



Current Report

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Fall forage production and first hollow stem date in small grain varieties during the 2017-2018 crop year

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Introduction

Fall forage production potential is one of the major considerations in deciding which variety to plant. Dual-purpose wheat producers may find varietal characteristics, such as grain yield after grazing and disease resistance to be 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.

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 frequently more important than variety 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 the fall forage variety trials is to give producers an indication of the fall forage production ability of small grain varieties commonly grown throughout Oklahoma. The forage trials were conducted under the umbrella of the Oklahoma State University Small Grains Variety Performance Tests. During the 2017-2018 crop year, the forage trial was conducted at Chickasha, Haskell and Stillwater test sites. Additionally, first hollow stem measurements were collected at Chickasha and Stillwater. Weather data for those locations are provided in Figures 1 through 3.

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 all three 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 ½ inch above the soil surface from the interior rows within each plot. Two separate forage clippings were collected at each location. After the first clipping at Chickasha and Stillwater, plots were mowed to 2.5 inches to simulate grazing. For these two locations, the results for each clipping is presented, and the combined total of the two clippings represents the fall forage yield potential. At the Haskell location, plots were not mowed after the first clipping. For this location, the results for each clipping are presented and represent a forage stockpiling scenario. All samples were placed in a forced-air dryer for approximately seven days and weighed. Fertility, planting date and clipping date information is provided in Table 1.

First hollow stem sampling began at the end of 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 digging an approximately 8-inch section of row and selecting 10 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 at first hollow stem when the average of the 10 plant samples was 1.5 cm or greater.

Results

The 2017-2018 wheat fall forage production season cannot be described other than disappointing for most producers. Adequate soil moisture was present at the end of August through the first few days of September. Those who planted during this window and were able to protect the crop from fall armyworm achieved good stands and had some available pasture later in the fall. However, for those who waited until mid-September or later to plant, the soil moisture quickly dried up and most wheat was sown into dry conditions. Some producers did receive precipitation in late-September, but other

