

## **Introduction to Colorado's 2001 Alfalfa Variety Trials**

Alfalfa hay is an important crop in Colorado with over 900,000 acres harvested in 2000, producing 3.3 million tons, and worth an estimated \$270M. Dozens of new varieties are sold in Colorado each year and Colorado hay producers need current, reliable, and unbiased variety performance information to make the best alfalfa variety decision. Irrigated alfalfa is grown in a wide range of different agricultural ecologies in Colorado which requires variety performance results for local conditions. Colorado State University researchers evaluate alfalfa varieties at multiple locations every year to provide Colorado hay producers with locally adapted alfalfa variety performance results. Participation by alfalfa seed companies in the state trials is completely voluntary. An RCB design with four replications is used for all five alfalfa variety trials conducted in Colorado.

**Forage yields of 24 alfalfa varieties at Rocky Ford<sup>1</sup>, Arkansas Valley, CO in 2001.**

Variety	Brand/Source	1 <sup>st</sup> Cut	2 <sup>nd</sup> Cut	3 <sup>rd</sup> Cut	4 <sup>th</sup> Cut	2001
		May 31	July 3	Aug 9	Oct 2	Total
-----tons /acre <sup>2</sup> -----						
Arapaho	Dairyland Research	1.64	1.21	1.24	1.43	5.52
ZX 9450A*	ABI Alfalfa, Inc.	1.47	1.15	1.18	1.40	5.20
Target Plus	Producers Hybrids	1.47	1.15	1.15	1.40	5.17
Arrow Head	Dairyland Research	1.42	1.15	1.26	1.32	5.15
FG 6M71*	Forage Genetics Int'l.	1.32	1.17	1.25	1.36	5.10
Emperor	America's Alfalfas	1.45	1.18	1.14	1.32	5.09
ZG 9650A	ABI Alfalfa, Inc.	1.28	1.12	1.20	1.47	5.07
Winter Crown	Dairyland Research	1.36	1.13	1.22	1.35	5.06
Abilene + Z	America's Alfalfas	1.33	1.16	1.20	1.37	5.06
Dagger + EV	AgriPro Seeds, Inc.	1.33	1.20	1.14	1.36	5.03
53VO8	Pioneer Hi-Bred Int'l.	1.35	1.21	1.16	1.30	5.02
54Q53	Pioneer Hi-Bred Int'l.	1.35	1.09	1.16	1.31	4.91
FG 5M84*	Forage Genetics Int'l.	1.30	1.08	1.19	1.33	4.90
Magnum V-Wet	Dairyland Research	1.22	1.13	1.17	1.38	4.90
Lahontan	USDA - NV	1.30	1.14	1.18	1.25	4.87
Ranger	USDA - NE	1.31	1.14	1.13	1.25	4.83
4200	Arkansas Valley Seed	1.37	1.08	1.10	1.24	4.79
Geneva	Novartis Seeds	1.30	1.10	1.12	1.26	4.78
ZC 9941A*	ABI Alfalfa, Inc.	1.25	1.14	1.11	1.27	4.77
Samurai	America's Alfalfas	1.26	1.12	1.08	1.28	4.74
ZX 9853	ABI Alfalfa, Inc.	1.24	1.03	1.14	1.30	4.71
A 30-06	ABI Alfalfa, Inc.	1.25	1.17	1.10	1.18	4.70
Baralfa 42IG	Barenbrug U.S.A.	1.31	1.07	1.09	1.23	4.70
FG 3R139*	Forage Genetics Int'l.	1.26	1.07	1.10	1.24	4.67
<b>Average</b>		<b>1.34</b>	<b>1.13</b>	<b>1.16</b>	<b>1.32</b>	<b>4.95</b>
LSD <sub>(0.05)</sub>		0.13	NS	0.10	0.10	0.33

<sup>1</sup>Trial conducted on the Arkansas Valley Research Center; seeded 9/01/00.

<sup>2</sup>Yields calculated on oven-dry basis.

