

UNITED STATES DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE  
BISMARCK, NORTH DAKOTA

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**NOTICE OF RELEASE OF TOBER GERmplasm VIRGINIA WILDrye**

The United States Department of Agriculture; Natural Resources Conservation Service; Minnesota Agricultural Experiment Station; North Dakota Agricultural Experiment Station; and the South Dakota Agricultural Experiment Station announce the naming and release of a seed propagated selected natural germplasm of Virginia wildrye, *Elymus virginicus* L. This selected class pre-varietal release is known as Tober Germplasm Virginia wildrye. This alternate release procedure is justified because there are no adapted northern origin releases of Virginia wildrye. Therefore, Tober Germplasm Virginia wildrye was developed to fulfill this need in the Northern Great Plains and Upper Midwest.

Tober Germplasm has been assigned NRCS accession number 9094359. Tober Germplasm was developed to provide an adapted seed source with a broad genetic base for use in the Northern Great Plains and Upper Midwest, with primary objectives of ecological revegetation, wildlife habitat, riparian cover, forage production and erosion control. Tober Germplasm has a high level of species diversity and is expected to perform well over a broad area throughout Minnesota, North Dakota, South Dakota, and bordering states. Plants originating greater distances from the planting site add genetic diversity within the species, for improved long-term stability and broader area of adaptation (Harris et al 2006).

**ORIGIN:** Tober Germplasm is a composite of 78 accessions selected from an initial evaluation nursery of 81 accessions. Each accession represents a different collection location (Table 1). All accessions were seed collected in 2008-2009 by NRCS field office and Plant Materials staff from sites where Virginia wildrye was naturally growing in North Dakota, South Dakota, and Minnesota. Conditions varied from partial shade to full sun. This area covers parts of four land resource regions including the Northern Great Plains Spring Wheat Region, Northern Lake States Forest and Forage Region, Central Feed Grains and Livestock Region, and the Western Great Plains Range and Irrigated Region. Average annual precipitation ranges from approximately 15-34 inches with a freeze-free period ranging from 95 to 150 days. Generally, seed was collected from several plants at each site.

Seedlings were propagated from the collected seed and nine plants of each accession were transplanted 20 May 2010 to a spaced plant evaluation nursery consisting of 3 plant subplots arranged in a randomized complete block with 3 replications at the Bismarck Plant Materials Center (PMC), Bismarck, North Dakota. Plant characteristics were visually evaluated in 2010 and 2011 for vigor, disease resistance, leafiness, flowering date, seed production, and winter hardiness. Plants of small stature, extremely early or late flowering, poor vigor, poor overall plant size or diseased were removed

from the assembly. Plants were screened two to three times each growing season. The goal of this plant selection strategy was not to specifically select a few outstanding plants, but to representatively select a diverse group of Virginia wildrye genotypes that would have a broad genetic base to facilitate adaptation to an array of sites in the Northern Great Plains and Upper Midwest. Seed harvested from this block, which consisted of 557 plants, became the breeder seed of Tober Germplasm (Generation 0). It was assigned NRCS accession number of 9094359.

**ECOTYPE DESCRIPTION:** Virginia wildrye is a native, cool-season, perennial bunchgrass which grows 2-4 feet in height. Leaf blades are flat and numerous. The spikes are stiffly upright 2-6 inches long. Seeds can be awned or awnless. There are usually two spikelets/node, heavy glumes (horseshoe-shaped) bowed at the base, and short, rigid ligules. It can be misidentified as Canada wildrye, which can be found growing in the same locations. Canada wildrye heads are nodding and have longer awns when compared to heads of Virginia wildrye. Virginia wildrye prefers moist, heavier textured soils and is shade tolerant. It is considered short-lived but will reseed if allowed to grow to maturity. Drought tolerance is rated as fair and flood tolerance good. It will not tolerate saline conditions. Virginia wildrye is generally considered self-pollinated but has been found to cross pollinate with Canada wildrye. Tober Germplasm Virginia wildrye does not differ significantly from a general plant description of the species.

Tober Germplasm has an average height of 2-4 feet and flowers early to mid-July in Bismarck, North Dakota. Flowering time is similar to 'Mandan' Canada wildrye and approximately two weeks earlier than a commercially available Minnesota ecotype. Seed harvest date varies depending on growing conditions and year. Seed harvest has ranged from early August to early September at Bismarck, North Dakota. Seed lots of Tober Germplasm harvested had a mix of glumed and glumeless seed and averaged approximately 81,000 seeds/pound. Tober Germplasm averaged 61,000 seeds/pound with the glumes intact and 112,000 seeds/pound without glumes.

