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**PLANT SYMPTOMS INDUCED BY FEEDING OF  
SOME LEAFHOPPER SPECIES**

**HENRY H. P. SEVERIN**



# PLANT SYMPTOMS INDUCED BY FEEDING OF SOME LEAFHOPPER SPECIES<sup>1</sup>

HENRY H. P. SEVERIN<sup>2</sup>

## INTRODUCTION

IN A RECENT paper, Severin, Horn, and Frazier (1945)<sup>3</sup> described certain symptoms of curly top or aster yellows induced by the saliva of *Xerophloea vanduzeei* Lawson. On sugar beets it produced cleared veinlets, considered a reliable symptom of curly top. On asters it caused cleared venation with yellow veinbanding, stunting of the plants, development of axillary shoots from the bud in the axil of the leaves, and virescence of the flowers, all symptoms of aster yellows. The most striking effect produced by the feeding of the leafhoppers is breaking in color of the petals of asters.

In an investigation of a large number of leafhopper vectors of the California aster-yellows virus, 10 species induced symptoms on healthy China aster (*Callistephus chinensis*) and Golden Self-Blanching celery (*Apium graveolens* var. *dulce*) apparently by the saliva or by the feeding. A brief description of the symptoms produced by these leafhopper species follows.

### TEXANANUS LATIPEX DELONG

In working on the life history of *Texananus latipex* it has been observed that some single noninfective nymphs induce cleared veins and veinlets with yellow veinbanding (plate 1, *A*) on the youngest leaf of healthy celery plants. In a later stage numerous small, green islands develop, surrounded by yellow areas (plate 1, *B*). Chlorotic areas appear on the intermediate leaves with scattered green islands. In the advanced stages, chlorosis gradually spreads on the inner and intermediate leaves until all of these leaves are yellow.

### TEXANANUS LATHROPI OSBORN AND LATHROP

The symptoms produced by the feeding of some single noninfective nymphs of *Texananus lathropi* are similar to those described for *T. latipex*.

### TEXANANUS PERGRADUS DELONG

With this species the symptoms on the youngest leaf of healthy celery caused by the feeding of the leafhoppers are cleared veins and veinlets with white veinbanding (plate 1, *C*), followed by mottling.

### TEXANANUS SPATULATUS VAN DUZEE

The symptoms on the leaves of healthy celery induced by the feeding of nymphs and adults vary according to the populations of the leafhoppers. The first symptom is a clearing of the veins and veinlets (plate 2, *A*) on the youngest leaf of healthy celery, accompanied later with yellow veinbanding (plate 2, *B*). Yellow areas appear on the younger leaves (plate 2, *C*), and

<sup>1</sup> Received for publication December 4, 1945.

<sup>2</sup> Entomologist in the Experiment Station.

<sup>3</sup> See "Literature Cited" for complete data on citations, referred to in the text by author and date of publication.

chlorosis gradually spreads over the entire leaflets (plate 2, *D*, *E*), followed by a necrosis of the veins (plate 2, *F*). Large populations of nymphs and adults cause an outward rolling or curling of the leaflets, and chlorosis (plate 1, *D*).

The yellowing along the cleared veins followed by necrosis resembles the symptoms on celery leaves induced by the saliva of noninfective yellow willow aphids, *Carariella capreae* (Fabricius) as reported by Severin and Freitag (1938).

