# UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

# COTTON GUIDELINES

## FUSARIUM UPDATE: SCOUTING FOR AREAS WITH NEW FUSARIUM PROBLEMS?

### *(update – reprinted from: (CA Cotton Review, June 2002)*

*Prepared by: Bob Hutmacher* *UCCE – Shafter REC and UC Davis Agronomy*
*Mike Davis* *UCCE – UC Davis Department of Plant Pathology*

**The Potential Problem.** Fusarium wilt is a fungal vascular wilt disease that has been widely investigated in the San Joaquin Valley cotton production area since the late 1950's. At that time, USDA and University of CA researchers identified the primary symptoms as seen in SJV Acala cotton, conditions that favored the disease, and confirmed that there usually, but not always, is an association between the fungal organism (*Fusarium oxysporum vasinfectum)* and root knot nematode *(Meloidogyne incognita).* Fusarium problems in the past have almost exclusively been in areas where yield and stand losses due to root knot nematodes are a known occurrence.

During the past year, there have been several occurrences of confirmed *Fusarium* or, in other cases, Fusarium-like symptoms in which Fusarium has not been isolated that have occurred under conditions that generate some interest and concern among University of CA and industry staff. These concerns include: (1) *Fusarium* in several Pima fields; and (2) *Fusarium* confirmed in a clay loam site where root knot nematodes are not typically found at damaging population levels; and (3) could this be a new strain of Fusarium that could impact not only Pima but Upland varieties as well?

To date, UC investigations have not firmly identified whether or not these are just new sightings of Fusarium from the same "family" of Fusarium strains present for years in CA or if we might be dealing with a more recently-introduced organism. Part of the concern is related to the possibility that CA production areas could be seeing early signs of an infestation with the strains of Fusarium that have dealt heavy yield losses in parts of Australia in recent years. Genetic "mapping" tools are available to differentiate strains of Fusarium found here in CA from those found in Australia, and are in use in the UC Davis Department of Plant Pathology to evaluate these fields. It is important to note that none of the strains isolated in the very limited number of fields tested (where there were symptoms of concern) in 2001 were found to be either of the two known Australian strains.

**Symptoms and a Little History.** It is known that *Fusarium* can infect and produce symptoms and yield reductions in both Upland and Pima. However, most of the recent sightings of Pima with Fusarium symptoms severe enough to cause stand losses and yield reductions have been in areas with known "history" of past root knot nematode / Fusarium problems with Acala varieties.

There are some limited varietal differences in observed susceptibility to *Fusarium* wilt, but this may be more related to varietal differences in susceptibility to root knot nematode among Acala varieties. Little is known about varietal interactions related to root knot nematode or Fusarium susceptibility in Pima.

**Our Request to Interested Parties.** UC staff in cotton would like to request your assistance in keeping us informed of fields in which you suspect *Fusarium* might be a problem or where you have seen symptoms of interest. We are particularly interested in areas without a consistent prior history of *Fusarium* problems (possibly indicating something new). If you have a field you would like to have us look at, please contact Bob Hutmacher or your local Farm Advisor so we can get a University of CA Plant Pathologist involved in identifying: (1) if sampled plants have been infected with Fusarium; and (2) what strain of Fusarium is involved.

**What to Look For?** The disease can cause leaf yellowing and necrosis that typically begins on the leaf margins. In some cases, the symptoms can look quite similar to damage associated with *Verticillium* wilt. Because of the similarities, positive identification of *Fusarium* generally should include isolation of the fungus by plant pathologists. General symptoms of *Fusarium* as seen previously in CA cotton include:

- Brown "staining" in the stem water-conducting, vascular tissue
- The vascular staining with known strains of *Fusarium* tends to be darker & more continuous (less "streaky" than seen with *Verticillium),* and is more typically seen lower in the stem and upper tap root
- With prior known strains of *Fusarium*, leaf foliar symptoms (particularly the necrotic, brown areas) are more likely to begin at the leaf margins rather than in interveinal locations (between major leaf veins) as seen with *Verticillium* wilt
- Plants infected early in the growing season with *Fusarium* can be killed and might still be visible later in the year as small groupings of dead plants, or they can survive and be severely stunted as seen with root-knot nematode injury
- In more seriously affected plants, stunting and a reduced boll load can occur, or in more severe cases, visible leaf wilting, leaf loss and death

*Fusarium* is an organism favored by warm temperatures, so the mid-summer period continues to be a time when symptoms can appear in affected fields. As with *Verticillium* wilt symptoms, *Fusarium* will not usually cause mass wilting of all the plants down a row or in an entire area of the field, but will instead be seen as apparently random plants which can be affected at different times during the season.

For more information contrasting *Fusarium* symptoms and situations with those of *Verticillium*, you can look at Table 13.10 in the Cotton Production Manual (p. 170, Publication # 3352). More information and illustrations of leaf and stem symptoms of the type of *Fusarium* predominant in past research on CA cotton can also be located in the Cotton IPM manual and on the "IPM Pest Management Guidelines" section of the University of CA Integrated Pest Management website:

**http://www.ipm.ucdavis.edu**

(then go to section on "Pests of agricultural crops, floriculture and nursery ornamentals", follow that to "Pest Management and Identification" and then to "Cotton Pests and Diseasese

**Reason to Keep Our Eyes Open on This Subject.** With all of the other current "challenges" to production and profitability in CA cotton, we are not looking for or looking forward to another major problem. However, past known strains of *Fusarium* have been partially controllable only through crop rotation, field equipment sanitation practices, and judicious use of very limited Acala germplasm with resistance to root knot nematode.

For cotton production, there are no affordable and completely effective soil fumigant materials useful on strains of *Fusarium* previously known in CA, and that has also been the experience to date with the strains of *Fusarium* they are dealing with in Australia. Early identification of whether or not we have new strains of *Fusarium* in San Joaquin Valley cotton will be useful in assessing possible needs for control strategies.