

## Research Update-California Melon Board Proposal

Emergence of Cucurbit yellow stunting disorder virus (CYSDV) in the desert Southwest:  
Assessment of the threat to melon production and development of an integrated disease  
management strategy

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### **Incidence and distribution of CYSDV:**

Surveys were conducted in the spring and fall of 2008 to determine the incidence of CYSDV in melons. The first survey was conducted on 2 May and a total of 12 fields were visited. Symptoms of CYSDV were found in one field and this was confirmed by the RT-PCR test. These results indicated that the incidence of CYSDV in spring melons was low, but that the virus had survived the winter. A second survey was conducted in 11-12 June, and a total of 28 fields were sampled. Considerably more CYSDV symptoms were observed, and CYSDV infection was confirmed in samples from 11 fields by RT-PCR. Most infections were found in melon fields (cantaloupe and honeydew), but infected plants also were found in a watermelon field. In addition, plants in a number of fields showed mosaic and dark green blistering symptoms and this was determined to be due to potyvirus infection; molecular analysis revealed that the viruses involved were *Watermelon mosaic virus* and a virus most closely related to *Zucchini yellow mosaic virus*. Thus, the incidence of CYSDV had increased considerably by June 2008, and there was a considerably higher percentage of infected fields in Imperial County than were found during the same period in 2007, when only 1 field was confirmed having CYSDV infection. Given that whitefly numbers were not particularly high in spring 2008, this suggests that CYSDV overwintered better in 2007-08 than in 2006-07.

A fall survey was conducted in the Imperial Valley on 3 October. Only 3 fall-planted melon fields were identified. CYSDV infection in plants from all three fields was confirmed based on molecular testing (RT-PCR). One field had a dual infection of both CYSDV and *Cucurbit leaf crumple virus*. In fall 2008, melon samples with CYSDV symptoms also were received from Coachella Valley and these were confirmed to have CYSDV infection by the RT-PCR test. These results are consistent with those of the past 2 years, with nearly universal infection in all fall-planted fields.

We have identified CYSDV in non-cucurbit crop and weed hosts in the Imperial County. This has been done through numerous field surveys conducted by Drs. Wintermantel, Gilbertson and Natwick, with assistance from DREC staff and the Imperial Co. Ag Commissioner's office. A total of 150 samples were collected for testing for CYSDV. To date, our results indicate that CYSDV infects at least 8 non-cucurbit weed and crop plants in the Imperial Valley/Sonoran Desert region from at least 7 different taxonomic families. Furthermore, experimental host range studies conducted at the USDA-ARS in Salinas, CA have confirmed that whiteflies can acquire CYSDV from several of these hosts (i.e., lettuce (*Lactuca sativa*), buffalo gourd (*Cucurbita*

*foetidissima*), alkali mallow (*Sida hederacea*), and ground cherry (*Physalis wrightii*) to transmit it back to melon. This is a much broader host range than was originally believed to exist for CYSDV. However, this finding also explains how the virus is able to persist in the Imperial Valley.

### **Evaluation of chemical and cultural controls:**

A whitefly insecticide efficacy study was conducted in the spring of 2008. The plot was planted 19 March and it was drip-irrigated. The plot design was a randomized complete block with 4 replicates. Whitefly adult and immature populations were determined following each of the three treatments. Overall whitefly populations were low in the spring and all insecticide treatments (Movento, Oberon 2C, QRD 416, Venom 20 SG, Esteem 0.86 EC, Knack 0.86 EC, NNI-1010 20SC, NAI-2302 15 EC and NNI-0871 SC) had fewer whitefly adults than the untreated check. All insecticides also significantly reduced numbers of nymphs at 7 and 11 days after treatments (DAT), but there was not difference at 4 DAT. These materials were less effective in reducing egg densities. There also was no phytotoxicity observed nor was CYSDV detected.

### **Resistance Breeding:**

In 2007, naturally infected field tests at DREC confirmed host plant resistance to CYSDV in PI 313970 and TGR-1551, and revealed potentially resistant individuals in three melon accessions (Ames 20203, PI 614185, PI 614213) from India not previously challenged with CYSDV. Cuttings from selected plants of PI 313970 and TGR-1551 and the other three putative resistant individuals were rooted in the greenhouse at Salinas for self-pollination and testing at DREC in 2008. Seed were obtained from the PI 313970 and TGR-1551 cuttings but not from the other three individuals.

Four CYSDV resistance tests were planted in a field at DREC in early September 2008: two genetic studies involving PI 313970 and TGR-1551, germplasm evaluation of 100 more accessions from India, and an evaluation of a sample of the self-pollinated progenies from the PI 313970 and TGR-1551 cuttings taken from DREC in 2007. Early indications suggest that these tests will be subject to uniform CYSDV infection: whiteflies were abundant and CYSDV-like symptoms were apparent in an adjacent melon experimental plot at the time of planting. Also of note, this project received permits from CDFA for experimental work with CYSDV at the USDA, ARS research station in Salinas.