Corn Silage Tests in Tennessee

2019

Virginia Sykes, Assistant Professor, Variety Testing Coordinator and Agroecology Specialist

Alex Wilson, Research Associate, Variety Testing and Agroecology

Weston Bracey, Graduate Research Assistant, Variety Testing and Agroecology

Gary Bates, Professor and UT Beef and Forage Center Director

David McIntosh, Coordinator, UT Beef and Forage Center

**This report is available as a pdf and in
sortable, mobile friendly tables at:**

search.utcrops.com/corn-silage

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B.J. DeLozier, Farm Manager
Cody Fust, Farm Crew Leader
Charles Summey, Senior Field Worker
Nicholas Tissot, Light Farm Equipment Operator

Plateau AgResearch and Education Center (Crossville, TN)
Walt Hitch, Director
Greg Blaylock, Farm Crew Leader

Highland Rim AgResearch and Education Center (Springfield, TN)
Robert Ellis, Director
Brad S. Fisher, Research Associate

Middle Tennessee AgResearch and Education Center (Spring Hill, TN)
Kevin Thompson, Director
Joe David Plunk, Research Associate

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CORN SILAGE YIELD TESTS

2019

Experimental Procedures

AgResearch and Education Center (REC) Tests: Five corn hybrids were evaluated for silage yield and quality in 2019. The tests were conducted at the East Tennessee (Knoxville), Highland Rim (Springfield), Middle Tennessee (Spring Hill), and Plateau (Crossville) RECs. The plots at all locations consisted of two rows, planted 30 inches apart, 30 feet in length. Entries were arranged in a randomized complete block design with three replications. Yields were adjusted to both dry weight and 65% moisture. Plots were planted at 36,000 seeds/ac with a population goal of 34,000 plants/ac. The resulting plant populations, as well as the planting and harvesting dates, are given in Table 1. Plots were harvested using commercial silage harvesters. A sub-sample of approximately 3 lbs was taken from each plot for analysis. Fresh weight and dried weight were recorded on each sample for determination of moisture at harvest. Dried samples were then ground and analyzed for nutritional content. Silage quality analyses were provided by the UT Beef and Forage Center using a Foss DS2500F (Foss North America, Eden Prairie, MN) instrument with the 2018 NIRS Consortium (Hillsboro, WI) model for Unfermented Corn Silage. Predictions for milk production per ton and milk production per acre were calculated using the University of Wisconsin Milk2006 program.

Growing Season: Rainfall early in the season delayed planting throughout most of Tennessee, with flooding occurring in the Western half of the state. Statewide corn planting remained 2 to 9% behind the five-year average through the end of May. By May 19th, 85% of corn had been planted, compared the 5-year average of 94%. Once planted, warm weather and adequate rainfall resulted in good growth. By mid-August, 88% of the crop rated good to excellent.

Interpretation of Data:
The tables on the following pages have been prepared with the entries listed in order of yield performance, the highest-yielding entry being listed first. Mean separation was performed using the **Fisher's Protected LSD (Least Significant Difference) test**. The mean trait value of any two entries being compared must differ by at least the LSD amount shown to be considered different at the 5% level of probability of significance. To simplify interpretation, **Mean Separation Letters** have been listed next to each entry for traits analyzed across locations. Hybrids that have any letter in common are not significantly different in yield at the 5% level of probability based on the LSD test. Hybrids with performance not significantly different from the top performing hybrid will have an "a" included in the list of mean separation letters next to that entry.

Table 1. Location information from University of Tennessee Institute of Agriculture (UTIA) AgResearch and Education Centers (REC) where corn silage variety tests were conducted in 2019.

Location	AgResearch and Education Center	Planting Date	Harvest Date	Plant Population	Soil Type
Knoxville	East Tennessee	04/16/19	08/05/19	33048	Shady Loam
Crossville	Plateau	05/16/19	08/30/19	36687	Lilly Loam
Spring Hill	Middle Tennessee	04/23/19	08/02/19	28053	Huntington Silt Loam
Springfield	Highland Rim	04/16/19	07/31/19	28053	Mountview Silt Loam

Table 2-a. Mean yield and agronomic traits across locations of five corn hybrids evaluated for silage in small plot replicated trials at four REC locations in Tennessee during 2019. Analysis included hybrid performance over a 1 yr (2019), 2 yr (2018-2019) and 3 yr (2017-2019) period.

