

OSU
Collection

WOODWARD SAND BLUESTEM: Origin, Description, and Adaptation

By

Jack R. Harlan and William R. Kneebone
Department of Agronomy

Bulletin B-561



and
Agricultural Research Service
U.S.D.A.

August, 1960

**Agricultural Experiment Station
Oklahoma State University, Stillwater
and
Crops Research Division
Agricultural Research Service
United States Department of Agriculture**

Contents

Origin	5
Description	7
Adaptation	8
Availability	9

WOODWARD SAND BLUESTEM

Origin, Description, and Adaptation

*Jack R. Harlan and William R. Kneebone**

Woodward sand bluestem, released in 1955, was developed for the southern Great Plains. It is superior to common sand bluestem in seedling vigor, leafiness, seed production, and adaptability to combine harvest. Woodward also produces more vegetative growth in the seeding year than most common sources. This early vegetative growth, along with a greater than average degree of spread, makes it an excellent variety for conservation purposes.

Origin

The original source material for Woodward sand bluestem was set out by D. A. Savage in a spaced nursery at the United States Southern Great Plains Field Station, Woodward, Oklahoma, in 1937. Plants were from two different seed lots. One lot was harvested from sand dunes near Clovis, New Mexico, and the other just north of Woodward.

In 1940, M. L. Peterson selected 39 plants from the Clovis population and 28 from the Woodward population. These plants were all vigorous, leafy, and disease free. Most of them were less than 5 feet tall. They were established in an isolated crossing block. In 1941 crossed and selfed seed was taken from 7 Clovis and 11 Woodward selections. Seedlings from this seed were set out in a breeding nursery in 1942.

In 1943, J. R. Harlan selected plants with the best seed-set among the approximately one thousand individuals in this nursery, irrespective of their sources. Each plant was analyzed for seed-set in the field by threshing several heads on a rub board. Selected plants were then classified for height and maturity and placed in six isolation blocks as follows: short-early; short-late; medium early; medium late; tall-early; and tall-late.

* Respectively: Geneticist, Crops Research Division, Agricultural Research Service, United States Department of Agriculture, and professor of agronomy, Oklahoma State University; research agronomist, Crops Research Division, Agricultural Research Service, United States Department of Agriculture, and associate professor of agronomy, Oklahoma State University.

Seed was obtained from these six blocks in 1945 and separate populations established in the 1946 nursery. The process was repeated in 1947, selecting this time within populations. All plants were checked for seed-set and again classified for height and maturity. Selected plants were moved to six new blocks. Seed was obtained from these blocks in 1948. In 1948, early and late blocks had plants with overlapping maturities. The small range of average maturities between the two medium height blocks was then ignored and seed from both was bulked to plant a preliminary seed increase block in 1949. Occasional excessively tall plants were later removed from this increase block.

The 1949 planting remains on the Woodward station as the breeder seed increase of Woodward sand bluestem (Figure 1). It still produces excellent seed yields under irrigation. Irrigated foundation seed increases were established with seed from this planting at El Reno, Okla., and Manhattan, Kans. Present commercial plantings of pure Woodward can be traced to one of these three increases.

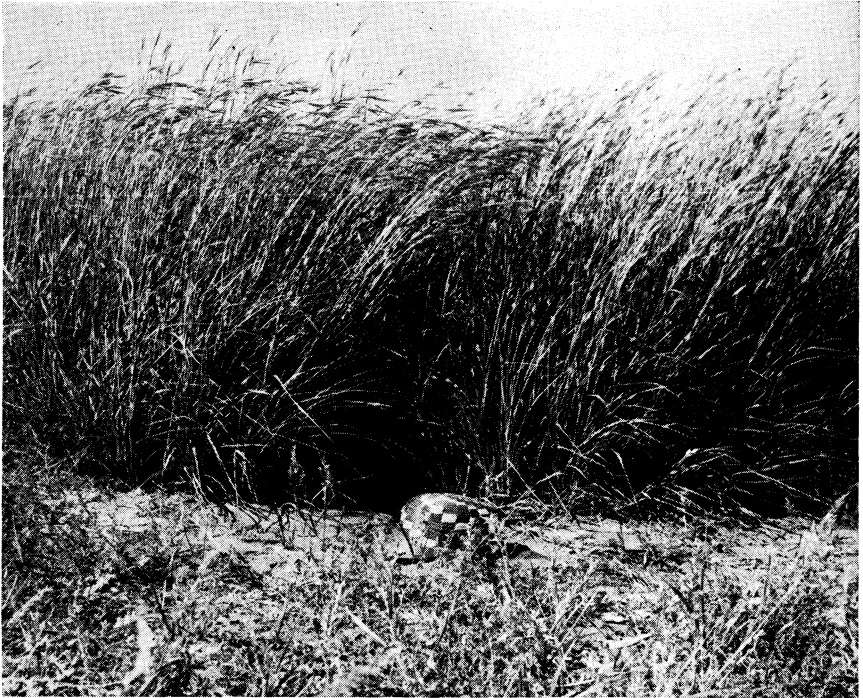


Figure 1. A portion of the irrigated breeder's seed increase of Woodward sand bluestem at the United States Southern Great Plains Field Station. Picture taken in the eighth year from seeding.

