UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

and

NEBRASKA AGRICULTURAL EXPERIMENT STATION
LINCOLN, NEBRASKA

and
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NOTICE OF RELEASE OF 'PRONGHORN' PRAIRIE SANDREED

The U. S. Department of Agriculture, Agricultural Research Service (ARS) and the Nebraska Agricultural Experiment Station (NAES) and the U. S. Department of Agriculture, Soil Conservation Service (SCS), announce the release of 'Pronghorn' prairie sandreed [Calamovilfa longifolia (Hook.) Scribn.]. The cultivar was developed by the USDA-ARS, in cooperation with the NAES and USDA-SCS.

Prairie sandreed is a native warm-season grass that is found on sandy soils in the central and northern prairies of the the United States. It is the most uniformly distributed and most abundant grass in the Nebraska Sandhills, a 12.8 million acre area of sandy, sands, and choppy sands range sites in the central and northern part of Nebraska and adjacent areas of South Dakota. This region is predominately native rangeland but extensive acreages were plowed and converted to grain crop production with the aid of center pivot irrigation systems. This practice is no longer economical on many sites and the land needs to be reseeded to grasses. The only available cultivar of prairie sandreed, 'Goshen', has a low level of tolerance to endemic leaf and stem rusts which makes it poorly adapted for use in the sandhills.

The SCS assembled forty eight field collections of prairie sandreed from Nebraska, Kansas, and South Dakota and evaluated them at the SCS Plant Materials Center at Manhattan, Kansas in 1969. Original seed of four of the accessions which were from Rock, Greeley, and Boone Counties, Nebraska and from Republic County, Kansas that had superior stands, vigor, and disease resistance were sent to the USDA-ARS grass breeding program at the NAES. Space-planted evaluation nurseries of these accessions and an ARS accession collected from Howard County, Nebraska were established at Lincoln, Nebraska. Plants with superior culm number, leafiness, spread by rhizomes, and rust tolerance were selected for polycrossing from the Boone (48), Greeley (16),and Howard (72) populations in the spring of 1971. Clonal pieces (ramets) of each selected plant (numbers in parentheses) were transplanted at random into three different isolations or crossing blocks and were allowed to cross via wind pollination. There were six different crossing blocks: Howard x Boone, Howard x Greeley, Howard x Howard, Greeley x Boone, Greeley x Greeley, and Boone x Boone. Progeny from Boone plants in each of the isolations were established in a space-planted,

unreplicated, progeny row evaluation nursery. The same procedure was followed for the Greeley and Howard populations. These nurseries contained from 1000 to over 3000 plants which were evaluated for vigor, forage production, and rust resistance. Individual plants, Boone (180), Greeley (147), and Howard (180) were selected from these nurseries and moved to separate, isolated crossing blocks. Seed was harvested from these isolations on a bulk basis. One thousand seedlings were grown from each of these bulk seed lots and were transplanted at random into rows to establish the breeder seed field in 1980.

Evaluation trials of Pronghorn and Goshen were conducted at Mead, Bassett, and Scottsbluff, Nebraska which are located in eastern, north central, and western Nebraska, respectively, on sandy sites. Rust severity on prairie sandreed increases from western to eastern Nebraska because of increasing precipitation and humidity. In all three environments Pronghorn has significantly superior rust tolerance. Its level of rust infestation is typically about one fourth to half that of Goshen. Although its primary advantage in comparison to Goshen is its improved rust resistance, it also produces stands and forage yields equivalent or superior to those of Goshen.

Pronghorn is a heterogeneous cultivar with a broad genetic base that has a high degree of rust tolerance. It is adapted to and recommended for use in revegetating sandy sites in the Nebraska Sandhills and Northwest Kansas. Seed propagation of Pronghorn is restricted to three generations of increase from breeder seed, one each of foundation, registered, and certified. Breeder seed (Syn 1) is maintained by the NAES. Foundation seed will be maintained and distributed by the Foundation Seed Division, NAES according to the allocation policies of the NAES as mutually agreed. The USDA-ARS and USDA-SCS have no seed for distribution.

