

# Savoy, a Virus Disease of Beet Transmitted by *Piesma Cinerea*

G. H. COONS, JOHN E. KOTILA AND DEWEY STEWART<sup>1</sup>

The sugar beet disease known as "Savoy" was first described in 1892 in Indiana by Arthur and Golden (1)<sup>2</sup>, and was considered by them to be caused by a bacterium. Some years later, Cunningham (3), working under the direction of Arthur, again attributed the disease to a bacterial organism but without convincing evidence of pathogenicity. Towar (5) in 1901 described and illustrated "leaf curl" of sugar beets as occurring in Michigan.

The photographs and descriptions leave little doubt that these are early records of sugar beet Savoy. The writers (2) reported in 1937 that the disease is caused by a virus, named it "Savoy," and stated that a species of lace bug, *Piesma cinerea* Say had been proved to be the insect vector of the virus.

Plants affected by savoy (sugar beet, red garden beet) show dwarfed, down-curved, savoyed leaves (Figure 1). The most pronounced effects are found on the innermost leaves. Primary symptoms of the disease are veinlet clearing, followed by thickening of the veinlets, giving the dorsal surface of a leaf a netted appearance. Roots of affected plants show in late stages phloem necrosis and flesh discoloration, simulating curly top effects. After an initial partial involvement of leaves and root, the disease becomes general. Roots of diseased plants test low in sucrose.

Only adults of *P. cinerea* have transmitted the virus. Both viruliferous and non-viruliferous individuals have been found. The virus overwinters in affected plants and probably in the vector. The incubation period in sugar beets is 3 to 4 weeks. Graft transfers have been successful, but the cion from a diseased plant must be left in place at least 7 days for the virus to be transmitted. This is taken to indicate that the virus affects chiefly the phloem of the beet. Attempts to transmit the virus by means of juice, aphids (*Myzus persicae* Sulz., *Aphis rumicis* L.), leafhoppers, including the beet leafhopper (*Circulifer tenellus* (Baker)), or by dodder, have been unsuccessful. The disease has been found in Maryland, Michigan, Ohio, Minnesota, Nebraska, South Dakota, Colorado, Texas and Montana. In sugar beet fields the incidence has ranged from a trace to about 5 percent. In portions of fields near a woodlot or waste land, the disease incidence may be far higher than the field averages. The disease has been reported from Ontario (4).

Savoy appears most closely related to Krauselkrankheit of sugar beets and related plants in Central Europe. The vector of the European virus is *Piesma quadrata* Fieb. These diseases differ distinctly from curly top.

So far, sugar beet savoy has been relatively minor in its effects upon crop production in the United States.

<sup>1</sup> Principal Pathologist, Senior Pathologist, and Senior Agronomist, Division of Sugar Plant Investigations, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, respectively.  
<sup>2</sup> Numbers in parentheses refer to literature cited.



Figure 1. Savoy of Sugar Beets. One-sided involvement of the plant following mid-season attack is shown. Older leaves are stunted and crinkled. Their veinlets are thickened; lower surfaces of affected leaves have netted appearance. Younger leaves are curled and distorted; their veinlets commonly show clearing.

#### Literature Cited

- (1) ARTHUR, J. C., and GOLDEN, K. E.  
1892. Diseases of the sugar beet root. *Ind. Sta. Bui.* 39: 54-58; 61-62.
- (2) COONS, G. H., KOTILA, J. E., and STEWART, D.  
1937. Savoy, a virus disease of beet, transmitted by *Piesma cinerea*. (Abstract). *Phytopathology*, 27:125.
- (3) CUNNINGHAM, CLARA A.  
1899. A bacterial disease of sugar beet. *Bot. Gaz.* 28 (3) : 177-192.
- (4) HILDEBRAND, A. A., and L. W. KOCH.  
1942. Savoy disease of sugar beets in Southwestern Ontario. *Phytopathology*, 32:328-331.
- (5) TOWAR, J. D.  
1902. Leaf curl of beets in sugar beet experiments, 1901. *Mich. Sta. Bui.* 197: 138-140.