**PLANT PERFORMANCE:** Tober Germplasm was compared to 'Mandan' Canada wildrye and to a Minnesota ecotype of Virginia wildrye for forage production and quality. Tober Germplasm flowered about the same time as 'Mandan' Canada wildrye and about two weeks earlier than the Minnesota ecotype. Forage production averaged 6483 lbs/acre for Tober Germplasm, 6055 lbs/acre for the Minnesota ecotype and 4849 lbs/acre for 'Mandan' Canada wildrye when harvested in late June at Bismarck. Forage quality of Tober Germplasm was comparable to 'Mandan' Canada wildrye and a Minnesota ecotype (Table 2). Seed yields average 300-400 PLS pounds/acre from 2014-2017 with a yield of 475 PLS lb/acre occurring in 2014.

Leaf/stem ratio is an indication of forage quality and declines as plants mature and stems lignify. Leaf/stem ratio of Tober Germplasm was determined slightly higher than 'Mandan' Canada wildrye from 3 years of sample analysis. Tober Germplasm had an average leaf/stem ratio (by weight) of 0.28 and 'Mandan' Canada wildrye 0.25 at the milk to soft dough growth stage,

Thirteen field trials of Tober Germplasm were planted in 2014-2016: six in South Dakota, four in North Dakota and three in Minnesota. Tober Germplasm was planted as part of a grass/forb mix at all sites except one, where it was planted as a monoculture between tree rows. In twelve of the thirteen field trials, Tober Germplasm rated excellent for performance in these plantings (Table 3).

**AREA OF ADAPTATION:** Tober Germplasm is expected to perform well throughout Minnesota, North Dakota and South Dakota; particularly where precipitation is 15 inches or greater. Tober

Germplasm has a high level of species diversity and will fill the need for a genetically diverse Virginia wildrye release that is broadly adapted to the Northern Great Plains and Upper Midwest of the United States. This release is expected to perform well wherever Virginia wildrye is recommended in these areas. Plants originating greater distances from the planting site add genetic diversity within the species, for improved long-term stability and broader area of adaptation (Harris et al 2006).

**Ecological Considerations and Evaluation:** An Environmental Evaluation of Plant Materials Releases was completed using guidelines established by the NRCS (USDA-NRCS, 2010), and the best available information for this species. Results from this evaluation determined that Tober Germplasm was suitable for release based on the criterion contained in this document. Virginia wildrye is a naturally occurring species throughout North America and the release of Tober Germplasm for public use would not constitute the introduction of a foreign species to local ecosystems. Tober Germplasm was selected from native stands of Virginia wildrye that has had no genetic modifications. The environmental evaluation indicates that negative impact to other native species would be minimal to non-existent.

**CONSERVATION USE:** The conservation uses of Tober Germplasm include conservation cover, erosion control, pasture and hayland, wildlife habitat (including pollinators), prairie revegetation, riparian plantings, rangeland seeding, and landscaping.

**AVAILABILITY OF PLANT MATERIALS:** Breeder seed (Generation 0) is maintained by the Bismarck Plant Materials Center. Generation 1 (G1) seed (equivalent to Foundation Seed) of Tober Germplasm is grown by the Bismarck PMC and distributed through North Dakota Foundation Seed Stocks as a Selected Class germplasm (green tag). For seed availability, contact the Bismarck Plant Materials Center, 3308 University Drive, Bismarck, North Dakota 58504. Certification of Tober Germplasm Virginia wildrye will be limited to two generations (G2). There will be no certification of Tober Germplasm beyond Generation 2 (G2).

#### **REFERENCES:**

Harris, J. A., R. J. Hobbs, E. Higgs, and J. Aronson. 2006. Ecological restoration and global climate change. *Restoration Ecology*. Vol. 14, No. 2. pp.170-176.

USDA NRCS. 2006. Land resource regions and major land resource areas of the United States, Caribbean, and the Pacific Basin. Washington (DC): USDA Agricultural Handbook 296.

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Table 1. Seed collection locations of Tober Germplasm Virginia wildrye in Minnesota, North Dakota, and South Dakota. USDA-NRCS Bismarck, ND.

