Plant Guide

PRAIRIE SANDREED
Calamovilfa longifolia (Hook.) Scribn.

Plant Symbol = CALO

Contributed by: USDA NRCS Bismarck, North Dakota and Manhattan, Kansas Plant Materials Centers

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Kansas Wildflowers and Grasses

Alternate Names
sand reed, prairie sandgrass, big sandgrass

Uses
Grazing/rangeland/hayland: Prairie sandreed is a native, sod forming, warm season grass commonly found on sandy rangeland sites throughout the Central and Northern Plains and Great Lakes Region. This grass is recognized as a key species in grazing programs because of its abundance, yield potential and distribution of herbage production during the growing season. Prairie sandreed begins growth earlier in the spring than most warm season perennial grasses, thus its herbage is available for livestock grazing. The forage value is considered fair to good for cattle and horses, and fair value for sheep during its first two months of growth, and after it cures on the stem for fall and winter grazing. Crude protein content and available carbohydrates are inversely related in this plants constitution. Crude protein drops from 16 percent in May to 4 percent in November while available carbohydrates increase from 45 percent in May to 55 percent in November (Craig, 2002). Prairie sandreed is usually considered a decreaser with grazing pressure, but will initially increase under heavy grazing use, especially if growing within a big bluestem/sand bluestem plant community. Prairie sandreed generally is seeded as a component of a native mix for range seeding on sandy sites.

Wildlife Value: Prairie sandreed provides fair forage for grazing and browsing wildlife in early spring and summer. The plant becomes more important in late fall and winter as the plant cures well on the stem and provides upright and accessible forage. Seed is used by songbirds and small rodents.

Erosion Control: The rhizomatous growth habit and extensive fibrous root system of prairie sandreed makes it an excellent species for stabilization of sandy sites. On the shores of the Great Lakes it provides wind erosion control, dune stabilization, and water quality improvement.

Status
Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description
General: Grass Family (Poaceae). Prairie sandreed is a tall, coarse, stemmy, open sod forming grass found on sandy soil sites in typically low precipitation zones. Its coarsely fibrous root system augmented by scaly, spreading rhizomes produces an effective sand binding species. The culms are 1.0 to 1.5 meters (3-5 feet) tall, arising singly and are attached to the stout, spreading rhizomes. Leaves are mostly cauline, pale green to straw colored. Leaf blades are rigid, flat to rolled, hairless, 30 cm (12 inches) long or longer, tapered to a drawn out tip. The ligule is short and hairy and the collar is hairy inside. Inflorescence is a panicle 15 to 35 cm (6-13 inches) long, semi-open and wider in the middle. Spikelets are pale, shiny, and one flowered. The lemmas are awnless and

densely hairy at the base. It flowers from August to September and, and like most grasses, is wind pollinated. Prairie sandreed possesses the C-4 photosynthetic pathway for carbon fixation (Waller and Lewis, 1979).

Distribution: For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Habitat: Prairie sandreed is native from Manitoba to Quebec, Canada and south to Idaho, Colorado, Kansas and Indiana. Optimal performance can be expected on a sandy textured soil in the 40 to 50 cm (16-20 inch) rainfall zone. It exhibits strong drought tolerance when well established. It is intolerant of high water tables and early spring flooding.

Steve Hurst, From PLANTS, provided by ARS Systematic Botany and Mycology Laboratory.

Adaptation

Prairie sandreed is drought tolerant and adapted to mean annual precipitation of less than 25 cm up to 50 cm (10-20 inches). It is predominately found growing in clumps or colonies on coarse or sandy soil types. It will grow on soils that are somewhat alkaline, but it is not tolerant to salt. Prairie sandreed occurs naturally in mixed native stands with sand bluestem *Andropogon hallii*, little bluestem *Schizachyrium scoparium*, and sand lovegrass *Eragrostis trichodes* on choppy sand range sites. Several shrubs, including yucca *Yucca glauca* and sand sage *Artemisia filifolia* and a variety of forbs occur intermixed on these sites. It has been found growing on blow out sites in the Nebraska Sandhills.

