



# Curly Top Virus Biology, Transmission, Ecology, and Management

The group's collaborative research provided necessary background information on the curly top virus, developed tools to help with its management, and kept the disease's profile high so that growers and industry representatives can plan for potential disease management and do more to successfully prevent serious outbreaks of the disease before the planting season is under way.

## Who cares and why?

Beet curly top virus (BCTV) is the most widespread geminivirus (DNA virus that infects plants) in the U.S. It is endemic in the western U.S. and causes economic damage to a wide variety of crops. Transmitted by the beet leafhopper insect, the virus infects a broad range of host from many plant families. The leafhopper vector also feeds and breeds on an extensive range of plant hosts and can migrate considerable distances. Management of this viral pathogen and its leafhopper vector has proven difficult, and a sustainable management program is needed. Only when many individuals work together across state lines will significant progress in management of BCTV be possible. WERA-1007 meets to discuss, assess, and prioritize required research on BCTV genetics, vector biology and genetics, weed ecology, and disease management and to coordinate interdisciplinary research at a regional level. In addition to this needed coordination, another expected outcome is that the agricultural industry will know about new research on BCTV as it is being done, instead of after publication, and will be able to influence the direction of the research.



Beet curly top virus (BCTV) infects a variety of vegetable crops including tomatoes, beans, potatoes, spinach, and beets—pictured here showing symptoms of infection. Photo courtesy of Colorado State University.

## What has the project done so far?

Several funded collaborative projects on curly top virus were undertaken among group members. One looked at the transmission of curly top virus by the beet leafhopper to resistant tomato varieties. A second collaborative project was a screening for resistance to curly top virus in chile peppers, and a third compared viral infection in insects with plant infection. A collaborative project for 2011 was established to study the mechanism of resistance to curly top virus in dry beans.

## Impact Statements

Improved communication and collaboration among researchers (including USDA researchers) and Extension personnel.

Kept a high profile for the disease, encouraging growers and industry representatives to plan for potential disease problems and request more information about disease potential before the start of the planting season, instead of waiting to respond after a serious disease problem takes over a field.

Reported resistance to curly top virus in several host plants, giving growers a better idea of which crops varieties will be productive and profitable.

Tested the use of management strategies, such as reflective mulch and row covers, providing growers with more options for protecting crop yield and quality.

Monitored disease vector activity and made several reports on disease incidence in different locations in the West, helping to track disease spread and target areas for control efforts.

Provided necessary information on the nature and extent of curly top disease and vector migration and feeding preferences, helping scientists and growers predict disease occurrence. This research also helped determine the types of plant screenings that need to occur to better assess potential disease resistance in new plant varieties.

## What research is needed?

The primary research needs are to understand the reasons for rapid development of new strains of the viruses that cause curly top disease; develop additional plant varieties that are resistant to these viruses; better predict leafhopper population movement; and develop more cost-effective, practical methods for disease management.



Floating row covers are used to protect newly transplanted tomato plants from beet leafhopper, the insect vector of curly top virus. Photo courtesy of New Mexico State University.

## Want to know more?

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