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Field Crop Notes
Tulare County

Vol. 10, Issue 4, March 2013

2012 Tulare/Fresno County Silage Corn Variety Trial

Shannon Mueller, Farm Advisor from the Fresno County Cooperative Extension office, and I teamed up for the annual silage corn variety trial in 2012. The location was at Milky Way Dairy, the same as last year but in a different field. The soil was a fine sandy loam. After harvesting the preceding crop of winter forage, manure was spread and the field disked, furrowed out, and pre-irrigated.

Each plot was five 30-inch rows wide and slightly over a quarter mile in length. There were 3 replications. Thirteen varieties were planted to moisture on June 19. Pounce, 6 lb/A, was applied at planting. Stand counts, 20 locations within each plot, were taken 14 days after planting. Average populations were very uniform, ranging from a low of 32,817 to a high of 33,933 plants per acre (Table 1).

Crop development proceeded normally. Roundup Powermax (32 fl oz/A) was applied for Johnsongrass on July 20 and Status was applied (2 oz/A) on July 22. Oberon (11 fl oz/A) was applied to control spider mites in the last half of July by ground. Tassels first emerged in early August with the major pollination period in mid-August. Plant and ear heights were taken in late September (Table 1) and harvest was on October 12. All five rows and the entire length of each plot were harvested for yield data (Table 2).

Table 1. Plant population, tassel and silk ratings, and plant and ear heights, 2012 Tulare/Fresno Silage Corn Variety Trial, Milky Way Dairy, Visalia, CA.

	3-Jul	16-Aug		30-Aug	24-Sep	
Brand	Plant Population	Tasssel Rating 1=none; 5=all out	Silk Rating 0=none; 5=brown	Silk Rating 0=none; 5=brown	Plant Height (ft)	Ear Height (ft)
Croplan8621VT3/P	32,833	2.8 bcd	2.8 ab	4.1 cd	11.5 cd	6.3 bc
DK 67-88 (field Variety)	33,033	3.1 ab	2.9 a	4.9 a	12.1 b	6.6 ab
N82V311	33,233	2.5 de	2.3 c	4.3 bc	13.4 a	6.4 abc
Integra 9682VT3	33,250	1.6 f	1.3 d	3.8 de	12.1 b	6.7 a
NuTech 5X-716	33,333	3.1 ab	2.8 ab	4.9 a	11.8 bc	6.2 cd
DK 64-67	33,517	2.6 cde	3.0 a	5.0 a	10.4 f	5.6 f
Dyna-Gro 57VP51	33,933	2.5 de	3.0 a	4.6 ab	10.4 f	5.1 g
BH 8860GT	33,467	3.0 ab	2.4 bc	4.3 bc	12.0 b	5.9 def
Baglietto 5530RR	32,817	2.9 abc	2.8 ab	4.7 a	11.0 e	5.7 f
ES 7615VT2P	33,883	3.0 abc	2.0 c	3.5 e	11.8 bc	6.1 cde
TMF2L871	33,450	2.2 e	1.3 d	4.0 cd	11.1 de	5.9 def
MC 6583	33,317	3.0 abc	3.0 a	3.9 cd	10.8 ef	5.7 f
TG8574GTCBll	33,867	3.3 a	3.0 a	4.1 cd	11.0 e	5.8 ef
Grand Mean	2.14	2.75	2.50	4.30	11.50	5.99
Probability	33379	0.000	0.00	0.00	0.000	0.000
LSD (0.05)	0.65	0.35	0.44	0.37	0.458	0.365
Coefficient of Variation (%)	NS	7.5	10.5	5.1	2.4	3.6

Planted June 19, 2012, and harvested Oct 12, 2012. Values are means of three replications. Within a column means follwed by a common letter do not differ significantly at the 5% level of probability (Duncan's Multiple Range).

As the plots were chopped, each was subjectively rated for lodging on a 0 to 5 scale (Table 2). A score of 0 meant no plants had fallen and a score of 5 indicated that 85% or more of the plot had lodged. None of the plots had a score of 5 but TG8574GTCBII had significant lodging in all reps with an average rating of 4.

Samples for moisture and quality were collected from each plot at the silage pile by taking several small handfuls from different areas of the just-dumped pile of chopped corn. Moisture samples were put in zip lock bags. These samples were weighed and put into a drying oven the same day. Samples for quality were vacuum sealed at the silage pile and sent to Cumberland Valley Lab for quality analysis. Dry matter and moisture data reported in Table 2 are an average from the drying oven and the laboratory results.

