

**SUMMARY REPORT**  
**California Cotton Alliance Supported Project**  
**2014 Project Activities to Date**

**PROJECT TITLE:** Field Screening Support – Verticillium wilt resistance of new germplasm Pima, Acala and California Upland Varieties

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**Objectives of Research:**

The overall objective of this research was to identify and utilize field screening locations with a moderate to high level of sustained Verticillium wilt inoculum to provide a location for field screening of cotton germplasm of interest in CA Cotton production. The aim of the work is to utilize locations with a Verticillium wilt population for field screenings to identify relative susceptibility of newer commercial varieties of interest for CA Cotton production, and to then screen experimentals from both commercial breeders or seed companies plus those from USDA-ARS or other public breeding programs.

**Project Work to Date**

Two test locations were identified with a moderate amount of Verticillium wilt problems evident in field screenings. Varieties entered in the FOV race 4 testing program were also evaluated for verticillium wilt present at the sites. A WSREC test location was evaluated at the West Side REC, and susceptible cotton varieties were again planted in a repeat site in order to develop that site as a repeat location to build up Verticillium inoculums for testing purposes. The entries evaluated included approved Acala varieties still available commercially and non-Acala CA Uplands, experimental Uplands and commercial and experimental Pima varieties from seed companies and public breeders in multiple locations.

The research sites evaluated as possible sites included the West Side REC site where no FOV race 4 was evident, and two sites where both Verticillium wilt and race 4 FOV were both present. In our work done to date, it seems workable to differentiate between verticillium wilt and race 4 FOV vascular stain symptoms in the plants when diagnosis and evaluation of plants was done at the optimum timing for both diseases. It is much more difficult and likely less useful to focus on foliar symptom severity as a relative indicator. In the tables that follow from 2014 screening summaries from two sites for all the entries evaluated, our plan is to focus on the vascular staining data, and the varieties / cultivars to focus on for additional evaluations would in particular be those that showed up as more severely infected (higher incidence of vascular staining) in both test sites (as opposed to a variety, for instance, with a relatively low incidence (% vascular staining) at only one location. The 2014 data summary data for the WSREC site is not complete, but we will be working to summarize those during the next month or two for a more complete report.

In our experience, the relative level of late season foliar damage is not necessarily an important indicator of relative impacts on yield, while the level of vascular staining can be a useful indicator of the areas of inoculum presence in the field and as an indicator of whether or not Verticillium is prevalent enough in the field to become an expanding problem. The best timing for the disease evaluations in the plants (vascular staining ratings) seems to be at about 5 to 8 weeks after planting with the Fusarium race 4 versus about 4 to 8 weeks

later for the verticillium ratings. The verticillium wilt symptoms were most evident in the second two sites (ones which also had Fusarium wilt symptoms), so the primary efforts in screening were done at those two sites.

Seed amount requirements for these small screening trials were on the order of several hundred seed per entry. This year and in the future the small size of the trial plantings should prevent seed amount from being a constraint to including cultivars that represent new germplasm. The primary trials were very small plot trials with 3 replications, and plots were one row in width by 15 to 20 feet in length, with about 60 seed planted per plot (less if seed availability was a problem with entries).

**Data Collection and Results / Future Plans.** Verticillium wilt incidence was evaluated in 20 to 25 plants per field replication in the entries at the test locations. Evaluations of plants were done by cutting the stems at an angle and across the stem diameter at a point about 5 cm above the cotyledonary node. The primary evaluation was presence / absence of the streaky vascular staining evident with verticillium wilt, and a secondary evaluation was just a visual ranking of the extent (percent) of leaves on the plant showing some evidence of necrotic areas or yellowing associated with Verticillium wilt. As California producers sort through a wide range of Pima and Upland germplasm going forward with multiple goals of finding high yielding, acceptable maturity timing, and high fiber quality varieties with resistance to diseases such as race 4 Fusarium, the idea behind evaluations for verticillium wilt would be to try to identify relative levels of susceptibility of newer or newly-considered cultivars also to Verticillium wilt.

The evaluations done in 2013 and 2014 at the UC West Side REC indicated a relatively low to moderate population of Verticillium that was not particularly conducive to separating out moderately susceptible from highly susceptible cultivars, since none of the tested cultivars at the site exceeded about 20-25 percent infection rates (vascular staining symptoms) in any replications.

Please contact Bob Hutmacher (Cell: (559) 260-8957 with questions or to suggest possible test plot locations if interested.

