Registration of Maize Germplasm Line GEMS-0002

GEMS-0002 (Reg. no. GP-400, PI 632413) is a maize (Zea mays L.) partially inbred germplasm line released by The Ohio State University (OSU) Ohio Agricultural Research and Development Center (OARDC) in accordance with the Germplasm Enhancement of Maize (GEM) protocol (Pollak, 2003). GEMS-0002 was released in March 2002 for use in the development of genetically diverse, elite, maize parental lines.

An S₁ breeding line (OSU 43-2) was selected from GEM breeding population FS8A(S):S09 using pedigree selection methods. FS8A(S) is a synthetic population released by the University of Florida in 1988. Its pedigree consists of approximately 35% southeastern United States, 23% U.S. Corn Belt, and 42% tropical maize germplasm (Horner, 1990). S09 is an Iowa Stiff-Stalk Synthetic (BSSS)-related proprietary inbred. Thus, the source population was estimated to be comprised of approximately 62% Corn Belt Dent germplasm (50% BSSS-related, plus an additional 11.5% diverse Corn Belt Dent containing a high proportion of inbred C103A), 17.5% southeastern U.S., and 21% tropical maize germplasm. FS8A(S) was noted in earlier research (Dudley et al., 1996) as a population containing favorable alleles not present in elite Corn Belt hybrids. Breeder seed was increased by controlled full-sib pollination of nearly 200 S₁ plants in the 2002 OSU nursery. Seed for distribution was increased by controlled full-sib pollination at the USDA-ARS nursery in Ames, IA, during 2003 and 2004.

GEMS-0002 is an S₂ bulk composite that relates back to the S₁ line OSU 43-2, theoretically 75% homozygous. According to GEM protocol (Pollak, 2003), S₂ lines displaying agronomic variation are selected for release so that further inbreeding and selection may be practiced.

Several thousand plants from the GEM FS8A(S):S09 breeding population were grown at the OARDC in 1997 and 441 S₁ progenies were produced by self-fertilization of S₁ plants. The progenies were planted in single-row plots in the 1998 field nurseries in Iowa and Ohio. Two plants were self-pollinated per row and visual selection for agronomic traits was undertaken at both locations. Additionally, selection for resistance to green-snap was practiced in Iowa, and selection for resistance to Cercospora zeae-maydis (Tehon & Daniels) infection (causal agent of gray leaf spot) and to infestation of tassels by corn leaf aphids [Ropalosiphum maidis (Fitch)] was practiced in Ohio. Postharvest selection for good ear fill, sound kernels, and absence of ear rot occurred at both locations. S₂ progeny lines (70 from Iowa and 100 from Ohio) were planted in the winter (1998–1999) topcross isolation nursery and testcrosses were made using the elite proprietary inbred LH185, a non-BSSS related line.

Performance trials were conducted in 1999 at Limagrain Genetics test-sites near Savoy and Clay City, IL; Hedrick, IA; and Shelburn and Worthington, IN; as well as at USDA-ARS sites near Carroll, Crawfordsville, and Rippey, IA; and at OSU sites near Custar, South Charleston, and Wooster, OH. The exceptionally early maturity and all-around agronomic quality of the original seed source trials were conducted in 2001 at USDA-ARS test-sites near Custar, South Charleston, and Wooster, OH. The exceptionally early maturity and all-around agronomic quality of the experimental entries yielding 10,128 kg ha⁻¹ was noted in earlier research (Dudley et al., 1996) as a population containing favorable alleles not present in elite Corn Belt that of the commercial checks' mean (1 vs. 3% and 9 vs. 9% kernel, and absence of ear rot occurred at both locations. S₂ GEMS-0002 is a prolific line that displays upright, dark tassels by corn leaf aphids [Ropalosiphum maidis (Fitch)] was practiced in Ohio. Postharvest selection for good ear fill, sound kernels, and absence of ear rot occurred at both locations. S₂ GEMS-0002 is a prolific line that displays upright, dark kernels, and absence of ear rot occurred at both locations.

Crossing experiments were conducted with the OSU 43-2 line and testcrosses with OSU 43-2 had an average of 200 vs. 225 g kg⁻¹ and 0.05 = 10 g kg⁻¹ for both the testcrosses and commercial checks of tests. Stalk lodging was approximately equal to that of the commercial checks' mean (1 vs. 3% and 9 vs. 9% kernel, and absence of ear rot occurred at both locations. S₂ GEMS-0002 is a prolific line that displays upright, dark kernels, and absence of ear rot occurred at both locations.

Mid-silk date of GEMS-0002 is approximately 3 to 4 d earlier than that of B73 in Ohio across three locations in the eastern U.S., and 21% tropical maize germplasm. FS8A(S) was noted in earlier research (Dudley et al., 1996) as a population containing favorable alleles not present in elite Corn Belt hybrids. Breeder seed was increased by controlled full-sib pollination of nearly 200 S₁ plants in the 2002 OSU nursery. Seed for distribution was increased by controlled full-sib pollination at the USDA-ARS nursery in Ames, IA, during 2003 and 2004. GEMS-0002 is an S₂ bulk composite that relates back to the S₁ line OSU 43-2, theoretically 75% homozygous. According to GEM protocol (Pollak, 2003), S₂ lines displaying agronomic variation are selected for release so that further inbreeding and selection may be practiced.

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