University of California Cooperative Extension • Tulare County

Field Crop Notes

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Roundup Ready Silage Corn Trial Results

Roundup Ready Silage Corn Trial – Tulare County 2003

The 2003 UCCE Tulare County Silage Corn Variety Trial focused on Roundup Ready varieties in a no-till production system. The trial followed winter forage. The field was pre-irrigated and then planted on May 17, 2003, using a John Deere 1700 vacuum planter. Borders were similar to those found in alfalfa and only 1 row of potential production was lost with each of these borders. Thirty rows fit between the borders with 3 plots in each bordered check. Plots were 10 rows wide and the length of the field, more than 1700 ft. There were 3 replications and each variety was in each location relative to the borders one time or, in other words, each variety was in the first 10 rows in one rep, the center 10 rows in another rep, and the last 10 rows in another replication.

It is a common experience voiced by growers who have tried no-till corn that the window between pre-irrigation and planting is smaller than for fields prepared in the conventional manner. Soil moisture was a little less than optimal for the first few checks of the trial at planting. Emergence was a little ragged in those checks at first. In some areas, the ground was hard and seed was shallow and not in moisture. There were also a few areas in the field where the planter had to cut through residue of lodged stems from the previous winter forage crop. In these areas, the seed was not placed very deep. With the first irrigation, which in this no-till field occurred when the corn was just 2-3 inches tall, the seed that had not been in moisture germinated. For several weeks, stands and plant heights were uneven. However at harvest, each variety was quite uniform in height.

In between the first and second irrigations, stand counts were taken June 6-10 in 20 locations in the field, measuring 1/1000 of an acre in each location. Seed counts estimated by the planter and stand counts taken in June are shown in **Table 1**.

At planting, Mustang 1.5 EW and 25 gal. of 8-8-8 plus zinc and sulfur were applied to the row. Roundup was applied at 28 oz/A twice, in early June and again in early July. Anhydrous ammonia was sidedressed in early July.

At harvest there were noticeable differences in aphids in some varieties with Croplan 827RR having the most aphids. Ratings are shown in **Table 1**.

Harvest was on August 27, 2003. Moisture at harvest, yield as harvested, and yield adjusted to 70% moisture are shown in **Table 1**. Not surprisingly with a variety trial, there were significant differences in moisture among varieties at harvest, resulting in significant differences in weights at harvest. Converting all yields to 70% moisture changed the ranking among varieties. Statistically there were no significant differences among varieties at 70% moisture, even though there was a difference of 5.8 tons between the highest and lowest yielding varieties.

Roundup Ready Silage Corn Trial – Kings County 2002

In 2002, a Roundup Ready trial was conducted in Kings County under conventional tillage. Results from that trial are found in **Tables 2** and **3**.

Table 1. 2003 UCCE Tulare County No-Till Roundup Ready Silage Corn Variety Trial[1]

C. Frate, UCCE
Grower: Tom Barcellos

Planted: May 17, 2003
Harvested: August 17, 2003
Soil type: Chino loam

Brand	Moisture @ harvest %		Yield as harvested tons/A		Yield adjusted to 70% moisture tons/A	Plant height ft	Aphid Rating[2]		Seed Count[3] at planting	Stand Count[4] June 6-10
DK 6680RR (field variety)	71.2	b	27.9	a	26.8	10.5	0.3	A	32,600	32,784
NC+6962RR	71.2	b	27.0	a	25.9	10.5	0.3	A	32,200	30,516
Hytest 7815RR	73.0	a	26.6	ab	24.0	9.6	3.0	B	31,800	30,734
Golden Harvest 9599 RR	71.1	b	26.2	ab	25.3	10.2	1.3	A	32,800	30,634
Baglietto 5636RR	71.1	b	25.2	abc	24.2	10.3	1.2	A	32,900	30,634
ST 7624RR	71.9	ab	24.5	abc	22.9	10.0	0.3	A	31,400	25,734
Asgrow RX897RR	71.4	b	24.1	abc	23.0	10.3	1.2	a	30,400	31,500
Croplan 827RR	73.0	a	24.1	abc	21.7	9.8	4.2	c	31,900	29,766
DK 6760 RR	68.5	c	22.5	bcd	23.5	9.5	2.5	b	32,400	30,300
Mycogen 2D701	67.9	c	21.5	cd	23.0	9.3	1.2	a	32,500	28,684
Lazer Brand 64-C2RR	67.3	c	21.3	cd	23.1	9.4	0.3	a	32,100	30,666
DynaGrow 57K14	67.8	c	19.6	d	21.0	9.0	0.5	a	30,600	24,884
Trial Average	*70.4*		*24.2*		*23.6*	*9.8*	*1.4*		*31,967*	*29,736*
CV%	*1.2*		*9.3*		*9.8*	*8.2*	*46.7*			*3.96*
LSD	*1.40*		*3.82*		*NS*	*NS*	*1.1*			*998*

