Oklahoma Cooperative Extension Service CR-2141
0409

Current Report

Fall forage production and date of first hollow stem in winter wheat varieties during the 2008-2009 crop year

Jeff Edwards
Small Grains Extension Specialist

Richard Austin
Senior Agriculturalist

Jay Ladd
Lab Technician II

Introduction

Fall forage production potential is just one consideration in deciding which wheat variety to plant. Dual-purpose wheat producers, for example, may find varietal characteristics such as grain yield after grazing and disease resistance to be more important selection criteria than slight advantages in forage production potential. Forage-only producers might place more importance on planting an awnless wheat variety or one that germinates readily in hot soil conditions. Ultimately, fall forage production is generally not the most important selection criteria used by Oklahoma wheat growers, but it is one that should be considered.

Fall forage production by winter wheat is determined by genetic potential, management and environmental factors. The purpose of this publication is to quantify some of the genetic differences in forage production potential and grazing duration among the most popular wheat varieties grown in Oklahoma. Management factors such as planting date, seeding rate, and soil fertility are very influential and are frequently more important than variety in determining forage production. Environmental factors such as rainfall and temperature also play a heavy role in dictating how much fall forage is produced. All of these factors along with yield potential after grazing and the individual producer's preferences will determine which wheat variety is best suited for a particular field.

Site Descriptions and Methods

The objective of the fall forage variety trials is to give producers an indication of the fall forage production ability of wheat varieties commonly grown throughout the state of Oklahoma. The forage trials are conducted under the umbrella of the Oklahoma State University winter wheat variety trials at the El Reno, Okla. and Stillwater, Okla. test sites. Weather data for these sites are provided in Figures 1 and 2.

A randomized complete block design with four replications was used at each site. Forage was measured by hand clipping two 1-m by 1-row samples at random sites within each plot. Samples were then placed in a forced-air dryer for approximately 7 days and weighed. All plots were sown at 120 lbs/acre. Conventional till plots received 50 lbs/acre of 18-46-0 in furrow at planting and no-till plots received 5 gal/acre of 10-34-0 at planting. Fertility, planting date and harvest date information are provided in Table 1.

Figure 1. Average daily temperature and rainfall from Sept. 1, 2008 to Dec 31, 2008, Stillwater, Okla.

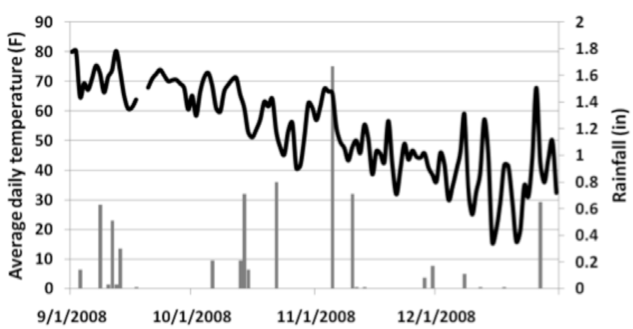

Figure 2. Average daily temperature and rainfall from Sept. 1, 2008 to Dec 31, 2008, El Reno, Okla.

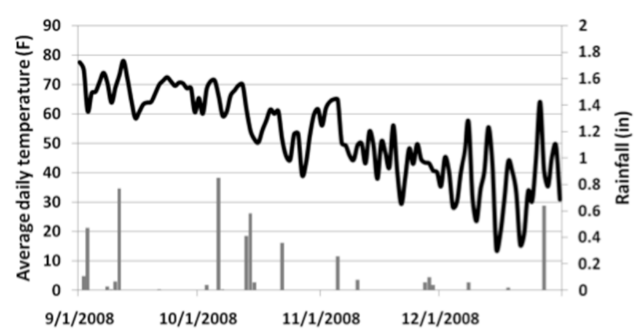

Table 1. Location information.

	Planitng date	Sampling date	pH	P	K
El Reno Conventional till	9/25/2008	12/11/2008	5.6	108	362
El Reno No-till	9/25/2008	12/11/2008	5.1	102	279
Stillwater	9/16/2008	12/02/2008	5.6	39	341

Results

There were no statistically-significant differences in fall forage production among wheat varieties within a location in 2008 (Table 2). Average fall forage production by conventionally-tilled winter wheat plots was 1,690 lbs/acre more at the Stillwater site than the El Reno site in 2008 (Table 2). This was partially due to a nine-day earlier planting date for the Stillwater site but also was attributable to greater plant-available moisture at the Stillwater location.