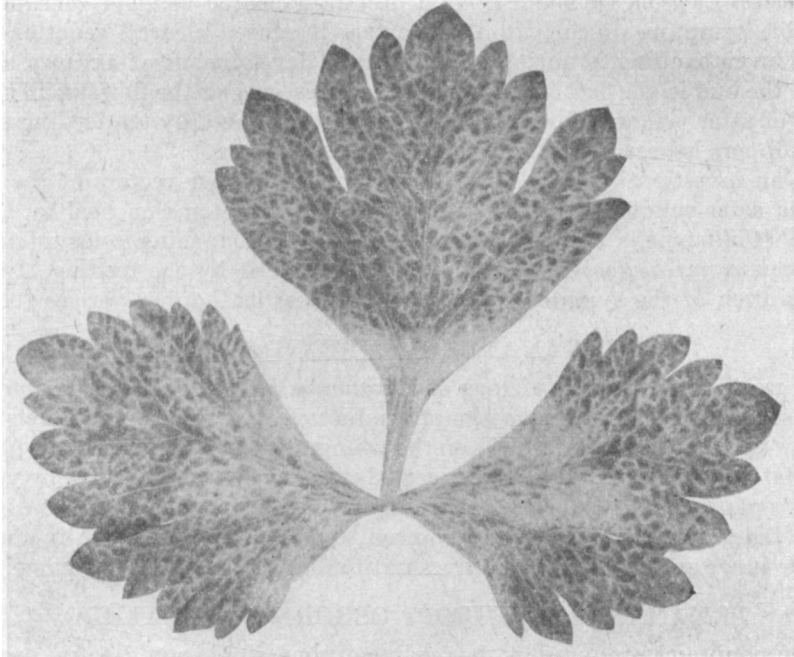


Fig. 1.—Cleared veins and veinlets on Golden Self-Blanching celery (*Apium graveolens dulce*) caused by the feeding of an occasional adult of *Acinopterus angulatus* Lawson.

The symptoms on the leaves of sugar beets nonsusceptible to aster yellows, are small yellow areas (plate 1, *E*) which gradually enlarge, followed by necrosis (plate 1, *F*).

#### GYPONANA HASTA DELONG

The feeding of noninfective adults of *Gyponana hasta* on healthy celery causes a stunting and curving of the petioles of the younger leaves, but not a twisting and intertwining of the petioles as in celery naturally and experimentally infected with aster yellows (Severin, 1929). Noninfective short-winged aster leafhopper, *Macrostelus divisus* (Uhler), failed to recover the virus and transfer it to healthy celery or asters from celery showing symptoms produced by the feeding of noninfective *G. hasta*. When celery plants showing

stunting and curving of the petioles induced by the feeding of this leafhopper were kept in insectproof cages, the petioles of the newly developing leaves were normal.

#### ACINOPTERUS ANGULATUS LAWSON

In testing the efficiency of virus transmission to healthy asters by single adults of this species an occasional plant showed cleared veins and veinlets with yellow veinbanding on a portion of an outer leaf (plate 3, *F'*) resembling the earliest symptom of aster yellows. The youngest leaf, however, failed to show these symptoms. Noninfective short-winged aster leafhoppers failed to recover the virus from asters showing cleared venation on the older leaf and transfer it to healthy aster and celery plants. An occasional celery plant showed cleared veinlets (fig. 1) on the youngest leaf, caused by the feeding of a single adult.

#### COLLADONUS MONTANUS (VAN DUZEE)

The feeding of large populations of this leafhopper on celery plants causes a mottling of the leaflets (plate 3, *A, B*) and chlorosis which gradually spreads over the entire leaflets (plate 3, *C, D, E*). These symptoms may be induced by the drain of sap, or by the salivary secretion, or both.

#### COLLADONUS GEMINATUS (VAN DUZEE)

The symptoms on celery produced by the feeding of large numbers of this leafhopper are similar to those described for *Colladonus montanus*.

#### CLOANTHANUS IRRORATUS (VAN DUZEE)

The feeding of large populations of this leafhopper on celery plants causes cleared veins and veinlets with yellow veinbanding. Yellow areas appear on the intermediate leaves, and chlorosis spreads over the entire leaves.

#### IDIODONUS HEIDEMANNI (BALL)

Nymphs of this leafhopper species are yellow in color and each nymph in feeding on an aster leaf causes a yellow discoloration (plate 4, *A*), presumably serving as a protective resemblance. Each yellow area increases in size, followed by necrosis (plate 4, *B*). Since but 1 nymph will induce these symptoms, a toxic salivary secretion is probably involved.