[1]Within a column, values followed by a common letter do not differ significantly at the 5% level of probability using Duncan's Multiple Range.

[2]Aphid ratings taken in late August: 0 = none and 5 = most plants with heavy aphid populations.

[3]Seed Count is the "ball park" figure noted in the tractor from readouts during planting. The two lowest counts were large seeds (large round and large flat) while the planter was set for medium sized seed.

[4]Stand counts based on 20 readings per check, each representing 1/1000th of an acre.
Stand counts differed significantly by rep: Rep I = 29,092; Rep II = 29,458; and Rep III = 30,658.

Table 2. 2002 Round Up Ready Silage Corn Variety Trial

University of California Cooperative Extension - Kings County

Cooperator: Bill Longfellow
Harvested by: Netto Ag, Inc.
Planted: May 6, 2002
Harvested: Aug. 22 @ 108 days

UC Farm Advisor: Carol Collar
UC Field Assistant: Oscar Lopez
Site: N side of Idaho between 7th and 8th Ave.
Plot size: 8- 38"rows X 1230 ft, 4 reps

Company	Brand	Tons/Acre adjusted to 30% DM	% Dry Matter at harvest	Tons/Acre as harvested	Plants per acre	Plant height (ft.)	Ear height (ft.)	Ear % DM	Lbs/ear. @ 60% DM
Baglietto	5636 RR	36.2	26.7	40.6	33,500	11.5	6.1	52.2	0.50
DeKalb	668 RR	33.5	27.8	36.1	29,500	10.9	5.5	55.0	0.56
Asgrow	RX897 RR	33.2	28.0	35.6	28,750	10.8	5.7	55.6	0.59
United Agr Prod	5467 RR	33.2	33.9	29.4	28,750	9.8	4.1	58.3	0.77
SeedTec	7624 RR	33.2	26.7	37.3	31,250	10.4	5.1	53.4	0.57
HyTest	7815 RR	31.7	26.3	36.2	30,500	10.4	5.8	52.7	0.55
Croplan	827 RR	30.3	26.3	34.5	30,250	10.1	5.6	53.4	0.55
Coefficient of Variation %		*4.86*	*3.97*	*3.90*	*1.74*	*2.76*	*4.26*	*3.64*	*9.44*
LSD (0.05)		*2.384*	*1.65*	*2.064*	*764.7*	*0.423*	*0.334*	*2.871*	*0.795*
average of all plots		*33.04*	*27.95*	*35.67*	*30,357*	*10.54*	*5.42*	*54.36*	*0.58*

Plants per acre were measured at harvest.
Ear weights were measured at both ends of the field in all 4 reps.
Ten consecutive ears were harvested, weighed and sampled for dry matter.