Dale F. Vanderhoof — 5-5-88

Interim Director, Nebraska Research Division — Date

M. E. Carter — MAY 23 1988

Administrator, Agricultural Research Service, USDA — Date

Wilson Scaling — 5/25/88

Chief, Soil Conservation Service, USDA — Date

PRONGHORN PRAIRI SANDREED (NE CL 1)

DEVELOPMENT AND EVALUATION

Prairie sandreed, Calamovilfa longifolia (Hook) Scribn. is a native warm-season grass that is found on sandy soils in the central and northern praires of the the United States. It is the most uniformily distributed and most abundant grass in the Nebraska Sandhills, a 12.8 million acre area of sandy, sands, and choppy sands range sites in the central and northern part of Nebraska and adjacent areas of South Dakota. This region is predominately native rangeland but extensive acreages were plowed and converted to grain crop production with the aid of center pivot irrigation systems during the era of high commodity prices and low energy costs. Grain production is no longer economical on many of these sites and the land needs to be reseeded to grasses. The only available cultivar of prairie sandreed, 'Goshen', has a low level of resistance to endemic leaf and stem rusts which makes it poorly adapted for use in the sandhills. Pronghorn was bred for superior rust resistance using germplasm adapted to the Nebraska sandhills.

The Soil Conservation Service (SCS) assembled forty eight field collections of prairie sandreed from Nebraska, Kansas, and South Dakota and established them in unreplicated rows at the SCS Plant Materials Center at Manhattan, Kansas in 1968. A check, Goshen, was planted every tenth row. Accessions from three other Plant Materials Centers were also included in this evaluation. In 1969, this planting was evaluated by E.T. Jacobson, SCS Plant Materials Center Manager, for stand, vigor, and disease resistance and the most promising accessions were identified. Original seed of the four top ranked accessions which were from Rock, Greeley, and Boone Counties of Nebraska and Republic County, Kansas were sent to L.C. Newell, ARS agronomist stationed at the Nebraska Agricultural Experiment Station, Lincoln, Nebraska.

A space-planted evaluation and selection nursery of these accessions was established at Lincoln, Nebraska. In addition, L.C. Newell also established an evaluation nursery of plants from collections that he made in Howard County, Nebraska. Plants in these nurseries were evaluated for culm number, leafiness, spread by rhizomes, and rust tolerance. Superior plants (number in parentheses) were selected for polycrossing from the Boone (48), Greeley (16), and Howard (72) populations in the spring of 1971. Each of the selected plants were split into six pieces (ramets). Two ramets of each plant were transplanted at random into three different isolations or crossing blocks. There were six different crossing blocks: Howard x Boone, Howard x Greeley, Howard x Howard, Greeley x Boone, Greeley x Greeley, and Boone x Boone. The plants in these isolations or crossing blocks were allowed to randomly mate via wind pollination. Progeny from Boone plants in each of the isolations were established in a space-planted, unreplicated, progeny row evaluation nursery. The same procedure was followed for the Greeley and Howard populations. These nurseries contained from 1000 to over 3000 plants. The plants in these nurseries were evaluated for vigor, forage production, and rust tolerance. Individual plants (Boone - 180, Greeley - 147, and Howard - 180) were

selected from these nurseries and moved to isolated crossing blocks. The plants from each population were moved to a separate isolation. The Boone selections were made by L.C. Newell and the Greeley and Howard selections were made by K.P. Vogel, ARS geneticist. Two ramets of each selected plant was transplanted into the Greeley and Howard isolations while only one ramet of each clone was transplanted into the Boone isolation. Seed was harvested from these isolations on a bulk basis. One thousand seedlings were grown from each of these bulk seed lots and were transplanted at random into rows to establish the breeder seed field in 1980. A foundation seed field produced from Syn 1 seed was established at Mead, Nebraska.