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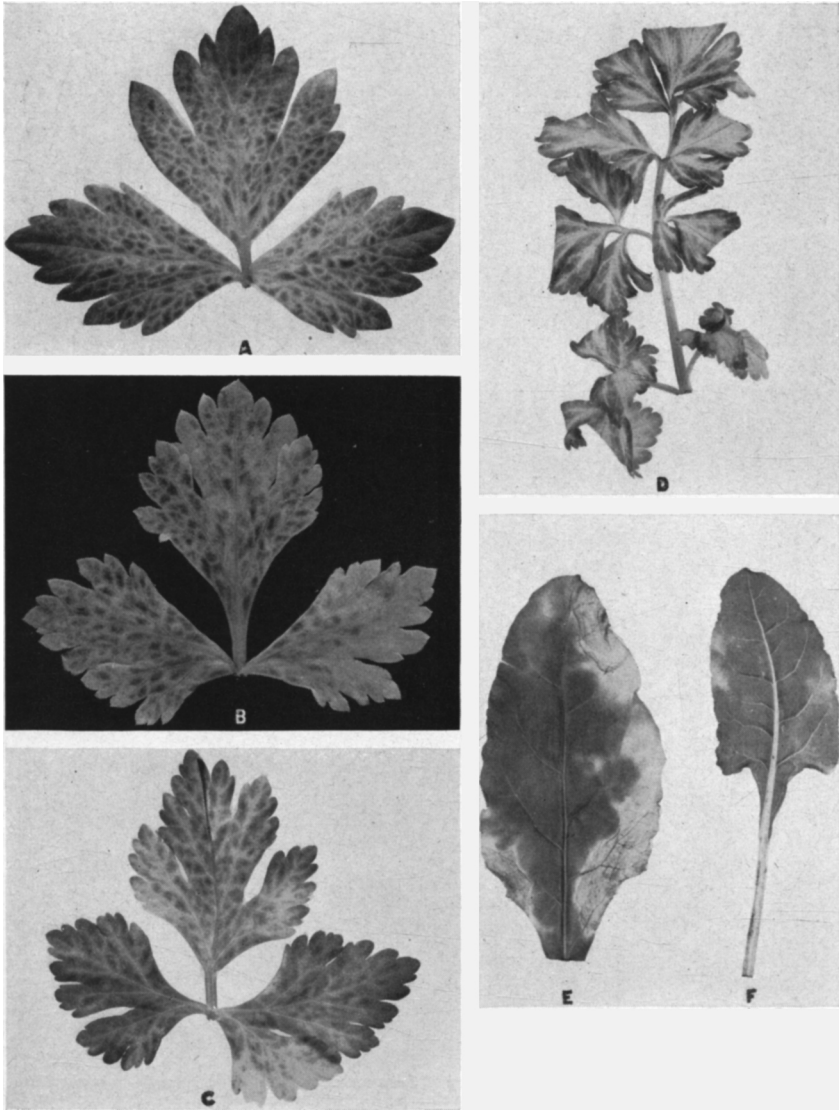


Plate 1.—Symptoms induced by the feeding of phlepsid leafhoppers: *A*, celery (*Apium graveolens dulce*) leaflets showing cleared veins and veinlets with yellow veinbanding, induced by the feeding of *Texananus lathropi* or by *T. latipex*; *B*, numerous small, green islands surrounded by yellow areas caused by *T. lathropi* or *T. latipex*; *C*, cleared venation, white veinbanding, and mottling produced by *T. pergradus*. Symptoms induced by *T. spatulatus*: *D*, outward rolling, curling, and chlorosis of celery leaflets; *E*, large yellow areas and necrosis of sugar-beet leaf; *F*, small yellow areas on blade and egg punctures in petiole of sugar-beet leaf.

