THE
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

AND

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

AND

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

AND

MINNESOTA AGRICULTURAL EXPERIMENT STATION

AND

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

ANNOUNCE THE
RELEASE OF 'FORESTBURG' SWITCHGRASS

'Forestburg' switchgrass (Panicum virgatum L.) was collected by the USDA, SCS, Plant Materials Center, Bismarck, North Dakota, and was developed and evaluated in cooperation with the USDA, ARS, Mandan, North Dakota. Forestburg was tested as SD-149(PI-478001) and jointly released with the North Dakota Agricultural Experiment Station, North Dakota State University, Fargo, North Dakota; the Minnesota Agricultural Experiment Station, University of Minnesota, St. Paul, Minnesota, and the South Dakota Agricultural Experiment Station, South Dakota State University, Brookings, South Dakota.

Forestburg is a composite of four accessions collected in Sanborn County near Forestburg, South Dakota, by John McDermand, SCS Plant Materials Specialist. Accession numbers of PM-SD-203, -205 and -206 were collected in 1956. PM-SD-62 was collected in 1961. Initial evaluations were conducted at the Bismarck Plant Materials Center 1957 through 1963. In 1963, seed was collected and composited from the four accessions. An initial increase field 0.5 acre was established in 1964. The phenology, forage yield and quality, animal performance and wildlife habitat potential have been documented in advanced evaluation studies and field plantings located in North Dakota, South Dakota and Minnesota.

Forestburg has demonstrated superior winter hardiness and persistence, seed production ability, and earlier maturity than other accessions. Forage production exceeds that of the northern seed source NDG-965-98 and is equal or greater than 'Nebraska 28' when grown at northern latitudes. Cultivars from southern sources ('Summer', 'Pathfinder', 'Blackwell' and 'Cave-in-Rock') initially produce more forage. However, pressures resulting from grazing, drought and winter injury, eventually reduce stands and decrease forage production of the southern cultivars. Except for higher seed yields, Forestburg is similar in performance and adaptation to 'Sunburst'. Animal performance (average daily gain) resulting from Forestburg is slightly higher than Pathfinder.

Table 1. Maturity ratings of switchgrass cultivars grown at four (4) locations.

Accession	Origin	Upham, ND 1983	Upham, ND 1984*	Bismarck, ND 1982	Lake Andes, SD 1984**	Fergus Falls, MN 1983*	$\bar{X}$
NDG-965-98	Morton Co., ND	8.0	6.5	-	6.0	5.8	6.6
Forestburg (SD-149)	Sanborn Co., SD	5.0	3.8	8.0	4.3	3.7	5.0
Sunburst	Southeast SD	4.5	3.5	-	4.6	3.5	4.0
Neb-28	Holt Co., NE	4.5	4.0	7.5	4.7	3.5	4.8
Summer	Otoe Co., NE	3.5	1.0	7.0	3.9	2.7	3.6
Pathfinder	Kansas-Nebraska	4.0	2.0	6.0	3.3	2.1	3.5
Cave-in-Rock	Illinois	2.5	2.0	-	3.4	2.2	2.5
Blackwell	Oklahoma	2.5	1.8	-	3.6	2.1	2.5

Maturity ratings:
1=vegetative
2=boot
3=first emergence of inflorescence
4=first anthesis
5=50% anthesis
6=first seed ripe
7=50% seed ripe
8=seed mature
9=complete dormancy

*Mean of ratings for four (4) dates.

**Mean of ratings from seven (7) dates.

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*Mean of ratings for four (4) dates.

