CURLY TOP OF TOMATO

Curly top of tomato, also known as western yellow blight, is a virus disease that has seriously hindered commercial tomato production in central and eastern Washington. The disease also causes serious losses in home gardens.

Curly top virus affects more than 300 broad-leaved plants. Tomato, bean, squash, cucumber, melon, spinach, table beet, pepper, and some flowering plants are the most common cultivated plants affected in Washington. Weeds and cultivated plants infected with curly top virus serve as reservoirs for the insect vector and the virus. Overwintering mustard weeds are the main source of the leafhopper vector and virus during the spring. Russian thistle and sugar beets are the main source during the summer.

Curly top symptoms vary somewhat according to the plant involved. In tomato plants, fully developed leaves show a pronounced upward rolling. These leaves become yellowish with purple veins, and the foliage becomes stiff and brittle. The growing tips are stunted and the youngest leaves curl and turn yellow. Infected tomato plants decline rapidly and die. Immature fruit on the plant ripen prematurely. Symptoms on many cultivated plants, beets, for instance, are characterized by vein clearing, vein swelling, stunting, and leaf curling, particularly at the growing point.

Curly top virus is transmitted only by the beet leafhopper, which appears in desert areas throughout eastern Washington and the Intermountain West. The leafhopper does not multiply on tomatoes but multiplies particularly well on sugar beets and on weeds that serve as reservoirs for the virus. Leafhoppers acquire the virus by feeding on a diseased plant. They can pick up enough virus in just a few minutes of feeding to remain infective for the remainder of their lives.

After a virus-laden leafhopper feeds on a healthy plant, curly top symptoms begin to appear in a week or two; within a month the tomato plant will be dead. The virus multiplies rapidly in a tomato plant and within a day or two, before symptoms appear, the virus can be picked up by feeding leafhoppers.

Curly top occurs wherever the beet leafhopper is found, which, in the United States, is only in arid areas of the West. Dry environmental conditions that favor the insect generally also favor the disease. Leafhoppers multiply most rapidly when
temperature and light intensity are high and days are long—typical summer conditions in eastern Washington. They begin reproducing in desert areas as the weather warms in late spring and move into cultivated areas and gardens when the deserts start drying up in late May and into June. Young, rapidly growing plants of tomatoes and other vegetables and ornamentals are particularly susceptible. This is also the time when leafhoppers migrating from nearby nonirrigated areas feed on them.

Control of curly top is accomplished in crops such as sugar beet, bean, tomato, and squash by growing disease-resistant or tolerant varieties. Sugar beets were nearly eliminated as a crop in arid regions of the western United States before resistant varieties were developed. Resistant tomato cultivars—Columbian, Roza, Rowpac, and Saladmaster—developed at WSU Prosser, greatly reduce losses from curly top, but so far, seed is available only from Prosser (contact Grace Carlson, USDA-WSU Rt.2 Box 2953A, Prosser, WA. 99350). Commercial, machine harvest types also are available.

Spraying tomatoes with insecticides does not control the disease because leafhoppers migrate from distant places and do not reproduce or remain in tomato fields. By the time migrating leafhoppers succumb to an insecticide, they have already transmitted curly top virus to the tomatoes. By the time curly top is evident in a tomato planting, the leafhoppers have long since moved on to other crops or weeds which they prefer.

Losses from curly top in the home garden can be minimized by direct seeding tomatoes or by growing them in the shade of taller crops such as corn. Shading minimizes curly top because leafhoppers tend to avoid shade. Direct-seeded plants are more resistant than transplants. Do not thin direct-seeded plantings, since the disease will usually do some thinning. Unthinned plants will produce just as well as thinned plants and tend to shade one another. Avoid planting table beets or spinach near tomatoes, since these crops are prolific sources of both leafhoppers and virus.