Table 2. Yield data, 2012 Tulare/Fresno Silage Corn Variety Trial, Milky Way Dairy, Visalia, CA.

Brand	Lodging Score 0=none; 1=minimal; 3=many areas 5 =>85% lodged	Tons/A as harvested	Average % Dry Matter	% Moisture @ Harvest (100-DM)	Tons/Acre Dry Matter	Tons/Acre adjusted to 70% Moisture
Croplan 8621VT3/P	0.1 c	32.94 a	32.84 cd	67.16	10.82 a	36.06 a
DK 67-88 (field Variety)	0.0 d	31.38 ab	34.08 c	65.92	10.69 ab	35.65 ab
N82V311	1.1 bcd	33.18 a	32.28 cd	67.72	10.69 ab	35.64 ab
Integra 9682VT3	0.6 bcd	34.54 a	30.27 de	69.73	10.44 abc	34.81 abc
NuTech 5X-716	0.3 cd	33.47 a	30.20 de	69.80	10.11 abcd	33.69 abcd
DK 64-67	1.3 bcd	26.45 bc	37.88 b	62.12	10.02 abcd	33.39 abcd
Dyna-Gro 57VP51	0.0 d	29.59 abc	32.26 cd	67.74	9.56 abcde	31.87 abcde
BH 8860GT	0.6 bcd	31.42 ab	30.29 de	69.71	9.53 abcde	31.75 abcde
Baglietto 5530RR	1.9 bc	27.71 bc	32.85 cd	67.15	9.10 bcde	30.33 bcde
ES 7615VT2P	1.9 bc	26.84 bc	33.70 c	66.30	8.87 cde	29.57 cde
TMF2L871	1.4 bcd	31.01 abc	28.07 e	71.93	8.73 de	29.11 de
MC 6583	2.1 b	26.21 c	31.62 cd	68.38	8.28 ef	27.61 ef
TG8574GTCBll	4.0 a	15.89 d	43.46 a	56.54	6.84 f	22.81 f
Grand Mean	1.18	29.28	33.06		9.51	31.72
Probability	0.000	0.000	0.000		0.000	0.000
LSD (.05)	1.401	4.482	2.802		1.458	4.852
CV%	70.34	9.06	5.03		9.07	9.060

Planted June 19, 2012, and harvested Oct 12, 2012. Values are means of three replications. Within a column means follwed by a common letter do not differ significantly at the 5% level of probability (Duncan's Multiple Range).

In Table 2, yield data are presented as tons per acre as weighed at the dairy, as dry matter per acre, and as tons per acre after adjusting to a standard of 70% moisture. It is difficult to directly compare yield and quality when there is a wide range of maturity at harvest. In this trial, moisture ranged from 56.5 % to almost 72% at harvest. TG8574GTCBII was the driest (which may be part of the reason that it lodged as much as it did). Simply adjusting all the yields to 70% moisture by an equation does not solve the problem of comparing varieties because it favors varieties that are drier on the harvest date. This is because a drier variety has all of the advantage of having developed more starch in the kernels because it is more mature, and then, with the adjustment calculation, moisture weight is added to get to 70% moisture. Wetter, less mature corn is at a disadvantage because it didn't get to fill the kernel as much as more mature corn and moisture weight is subtracted to get to 70%. In this year's trial, only one variety averaged more than 70% moisture, but the adjustment calculation still favors drier varieties over the less dry varieties.

The top 8 yielding varieties in Table 2 all have an "a" next to their yield when presented as dry matter per acre. This means that there is a 95% probability that those varieties are not different from each other. When using results like these to select varieties to plant, it is important to consider not only the relative maturity at harvest

for the different varieties but also the group of top yielding varieties and not just the one variety at the top of the list.

Other considerations when selecting a variety may be the feed quality of the corn as it goes into the silage pile. High quality going into the silage pile doesn't guarantee it will be high quality after ensilage but, if it is not high quality going in, it definitely won't be high quality coming out. Quality data for this trial is listed in Table 3. Each nutritionist seems to have his or her own system for determining what makes the best feed, so you may want to confer with your nutritionist when selecting varieties to plant.

Table 3. Quality data, 2012 Tulare/Fresno Silage Corn Variety Trial, Milky Way Dairy, Visalia, CA.

