



# Current Report

Oklahoma Cooperative Extension Fact Sheets are also available on our website at: [facts.okstate.edu](http://facts.okstate.edu)

## Fall forage production and first hollow stem date in small grain varieties during the 2018-2019 crop year

Robert Calhoun  
Senior Agriculturalist

Jeff Edwards  
Department Head, Plant and Soil Sciences

Branden Watson  
Graduate Research Assistant

Christopher Gillespie  
Graduate Research Assistant

### Introduction

Fall forage production potential is one of the major considerations in deciding which 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 an advantage in early 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 though, fall forage production is a selection criterion that should be considered. For more information on variety characteristics, please refer to OSU Fact Sheet PSS-2142 *Wheat Variety Comparison Chart*.

Fall forage production potential is determined by genetics, 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 small grain varieties grown in Oklahoma. Management factors such as planting date, seeding rate and soil fertility are very influential and are sometimes more important than variety selection in determining forage production. Environmental factors such as rainfall amount and distribution 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 variety is best suited for a particular field.

### Site Descriptions and Methods

The objective of fall forage variety trials is to give producers an indication of the fall forage production ability of small grain varieties commonly grown throughout the state of Oklahoma. The forage trials were conducted under the umbrella of the Oklahoma State University Small Grains Variety Performance Tests. During the 2018-2019 crop year, the forage trials were conducted at the Chickasha and Stillwater test sites. Additionally, first hollow stem measurements were collected at both sites. Weather data for each location are provided in Figures 1 and 2.

A randomized complete block design with four replications was used at each site. Plots at each location were established in a conventionally-tilled seedbed and received 50 pounds per acre of 18-46-0 in furrow at planting. The seeding rate for each small grain at both locations was 120 pounds per acre for wheat, triticale and rye; 96 pounds per acre for barley; and 65 pounds per acre for oat. Forage was measured by hand clipping two, 1-meter by 1-row samples approximately 1/2 inch above the soil surface from the interior rows within each plot. There was only one forage sampling date at each location. All samples were placed in a forced-air dryer after collection for approximately seven days and weighed. Fertility, planting date and clipping date information is provided in Table 1.

First hollow stem sampling began mid-February at the Stillwater and Chickasha locations and continued every three to four days on a by-variety basis until varieties reached first hollow stem. Plant samples were collected for each variety by

Table 1. Location, planting, clipping and soil information

	Planting date	Clipping dates	pH	N	STP	STK
Chickasha	9/19/18	12/5/18	7.7	113	53	307
Stillwater	9/14/18	12/17/18	5.9	119	36	239

STP: soil test P index; STK: soil test K index.

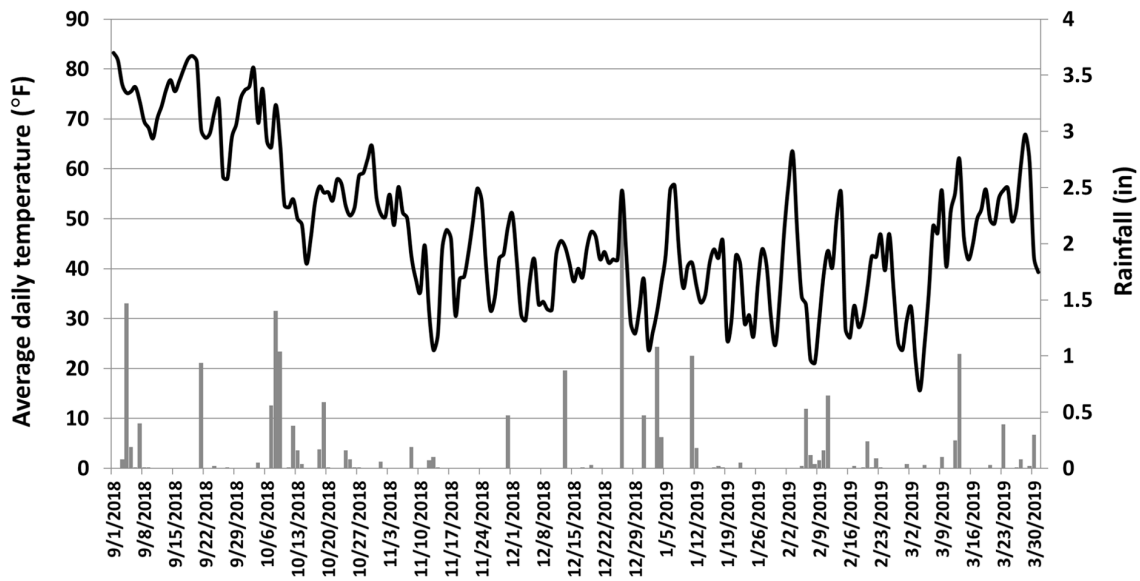


Figure 1. Average daily temperature (line graph) and rainfall (bar chart) from Sept. 1, 2018 to March 31, 2019 at Stillwater. Weather data courtesy Oklahoma Mesonet.

