

WINTER DISEASES OF LETTUCE

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Introduction

Several diseases of lettuce can cause substantial yield losses during winter and early spring months. These diseases are aided by the cool, moist weather conditions that generally prevail. Fungal and bacterial diseases both are important.

Effective control measures are available, but control depends upon identification of the disease organism and proper timing and placement of pesticide applications. The following descriptions will help growers identify the important winter diseases of lettuce. Effective pesticides and rates of application to control these diseases are also suggested.

Fungal Diseases

Sclerotinia drop (lettuce drop caused by *Sclerotinia sclerotiorum*) and the gray mold caused by *Botrytis cinerea* are major fungal diseases of lettuce grown at higher elevations during winter months.

Lettuce drop and gray mold are first observed as plants approach maturity. Infection generally occurs on the lower leaves. These leaves collapse, and the entire head wilts and yellows.

Lettuce drop is distinguished by its abundant white, cottony, mycelial growth during moist weather and by the presence of hard, black, sclerotial bodies on the underside of lower leaves and basal part of the stem. The sclerotial bodies are irregularly shaped and usually ½ inch or more in size. In later stages, the stem and head often disintegrate into a soft, watery mass covered with sclerotia. Sclerotia may survive two to three years in the soil. Gray mold produces a firm, watery, brown decay on the underside of the head. It can be easily identified by the presence of its dense gray or light brown spores, which form in abundance.

Both fungal diseases are favored by cool, moist conditions. Both infect lettuce plants by means of



Figure 1. Plants infected with *Sclerotinia sclerotiorum* form a white, mycelial mat with characteristic dark, irregularly shaped, sclerotial bodies on the lower stem.



Figure 2. Healthy lettuce plants (left) and plants infected by bacterial soft rot (right) caused by *Erwinia carotovora*.

small, airborne spores (ascospores or conidia), which require high humidity and free water for infection to occur. Infection occurs on dead or dying plant tissues generally associated with the crown and lower senescing leaves of mature plants.

Bacterial Diseases

Bacterial diseases of lettuce may cause considerable yield losses, particularly when continuous cool, wet conditions are associated with maturing lettuce crop. Soft rot caused by *Erwinia carotovora* and leafspot and slime caused by a combination of *E. carotovora*, *Pseudomonas sp.*, and *Xanthomonas sp.* are the major diseases. Soft rot is char-

acterized by an initial wilting of individual leaves or several outer wrapper leaves. Wilting is associated with collapsed vascular tissues, which are light brown to red when viewed from the cut stem end. As the disease advances, the middle of the stem becomes watersoaked in appearance, macerated, and greenish. Wilting of the mature head is associated with extensive rotting of the stem.

Bacterial leafspot and slime first appear as small, faint, watersoaked leafspot areas confined between the veins and at the tips of leaves. Leafspots can usually be first observed on outer leaves early in plant development. These watersoaked areas develop in a few days into brownish spots with necrotic