Brand	Crude Protein (% DM)	ADF (% DM)	NDF (% DM)	Lignin (% DM)	30-hr Digestibility (% NDF)	Sugar (% DM)	Starch (% DM)
Croplan8621VT3/P	7.1 cde	25.2 b	37.0 e	3.25 bc	51.1 cd	1.77 a	32.9
DK 67-88 (field Variety)	7.3 bc	27.1 ab	41.4 abcde	3.52 ab	52.3 bc	1.37 ab	30.8
N82V311	7.7 a	25.5 b	38.8 cde	3.12 c	55.0 ab	1.73 ab	32.0
Integra 9682VT3	7.3 bc	28.4 ab	42.4 abc	3.53 ab	53.3 abc	1.37 ab	29.0
NuTech 5X-716	7.5 ab	25.2 b	37.5 de	3.31 bc	52.4 bc	1.37 ab	33.7
DK 64-67	7.3 bcd	27.4 ab	40.1 bcde	3.66 a	50.8 cd	1.37 ab	31.1
Dyna-Gro 57VP51	7.6 ab	26.9 ab	40.9 bcde	3.55 ab	49.0 d	1.60 ab	30.0
BH 8860GT	7.0 de	29.9 a	44.0 ab	3.67 a	50.5 cd	1.53 ab	27.3
Baglietto 5530RR	7.7 a	26.0 b	39.0 cde	3.40 abc	52.4 bc	1.40 ab	32.2
ES 7615VT2P	7.5 ab	27.5 ab	40.2 bcde	3.54 ab	50.3 cd	1.60 ab	30.3
TMF2L871	7.5 ab	26.0 ab	40.4 abcd	3.34 abc	51.8 cd	1.76 a	28.9
MC 6583	6.9 e	29.5 a	43.6 ab	3.72 a	51.0 cd	1.30 bc	28.2
TG8574GTCBll	6.9 e	29.4 a	45.3 a	3.60 ab	55.4 a	0.93 c	28.5
Grand Mean	7.3	27.3	40.9	3.48	51.9	1.47	30.4
Probability	0.000	0.016	0.004	0.013	0.003	0.007	0.220
LSD (.05)	0.3	2.8	3.9	0.31	2.78	0.37	NS
Coefficient of Variability (%)	2.3	6.1	5.6	5.20	3.17	15.02	9.41

Planted June 19, 2012, and harvested Oct 12, 2012. Values are means of three replications. Within a column means follwed by a common letter do not differ significantly at the 5% level of probability (Duncan's Multiple Range).
DM = dry matter; ADF = acid detergent fiber; NDF = neutral detergent fiber

Refuge Requirements for Planting Corn with Insect Resistance Biotech Traits

There is more and more corn seed for sale in California with genetic biotech traits for insect control (mostly various cutworms, corn borers, corn earworm and/or root worms that are targets of Bt, an insect toxin from the bacterium *Bacillus thuringiensis*). By law, when these types of seed are planted, growers are obligated to plant a certain percentage of their corn acres with corn that does not have the biotech trait. The reason for this is to reduce the chance for insects to develop resistance to the insect-killing trait built into the biotech corn. These areas planted with corn that does not have the insect resistance are called refuge areas. The requirement for planting a refuge still holds, even if the target pest is not a problem in the area where the biotech seed is planted.

The percentage of refuge acres that is required varies by what biotech trait(s) is in the variety and by where the corn is grown. Corn grown in the Cotton Belt usually requires a larger percentage of refuge acres than corn planted in the Corn Belt. Based on my contacts, California falls under the Corn Belt rules if nothing more specific is stated on the seed bag tag.

When a refuge area is required, there are also rules regarding how close it must be to the field that is planted with the insect resistant biotech corn seed.

Some corn varieties are sold with susceptible seeds mixed into the bag with the biotech seed. In this case, the refuge will be in the planted field along with the biotech plants. It can be considered that the refuge is "in the bag" of seed and a separate refuge does not have to be planted.

The key to knowing your responsibility as a grower is to **read the tag on the seed bag**. It will tell you if a refuge is required and what percent of the acreage needs to be planted to susceptible corn. There will also be a technology agreement for you to sign if you are purchasing and planting corn with these genetic characteristics. Seed companies are obligated to follow through and determine if growers are planting the refuges that are required.

The National Corn Growers Association has a web site (http://www.ncga.com/for-farmers/irm-refuge-calculator) to help calculate refuge acre requirements.

If you have questions about the corn seed you buy, ask your dealer/salesperson for clarification.