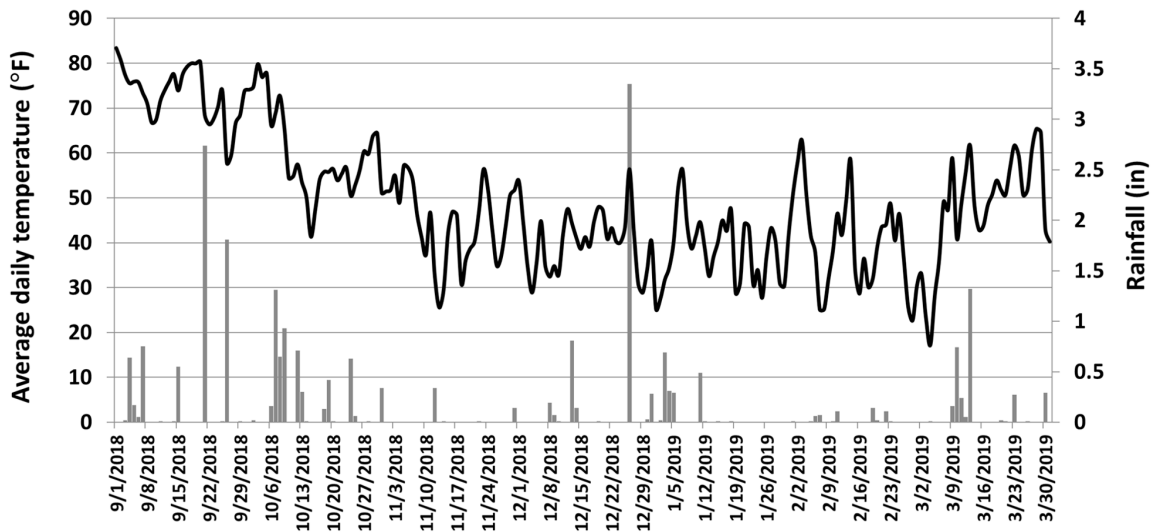


Figure 2. Average daily temperature (line graph) and rainfall (bar chart) from Sept. 1, 2018 to March 31, 2019 at Chickasha. Weather data courtesy Oklahoma Mesonet.

digging an approximately 8-inch section of row and selecting ten plants randomly from this sample. The largest tiller on each plant was split longitudinally, and the hollow stem below the developing grain head was measured. Varieties were considered to be at first hollow stem when the average measurement of the ten plant samples was 1.5 centimeter or greater. For more information on first hollow stem, refer to OSU Fact Sheet PSS-2147 *First Hollow Stem: A Critical Wheat Growth Stage for Dual-Purpose Producers*.

## Results

As indicated in Figures 1 and 2, the 2018-2019 fall forage production season included moderate temperatures and plentiful rainfall that were conducive to fall forage production by small grains, and our results reflect these favorable conditions. Average wheat fall forage production at Stillwater was 2,260 pounds per acre and yields ranged from 1,710 to 3,050 pounds per acre. Average wheat forage yield at Chickasha was 3,450 pounds per acre and yields ranged from 2,850 to 4,150 pounds per acre. Average total fall forage production for the triticale, rye, barley and oat varieties at Chickasha was 3,170; 3,140; 3,250 and 2,320 pounds per acre, respectively (Table 4).

First hollow stem data are reported in 'day of year' (day) format for the winter wheat varieties in Table 5 and the triticale, rye, barley and oat varieties in Table 6. To provide reference, keep in mind that March 1 is day 60. February and March of 2019 were characterized by cooler-than-normal temperatures and resulted in slower plant development and onset of first hollow stem than normally expected for our region. The average winter wheat first hollow stem date at Stillwater was day 74 (March 15). This was four days later than in 2018 and eight days later than the previous 20-year average at this location. At Stillwater, there was a 28-day difference between the earliest and latest varieties, compared to a 20-day difference in 2018 and a nine-day difference in 2017. The average winter wheat first hollow stem date for the Chickasha location was 61 (March 2), which was three days earlier than in 2018 and the same date observed in 2017. At this location, there was a 27-day difference between the earliest and latest varieties, compared to a 25-day difference in 2018 and a 12-day difference in 2017.