**Mean of ratings from seven (7) dates.

Table 2. Mean annual forage production of switchgrass cultivars at nine locations. 1974-1985

Cultivars/ Accession	*(11) Bismarck ND	*(3) Upham ND	*(2) Lake Andes SD	*(1) Pierre SD	*(3) Fergus Falls MN	Morris MN	Brookings SD	Lamberton MN	Rosemount MN	Average
					lb/ac					
NDG-965-98	--	5398	3735	1154	3147	--	5200	--	--	3727
Sunburst	--	8285	6063	3560	7456	--	7900	--	--	6653
Forestburg (SD-149)	4343	6956	5903	3083	4700	5980	5900	7940	6360	5685
Neb-28	4717	7151	5901	2217	4384	--	6400	9000	--	5681
Summer	5552	7184	6831	3882	7954	6540	11400	9000	6660	7222
Pathfinder	4712	7529	7194	5076	7152	6260	4400	9040	7440	6533

( ) indicate number of years of data averaged.

* trials with three replications each.

Table 3. Stand Ratings of switchgrass accessions grown at four (4) locations.

	Fergus Falls, MN					Pierre, SD			Lake Andes, SD			Upham, ND					
Accessions	1982	1983	1984	1985	$\bar{X}$	1984	1985	$\bar{X}$	1983	1984	$\bar{X}$	1982	1983	1984	1985	$\bar{X}$	Overall Average
NDG-965-98	6	2	1	2	3	2	1	1.5	2	1	1.5	1	1	1	1	1	2
Sunburst	7	3	1	1	3	2	1	1.5	2	1	1.5	1	2	1	1	1	2
Forestburg (SD-149)	5	1	1	1	2	2	1	1.5	2	1	2.0	1	1	1	3	2	2
Neb-28	9	5	2	2	5	2	1	1.5	2	1	1.5	4	5	2	1	3	3
Summer	7	3	1	1	3	2	1	1.5	2	1	1.5	1	1	1	1	1	2
Pathfinder	6	3	1	2	3	3	1	2.0	1	1	1.0	1	2	1	1	1	2
Cave-in-Rock	4	3	1	3	3	3	1	2.0	2	2	2.0	1	4	1	2	2	2
Blackwell	6	2	1	2	3	2	1	1.5	1	1	1.0	1	2	1	1	1	2

Note: Stand ratings were visual scores with 1=excellent, 3=good, 5=fair, 7=poor, 9=very poor.

Table 4. Plant density of switchgrass accessions grown at four (4) locations.

	Fergus Falls, MN			Pierre, SD			Lake Andes, SD	Upham, ND				Overall
Accession	1983	1984	$\bar{X}$	1984	1985	$\bar{X}$	1984	1982	1983	1984	$\bar{X}$	Average
	plts/ft^2											
NDG-965-98	23	29	26	21	32	27	29	24	30	32	29	28
Sunburst	17	22	20	20	37	29	20	15	18	20	18	22
Forestburg (SD-149)	23	30	27	21	35	28	34	20	31	30	27	29
Summer	12	20	16	26	36	31	28	8	8	19	12	22
Neb-28	17	26	22	10	31	21	27	24	32	31	29	25
Pathfinder	14	22	18	18	35	27	33	23	27	30	27	26
Cave-in-Rock	18	18	18	19	23	21	20	22	15	19	19	20
Blackwell	23	23	23	20	30	25	28	20	18	21	20	24

The mean initial flowering dates (anthesis) for switchgrass has a northwest to southeast gradient in the northern Great Plains. Phenology data recorded at Fergus Falls, Minnesota, indicate Forestburg to be 24-27 days later than the northern source NDG-965-98. It is 0 to 3 days earlier than 'Nebraska-28' and 'Sunburst', and 21-30 days or more earlier than the southern cultivars 'Pathfinder', 'Blackwell' and 'Cave-in-Rock' (Table 1).

Soils: Forestburg is best suited to light or medium textured soils. It is not well adapted to highly saline or alkaline soils (McDermand Pers. Comm, 1973).

Adaptation: The primary area of adaptation for Forestburg is on sites where switchgrass is recommended in the following Major Land Resource Areas:

North Dakota: 53B - Central Dark Brown Glaciated Plain; 54 - Rolling Soft Shale Plain; 55A and 55B - Northern and Central Black Glaciated Plain and 56 - Red River Valley of the North (South half).