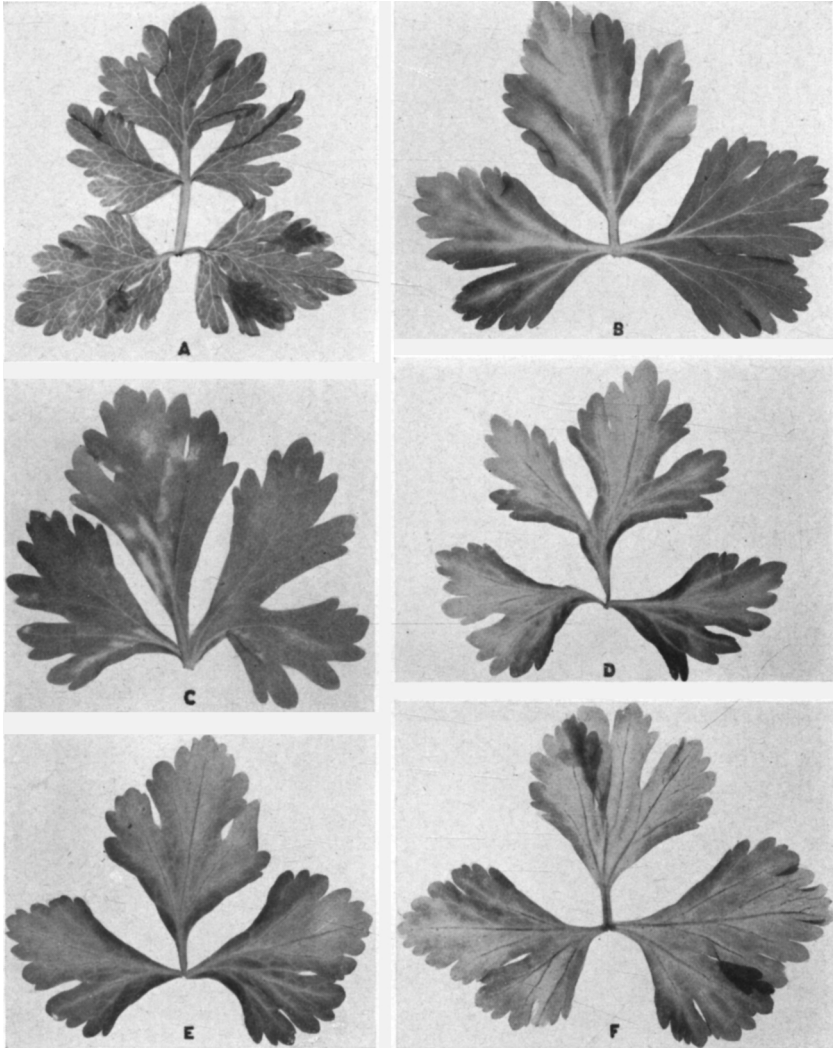


Plate 2.—Symptoms induced by the feeding of *Texanonus spatulatus* on celery (*Apium graveolens dulce*) leaves: A, cleared veins and veinlets; B, yellow veinbanding and chlorosis; C, interveinal yellow areas; D, E, chlorosis spreading over most of the leaflets with yellow veinbanding still evident in chlorophyll areas; F, chlorosis of leaflet and necrosis of veins.