## Acknowledgments

The authors want to thank the Oklahoma Wheat Commission and the Oklahoma Wheat Research Foundation for providing partial funding for this research.

## Seed Sources and Abbreviations

AGSECO = AGSECO Inc.

AgriMAXX = AgriMAXX Wheat

AgriPro = AgriPro/Syngenta Seeds

CROPLAN = CROPLAN by WinField United

Dyna-Gro = Dyna-Gro Seed

KWA = Kansas Wheat Alliance

LCS = Limagrain Cereal Seeds

OGI = Oklahoma Genetics Inc.

OSU = Oklahoma State University

PlainsGold = PlainsGold Seeds

TriCal = TriCal Superior Forage

Watley = Watley Seeds

WestBred = WestBred Wheat

**Table 2. Fall forage yields for winter wheat varieties at Stillwater during the 2018-2019 production year.**

Licensee	Variety	2018-19 -----lbs dry forage/acre-----	2-Year	3-Year
OGI	Duster	3,050	2,230	2,390
OGI	Gallagher	2,720	1,910	2,180
WestBred	WB4303	2,670	1,970	2,300
OGI	Ruby Lee	2,610	1,900	1,930
OGI	Doublestop CL Plus	2,570	1,930	2,340
AgriPro	SY Achieve CL2	2,570	2,090	-
KWA	KS Venada	2,560	-	-
OGI	Iba	2,540	1,910	2,180
AgriPro	Bob Dole	2,520	2,180	2,540
OGI	Lonerider	2,510	2,000	-
CROPLAN	CP7826	2,490	1,900	-
AGSECO	TAM 114	2,490	1,880	2,050
AgriPro	SY Rugged	2,430	1,990	-
WestBred	WB4515	2,420	2,020	2,260
OGI	NF 101	2,380	2,000	2,260
KWA	Zenda	2,370	2,110	2,340
OGI	Bentley	2,360	1,860	2,000
PlainsGold	Crescent AX	2,360	-	-
OGI	Spirit Rider	2,360	1,990	2,180
PlainsGold	Langin	2,350	1,880	2,340
LCS	LCH15ACC7-7	2,320	-	-
WestBred	WB4269	2,320	1,840	2,230
KWA	Joe	2,300	1,770	2,250
AgriPro	SY Flint	2,300	1,920	2,110
AGSECO	AG Icon	2,290	1,920	2,030
WestBred	WB4418	2,290	-	-
KWA	KS080093K-18	2,260	-	-
AgriPro	SY Grit	2,250	1,790	2,100
WestBred	WB4699	2,250	-	-
CROPLAN	CP7909	2,240	-	-
AgriPro	SY Monument	2,230	2,010	2,480
WestBred	WB-Grainfield	2,230	1,810	2,080
WestBred	WB4792	2,220	-	-
Watley	TAM 204	2,210	1,820	2,010
OGI	Stardust	2,200	1,740	1,870
WestBred	WB4595	2,200	-	-
PlainsGold	Canvas	2,190	-	-
CROPLAN	CP7869	2,190	-	-
LCS	LCS Pistol	2,190	1,820	2,290
LCS	LCS Chrome	2,180	1,980	2,370
OGI	Smith's Gold	2,120	1,850	2,220
AgriPro	SY Razor	2,120	-	-
AgriMAXX	AM Eastwood	2,090	1,850	-
OGI	Green Hammer	2,080	1,910	2,210
AgriPro	SY Benefit	1,990	1,690	-
Dyna-Gro	Long Branch	1,930	1,670	2,180
Watley	TAM 112	1,930	-	-
KWA	Larry	1,910	1,750	1,970
OGI	Showdown	1,860	1,730	2,250
OGI	Baker's Ann	1,770	1,850	-
AGSECO	AG Gallant	1,710	1,510	-
<b>OSU Experimentals</b>				
	OK14P212	2,290	1,970	-
	OCW04S717T-6W	2,160	1,820	-
	OK14P736W	1,950	-	-
	OK16729W	1,940	-	-
	OK149132C	1,820	-	-
	OK16D101089	1,780	-	-
<b>Average</b>		<b>2,260</b>	<b>1,890</b>	<b>2,200</b>
<b>LSD (0.05)</b>		<b>340</b>	<b>NS</b>	<b>NS</b>

Notes: Shaded values are not statistically different from the highest-yielding variety within a column. NS = not significant.

