist weather favorable for growth of the pathogen. Affected tissue soon dies leaving large and angular necrotic lesions on the leaves.

Dissemination

Spores of the downy mildew fungus are usually short-lived, but they may survive for several days under cool, moist conditions. Windborne spores can be carried considerable distances, spreading within and to adjacent fields. The fungus usually does not survive in soil for very long and is rarely, if ever, seedborne. Wild lettuce is also a host of the fungus, but the primary infection in most cases comes from currently infected crops. This mode of survival is common in areas where lettuce crops overlap.

Environmental Conditions

Favoring the Disease

Free water on the lettuce leaf is necessary for infection to occur. Downy mildew spores germinate between 1.1° and 20°C (34° and 69°F). The spore produces a germ tube that attaches itself to the leaf by a slight swelling and then penetrates the epidermal and parenchyma cells within 12 to 24 hours. Development of the fungus in the leaf intercellular spaces is favored by temperatures around 21°C (70°F) and humidity is not important during this phase of disease development. Sporulation of downy mildew only occurs during high relative humidity.

Control

Resistant varieties have effectively controlled downy mildew of lettuce for years, but this fungus has the ability to produce new races that can infect previously resistant varieties. Calmar, with excellent resistance to downy mildew, was first, planted to significant acreage in 1964 and provided reliable control of the disease until 1976, when a new race of the fungus appeared in the Santa Maria and Salinas valleys. Research is under way to develop lettuce varieties resistant to the races of the fungus now prevalent in California.

Such fungicides as maneb or zineb applied frequently reduce the effect of the disease, but control is difficult because the undersurfaces of leaves must be thoroughly covered with fungicide. Copper fungicides should be used with caution because repeated applications may cause yellowing and necrotic spots to appear on leaves and midrib. Systemic fungicides have been developed that effectively control the disease, but none, as yet, has been registered for use on lettuce in the United States.

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