Table 3. 2002 UCCE Round Up Ready Silage Corn Trial - Kings County

Cooperator: Bill Longfellow — Planted: May 6, 2002

Harvester: Netto Ag., Inc — Harvested: Aug. 22, 2002

Company	Brand	Tons/A adjusted to 30% DM	% Dry Matter at Harvest	% Crude Protein	% ADF	% NDF	% Digestible NDF	% Non-fibrous Carbohydrate	% Digestible DM	TDN (if fed @ 1X maintenance)	NE l (if fed @ 3X maintenance)	Lbs/ear. @ 60% DM
Baglietto	5636 RR	36.2	26.7	8.0	27.6	43.3	46.5	40.1	76.9	68.8	0.657	0.50
DeKalb	668 RR	33.5	27.8	8.0	29.3	46.1	46.1	37.8	75.1	67.0	0.635	0.56
Asgrow	RX897 RR	33.2	28.0	7.9	29.7	46.1	44.7	37.6	74.5	66.4	0.630	0.59
United Agr Prod	5467 RR	33.2	33.9	7.6	21.7	36.2	45.4	48.7	80.2	73.6	0.715	0.77
SeedTec	7624 RR	33.2	26.7	8.3	28.3	42.6	44.8	39.9	76.5	67.8	0.649	0.57
HyTest	7815 RR	31.7	26.3	7.9	29.6	46.5	43.9	36.0	73.9	65.5	0.619	0.55
Croplan	827 RR	30.3	26.3	7.9	28.6	44.1	46.3	38.9	76.3	68.0	0.647	0.55
Coefficient of Variation %		*4.86*	*3.97*	*3.38*	*5.31*	*5.26*	*5.12*	*6.25*	*2.55*	*3.29*	*3.94*	*9.44*
LSD (0.05)		*2.384*	*1.65*	*0.399*	*2.20*	*3.40*	*3.45*	*3.70*	*2.89*	*3.33*	*0.04*	*0.795*
average of all plots		*33.04*	*27.95*	*7.9*	*27.8*	*43.5*	*45.4*	*39.9*	*76.2*	*68.1*	*0.7*	*0.58*

Percent crude protein, acid detergent fiber (ADF) and neutral detergent fiber (NDF) measured by "wet" chemistry.

Values for CP, ADF, NDF, dig NDF, non-fibrous carbohydrate, dig DM, TDN and NE l expressed on 100% DM basis.

Digestible NDF measured by 30 hour in vitro analysis.

Energy calculations for TDN and Net Energy for lactation (NE l) are the UC Davis equations as described in "Robinson, P.H., 1999. Estimating the Energy Value of Ruminant Feedstuffs.

Available on the Web at: animalscience.ucdavis.edu/faculty/robinson.

Analyses conducted by JL Analytical Services, Inc.

Reduced-Till and No-Till Trials in Tulare County 2003

Working with Gil Replogle who farms north of Visalia, two trials were conducted looking at silage corn production following winter forage with no-tillage and reduced tillage between crops.

Corral manure was spread on all plots prior to pre-irrigation. However, one half of each no-till plot did not receive manure in order to evaluate if manure applied to the surface and not worked in would be damaging to corn seedlings.

Tillage practices are listed in **Table 4**.

The strip-till operation was to a depth of 10-12 inches with a winged shoe at the base of the shank.

Each treatment was replicated 3 times. Individual plots were 36 rows by the length of the field, consisting of one border check. One trial was in a sandy loam field and the other in a clay loam field. Irrigation was by ditch and siphon tubes. Both fields received commercial fertilizer in addition to manure to ensure that nitrogen shortage was not a factor in plant growth and yield. All plots were planted with a John Deere no-till planter. For conventional plots, the springs were not important but in the no-till plots the down pressure from the springs was at the maximum setting. The planter had a colter in front of each planter to work the soil in the drill row and Yetter trash managers to remove trash and clods. Disk closers and press wheels were mounted behind the planter boxes.

Grower observations. In general, the sandy loam field was easier to work and to time cultural operations. The clay loam field had uneven pockets of moisture and, if too dry, was much more difficult to work. Plots strip-tilled before pre-irrigation kept moisture better than plots that were strip-tilled after pre-irrigation; however, it took less power to strip-till after irrigation than in drier soil. The grower utilizes GPS technology, which enabled him to plant exactly in the strip-tilled area. Without GPS, this would have been quite difficult. The single disk treatment had a lot of clods at planting but the trash managers handled them well and they did not interfere with planting.