\*Indicates experimental entry

**Trial Site Information:**

Elevation: 4178 feet. Average annual precipitation 11.86 inches. Average frost-free days-158

Last spring frost-April 24, 2001; First fall frost-October 6, 2001; 2001 frost-free days-165

Fertilizer: 100 lbs. P<sub>2</sub>O<sub>5</sub> + 21 lbs. N/acre prior to planting

Soil Series: Rocky Ford silty clay loam

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The Arkansas Valley, in southeastern Colorado, extends from the mountains on the west to the Kansas border. Alfalfa is the most important irrigated crop in the Valley being produced on 165,000 acres. Furrow or flood irrigation predominates, but about 3,000 acres are produced under sprinklers and there are an additional 5,000 dryland acres. The elevation varies from 3,400 feet in the east to 4,700 feet at Pueblo. The average annual precipitation along the Valley is 11 inches.

The average frost-free period is 158 days from May 1 to October 6 which results in four cuttings per season as a standard practice. Successful varieties need winter hardiness (temperatures go below 0°F), but they also must take advantage of a relatively long growing season. The average alfalfa yield in the Valley is 4.40 tons/acre. The most persistent pests are the alfalfa weevil, stem nematode, and tansy mustard/flixweed.

#### **Researcher comments**

This was the first harvest season for this trial established in the fall of 2000. The trial was irrigated 3 times after planting in the fall, once prior to the first cutting and once after each cutting. A frost (28°F) on September 25, 2000 tended to set stand establishment back somewhat. Rainfall from April through September was 9.5 inches compared to the long term average of 9 inches. Irrigation water was available through the season and all four cuttings were harvested without rain damage. The irrigation prior to the 2<sup>nd</sup> cutting was inadequately applied and resulted in lower yields. The trial, at the end of the season, appeared to be well established and the earlier problems overcome. The average trial yield was 4.95 tons per acre.

#### **Researcher**

Dr. Frank Schweissing, Superintendent-Entomologist, has conducted alfalfa trials at the Arkansas Valley Research Center (AVRC) for 30 years. He received his B.S. and M.S. in Entomology from Colorado State University and Ph.D. in Entomology from Kansas State University. He began working at the AVRC in 1961 as an Entomologist and became Superintendent in 1980. His major research efforts have been with the insect and mite pests of alfalfa, corn, sorghum, and onions.

## Forage yields of 26 alfalfa varieties at Wiggins<sup>1</sup> 2001 and for the period 1999-2001.

Variety	Brand/Source	2001				Total			
		1 <sup>st</sup> Cut	2 <sup>nd</sup> Cut	3 <sup>rd</sup> Cut	4 <sup>th</sup> Cut	2001	2000	1999	3-yr
		May 22	Jun 28	Jul 27	Aug 31				
-----tons/acre <sup>2</sup> -----									
Pioneer brand 5396	Pioneer Hi-Bred Int'l, Inc.	2.84	2.14	1.61	1.65	8.24	8.88	8.05	25.17
Reno	Novartis Seeds	2.61	2.18	1.60	1.65	8.04	9.11	8.00	25.16
DEKALB DK142	Monsanto/DEKALB	2.78	2.06	1.60	1.64	8.09	9.27	7.78	25.13
Big Horn	Cargill Hybrid Seeds	2.71	2.20	1.66	1.63	8.20	9.19	7.66	25.06
Legacy	Grassland West Company	2.60	2.11	1.52	1.65	7.89	9.19	7.92	25.00
DEKALB DK127	Monsanto/DEKALB	2.80	2.08	1.60	1.59	8.08	9.26	7.54	24.88
TMF Multi-plier II	Mycogen Seeds	2.75	2.09	1.48	1.61	7.94	9.09	7.80	24.83
Pioneer brand 5312	Pioneer Hi-Bred Int'l, Inc.	2.96	2.08	1.57	1.65	8.25	9.01	7.56	24.82
Depend+EV	Agripro Seed, Inc.	2.59	2.09	1.55	1.56	7.79	9.24	7.77	24.80
Garst Seed 631	Garst Seeds	2.71	2.07	1.63	1.65	8.06	8.86	7.84	24.76
Garst Seed 630	Garst Seeds	2.78	2.06	1.54	1.65	8.04	8.84	7.78	24.66
WL 325HQ	W-L Research, Inc.	2.71	2.07	1.60	1.63	8.01	8.84	7.77	24.62
Magnum III	Dairyland Seed Company	2.58	2.14	1.60	1.60	7.92	8.74	7.80	24.46
Alpha 2001	Great Lakes Hybrids	2.82	2.09	1.55	1.63	8.09	8.54	7.77	24.40
Shamrock	Sharp Bros. Seed Co.	2.47	2.00	1.51	1.58	7.56	8.88	7.92	24.36
AlfaLeaf II	Sharp Bros. Seed Co.	2.38	2.05	1.55	1.62	7.60	8.98	7.76	24.34
Innovator+Z	America's Alfalfa	2.76	2.02	1.47	1.55	7.80	8.64	7.81	24.25
Excalibur II	Allied Seed	2.59	2.02	1.54	1.61	7.76	8.75	7.74	24.25
AmeriGraze 401 + Z	America's Alfalfa	2.54	1.92	1.54	1.59	7.59	8.86	7.59	24.04
Spartan	Allied Seed	2.64	2.06	1.52	1.57	7.80	8.57	7.67	24.04
Complete	Arrow Seed Co.	2.56	1.98	1.47	1.54	7.54	8.58	7.81	23.93
Tahoe	Novartis Seeds	2.67	1.99	1.60	1.69	7.96	8.76	6.98	23.70
Total + Z	America's Alfalfa	2.48	1.96	1.49	1.55	7.48	8.43	7.71	23.62
Webfoot MPR	Great Lakes Hybrids	2.53	1.99	1.53	1.55	7.60	8.32	7.44	23.37
Focus HSN <sup>3</sup>	Arkansas Valley Seeds	2.41	2.06	1.56	1.64	7.68	8.46	7.18	23.32
Evergreen-2	Arkansas Valley Seeds	2.48	2.04	1.59	1.66	7.77	8.36	6.87	23.00
<b>Average</b>		<b>2.65</b>	<b>2.06</b>	<b>1.56</b>	<b>1.61</b>	<b>7.88</b>	<b>8.83</b>	<b>7.67</b>	<b>24.38</b>
LSD <sub>(0.30)</sub>		0.29	0.10	0.07	0.05	0.18	0.27	0.24	0.13

