

Watermelon Vine Decline and Fruit Rot

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In Spring 2003 and 2004 in Southwest Florida and in Fall 2003 and 2004 in West Central Florida (Manatee County area), a severe watermelon vine decline occurred as the crop approached harvest or soon after the first harvest. Foliar symptoms included a slight yellowing, wilting of the vines, scorched and brown leaves, premature leaf loss, and rapid vine collapse. Frequently, the interior fruit rind appeared greasy and discolored (brown), and fruit were non-marketable. However, there are no external symptoms on the fruit. Growers in West Central Florida indicate that the disease appeared in previous years, perhaps as early as 2001.

Disease progress was very rapid. In some fields, vine decline increased from 10% affected plants to greater than 80% within a week. Entire fields were lost. Some growers experienced a significant loss in yield in excess of 50% of their crops in spring 2004. Losses in spring 2005 are already estimated at 70% for one planting in southwest Florida.

Research is progressing towards finding the cause, or causes, of vine decline, so that it may be managed or avoided in the future. Scientists are trying to determine if the vine decline is environmentally induced or if a pathogen is involved. During outbreaks, symptomatic plant tissue and soil were sampled. Nutritional testing indicated that there were soil and tissue nutritional deficiencies in most fields; however, the deficiencies were not uniform from site to site. Therefore, these deficiencies may only have contributed to weakening the plants, thus increasing their susceptibility to disease. In attempts to link cultural practices to the onset and spread of the decline, growers were asked to provide information on all cultural practices performed at their farms. Initial analysis of the survey did not find common links to fungicides, insecticides, herbicides, irrigation, cultivars, transplant production, fumigation, or other practices. There does not seem to be an environmental cause of this disease, but the environment may play a role in the decline.

Numerous samples were evaluated for disease causing agents. Various fungi and bacteria were recovered from symptomatic crown, root, foliar, and fruit tissue. In the lab and greenhouse, several fungal samples caused watermelon seedling death. Several of the fungal isolates were characterized as *Fusarium oxysporum* f. sp. *niveum*, Races 0 and 1, which commonly cause Fusarium Wilt disease. However, the symptoms associated with the vine decline are clearly not the same as Fusarium Wilt. The Fusarium wilt fungus has only been isolated in a small percentage of the affected plants. Moreover, a pathogen carried in the soil does not fit the characteristics of this disease. Vine decline has occurred in watermelon crops produced on land that had never been farmed before and was in native landscape. Soilborne pathogens typically build up year after year and rarely cause consistent crop loss. Other fungi isolated from declining vines include Pythium, Phytophthora, and Rhizoctonia, but none of these were consistently isolated or caused symptoms similar to the vine decline on watermelon plants. However, these pathogenic fungi may contribute to and have a secondary role in vine decline. Bacteria were recovered that cause disease when inoculated on watermelon fruit in the lab, and characterization of these bacteria is underway.

Samples were also examined for the presence of viruses and viroids by various tests. Light and electron microscopic examination of symptomatic plants revealed inclusion bodies consistent with virus infection. Crude extracts from declining watermelons were filtered to remove fungi and bacteria and used to inoculate greenhouse-grown watermelon plants. The inoculated plants developed decline symptoms similar to those observed in the field and died. Screening of plant tissue by serological testing revealed Papaya ringspot virus type W (PRSV-W), a virus commonly observed in South Florida watermelon fields. PRSV-W was purified and used to inoculate additional watermelon plants. However, PRSV-W alone did not lead to the same symptoms of vine decline. This and other results suggest the presence of a second virus or viroid. Research is ongoing to identify the second virus or viroid and determine the role it may play in vine decline.

Additional experiments were placed last fall in watermelon fields that previously had vine decline to examine host resistance and fungicide efficiency. However, vine decline did not occur at any of the test sites. Spring trials were established mid-February in cooperation with growers who experienced vine decline in 2003 and 2004. On the assumption that we are dealing with a soilborne fungus (or fungi) and/or a virus, the experiment has transplants of watermelon obtained from a local producer; watermelon plants grafted onto gourd rootstocks resistant to most soil-borne pests; and cantaloupe, which appears to be a non-susceptible host. We also have plots of watermelon treated for whitefly and aphid control, possible virus transmitters, as well as those containing many different cultivars of watermelon, to see if tolerance or resistance is available.

In the lab, screening and identification of fungal, bacterial, and viral isolates continues. New diseased plant samples continue to be processed for the pathogen screening program along with pathogens/suspect pathogens previously identified. This will help to confirm whether suspected pathogens are associated with tissue showing symptoms.

Research into the cause of watermelon vine decline is continuing, and the resulting information about this damaging disease will be provided in future updates.