Below are two other sources of information on the internet.
http://corn.agronomy.wisc.edu/Management/pdfs/A3857.pdf This article shows configurations for planting refuge areas (2008 University of Wisconsin).

http://corn.agronomy.wisc.edu/Management/pdfs/Handy_Bt_Trait_Table.pdf This article, dated January 2012, lists the different corn traits, names that companies are using, and what the refuge requirements for the Midwest are. The Midwest would be considered the Corn Belt.

2012 Silage Corn Spider Mite Trials

In a 2010 and 2012, spider mite trials were conducted in a grower's field north of Tulare. Plots were either 12 rows (2010) or 24 rows (2012) wide and ran the length of the field (1/4 mile). Miticide treatments were applied by a custom applicator (Vieira Custom Spraying) with a ground rig using drop nozzles in 20 gal/acre volume. A non-ionic surfactant was included in all treatments except for Comite. In 2010, the field trial was sprayed on June 23 when plants were 5-6 ft tall and harvested on August 3; in 2012, the application was May 31 when plants were 4-5 ft in height and harvest occurred on August 14. Each treatment was replicated 4 times. Except in 2010, when two rates of Oberon were tested, only one rate of each miticide could be included in the trial. Each ag chemical company decided which rate to use for their product (Table 4). Keep in mind when reviewing the results that some materials are applied at the maximum label rate, while others were applied at the middle-of-the-label rate. In both years, 5 rows in the center of each plot were harvested by D&G custom choppers for yield data.

Table 4. List of treatments for 2010 and 2012 silage corn spider mite trials, Tulare, CA.

Treatment	Rate/A	Year Tested	
UTC	-	2010	2012
Oberon (mid-label)	12.8 fl oz	2010	2012
Oberon (top label)	16 fl oz	2010	No
Onager (mid-label)	16 fl oz	2010	2012
Comite (top-label)	3 pts	2010	2012
Zeal (top-label)	3 oz	No	2012

Spider mite populations were estimated by counting spider mites on 16 (2010) or 12 (2012) leaves per plot. Leaves selected were generally the 4th or 5th leaf up from the base of the plant.

Counts for each year are shown in Figures 1 and 2. In both years, the untreated control plots had much higher counts than the miticide treatments. In the figures it looks like the spider mite populations in the untreated check declined quickly after they peaked in July or August. This apparent drop in population was mostly due to the movement of spider mites to leaves higher in the plant because the lower leaves, which were the ones sampled, had been desiccated by their feeding.

Figure 1. Spider mite counts, based on 16 leaves, 2010 Tulare County Trial, Tulare, CA.

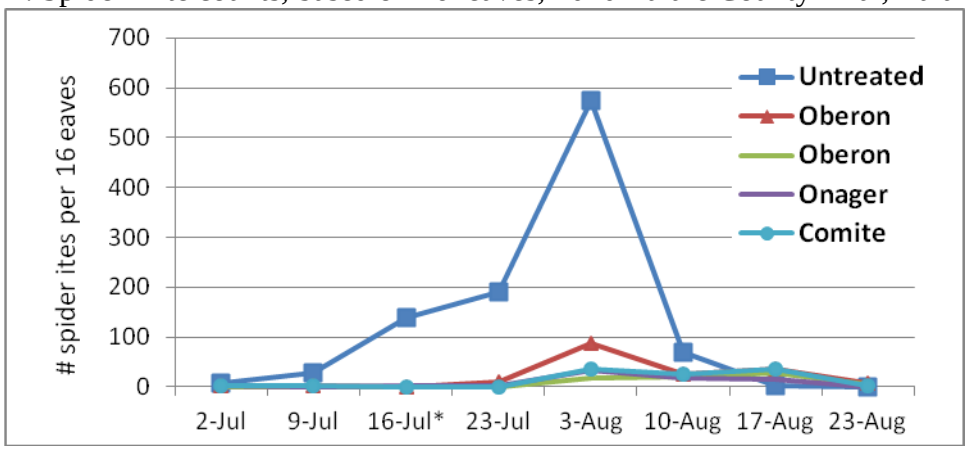

Figure 2. Spider mite counts, based on 12 leaves, 2012 Tulare County Trial, Tulare, CA.