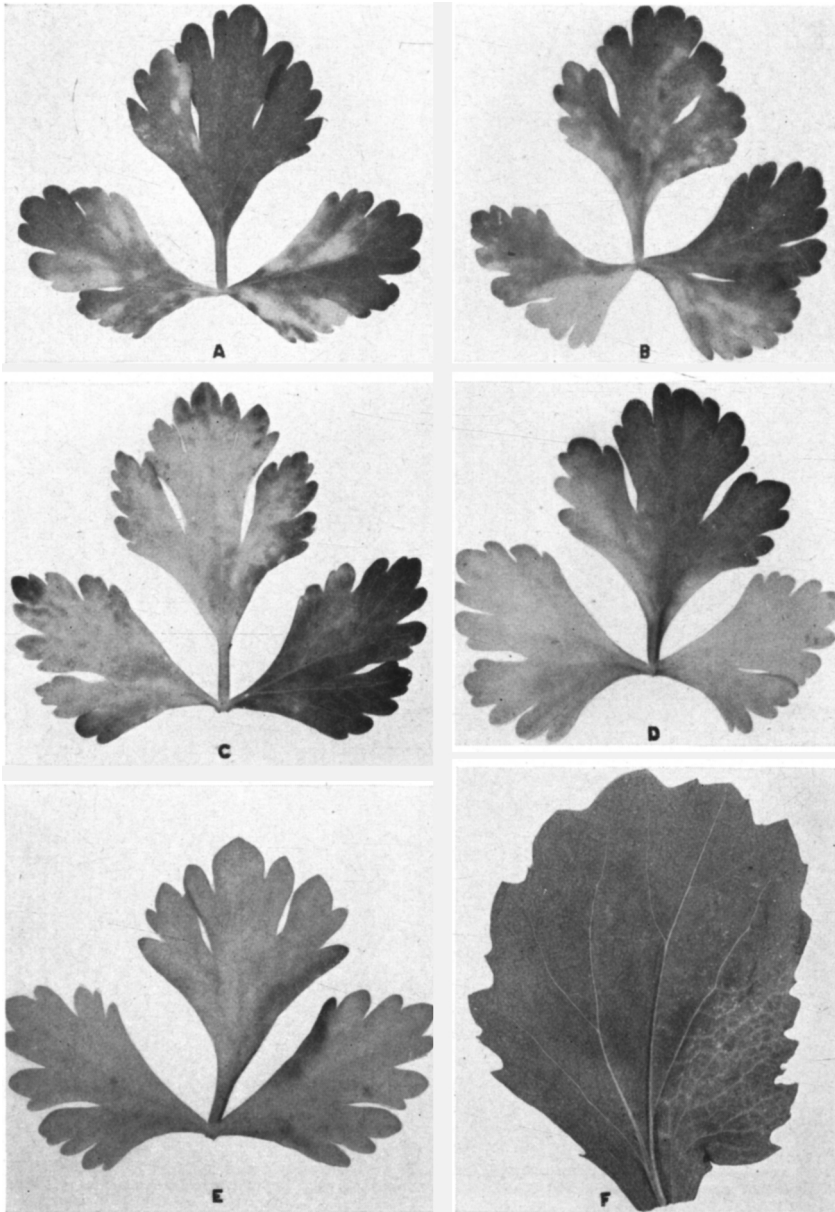


Plate 3.—Symptoms caused by the feeding of large populations of the mountain leafhopper, *Colladonus montanus*, on celery (*Apium graveolens dulce*) leaflets: A, B, mottling; C, D, E, chlorosis gradually spreading over the entire leaflets. F, cleared veins and veinlets on a portion of an outer China aster (*Callistephus chinensis*) leaf induced by a single adult *Acinopterus angulatus*.

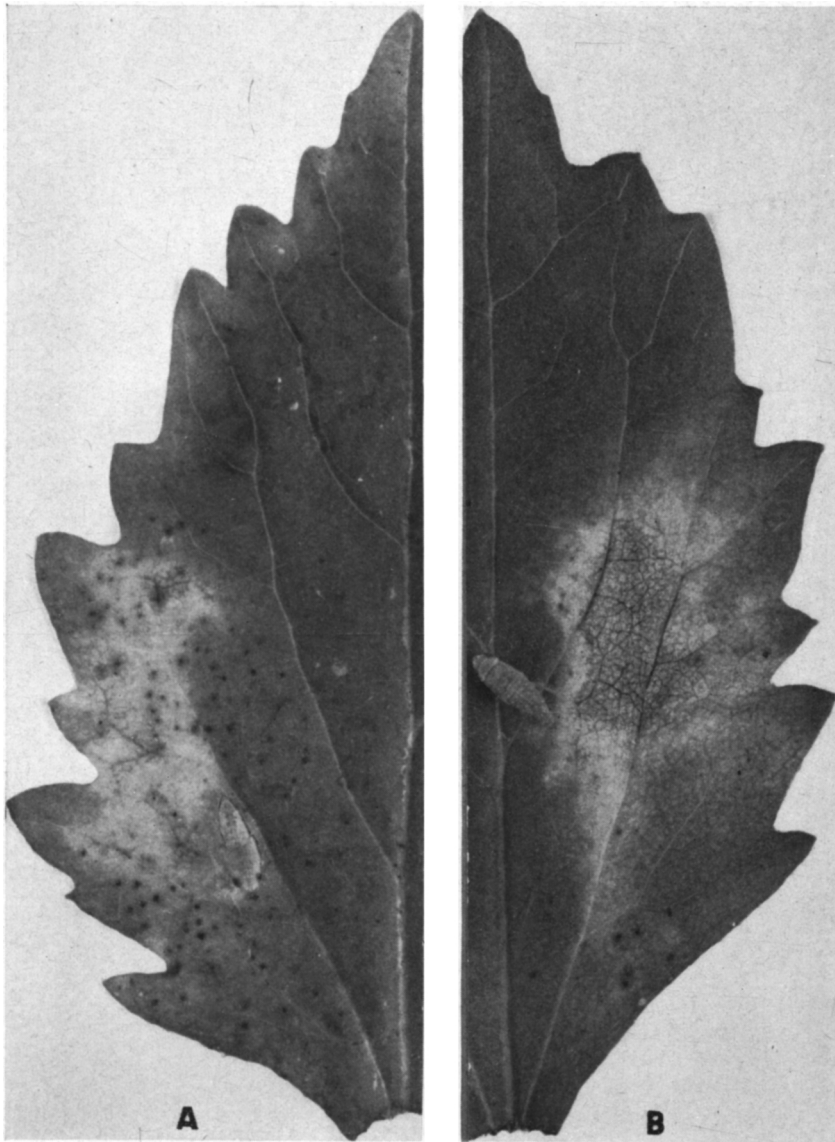


Plate 4.—Symptoms on China aster (*Callistephus chinensis*) leaves induced by the saliva of single nymphs of *Idiodonus heidemanni*: *A*, yellow discoloration of aster leaf serving as a protective resemblance with nymph of the same color; *B*, yellow discoloration and necrosis of aster leaf; the nymph was transferred from the yellow to the green portion of the leaf to contrast the color.