1A.1D were transferred to durum wheat by backcrosses and electrophoretic screening. During the transfer, in two independent cases (1A.$1D_{5+10}$-5 and 1A.$1D_{2+12}$-5, UCRD01-3 and UCR01-6, respectively), the *Glu-D1* locus translocated spontaneously from chromosomes 1A to chromosomes 1B. The pedigree of UCRD01-1 is Rhino 1A.$1D_{5+10}$-2/'Monroe'/4*WB881, of UCRD01-2 is Rhino1A.$1D_{5+10}$-4/Monroe//3*WB881; of UCRD01-3 is Rhino1A.$1D_{5+10}$-5/Monroe//3*WB881 and UCRD01-4 is Rhino1A.$1D_{5+10}$-6/Monroe//3*WB881. The pedigrees of the two germplasms with translocations of *Glu-D1a* are Rhino1A.$1D_{2+12}$-2/3*WB881 and Rhino1A.$1D_{2+12}$-5/3*WB881 for UCRD01-5 and UCRD01-6, respectively.

Despite a single round of homeologous recombination that was employed in the production of the original 1A.1D translocations in Rhino, all introgressions of 1DL present in the six lines of durum wheat here are interstitial. This is presumably because chromosomes 1D present in Rhino were in fact spontaneously recombined 1D.1A translocations, with terminal segments of 1D replaced by corresponding segments of 1A. Consequently, all distal breakpoints among the three 1A.$1D_{5+10}$ chromosomes should be identical; the proximal breakpoints are likely different.

In preliminary tests, introduction of *Glu-D1* into durum wheat was associated with improvements in bread-making quality. These improvements ranged from approximately 12 to 600% depending on the levels of the parameters tested in the original recipient lines, with low quality recipients showing the most dramatic improvements. The parameters of pasta quality did not appear to be affected to a readily detectable extent.

Introduction of fragments of chromosome 1D into durum wheat may be associated with yield reduction in the recipient lines. However, this reduction appears dependent both on the translocation itself as well as on the recipient line. Among several durum wheats tested in the preliminary screening, WB881 showed the highest yield reductions and 'Turbo' the least; among the translocations tested, 1A.$1D_{2+12}$-2 in cv. Turbo did not affect yield. These observations suggest that it may be possible to select appropriate genetic backgrounds in which the 1A.1D translocations present in the registered lines do not affect yield.

Spontaneous transfers of *Glu-D1* to 1B allow the development of durum wheats with four doses of *Glu-D1*. However, serious yield reduction was observed in both lines with the spontaneous transfers of *Glu-D1* to chromosome 1B and the first lines with four doses of *Glu-D1* appeared unsuitable for commercial use.

Small quantities of seed of these lines can be obtained for research and breeding purposes from the author.

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Registration of RS-H Hybrid Wheatgrass Germplasm

RS-H hybrid wheatgrass (*Elymus hoffmannii* Jensen & Asay) germplasm (Reg. no. GP-8, PI 631392) was developed by the USDA-ARS, Forage and Range Research Laboratory in cooperation with the Utah Agricultural Experiment Station and released on 10 May 2002. It was derived from a collection made in 1979 by J. A. Hoffmann (USDA-ARS, Logan, UT) and R. J. Metzger (USDA-ARS, Corvallis, OR) from the edge of a wheat field approximately 56 km northwest of Eleskirt, Erzurum Province, Turkey. The original seedlot, MH-114-1085, described in the collection notes as *Agropyron* sp., was identified as quackgrass [*Elymus repens* (L.) Gould, (= *Agropyron repens* (L.) P. Beauv. and *Elytrigia repens* (L.) Nevski] (D.R. Dewey, unpublished). It was included in the National Plant Germplasm System as *Elytrigia repens* (PI 593438).