Irrigation was the most difficult aspect to the no-till and reduced-till plots. In the first irrigation, water did not move evenly down those checks. Without a tail water return system, and with young corn and hot temperatures, it was important not to let water pile up in any area and for water to get to all areas of the check. Irrigators spent hours trying to cut ways for water to move from low spots. Making small furrows after the first irrigation in all the reduced-till plots solved this problem. No-till plots were not furrowed out.

Results. Stand counts and yield data are presented in **Tables 5** and **6**. Stand counts taken a few weeks after emergence were significantly higher in both fields for the conventional treatment compared to other treatments. In the clay loam field, stand counts for the no-till treatment were significantly less than the other treatments. In the no-till plots, manure did not negatively impact crop emergence. If anything, it kept the soil moister after the pre-irrigation and planted more easily.

Table 4. Tillage practices following winter forage harvest in reduced and no-till silage corn trial, UCCE, Tulare County, 2003.

Operation	Conventional Treatment	Strip-till with shank prior to pre-irrigation	Strip-till with shank after pre-irrigation	One light disk to incorporate manure	No-till
Spread manure	X	X	X	X	½ of each plot
Disk	2X'S			X	
Spring harrow	X				
Furrow out	X				
Break beds	X				
Roll beds	X				
Strip-till		X	X	X	
Plant	X	X	X	X	X
Furrow out after first irrigation	X	X	X	X	
Total Passes	**9**	**4**	**4**	**4**	**2**

Table 5. 2003 UCCE Silage Corn No-Till and Reduced-Till Trial - Sandy Loam Field, Tulare County

Grower: Gil Replogle

Planting dates: Plots 1 & 4 on June 11; Plots 2, 3, 5-7& 9 on June 12; Plots 11 & 14 on June 14;
Plots, 8, 10, 12, 13, 15 on June 16

Variety: Asgrow RX 897RR

Harvest dates: Rep I on Sept. 29; Reps II and III on October 8, 2003

Treatments	Stand Counts June	Moisture at Harvest %	Tons/Acre as harvested	Tons/planted Acre adjusted to 70% Moisture (borders not included)	Tons/A based on area harvested plus borders
Conventional	34,726 a	56.8	25.1	35.9	35.9 a
Strip-till prior to pre-irrigation	33,126 b	61.6	28.8	36.7	33.0 b
Strip-till after pre-irrigation	33,540 b	62.6	28.8	35.6	32.1 b
Light disk, pre-irrigation, strip--till	33,520 b	58.6	26.4	35.9	31.8 b
No-till	32,734 b	60.2	25.5	33.8	30.4 b
Coefficient of variability %	1.69	3.87	7.15	4.3	4.25
Probability	0.02	0.08	0.13	0.31	0.01
LSD .05		NS	NS	NS	2.6
Trial Average	33,530	60.0	26.9	35.6	32.6

Table 6. 2003 UCCE Silage Corn No-Till and Reduced-Till Trial - Clay Loam Field, Tulare Co.

Grower: Gil Replogle

Planting dates: plots 3, 5, 7, 9, 14, & 15 planted on June 16; Plots 1, 2, 4,6, 8, & 10-13 planted on June 17

Harvest dates: October 9, 2003

Treatments	Stand Counts June	Moisture at Harvest %	Tons/Acre as harvested	Tons/planted Acre adjusted to 70% Moisture (borders not included)	Tons/A based on area harvested plus borders
Conventional	33,886 a	62.2	27.5	34.6	34.6 a
Strip-till prior to pre-irrigation	32,446 b	64.3	27.9	33.2	29.9 b
Strip-till after pre-irrigation	31,886 b	63.1	26.5	32.6	29.3 b
Light disk, pre-irrigation, strip--till	32,566 b	63.1	27.2	33.5	30.2 b
No-till	30,286 c	63.3	27.0	33.0	29.7 b
Coefficient of variability %	1.78	1.28	3.23	3.32	3.34
Probability	0.00	0.11	0.41	0.29	0.00
LSD @ .05	1080	NS	NS	NS	1.94
Trial Average	32,214	63.2	27.24	33.4	30.7

When yields were analyzed based on the planted area, there were no significant differences in yield among treatments in either field. However, borders in these fields were 10 feet wide, taking 10% of the area of the field out of production. When yields were analyzed with the area of the borders charged to the reduced-till and no-till plots (conventional bed planting doesn't need borders), the conventional treatment yielded significantly higher. Experience of other growers in the county who have planted no-till has shown that smaller borders are possible. In these other fields, borders more like alfalfa borders have been used and it is estimated that only 1 row of corn is lost per border instead of the 4 rows that were lost with the 10 ft borders used in these studies.