The lack of differences in forage yield among varieties further illustrates that most commercially-available wheat varieties can produce adequate fall forage when managed properly. While most varieties can produce adequate fall forage, the two and three-year averages (Tables 3 and 4) clearly show that some varieties routinely produce more forage than others when placed under similar management. This does not mean, however, that a high-yielding variety from our test will produce a bumper crop of forage when not managed properly. Similarly, some of the mid-tier and even lower-tier varieties in our test are excellent dual-purpose varieties due to traits such as late first hollow stem and prolific tillering.

Conventionally-tilled wheat plots produced 660 lbs/acre more forage yield than no-tillage plots at the El Reno site

Table 2. Fall forage production by winter wheat varieties sown in 2008 at Stillwater and El Reno. No statistical differences were observed among varieties.

Source	Variety	Stillwater	El Reno Conv. till	El Reno No-till	No-till Difference
		------------------------------lbs dry forage/acre-----------------------------			
WestBred	Armour	3,400	1,660	900	-760
Oklahoma	Centerfield	3,340	1,610	950	-660
Oklahoma	Deliver	3,020	1,550	990	-560
AgriPro	Doans	3,220	1,840	860	-980
Oklahoma	Duster	3,620	1,700	1,160	-540
Oklahoma	Endurance	2,960	1,500	1,120	-380
AgriPro	Fannin	3,540	1,440	900	-540
Kansas	Fuller	3,280	1,800	960	-840
AgriPro	Jackpot	3,370	1,520	690	-830
AgriPro	Jagalene	3,180	1,720	910	-810
Kansas	Jagger	3,270	1,400	940	-460
WestBred	Keota	3,420	-	-	-
USDA-ARS	Mace	3,400	-	-	-
Oklahoma	OK Bullet	3,340	1,690	1,040	-650
Oklahoma	OK Rising	3,410	1,770	1,180	-590
Kansas	Overley	3,390	1,860	1,060	-800
WestBred	Santa Fe	3,160	1,420	680	-740
WestBred	Shocker	3,640	1,490	880	-610
Texas	TAM 111	3,350	-	-	-
Texas	TAM 112	3,280	-	-	-
Texas	TAM 203	2,990	1,420	840	-580
Texas	TAM 304	3,370	-	-	-
WestBred	Winterhawk	2,940	-	-	-
Average		3,300	1,610	950	-670
LSD		NS†	NS	NS	

† NS = differences among varieties within a location were nonsignificant at P = 0.05.

in 2008 (Table 2). Similar trends were observed in the two (710 lbs/acre difference) and three (790 lbs/acre difference) year data. These data were collected as part of a three-year, comprehensive experiment comparing no-till and conventional till wheat production practices, so it is important to reserve judgment on the two systems until final grain yield data are in and economic analyses performed. Nevertheless, our data have consistently shown less forage production in no-till plots than in conventional till plots.

The lesser forage production in no-till was probably due to several factors. Emergence was delayed in no-till plots in two years of the experiment due to drier soil conditions in the top 1.5 inches of the profile. In this situation, the final tillage operation brought enough moisture to the surface to allow for germination and adequate subsoil moisture was present to fuel early-season plant growth. Had adequate subsoil moisture not been present, the results would likely have been reversed. Other probable causes include cooler soil temperatures and shallow soil compaction, which may actually benefit grazing conditions by keeping cattle out of muddy conditions. It also is important to note that grain yields have been greater in no-till plots than conventional till plots some years of the experiment.

As mentioned previously, occurrence of first hollow stem dictates when cattle are removed from wheat pasture; therefore, fall forage numbers provided in this document describe the amount of forage available, but date of first hollow stem dictates how long the forage can be utilized. There was a 17-day difference between the earliest (Fannin) and latest (Centerfield & Mace) first hollow stem varieties at Stillwater in 2008. Unlike previous years, however, we observed no difference in date of first hollow stem between conventional till and no-till plots at El Reno.

Acknowledgments

The authors want to thank the Oklahoma Wheat Commission and the Oklahoma Wheat Research Foundation for providing partial funding for this research. We want to thank Don and Ray Bornemann for providing land and resources for the El Reno test site. We also acknowledge the hard work of Brad Tipton, Dillon Butchee and John Dollar in collecting the data presented in this report.