Evaluation trials of Pronghorn and Goshen were established at Mead, Bassett, and Scottsbluff, Nebraska which are located in eastern, north central, and western Nebraska respectively, on sandy sites. Rust severity on prairie sandreed increases from western to eastern Nebraska because of increasing precipitation and humidity. In all three environments Pronghorn has significantly superior rust resistance (Tables 1, 2, 3). Its level of rust infestation is typically about one fourth to half that of Goshen. Although its primary advantage in comparison to Goshen is its improved rust resistance, it also produces stands and forage yields equivalent or superior to those of Goshen. Rust samples collected from Goshen and Pronghorn plants at Mead in 1984 were identified as Puccinia amphigena Dietel by John W. McCain of the Arthur Herbarium, Department of Botany and Plant Pathology, Purdue University.

In summary, Pronghorn represents the results of three cycles of breeding. The first cycle was at the SCS Plant Materials Center at Manhattan, Kansas where superior accessions were identified. There were then two cycles of individual plant selection at the Nebraska Agricultural Experiment Station. Selected plants were random mated following each cycle of selection. The interpopulation mating was done to increase the heterogeneity of the resulting cultivar. Pronghorn is a heterogeneous cultivar with a broad genetic base that has a high degree of rust tolerance. It is adapted to and recommended for use in revegetating sand sites in the Nebraska sandhills and Northwest Kansas.

Table 1. Stands, rust ratings, and forage yields of Goshen and Pronghorn prairie sandreed in replicated (r=4) plots transplanted on June 8, 1985 at Bassett, Nebraska.

Strain	Means					
	Stand			Rust[1]		Forage yield
	1985[2]	1986[2]	1987[3]	1986	1987	1987
	------	%	------	---Rating---		kg ha^{-1}
Goshen	62	58	48	6.5	8.2	230
Pronghorn	47	58	57	1.0**	2.0**	938

** Indicates Pronghorn is significantly different than Goshen at the 0.01 level of probability.

1 Rust infestation rated on a 0 to 9 scale; 0 = no rust, 9 = all leaves heavily rusted with no green-leaf tissue.

2 Stands = plants surviving/plants transplanted.

3 Stands measured by using a frequency grid. Multiplication by 0.4 converts stands to plants m^{-2}. Stands >25 or 10 plants m^{-2} are acceptable in range seedings in the Central Great Plains.

Table 2. Stands, rust ratings, and forage yields of Goshen and Pronghorn prairie sandreed in replicated (r=6) plots seeded at Mead, Nebraska in the spring of 1982 and 1986.

Strain	1986 Planting 1987 Mean			1982 Planting 1985 Mean
	Stand[1]	Rust[2]	Forage yield	Rust
	%	Rating	kg ha^{-1}	Rating
Goshen	8	7.3	109	10
Pronghorn	30**	4.6**	1498**	6.4**

** Indicates that Pronghorn is significantly different than Goshen at the 0.01 level of probability.

1 Stands measured using a frequency grid. Multiplication by 0.4 converts percentages to plants m^{-2}. Stands of 25% or 10 plants m^{-2} are acceptable in range seedings in the Central Great Plains.

2 Rust infestation rated on a 0 to 10 scale; 0 = no rust, 10 = all leaves heavily rusted with no green tissue.

Table 3. Stands, rust ratings,and forage yields of Goshen and Pronghorn prairie sandreed in replicated (r=6) plots seeded at Scottsbluff, Nebraska in the spring of 1986.

Strain	1987 Means		
	Stand[1]	Rust[2]	Forage yield
	%	Rating	kg ha^{-1}
Goshen	70	3.5	2196
Pronghorn	58	1.2**	2905

** Indicates that Pronghorn is significant y different than Goshen at the 0.01 level of probability.

1 Stands measured using a frequency grid. Multiplication by 0.4 converts percentages to plants m^{-2}. Stands of 25% or 10 plants m^{-2} are acceptable in range seedings in the Central Great Plains.

2 Rust infestation rated on a 0 to 10 scale; 0 = no rust, 10 = all leaves heavily rusted with no green tissue.