Establishment

Propagation of *Calamovilfa longifolia* is accomplished by seed and vegetative means. Maun (1981) studied germination and seedling establishment on Lake Huron sand dunes at Pinery Provincial Park, Ontario. Seedling establishment is considered risky on sand dunes where high soil surface temperatures, low nutrient supply, low moisture availability, and erosion can limit seedling establishment and growth. Maun (1981) found that *Calamovilfa longifolia* produces large numbers of intermediate size seed (mean seed weight 1.64 mg + .14 mg standard deviation). He further noted that the endosperm of sandreed exhibited a dimorphic color scheme (brown and white) and that the brown endosperm types were significantly heavier than the white types. Maun's (1981) seed germination studies indicated that the best germinations of *Calamovilfa* were produced when growth chamber settings were 25 degrees C (14 hours) and 10 degrees C (10 hours). Temperatures higher (35 and 20 degrees C) and lower (15 and 0 degrees C) than those reduced germination significantly. Stratification of sandreed seed did not improve total germination, but it produced a faster rate of germination overall. Maun and Riach (1981) studied sand deposition effects on seedling emergence at field sites and greenhouse plantings. They found that seedling emergence from greater than 8.0 cm (3 inch) depths was not probable. Excavation of sites with seed buried by more than 8 cm (3 inch) of sand indicated that seed had germinated, but failed to emerge from that depth. Thus seedling emergence was negatively correlated with planting depth. Therefore, planting of prairie sandreed should be accomplished with a drill equipped with depth bands to better control depth of seeding. Seed should be planted at a depth of 2.54 cm (1 inch) on coarse textured soils and 1.27 cm (1/2 inch) or less on medium to fine textured soils. Seedbed preparation should provide a weed free, firm surface on which to plant. Seedling vigor is only fair and stands develop rather slowly. Stands may require as long as two to three years to fully develop. Seeding rate will vary by region and may be influenced by the amount of processing provided by the seed producer. Some seed vendors process the seed down to the bare caryopsis. This will influence the seeding rate that is utilized.

Management

Mullahey et al. (1991) found that a June and August defoliation of prairie sandreed over a three year period produced the greatest dry matter yield compare to other treatments and the control. Generally annual dry matter yields declined for all defoliation treatments and the control during the three year study. Burlaff (1971) concluded that the concentration of crude protein in prairie sandreed declined with increased maturity of the forage. Dry matter digestibility also declined with advanced maturity of the plants. In similar studies Cogswell and Kamstra (1976) found that highly lignified species had lower *in vitro* dry matter digestibility

values. Protein content of prairie sandreed decreased with maturity of the plant. Aase and Wight (1973) proved that water infiltration rates on undisturbed prairie sandreed were significantly higher and averaged about four times those on undisturbed surrounding vegetation. The duo attributed the greater infiltration rate in prairie sandreed colonies to the vigorous growth and resultant residue which intercepts rain drops and reduces the energy with which the rain impacts and seals the soils surface. They also discussed the effect of soil texture on infiltration rates and noted that coarse textured soils had higher infiltration rates. Total water use during the growing season was higher by prairie sandreed than by the surrounding vegetation, however dry matter production was twice as great. Production data collected at Pierre, SD reported prairie sandreed (ND-95) production at 5,912 kg/ha (5,279 lbs/acre) of forage compared to 6,667 kg/ha (5,953 lbs/acre) for big bluestem ('Bison') at the same location. Prairie sandreed responds positively to prescribed spring burns.

Pests and Potential Problems

Grasshopper infestations can damage seedlings. Gophers have been known to undercut, smother and utilize the forage. Leaf rust (*Puccinia amphigena* Dietel.) was identified as a potential antiquality factor in the forage production of prairie sandreed. Mankin (1969) also identified leaf mold (*Hendersonia calamovilfae* Petr.), leaf spot (*Septoria calamovilfae* Petr.) and rust as plant pathogens that can affect prairie sandreed plants. Prairie sandreed plants with origins in the Great Plains are increasingly susceptible to rust when moved eastward.

Environmental Concerns

Prairie sandreed does not pose any known negative concerns to the environment. It can form dense colonies on coarse soils where it is well adapted. This attribute is often looked at as a positive trait for increasing ground cover which reduces both wind and water erosion on these sites.

