

Shafter Cotton Field Day, Sept. 21, 2004

UC Riverside Blackeye Improvement Program-Activities at Shafter

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Blackeyes are a well-adapted and generally profitable rotation crop for many cotton growers in the southern San Joaquin Valley, but improved blackeye varieties are needed for the California blackeye industry to remain competitive with other producing areas such as the High Plains of Texas. The major objectives of the UCR Blackeye Varietal Improvement program are to develop blackeye bean varieties and complementary management methods that increase grower profits through increased yield and grain quality, and decreased production costs. The Shafter Station has been an ideal, representative yield-testing site for the products of our breeding program for the last ten years. As a result of these efforts, we released the blackeye variety California Blackeye No. 27 (CB27) in 1999. CB27 has high yield potential, heat tolerance, improved broad-based resistance to root-knot nematodes (*Meloidogyne incognita* and *M. javanica*) and resistance to the two races of Fusarium wilt present in California (Table 1). CB46 has resistance to one race of Fusarium wilt and to only one of three strains of root-knot nematodes present in California. CB27 also has grain that is brighter white than CB46 and larger in size.

In 2004 there were three blackeye field experiments on the Shafter Research Station:

- 1. Advanced Blackeye Trial:** We are evaluating the grain yield and grain quality of 8 advanced blackeye breeding lines from the UCR breeding program, along with the standard variety 'CB46' and the newer variety 'CB27'. Most entries in this trial have resistance to two races of Fusarium wilt and some have stronger resistance to root-knot nematodes than CB46 (Table 1); all have excellent seed quality and high yield. Several entries are later in maturity than CB46 and are expected to have much greater yield potential. This trial is also being conducted at the Kearney Research and Extension Center.
- 2. Advanced Blackeye Breeding Line Nursery:** We are evaluating 100 advanced lines from our breeding program. These lines combine the best features of existing blackeye varieties. Selection of lines for further testing will be based on their having a high-yielding plant type, desirable grain quality, resistance to root-knot nematodes, Fusarium wilt and 'early cut-out'. Selected lines will be included in replicated yield trials in 2005 and in future years.
- 3. Strip plots of CB46, CB27, UCR 539, and UCR 524.** Four-row, 300 foot-long strip plots of CB46, CB27, UCR 539, and UCR 524 were sown on May 5 on 1 acre block. UCR 524 and UCR 539 are promising blackeye breeding lines that have been tested for several years in small plot evaluations. Each varietal strip was replicated three times. Observations of the maturity, yield potential and extent of ground cover were made. UCR 524, a blackeye line with very large seed was judged to be promising and merits additional testing in 2005.

Table 1. Source pedigree, nematode resistance, days to maturity and seed weight (g/100 seeds) of 8 blackeye breeding lines selected for inclusion in Advanced Trials conducted at Shafter and Kearney in 2004.

Source	Pedigree	Days to maturity	Nematode resistance	Seed weight
2003-Sh-27	UCD9259/96-11-522	86	Rk	23.5
2003-Sh-31	UCR 53/AB105	90	Rk+	22.2
2003-Sh-40	CB46/99-8-622-2	100	Rk+	25.0
2003-Sh-46	CB46/99-8-622-2	100	sus	24.5
2003-Sh-49	CB46/99-8-622-2	90	Rk+	22.4
2003-Sh-50	CB46/99-8-622-2	90	Rk	25.5
2003-Sh-57	UCR 24/99-8-622-2	90	sus	22.6
2003-Sh-65	97-15-769/H8-8-9	95	sus	20.2
CB27		86	Rk+	21.4
CB46		90	Rk	19.9

** Rk- Phenotype indicates entry carries gene Rk or equivalent (CB46 is known to carry gene Rk).
Rk+=Rk+rk3- Entry probably carries both Rk and rk3 genes.

Table 2. Resistance/tolerance features of CB5, CB27, CB46 and promising breeding lines developed at UCR and grown in observation strip plots at Shafter in 2004

Entry	Fusarium wilt		Root-knot nematodes		
	Race 3	Race 4	<u><i>M. incognita</i></u>		<i>M. javanica</i>
			avirul.	virulent	
CB5	No	No	Yes	No	No
CB46	Yes	No	Yes	No	No
CB27	Yes	Yes	Yes	Yes	Yes
UCR 539	Yes	No	Yes	Yes	Yes
UCR 524	Yes	Part.	Yes	No	No

avirul. = avirulent, effectively controlled by gene *Rk*; virulent = not effectively controlled by gene *Rk* alone; Yes+=less root galling than CB27; Less gall=less galling than CB46, similar in galling to CB27 at Kearney *M. javanica* site in 2000.