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Curly top of tomatoes and peppers

Beet Curly Top Virus (BCTV) is an insect-vectored viral disease that affects sugar beets, tomatoes, melons, peppers, beans, cucumbers, squash, pumpkins, spinach, vine seed and a variety of weeds. The BCTV is transmitted by *Circulifer tenellus*, commonly known as the beet leafhopper (BLH). In California, 2013 was a big year for BCTV in tomatoes and the processing tomato industry suffered extensive losses estimated about $100M. It remains a disease that has the potential to cause extensive losses in certain years depending on environmental conditions.

BLH have a very distinct migratory pattern. In the fall, the BLH overwinter in the foothills where the females lay eggs on weeds, many of which are perennial and infected with BCTV. In the late spring, the leafhoppers migrate from the foothills to the agricultural valley in search for suitable hosts. As the adults migrate across the valley, they infect crop plants such as tomatoes and peppers (not suitable hosts) in search of suitable feeding and breeding host plants. As the disease is limited to phloem, the food conducting vascular tissue of the plant, the BLH must feed on phloem to acquire and transmit the virus. Once the virus is acquired by the BLH, it is carried for the rest of the life of the leafhopper and thus long distance spread is common.

Symptoms

Plants can show symptoms about 7-14 days after infection. Young plants infected early in the season usually die. Plants infected later in the season are stunted (Fig. 1), yellowish and have poor growth and the leaves of infested plants become thick, crisp and crinkled, rolled inward and cupped upward. Veins on the underside of the leaves usually have purple discoloration (Fig. 2). These symptoms will develop on the upper part of the plant or on entire shoots, but the plants generally do not die. Young green fruits will be stunted and ripen premature (Fig. 3). Infected plants are usually scattered in a field (Fig. 4) and once a plant is infected, it will not recover and will die or remain stunted without flowering or any fruit set. Margins or edges of fields are more susceptible to BCTV as the leafhoppers tend to feed on plants bordering bare soils.

Fig. 1 Stunted pepper plant due to curly top virus

Fig. 2 Infected tomato leaves with purple discoloration

Fig. 3 Premature ripened fruit

Fig. 4 Curly top infested tomato field

Management

As for other diseases, a proper and accurate diagnosis is crucial as other tomato and pepper viruses may cause similar symptoms. BCTV is a major constraint for processing tomatoes as the control remains challenging due to the disease being sporadic and unpredictable. So far, there are no commercially available resistant cultivars for tomatoes and peppers. Insecticides to control leafhoppers may not be effective as the leafhoppers do not stay in the field and transmit virus immediately upon feeding. By the time symptoms become evident, the leafhoppers have long since migrated to other fields or crop hosts, therefore making the pesticide application ineffective. Currently the CDFA Curly Top Control Program (CTVCB) monitors leafhopper population and targets the BLH populations by insecticide sprays. Cultural practices such as not planting near the foothills or dense planting can be helpful in reducing the incidence.

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