Description

Populations of Woodward sand bluestem plants include a wide range of different types, but many of the differences are superficial. Most plants are of moderate height, leafy, and somewhat resistant to foliar diseases. They tend to spread more than ordinary sand bluestem. Plants are fine to medium stemmed, with an abundance of flowers near the top of the plant. Seed-set is generally excellent. (For a comparison of Woodward with a common type, see Figures 2 and 3).

As a variety, Woodward is superior to common sources in (1) seedling vigor and emergence, (2) leafiness and resistance to leaf diseases, (3) desirable plant height, basal spread and head placement, and (4) flower production and seed-set. Compared with good local common, Woodward



Figure 2. An excellent plant of Woodward sand bluestem. Note the dense leafy growth, the fine stems, the broad plant base, the medium height, and the concentration of heads near the top of the plant.



Figure 3. A typical plant of common sand bluestem. Note the coarse, stemmy, open growth, the narrow plant base, the scattering of heads far down the stems, and the height compared with Figure 2. The plants in Figures 2 and 3 were grown in the same nursery under the same conditions.

has been outstanding in seed yield but somewhat low in forage production. Because of its leafiness and relatively fine stems, however, Woodward probably produces as much or more *usable* forage than do common sources. Comparative data are given in Tables 1-4.

Adaptation

Sand bluestem is one of the most productive native grasses on sandy soils in the southern Great Plains. It will grow well in medium textured soils in central Oklahoma and Kansas, but for best growth requires progressively lighter soils as precipitation decreases to the west. It occurs naturally on sands in eastern Colorado, in eastern New Mexico, and in the Texas and Oklahoma Panhandles. The Woodward variety can be grown wherever sand bluestem occurs in the southern Great Plains, but is best adapted north of U. S. Highway 70.

Availability

Since wild harvests of pure sand bluestem are very rare, because of poor seed-set and a general lack of pure stands, the Woodward variety represents the best opportunity for general use of this very valuable and important native grass. Foundation and registered seed are available through the Oklahoma and Kansas Crop Improvement Associations. Certified seed is being grown in both states. Several Texas growers are also producing seed, and Woodward sand bluestem seed is available commercially.

Table 1.—Dryland seed yields of Woodward and Oklahoma common sand bluestems planted in 44-inch cultivated rows at Woodward, Oklahoma.*

Variety	1957		1958		Average	
	Yield (lbs./A.)	Purity (percent)	Yield (lbs./A.)	Purity (percent)	Yield (lbs./A.)	Purity (percent)
Woodward	493	23.9	302	31.2	398	27.6
Oklahoma Common	353	30.6	135	28.4	244	28.5

* Averages from 5 replications.

Table 2.—Leafiness ratings, plant heights, and basal spread of 2-year-old spaced plants of Woodward, Oklahoma common, and Kansas common sand bluestem at Woodward, Oklahoma, 1956. Figures are averages from 96 plants of each variety.

Variety	Leafiness rating*	Plant height (inches)	Basal spread (inches)
Woodward	4.8	46.3	12.8
Oklahoma Common	5.5	56.5	12.6
Kansas Common	5.1	53.4	12.7

* 1=all leafy, 9=all stems

Table 3.—Air-dry forage yields (pounds per acre) from Woodward and Oklahoma common sand bluestem grown at Woodward, Oklahoma.

Variety	Cultivated rows 1954-56*	Transplanted plots 1958-59**
Woodward	3012	2204
Oklahoma Common	3346	2675

* 3-year averages from 5 replicates, year of establishment included.

** 2-year average from 4 replicates, year of establishment included. Seedlings set out at 1-foot spacing.

Table 4.—Days to emergence, emergence percent, height, and green weight of seedlings at 28 days from various sizes of sand bluestem grain planted in sterilized soil.*

Variety	Seed size as screened**	Days to emergence	Emergence (percent)	Height (centimeters)	Green weight of 100 seedlings (grams)
Woodward	6x18	7.0	78.3	13.0	2.54
	6x20	7.0	67.7	12.0	1.70
	6x22	8.0	69.0	10.0	1.45
	6x24	8.0	67.3	10.6	1.26
Oklahoma Common	6x18	11.0	17.3	13.3	2.53
	6x20	12.3	17.0	10.0	1.20
	6x22	12.7	12.0	9.0	1.12
	6x24	14.0	10.3	7.0	.65

* Data from Kneebone, William R. and Cremer, Carlos L. "The relationship of seed size to seedling vigor in some native grass species." *Agron. Jour.* 47:472-477. 1955. All figures are averages of 3 replicates

** Seed passed through next larger screen but was retained by listed size.

