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LATE—PLANTED

Annual Summer Forages

B. D. Brown and L. Long

Cooperative Extension Service
University of Idaho
College of Agriculture

About the Authors

Brad D. Brown is an assistant Extension professor of soil science and Extension crop management specialist, and Lori Long is a scientific aide at the University of Idaho Southwest Idaho Research and Extension Center at Parma.

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Introduction

Warm-season annual forages are occasionally considered for later-than-normal planting in the Treasure Valley of southwestern Idaho. The consideration can result from:

1. Failure to obtain contracts for commodities such as potatoes, sugarbeets and seed crops;
2. Failure to establish earlier planted crops;
3. The need for warm-season forages or grain crops following a cool-season cereal harvested for forage in the spring (double cropping);
4. Land improvements such as land leveling that delay normal farming operations.
5. Late financing;
6. Late-season possession of purchased or rented farm acreage and
7. The need for forage when alfalfa is taken out after the first cutting.

No doubt other circumstances arise which lead to consideration of annual warm-season forages. In some cases, short-season forages will be considered in areas where the growing season is short.

The forages can be summer or winter grazed, green chopped, hayed or ensiled. The type of forage desired will depend on available markets as well as productivity of these forages. Little information is available on the relative performance of warm-season forages under late planting conditions in the Treasure Valley of southwestern Idaho and eastern Oregon. This study was conducted to provide data on the performance of late-planted, warm-season forages.

Methods and Materials

Field corn hybrids ranging in maturity from 76 to 105 days, forage sorghum hybrids, sorghum-sudan hybrids and sudan hybrids were planted at the University of Idaho Southwest Idaho Research and Extension Center at Parma in 1985 and 1986. Forage treatments were arranged in randomized complete blocks with five replicates.

The trials were planted June 14, 1985, and June 17, 1986, after fall-planted winter cereal-legume forage mixes were swathed and chopped from the plot area. Conventional seedbed preparation included disking in 1985 and both disking and plowing in 1986. Nitrogen was broadcast at the rate of 200 pounds per acre and incorporated with a roller harrow before planting. Other nutrients were adequate according to soil test. Corn and sorghum hybrids were planted in single rows on 30-inch beds. All other forages were drilled in 7-inch rows and corrugated to give 30-inch beds. The trials were furrow-irrigated as needed.

Silage yields were measured Sept. 24-25, 1985, and Nov. 4, 1986. Grain yields of corn and grain sorghum hybrids were measured Oct. 28, 1985, and Oct. 29-30, 1986. Fresh weight of the forage and grain was recorded and subsamples were collected for determining moisture content. Forages were not clipped before harvest, so yields reflect production of forages grown for silage or winter grazing.

Results

Weather Observations

The 1985 season was characterized by above normal temperatures in June and July, below normal temperatures in August and well below normal temperatures in September (Fig. 1). September 1985 was the coldest September recorded in this century, with above normal rainfall. Although the early part of the season was favorable for good forage growth, the latter part was far from ideal for maximum dry matter production and early maturity. Total growing days (base 50°F) from planting to silage harvest were 1,665. The first killing frost occurred September 30. Total growing degree days to the first killing frost were 1,729.

The 1986 season was characterized by temperatures above normal in June, below normal in July, above normal in August and well below normal in September (Fig. 1). The first killing frost (28°F) did not occur until October 12. Total growing degree days between planting and the first killing frost were 1,847. The 1986 season was, therefore, much more conducive for warm season forage growth and maturity than 1985.

