MANAGEMENT OF FOV RACE 4

• Plant resistant / tolerant/varietals:
  - Growing susceptible varieties will increase inoculum levels in the soil.
  - Unfortunately, many commercial cotton varie-
tuas (Gins and abortuas) are not tolerant or high-susceptible to Race 4 FOV. In particular, do not grow these varieties known to be highly susceptible in confirmed Race 4 FOV fields or even near infected sites.

• Fields identified with Race 4 FOV:
  - Only varieties with the highest levels of toler-
ance as identified in UCT/UPD screening tol-
eries. More information from variety screen-
ing for Race 4 FOV is available at University of CA cotton website (http://cotton.ucdavis.edu/)

• In fields considered to be with Race 4 FOV:
  - Continue to plant varieties with quality and yield characteristics you want, but remain on the lookout for FOV disease symptoms and fol-

• Crop rotation:
  - Basic pest control with other FOV races, rotation to non-host crops or summer fallow will likely re-

• Practice containment strategies to limit spread among your fields:
  - If affected area is small, consider:
    - Soil solarization alone or in combination with seed treatment. Soils with high light-blocking film layer for 1-2 months duration.
    - Long-term Fallow - must include cool, wet period, and must be kept weed-free.
    - Summer flooding - duration of several months or extended floods (likely required) (lack research on efficacy for FOV).
    - Soil fumigants - use chemicals with some fungicide activity and target pests to destroy for spot or small area treatments (check with UCD/UPD for contact)

• If affected area is large, plant resistant varieties or alternative crops.

IMPORTANT POINTS TO REMEMBER

• FOV cannot be eradicated once it is estab-
lished in your fields. Take steps to prevent its intro-
duction or to help with containment to the degree possible.

• FOV is spread through (1) infected soil, (2) infected plant debris, and (3) infected seed. Introduce practices to reduce or pre-
vent movement of these materials within and between fields.

• Scout fields for FOV in the spring, ideally when plants have 2-7 main stem nodes (complete scouting before first bloom so you can find & evaluate weak growth or blank areas in fields).

• If Race 4 has been confirmed, plant resis-
tant or known highly tolerant varieties only and limit soil movement between in-
fested and non-infested areas or among fields.

BASIC FOV BIOLOGY

Fusarium oxysporum f. sp. vas. infection (FOV) is a soil-inhabiting fungus.

• Life Cycle:
  - FOV spores germinate when in the proximity of host plant roots. The fungus spreads from roots to stems through xylem (water-conducting vascular tissue), produces spores (spores quickly depend-
ing in part on plant susceptibility), and can then infect new plants or seed in the soil. In addition to susceptibility con-
trol, methods to control FOV include preventive seed treatment and use of weed seeds and weedless plant species. Spores can survive in the soil for years in the soil. FOV be-
comes a permanent soil resident once introduced and cannot be eradicated.

• Other plant hosts: FOV can sustain itself on the roots of many weeds and broadleaf plants, but FOV races specific to cotton (such as Race 4 FOV) will not cause disease in other plant species.

• Survival structures: FOV makes both short- and long-lived conidia as well as long-lived, thick-walled chlamydoconidia (spore-like structures) that can survive tough environmental conditions (heat, dehydration).

CONTAINMENT PRACTICES

FOV can spread through movement of (1) infected soil, (2) infected plant debris, and (3) infected seed.

• Limit Movement of Soil:
  - Premium quality topsoil, sprayer pipes, ma-
    chinery (e.g. harvesters) coming from farms or fields that you cannot vouch for an FOV-free.

• Inspect infected fields, avoid land-planning for

• Vascular shredding is most evident in tap roots.
  - When evaluating vascular systems for shredding, do not cut stems — pruce plants with an intact 5 to 6 inch section of tap root, then loosen roots longitudinally, and look for dark brown vascular shredding in roots (similar to that shown in picture below or on Low, CA cotton website).

• Differentiating symptoms of FOV from Verticillium wilt:
  - Verticillium symptoms appear later in season than FOV (i.e. blossom drop/bloom later).
  - Verticillium vascular shredding is generally lighter in color, more irregular in nature, and has less or no shred evident in lower stems (2 to 6 inches above seedling)
  - FOV vascular shredding occurs as deep tan to black nodules as a tap root brown color.

• Identifying Race 4 FOV:
  - Symptom of all stages of FOV will look similar, so identification of race 4 FOV can only be made through a properly conducted plant pathol-
    ogy laboratory based on evaluations of plant tissue from suspect plants. While tech-
    niques do exist for evaluation of Race 4 FOV in soil, the tests are expensive and labor inten-
    sive, and are currently not available for evaluation of sites for likely presence of Race 4 FOV.

• Race 1 FOV may be a possible diagnosis if you have sandy-loam soils and root knot nematodes (visual symptoms are similar to Race 4 FOV, so pathology evaluations are required to differentiate between Race 4 FOV races).

• If Race 4 FOV is confirmed, to the degree possible, either: removing infected internal plant or affected areas as well as immediately adjacent areas in order to prevent spread. More importantly, if you are growing a susceptible cotton cultivar, do not use infected plants for planting, pull up plants and burn them or compost them at high temperatures.

MANAGEMENT OF RACE 4 FOV

Carefully note location of any confirmed or likely infected areas. Get a hand-held GPS to provide GPS coordinates of infected areas if possible. Moni-

For more information, visit: http://scottcounty.ucdavis.edu, www.cogg.org, or contact Bob Hutmacher (University of CA) at (909) 389-1567.

CGASA recognizes the following contributors to this publication:
Ben Hutmacher, David Kabisch, Mary coleg, Peter Usoh, Steve Wright, Peter Usoh, Brian Bennett, Paul Keyser, Dan March, Gerardo Benitez, and Dale Brockman (various affiliations: Shafter Cotton Research Center UC/CSA/AS, UC Kearney REC, UC Davis Plant Science and Pathology Department, University Cooperative Extension).


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