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Registration of WS4U and WS8U Switchgrass Germplasms

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Two upland switchgrass (*Panicum virgatum* L.) germplasm pools, WS4U (Reg. no. GP-92, PI 639191) and WS8U (Reg. no. GP-93, PI 639192), were released cooperatively on 18 July 2002 by the University of Wisconsin, University of Nebraska, and the USDA-ARS, Lincoln, NE. These germplasms were developed as source material to be used in developing cultivars with increased biomass yield and geographic adaptation for bioenergy production in USDA hardiness zones 3 and 4 in the northern USA and similar geographic regions of southern Canada. WS4U is a tetraploid ($2n = 4x = 36$) and WS8U is an octoploid ($2n = 8x = 72$).

Spaced-plant nurseries were established at Arlington and Marshfield, WI, using switchgrass seedlings from 135 germplasm sources. Plant spacing was 0.9 by 0.9 m. Twenty seedlings of each germplasm source were transplanted at each location in spring 1997. The germplasm sources consisted of 21 cultivars or experimental populations and 114 plant introductions from USDA-NPGS-GRIN. All but 13 of the plant introductions were collected from prairie remnants in eastern South Dakota. The experimental design was a randomized complete block with four replicates and five plants per plot. Plants were visually evaluated for vigor, lodging resistance, large stem size, and rust (caused by *Puccinia* spp.) reaction in 1998 and 1999.

A third nursery was established at Marshfield in 1998 using 56 plants each of 41 germplasm sources. The germplasm sources consisted of 20 cultivars or experimental populations and 21 collections from native prairie remnants in Indiana, Michigan, Minnesota, Ohio, and Wisconsin. Seeds of the prairie remnant populations were collected by USDA-NRCS-PMC personnel in autumn 1997 (Casler, 2005). The experimental design was a randomized complete block with four replicates and 14 plants per plot. Plants were visually evaluated for vigor, lodging resistance, large stem size, and rust reaction in 1999.

In September 1999, 260 plants were selected from the three spaced-plant nurseries. One leaf per plant was sent to the USDA-ARS Forage Research Laboratory, Lincoln, NE, for ploidy level determination by the University of Nebraska's Flow Cytometry Center (Lu et al., 1998). Expected DNA content was 3.0 pg nucleus^{-1} for tetraploids ($2n = 4x = 36$), 4.5 pg nucleus^{-1} for hexaploids ($2n = 6x = 54$), and 6.0 pg nucleus^{-1} for octaploids ($2n = 8x = 72$). The use of DNA content for ploidy classification is less precise than chromosome counts and these classifications should not be taken as a warranty that all plants within each population have the designated euploid chromosome number. Each population may contain aneuploids and/or hexaploids. Based on nuclear DNA content, plants were classified as tetraploid ($n = 162$) or octaploid ($n = 98$). WS4U is composed of six plants from 'Blackwell' (2.90 ± 0.30 pg DNA nucleus^{-1}), one plant from 'Carthage' (3.16), two plants from 'Cave-in-Rock' (2.93 ± 0.46), three plants from 'Falcon' (3.10 ± 0.10), two plants from 'Pathfinder' (3.01 ± 0.25), one plant from 'Shawnee' (3.14), four plants from 'Sunburst' (2.65 ± 0.59), one plant from 'KY1625' (2.87), three plants from germplasm in the USDA breeding program at Lincoln, NE (3.10 ± 0.15), six plants from NRCS collections (3.11 ± 0.22), and 133 plants from USDA-NRCS Plant Introductions originating from southeastern South Dakota (2.87 ± 0.37). WS8U is composed of two plants from Blackwell (6.24 ± 0.15), 12 plants from Carthage (6.04 ± 0.59), 14 plants from Cave-in-Rock (6.08 ± 0.46), two plants from 'Dacotah' (6.34 ± 0.05), one plant from 'Forestburg' (6.35), two plants from Pathfinder (6.32 ± 0.49), seven plants from Shawnee (5.93 ± 0.50), three plants from 'Shelter' (6.13 ± 0.13), one plant from Sunburst (6.24), two plants from 'Trailblazer' (6.26 ± 0.03), four plants from 'KY1625' (6.16 ± 0.39), 19 plants from germplasm in the USDA breeding program at Lincoln, NE (5.94 ± 0.58), 12 plants from NRCS collections (6.15 ± 0.47) (Casler, 2005), and 17 plants from USDA-NRCS Plant Introductions originating from southeastern South Dakota (5.47 ± 0.72).

Selected plants were transplanted into a tetraploid (WS4U) or octaploid (WS8U) crossing block in early May 2000. Crossing blocks were well watered and fertilized with 112 kg N ha^{-1}. Seed was harvested from each plant in September 2000. Threshed and cleaned seed from each plant was bulked in equal quantities to create the WS4U and WS8U germplasm pools.

Seeds of these two germplasms were deposited in the National Plant Germplasm System. Seed samples (~1000 seeds) of each germplasm will be distributed on written or email request to M.D. Casler, USDA-ARS, U.S. Dairy Forage Research Center, Madison, WI 53706–1108 (mdcasler@wisc.edu).

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