

### Registration of P-7 Bluebunch Wheatgrass Germplasm

P-7 bluebunch wheatgrass [*Pseudoroegneria spicata* (Pursh) A. Löve] germplasm (Reg. no. GP-7, PI 619629) was released 28 Feb. 2001 as a selected class of Certified seed (genetically manipulated track). This class of prevaryety germplasm is eligible for seed certification under guidelines developed by the Association of Seed Certifying Agencies (2001). Participating in the release are USDA-ARS and the Utah Agricultural Experiment Station.

P-7 is a multiple-origin polycross generated by intermating 23 open-pollinated, native-site collections and two cultivars from Washington, Oregon, Nevada, Utah, Idaho, Montana, and British Columbia. Breeder seed of P-7 was bulked across the 25 populations in direct proportion to their seed yield in 1995 in a replicated test at the Utah State University Blue Creek Farm, Box Elder County, UT (Larson et al., 2000). Two of the populations are the cultivars Whitmar and Goldar (both originating in southeastern Washington), released by the USDA-SCS in 1946 and 1989, respectively (Hein, 1958; Gibbs et al., 1991). Whitmar is an awnless cultivar developed from a population collected near Colton, Whitman County, WA, and Goldar is an awned cultivar developed from a population collected near Anatone, Asotin County, WA. Nine of the remaining populations were collected by T.A. Jones (PI 537368, Pollock, ID; PI 537370, Riggins, ID; PI 598821, Wawawai Park, WA; PI 537374, Steptoe Butte, WA; PI 537375, Durkee, OR; PI 537378, Lone Mountain Junction, NV; PI 516185, Seneca, OR; PI 537388, Dayton, WA; PI 563870, Green Canyon, UT), seven by K.H. Asay (PI 563872, New Meadows, ID; PI 563867, Colton, WA; PI 563868, Wawawai Road, WA; PI 563874, Wawawai Park, WA; PI 562050, Wawawai Park, WA; PI 598816, Connell, WA; PI 562056, Lind, WA), and seven were obtained from miscellaneous sources (PI 595192, Wawawai Road, WA; PI 595193, Almota Road, WA; PI 595196, Darby, MT; PI 236670, Slocan, BC; P-3, Grande Ronde River, OR; P-5, unknown; KJ-10, Salina Canyon, UT). Twenty-four of the constituent populations are diploid ( $2n = 2x = 14$ ) and one (PI 537374) is tetraploid ( $2n = 4x = 28$ ). The inclusion of the tetraploid PI 537374 in the polycross was inadvertent. The representation of this tetraploid is expected to decline dramatically through generations of seed increase. Therefore, P-7 can be considered to be predominantly diploid, the dominant ploidy level of bluebunch wheatgrass.

P-7 is intended to provide genetic diversity within a single germplasm for semiarid to mesic sites where bluebunch wheatgrass was an original component of the vegetation. Bluebunch wheatgrass is a cross-pollinated species widely distributed in the Intermountain West. The proportion of total nucleotide variation among the two cultivars of this species ( $G_S = d_A/d_{XY}$ ) was 0.07 (Larson et al., 2000), an order of magnitude lower than reported among northern California populations of self-pollinating purple needlegrass [*Nassella pulchra* (Hitcch.) Barkworth] (Larson et al., 2001). P-7 was developed to reflect the large proportion of genetic variation packaged within natural bluebunch wheatgrass populations, e.g., 93% within Whitmar and Goldar, as well as the small proportion of genetic variation typically found between natural populations, e.g., 7% between Whitmar and Goldar (Larson et al., 2000). Six-

teen of the P-7's 25 component populations are predominately awned and 9 are predominately awnless (Larson et al., 2000). Because the awnless state is dominant and the awned state is recessive in bluebunch wheatgrass and its relatives (Jones et al., 1991), P-7 individuals are predominately awnless.

More amplified fragment length polymorphic (AFLP) alleles (99) were found to be unique to P-7, i.e., present in P-7 but absent in Goldar and Whitmar, than were found to be unique to Whitmar (59) or Goldar (49) (Larson et al., 2000). P-7 also had fewer fixed loci (233) than Whitmar (385) or Goldar (318). Overall nucleotide-sequence diversity [ $\pi \pm SE(1000)$ ], i.e., within-population variation, was greater for P-7 ( $38.7 \pm 1.6$ ) than for Whitmar ( $34.2 \pm 1.5$ ) or Goldar ( $33.9 \pm 1.5$ ). Average net nucleotide-sequence divergence ( $d_A$ ), i.e., between-population variation, was  $0.3 \pm 0.2$  between P-7 and Goldar,  $1.3 \pm 0.2$  between P-7 and Whitmar, and  $2.6 \pm 0.3$  between Goldar and Whitmar. Therefore, P-7 is genetically intermediate between the two cultivars but more similar to Goldar than to Whitmar.

G-0 (the separate 25 populations), G-1 (first intermating), and G-2 (second intermating) generations will be maintained by the USDA-ARS Forage and Range Research Laboratory, Logan, UT. G-2 seed will be made available to growers for production of G-3 and G-4 generations of seed (third and fourth intermating) by the Utah Crop Improvement Association. Sale of P-7 seed beyond generation G-4 is expressly prohibited to limit genetic shift. Small quantities of seed will be provided to researchers upon request to the corresponding author.

T.A. JONES,\* S.R. LARSON, D.C. NIELSON, S.A. YOUNG,  
N.J. CHATTERTON, AND A.J. PALAZZO

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- T.A. Jones, S.R. Larson, D.C. Nielson, and N.J. Chatterton. USDA-ARS Forage and Range Research, Utah State Univ., Logan, UT 84322-6300; S.A. Young, Utah Crop Improvement Association, Utah State Univ., Logan, UT 84322-4820; A.J. Palazzo, U.S. Army Cold Regions Research and Engineering Laboratory, 72 Lyme Road, Hanover, NH 03755-1290. Utah Agric. Exp. Stn. Journal Article no. 7437. Registration by CSSA. Accepted 28 Feb. 2002. \*Corresponding author (tomjones@cc.usu.edu).