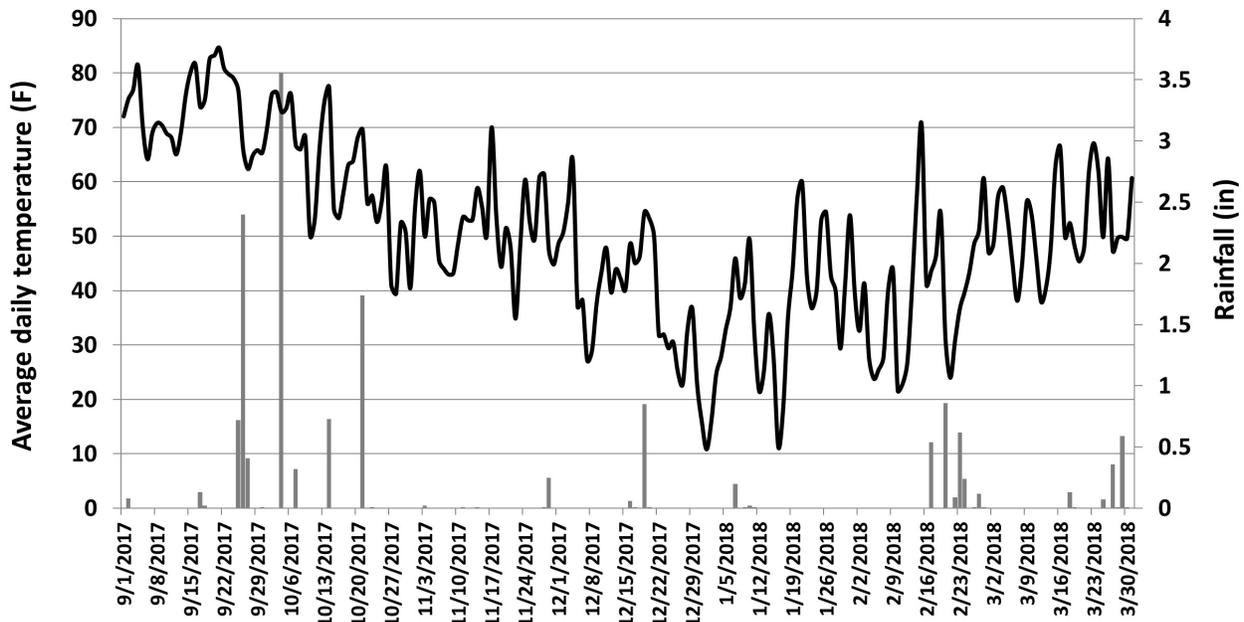


Figure 1. Average daily temperature (line graph) and rainfall (bar chart) from Sept. 1, 2017 to March 31, 2018 at Stillwater. Weather data courtesy Oklahoma Mesonet.

Table 1. Location, planting, clipping and soil information

	Planting date	Sampling dates		pH	N	STP	STK
Chickasha	9/25/17	11/16/17	12/18/17	6.5	96	37	277
Haskell	9/11/17	11/3/17	12/14/17	-	-	-	-
Stillwater	9/15/17	11/14/17	12/13/17	5.1	166	128	313

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

than that, the rain did not return for the rest of the fall. The result was a limited number of days of grazing or no available pasture at all. Dry conditions also remained throughout December, January and into February. A widespread rainfall event finally occurred in late February. Temperatures toward the end of winter remained cool, and the wheat broke winter dormancy almost two weeks later than normal. Although the cooler temperatures persisted throughout the time for cattle removal, the dry conditions did not provide a good opportunity for grazed wheat to recover.

The forage trial at Stillwater was ‘dusted-in’ on Sept. 15. The trial received 3.5 inches of rain from Sept. 25 to Sept. 27 and another 3.5 inches of rain on Oct. 4. Unfortunately, the portion of the field where the triticale, barley, rye and oat plots were located had significant ponding issues, and that portion of the trial had to be abandoned. Fortunately, the winter wheat varieties were at least spared from this issue. Limited growth occurred during the fall and little forage accumulated after the simulated grazing in November. Average total winter wheat fall forage production at Stillwater was 1,480 pounds per acre (Table 2), which was 1,310 pounds per acre less than the 2016 average and 1,200 pounds per acre below the 10-year

average at this location. The range in forage production was 1,840 to 1,080 pounds per acre.

The forage trial at Chickasha was sown into moist soil, and good stands were established. However, overall growth was less throughout the fall and, similar to Stillwater, limited regrowth occurred after the simulated grazing in November. The average total fall forage production at Chickasha was slightly better than Stillwater at 2,060 pounds per acre (Table 3), which was 1,860 pounds per acre below 2016 and 720 pounds per acre below the four-year average at this location. The range in total forage yield was 2,560 to 1,490 pounds per acre. Average total fall forage production for the triticale, rye, barley and oat varieties was 1,940; 2,180; 1,950; and 1,020 pounds per acre, respectively (Table 4).

The Haskell location also received limited rain in the fall. The rains were timely, however, and the forage production was much greater. Average winter wheat forage collected in December was 4,190 pounds per acre (Table 5). The average forage production for the triticale, rye, barley and oat varieties was 3,770; 3,960; 4,110; and 4,900 pounds per acre, respectively (Table 5).

First hollow stem data are reported in 'day of year' (day) format for the winter wheat varieties in Table 6 and the triticale, rye, barley and oat varieties in Table 7. To provide reference, keep in mind that March 1 is day 60. The beginning of 2018 was the opposite of that experienced in 2017. Cooler-than-normal temperatures resulted in a much later break from winter dormancy, and overall crop development was slow during this time. The average winter wheat first hollow stem date at Stillwater was day 70 (March 10). This was 19 days later than in 2017 and 10 days later than the 20-year average at this location. At Stillwater, there was a 20-day difference between the earliest and latest varieties, compared to only a nine-day difference in 2017 and a 15-day difference in 2016. The average winter wheat first hollow stem date for the Chickasha location was 64 (March 4). There was a 25-day difference between the earliest and latest varieties, compared to a 12-day difference at this location last year.