<sup>1</sup>Trial conducted on the Martin Smits farm, seeded 9/3/97.

<sup>2</sup>Yields calculated on air-dry basis.

<sup>3</sup>Previously named 'Pinnacle.'

### **Trial Site Information:**

Elevation: 4750 ft.

Soil Series: Valent loamy sand with some bijou loamy sand characteristics

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**Forage yields of 20 alfalfa varieties at Fruita<sup>1</sup> 2001 and for the period 1999-2001.**

Variety	Brand/Source	2001				Total			
		1 <sup>st</sup> Cut May 21	2 <sup>nd</sup> Cut July 6	3 <sup>rd</sup> Cut Aug 27	4 <sup>th</sup> Cut Oct 2	2001	2000	1999	3-yr
-----tons/acre <sup>2</sup> -----									
Focus HSN <sup>3</sup>	Arkansas Valley Seed Co	2.47	2.06	2.66	1.15	8.34	9.85	8.74	26.93
Millennia	IFA	2.37	2.20	2.57	1.31	8.44	9.72	8.68	26.84
ZX 9453	ABI Alfalfa, Inc.	2.24	2.12	2.32	1.21	7.88	9.94	8.60	26.42
Baralfa 54	Seekamp Seed	2.38	1.98	2.55	1.18	8.09	9.52	8.39	26.00
WL 232 HQ	Germaines Seeds	2.31	2.01	2.44	0.98	7.73	9.57	8.70	26.00
Reno	Novartis	2.34	1.99	2.65	1.15	8.12	9.64	8.18	25.94
ZX 9451	ABI Alfalfa, Inc.	2.16	1.95	2.28	1.13	7.52	9.66	8.70	25.88
Archer	America's Alfalfa	2.08	2.19	2.36	1.16	7.79	9.54	8.55	25.88
Archer II	America's Alfalfa	2.18	2.24	2.23	1.16	7.81	9.52	8.51	25.84
DEKALB DK 142	Monsanto/DEKALB	2.02	1.72	2.50	1.01	7.25	9.83	8.74	25.82
TMF Multiplier II	Mycogen Seeds	2.19	1.75	2.70	1.06	7.69	9.65	8.44	25.78
WL 325 HQ	Germaines Seeds	2.16	2.19	2.37	1.10	7.83	9.34	8.39	25.55
DEKALB DK 140	Monsanto/DEKALB	2.09	1.93	2.42	1.08	7.51	9.42	8.51	25.45
Garst 6420	Garst	1.74	1.53	2.32	1.04	6.63	9.87	8.69	25.19
DEKALB DK 134	Monsanto/DEKALB	2.09	1.88	2.46	1.02	7.45	9.47	7.99	24.91
ABT 350	ABT	1.97	1.84	2.04	0.92	6.77	9.57	8.40	24.75
Innovator+Z	America's Alfalfa	2.02	1.79	2.43	0.90	7.14	9.29	8.20	24.62
TMF 421	Mycogen Seeds	2.14	1.85	2.25	0.93	7.16	9.21	8.08	24.45
Ranger	public	1.99	1.57	2.43	0.89	6.88	9.31	7.45	23.64
Ladak	public	2.00	1.58	2.52	0.82	6.91	9.09	7.20	23.20
<b>Average</b>		<b>2.15</b>	<b>1.92</b>	<b>2.43</b>	<b>1.06</b>	<b>7.55</b>	<b>9.55</b>	<b>8.36</b>	<b>25.45</b>
LSD <sub>(0.05)</sub>		NS	0.22	0.30	0.13	0.72	0.42	0.49	1.03

