

Evaluation of commercial cotton cultivars for resistance to *Fusarium* wilt and root-knot nematode, 2015.

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The trial was conducted at the Plant Breeding Unit near Tallassee, AL on a Kalmia loamy sand (80% sand, 10% silt, 10% clay). The field has a history of continuous cotton production and natural infestations of the causal agents of Fusarium wilt (*Fusarium oxysporum* f. sp. *vasinfectum*) and root-knot nematode (*Meloidogyne incognita*). Plots consisted of one row with 1m row spacing, four replications, and rows were 6 m long with 3 m alleys. Ten commercially available cotton varieties commonly grown in the region were tested for resistance or tolerance to Fusarium wilt and the root-knot nematode and compared to a susceptible check Rowden and a resistant check M-315. Fertilizer and pesticide management practices were applied as necessary according to the Alabama Cooperative Extension System recommendations. The trial was planted June 1, 2015. Initial and final stand counts were made July 1 and September 15, respectively. Five disease incidence evaluations were made throughout the growing season. Root-knot egg counts were obtained from three whole root systems per plot at 45 DAP. Plots were harvested November 16, 2015. Monthly average maximum temperatures from planting in May through harvest in October were 28.9, 31.9, 33.2, 32.5, 29.6 and 25.6°C with average minimum temperatures of 14.7, 19.7, 21.0, 20.1, 17.4 and 11.4°C, respectively. Rainfall accumulation for each month was 19.2, 9.3, 11.8, 8.2, 3.6 and 3.1 cm with a total of 55.2 cm over the entire season. The rainfall was adequate in July but very dry in Aug and Sep. Data were analyzed by ANOVA using PROC GLIMMIX with SAS 9.4 (SAS Institute, Inc., Cary, NC) and means compared with Tukey's HSD test at the $\alpha \leq 0.05$ level.

Fusarium wilt incidence in the South field (Table 1) ranged from 0.3 % in the CG 3885 B2XF commercially available cultivar to 45% in the nematode susceptible check Rowden. All cultivars supported less FOV incidence than the standard Rowden. Root-knot nematode eggs were extracted from plants and root system weights were similar between all cultivars and the two controls. Root-knot nematode total egg numbers were exceptionally high in 2015 and ranged from a low of 1966 eggs supported by the resistant standard M-315 to a high of 34541 eggs in ST 6448 GLB2. The resistant check M-315 averaged 1966 compared to the susceptible standard Rowden's 12203 eggs per gram of root. The root knot numbers of eggs per gram of root standardizes the nematode populations depending on the size of the plant's root system. Root-knot eggs per gram of root varied from a low of 123 again in the M-315 resistant standard to a high of 4350 in in ST 6448 GLB2. The ST 6448 GLB2 cultivar supported similar root-knot egg per gram of root densities as PHY 499 WRF, CG 3885 B2RF, and Rowden. The cultivars DP 1558 NR B2RF, ST 4747 GLB2, DP 1454 NR B2RF, ST 4946 GLB2, PHY 487 WRF, and PHY 333 WRF all supported similar root-knot eggs densities as the M-315 resistant control. All varieties tested yielded significantly higher than the susceptible check Rowden. Raking the cultivars by seed cotton yield in lb/A, the highest yielding variety was DP 1558 NR B2RF followed by ST 4747 GLB2, ST 4946 GLB2, and CG 3885 B2RF. These four cultivars produced a 16% (573 lb/A) increase in yield over the M-315 resistant control.

Table 1. Cotton cultivar response to Root-knot nematode and Fusarium wilt and subsequent yield, 2015.

Cultivar	Root fresh weight gm		Root-knot eggs total		Root-knot eggs/ gm root		% FOV	Seed cotton lb/A		
DP 1558 NR										
B2RF	12.1	a	8066	cd	563	abc	3.6	b	3775	a
ST 4747 GLB2	12.0	a	10019	bcd	821	abc	2.1	b	3681	a
ST 4946 GLB2	12.9	a	7356	cd	530	abc	2.1	b	3626	a
CG 3885 B2XF	9.0	a	7538	cd	1657	a	0.3	b	3318	a
DP 1454 NR										
B2RF	11.3	a	12101	bcd	890	abc	7.4	b	2962	ab
PHY 487 WRF	9.6	a	10677	bcd	1092	abc	3.2	b	2777	ab
PHY 333 WRF	9.5	a	9519	bcd	818	abc	1.8	b	2730	ab
NG 3406 B2XF	11.5	a	16320	bc	1318	ab	4.1	b	2596	ab
PHY 499 WRF	11.0	a	28719	ab	2479	a	6.0	b	2527	ab
ST 6448 GLB2	7.7	a	34541	a	4350	a	4.2	b	1931	b
M315	8.7	a	1966	d	123	c	1.2	b	3027	ab
ROWDEN	7.3	a	12203	bcd	1549	a	45.1	a	410	c