Seed Sources and Abbreviations

- AGSECO = AGSECO Inc.
- AgriMAXX = AgriMAXX Wheat
- CROPLAN = CROPLAN by WinField United
- Dyna-Gro = Dyna-Gro Seed
- KWA = Kansas Wheat Alliance
- LCS = Limagrain Cereal Seeds
- Northern Seed = Northern Seed, LLC / TRICAL
- OGI = Oklahoma Genetics Inc.
- OSU = Oklahoma State University
- PlainsGold = PlainsGold Seeds
- AgriPro = AgriPro/Syngenta Seeds
- USDA = United States Department of Agriculture ARS
- Watley = Watley Seeds
- WestBred = Monsanto Co./WestBred Wheat

Acknowledgments

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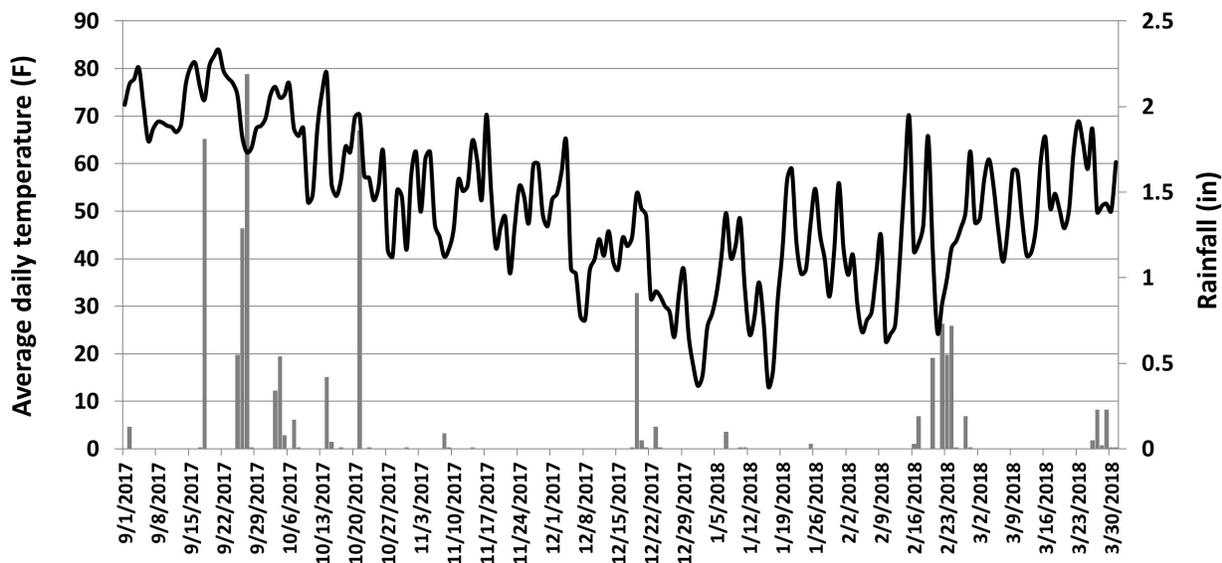


Figure 2. Average daily temperature (line graph) and rainfall (bar chart) from Sept. 1, 2017 to March 31, 2018 at Chickasha. Weather data courtesy Oklahoma Mesonet.