Hybrid	Herbicide Pkg[†]	Insect Pkg.[†]	Avg. Yield Dry Weight (*tons/acre*)			Avg. Yield 65% Moisture (*tons/acre*)			Milk/ton[§] (*lbs/ton*)			Milk/acre[§] (*lbs/acre*)		
			1 yr[‡]	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr
Augusta A9967	RR,LL	3000GT	8.5 A			24 A			3143 AB			26590 A		
Croplan 6027	RR	VT2P	8.5 A			24 A			3040 BC			25629 A		
Augusta A7768***	RR,LL	3110GT	8.5 A	8.3 A	8.5 A	24 A	24 A	24 A	3259 A	3131 A	3130 A	27611 A	26122 A	26630 A
Croplan 5900***	RR	VT2P	8.4 A	8.6 A	8.7 A	24 A	25 A	25 A	2959 C	2899 B	2941 B	24654 A	24855 AB	25672 A
Croplan 5700**	RR	VT2P	8.3 A	8.2 A		24 A	23 A		2989 C	2884 B		24886 A	23578 B	
Average			8.4	8.4	8.6	24	24	25	3078	2971	3036	25874	24852	26151
Standard Error			0.5	0.3	0.4	1	1	1	124	123	70	1454	1072	1136
L.S.D..05			N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	152	118	100	N.S.	N.S.	N.S.
C.V.			13	12	12	13	12	12	6	7	7	15	15	16
Plots per entry (reps x locs.)			12	24	36	12	24	36	12	24	36	12	24	36

Table 2-a, cont.

Hybrid	Herbicide Pkg[†]	Insect Pkg.[†]	Moisture at Harvest (%)			Plant Height (*inches*)			Ear Height (*inches*)			Lodging[‖] (%)		
			1 yr	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr
Augusta A9967	RR,LL	3000GT	64 AB			110 A			46 A			0.2		
Croplan 6027	RR	VT2P	63 B			109 A			39 B			0.2		
Augusta A7768***	RR,LL	3110GT	65 A	62 AB	64 A	110 A	114 A	118 A	40 B	44 B	44 B	0.2	0.9	0.9
Croplan 5900***	RR	VT2P	64 AB	61 B	64 A	109 A	113 A	115 A	46 A	49 A	48 A	0.4	0.2	0.3
Croplan 5700**	RR	VT2P	65 A	63 A		112 A	115 A		44 A	49 A		0.2	0.2	
Average			64	62	64	110	114	116	43	47	46	0.2	0.4	0.6
Standard Error			1	3	3	5	4	4	1	4	2			
L.S.D..05			N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	3	2	2			
C.V.			3	4	4	7	5	5	7	6	7			
Plots per entry (reps x locs.)			12	24	36	12	24	36	12	24	36	12	24	36

† For a full description of abbreviated biotech traits, see table 6.
‡ Hybrids that have any MS letter in common, within a column, are not significantly different at the 5% level of probability using a least signficiant difference (LSD) mean separation test.
§ Based on University of Wisconsin Milk2006 software program. .
‖ Lodging data was transformed due to non-normality. Least square means were back-transformed for ease of interpretation, therefore mean separation letters but no LSD value are given.

Table 2-b. Mean dry weight yield and feed quality characteristics across locations of five corn hybrids evaluated for silage in small plot replicated trials at four REC locations in Tennessee during 2019. Analysis included hybrid performance across a 1 yr (2019), 2 yr (2018-2019) and 3 yr (2017-2019) period.

Hybrid	Herbicide Pkg[†]	Insect Pkg.[†]	Avg. Yield Dry Weight (tons/acre)			Crude Protein[¶] (% dm)			Neutral Detergent Fiber[¶] (% dm)			30 hr In Vitro Neutral Detergent Fiber Digestibility[¶] (% of NDF)		
			1 yr[‡]	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr
Augusta A9967	RR,LL	3000GT	8.5 A			7.6 A			45.1 AB			53.9 B		
Croplan 6027	RR	VT2P	8.5 A			7.8 A			47.2 A			53.8 B		
Augusta A7768***	RR,LL	3110GT	8.5 A	8.3 A	8.5 A	7.9 A	7.5 A	7.4 A	43.5 B	43.9 B	46.6 B	56.6 A	51.5 A	53.5 A
Croplan 5900***	RR	VT2P	8.4 A	8.6 A	8.7 A	7.5 A	7.2 AB	7.4 A	47.5 A	46.8 A	49.4 A	54.4 B	49.5 B	52.4 A
Croplan 5700**	RR	VT2P	8.3 A	8.2 A		7.5 A	7.0 B		45.9 AB	47.0 A		53.8 B	49.1 B	
Average			8.4	8.4	8.6	7.7	7.2	7.4	45.9	45.9	48.0	54.5	50.0	53.0
Standard Error			0.4	0.5	0.4	0.6	0.5	0.3	1.5	1.4	2.7	1.7	4.9	3.8
L.S.D..05			N.S.	0.5	0.5	N.S.	0.3	N.S.	2.5	2.4	2.1	1.9	1.9	N.S.
C.V.			14	11	12	7	7	6	7	9	9	4	7	6
Plots per entry (reps x locs.)			12	24	36	12	24	36	12	24	36	12	24	36

Table 2-b, cont.