<b>Accession</b>	<b>State</b>	<b>County</b>	<b>Accession</b>	<b>State</b>	<b>County</b>
9092247	MN	Clay	9094275	ND	Kidder
9092250	MN	Aitkin	9094276	ND	Griggs
9092251	MN	Mille Lacs	9094278	ND	Nelson
9092253	MN	Aitkin	9094309	ND	McHenry
9092254	MN	Sherburne	9094310	ND	McLean
9092255	MN	Sherburne	9094323	ND	McKenzie
9092256	MN	Aitkin	9094324	ND	Golden Valley
9094261	MN	Rice	9094325	ND	Burleigh
9094277	MN	Polk	9094327	ND	Renville
9094283	MN	Marshall	9094328	ND	Bottineau
9094284	MN	Marshall	9094329	ND	Mountrail
9094285	MN	Red Lake	9094330	ND	Ward
9094300	MN	Douglas	9092257	SD	Beadle
9094301	MN	Wadena	9094263	SD	Clay
9094302	MN	Beltrami	9094264	SD	Clay
9094303	MN	Norman	9094265	SD	Yankton
9094307	MN	Carlton	9094266	SD	Union
9094311	MN	Yellow Medicine	9094273	SD	Hanson
9094312	MN	LacQuiParle	9094274	SD	Dewey
9094313	MN	Sherburne	9094286	SD	Corson
9094316	MN	Pipestone	9094287	SD	Jackson
9094317	MN	Murray	9094288	SD	Custer
9094318	MN	Cottonwood	9094289	SD	Harding
9094319	MN	Redwood	9094290	SD	Shannon
9094320	MN	Lyon	9094291	SD	Mellette
9094321	MN	Lincoln	9094292	SD	Perkins
9094326	MN	Lac Qui Parle	9094293	SD	Fall River
9092245	ND	Richland	9094294	SD	Stanley
9092246	ND	Cass	9094295	SD	Butte
9092249	ND	Morton	9094296	SD	Lawrence
9092252	ND	Walsh	9094297	SD	Roberts
9092259	ND	Emmons	9094298	SD	Roberts
9092260	ND	Logan	9094299	SD	Big Stone
9094262	ND	Morton	9094304	SD	Hutchinson
9094267	ND	Oliver	9094305	SD	Hand
9094268	ND	Mercer	9094308	SD	Grant
9094269	ND	Mercer	9094314	SD	Brookings
9094270	ND	Dunn	9094315	SD	Minnehaha
9094271	ND	Stark	9094322	SD	Marshall

Table 2. Forage quality estimates of Tober Germplasm, ‘Mandan’ Canada wildrye and a commercial source of Virginia wildrye. USDA-NRCS Bismarck, ND.

Forage quality estimates	Cultivar/Germplasm		
	Tober Germplasm	Mandan <sup>1/</sup>	MN Source <sup>2/</sup>
	-----%-----		
Crude protein	10	10	10
In vitro true digestibility	64	70	67
Total digestible nutrients	55	57	57
Acid detergent fiber	43	41	40
Neutral detergent fiber	71	68	66
Relative feed value	73	78	81

<sup>1/</sup>*Elymus canadensis*; <sup>2/</sup>Minnesota source of Virginia wildrye obtained from Kaste Seed Inc., Fertile, MN.

Table 3. Field planting trial locations of Tober Germplasm Virginia wildrye in Minnesota, North Dakota and South Dakota.

State	County	Location	Soil Series	Soil Texture	MLRA
SD	Gregory	SE1/2 Sec 2-T95N-R70W	Jansen	Loamy	
SD	Roberts	NE1/4 Sec 26-T126N-R50W	Forman/Aastad	Loamy	102A
SD	Yankton	NE1/4 NE1/4 Sec 13-T95N-R55W	CLA	Loamy	102B
SD	Sanborn	Sec 18-T108N-R61W-Sec 18	Eec	Loamy	
SD	Todd	SW1/4 Sec 20-T36N-R27W	Ronson-Anselmo	Fine Sandy Loam	66
SD	Lyman	SW1/4 Sec2-T103N-R79W	Millboro	Silty Clay	63B
ND	Slope	N1/2 Sec 32-T135N-R100W	Vebar/Flasher	Fine Sandy loam	54
ND	Towner	Sec 20-T163N-R66W	Hamerly Barnes	loam	55A
ND	Stutsman	Sec 8-T138N-R64W	Barnes Buse	loam	55B
ND	Morton	Sec 28-T137N-R85W			54
MN	Mahnomen	Sec 4-T143N-R41W	Vallers	Clay loam	102A
MN	Mahnomen	Sec 23-T145N-R42W	Hamerly-Vallers	fine loamy	102A
MN	Benton	Sec 14-T38N-R29W	C48A C74A	Loam	

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**Approvals for the release of Tober Germplasm Virginia wildrye, *Elymus virginicus* L.:**

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