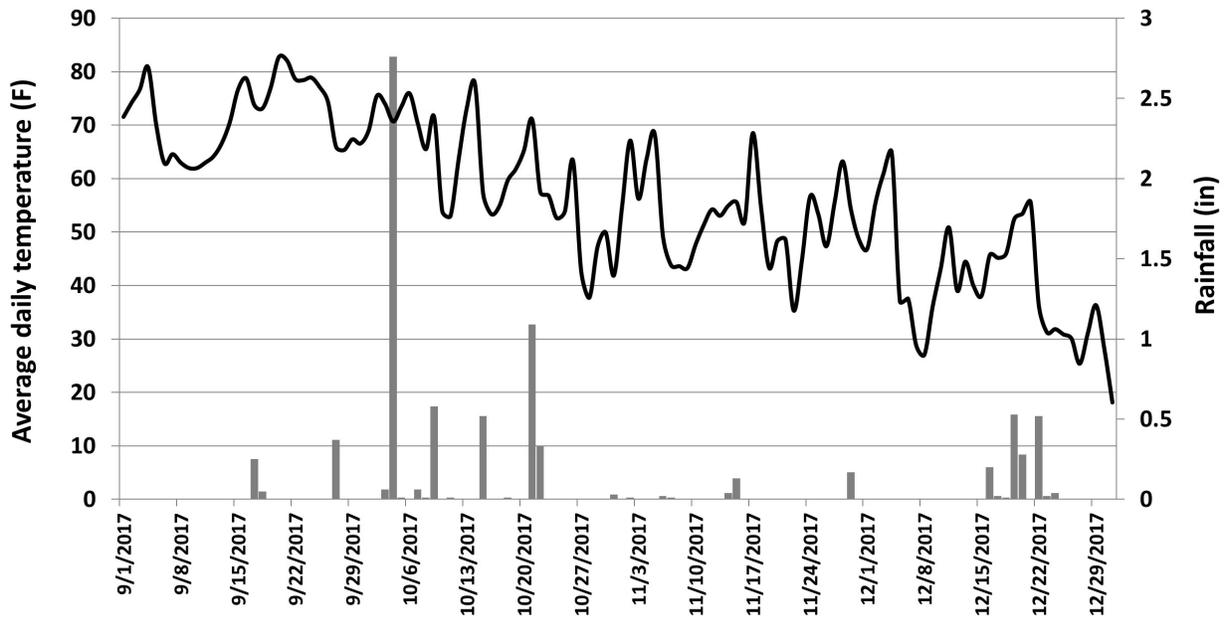


Figure 3. Average daily temperature (line graph) and rainfall (bar chart) from Sept. 1, 2017 to Dec. 31, 2017 at Haskell. Weather data courtesy Oklahoma Mesonet.

Table 2. Fall forage yields for the winter wheat varieties at Stillwater during the 2017-2018 production year.