Table 3. Two-year average fall forage production by winter wheat varieties sown in 2007 and 2008 at Stillwater and El Reno.

Source	*Variety*	*Stillwater*	*El Reno Conv. till*	*El Reno No-till*	*No-till Difference*
		------lbs dry forage/acre------			
Oklahoma	Centerfield	**2,890**†	1,740	1,170	-570
Oklahoma	Deliver	2,520	**2,180**	**1,610**	-570
AgriPro	Doans	2,540	**2,320**	**1,290**	-1,030
Oklahoma	Duster	**2,970**	**2,220**	**1,450**	-770
Oklahoma	Endurance	2,390	**2,160**	**1,470**	-690
AgriPro	Fannin	**2,790**	**2,220**	**1,400**	-820
Kansas	Fuller	2,570	**1,970**	1,260	-710
AgriPro	Jackpot	2,670	**2,180**	**1,320**	-860
AgriPro	Jagalene	2,360	1,850	1,050	-800
Kansas	Jagger	2,270	1,690	1,140	-550
Oklahoma	OK Bullet	**2,760**	**2,030**	**1,370**	-660
Kansas	Overley	2,670	1,930	**1,390**	-540
WestBred	Santa Fe	2,370	**2,040**	1,150	-890
WestBred	Shocker	**2,770**	1,850	**1,320**	-530
Texas	TAM 203	2,370	-	-	-
Texas	TAM 304	**2,970**	-	-	-
Average		2,620	2,030	1,310	-710
LSD		290	360	330	

† Bolded numbers are not statistically different from the highest-yielding variety within a column.

Table 4. Three-year average fall forage production by winter wheat varieties sown in 2006, 2007 and 2008 at Stillwater and El Reno.

Source	*Variety*	*Stillwater*	*El Reno Conv. till*	*El Reno No-till*	*No-till Difference*
		lbs dry forage/acre			
Oklahoma	Centerfield	**2,650**†	2,190	1,510	-680
Oklahoma	Deliver	2,390	**2,580**	**1,870**	-710
AgriPro	Doans	2,330	**2,650**	1,620	-1,030
Oklahoma	Duster	**2,670**	**2,640**	**1,810**	-830
Oklahoma	Endurance	2,210	**2,580**	**1,740**	-840
AgriPro	Fannin	**2,520**	**2,760**	**1,660**	-1,100
Kansas	Fuller	2,360	2,310	1,520	-790
AgriPro	Jagalene	2,150	2,230	1,340	-890
Kansas	Jagger	2,000	2,040	1,440	-600
Oklahoma	OK Bullet	**2,490**	2,380	**1,680**	-700
Kansas	Overley	2,370	2,210	**1,690**	-520
WestBred	Santa Fe	2,090	**2,530**	1,510	-1,020
WestBred	Shocker	2,410	2,290	**1,700**	-590
Average		2,360	2,410	1,620	-790
LSD		180	240	230	

† Bolded numbers are not statistically different from the highest-yielding variety within a column.

Table 5. Occurrence of first hollow stem (day of year) for winter wheat varieties sown in 2009 at Stillwater and El Reno.

Variety	*Stillwater*	*El Reno Conv. till*	*El Reno No-till*	*Variety*	*Stillwater*	*El Reno Conv. till*	*El Reno No-till*
	day of year				*day of year*		
Fannin	52	-	-	OK Rising	63	-	-
Shocker	54	66	64	TAM 304	63	-	-
Billings	56	-	-	Pete	65	-	-
Jackpot	57	68	64	Aspen	66	-	-
Fuller	58	62	62	Deliver	66	68	75
Jagger	58	60	66	Doans	66	66	68
TAM 112	58	-	-	Duster	66	72	68
TAM 203	58	72	68	Keota	66	62	64
Santa Fe	59	62	66	TAM 111	66	-	-
OK Bullet	61	66	66	Winterhawk	66	64	68
Overley	61	64	66	Endurance	67	75	75
STARS 0601W	61	-	-	Centerfield	69	75	75
Armour	63	64	64	Mace	69	-	-
Guymon	63	-	-				
Jagalene	63	68	68	Average	62	67	67

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0409 TE