South Dakota: 53B and 53C - Central and Southern Dark Brown Glaciated Plains; 55B and 55C - Central and Southern Black Glaciated Plains; 61 - Black Hills Footslopes; 63A and 63B - Rolling Pierre Shale Plains; 102A - Rolling Till Prairie and 102B - Loess Uplands and Till Plains.

Minnesota: 56 - Red River Valley of the North (South half); 57 - Northern Minnesota Gray Drift; 90 - Minnesota Thin Loess and Till; 91 - Minnesota Sandy Outwash; 102A - Rolling Till Prairie; 102B - Loess Uplands and Till Plains; 103 - Central Minnesota Till Prairie; 104 - Eastern Iowa and Minnesota Till Prairies and 105 - Northern Mississippi Valley Loess Hills.

The physical features of these resource areas are described in Land Resource Regions and Major Land Resource Areas of the United States (USDA, SCS, 1981).

Seed Production: Forestburg produces an abundant seed crop. Stand establishment of Forestburg can usually be accomplished in one growing season. The second growing season may be needed to increase vigor and forage production. Seed production can be expected the second year and continue indefinitely provided good management techniques are applied.

References:

Hitchcock, A. S. 1951. Manual of the grasses of the United States. 2nd ed. Rev. by Agnes Chase, U.S. Dep. Agr., Misc. Pub. No. 200. Washington, D.C.

USDA, Soil Conservation Service. 1981. Land Resource Regions and Major Land Resource Areas of the United States, Agric. Handbook 296, 156 p.

Prepared by: The data to support release of Forestburg switchgrass was assembled by Russell J. Haas, Plant Materials Specialist, Soil Conservation Service, Bismarck, North Dakota and Erling T. Jacobson, Plant Materials Specialist, MNTC, Soil Conservation Service, Lincoln, Nebraska.

Table 5. Animal and plant performance of Forestburg (SD-149) and Pathfinder switchgrass pastures at Morris, MN, 1983-1985.

Measurement	Year	Forestburg (SD-149)	Pathfinder
average daily gains	(lb/day)		
	1983	.18	1.05
	1984	3.42	.40
	1985	1.77	3.15
	3 yr. average	1.79	1.53
animal gain/acre	(lb/ac)		
	1983	44	119
	1984	207	38
	1985	98	180
	3 yr. average	116	116
plant cover following 1983-1985 grazing (% cover)			
	plant	33	25
	litter	48	67
	bareground	18	6
	other	1	2

Table 6. Mean seed yields of switchgrass cultivars at Brookings, SD. 1981.

Accession/ Variety	Seed Yield (lbs/ac)
Forestburg (SD-149)	189
Sunburst	159
Neb-28	149
Summer	150

DATA TO SUPPORT RELEASE OF 'FORESTBURG' SWITCHGRASS

Cultivar: 'Forestburg'
Accession No.: SD-149, 6010T, PI-478001
Common Name: Switchgrass
Scientific Name: Panicum virgatum L. Symbol: PAVI2

Description: Switchgrass is a tall native perennial warm-season grass. Plants usually occur in large bunches, green or glaucous with numerous scaly creeping rhizomes; culms erect, tough and hard, 1 to 2 m, rarely 3 m tall; sheaths glabrous; blades 10 to 60 cm long, 3 to 15 mm wide, flat glabrous, or sometimes pilose above or near the base, rarely pilose all over, panicle 15 to 50 cm long, open, sometimes diffuse; spikelets 3.5 to 5 mm long, acuminate; first glume clasping, two-thirds to three-fourths as long as the spikelet, acuminate or cuspidate; fruit narrowly ovate, the margins of the lemma in-rolled at the base. Switchgrass is found in prairies and open ground, open woods, and brackish marshes. Distribution ranges from Nova Scotia and Ontario, Maine to North Dakota and Wyoming, south to Florida, Nevada and Arizona; Mexico and Central America. In the Northern Plains, switchgrass is best adapted to deep, moist fertile soils of the eastern Dakotas, Nebraska, western Minnesota and Iowa. Further west in the region, it may be found in ravines, valleys, depressions and other overflow areas favored by water runoff (Hitchcock 1951).