Summary. In these trials where no-till and reduced-till were used for the first time, yields were comparable to conventional tillage on a per planted area basis. The long-term impact of these reduced and no-till systems have not been studied in California for corn/winter forage cropping systems. Irrigation may be something each grower needs to experience in his/her own field to determine the placement and size of borders and the need for furrows.

(For a more detailed account of these trials, please request a report from the UCCE office in Tulare County or refer to the Proceedings of the 33rd California Alfalfa and Forage Symposium).

Insecticide Trials for Corn Leafhopper & Corn Stunt Disease

Seed Treatment Trials

Two seed treatment trials, using the systemic insecticide treatment Poncho 1250, were conducted in the 2003 season. Both trials were planted in late July and harvested in early November. In the first trial there were 4 replications, plots were 16 rows wide for the field length, and the center 12 rows were harvested. In the second trial, there were only 2 replications, plots were 20 rows wide for the length of the field, and the center 16 rows were harvested. In both trials, leafhopper counts, based on yellow sticky cards placed in the center of each plot at both ends and about 30 feet into the field, were reduced in the plots with Poncho 1250. Overall for the season, leafhopper counts were about half of those in the untreated control plots (**Table 7**).

Disease counts, taken at harvest and based on typical stunt symptoms, were significantly reduced with seed treatment. However, the impact on yield was not significant (**Table 7**).

Foliar Spray Trials

There were also three foliar trials conducted in the summer of 2003. In each case, fields were identified that had leafhopper populations. Then arrangements were made for timing of ground treatments with the irrigation schedule so that ditches could be closed and the ground dry enough for traffic. Therefore in every case, leafhoppers had been present for several weeks in fields before treatments. Plants were from 4 to 6 ft in height by the time of treatment.

Plots ranged from 24 to 16 rows wide. A minimum of 10 rows from the center of the plots was harvested. Leafhopper counts were based on yellow sticky cards in the center of each plot, at both ends and about 30 ft into the fields. As passes were taken out of the field at harvest, disease counts based on typical corn stunt symptoms were taken in each plot.

In addition to an untreated check in each of the three trials, Capture + dimethoate and Furadan were included in all trials. Mustang was included in one trial (the 60 day PHI made it impractical for the other two trials). Metasystox-R was included in two trials under a EUP as it no longer has corn on the label.

The two treatments containing pyrethroids (Capture and Mustang) reduced leafhoppers more than the other insecticides. Trial results are summarized in **Table 8**. However, symptom reduction was minimal or non-existent and yields were not increased by much if at all by all of the insecticide treatments...

Looking at the results there are 2 possible explanations: 1) either the majority of infection occurred before the insecticides were applied; and/or 2) it doesn't take many leafhoppers to effectively spread disease. In 2004, we hope to have at least one trial with early foliar applications that may help answer the question of timing. On the other hand, it is common that with insect vectored diseases it is very difficult to control the disease by controlling the insect.

What to do about corn stunt in the short run? Planting early is still the best bet because leafhopper numbers are much less in spring than later in the season. However, it may not be best to be the first field with emerging seedlings, as overwintered leafhoppers will be looking for corn whenever it is a warm day.

Table 7. Summary of Systemic Seed Treatments for Corn Leafhopper and Corn Stunt Disease, UCCE, Tulare 2003

	Trial with 4 Replications			Trial with 2 Replications		
Treatments	**Total number of leafhoppers per season**	**Tons/Acre adj. To 70% Moisture**	**% Plants with symptoms at harvest**	**Total number of leafhoppers per season**	**Tons/Acre adj. To 70% Moisture**	**% Plants with symptoms at harvest**
Standard	270	24.32	38.7	700	22.18	16.6
Plus Poncho	125	24.47	22.9	330	24.56	3.6
COV%		5.71	6.86		2.14	1.97
Probability		0.89	0.002		0.13	0.01
LSD @ 5%		NS	4.75		NS	4.75

Table 8. Summary of leafhoppers, % plants with symptoms, and yield from 3 trials for corn leafhopper and corn stunt disease, UCCE Tulare County 2003.