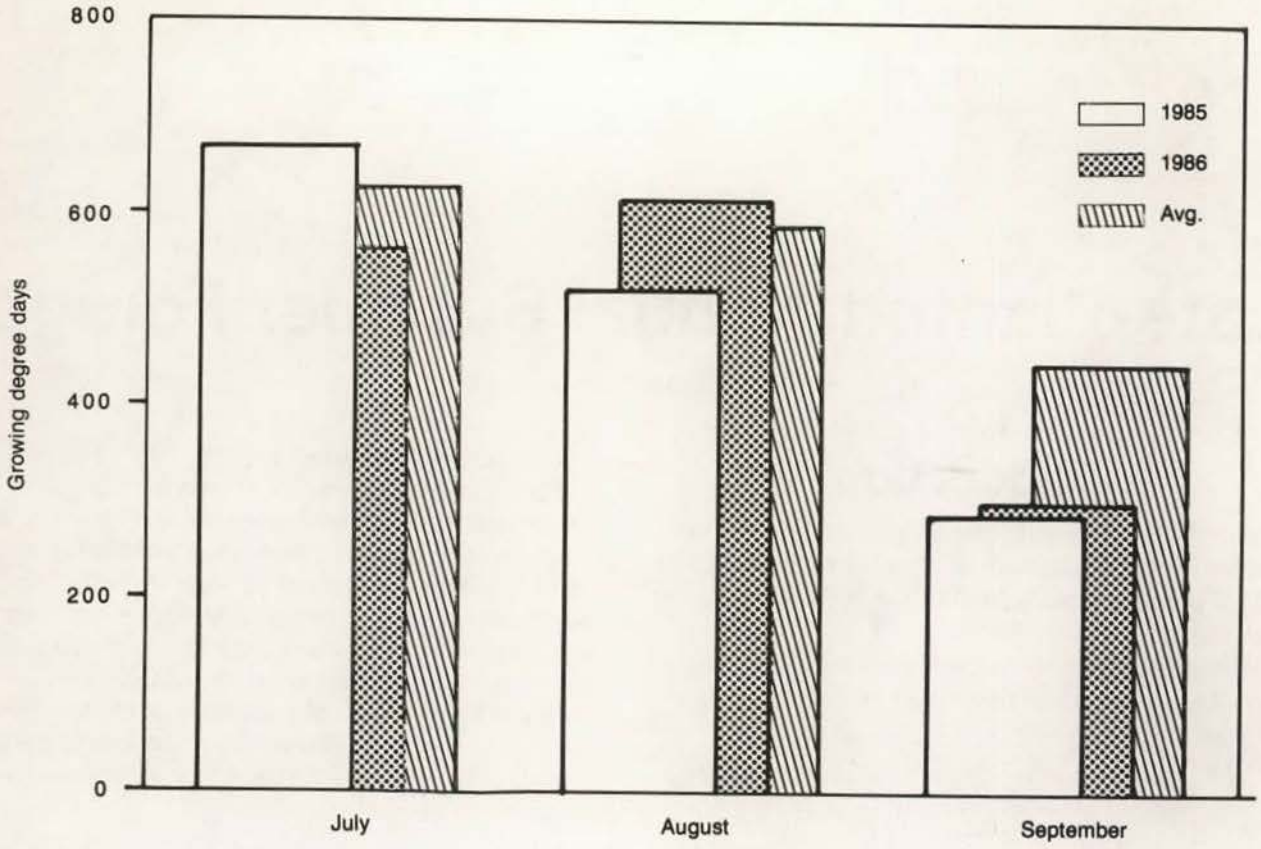

Fig. 1. Monthly growing degree days (Base 50) for July, August and September 1985 and 1986 as compared to long-term average.

Table 1. Silage production and moisture content of warm season forages planted June 14, 1985, and June 17, 1986, at Parma following a first crop of cereal/legume silage.