<sup>1</sup>Trial conducted on the Western Colorado Research Center, seeded 8/27/98.

<sup>2</sup>Yields calculated on air-dry basis.

<sup>3</sup>Previously named 'Pinnacle.'

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**Forage yields of 24 alfalfa varieties at Center<sup>1</sup>, San Luis Valley, CO in 2001.**

Variety	Brand/Source	1st Cut	2nd Cut	2001 <sup>3</sup>
		Jun 5	July 17	Total
		-----tons/acre <sup>2</sup> -----		
Select	Forage Genetics Intl.	1.76	2.38	4.14
WL 325 HQ	W-L Research	1.67	2.38	4.05
DEKALB DK 143	Monsanto/DEKALB	1.74	2.31	4.05
DEKALB DK 142	Monsanto/DEKALB	1.73	2.26	3.99
WL 327	W-L Research	1.77	2.20	3.97
Pro Gro	M.B.S. Inc	1.70	2.27	3.97
WL 232 HQ	W-L Research	1.76	2.20	3.96
54Q53	Pioneer Hi-Bred Intl.	1.67	2.25	3.92
Columbia 2000	Public	1.88	2.00	3.88
AmeriStand 201	ABI Alfalfa, Inc.	1.71	2.12	3.83
FG 4200	Arkansas Valley Seeds	1.52	2.27	3.79
Baralfa 42IQ	Barenbrug Colorado	1.78	2.01	3.79
Magnum V	Dairyland Seed Co.	1.54	2.23	3.77
Abound	Asgrow Seed Co.	1.55	2.19	3.74
Aspire	Asgrow Seed Co.	1.65	2.08	3.73
Award	Asgrow Seed Co.	1.65	2.08	3.73
Geneva	Novartis Seeds	1.56	2.12	3.68
53V08	Pioneer Hi-Bred Intl.	1.64	2.02	3.66
FG 3R139	Forage Genetics Intl.	1.60	2.06	3.66
Gold Plus	M.B.S. Inc.	1.57	2.07	3.64
Vernal	USDA WI-AES	1.54	2.06	3.60
DEKALB DK 134	Monsanto/DEKALB	1.47	2.12	3.59
Ranger	USDA NE-AES	1.51	2.04	3.55
HybriForce TM-400	Dairyland Research Intl	1.53	2.00	3.53
<b>Average</b>		<b>1.65</b>	<b>2.15</b>	<b>3.80</b>
LSD <sub>(0.30)</sub>		0.14	0.15	0.22

<sup>1</sup> Trial conducted on the Sherril Mix farm, Roads 8N & 1W; seeded 6/16/00.

<sup>2</sup> Yields calculated on oven-dry basis.

<sup>3</sup> Total of two cuttings third cutting was lost.

**Trial Site Information:**

(Elevation 7700 ft.)

Average annual precipitation 6.92 inches. Average frost-free days - 88days (32°F). Average last spring frost - June 6; average first fall frost - September 11.