Licensee	Variety	2017-2018		Fall total	2-Year	3-Year
		11/14/17	12/13/17			
-----lbs dry forage/acre-----						
KWA	Zenda	1,570	270	1,840	2,330	2,500
AgriPro	Bob Dole	1,600	240	1,840	2,550	-
AgriPro	SY Monument	1,500	280	1,780	2,610	2,640
LCS	LCS Chrome	1,610	160	1,770	2,470	2,520
OGI	Smith's Gold	1,420	220	1,640	2,280	-
OGI	Spirit Rider	1,480	160	1,640	2,080	-
WestBred	WB4515	1,450	180	1,630	2,180	2,380
OGI	NF 101	1,210	420	1,630	2,190	2,630
AgriPro	SY Achieve CL2	1,420	200	1,620	-	-
AgriMAXX	AM Eastwood	1,570	40	1,610	-	-
LCS	LCS Mint	1,460	130	1,590	2,200	2,360
KWA	Larry	1,400	180	1,580	2,000	2,260
AGSECO	AG Icon	1,310	250	1,560	1,900	-
AgriPro	SY Flint	1,360	190	1,550	2,010	2,490
AgriPro	SY Rugged	1,320	230	1,550	-	-
OGI	Lonerider	1,450	30	1,480	-	-
KWA	Oakley CL	1,280	180	1,460	-	-
LCS	LCS Pistol	1,430	30	1,460	2,330	2,740
WestBred	WB4458	1,280	150	1,430	2,070	2,240
Watley	TAM 204	1,320	110	1,430	1,910	2,280
PlainsGold	Langin	1,190	220	1,420	2,340	-
OGI	Duster	1,310	110	1,420	2,060	2,370
Dyna-Gro	Long Branch	1,370	50	1,420	2,310	2,630
WestBred	WB-Grainfield	1,290	100	1,390	2,000	2,270
AgriPro	SY Benefit	1,280	110	1,390	-	-
OGI	Bentley	1,240	120	1,360	1,830	2,240
WestBred	WB4269	1,280	80	1,360	2,180	-
WestBred	WB4721	1,280	60	1,340	2,060	2,270
CROPLAN	CP78-26	1,280	30	1,310	-	-
AGSECO	AG Gallant	1,280	30	1,310	-	-
AgriPro	SY Grit	1,170	140	1,310	2,020	2,310
LCS	T158	1,180	120	1,300	2,070	2,450
OGI	Stardust	1,230	60	1,290	1,700	-
OGI	Doublestop CL Plus	1,250	30	1,280	2,220	2,500
WestBred	WB4303	1,110	170	1,280	2,110	2,380
AGSECO	TAM 114	1,130	140	1,270	1,820	2,170
KWA	Joe	1,060	170	1,230	2,230	2,530
OGI	Iba	1,140	70	1,210	1,990	2,280
LCS	LCS Avenger	1,160	30	1,190	-	-
WestBred	Winterhawk	1,030	140	1,170	1,790	2,050
OGI	Gallagher	1,020	90	1,110	1,910	2,520
OGI	Ruby Lee	1,020	60	1,080	1,550	2,330
OSU Experimentals						
	OK13621	1,500	420	1,920	-	-
	OK14319	1,700	140	1,840	2,480	-
	OCW05S616T-2	1,500	330	1,830	-	-
	OK13209	1,560	190	1,750	2,270	-
	OK14P212	1,410	250	1,660	-	-
	OK12716	1,570	30	1,600	2,440	2,570
	OCW04S717T-6W	1,400	70	1,470	-	-
	OCW03S580S-8F	1,190	240	1,430	-	-
	OK12206-2	1,130	140	1,270	2,120	-
Average		1,330	150	1,480	2,130	2,400
LSD (0.05)		330	NS	430	550	NS

Notes: Shaded values are not statistically different from the highest-yielding variety within a column. TAM 112 was removed from the analysis due to less than 25% stand establishment.

Table 3. Fall forage yields for the winter wheat varieties at Chickasha during the 2017-2018 production year.

Licensee	Variety	2017-2018		Fall total	2-Year	3-Year [†]
		11/16/17	12/18/17			
-----lbs dry forage/acre-----						
WestBred	WB4458	2,100	460	2,560	3,020	3,080
WestBred	WB4269	2,150	180	2,330	3,130	-
LCS	T158	1,890	380	2,270	3,090	-
AgriPro	SY Flint	1,930	280	2,210	3,180	-
KWA	Joe	2,080	120	2,200	3,230	-
LCS	LCS Pistol	2,130	50	2,180	2,910	3,120
OGI	Ruby Lee	1,990	150	2,140	3,000	2,910
OGI	Gallagher	1,930	180	2,110	3,160	3,410
OGI	NF 101	1,960	140	2,100	3,030	3,280
AGSECO	TAM 114	1,950	150	2,100	3,260	-
OGI	Bentley	1,740	350	2,090	2,950	3,130
OGI	Lonerider	2,000	90	2,090	-	-
WestBred	WB-Grainfield	1,740	340	2,080	3,040	-
OGI	Duster	1,940	90	2,030	3,390	3,510
AgriPro	SY Grit	1,900	120	2,020	3,140	-
Dyna-Gro	Long Branch	1,790	160	1,950	2,870	-
OGI	Smith's Gold	1,810	120	1,930	2,920	-
LCS	LCS Mint	1,570	330	1,900	2,510	-
WestBred	WB4303	1,580	310	1,890	3,210	-
Watley	TAM 204	1,680	160	1,840	3,130	3,190
WestBred	WB4515	1,570	180	1,750	2,730	-
OGI	Iba	1,450	290	1,740	2,820	2,950
LCS	LCS Chrome	1,670	40	1,710	3,000	-
AgriPro	SY Rugged	1,570	140	1,710	-	-
OGI	Doublestop CL Plus	1,460	30	1,490	2,800	3,110
OSU Experimentals						
	OK12206-2	2,300	220	2,520	-	-
	OK14319	2,260	230	2,490	-	-
	OCW03S580S-8F	2,860	390	2,250	-	-
	OK14P212	2,030	100	2,130	-	-
	OCW05S616T-2	1,620	500	2,120	-	-
	OK12716	1,750	30	1,780	2,910	-
Average		1,880	200	2,060	3,020	3,170
LSD (0.05)		500	NS	NS	NS	NS

