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Fall forage production and date of first hollow stem in winter wheat varieties during the 2010-2011 crop year

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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 a 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 Small Grains Variety Performance Tests at our El Reno and Stillwater, OK test sites. Weather data for these two sites are provided in Figure 1.

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 seven days and weighed. All plots were sown at 120 lb/A in a conventionally-tilled seedbed and received 50 lb/ac of 18-46-0 in furrow at planting. Fertility, planting date, and harvest date information are provided in Table 1.

Results

The 2010-2011 wheat production season will undoubtedly go down as one of the driest, if not the driest, in Oklahoma history. While many areas of the state never received sufficient rainfall for uniform wheat germination, our two test sites received a timely rainfall in September which allowed for uniform germination and emergence of test plots (Figure 1). This was followed by two very timely one-inch plus rainfall events in October and November that allowed for ample forage

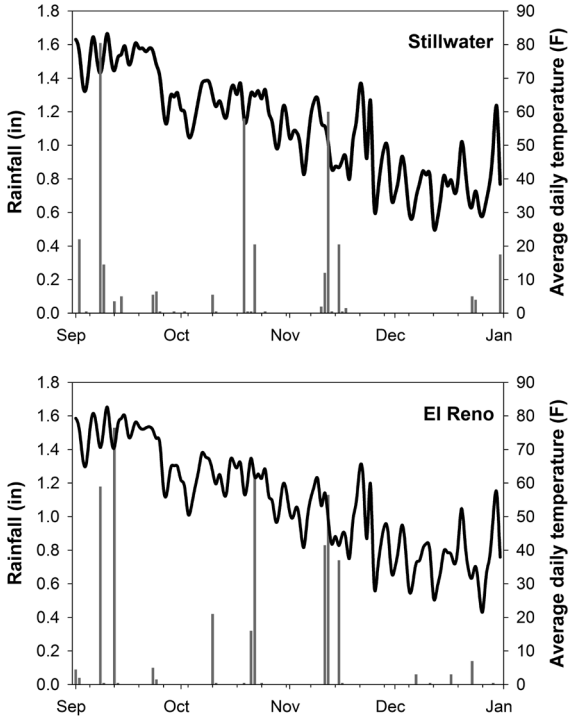

Figure 1. Average daily temperature (line graph) and rainfall (bar chart) from Sept. 1, 2010 to Dec. 31, 2010 at Stillwater and El Reno, OK. Weather data courtesy Oklahoma Mesonet (http://agweather.mesonet.org)

Table 1. Location information for 2010-2011 OSU wheat forage trials.

	Planting date	*Sampling date*	*pH*	*N*	*P*	*K*
Stillwater	9/14/2010	12/1/2010	5.3	112	144	348
El Reno	9/20/2010	12/3/2010	6.7	82	61	337

Table 2. Fall forage production by winter wheat varieties at Stillwater, OK from 2007 to 2010.

Source	*Variety*	*2010*	*2-Year*	*3-Year*	*4-Year*
		----------lbs dry forage/acre----------			
CSU	Bill Brown	3,180†	-	-	-
WestBred	Armour	3,040	2,740	-	-
OSU	Billings	2,970	2,710	-	-
CSU	Hatcher	2,930	-	-	-
OSU	Ruby Lee	2,930	2,730	-	-
TAMU	TAM 112	2,930	2,640	2,850	-
AgriPro	Greer	2,880	2,510	-	-
AgriPro	Fannin	2,870	2,820	3,060	2,810
WestBred	Winterhawk	2,870	2,500	2,650	-
OSU	Pete	2,860	2,590	-	-
WestBred	WB-Stout	2,850	-	-	-
AgriPro	Doans	2,830	2,650	2,840	2,600
OSU	Endurance	2,830	2,640	2,750	2,520
OSU	Duster	2,820	2,820	3,090	2,890
LCS	T158	2,810	-	-	-
OSU	Centerfield	2,790	2,530	2,800	2,710
AgriPro	Jackpot	2,750	2,630	2,880	2,650
KSU	Overley	2,740	2,650	2,900	2,660
OSU	Garrison	2,710	2,280	-	-
OSU	OK Bullet	2,710	2,710	2,920	2,730
WestBred	Santa Fe	2,710	2,650	2,820	2,510
TAMU	TAM 111	2,700	2,490	2,780	2,600
KSU	Fuller	2,690	2,560	2,800	2,570
WestBred	WB-Cedar	2,690	-	-	-
TAMU	TAM 401	2,670	2,620	-	-
OSU	Deliver	2,660	2,510	2,680	2,510
TAMU	TAM 203	2,620	2,730	2,810	2,550
UNL	Mace	2,590	-	-	-
WestBred	Shocker	2,530	2,530	2,900	2,650
KSU	Everest	2,410	2,200	-	-
KSU	Jagger	2,390	2,350	2,660	2,310
Experimentals					
	OK07209	3,120	-	-	-
	OK07231	3,100	2,790	-	-
	OK07S117	2,740	-	-	-
Average		**2,790**	**2,600**	**2,830**	**2,620**
LSD(0.05)		560	330	270	220

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

Table 3. Fall forage production by winter wheat varieties at El Reno, OK in 2007, 2008, and 2010.