Hybrid	Herbicide Pkg[†]	Insect Pkg.[†]	Starch[¶] (% dm)			Acid Detergent Fiber[¶] (% dm)			Total Digestable Nutrients[¶] (% dm)			Net Energy for Lactation[¶] (Mcals/lb)		
			1 yr	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr
Augusta A9967	RR,LL	3000GT	28.0 A			25.0 AB			68.7 AB			0.68 AB		
Croplan 6027	RR	VT2P	23.7 B			26.1 A			67.3 BC			0.67 BC		
Augusta A7768***	RR,LL	3110GT	27.4 A	28.1 A	26.0 A	23.8 B	24.5 B	26.3 B	70.5 A	69.1 A	69.6 A	0.70 A	0.68 A	0.67 A
Croplan 5900***	RR	VT2P	22.9 B	24.7 B	22.5 B	26.4 A	26.4 A	28.4 A	66.4 C	66.0 B	67.1 B	0.65 C	0.64 B	0.65 B
Croplan 5700**	RR	VT2P	24.3 B	24.3 B		25.3 AB	26.4 A		66.8 BC	65.8 B		0.66 C	0.64 B	
Average			25.2	25.7	24.2	25.3	25.7	27.4	67.9	67.0	68.4	0.67	0.65	0.66
Standard Error			1.7	1.8	2.6	1.0	1.0	2.0	1.7	1.5	1.1	0.02	0.02	0.01
L.S.D..05			2.8	3.0	2.4	1.8	1.7	1.5	2.0	1.6	1.4	0.02	0.02	0.01
C.V.			13	20	21	9	11	11	4	4	4	4	5	4.67
Plots per entry (reps x locs.)			12	24	36	12	24	36	12	24	36	12	24	36

* Hybrids marked with an asterisk were in the top performing "A" group for yield within two (**) or three (***) consecutive years of the previous three year evaluation period.
† For a full description of abbreviated biotech traits, see table 6.
‡ Hybrids that have any MS letter in common, within a column, are not significantly different at the 5% level of probability using a least signficiant difference (LSD) mean separation test.
¶ Quality values were calculated on a 100% dry matter (DM) basis

Table 3. Mean dry weight yields across and by location of five corn hybrids evaluated for silage in replicated small plot trials at four REC locations in Tennessee during 2019.
Analysis included hybrid performance across a 1 yr (2019), 2 yr (2018-2019) and 3 yr (2017-2019) period.

Hybrid	Herbicide Pkg.[†]	Insect Pkg.[†]	Avg. Yield Dry Weight (tons/acre)			Knoxville (tons/acre)			Crossville (tons/acre)			Spring Hill (tons/acre)			Springfield (tons/acre)		
			1 yr[‡]	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr	1 yr	2 yr	3 yr
Augusta A9967	RR,LL	3000GT	8.5 A			8.5			9.5			8.4			7.6		
Croplan 6027	RR	VT2P	8.5 A			8.3			9.4			8.4			7.7		
Augusta A7768***	RR,LL	3110GT	8.5 A	8.3 A	8.5 A	8.9	8.1	8.3	8.6	8.3	8.5	7.9	8.7	9.4	8.4	8.2	7.7
Croplan 5900***	RR	VT2P	8.4 A	8.6 A	8.7 A	9.5	9.3	9.2	9.7	9.4	9.4	7.4	8.3	9.0	6.9	7.4	7.4
Croplan 5700**	RR	VT2P	8.3 A	8.2 A		8.8	8.5		9.4	8.7		7.8	8.1		7.3	7.3	
Average			8.4	8.4	8.5	8.8	8.6	8.7	9.3	8.8	8.9	8.0	8.4	9.2	7.6	7.7	7.5
Standard Error			0.3	0.5	0.4	0.6	0.6	0.4	0.6	0.5	0.3	0.8	0.7	0.9	0.9	0.4	0.4
L.S.D..05			N.S.	0.53	0.50	N.S.	N.S.	N.S.	N.S.	N.S.	0.69	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
C.V.			14	11	12	12	12	12	10	9	7	16	11	10	16	12	14
Plots per entry (reps x locs.)			12	24	36	3	6	9	3	6	9	3	6	9	3	6	9

* Hybrids marked with an asterisk were in the top performing "A" group for yield within two (**) or three (***) consecutive years of the previous three year evaluation period.
† For a full description of abbreviated biotech traits, see table 6.
‡ Hybrids that have any MS letter in common, within a column, are not significantly different at the 5% level of probability using a least signficiant difference (LSD) mean separation test.