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

[†] Three-year results are the average of 2017, 2016, and 2014.

Table 4. Fall forage yields by triticale, rye, barley and oat varieties at Chickasha during the 2017-2018 production year.

Crop	Source	Variety	2017-2018		Fall total
			11/16/17	12/18/17	
----- lbs dry forage/acre-----					
Triticale					
	OGI	NF 201	1,670	580	2,250
	Northern Seed	TriCal Exp 08F01	1,510	690	2,200
	Northern Seed	TriCal 131	1,400	550	1,950
	Northern Seed	TriCal 813	1,450	410	1,860
	Northern Seed	TriCal Flex 719	1,180	240	1,420
	Average		1,440	490	1,940
	LSD (0.05)		NS	NS	NS
Rye					
	OSU	Elbon	1,880	620	2,500
	OSU	Maton	1,880	390	2,270
	OSU	Oklon	1,820	410	2,230
	Northern Seed	KWS Bono	1,800	190	1,990
	Northern Seed	KWS Propower	1,760	130	1,890
	Average		1,830	350	2,180
	LSD (0.05)		NS	NS	NS
Barley					
	USDA	Exp 1	1,770	520	2,290
	OSU	Post 90	2,020	70	2,090
	USDA	Exp 2	1,210	270	1,480
	Average		1,670	280	1,950
	LSD (0.05)		410	NS	380
Oat					
	OGI	NF 402	780	350	1,130
	OSU	OKAY	730	170	900
	Average		760	260	1,020
	LSD (0.05)		NS	NS	NS

Notes: Shaded values are not statistically different from the highest-yielding variety within a column for each crop. AG 135 was removed from the triticale analysis due to a planting error. Maton II was dropped from the rye analysis due to less than 25% stand establishment.

Table 5. Fall forage yields for the winter wheat, triticale, rye, barley and oat varieties at Haskell during the 2017-2018 production year.

Crop	Source	Variety	2017-2018	
			11/3/17	12/14/17
			----- lbs dry forage/acre -----	
Wheat				
	AgriPro	SY Grit	2,400	4,570
	OGI	Duster	2,540	4,210
	OGI	Gallagher	2,980	4,210
	Watley	TAM 204	2,250	3,780
	Average		2,540	4,190
	LSD (0.05)		360	NS
Triticale				
	AGSECO	AG 135	2,470	4,210
	Northern Seed	TriCal 131	1,820	4,070
	Northern Seed	TriCal 813	2,900	4,070
	OGI	NF 201	2,690	3,630
	Northern Seed	TriCal Exp 08F01	1,820	3,490
	Northern Seed	TriCal Flex 719	2,030	3,120
	Mean		2,290	3,770
	LSD (0.05)		650	NS
Rye				
	Northern Seed	KWS Propower	2,900	4,720
	OGI	Maton II	1,600	4,280
	Northern Seed	KWS Bono	2,690	4,070
	OSU	Oklon	2,900	4,070
	OSU	Elbon	2,900	3,410
	OSU	Maton	2,980	3,190
	Mean		2,660	3,960
	LSD (0.05)		900	NS
Barley				
	OSU	Post 90	2,980	4,570
	USDA	Exp 2	2,470	3,990
	USDA	Exp 1	1,740	3,780
	Mean		2,400	4,110
	LSD (0.05)		660	NS
Oat				
	OSU	OKAY	2,690	5,080
	OSU	NF 402	2,830	4,720
	Mean		2,760	4,900
	LSD (0.05)		NS	NS