Source	Variety	2010	2-Year†	3-Year
		----------lbs. dry forage/acre----------		
AgriPro	Fannin	4,160‡	2,800	2,870
OSU	OK Bullet	4,020	2,850	2,690
WestBred	Armour	3,790	2,720	-
OSU	Billings	3,750	-	-
AgriPro	Greer	3,730	-	-
WestBred	WB-Stout	3,670	-	-
OSU	Duster	3,640	2,670	2,700
OSU	Centerfield	3,590	2,600	2,360
KSU	Overley	3,590	2,720	2,480
TAMU	TAM 401	3,520	-	-
KSU	Everest	3,510	-	-
WestBred	Shocker	3,490	2,490	2,400
TAMU	TAM 203	3,490	2,450	-
OSU	Deliver	3,440	2,500	2,600
AgriPro	Jackpot	3,440	2,480	2,600
WestBred	Santa Fe	3,310	2,370	2,460
WestBred	WB-Cedar	3,300	-	-
OSU	Garrison	3,250	-	-
KSU	Fuller	3,220	2,510	2,380
OSU	Pete	3,180	-	-
AgriPro	Doans	3,110	2,470	2,580
OSU	Endurance	3,030	2,270	2,450
KSU	Jagger	2,900	2,150	2,090
Experimentals				
	OK07S117	3,850	-	-
Average		**3,500**	**2,540**	**2,510**
LSD(0.05)		810	500	380

† Data were not reported in 2009. 2-year averages include 2008 and 2010 data. 3-year averages include 2007, 2008, and 2010 data.
‡ Shaded cells within a column are not statistically different from the greatest value within that column

production. This was not the case in many areas of Oklahoma where early-season drought prevented fall forage production from reaching the 1,000 lb/ac mark.

Forage yields at both sites were outstanding in 2010, and all varieties produced greater than 2,000 lb/ac of forage by early December (Tables 2 and 3). There were a large number of varieties in the top statistical grouping for forage yield (i.e. all varieties within this group produced statistically-equivalent forage yield) at both sites. In fact, only four cultivars (Mace, Shocker, Everest, and Jagger) fell outside of the top statistical grouping for forage yield in 2010 at Stillwater. The top grouping at El Reno included more than 50 percent of the cultivars tested. A similar trend was observed for the two-year forage averages at both sites with most varieties producing statistically-equal forage yields by early December.

There is greater separation among varieties when three- and four-year forage yields are considered and some consistent top performers such as Fannin, Duster, and OK Bullet can be identified. This is not to say that some of the newer varieties cannot produce forage yields equal to or greater than these three varieties, and rankings could change as we have more data on newer varieties. Three- and four-year variety comparisons, however, are extremely valuable in evaluating the stability of forage production over a range of environments.

As mentioned in the introduction, fall forage production is only one parameter to be considered when choosing a dual-purpose wheat variety. Date of first hollow stem, for example, will determine how long fall forage production can be utilized into the spring and should be considered in conjunction with fall forage production. Varieties such as TAM 401 and Fannin are outstanding forage producers but also have very early date of first hollow stem. Varieties such as Doans and Endurance are not consistently as good of forage producers as TAM 401 and Fannin but are above-average forage producers and much later to first hollow stem. Dual-purpose producers should consider these two parameters in conjunction with grain yield after grazing before making a variety choice.

First hollow stem data are reported in 'day of year' (day) format. To provide reference, keep in mind that March 1 is day 60 (except for leap years). Average occurrence of first hollow stem at Stillwater and El Reno in 2011 was day 63 and 64, respectively. This was approximately one week earlier than average occurrence of first hollow stem in 2010, and was probably a result of warmer temperatures combined with drought stress. There was a 29-day range in occurrence of first hollow stem at Stillwater and a 24-day range at El Reno. Environment plays a role in occurrence of first hollow stem,

Table 4. Occurrence of first hollow stem (day of year) for winter wheat varieties sown in 2010 and measured in 2011 at Stillwater and El Reno, OK.

		Stillwater	El Reno
		----day of year ----	
AgriPro	Fannin	48	60
KSU	Jagger	49	65
KSU	Everest	52	62
AgriPro	Greer	52	52
OSU	Billings	55	60
KSU	Fuller	55	57
OSU	Guymon	55	-
AgriPro	Jackpot	55	62
KSU	Overley	55	62
TAMU	TAM 401	55	60
OSU	Garrison	58	69
TAMU	TAM 112	58	-
CSU	Bill Brown	60	-
WestBred	Santa Fe	60	65
TAMU	TAM 203	60	62
WestBred	WB-Stout	60	67
OSU	OK Bullet	62	67
OSU	Ruby Lee	62	-
WestBred	Shocker	62	60
LCS	T158	62	-
OSU	OK Rising	65	-
OSU	Duster	67	69
WestBred	Armour	68	65
CSU	Hatcher	68	-
OSU	Pete	68	65
WestBred	WB-Cedar	68	65
WestBred	Winterhawk	68	-
WestBred	Aspen	70	-
OSU	Centerfield	70	72
OSU	Deliver	70	69
AgriPro	Doans	70	65
TAMU	TAM 111	72	-
OSU	Endurance	73	76
OSU	2174	77	-
UNL	Mace	77	-
Experimentals			
	OK07S117	52	54
	OK07214	58	-
	OK05312	60	-
	OK06336	68	-
	OK07209	68	-
	OK07231	68	-
	OK08328	68	-
	OK05511-RHf2	70	-
Average		**63**	**64**

so day of first hollow stem for individual varieties varied slightly between locations, but relative rankings of varieties (i.e. early, medium, or late) were relatively consistent.

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Seed Source Abbreviations
CSU = Colorado State University
KSU = Kansas State University
LCS = Limagrain Cereal Seeds
OSU = Oklahoma State University
UNL = University of Nebraska-Lincoln
TAMU = Texas AgriLife Research

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