Cultivar name or Variety	Type of Cotton (U= Upland; P=Pima)	Location of evaluation	Percent of 20-25 sampled plants with verticillium wilt vascular stain symptoms		Cultivar name or Variety	Type of Cotton (U= Upland; P=Pima)	Location of evaluation	Percent of 20-25 sampled plants with verticillium wilt vascular stain symptoms
Phy-725RF	U	Kern Co. Tulare Co. WSREC	53 80 15		Phy-802 RF	Pima	Kern Co Tulare Co WSREC	0 0 0
Phy-PX7064-05WRF	U	Kern Co Tulare Co WSREC	27 60 10		Phy-805RF	P	Kern Co Tulare Co WSREC	7 7 0
Phy-499WRF	U	Kern Co. Tulare Co. WSREC	53 67 15		Phy 811 RF	P	Kern Co Tulare Co WSREC	0 0 0
FM-1830 GLT	U	Kern Co. Tulare Co. WSREC	7 20 5		DP-358 RF	P	Kern Co Tulare Co WSREC	0 0 0
FM-2334 GLT	U	Kern Co. Tulare Co. WSREC	0 7 5		Mon 13R348R2P	P	Kern Co Tulare Co WSREC	0 0 0
FM-2322 GLT	U	Kern Co. Tulare Co. WSREC	0 7 0		Mon 12R254 R2P	P	Kern co Tulare Co WSREC	33 13 0
DP-1252 B2RF	U	Kern Co. Tulare Co. WSREC	67 33 10		HA-211	Hybrid	Kern Co Tulare Co WSREC	7 7 5
DP-1137 B2RF	U	Kern Co. Tulare Co. WSREC	67 20 5		HA-1432	Hybrid	Kern Co Tulare Co WSREC	0 7 0
DP-1050 B2RF	U	Kern Co. Tulare Co. WSREC	80 67 20		DP-340	P	Kern Co Tulare Co	47 0
Phy-755 RF	U	Kern Co. Tulare Co. WSREC	73 60 15		BX-1530 GLT	U	Kern Co Tulare Co WSREC	60 87 10
DP-1050 B2RF	U	Kern Co Tulare Co WSREC	80 67 15		BX-1534 GLT	U	Kern Co Tulare Co WSREC	27 20 0
Phy-755 RF	U	Kern Co Tulare Co WSREC	73 60 10		BX-1535 GLT	U	Kern Co Tulare Co WSREC	13 7 5
Daytona RF	U	Kern Co Tulare Co WSREC	27 47		BX-1536 GLT	U	Kern Co Tulare Co WSREC	40 53 10

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BX-1538 GLT	U	Kern Co. Tulare Co. WSREC	60 53 10		OA-5	P	Kern Co Tulare Co WSREC	0 0 0
13 R352 B2R2	U	Kern Co Tulare Co WSREC	53 40 5		OA-6	P	Kern Co Tulare Co WSREC	7 33 5
12 R249 B2R2	U	Kern Co. Tulare Co. WSREC	40 67 10		OA-7	P	Kern Co Tulare Co WSREC	0 40 10
12 R224 B2R2	U	Kern Co. Tulare Co. WSREC	73 40 15		OA-8	P	Kern Co Tulare Co WSREC	0 0 0
13 R310 B2R2	U	Kern Co. Tulare Co. WSREC	27 20 0		OA-9	P	Kern Co Tulare Co WSREC	0 0 0
14 R1455 B2R2	U	Kern Co. Tulare Co. WSREC	33 73 20		OA-10	P	Kern Co Tulare Co WSREC	0 0 0
14 R1456 B2R2	U	Kern Co. Tulare Co. WSREC	13 33 5		OA-13	U	Kern Co Tulare Co WSREC	53 80 20
Phy-417 WRF	U	Kern Co. Tulare Co. WSREC	40 67 15		OA-14	U	Kern Co Tulare Co WSREC	80 - 15
Phy-427 WRF	U	Kern Co. Tulare Co. WSREC	47 47 5		OA-15	U	Kern Co Tulare Co WSREC	0 27 5
OA-1	P	Kern Co. Tulare Co. WSREC	7 13 0		OA-16	U	Kern Co Tulare Co WSREC	0 27 10
OA-2	P	Kern Co Tulare Co WSREC	7 0 0		OA-17	U	Kern Co Tulare Co WSREC	33 27 0
Oa-3	P	Kern Co Tulare Co WSREC	0 0 0		OA-18	U	Kern Co Tulare Co WSREC	20 27 10
OA-4	P	Kern Co Tulare Co WSREC	0 0 0		OA-19	P	Kern Co Tulare Co WSREC	40 27 0

