

Colorado  
Farm  
Defense Program

Colorado State College  
Fort Collins, Colorado  
Extension Service

D-10

LIBRARY  
COLORADO STATE COLLEGE OF A. & M. S.  
FORT COLLINS, COLORADO

EXAMINED AND SPECIALIZED

# Diseases of Sugar Beets

W. J. HENDERSON

*Extension Plant Pathologist*

**Damping-off** is a disease of sugar-beet seedlings, caused by certain molds which are carried on the seeds and in the soil. It may be manifested by the rotting of the seed in the soil, death of seedlings before they emerge from the soil, a watery soft-rot of the stems just above the ground line which causes the plants to wilt, topple over, and die, and quite often, infection occurs near the end of the seedling stage. Such plants are stunted, and develop normal-shaped beets which are often short and round (turnip-shaped) at harvest.

During the past 4 years, the Colorado Extension Service conducted a number of sugar-beet seed-treatment tests in a few widely separated counties. The results of these tests showed quite definitely that by treating the seeds with new improved cerasan, at the rate of 4 to 5 oz. per 100 lb., the stand was increased an average of 30 percent, and the yield 12 percent for the 4 years. These increases were due to the control of the damping-off disease. It was also quite evident that the seedlings, grown from treated seed, were considerably more vigorous than those grown from untreated seed.

The best device for applying the new improved ceresan to the seeds is the barrel-treater. The barrel should be rotated 30 to 40 times, to insure good coverage of the seeds. The treated seeds should be stored in sacks for 48 hours prior to planting. new improved ceresan is a poisonous dust and should not be breathed. Therefore, the treating should be done out-of-doors, so that the operator can take advantage of the wind; or where the treating is done indoors, the operator should either place a dry cloth over his mouth and nose, or wear a respirator.

**Black-rot** is one of the serious diseases of sugar-beet seedlings. It causes considerable losses of stands in many districts of Colorado, and in a few of them, it is the limiting factor in sugar-beet production.

The molds which cause black-rot live in the soil, where they may accumulate to the extent that stands of beet seedlings cannot be obtained because of the disease.

The first evidence of the presence of black-rot molds in the soil is a poor stand. An examination of the blank spaces in the rows will reveal that the young seedlings decayed before they reached the surface of the soil. The disease is characterized by drooping of the plants, retardation of growth, and general yellowing of the leaves. The infected roots become brownish, then black. The latter symptom makes identification of the disease quite certain. In cases where soil moisture is plentiful, the diseased plants may remain alive for several days, but when the weather turns dry and warm, the affected roots wither to a mere thread, and the plants wilt and dry-up. A few black-rot-infected plants may survive, but they never produce desirable beets.

Although this disease has been subject to much experimental work in several states, no satisfactory control method has ever been perfected. There are, however, certain practices that will help to reduce the losses from the disease. (1) Treat all seed with new improved ceresan at the rate of 4 to 5 oz. per 100 lb. of seed. (2) Use a 5-year crop rotation. (3) Early planting is advisable.

**Leaf-Spot.**—In seasons when moisture is plentiful, leaf-spot may cause considerable loss of sugar-beet production in Colorado. The disease produces spots of about  $\frac{1}{8}$ -inch in diameter on the leaves and stems. The spots also may occur on the seedstalks and seedballs. The latter play an important roll in overwintering the fungus which causes the disease. The newly developed spots frequently have red borders, and at maturity the centers become ashen-gray, and are covered with black dots, which can be seen with the aid of a hand-lens. When the attack is severe, the spots become so numerous that the leaves and stems die.

The black dots on the spots produce spores (seed) of the fungus that cause the disease, which are blown to adjacent plants in the crop. When moist and warm climatic conditions exist, the disease is spread very rapidly and may injure entire crops of sugar beets. Usually as the leaves of a plant are killed, new ones are produced, which in turn may become infected and die. This continued dying and production of new leaves, not only reduces the sugar content of the beets, but also develops a pyramiding of the crown which is undesirable because of excessive tare at harvest time.