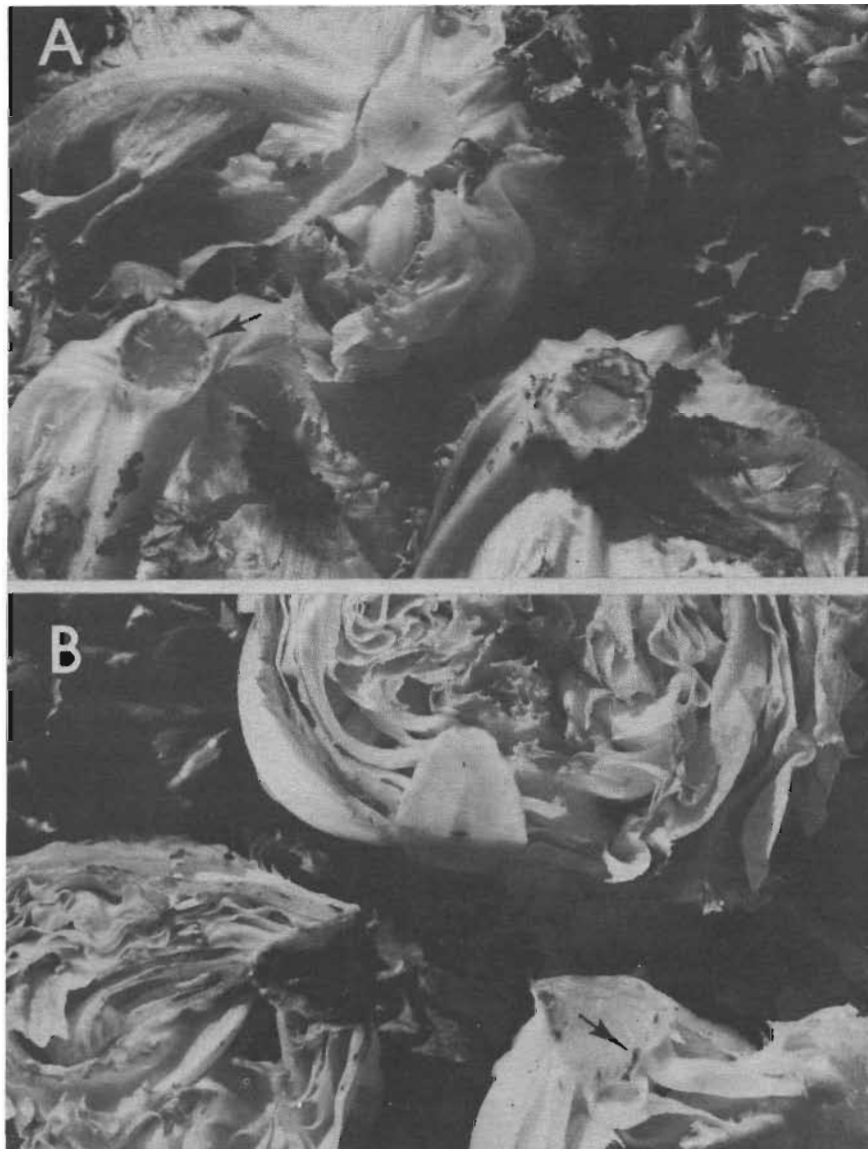


Figure 3. Healthy lettuce (top, A & B) shows firm, clear stem in cross-section (A) and longitudinal section (B). Diseased plants (bottom) show effects of bacterial soft rot. Darkened stem pith (bottom left, B) illustrates extensive rotting. Vascular discoloration (arrows, A & B) is from bacterial invasion.



Figure 4. Bacterial leafspot of lettuce is characterized by small, darkened spots on outer leaves, which are watersoaked in appearance.

centers. As the disease advances, leafspots expand between leaf veins on the outer leaves and invade internal leaves, resulting in a slimy rot of the internal head leaves.

Fungal Disease Control

Two new fungicides recently registered for use on lettuce give effective control of these diseases.

Ronilan (vinclozolin, BASF Wyandotte Corp.) is a nonsystemic contact fungicide used primarily as a foliar spray. This chemical inhibits the fungus spore germination and growth but has only limited activity as a systemic. It is available as a 50 percent wettable powder and has not been shown to be phytotoxic to a wide range of crops at suggested rates.

Rovral (iprodione, Rhone-Poulenc Chemical Co.) is a broad-spectrum contact fungicide. Like Ronilan, it is active against *Botritis*, *Monilinia*, and *Sclerotinia* but also controls *Alternaria*, *Rhizoctonia*, and *Helminthosporium*. It inhibits both spore germination and mycelial growth but is not systemic. It is available as a 50 percent wettable powder. Phytotoxicity has not been observed on a wide range of crops at suggested rates.

Fungicide tests during the past few years on beans and lettuce have shown both fungicides to be effective for control of *Sclerotinia sclerotiorum* and *Botrytis cinerea*. Ronilan was more effective for control of both diseases on snapbean when applied at early and full bloom. Two or three applications of Ronilan after planting gave excellent control of lettuce drop. Rovral controlled lettuce drop

when three applications 14 days apart were made after seeding or transplanting. Thorough coverage of lower leaves, plant stems, and bed surfaces is essential for control.

Bacterial Disease Control

Pesticides containing copper are the most effective means for controlling these diseases. Prevention is probably the best means of control, as methods for early detection of soft rot and slime can be unreliable. On the other hand, bacterial leaf spot can be controlled by applying pesticides as soon as disease symptoms are observed. The most critical period to protect the crop is from heading up to maturity. It is important to use a good spreader-sticker, particularly during rainy periods.

Three other pesticides also have been effective and are suggested. All are nonsystemic contact chemicals and are used as foliar sprays. Citcop (copper salt of fatty and rosin acids, Cities Service Co.) is a noncorrosive liquid copper fungicide, available as a 4-lb emulsifiable compound. Application at the rate of 4 qt per acre is suggested. Tri-basic copper sulfate (basic copper sulfate, Cities Service Co.) is available as a 53 percent wettable powder. Control of bacterial disease in lettuce is more effective when tri-basic copper sulfate is used in combination with Dithane M-45 (mancozeb, Rohm and Hass Chemical Co.) and applied at the rate of 2 lb of each chemical per acre. Kocide 101 (copper hydroxide, Kocide Corp.) is a wettable powder. Application rates of 2 lb to 4 lb per acre are suggested.

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