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

Table 6. Occurrence of first hollow stem (day of year) for the winter wheat varieties sown in 2017 and measured in 2018 at Stillwater and Chickasha.

<i>Licensee</i>	<i>Variety</i>	<i>Stillwater</i>	<i>Chickasha</i>
		-----day of year-----	
AgriMAXX	AM Eastwood	58	-
AgriPro	SY Achieve CL2	60	-
WestBred	WB4303	61	51
AgriPro	SY Benefit	62	-
OGI	Lonerider	64	63
OGI	NF 101	64	64
AgriPro	SY Rugged	64	63
Watley	TAM 112	64	-
WestBred	WB4721	64	-
KWA	Zenda	64	-
PlainsGold	Langin	65	-
Watley	TAM 204	66	53
AgriPro	Bob Dole	67	-
OGI	Gallagher	67	51
WestBred	WB4458	67	61
AGSECO	AG Gallant	69	-
AgriPro	SY Grit	69	61
Dyna-Gro	Long Branch	70	66
OGI	Smith's Gold	70	65
OGI	Stardust	70	-
LCS	T158	70	70
WestBred	WB4269	70	59
CROPLAN	CP78-26	71	-
LCS	LCS Avenger	71	-
LCS	LCS Mint	71	70
OGI	Iba	72	65
OGI	Ruby Lee	72	63
AGSECO	TAM 114	72	63
WestBred	WB4515	72	65
WestBred	Winterhawk	73	-
AGSECO	AG Icon	74	-
OGI	Duster	74	67
KWA	Larry	74	-
LCS	LCS Pistol	74	67
AgriPro	SY Flint	74	64
WestBred	WB-Grainfield	74	64
KWA	Joe	75	75
OGI	Bentley	76	69
OGI	Doublestop CL Plus	76	74
LCS	LCS Chrome	76	70
AgriPro	SY Monument	76	-
KWA	Oakley CL	78	-
OGI	Spirit Rider	78	-
OSU Experimentals			
	OK12D22004-016	58	-
	OCW03S580S-8F	64	61
	OK13209	64	-
	OCW05S616T-2	68	63
	OK13621	70	-
	OCW04S717T-6W	71	-
	OK14319	71	63
	OK168513	71	-
	OK12206-2	72	64
	OK12716	73	63
	OK14438	76	-
	OK14P212	76	76
Average		70	64

Table 7. Occurrence of first hollow stem (day of year) for the triticale, rye, barley, and oat varieties sown in 2017 and measured in 2018 at Chickasha.

<i>Crop</i>	<i>Licensee</i>	<i>Variety</i>	<i>Chickasha</i> <i>---day of year---</i>
Triticale			
	AGSECO	AG 135	49
	OGI	NF 201	51
	Northern Seed	TriCal 131	55
	Northern Seed	TriCal 813	59
	Northern Seed	TriCal Flex 719	61
	Northern Seed	TriCal Exp 08F01	61
	Average		56
Rye			
	OSU	Maton	60
	OGI	Maton II	61
	OSU	Elbon	64
	OSU	Oklon	65
	Northern Seed	KWS Propower	81
	Northern Seed	KWS Bono	81
	Average		69
Barley			
	OSU	Post 90	73
	USDA	Exp 1	74
	USDA	Exp 2	75
	Average		74
Oat†			
	OGI	NF 402	79
	OSU	OKAY	82
	Average		81

† Deer feeding resulted in a delay in the onset of FHS.

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