Leaf-spot of sugar beets may be controlled by the use of resistant varieties, cultural practices, and the application of either copper sprays, or copper dusts. The fact that the fungus which causes leaf-spot overwinters in the soil on beet refuse, makes it advisable to employ a planting plan in which sugar beets do not follow sugar beets in the crop rotation. The Division of Sugar Plant Investigations, U.S.D.A., cooperating with State Agricultural Experiment Stations, has developed two hybrid varieties of sugar beets which have considerable tolerance to the leaf-spot disease. Of these hybrid varieties, U. S. 215x216 possesses a good degree of resistance, and U. S. 200x215 has a moderate degree of resistance. These varieties were released only a few years ago, and the supply of seed for either variety is limited. Before planting any new variety on a large scale, it would be advisable to consult the county extension agent regarding the adaptability in that district.

Spraying either with (4-4-50) bordeaux mixture, or yellow cuprocide sprays will give satisfactory control. Use  $1\frac{1}{2}$  lb. of yellow cuprocide and  $\frac{1}{3}$  pt. of emulsifier B-1956 per 100 gal. of water. Apply 50 to 75 gal. per acre, with 200 to 250 lb. pressure, and make 3 applications at 10-day to 2-week intervals. For dusting, either use cuprocide dust, or copper oxychloride dust. The cuprocide dust is made with 5 lb. yellow cuprocide and either 5 lb. vatsol K, or 1 lb. vatsol OS sticker, thoroughly mixed with sufficient cherokee clay to make 100 lb. of dust. Use 12 lb. of copper oxychloride and either 5 lb. vatsol K, or 1 lb. vatsol OS sticker, thoroughly mixed with sufficient cherokee clay to make 100 lb. of the dust. Apply either of the dusts at the rate of 25 to 30 lb. per acre. Make 3 applications at 10-day to 2-week intervals. A power duster should be used to make the applications.

**Curly-top** is a virus disease of sugar beets. The virus which causes the disease is carried from infected beet plants to healthy ones by the beet leafhoppers (white-fly). Curly-top occurs in the sugar-beet districts of the Western Slope and has been reported in the Rocky Ford area. Leaves which were mature before they became infected, appear normal at first, then later they

turn yellow and die. The leaves which develop after the plants become inoculated, are dwarfed, curled, and usually show swelling of the veins on the under-side of the leaves. The leaf swellings may be either conspicuous and on every vein of the leaf, or they may be inconspicuously scattered on a few veins. In the advanced stages, the vascular areas of the stems and roots show a dark discoloration. This discoloration in a cross-section of the taproot, shows as dark, concentric rings. A sticky, clear liquid is often found on the older leaves which show the vein swellings.

Although curly-top is a serious disease, it can be avoided by the use of adaptable, resistant varieties. It is suggested that before planting any of the resistant varieties, the county extension agent be consulted regarding the variety best adapted for the respective district involved.

**The blackheart disease** of sugar beets is caused by a deficiency of available phosphate in the soil for proper, beet-plant growth. The symptoms of the disease are striking and easily detected. The first manifestation of blackheart is the slow growth of the seedlings. This retardation of growth may continue throughout the growing season. The leaves are smaller, become a dull, dark-greenish color. Later the color of the affected leaves changes to a tarnished tinge, and the development of localized areas of brown to nearly black between the veins. The latter color may originate either at the leaf-margins, or between the veins, and eventually involve the entire leaf-blade, except the veins which remain green. In advanced stages the affected leaves may dry up and die. The leaf stems become less firm, allowing the leaves to droop-over to the ground, thus giving the plant a sprawling, flat appearance. The beets (taproots) are usually relatively small, develop dark lesions on the surface, and the vascular area becomes discolored. Quite often secondary organisms invade the affected tissue and cause a semi-dry-rot.

Experiments conducted by the Colorado Experiment Station, and field tests conducted by the Colorado Extension Service in Prowers County, show definitely that the application of superphosphate at the rate of 150 lb. per acre will control the blackheart disease of sugar beets.