Soil Series: Norte gravelly sandy loam

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## **San Luis Valley Alfalfa Variety Trial at Center**

The San Luis Valley is a huge, flat inter-mountain valley surrounded by snow-capped mountains. The area is comprised of Alamosa, Conejos, Costilla, Rio Grande, and Saguache counties. This area has been increasing its alfalfa yield, alfalfa price and acreage and produced 165,000 acres in 2000. San Luis Valley alfalfa hay production was valued at \$49.5 million. High altitude acreage in Colorado is over 200,000 acres.

Growers here usually cut three times per year. Stands typically last 5-7 years. Winter-hardiness and persistence are important variety selection factors; as well as yield and pest resistance.

### **Researcher Comments**

Alfalfa is not part of the rotation at the SLV Research Center, therefore, I am grateful for the cooperation of local potato/barley/alfalfa producer, Sherril Mix.

The trial was planted solo in June 2000; the stand is very good in this the first full year of harvesting. This field was harvested three times; however, mis communication resulted in the loss of the third harvest. This trial will be harvested two more years and a new trial will be planted in 2003.

Conditions produced about an average yield in 2001. The early spring was warm which made the first cutting a little early (June 5). The second cutting (July 17) was mostly rained on by late July and early August monsoon rains. The third cutting (Sept. 8) was bigger than some years because of the early first cutting. Variety differences were not statistically different; however, Vernal and Ranger were close to the bottom of the trial as they have been for the last 20 years. Vernal and Ranger were nearly 0.7 tons per acre below the top yield, as usual.

### **Researcher**

Merlin Dillon, Area Extension Agent, Agronomy, has conducted alfalfa trials in the San Luis Valley for 20 years. Raised on a dryland farm in southeast Colorado (Baca County), Merlin received his B.S. in agronomy from Panhandle State University in Goodwell, Oklahoma, and an M.S. in agronomy from Colorado State University. Merlin worked for Kansas State University as a crop's researcher in Tribune, KS, as an irrigated crop's consultant, and as an independent fertilizer applicator prior to joining CSU Cooperative Extension in 1982. His research has included small grain variety trials (soft white and hard red spring wheat, durum wheat and barley and oats) as well as quinoa, canola, and bio-control crops.

## Forage yields of 20 alfalfa varieties at Yellow Jacket<sup>1</sup> in 2001.

Variety	Brand/Source	1 <sup>st</sup> Cut	2 <sup>nd</sup> Cut	3 <sup>rd</sup> Cut	Total
		June 6	July 20	Sept 5	
-----tons/acre <sup>2</sup> -----					
ZG 9650A*	ABI Alfalfa	4.41	2.68	1.90	8.98
Focus HSN <sup>3</sup>	Arkansas Valley Seeds	4.64	2.54	1.65	8.83
DEKALB DK 134	Monsanto/DEKALB	4.11	3.00	1.69	8.79
WL 327	Germain's Seed	3.68	3.09	1.92	8.70
Award	Asgrow Seed Co.	4.24	2.74	1.70	8.67
Magnum V	Dairyland Seed Co.	3.93	2.85	1.79	8.58
DEKALB DK 142	Monsanto/DEKALB	3.76	2.92	1.83	8.51
Pro Gro	MBS Genetics	3.76	2.70	1.97	8.42
Aspire	Asgrow Seed Co.	4.04	2.62	1.74	8.41
DEKALB DK 143	Monsanto/DEKALB	3.89	2.66	1.83	8.39
Baralfa 54	Barenbrug USA	3.73	2.63	1.97	8.33
Millennia	IFA	3.74	2.58	1.94	8.26
Forecast 1001	Dairyland Seed Co.	3.59	2.63	1.92	8.14
Archer II	America's Alfalfa	3.78	2.38	1.93	8.09
AmeriGraze 401+Z	America's Alfalfa	3.48	2.60	1.78	7.85
WL 325HQ	Germain's Seed	3.63	2.56	1.55	7.75
Abound	Asgrow Seed Co.	3.59	2.30	1.86	7.74
Geneva	Novartis Seeds	3.27	2.55	1.87	7.69
ZX 9652*	ABI Alfalfa	3.46	2.43	1.73	7.61
Ranger	Public	3.42	2.27	1.39	7.07
<b>Average</b>		<b>3.81</b>	<b>2.64</b>	<b>1.80</b>	<b>8.24</b>
LSD <sub>(0.30)</sub>		0.36	NS	0.19	0.58

<sup>1</sup>Trial conducted on the Southwestern Colorado Research Center, seeded 6/2/00

<sup>2</sup>Yields were calculated on an oven-dry basis and adjusted to 12% moisture.

