Western cotton (Acala, Upland, and Pima) germplasm enhancement for agronomic, fiber traits, and pest resistance.

Part of project P36 (Project 36 is located field 22).
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Summary:

Since the re-establishment of the USDA-ARS, WICS, genetic/breeding program, we have been focusing on bringing germplasm from any possible source available to us in order to increase genetic diversity. Most of the time, the genetic diversity in the cotton crop is used as an indicator to recognize potential threats to sustaining high yields. In the last couple of years, several troubling developments have recognized *Fusarium oxysporum* f.sp. *vasinfectum* (FOV) Atk. Sny & Hans as a recurring and potentially expanding threat to cotton production. The vulnerability of cotton production to this pathogen highlights the need for comprehensive research to protect the cotton industry from FOV, both from virulent populations which may be introduced and new virulent strains arising from within cotton production areas. Until recently, only race 1 and race 2 were known to occur in the United States (DeVay, 1986; Smith et al., 1981). UC scientists have recently identified race 4 of FOV in cotton plants grown in California fields.

This race 4, first identified in India on Asiatic cottons, had not previously been identified in the U.S. Historically, most cotton crop loss in the San Joaquin Valley to Fusarium wilt was thought to all be associated with races 1 or 2, and in these fields the worst damage was observed when there was also significant nematode damage from root knot nematode (Veech, 1984; Bell, 1984). However, within the past few years, race 4 FOV caused extensive symptoms in cotton plants grown in clay loam and loam soils in which root knot nematode populations and root damage from nematodes were nonexistent or extremely low. In field evaluations in California, disease expression of race 4 has been most severe in Pima cotton fields, but the fungus also has the capability to infect and cause disease in Acala and Upland cottons (Hutmacher et al., 2005; Kim et al., 2005; Ulloa et al., 2006). From these evaluations it was concluded that most commercial Pima (*Gossypium barbadense* L.) cultivars grown in California were susceptible to FOV race 4 (stand loss, stunting, etc). This research identified potentially new improved resistant germplasm. Because of the need of tolerance/resistant pima germplasm in California and because we know that host-plant resistance is the most economic and effective strategy for Fusarium wilt control in cotton, this year we are testing SJ-P01F germplasm line for possible release in the near future for public incorporation into California cotton cultivars. In addition, we are continuing to develop highly resistant germplasm.

In preliminary trials, SJ-P01F did not show superior Fusarium wilt (FOV) tolerance for race 4 or yield as compared to Phytogen 800 (which is the most tolerant commercial variety). However, SJ-P01F showed reasonably good tolerance to FOV race 4, yield, and fiber quality for a pima cotton germplasm. SJ-P01F was also designated or named as USDA-39 and UCA-FOV-

03. Final yield and fiber quality-characteristic data will be obtained this year for possible release. The primary reason for SJ-P01F release is to provide the private and public breeders with an additional source for FOV race 4 resistance with acceptable yield and fiber quality which will be easier to select for or incorporate into new advanced commercial experimental varieties.

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