Company brand	Hybrid	Maturity	Silage yield[1]		Silage moisture	
			1985	1986	1985	1986
		(days)	------ (tons per acre) ------		---------- (%) ----------	
Corn						
Pioneer	3969	76	14.6de[2]	21.9ab	69.7e	50.9ab
Pioneer	3992	78	13.5e	-	70.5de	-
Northrup King	9151	90	14.7cde	18.1bcd	74.2ab	58.7cde
Pioneer	3747	105	15.4bcde	21.0abc	74.6ab	59.9def
Stauffer	S2184	83	-	18.3bcd	-	53.3bc
Stauffer	S2206	83	-	18.0cd	-	58.0cd
Forage sorghum						
Pioneer	931		17.9ab	22.7a	72.2bcd	62.6defg
Northrup King	326		17.0abcd	14.0de	74.5ab	74.1j
Sorghum-sudan						
Pioneer	877F		17.5abc	13.6e	72.4bcd	66.5ghi
Northrup King	Sordan 79		17.7ab	15.9de	76.0a	69.71hij
Sudan						
Northrup King	Trudan 8		18.8a	12.3e	71.6cde	64.9efgh
Cereal/legume mix						
Ferry Morse			9.2f	-	73.6bc	-
Millet						
Northrup King	24		-	12.6e	-	46.7a

[1]Silage yield values are corrected to a 67 percent moisture content.

[2]Means within a column followed by the same letter are not significantly different at the 5 percent level of probability.

Silage Production

Silage yields (67 percent moisture) of all forages ranged from 9.2 to 18.8 tons per acre in 1985 (Table 1). Field corn hybrids in 1985 tended to produce less silage than the forage sorghum, sorghum sudan or sudan grass hybrids. Silage yields did not differ statistically among corn hybrids in 1985, even though the hybrids had a wide range in maturity. Silage moisture content at harvest was lowest for the earliest maturing corn hybrids. These data suggest that the 90- and 105-day hybrids did not fully mature by the first killing frost.

Forage sorghum, sorghum sudan and sudan grass hybrids did not differ statistically in silage yields. A spring forage mix consisting of wheat, barley, oats, peas, vetch and Faba beans was the least productive of the forages in 1985 and was not evaluated in 1986.

Yields for all forages in 1986 ranged from 12.3 to 22.7 tons per acre (Table 1). Some corn hybrids yielded as much or more than forage sorghums and statistically more than the sorghum-sudan, sudan or pearl millet hybrids. The shortest season corn hybrid (76-day maturity) yielded as much forage as the longest season hybrid and was 9 percent lower in moisture at harvest.

Lodging of sudan grass and early weed competition in drilled sorghum-sudan and sudan hybrids may have reduced yield potential of these forages in 1986. Among forage sorghums, Pioneer Brand Hybrid 931 was more productive than Northrup King Brand Hybrid 326. Plant height differences between these two hybrids were substantial with 931 the taller. Sorghum-sudan, sudan and pearl millet hybrids did not differ statistically in silage production. Forage moisture for the pearl millet was 18 percent lower than for the other hybrids.

Corn hybrid silage was somewhat more productive in 1986 than in 1985 but silage production with sorghum-sudan and sudan hybrids appeared to be lower.

Table 2. Forage protein and ash of warm season forages following a first crop of cereal/legume silage silage at Parma, 1985 and 1986.

Company brand	Hybrid	Protein 1985	Protein 1986	Ash 1986
		(%)	(%)	(%)
Corn				
Pioneer	3969	4.4de[1]	5.0bc	6.4d
Pioneer	3747	4.7c	4.7d	6.6cd
Northrup King	9151	-	4.4e	-
Stauffer	2184	-	4.6d	-
Stauffer	2206	-	4.9c	-
Forage sorghum				
Pioneer	931	4.2e	3.2g	7.3bcd
Northrup King	326	4.5cd	5.3a	7.7abc
Sorghum-sudan				
Pioneer	877F	6.2b	2.5h	7.4bcd
Northrup King	Sordan 79	6.8a	4.1f	8.8a
Sudan				
Northrup King	Trudan 8	6.2b	4.0f	8.1ab

[1]Means within a column followed by the same letter are not significantly different at the 5 percent level of probability.