	Total Number of Leafhoppers			**% Plants with Symptoms**			***Yield @ 70% Moisture***		
Treatments	Field 1	Field 2	Field 3	Field 1	Field 2	Field 3	Field 1	Field 2	Field 3
Untreated Check	710	1031	1299	12.4	53	26	28.8	13.6	14.5
Capture + dimethoate	56	196	532	7.8	50	26	30.2	14.0	15.3
Mustang	64			9.3			29.7		
Metasystox R		494	1378		48	22		14.0	14.6
Furadan	499	805	1043	10.4	47	25	29.6	14.0	15.5

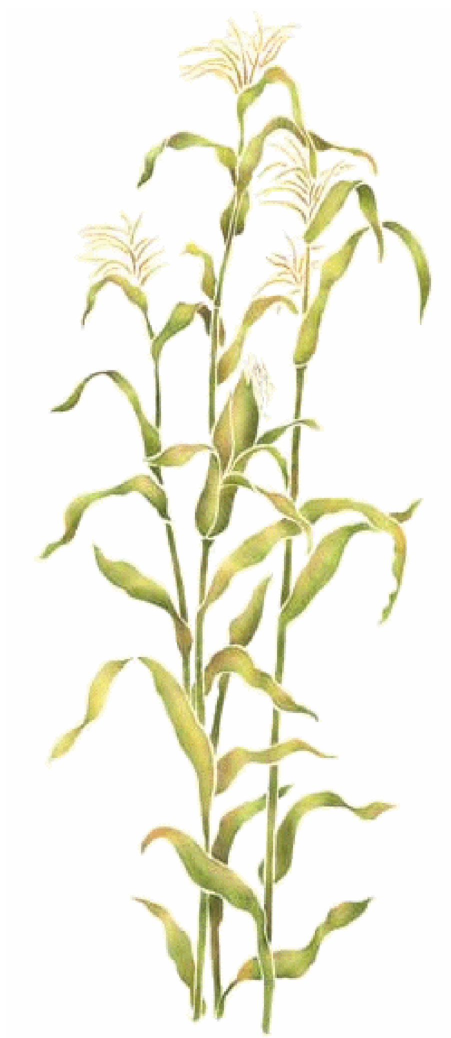
A tank mix of Capture + dimethoate is effective in suppressing spider mites (although not as good nor as long lasting as Comite). It may pay to use that combination for spider mite control although a blowup of spider mites may occur later in the season. There is no treatment threshold for corn leafhopper but it would likely be very low if the objective were to control disease. (Corn can tolerate a good number of corn leafhoppers if they are not carrying the corn stunt organism).

ACKNOWLEDGEMENTS
These corn trials and the information they provide would not have been possible without the cooperation and help of many people who deserve our gratitude: growers Tom Barcellos, Gil Replogle, Frank Pacheco, Duco Systma, Alex Garcia, and Charlie Pitigliano; custom applicators Veiera Custom Sprayers and Costa Spraying; ag chemical companies Gustufson, Gowan and FMC; harvesters E&M Ag Services, Vieira Custom Chopping, D&G Chopping, and Hofstee Harvesting; colleagues Charlie Summers, Carol Collar, Shannon Mueller, Albert Newton, John Soares, Brandon Brown, Jan Bowen, and Mark Strawn.

Other meetings offered by UCCE:

Agritourism & Nature Tourism Workshop, April 14, 04, 9:30-3:30, Reedley Opera House. $40 per person. For more information, call Edna at 559/685-3303.

Weed Control in Riparian Systems, May 7, 2004, Exeter Memorial Building. For more information, call Edna at 559/685-3303.



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Cooperative Extension
Tulare County
4437B S Laspina St
Tulare, CA 93274

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Carol Frate, Farm Advisor