

Table 17. Race 4 Fusarium (FOV-4) infested field evaluation of entries in the 2018 RBTN in Tulare county near Tipton, California¹, conducted by University of California and USDA-ARS (Hutmacher, Ulloa et al).

Entry	Foliar Disease Severity Index ²		Vascular Root Staining ³		Main Stem Nodes		Plant Height		Plant Percent Survival ⁴	
	0-5	σ	0-5	σ	no.	σ	cm	σ	%	σ
Ark 1015-42	1.07	0.88	2.40	0.83	17.8	2.24	27.27	5.31	69.0	15.8
Ark 1005-41	0.27	0.59	2.07	0.96	17.87	2.95	29.40	4.82	76.3	12.6
Ark 1004-38	0.40	0.74	2.33	0.72	17.93	1.71	32.20	8.18	67.9	23.4
Ark 1005-35	0.20	0.41	1.60	0.83	17	1.73	30.13	3.34	90.0	7.2
Ark 1007-15	0.33	0.62	1.87	1.30	16.73	2.12	29.80	6.01	83.7	14
16-13P1115	0.33	0.72	1.73	1.28	17.2	2.31	32.60	4.31	81.1	17.6
TAM LBB 150107	0.27	0.70	2.07	1.10	18.53	2.85	31.53	3.52	77.6	15.5
TAM LBB 150824	0.47	0.83	2.07	0.88	18.27	2.02	33.93	5.32	71.3	4.9
TAM LBB 150921	0.60	0.83	2.13	0.83	17.60	1.88	30.60	5.53	76.3	13.8
GA 2012141	0.33	0.72	1.73	1.22	15.40	1.80	27.87	4.63	75.1	20.4
GA 2015024	0.13	0.35	1.60	1.06	19.60	1.18	35.61	4.14	88.4	13.6
TAM 13S-03	0.40	0.74	2.07	0.88	17.40	2.06	26.87	4.56	86.0	14.3
TAM 12J-39	0.33	0.72	1.87	0.99	16.87	1.51	27.27	7.31	88.3	15.6
LA 14063083	0.20	0.56	2.53	0.99	16.67	1.99	25.87	4.31	82.4	11.1
LA 14063075	0.07	0.26	1.53	0.74	15.33	2.13	25.93	3.06	79.5	13.7
LA 11309040	0.40	0.51	2.47	0.64	17.20	1.52	28.87	3.64	82.4	17.5
PD 2011 021	0.20	0.41	2.00	0.76	17.27	1.79	28.67	4.32	90.4	2.4
PD 2011 081	0.33	0.60	1.60	1.24	16.67	1.54	26.73	8.46	76.9	17.6
PD 2011 026	0.13	0.35	1.73	1.16	16.20	1.32	31.73	2.99	81.4	5.3
MS 2010-87-5	0.33	0.49	2.20	0.68	18.33	1.11	31.00	3.25	92.3	9.5
DP 393 check	0.00	0.00	1.27	1.16	16.80	1.66	29.73	3.21	89.1	2.7
DP 493 check	0.07	0.26	1.40	1.12	17.67	1.88	28.33	3.37	88.6	1.3
FM 958 check	0.27	0.59	1.20	1.37	16.53	1.73	29.80	4.69	73.4	16.2
UA 222 check	0.33	0.00	2.47	0.64	18.13	2.47	29.73	3.22	73.1	15.3
Phy 499 WRF⁵	0.20	0.41	1.53	0.99	17.73	1.28	37.07	4.89	98.9	1.9
Phy 764 RF⁵	0.07	0.16	1.73	0.70	17.93	1.16	31.27	1.62	96.1	3.4
DP-340⁶	0.62	0.80	2.54	0.81	13.05	1.77	14.32	5.98	20.5	12.9
Phy-881 RF⁶	0.00	0.00	1.13	0.74	17.67	1.99	27.27	2.09	88.1	7.2
DP-348 RF⁶	0.13	0.35	1.20	0.68	17.73	1.91	28.40	2.06	87.6	11.3

¹ Tulare county location is a naturally infested field site where presence of race 4 of the Fusarium pathogen has been confirmed in pathology studies. Evaluations were conducted approximately 7 to 9 weeks after emergence (multiple dates in July and August). Destructive measurements were collected from 5 plants within three replications. A moderate to severe development of FOV-4 symptoms was observed in 2018, the third year of evaluations at this test site. Observed symptoms were more severe compared to evaluation conducted in 2016 and 2017. All but the most FOV-4 susceptible entries (susc. checks) experienced high survival rates (>70%) in 2018. In terms of screening for resistance to FOV-4 for this site/year, we consider genotypes with root stain index values <1.6 as having potential for resistance and warrant further evaluations.

² Foliar Disease Severity Index scale: 0 = no symptoms; 1 = epinasty and slight dwarfing; 2 = 1 to 30% of leaves chlorotic; 3 = 31 to 80% of leaves chlorotic and severe stunting; 4 = 81 to 100% of leaves chlorotic; and 5 = plant death.

³ Vascular Root Staining Scale: 0 = no vascular root staining evident, 1 = light vascular root staining evident as spotty areas, 2 = more continuous than 1, but light colored staining covering an area between one quarter and one half of the stem cross-section, 3 = moderate brown/black staining evident in a band encircling most of the stem cross section, 4 = brown/black staining evident across most vascular tissue in stem cross section, and 5 = plant severely damaged or plant death with staining evident throughout a cross-section of root tissue (Ulloa et al. 2006, 2009a).

⁴ The percentage of plant survival (PS) was calculated by dividing the total number of surviving plants on sample date by the initial plant count after plant establishment, and multiplying by 100.

⁵ Upland (Phy 499 WRF) and Acala (Phy 764 RF) check cultivars moderately-susceptible to FOV-4

⁶ Pima check cultivars moderately-susceptible (DP 340), and moderately resistant (Phy 881 RF and DP 348 RF) to FOV-4.