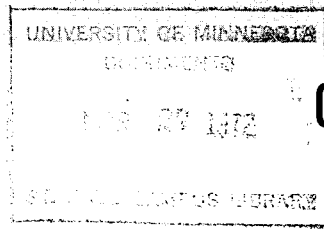


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Cercospora Leaf Spot of Sugar Beets

Cercospora leaf spot, a disease of sugar beets, is caused by the fungus *Cercospora beticola*.

Although infection is limited to leaves, dead or dying foliage retards root enlargement and reduces total sugar yield. Furthermore, water soluble impurities increase with greater disease incidence: the higher the percentage of impurities, the lower the percentage of recoverable sugar.

Leaf spot is often found in sugar beet fields in southern Minnesota. And, in recent years, it has become common in northern Minnesota. Although the disease was first reported in the United States early in this century, only within the last few years has its damage been fully realized.

In addition to sugar beets, the leaf spot fungus attacks table beets and several weeds such as thistle, pigweed, and lambsquarters. Weeds can act as overwintering hosts for the fungus and as sources of early summer sugar beet infection.

LIFE CYCLE

The leaf spot fungus overwinters in dead plant material on the ground, primarily in sugar beet leaves but also in weeds. Spores form and mature on this material in June or July, depending on the weather.

In June or early July, splashing water and wind carry spores to healthy sugar beet foliage, where infection occurs. Spore germination and leaf penetration begin when the temperature is between 60° and 90° F. and when free water from rain, dew, fog, or irrigation is on leaf surfaces. Optimum temperature for these processes is between 75° and 85° F.

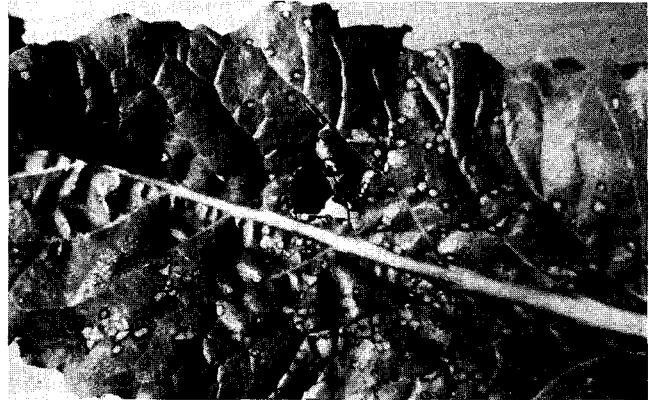
Penetration takes place through pores, called stomata, on the leaf surface. Within 7 to 10 days after penetration, characteristic leaf spots are produced (see figure). Supposedly, one spore can produce one leaf spot. A large number of spots causes a leaf to become completely brown and die.

A second generation of spores is produced on these leaf spots in 7 to 21 days, depending on the weather. Warm, moist weather favors rapid spore production.

New spores are splashed or blown to healthy plants by water and wind or possibly even carried by insects; then the infection cycle is repeated. The greater the number of infections, the more severe is the sugar beet loss.

Lack of moisture or prolonged temperatures below 60° F. or above 95° F. check disease development. However, these conditions are seldom present for extended periods during the growing season. Even during the 1964 drought, leaf spot infection was high; morning dews probably provided adequate moisture for fungus survival.

Sugar beets are not grown continuously in the same field. Therefore, leaf spot spores originate and move in from adjacent fields where sugar beets were grown the previous



A sugar beet leaf showing typical leaf spot symptoms. Spots are round, about 1/8 inch in diameter, and have a gray-white center and a purple margin.

season. Initial infection often appears at the field edge nearest the old field.

CONTROL

Experimental evidence shows that proper fungicidal spray applications can reduce leaf spot infection and increase yield. For best control, start the spray program when the first few leaf spot symptoms appear on plants. Usually this period will be early to mid-July in southern Minnesota and mid- to late July in northern Minnesota.

Fungicides registered for control of leaf spot disease of sugar beets include:

Common name	Some trade names
fixed copper	Tribasic Copper Sulfate, Kocide 101
maneb	Dithane M-22, Dithane M-22 Special, Manzate, Manzate D, Polyram
zinc ion maneb	Dithane M-45, Manzate-200, Mertect, Benlate

You must start spraying early because the fungicides are leaf protectants. They do not cure or eradicate infection already established in the leaf. A fungicide must be on the foliage soon after the disease first appears if future infections are to be prevented.

Apply the second and following sprays at not greater than 2-week intervals. Heavy rains wash most fungicide from foliage,

necessitating more frequent spraying. Generally, four sprays during the growing season profitably control leaf spot.

Commercial fungicides are wettable powders that settle out of water if the mixture is not agitated. This settling results in nonuniform coverage of the foliage during spraying. To avoid settling out, use a mechanical paddle agitator or a high capacity bypass system that recirculates the mixture in the tank.

You can improve coverage of leaf surfaces by adding a spreader-sticker agent to the fungicide-water mixture. Use the material suggested by the manufacturer of the fungicide you purchase.

Several different application techniques give good leaf spot control. However, you must always use properly adjusted spray equipment to get adequate foliage coverage.

Caution—Carefully read fungicide labels for instructions on safe and effective use. Store chemicals away from children; dispose of unused chemicals and empty containers in a safe location.

Spray equipment used for controlling leaf spot of sugar beets

Spray equipment	Minimum gallons per acre	Minimum pressure, pounds per square inch (p. s. i.)
Hydraulic sprayer	40	150*
Mist blower	20	100
Spray foil	10	20
Aircraft (fixed wing or helicopter)	5	—

*Higher pressure, up to 400 p. s. i., does a better job of coverage.

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