

# Curly Top Virus

## Guide H-106

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### DIAGNOSIS AT A GLANCE

#### Causes

Geminivirus—a ssDNA Virus

#### Common Hosts

Beets, tomatoes, peppers, beans, potatoes, spinach, cucurbits, many ornamentals, and weeds such as Russian thistle (tumbleweed) and mustard

#### Symptoms

- Leaf and fruit deformation
- Stunting
- Leaves turn yellow with purple veins.
- Leaves twist and curl upward.
- Leaves become thickened, stiff, and crisp.
- Petioles curl downward.
- Premature fruit ripening
- Reduced fruit quality and yield
- Infected young seedlings may die.

#### Transmission

Beet leafhopper (*Circulifer tenellus*)

#### Disease Conditions

Warm temperatures and dense leafhopper populations

#### Disease Management

Cultural practices:

- Plant virus-free transplants
- Control weeds and insects
- Remove infected plants
- Cage young plants in home gardens

Curly top virus (CTV), or beet curly top virus (BCTV) as it is more formally known, is widespread throughout arid and semi-arid regions of the world. The virus is common in the western United States from Mexico to Canada and in the eastern Mediterranean Basin. The virus has a wide host range, causing disease in over 300 spe-

cies in 44 plant families. The virus appears to be restricted to broad-leaved plants, as no monocotyledonous plants have been identified as hosts for this virus. The most commonly infected hosts include sugar beets (for which the disease was first named), tomatoes, peppers, beans, potatoes, spinach, cucurbits, cabbage, alfalfa, and many ornamentals. The virus also survives in many weeds, such as Russian thistle (tumbleweed) and mustard.

Symptoms vary depending on the host; however, this disease also produces some general symptoms. Other factors that relate to the type and severity of symptom development include virus strain and host physiology. The virus exists in many different strains, which vary in the severity of symptoms produced particularly in relation to the host. Severity of disease is also dependent on the age of the plant when infected. For example, when young plants are infected they will often die shortly after infection. When plants are infected after the seedling stage, the plants survive but are yellow and stunted. Infected leaves of some hosts, particularly tomatoes and peppers, become thickened and crisp or stiff, and roll upward as the petioles curve downward. The leaves turn yellow with purplish veins. Leaves of other hosts such as beets become very twisted and curly. In most cases, yield is reduced, and the fruit that is produced ripens prematurely. The immature, dull and wrinkled fruit is a good diagnostic symptom for tomatoes infected with CTV. If plants are infected after they have begun to set fruit, it is not uncommon to see infected and healthy fruit on the same stem.

This disease is transmitted (vectored) from infected to healthy plants by a small insect called the beet leafhopper (*Circulifer tenellus*). The leafhopper is an effective vector because it is able to transmit the virus after feeding on an infected

plant for as little as 1 minute and can subsequently transmit the virus for the remainder of its lifetime. The virus is not passed on to leafhopper progeny. Although leafhoppers that feed on infected plants are able to transmit the virus for their entire life, the effectiveness of transmission is reduced when the insect does not continually feed on infected plants.

While the disease can occur in commercial fields, it is particularly troublesome in home garden situations. The occurrence of this disease in home gardens may be due, in part, to the presence of alternate hosts that leafhoppers prefer to feed on, as well as an increased likelihood of infected source plants in the area.

There are no chemicals available for controlling the virus, but several cultural practices can help reduce or eliminate infections. Although resistance to curly top is not known, growers may benefit from trying to identify cultivars that are somewhat tolerant of the virus. Good sanitation practices, such as weed and insect control, are

also essential in limiting the occurrence of the disease. Home gardeners may also consider planting susceptible hosts, such as tomatoes and peppers, in a slightly shaded part of the garden, as leafhoppers prefer to feed in sunny locations. If the garden is in full sun, it may be helpful to place a netted cage over the plants when they are young. This netted material will provide a small amount of shade and, if the holes are small enough, may actually prevent leafhoppers from getting to the plants. If a cage is used, be sure the plant doesn't actually touch the netted material, as this will reduce the effectiveness. Remove cages when the plants are mature, as they are less susceptible to infection and will benefit from increased light for fruit development. All diseased plants should be removed from the field or garden as soon as they are noticed so that they do not continue to provide a source of the virus for transmission to healthy plants.

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