Forage Quality

Forage protein at harvest differed significantly among hybrids of the same species as well as among hybrids of different species (Table 2). In 1985, the sudan and sorghum-sudan hybrids were higher in protein than the forage sorghum or corn hybrids. In 1986, forage protein was markedly different among forage sorghum hybrids and among sorghum-sudan hybrids. Forage protein was lower in 1986 than in 1985 for the sorghum-sudan and sudan hybrids.

Percent ash in forages differed among hybrids within species as well as between species (Table 2). Corn had the lowest ash content. Northrup King Brand Sordan 79 had the highest ash but the amount was not statiscially different from ash content of two other forages.

No forage clearly had the highest quality. Forages that were higher in protein in 1985 tended also to be higher in ash. Average corn yield for 1986 (89.3 bushels per acre) was 65 percent higher than in 1985 (54.0 bushels), while corn silage yield in 1986 (19.4 tons per acre) was only 33 percent higher than in 1985 (14.5 tons). Consequently, corn silage in 1986 probably had higher energy content and higher total digestible nutrients than in 1985.

Grain Production

Grain yield of corn and grain sorghum hybrids ranged from 40.7 to 73.0 bushels per acre in 1985 and from 59.9 to 110.6 bushels per acre in 1986 (Table 3). Production was greater in 1986 due to the later killing frost and a longer growing season.

Table 3. Grain production of warm season forages planted June 14, 1985, and June 17, 1986, at Parma following a first crop of cereal/legume silage.

Company brand	Hybrid	Maturity	Grain yield[1] 1985	Grain yield[1] 1986
		(days)	(bushels per acre)	
Corn				
Pioneer	3969	76	73.0a	110.6a
Pioneer	3992	78	52.9ab	-
Stauffer	S2184	83		86.6b
Stauffer	S2206	83		93.9ab
Northrup King	9151	90	49.5b	74.1b
Pioneer	3747	105	40.7b	81.3b
Grain sorghum				
Ferry Morse			42.3b	59.9c

[1]Grain yield values are corrected to 56 pounds-per-bushel test weight and a moisture content of 15.5 percent.

The grain yield of Pioneer Brand 3969, the earliest maturing corn hybrid, was significantly higher in both years than the grain yield of the two longest-season corn hybrids, Pioneer Brand 3737 and Northrup King Brand 9151. Pioneer Brand 3969 yielded higher than the 83-day corn hybrids in 1986 but not all differences were significant at the 5 percent level. These data suggest the growing season from mid-June to mid-October in both years was not long or warm enough to mature corn hybrids with maturities longer than 75 to 80 days.

Grain sorghum yield was lower than the shortest season corn hybrid in 1985 and lower than all corn hybrids in 1986.

Summary

Warm season forages including field corn, sorghum, sorghum-sudan and sudan hybrids were evaluated in 1985 and 1986 for their potential as late-planted forage crops in southwestern Idaho. Forage yields ranged from 12.3 to 22.7 tons per acre depending on the year and type of forage grown. A spring forage mix was considerably less productive under late-planted conditions.

Short-season corn hybrids were better adapted to mid-June plantings in this production system than longer season hybrids, as might be expected. Though dry matter yields were at times comparable, the grain (energy) content of the forage was higher for the shorter season hybrids which were closer to maturity at the time of the first killing frost.

Grain yield for field corn or sorghum ranged from 40.7 to 110.6 bushels per acre. Maximum grain yield was obtained from a corn hybrid with a 76-day maturity. Considerable forage can be produced from late-planted warm season forages, but heat units during the growing season, date of the first killing frost, lodging and crop management such as weed control are major factors that affected production during the 2-year study.

In some years, the number of growing days from mid-June to the first killing frost will not be adequate to mature even short season corn hybrids.

Minimum tillage practices, by eliminating one to three additional tillage operations, will enable late-planted forages to be planted earlier than if conventional tillage practices were used. Therefore, minimum tillage can also lengthen the growing season for late-planted forages.

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