Although the original collection was predominantly rhizomatous, approximately 5% of the plants were nearly caespitose. In 1984, open-pollinated (OP) progenies from these caespitose plants were subjected to a cycle of mass selection for bunch-type growth habit to generate a cycle-1 breeding population. In 1988, controlled crosses were made among 20 selections from 1260 cycle-1 plants. These parental plants were selected on the basis of caespitose growth habit, vegetative vigor, leafiness, seed set, plant color, and freedom from plant pests. Space-planted nurseries of cycle-2 progeny were established at Nephi, UT (2400 plants; mean annual precipitation 350 mm) and at Evans research farm near Logan, UT (3000 plants; mean annual precipitation 425 mm) in 1993 and 1995, respectively. In 1997, OP seed was harvested from 24 plants from the Nephi and 28 plants from the Logan nurseries that were selected for improved seed yield, individual seed weight, and seedling emergence from deep (7.6 cm) plantings. Plants with reduced vigor and rhizome development were removed before anthesis during cycle 3. In 1998, 100 plants from each of 52 cycle-3 half-sib families were established at Evans research farm near Logan, UT, and evaluated for bunch-type growth habit, vegetative vigor, leafiness, plant color, seed yield, individual seed weight, and seedling emergence. On the basis of superior performance, OP seed of 60 plants (cycle-4 selections) were established in a 1360-plant nursery at Evans research farm near Logan, UT, in 1999. Inferior plants (20%) were rouged before pollination in 2001. On the basis of total seed yield (g), seed of the top 30 plants (cycle-5 selections) was bulked and designated as Breeder seed.

RS-H is cytologically similar to and interfertile with the cultivar NewHy (Asay et al., 1991; Jensen and Asay, 1996), which is an advanced-generation hybrid between quackgrass and bluebunch wheatgrass [*Pseudoroegneria spicata* (Pursh) A. Löve]. Results from morphological and cytological studies of NewHy, RS-H, quackgrass, and their hybrids indicate that RS-H originated from a natural hybrid between quackgrass and an Asian relative of bluebunch wheatgrass (Jensen and Asay, 1996). Because of its morphological divergence from quackgrass and similarity to NewHy, both RS-H and NewHy are now classified as a new species, *Elymus hoffmannii* (Jensen and Asay, 1996). As with NewHy, RS-H has a chromosome number of $2n = 6x = 42$ and a genomic constitution of **StStStStHH**. Genetic interchange likely occurred between the **St** genomes of the two parental species.

RS-H is less rhizomatous (58 vs. 83 cm), taller in stature (1007 vs. 934 mm), and has longer flag leaves (213 vs. 164 mm) than NewHy. Its rate of phenological development is similar to NewHy with anthesis occurring from mid- to late-June in nurseries near Logan, UT. RS-H is fully fertile and produces from 350 to 450 kg ha^{-1} of seed under limited irrigation on semiarid sites. The germplasm has shown tolerance to salinity that is comparable to NewHy, but less than tall wheatgrass [*Thinopyrum ponticum* (Podp.) Barkworth & D. R. Dewey]. Observed genetic variation within RS-H should allow selection for improved salinity tolerance.

On a saline site near Roosevelt, UT, forage yields of RS-H were similar to NewHy, tall wheatgrass, and intermediate wheatgrass and significantly greater than Russian wildrye [(*Psathyrostachys juncea* (Fisch.) Nevski], 'Garrison' creeping foxtail (*Alopecurus arundinaceus* Poir), Great Basin wildrye [*Leymus cinereus* (Scribn. & Merr.) A. Löve], and Altai wildrye [*Leymus angustus* (Trin.) Pilger]. Under irrigation, it yielded significantly less than orchardgrass (Dactylis glomerata L.), tall fescue (*Festuca arundinacea* Schreb.), or meadow brome (*Bromus riparius* Rehm.) (Jensen et al., 2001); however, it is significantly more resistant to drought than these grasses (Jensen et al., 2001; Waldron et al., 2002). Forage quality of RS-H is comparable to NewHy. It begins growth early in the spring and its leaves remain green and succulent longer in the growing season than most other wheatgrasses.

Seed of RS-H is maintained by the USDA-ARS, Forage and Range Research Laboratory, Utah State University, Logan, UT 84322-6300, and 25-g seed lots will be provided to researchers and other interested parties on request. This germplasm qualifies for commercial production in accordance with the "Tested Class Pre-variety Germplasm Certification Standards" adopted by the Association of Official Seed Certifying Agencies (AOSCA, 2001). Seed of this germplasm has been provided to the National Plant Germplasm System, where it will be made available for research purposes, including the development and commercialization of new cultivars. It is requested that appropriate recognition be given if this germplasm contributes to the development of a new breeding line or cultivar.