<sup>3</sup>Previously named 'Pinnacle.'

\*Indicates experimental entry.

### **Trial Site Information:**

(Elevation 6960 ft.)

Soil series: Wetherill silty clay loam

Previous crop: Small grain

Seeding rate: 20 lb/ac (6 in. row spacing)

Fertilizer: 100 lb P<sub>2</sub>

Precipitation: 5.8 in. (April 1 to Aug. 31)

Irrigation: 19.5 in. (7 sprinkler applications)

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## **Southwestern Colorado Alfalfa Trial at Yellow Jacket**

Southwestern Colorado has a rolling topography with slopes ranging from 1% to 12%. Alfalfa is the main crop in terms of acreage, production, and cash value. In 2000, 81,000 acres of alfalfa were harvested in the five counties of southwestern Colorado (Archuleta, Dolores, La Plata, Montezuma, and San Miguel). Approximately 85% of this acreage was irrigated. The majority of the irrigated areas are served by older water delivery systems. The Dolores Project, a new system developed by the Bureau of Reclamation, supplies irrigation water to 28,000 acres in the Dove Creek/Yellow Jacket area and to 7,500 acres on the Ute Mountain Ute Indian Reservation south of Cortez. Approximate irrigated alfalfa acreage harvested in the Dove Creek/Yellow Jacket area is 20,000 acres and 4,300 acres by the Ute Mountain Ute Indian Tribe. The average growing season is 120 days with annual precipitation of 16 inches with one-half received as snow. June is the driest month. The major soil series is Wetherill silty clay loam with a water holding capacity of 1.8 to 2.0 inches per foot and average soil organic matter content of 1%. The soils are generally low in phosphorus and high in potassium. The elevation where alfalfa is produced ranges from 5,500 ft. to over 7,000 ft.

Average irrigated alfalfa yields in 2000 ranged from 3.05 tons/acre in Archuleta County to 4.00 tons/acre for Montezuma County. The Dolores Project lands in the Dove Creek/Yellow Jacket area averaged 3.89 tons/acre in 2000.

There are usually three cuttings per year: early June, late July, and September. Alfalfa varieties recommended have dormancy ratings of 3 to 4 in most areas. The major pests in the area are pea aphids, crown and root rots, and alfalfa weevil in the lower elevation areas. Stem nematode and their relationship with crown and root rots is receiving increased attention.

Alfalfa hay quality in southwestern Colorado is good to excellent due to dry weather and relatively few disease and insect problems. The older irrigated areas of southwestern Colorado produce alfalfa targeted either for their own livestock operations or for livestock operations in the Four Corners area. A significant market for alfalfa hay has been developed with members of the nearby Indian tribes. A majority of the alfalfa produced under the Dolores Project is marketed to

dairies in the southwestern United States.

### **Researcher comments**

This was the second year for the alfalfa variety trial. A good to excellent stand was obtained in the establishment year. The first cut averaged 3.81 tons/acre and the second cut averaged 2.64 tons/acre in 2001. Producers in southwestern Colorado strive to obtain average yields from 2.5 to 3.0 tons/acre and 1.5 to 2.0 tons/acre for their first and second cuttings, respectively. The higher yields in the variety trial may be due to the new stand and harvesting only one cutting during the establishment year. The third cut averaged 1.80 tons/acre, which is comparable to alfalfa yields in the area. The public variety Ranger was the lowest yielding entry.

The variety trial was irrigated with a wheel-line sprinkler with 40 ft. x 60 ft. nozzle spacing (two 60 ft. moves per day). This sprinkler configuration is common in the area. We may be able to reduce the CV% (variability) if we changed the nozzle spacing to 40 ft. x 40 ft. (40 ft. moves). This would compensate for wind and higher transpiration rates during the day. A producer, however, may not have this irrigation flexibility since he has to cover larger acreages in a set number of days.

The growing season was again marked by below normal precipitation. This allowed most producers in the area to harvest all three cuttings without damage from rain. Quality was generally very good. At least two more years of variety performance results are planned for this trial.

### **Researchers**

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