Table 4. Characteristics, as described by the seed company, of corn silage hybrids evaluated in yield tests in Tennessee during 2019[†].

Hybrid[‡]	Grain Color	Maturity	Herbicide Tolerance	Insect Tolerance	Refuge in a Bag	Released or Experimental	Seed Treatment
Augusta A7768	Y	118	RR,LL	3110GT	N	R	Cruiser 250
Augusta A9967	Y	117	RR,LL	3000GT	N	R	Cruiser 250
Croplan 5700	Y	117	RR	VT2P	Y	R	Poncho 250
Croplan 5900	Y	119	RR	VT2P	Y	R	Poncho 250
Croplan 6027	Y	120	RR	VT2P	Y	R	Cruiser 250

† Information on this table provided by the respective seed companies.
‡ For a full description of abbreviated biotech traits, see table 6.

Table 5. Contact information for corn hybrid seed companies evaluated in silage tests in Tennessee during 2019.

Company	Contact	Phone	Email	Web site
Augusta Seed Corporation	Matt Rawley	540-886-6055	matt.rawley@augustaseed.com	www.augustaseed
Croplan by Winfield	Caleb Robertson	731-614-5234	clrobertson@landolakes.com	www.croplan.com

Table 6. Abbreviations used to identify biotech seed traits contained in corn silage hybrids evaluated in Tennessee in 2019.

Abbreviation	Name	Characteristic
LL	Bayer CropScience LibertyLink®	Glufosinate herbicide tolerance. Event: T25
RR	Monsanto Roundup Ready® Corn	Glyphosate herbicide tolerance.
RR2	Monsanto Roundup Ready® Corn 2	Glyphosate herbicide tolerance. Event: NK603
GT	Syngenta Agrisure® GT	Glyphosate herbicide tolerance. Event: SYTGA21
3000GT	Syngenta Agrisure® 3000GT	Cry1Ab, Corn Borer protection. Modified Cry3A, Protection of Western, Northern and Mexican Corn Rootworm. Glufosinate herbicide tolerance. Glyphosate tolerance. Event: SYTGA21+Bt11+MIR604
HX1	DowAgrosciences Pioneer Hi-Bred Herculex® I	Cry1F, Western Bean Cutworm, Corn Borer, Black Cutworm and Fall Armyworm resistance. Glufosinate herbicide tolerance. Event: TC1507
SSX	Monsanto Genuity™ SmartStax™ DowAgrosciences SmartStax™	Cry1A.105, Cry2Ab2, Cry1F, Cry3Bb1, Cry34/35Ab1 Western, Northern, and Mexican Corn Rootworms, European and Southwestern Corn Borers, Sugarcane Borer, Southern Cornstalk Borer, Western Bean and Black Cutworms, Corn Earworm, Fall Armyworm protection. Glyphosate herbicide tolerance. Glyphosate herbicide tolerance. Event: Mon88017+Mon89034+TC1507+DAS59122-7
VIP3110	Agrisure Viptera™ 3110	Vip3A, Cry1Ab, European and Southwestern Corn Borers, Southern Cornstalk Borer, Fall and Beet Armyworm, Black and Western Bean Cutworm, Sugarcane Borer, Common Stalk borer and Dingy Cutworm protection Glyphosate tolerance. Event: MIR162+Bt11+GA21
VIP3111	Agrisure Viptera™ 3111A	Vip3A, Cry1Ab. Protection from European and Southwestern Corn Borers, Corn earworm, Southern cornstalk borer, Fall and Beet armyworm, Black and Western Bean Cutworm, Sugarcane borer, Western, Northern and Mexican corn rootworm, Common stalk borer and Dingy cutworm. Glyphosate tolerance. Contains Agrisure Artesian technology with multiple genes for season long drought protection. Event: MIR162+Bt11+GA21+MIR604
VT2P	Monsanto Genuity™ VT Double PRO™	Cry1A.105, Cry2Ab2, European and Southwestern Corn Borers, Sugarcane Borer, Southern Cornstalk Borer, Corn Earworm, and Fall Armyworm protection. Glyphosate herbicide tolerance. Event: Mon89034+NK603
YGCB	Monsanto YieldGard® Corn Borer	Cry1Ab, European and Southwestern Corn Borers, Sugarcane Borer and Southern Cornstalk Borer protection. Event: Mon810
RIB	Refuge in Bag	