Seeds and Plant Production

Calamovilfa is a genus native to North America and contains five individual species (Rogers, 1970). *Calamovilfa* closely resembles *Calamagrostis* and *Ammophila* in gross morphological characteristics, and was placed close to them in the tribe Agrostideae by Hitchcock (1951). Reeder and Ellingson (1960) pointed out that *Calamovilfa* differs from these genera in several important embryo characteristics, types of lodicules, leaf anatomy, and chromosome size and number. *Calamovilfa* and *Sporoblus* appear to be more closely related and have several features in common, including the peculiar fruit characteristic of having its pericarp free from the seed coat, thus not a true caryopsis (Gould and Shaw, 1983). Reeder and Singh (1967) determined that the basic chromosome number of x=10 for *Calamovilfa*. They reported that the chromosome number for *Calamovilfa longifolia* determined from study of the meiosis in pollen mother cells in anthers revealed that the chromosome number is 2n=40. The average seed production at Bridger, Montana has been 183 kg/ha under irrigation in 91 cm (36 inch) rows. Seed yields in North Dakota range from 56 to 560 kg/ha (50 to 500 pounds/acre) under irrigation and 56 to 168 kg/ha (50 to 150 pounds/acre) under dry land conditions. It is recommended that seed production fields be planted in row widths of 61 to 91 centimeters (2-3 feet). Prairie sandreed is difficult to harvest in large quantities due to late maturity, seed shattering, lodging, and hairy seed units. Soil moisture on seed production fields should be kept at half field capacity up to flowering. No irrigation water should be applied during flowering and a minimum amount of irrigation water should follow flowering. Combining should be carried out during the hard dough stage of seed development. Seed processing should begin with a hammer milling and then re-cleaning in a fanning mill. A good seed quality is approximately 85 percent purity with a 75 percent germination which produces a 64 percent Pure Live Seed (PLS). There are approximately 695,960 seeds in a kilogram (2.54 pounds) of seed.

Cultivars, Improved, and Selected Materials (and area of origin)

Contact your local Natural Resources Conservation Service office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

'Goshen' prairie sandreed was cooperatively named and released by the Soil Conservation Service Plant Materials Center, Bridger, Montana and the Montana and Wyoming Agriculture Experiment Stations in 1976 (Scheetz and Lohmiller, 1978). The original germplasm was collected near Torrington, Wyoming in 1959. It was released without selection and tested under the experimental designations WY-17 and P-15588.

'Pronghorn' prairie sandreed was released by the USDA-ARS, the Agriculture Research Division of the University of Nebraska-Lincoln, and the USDA-SCS Manhattan Plant Materials Center, Manhattan, Kansas in 1988 (Vogel et al., 1996). An assembly of

48 accessions was collected in 1968 from Kansas, Nebraska, and South Dakota and established in a space plant nursery at Manhattan, Kansas. The top ranked accessions from the nursery were provided to L.C. Newell, ARS agronomist, for further evaluation. Selections from the nursery were evaluated for vigor, forage production and rust tolerance. Evaluation trials comparing Goshen and Pronghorn revealed that Pronghorn produced stands and forage equivalent to Goshen, but was significantly superior with respect to leaf rust resistance.

ND-95 (Bowman) was selected at the USDA-SCS Plant Materials Center, Bismarck, ND. ND-95 is an informal release of materials collected in 1956 from southwestern North Dakota (Bowman County). Seed production is average for the species. Forage production is comparable to Goshen, in the northern U.S., but ND-95 has demonstrated improved performance in parts of Canada. Its dense wiry root mass makes it well adapted for stabilizing sandy soils.

Koch Germplasm prairie sandreed was released by USDA-NRCS Rose Lake Plant Materials Center and the Michigan Association of Conservation Districts in 2007. Original germplasm was collected from native stands in costal zones along Lakes Michigan and Huron and subjected to three cycles of recurrent phenotypic selection for upright growth habit, seed production, and general vigor. Koch Germplasm prairie sandreed's anticipated uses include wind erosion control, dune stabilization, and water quality improvement in costal zones of the Great Lakes Region and other sandy areas.

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