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OA-20	U	Kern Co. Tulare Co. WSREC	7 0 0		ST-6448 GLB2	U	Kern Co Tulare Co WSREC	47 33 20
BX-1531 GLT	U	Kern Co Tulare Co WSREC	67 60 15		DP-348	U	Kern Co Tulare Co WSREC	7 0 0
BX-1532 GLT	U	Kern Co. Tulare Co. WSREC	47 67 10		OA-EXP.-08- 15	P	Kern Co Tulare Co WSREC	0 0 0
BX-1533 GLT	U	Kern Co. Tulare Co. WSREC	20 33 0		OA-EXP.11.8	P	Kern Co Tulare Co WSREC	7 0 0
BX-1537 GLT	U	Kern Co. Tulare Co. WSREC	0 20 5		OA-EXP.13.1	P	Kern Co Tulare Co WSREC	0 7 0
BX-1539 GLT	U	Kern Co. Tulare Co. WSREC	53 47 20		OA-EXP.13.7	P	Kern Co Tulare Co WSREC	0 7 5
FM-1320 GL	U	Kern Co. Tulare Co. WSREC	13 67 15		OA-EXP.13.9	P	Kern Co Tulare Co WSREC	13 7 0
FM-1944 GLB2	U	Kern Co. Tulare Co. WSREC	27 27 0		OA-EXP.16.9	P	Kern Co Tulare Co WSREC	13 0 0
FM-2484 B2F	U	Kern Co. Tulare Co. WSREC	0 0 0		OA-EXP.17- 12	P	Kern Co Tulare Co WSREC	7 0 0
ST-4747 GLB2	U	Kern Co. Tulare Co. WSREC	33 60 25		OA-EXP.19- 14	P	Kern Co Tulare Co WSREC	7 7 5
ST-4946 GLB2	U	Kern Co Tulare Co WSREC	7 53 10		OA-EXP.20- 13	P	Kern Co Tulare Co WSREC	0 0 0
ST-5032 GLT	U	Kern Co Tulare Co WSREC	27 60 20		OA-EXP.20- 16	P	Kern Co Tulare Co WSREC	0 13 10
ST-5289 GLT	U	Kern Co Tulare Co WSREC	67 60 5		OA-EXP.21- 12	P	Kern Co Tulare Co WSREC	0 0 0

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OA-21-15P	P	Kern Co. Tulare Co. WSREC	0 73 15		GW-06-3233	U	Kern Co Tulare Co WSREC	33 0 10
OA-EXP.23-11	P	Kern Co Tulare Co WSREC	7 0 0		GW-07-269	U	Kern Co Tulare Co WSREC	47 33 10
OA-EXP.23-14	P	Kern Co. Tulare Co. WSREC	7 0 0		GW-07-373	U	Kern Co Tulare Co WSREC	60 53 5
OA-EXP.24-14	P	Kern Co. Tulare Co. WSREC	0 0 0		Ark-0614-49	U	Kern Co Tulare Co WSREC	53 47 20
DP-360	P	Kern Co. Tulare Co. WSREC	0 0 0		Ark-0615-38	U	Kern Co Tulare Co WSREC	73 47 25
DP-744	P	Kern Co. Tulare Co. WSREC	47 7 10		Phy-72	U	Kern Co Tulare Co WSREC	60 60 20
Phy-830	P	Kern Co. Tulare Co. WSREC	7 13 5		PD-07066	U	Kern Co Tulare Co WSREC	47 20 5
FM-2989 GLB2	U	Kern Co. Tulare Co. WSREC	27 40 10		PD-07116	U	Kern Co Tulare Co WSREC	33 40 0
OA-EXP-15-3	P	Kern Co. Tulare Co. WSREC	7 7 0		PD-08039	U	Kern Co Tulare Co WSREC	40 47 15
OA-EXP-20-9	P	Kern Co. Tulare Co. WSREC	0 7 0		GA-2009100	U	Kern Co Tulare Co WSREC	40 40 15
SPR-856/1	P	Kern Co Tulare Co WSREC	7 0 0		GA-2009037	U	Kern Co Tulare Co WSREC	27 60 15
SPR-1000	P	Kern Co Tulare Co WSREC	0 7 0		GA-2010074	U	Kern Co Tulare Co WSREC	67 67 20
SPR-9009-6	P	Kern Co Tulare Co WSREC	0 0 0		MD-10-6	U	Kern Co Tulare Co WSREC	40 20 15

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LA-11309062	U	Kern Co. Tulare Co. WSREC	33 20 0		MS 00415	U	Kern Co Tulare Co WSREC	33 10
LA-11309040	U	Kern Co Tulare Co WSREC	20 5		MS 0040-19-4	U	Kern Co Tulare Co WSREC	60 15
LA-11309005	U	Kern Co. Tulare Co. WSREC	60 20		DP-393	U	Kern Co Tulare Co WSREC	33 20
OA-185	U	Kern Co. Tulare Co. WSREC	33 5		SG-105	U	Kern Co Tulare Co WSREC	53 25
OA-173	U	Kern Co. Tulare Co. WSREC	27 10		FM-958	U	Kern Co Tulare Co WSREC	27 0
PX-06520-42-2-1	U	Kern Co. Tulare Co. WSREC	53 0		UA-222	U	Kern Co Tulare Co WSREC	40 15
AU 51038	U	Kern Co. Tulare Co. WSREC	67 20		DP-491	U	Kern Co Tulare Co WSREC	33 5
AU 91411	U	Kern Co. Tulare Co. WSREC	40 10				Kern Co Tulare Co WSREC	
AU 52034	U	Kern Co. Tulare Co. WSREC	67 20				Kern Co Tulare Co WSREC	
NM 12Y1002	U	Kern Co. Tulare Co. WSREC	13 0				Kern Co Tulare Co WSREC	
NM 12Y1004	U	Kern Co Tulare Co WSREC	7 0				Kern Co Tulare Co WSREC	
NM 12Y1005	U	Kern Co Tulare Co WSREC	0 0				Kern Co Tulare Co WSREC	
MS 0043-28-1	U	Kern Co Tulare Co WSREC	33 5				Kern Co Tulare Co WSREC	