

Tomato Varieties Show Promise of Dodder Control

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Cuscuta spp. (dodder) infests thousands of acres of processing tomatoes in California. Other hosts include, alfalfa, safflower, onions, carrots, sugar beets and annual and perennial weeds. In California, dodder begins emerging from the soil during February and March (just in time for tomato emergence), but may continue emerging for several months. Because dodder is a rootless plant, it requires attaching to a green host plant within a couple of days of emerging from the soil or it will die. As a parasitic weed, it attaches to the host plant (generally the plant stem) and enters the plant using haustoria to gain water and nutrients from within the plant cells. Feeding off the host plant, it grows rapidly, enveloping tomato plants with its wiry orange strands. Tomatoes may be killed or severely retarded in growth under heavy infestations, leaving an entire tomato field blanketed with orange dodder plants. Dodder seed is known to survive in the soil for more than 10 years, making eradication difficult once it becomes established.

There are no registered herbicides that provide selective control of dodder in direct-seeded tomatoes. Recently, Shadeout® was registered in tomatoes in California but does not provide adequate control of dodder. Growers typically rogue infested fields twice early in the season to reduce its presence or apply postemergence herbicides (like glyphosate) as spot treatments to kill the host plant and the attached dodder. In either case, achieving control results in a loss of tomato plants and potential yield. Using transplanted tomatoes can be an effective method for protecting yields. While dodder can still attach to transplant tomatoes, the tomatoes will already be established ahead of the dodder attack. Delaying planting until after most of the dodder has emerged (about March 15) can be an effective method of avoiding the problem.

Studies conducted in 1994 by Sahm et al. in Germany demonstrated that tomato varieties infested with *Cuscuta reflexa* resulted in reduced dodder growth. Similar observations have been made in California by Lanini, King and others when H9492 was planted in dodder-infested fields.

Two studies were conducted in 1998 to evaluate dodder control using potential dodder-resistant tomato varieties. One study was conducted in western Fresno County and one at UC, Davis. The Fresno site had a history of dodder infection and dodder seed was planted at the Davis site. At the Fresno site, Heinz® 9492 and H9553 (a close relative of H9492) processing tomato varieties were compared against H8892 (grower standard). The three varieties were planted in multiple double-seeded rows, the length of the field. At the Davis site, H9492 was compared to a Harris Moran variety in 30'-long plots. All varieties tested in the studies are commercially available in California. Dodder attachment, growth, and seed production were evaluated in the studies.

Planting H9492 and H9553 resulted in significant dodder control at the Fresno site. While early counts showed no difference in the total number of dodder plants emerged or dodder attachment between the varieties tested, H9492 and H9553 did result in significantly less dodder

growth than in H8892. Dodder attached to H9492 or H9553 grew a maximum of 0.5 feet from the site of attachment, compared to H8892, which supported dodder plants 18 feet or more in length. Additionally, while there was some early dodder growth associated with the two tested varieties, the dodder attached to those plants subsequently died. Dodder cover and seed production was high in H8892, but nonexistent in H9492 or H9553.

Dodder emergence was poor at the Davis site, making it difficult to evaluate the plots. Mid-season ratings showed a 25% incidence of dodder on H9492 compared to 65% for the Harris Moran variety.

Although the unseasonably cool and wet season resulted in a “light” dodder year in 1998, results from this study showed a dramatic reduction in the amount of dodder growth and seed production when H9492 and H9553 were planted in western Fresno County. While the study did show a significant reduction in dodder growth and seed production, it is important to note that managing other weeds within the field was important for success. To be effective, growers will have to provide effective control of weed hosts within the field. Planting one of these resistant varieties in a field where other weed control is not adequately achieved could mean dodder survival.

The ability for growers to direct-seed dodder-resistant tomato varieties in previously infested fields is indeed interesting. If used in rotation with other non-host crops (like cotton) and sound weed control practices, these varieties should help reduce the impact dodder has on tomato production. With the increasing demand for biotechnology, it may be just a matter of time before these resistant characteristics are transferred to other commercial varieties or commodities.

