

Applied Methods to Control Beet Leaf Hopper and Lessen Incidence of Curly Top Virus on Tomato

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Personnel

Rick Heflebower, Horticulture Agent, Washington County
Tammy Mitchell, Master Gardener, St. George, UT
Dan Drost, Extension Vegetable Specialist, Logan, UT
Ryan Davis, Arthropod Diagnostician, Logan, UT

Situation

The southwestern area of the United States including Nevada, Arizona, Utah and California experience serious losses from Curly Top (CT) virus on tomato nearly every year. Losses reported by market growers and home gardeners exceed 80 percent some years. CT is a virus disease that is transmitted by the Beet Leafhopper (BLH). It is thought that hoppers pick up the virus from weeds in uncultivated areas and transmit it to tomato fields and home gardens. Once plants are infected, symptoms will show in 7-10 days, and there is no cure. Plants will slowly lose vigor, and decline producing few if any tomatoes.

Proposal

In 2007, 2008 and 2009 we planted the varieties Row Pack, Columbian, and Roza, (Washington) which had been advertised as being CT resistant. During each season, these varieties along with others, became infected with the virus and died. From this we concluded that resistance is not a reliable option for controlling CT. Light-weight row covers made from spun-bonded polyester material have been used for more than 20 years as a method to protect young vegetable plants from late frost. One report from California showed a decrease in whitefly-transmitted virus diseases on squash (Natwick). In 2010, we organized a study to evaluate the effectiveness of using polyester row covers as a means to exclude leafhoppers on tomato.

Methods and Materials

The following four varieties were selected to be included in a study conducted in 2010; Celebrity, Mountain Fresh, Row Pack and Columbian. Twenty plants of each variety were planted, half were covered with polyester row covers and the other half were left uncovered. A separate row was planted containing all four varieties that were sprayed weekly with insecticide. Yellow sticky cards (3x5 inch) were used to monitor BLH activity early in the season. The spring of 2010 was cooler than average resulting in a season that was two weeks later than normal.

Results

At the St. George location three of the uncovered plants showed CT symptoms and died. None of the covered plants were affected. At the New Harmony location two plants in the uncovered treatments showed CT symptoms and died. One plant in the insecticide treated area also became infected and died. None of the plants in the covered areas showed symptoms. The table below is a summary of both locations. BLH were detected at both locations. Many (100+ per card) were caught outside of the covers, and very few (10-20 per card) were caught inside.

Treatments	# Infected Plants	# Healthy Plants	Total in treatment
Uncovered	5	155	160
Covered	0	160	160
Insecticide	1	15	16

It appears from our observations that both the row covers and the insecticide were effective at preventing Curly Top Virus. The sticky cards allowed us to see that BLHs were present in fewer numbers under the cover than on the uncovered plants. It is important to note that based on how few infected plants were noted in the uncovered areas, we consider this to have been a "light year" with regard to CTV pressure.

Evaluation and Impact: We have been conducting CTV work since 2007. It began when Chad Reid contacted Washington State University and discovered they had seed from 4 tomato varieties that supposedly had resistance to CTV. Since 2007, I have personally had contact with Extension Agents and Specialists in Arizona, Nevada, and Oklahoma. It is difficult to know the number of acres and growers that this work has impacted. Certainly, the sharing of observations has increased awareness about CTV, how it is spread, and measures that can be taken to prevent it. I learned from talking to agents in other states that extensive measures are taken by State Agriculture Departments and Weed Supervisors where tomatoes are grown commercially. The two things that are implemented are the 1) removal of weeds that are considered as alternate hosts from adjacent fields and 2) the use of insecticides when hoppers are first detected. The removal of weeds from adjacent fields would be costly and take a cooperative effort on the part of public and private land holders in Utah. Since tomatoes are not considered a crop of commercial size in SW Utah, I do not foresee this type of effort being put forth. Growers will likely use insecticide sprays on areas of an acre or more. I expect that home growers and small market growers will use row covers as have been suggested.

Educational Outreach: The documentation of our work on CTV since 2007 was presented at the 2010 National Association of County Agricultural Agents Meeting in Tulsa, Oklahoma this past July. Our earlier variety trial, where we evaluated the CTV resistant cultivars, was reported on at the Western Region Ag Agent Meeting in Prineville, Oregon in 2008.

Educational Products Produced: The following educational products have been created and used during the past three years:

Abstracts

Heflebower, R. F. (2010). Controlling curly top virus. *Proceedings of 2010 National Association Agriculture Agent Annual Meeting and Professional Improvement Conference*. Tulsa, OK.

Heflebower, R. F., Reid, C., Winward, D. & Washburn, C. (2008). Curly top resistant tomato varieties for southern Utah. *Proceedings of the 7th Annual Western Region Extension Professional Development Conference*. Prineville, OR.

Fact Sheet

Heflebower, R. F., Reid, C., Frank, E., & Evans, K. (2008). Curly top of tomato. Utah Plant Pest Diagnostic Lab. Utah State University. Logan, UT. PLP-006.

Power Points

Heflebower, R.F., Reid, C., & Winward, D. (2008). Curly top resistant tomatoes for southern Utah. 7th Annual Western Region Extension Professional Development Conference. Prineville, OR.

Heflebower, R.F. (2010) Curly top tomato virus. National Association of County Agricultural Agents Annual Meeting and Professional Improvement Conference. Tulsa, OK.