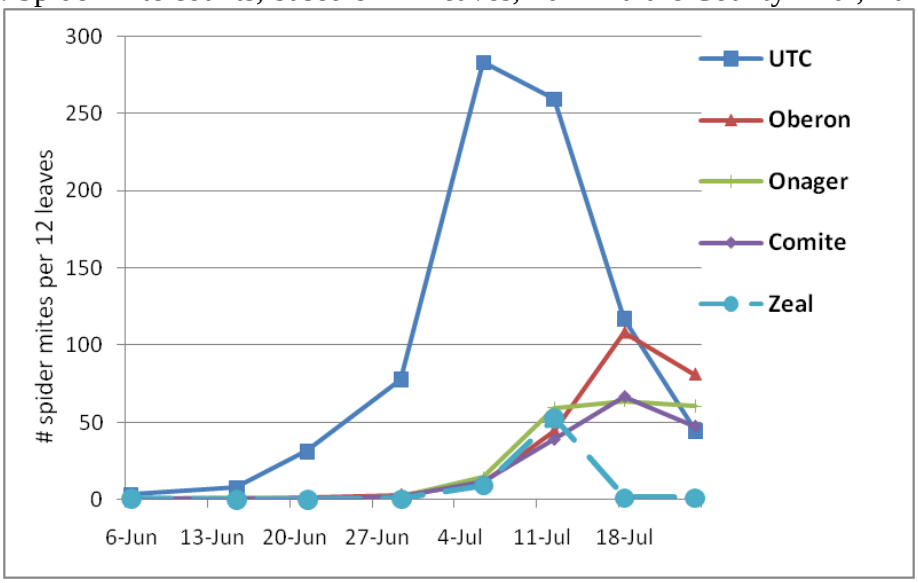

Table 5. Yield data from 2010 and 2012 corn silage spider mite trials, Tulare, CA.

Miticide	Rate applied per acre	(Maximum rate on label)	% Moisture at Harvest 2010	% Moisture at Harvest 2012	Yield adjusted to 70% Moisture 2010	Yield adjusted to 70% Moisture 2012
UTC	--	--	67.8	59.65	33.0 b	32.4 d
Oberon 2SC	12.8 fl oz	(16 fl oz)	68.2	63.04	39.4 a	34.3 cd
Oberon 2SC	16 fl oz	(16 fl oz)	67.4	--	38.4 a	--
Onager	16 fl oz	(24 fl oz)	67.9	62.80	39.3 *a*	36.3 bc
Comite	3 pts	(3 pt)	68.0	64.16	38.9 *a*	37.7 b
Zeal	3 oz	(3 oz)	--	64.05	--	41.4 a
		Probability	>50	0.4092	0.0167	0.0007
		LSD (.05)	NS	NS	3.86	3.17
		Coefficient of variation (%)	2.95	5.59	6.62	5.61

Values are means of four replications. Within a column means followed by a common letter do not differ significantly at the 5% level of probability.

Yield data for both trials are shown in Table 5. In both years there were no differences in the moisture at harvest, and yields are presented after adjustment to 70% moisture. In both years there was a significant reduction in yield when spider mites were uncontrolled. In 2010, all the treatments produced equivalent yields and averaged 6 tons per acre more than the untreated control. In 2012, Comite and Zeal, which were applied at maximum label rates, produced higher yields than Oberon and the untreated plots. Onager out-produced the untreated check but did not yield better than Oberon. Remember that both Onager and Oberon were applied at mid-label rates, while Comite and Zeal were applied at the maximum rate allowed by the label. Because they weren't all applied at the top label rates, it makes it hard to directly compare the efficacy of the miticides.

Controlling spider mites also improved some of the pre-ensilage quality parameters of the corn (Table 6). In 2012, Onager, Comite and Zeal significantly improved the percent acid detergent fiber (% ADF), percent neutral detergent fiber (% NDF), and Milk per Ton compared to the control. The results were not as clear cut in the 2010 trial, where, as a group, the miticide treatments significantly reduced the % ADF but individually the difference was not significant. The difference in %NDF was not significant.

Table 6. Quality data from 2010 and 2012 silage corn spider mite trials, Tulare, CA.

Miticide	Rate applied per acre	(Maximum rate on label)	ADF (%) 2010	ADF (%) 2012	NDF % 2010	NDF % 2012	Milk per Ton 2012
UTC	--	--	30.1	32.3 a	47.6	50.7 a	2458 c
Oberon 2SC	12.8 fl oz	(16 fl oz)	28.0	30.3 ab	44.4	47.7 ab	2666 bc
Oberon 2SC	16 fl oz	(16 fl oz)	28.5	--	46.0	--	--
Onager	16 fl oz	(24 fl oz)	27.9	28.0 bc	45.0	43.5 bc	2775 ab
Comite	3 pts	(3 pt)	28.4	27.3 bc	46.0	43.1 bc	2958 ab
Zeal	3 oz	(3 oz)	--	25.8 c	--	40.4 c	3038 a
		Probability	0.33	0.01	0.26	0.01	0.01
		LSD (.05)	NS	3.25	NS	4.90	292.20
		Coefficient of variation (%)	5.59	7.26	3.08	6.98	6.74

Values are means of four replications. Within a column means followed by a common letter do not differ significantly at the 5% level of probability.