**Table 3. Fall forage yields for winter wheat varieties at Chickasha during the 2018-2019 production year.**

Licensee	Variety	2018-2019	2-Year	3-Year
		-----lbs dry forage/acre-----		
OGI	Gallagher	4,150	3,130	3,490
OGI	Ruby Lee	3,980	3,060	3,330
CROPLAN	CP7826	3,970	-	-
OGI	Bentley	3,840	2,960	3,240
OGI	Duster	3,830	2,930	3,540
Dyna-Gro	Long Branch	3,710	2,830	3,150
OGI	NF 101	3,660	2,880	3,240
AgriMAXX	AM Eastwood	3,580	-	-
Watley	TAM 204	3,580	2,710	3,280
OGI	Showdown	3,570	2,680	3,140
AgriPro	SY Flint	3,530	2,870	3,290
OGI	Doublestop CL Plus	3,520	2,510	3,040
WestBred	WB4269	3,440	2,890	3,230
OGI	Smith's Gold	3,420	2,680	3,080
OGI	Green Hammer	3,360	-	-
LCS	LCS Chrome	3,360	2,530	3,120
WestBred	WB4303	3,320	2,610	3,250
AGSECO	AG Icon	3,240	-	-
OGI	Iba	3,150	2,440	2,930
AgriPro	SY Grit	3,130	2,570	3,140
AgriPro	SY Rugged	3,110	2,410	-
AgriPro	SY Razor	3,080	-	-
WestBred	WB4515	2,850	2,300	2,770
<b>OSU Experimentals</b>				
	OCW04S717T-6W	3,200	-	-
	OK149132C	3,150	-	-
	OK16D101089	2,860	-	-
<b>Average</b>		<b>3,450</b>	<b>2,720</b>	<b>3,190</b>
<b>LSD (0.05)</b>		<b>300</b>	<b>360</b>	<b>NS</b>

Notes: Shaded values are not statistically different from the highest-yielding variety within a column. NS = not significant.

**Table 4. Fall forage yields by triticale, rye, barley and oat varieties at Stillwater and Chickasha during the 2018-2019 production year.**

Crop	Source	Variety	Stillwater	Chickasha	
			2018-2019	2018-2019	2-Year
			-----lbs dry forage/acre-----		
Triticale	AGSECO	AG 135	2,050	3,230	-
	OGI	NF 201	1,940	3,370	2,890
	TriCal	TriCal 131	1,760	3,220	2,590
	TriCal	TriCal 718	1,460	3,020	-
	TriCal	TriCal 813	1,600	3,050	2,450
	TriCal	TriCal Merlin Max	1,710	3,420	-
	TriCal	TriCal Surge	2,070	3,290	-
	TriCal	TriCal Exp 30412	1,790	2,720	-
	TriCal	TriCal Exp 08TF01	1,290	3,180	-
		Average	1,740	3,170	2,640
	LSD (0.05)	300	360	NS	
Rye	OSU	Elbon	1,460	3,050	2,720
	OSU	Maton	1,510	3,060	2,800
	OSU	Oklon	1,720	3,310	2,910
		Average	1,560	3,140	2,810
		LSD (0.05)	NS	NS	NS
Barley	OSU	Eve	1,450	3,050	-
	OSU	Post 90	1,600	3,440	2,760
		Average	1,530	3,250	2,760
		LSD (0.05)	NS	370	
Oat	OGI	NF 402	1,680	2,440	1,790
	OSU	OKAY	2,290	2,190	1,540
<b>Average</b>			<b>1,990</b>	<b>2,320</b>	<b>1,670</b>
<b>LSD (0.05)</b>			<b>640†</b>	<b>NS</b>	<b>NS</b>

Notes: Shaded values are not statistically different from the highest-yielding variety within a column for each crop. NS = not significant.

