



Texas Agricultural Extension Service

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CURLY TOP VIRUS CONTROL FOR TEXAS TOMATO GROWERS

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Curly top is the most important disease of tomatoes in the western half of Texas. The virus disease occurs on many species of vegetables, including beans, beets, cantaloupe, cucumbers, squash and sugar beets, but consistently damages tomatoes more than any other crop.

The curly top virus overwinters on woody annual and perennial plants growing in desert areas of the Southwest. Russian thistle, filaree, tansy mustard and several other weedy plants support the virus and its insect host. The virus is transmitted only by the feeding of the beet leafhopper. Insect populations increase on weed hosts and then migrate to cultivated plants in the spring. Leafhoppers migrate as far as 300 to 400 miles. The virus is carried in the leafhopper and then injected into plant parts during feeding. After virus acquisition, leafhoppers can transmit it for an indefinite period. Infected plant levels depend on the number of virus-carrying insects, stage of crop development and predominant strain of the virus.

The beet leafhopper prefers a bright sunny location and avoids areas with low light intensity. This trait leads the insect to plants that are most isolated from other plants. Plants in skippy rows, at ends of rows or those planted with too much space between them make ideal targets for early curly top infection. The insect vector does not live on tomato plants for long periods; however, the virus can be acquired while feeding for 1 minute, and inoculation of a healthy plant can occur in the same amount of time. Symptoms appear about 2 weeks after infection. Symptoms are noticed first on scattered, infected plants followed by an increasing number of diseased plants during the next 2 weeks.

Disease symptoms on tomatoes first appear as a dull green or weak yellow colored plant. The main stem becomes abnormally erect. In a few hours the petioles and leaflets curve downward and leaflet

edges roll upward, giving a stiff leathery appearance. Veins on the bottom of the leaflet are swollen and have a purple color in most varieties. Growth stops immediately and all fruit turns red prematurely. Such fruit has poor size, flavor and quality. Lower leaves soon die on older plants, and young plants may be killed.

Control Measures

Experience with curly top shows that several cultural practices and management strategies give partial control. No single control practice completely eliminates the problem, but the gardener who combines as many useful practices as possible will have less disease than those who do not manage the crop for disease control. Practices which affect curly top development are:

- *Roguing.* Remove infected plants immediately after first symptoms are recognized. Diseased plants produce no salable fruit and only serve as a ready source of virus for secondary spread.
- *Weed Control.* Remove all weedy vegetation in and around the garden. Weeds compete with garden plants and attract the insect vector of curly top.
- *Thick Plantings.* Space plants closely in rows so they quickly develop a shady canopy. Thicker plantings minimize the loss from skips left while roguing diseased plants.
- *Cultural Practices.* Fertilize and irrigate to encourage fast growth of young tomato plants to produce heavy foliage that discourages leafhopper migration into these stands.
- *Shading.* Plant tomatoes in partial shade or construct shades of light cloth or lathing over the plants. Remember, shade discourages the leafhopper, and the resulting cooler temperature under the shade encourages fruit set on varieties which are not heat tolerant. Avoid excessive shading, however, which prevents proper plant function.
- *Do Not Attempt to Control the Beet Leafhopper.* The insect is not a permanent resident on tomatoes.

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Virus inoculation is completed by feeding for only minutes on a healthy plant. Disease development then occurs whether the insect is present or not. Further, it is not possible to predict when migration will occur or to kill every insect before the virus is introduced into the plant.

● *Planting Dates.* Plant early, determinate varieties as soon as possible so that fruit ripens before insect migrations. Delay planting late, indeterminate varieties until July 1. These varieties grow fast in summer heat but usually will not set fruit until cooler nights of August. Late planting reduces the time when infection can occur on the crop.

● *Resistant Varieties.* Four tomato varieties with resistance to curly top virus have been developed by USDA scientists at Prosser, Washington. They have been grown in various locations of West Texas since 1979. Some of these resistant varieties demonstrated good potential for home gardeners in Texas.

These varieties are:

● *Saladmaster.* This variety had a vigorous determinate vine and produced fruit weighing 1 to 2 ounces. The fruit had good flavor and the foliage provided fair coverage of the fruit. Yields were good at Alpine, Plains, Post, Lubbock and McLean, but yields were lower at Hereford, Dalhart and Vega. Two plants yielded 60 pounds at Alpine. Staked plantings at Dalhart yielded twice as much fruit as unstaked plants. The variety fruited well in hot weather but was slower when temperatures were higher.

In a large planting at Muleshoe, Saladmaster had six curly top infected plants out of 81; thus, 7 percent infection compared to 40 percent on the susceptible hybrid, Better Boy.

● *Rowpac.* This variety produced early, medium-sized fruit on a determinate plant. Fruit set was heavy even on the hottest days of summer both years.

Fruit ripened uniformly, weighed 5 to 6 ounces and were generally 3 inches wide and 2 inches deep. Yields were high in all areas, with 90 pounds on four plants at Alpine. Rowpac plants are small, determinate and do not have sufficient foliage to prevent sunburning on the fruit.

In the Muleshoe demonstration, 6 percent of 96 plants had curly top compared to 40 percent for the susceptible hybrid. This variety should perform well as an early producer and should be planted with a later maturing, indeterminate variety for season-long production.

● *Roza.* Plants were vigorous and indeterminate at most locations. Fruit were larger than Rowpac but sometimes rough and uneven. Yields were generally good in all demonstrations, but the plant did not set fruit well until cooler weather. Yields of 15 pounds per plant were common.

Curly top infection was found on 5 percent of 95 plants at Muleshoe, compared to 40 percent infection for the susceptible Better Boy hybrid. To extend the production period into the fall, try planting Roza with Rowpac.

● *Columbia.* This was the least desirable of the curly top-resistant varieties. Plants were not uniform for fruiting and growth, but yields were fairly high in some locations. Fruit weighed about 4 ounces.

At Muleshoe, 11 of 87 plants (12 percent) had curly top symptoms. Curly top resistance in Columbia is much better than in the Better Boy hybrid with 40 percent disease but not as good as in the other three varieties.

Breeding programs have produced many new tomato lines with resistance to the virus and high yielding ability. Growers can acquire these curly top resistant varieties by writing Selectex Seed Co., P.O. Drawer 900, Hale Center, TX 79041.

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