# *Registration of Germplasms*

## REGISTRATION OF *AGROPYRON REPENS* × *A. SPICATUM* GERMPLASMS RS-1 and RS-2[1]

**(Reg. No. GP11 and GP12)**

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THE RS-1 (GP11) and RS-2 (GP12) germplasms were developed by the Crops Research Laboratory, AR-SEA-USDA, in cooperation with the Agricultural Experiment Station at Utah State Univ. and released to breeders in April, 1980.

The two hybrid populations are characterized by the vigor and productivity of *Agropyron repens* and attributes of *A. spicatum* that are associated with its adaptation to semiarid range. The RS-1 population is essentially caespitose, with very limited rhizome development; the RS-2 population has moderate rhizomes. Both germplasms will probably be best adapted for range seedings in the 30- to 45-cm precipitation zones and for hay or pasture under irrigation.

The initial cross was made in 1962 between a local strain of hexaploid (2n = 42) *Agropyron repens* (L.) Beauv. (quackgrass) and two accessions of tetraploid (2n = 28) *A. spicatum* (Pursh) Scribn. & Smith (bluebunch wheatgrass).[3] The $F_1$ hybrid had 2n-35 chromosomes, and although meiotically irregular, it was partially fertile so that generation advance was accomplished without chromosome doubling. Mass selection from the $F_1$ to $F_5$ generation effectively improved the fertility and general vigor of the population. Selection was restricted to plants with characteristics of both parent species and plants with excessive rhizome development were excluded. More intense selection was initiated in the $F_5$ generation, and progenies of 170 selected $F_6$ or $F_7$ clonal lines were evaluated on representative semiarid range sites.

The parental clones of the RS-1 and RS-2 populations were selected on the basis of general vigor, degree of spread, leafiness, forage yield, seed yield, and seed quality. Polycross progenies from the 12 $F_6$ or $F_7$ clones with the highest selection index and rhizome development of less than 0.25 m per year were blended to form the RS-1 composite. The 10 best-performing lines with annual rhizome growth of from 0.3 to 0.5 m were selected for the parentage of RS-2.

The chromosome number of RS-1 and RS-2 stabilized at 2n = 42 and meiotic stability and good fertility have been achieved. Rate of phenological development is intermediate to that of the parental species. Date of bloom at Logan ranges from mid to late June. Average seed yields of the parental clones in trials near Logan (42 cm annual precipitation) were 28 and 26 g per spaced plant for RS-1 and RS-2, respectively. The base population from which the parental clones were selected averaged 15 g of clean seed per plant.

The degree of rhizome development is under genetic control and is responsive to selection pressure. Annual rhizome growth among clones in the $F_6$ or $F_7$ generation ranged form 0.1 to 0.6 m per year, with 63% of the lines averaging 0.25 m or less. On a surface mine reclamation site near Decker, Mont. (30 cm annual precipitation), forage yields of the hybrid were equivalent to those of crested wheatgrass or Russian wildrye and significantly higher than most of the other 60 Triticeae species and hybrids in the trial, including western wheatgrass, beardless wildrye, slender wheatgrass, bluebunch wheatgrass, and thickspike wheatgrass. Significant genetic variation also exists in the populations for general vigor and forage yield, suggesting excellent opportunity for continued selection. Preliminary data from feeding and grazing trials indicate that the hybrid is readily accepted by sheep and cattle. In vitro digestibility and crude protein content were intermediate to the parental species.

Seed of RS-1 and RS-2 will be produced and maintained by the AR-SEA-USDA Crops Research Laboratory in cooperation with Utah State Univ. Limited quantities of each germplasm release can be obtained upon request to K. H., Asay or D. R. Dewey, Crops Research Laboratory, Utah State Univ. (UMC-63), Logan, UT 84322. A written agreement will be expected from recipients to give recognition of the source when either germplasm release contributes to the development of new hybrid or cultivar.

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[3] Dewey, D. R. 1976. Derivation of a new forage grass from *Agropyron repens* × *Agropyron spicatum* hybrids. Crop Sci. 16:175-180.

## REGISTRATION OF BARLEY COMPOSITE CROSSES XXXVII-A, -B, AND -C

**(Reg. Nos. GP55 to GP57)[1]**

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THREE barley (*Hordeum vulgare* L.) populations, designated Composite Crosses XXXVII-A, XXXVII-B, and XXXVII-C, have been released by AR-SEA-USDA, to provide a diverse gene pool with possible new gene combinations for disease resistance.

Composite Crosses XXXVII-A, -B, and -C originated from crosses between male lines that are wild relatives of barley having excellent disease resistance, and female lines that were genetically male sterile. The male parents were 19 *H. spontaneum* (C. Koch) lines, each having resistance to leaf rust, incited by *Puccinia hordei* Otth, powdery mildew, incited by *Erysiphe graminis* (DC.) Merat *hordei* Em. Marchal, and scald, incited by *Rhynchosporium secalis* (Oud.) J. J. Davis, as determined in our greenhouse tests or reported from field data. The female lines were genetic male sterile stocks "124" and "128" (Hockett et al., 1968)[3], and the male-sterile diploid plants from balanced tertiary trisomic "75a msg 16." Stocks 124 and 128 contain the male-sterile gene "msg 1 ca" (formerly called ms 1). The following crosses were made at Beltsville, Md: In 1977, male-sterile plants of either stock 124 or 128 were hand pollinated with pollen from each of the 19 *H. spontaneum* lines to produce $F_1$ seed. In 1978, pollen from $F_1$ plants was used to hand pollinate male-sterile diploid plants from 75a msg 16 and male-sterile plants from stocks 124 and 128. The three way cross seed with 75a msg 16 as a parent were individually space planted at Aberdeen, Idaho in 1978. Harvest at Aberdeen was delayed and those plants having the shattering phenotype similar to that of the *H. spontaneum* parents were noted. Plants derived from three way cross seed with stocks 124 and 128 as parents in both crosses were screened for resistance to leaf rust, powdery mildew, and scald and the most resistant plants were grown in the greenhouse at Beltsville and harvested in 1979. In 1979, the following mechanical mixtures were seeded and designated Composite Crosses XXXVII-A, -B, and -C:

CC XXXVII-A (GP55). Developed by mechanically mixing seed harvested from nonshattering plants grown at Aberdeen, Idaho in 1978. The progeny of each male *H. spontaneum* was equally represented in the population. This mixture was grown in the spring nursery at Aberdeen in 1979. CC XXXVII-A is the harvested seed of this mixture and predominantly has the spring growth habit.

CC XXXVII-B (GP56). Developed by mechanically mixing the seed harvested from all of the plants (shattering and nonshattering) grown at Aberdeen in 1978. The progeny of each male *H. spontaneum* was equally represented in the population. CC XXXVII-B should contain genes that are linked to the shattering genes which may have been lost from CC XXXVII-A with selection for the nonshattering phenotype. This mixture was grown in the spring nursery at Aber-

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[3]Hockett, E. A., R. F. Eslick, D. A. Reid, and G. A. Wiebe. 1968. Genetic male sterility in barley. II. Available spring and winter stocks. Crop Sci. 8:754-755.