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PARENTAL LINE

Registration of Dw 89 and Dw 271 Dwarf Parental Lines of Sunflower

Two dwarf sunflower (*Helianthus annuus* L.) parental lines, Dw 89 and Dw 271, were jointly developed and released by the Institute for Sustainable Agriculture (CSIC) and the Center of Agricultural Research and Development (CIFA-Junta Andalucía) at Córdoba, Spain, in 1998. Dw 89 (Reg. no. PL-74, PI 631495) is an oilseed maintainer parental line near isogenic to the maintainer parental line HA 89 (PI 599773). Dw 271 (Reg. no. PL-75, PI 631496) is an oilseed restorer parental line near isogenic to the restorer parental line RHA 271 (PI 599786). Both parental lines are characterized by reduced plant height compared with their respective near-isogenic lines. Height of Dw 89 and Dw 271 was reduced by approximately 59 and 46%, respectively, compared with HA 89 and RHA 271.

Dw 89 and Dw 271 were developed by introgressing genes for reduced plant height from the dwarf line 'Donsky' into parental lines HA 89 and RHA 271, respectively. Donsky was obtained from the Institute for Field and Vegetable Crops, Novi Sad, Yugoslavia, and has been described elsewhere (Miller and Hammond, 1991). HA 89 is an oilseed maintainer line released by the Texas Agricultural Experiment Station and the USDA-ARS in 1971. RHA 271 is an oilseed restorer line released by the Texas Agricultural Experiment Station and the USDA-ARS in 1973. The initial crosses were made in 1989. F_1 plants which exhibited a semidwarf phenotype were backcrossed to the recurrent parents HA 89 and RHA 271. In each backcross generation, semidwarf heterozygotes were identified and backcrossed to the recurrent parents. During breeding, strong selection was made against a low head angle and low degree of autonomous seed set, characteristics exhibited by Donsky. Dw 89 and Dw 271 were released as BC_5F_6–derived BC_5F_7 parental lines. Dw 89 was converted to cytoplasmic male sterility (PET1 cytoplasm) by backcrossing with CMS HA 89. Height of Dw 89 was 51.3 ± 3.9 cm, compared with 125.5 ± 7.6 cm for HA 89. Dw 89 had a head diameter of 12.7 ± 2.2 cm, a stem diameter of 2.1 ± 0.3 cm, and 27.0 ± 2.5 leaves per plant, which did not differ significantly from HA 89. Dw 271 had a plant height of 64.2 ± 5.0 cm, compared with 119.6 ± 7.4 cm for RHA 271. Dw 271 had a head diameter of 8.2 ± 1.1 cm, a stem diameter of 1.8 ± 0.3 cm, and 21.4 ± 1.7 leaves per plant, which did not differ significantly from RHA 271.

Hybrids derived from the two dwarf parental lines were compared with those derived from their standard-height near-isogenic lines. Four hybrids were produced by crossing CMS HA 89 and CMS Dw 89 with RHA 271 and Dw 271. Eight hybrids were produced by crossing the CMS lines of HA 124 (PI 599775), HA 290 (PI 552935) (Fick et al., 1979a), HA 303 (PI 552941) (Fick et al., 1979b), and HA 821 (PI 599984) (Roath et al., 1986) with the restorer lines RHA 271 and Dw 271. Ten hybrids were produced by crossing the CMS lines of HA 89 and Dw 89 with the restorer lines RHA 274 (PI 599759) (Fick et al., 1975), RHA 279 (PI 599763), RHA 299 (PI 599767) (Fick et al., 1979b), RHA 856 (NSSL 202860) (Roath et al., 1987), and R7, the latter released in 1986 by INIA, Spain. The hybrids were evaluated in replicated rainfed trials at Córdoba, Spain, in 2000 and 2001.

The dwarf hybrids developed from both dwarf parents averaged 64.9 cm, compared with 159.9 cm for the standard-height near-isogenic hybrids. Hybrids between one dwarf and one standard-height parent were intermediate in height (semidwarf). The heights of semidwarf hybrids produced with Dw 271 and a set of CMS lines were reduced by 25% compared with the near-isogenic standard-height hybrids produced with RHA 271. The heights of semidwarf hybrids produced with CMS Dw 89 and a set of restorer lines were reduced by 27% compared with the near-isogenic standard-height hybrids produced with CMS HA 89. Semidwarf hybrids had larger stem