Origin: Forestburg switchgrass is a composite of four seed collections made in Sanborn County near Forestburg, South Dakota by John McDermand, Plant Materials Specialist, USDA Soil Conservation Service. Accessions SD-203, SD-205 and SD-206 were collected in 1956. SD-62 was collected in 1961. Initial evaluation studies were conducted in 1957-63 and 1961-63. In 1963, seed was harvested from all four collections, and bulked together. An increase planting of 0.5 acre (Field E-11) was established in 1964, and 1.7 acres (Field E-12) in 1967 at the Bismarck Plant Materials Center, Bismarck.

Uses: Forestburg is recommended for range seeding, warm season pasture plantings, and re-establishing native prairie on sites where switchgrass occurred naturally. In addition, the height and density of the residual vegetation provides excellent wildlife nesting habitat and a dense sod for erosion control on drastically disturbed areas and transportation corridors. It can be used in mixtures with other warm season grasses, such as indiangrass, big bluestem, little bluestem and sideoats grama.

Performance: The phenology, forage quantity, animal performance and wildlife habitat potential have been documented in advanced evaluation studies and field plantings located throughout North Dakota, South Dakota, and Minnesota. (Refer to Tables 1, 2, 5). Forestburg has demonstrated superior winter hardiness and seed production (Table 6). Forage production exceeds that of the northern seed source NDG-965-98, and is equal or greater than 'Nebraska-28' (Table 2). Cultivars 'Summer', 'Pathfinder', 'Blackwell', and 'Cave-in-Rock' from southern sources produce more forage in short term plantings. However, over a time period of several years, pressures resulting from grazing, drought and winter injury reduce stands and decrease forage production of the southern cultivars in northern latitudes (Table 5). Animal performance (average daily gain) resulting from Forestburg is slightly higher than Pathfinder (Table 5).

Mean flowering date (anthesis) for switchgrass has a northwest to southeast gradient in the northern Great Plains. Phenology evaluations at Fergus Falls, Minnesota, indicate Forestburg to be 24-27 days later than the northern source NDG-965-98. It is up to 3 days earlier than 'Nebraska 28' and 'Sunburst' and 21-30 days earlier than the southern cultivars 'Pathfinder', 'Blackwell' and 'Cave-in-Rock' which do not consistently produce viable seed at northern latitudes.

The primary area of adaptation and use of Forestburg is on sites where switchgrass is recommended for range and pasture seedings, wildlife habitat, natural area development, and revegetation of surface mines, critical area (waterways) and transportation corridors in North Dakota, South Dakota and Minnesota.

Breeder seed of Forestburg will be maintained at the USDA ARS, Northern Great Plains Reserarch Laboratory, Mandan, ND 58554. Foundation and certified generations of seed increase beyond breeder seed are authorized. Foundation seed will be available from the USDA SCS, Plant Materials Center, Bismarck, ND 58502.

Release date for publicity purposes shall be effective on the date of final signature of the release notice.

Robert R. Shaw, Acting — 2/6/87
Chief — Date
Soil Conservation Service
Washington, D.C.

T. B. Kinney — MAR 10 1987
Administrator — Date
Agricultural Research Service
Washington, D.C.

12/10/86
State Conservationist — Date
Soil Conservation Service
Bismarck, North Dakota

12-10-86
Director — Date
Agricultural Experiment Station
Fargo, North Dakota

Acting — 12-22-86
State Conservationist — Date
Soil Conservation Service
St. Paul, Minnesota

Richard J. Sauer — 12/22/86
Director — Date
Agricultural Experiment Station
St. Paul, Minnesota

1-5-87
State Conservationist — Date
Soil Conservation Service
Huron, South Dakota

R. A. Moore — 1-6-87
Director — Date
Agricultural Experiment Station
Brookings, South Dakota