† P-value = 0.0542

**Table 5. Occurrence of first hollow stem (day of year - March 1 = day 60) for winter wheat varieties sown in 2018 and measured in 2019 at Stillwater and Chickasha.**

<i>Licensee</i>	<i>Variety</i>	<i>Stillwater</i>	<i>Chickasha</i>
		-----day of year-----	
AgriMAXX	AM Eastwood	59	46
AgriPro	SY Achieve CL2	59	-
AgriPro	SY Benefit	60	-
PlainsGold	Crescent AX	66	-
LCS	LCH15ACC7-7	66	-
OGI	Skydance	66	-
OGI	NF 101	67	48
AgriPro	SY Razor	67	46
Watley	TAM 112	67	-
OGI	Baker's Ann	68	-
PlainsGold	Langin	68	-
AGSECO	TAM 114	68	-
KWA	Zenda	68	-
AgriPro	Bob Dole	70	-
WestBred	WB4303	70	52
OGI	Stardust	71	-
Watley	TAM 204	72	54
WestBred	WB4418	72	-
OGI	Gallagher	73	46
AGSECO	AG Gallant	74	-
OGI	Green Hammer	74	56
WestBred	WB4792	74	-
OGI	Bentley	75	70
OGI	Showdown	75	75
OGI	Smith's Gold	75	65
AgriPro	SY Rugged	75	54
WestBred	WB4699	75	-
OGI	Ruby Lee	76	50
WestBred	WB4269	76	66
WestBred	WB4595	76	-
KWA	Larry	78	-
Dyna-Gro	Long Branch	78	66
PlainsGold	Canvas	79	-
CROPLAN	CP7909	79	-
OGI	Iba	79	53
LCS	LCS Pistol	79	-
AgriPro	SY Flint	79	66
AGSECO	AG Icon	80	69
CROPLAN	CP7869	80	-
OGI	Doublestop CL Plus	80	71
OGI	Duster	80	52
KWA	KS Venada	80	-
KWA	KS080093K-18	80	-
OGI	Lonerider	80	-
OGI	Spirit Rider	80	-
AgriPro	SY Grit	80	69
AgriPro	SY Monument	80	-
WestBred	WB4515	80	55
WestBred	WB-Grainfield	80	-
CROPLAN	CP7826	82	73
KWA	Joe	82	-
LCS	LCS Chrome	87	68
<b>OSU Experimentals</b>			
	OCW04S717T-6W	68	72
	OK15MASBx7 8-1	68	-
	OK16729W	68	-
	OK16D101089	68	72
	OK168512	75	-
	OK149132C	79	69
	OK14P212	79	-
	OK14P736W	80	-
<b>Average</b>		<b>74</b>	<b>61</b>

**Table 6. Occurrence of first hollow stem (day of year - March 1 = day 60) for triticale, rye, barley and oat varieties sown in 2018 and measured in 2019 at Chickasha.**

<i>Crop</i>	<i>Licensee</i>	<i>Variety</i>	<i>Chickasha ---day of year---</i>
<b>Triticale</b>	TriCal	TriCal Surge	35
	TriCal	TriCal Exp 30412	35
	OGI	NF 201	38
	TriCal	TriCal Merlin Max	38
	AGSECO	AG 135	42
	TriCal	TriCal 131	43
	TriCal	TriCal Exp 08TF01	52
	TriCal	TriCal 813	57
	TriCal	TriCal 718	66
		<b>Average</b>	<b>45</b>
<b>Rye</b>	OSU	Maton	49
	OSU	Oklon	51
	OSU	Elbon	65
		<b>Average</b>	<b>55</b>
<b>Barley</b>	OSU	Eve	45
	OSU	Post 90	66
		<b>Average</b>	<b>56</b>
<b>Oat<sup>†</sup></b>	OSU	OKAY	69
	OGI	NF 402	72
		<b>Average</b>	<b>71</b>

<sup>†</sup> Deer feeding resulted in a delay in the onset of FHS.

# The Oklahoma Cooperative Extension Service

## WE ARE OKLAHOMA

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
  - It is administered by the land-grant university as designated by the state legislature through an Extension director.
  - Extension programs are nonpolitical, objective, and research-based information.
  - It provides practical, problem-oriented education
- for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
  - It utilizes research from university, government, and other sources to help people make their own decisions.
  - More than a million volunteers help multiply the impact of the Extension professional staff.
  - It dispenses no funds to the public.
  - It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
  - Local programs are developed and carried out in full recognition of national problems and goals.
  - The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
  - Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Oklahoma State University, as an equal opportunity employer, complies with all applicable federal and state laws regarding non-discrimination and affirmative action. Oklahoma State University is committed to a policy of equal opportunity for all individuals and does not discriminate based on race, religion, age, sex, color, national origin, marital status, sexual orientation, gender identity/ expression, disability, or veteran status with regard to employment, educational programs and activities, and/or admissions. For more information, visit <https://eeo.okstate.edu>.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President for Agricultural Programs and has been prepared and distributed at a cost of 20 cents per copy. Revised 0719 GH