

Fusarium Wilt Race 4 Cotton Disease in Texas

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In 2017, the strain of Fusarium wilt of cotton caused by the fungus, *Fusarium oxysporum* f. sp. *vasinfectum* Race 4 (FOV4), was confirmed in Texas in many fields in El Paso and Hudspeth counties. Although present and unrecognized there for several years before 2017, how the pathogen was introduced to the area is not known. Previously, FOV4 occurred only in the San Joaquin Valley of California, since 2001. Its presence has significantly affected production there, limiting the varieties producers can grow. Texas growers also report substantial yield losses with this disease (Fig. 1).

Cause and Significance

The FOV4 fungus is different from other races, or strains, of the Fusarium wilt fungi found in cotton-producing regions of the United States, including the current races that occur in the Southern High Plains of Texas. FOV4 is better adapted to causing disease than the other Fusarium wilt races. It causes disease without the involve-

ment of nematodes and in soils with neutral to alkaline pH. To cause disease, the other races require nematode infestation—usually root-knot nematode—and many are restricted to soils with a neutral to acidic pH.

Once introduced into a field, FOV4 is there forever. Crop rotation or fallowing will not eliminate it because the fungus can survive on the roots of plants other than cotton, without causing disease. Resistant commercial Upland cotton varieties are not yet available, and current fungicides are not effective.

Symptoms

It can take several years after FOV4 is introduced into a field to see disease symptoms. Bare spots occur randomly throughout the field, indicating areas where seedlings were killed earlier in the season (Fig. 2). Seedling damping-off caused by FOV4 can resemble disease caused by other common fungal pathogens, such as *Rhizoctonia solani*. Over several years, the size of these bare spots increases, usually because of the movement of infested soil due to tillage or furrow irrigation.



Figure 1. Stand loss caused by FOV4. Source: T. Isakeit, Texas A&M AgriLife Extension Service



Figure 2. Bare spots within a field can indicate the presence of *Fusarium oxysporum* f. sp. *vasinfectum* Race 4. Source: T. Isakeit, Texas A&M AgriLife Extension Service

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Although all the races of the *Fusarium* pathogen cause wilt, FOV4 is unique in that it causes root rot. When infected plants are approximately at first flower, black streaking can appear at the center of the root (Fig. 3). This streaking is limited to the roots. As the fungus grows, more of the root becomes decayed and, eventually, the plants wilt and die. Susceptible Upland varieties can have root rot without visible above-ground symptoms, in contrast to susceptible Pima varieties, which tend to show above-ground symptoms when root rot is present.



Figure 3. Black streaking in the center of the root caused by *Fusarium oxysporum* f. sp. *vasinfectum* Race 4. Source: T. Isakeit, Texas A&M AgriLife Extension Service

Movement of the Pathogen

As with all *Fusarium* wilt fungi, FOV4 is both soil-borne and seedborne. The fungus produces spores in the plant, which persist in the soil in the crop residue after harvest. The spores spread within a field when implements or water (for example, furrow irrigation) move the infested soil. The fungus can be transferred to other fields via implements that carry infested soil.

Control

FOV4 infects and survives inside seeds. The fungus does not kill the seed and survives acid delinting and seed-treatment fungicides. As a result, contaminated seed can disseminate FOV4 great distances and into previously non-infested fields.

- Do not plant seed originating from a region with FOV4. Growers with infested fields should not save and replant their own seed. To date, FOV4 is limited to El Paso and Hudspeth counties in Texas. Not all fields in this region are infested, but there is no reliable test to ensure seed is free of FOV4.
- Use a pressure washer and detergent or soap to clean soil and plant material from farm equipment that has been in infested fields, before moving it to other fields.
- Do not apply gin trash from infested fields or manure from cattle fed cottonseed from infested fields.
- Investigate the cause of randomly distributed bare spots and seedling death in your fields. Submit plant samples to your county agent, Extension specialist, or plant disease diagnostic clinic.

This disease occurs in a limited area of Texas and following the above recommendations can keep it that way.

For additional information:

Managing Race 4 FOV (Fusarium oxysporum f. sp. *vasinfectum*) *in California Cotton*, <http://cottoninfo.ucdavis.edu/files/277633.pdf>.

Extension Plant Pathology
<http://plantclinic.tamu.edu>

Texas A&M AgriLife Extension Service
AgriLifeExtension.tamu.edu

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