Both these trials indicate that spider mites left uncontrolled can reduce silage corn yields by 4-9 tons per acre (70% moisture). Miticides applied just once by ground in both years provided good control. Results of the 2012 trial indicate that there may be benefit to using maximum label rates.

Although this trial did not look at application methods, application by ground provides better coverage than air application and is the preferred way to treat for spider mites.

Blackeye Variety Selection – Consider Trying CB50

Compared to corn and alfalfa, for which many varieties are for sale, selecting a blackeye variety is relatively easy because there are few from which to choose. CB46 is the standard and a hard variety to beat. Released in the late 1980's to replace CB5, which was being "hammered" by Fusarium wilt race 3, it is a tough plant with a hardy seed. (Remember that the Fusarium wilt fungus that infects blackeyes is **not** the same Fusarium wilt fungus that infects cotton. For blackeyes, *Fusarium oxysporum* f.sp.*tracheiphilum* race 3 has been the predominant strain of the fungus for over 30 years in California). CB46 yields as well as CB5 where Fusarium wilt is not present and "way better" than CB5 in fields with Fusarium wilt race 3. CB46 has a smaller seed than CB5 and University of California breeders have been working to develop a variety that yields as well as CB46 but with a larger seed size and Fusarium resistance.

CB50 was released just a few years ago. It has a larger seed than CB46 and has resistance to both race 3 and race 4 of the Fusarium wilt fungus that infects blackeyes. CB50 also has a higher level of root knot nematode resistance than CB46. It is a little later to mature than CB46 by about 5 days. Several growers in Kern County who planted in early May had very good yield results last year. However, in a situation with a shorter season such as following winter forage, CB50 may not yield quite as high as CB46 in a disease-free field. However, if Fusarium wilt race 4 is present, CB50 is the variety to plant.

Last year was the first time I had seen a CB46 field in Tulare County greatly impacted by Fusarium wilt. Plants were dying prematurely in a rather large area of the field (Fig. 1). Examination of roots showed they were swollen (Fig. 2) compared to healthy roots but with no obvious rot symptoms. Cutting into the stem of the plant several inches above the soil line revealed that the xylem (the water conducting part) was red-brown in color (Fig. 3), a diagnostic symptom for Fusaruim wilt. Samples were sent to campus, and it was confirmed to be race 4. Spores of this fungus can be spread from field to field in water, plant debris, and soil. If you have any reason to think that you may have Fusarium wilt Race 4 in your fields, consider planting CB50, at least in part of your field, to see how it performs under your conditions.

Blackeye cowpea breeders at UC Riverside are continuing to develop varieties with increased disease and nematode resistance while maintaining or improving yield and seed quality. We expect to have one or two blackeye lines in a strip trial with a grower this coming year. CB50 and CB46 will be included for comparison. The breeders are also working on resistance to cowpea aphid (Fig. 4) and lygus bug. In trials at the UC Kearney station near Parlier, aphid resistance is very strong and clear cut. Now the resistance has to be incorporated into lines that have growth, yield, and seed quality characteristics similar to our current varieties. Lygus bug resistance is not clear cut, and although there is evidence that there are cowpea lines that are less susceptible to lygus bugs, pesticides will probably still be needed in the future to control this pest even with new varieties that will have improved lygus tolerance.

Photos can be viewed in color on the website version of this newsletter at
http://cetulare.ucanr.edu/newletters_898819/Field_Crop_Notes_692/

Fig. 1 CB46 blackeye field with dying plants due to Fusaruim wilt, Race 4.

Fig. 2 Swollen root just below soil line with no obvious rot, a typical symptom of Fusaruim wilt in early stages.

Fig. 3 Discolored xylem in the stem several inches above the soil line, a key diagnostic symptom for Fusarium wilt in blackeyes.

Fig. 4 Stunted blackeye plants covered with black sooty mold, evidence of a heavy infestation of cowpea aphid.

University of California
Cooperative Extension
Tulare County
4437B S Laspina St
Tulare CA 93274-9537

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March 2013

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Carol Frate, Farm Advisor