Registration of Acid Soil Tolerant Maize Populations SA-3 and SA-8

Populations SA-3 (Reg. no. GP-317, PI 584439) and SA-8 (Reg. no. GP-318, PI 584440) of maize (Zea mays L.) were developed by the South American Regional Maize Program of the International Maize and Wheat Improvement Center (CIMMYT) in collaboration with national agricultural research programs in South America and Asia and were released in 1993. SA-3 and SA-8 silk in about 56 to 58 d and can be harvested in about 110 to 115 d after planting in the nonacidic tropical lowland environments. SA-3 has yellow semiflmt grains and SA-8 has white semiflmt grains. These populations possess a broad genetic base and have high grain yield potential in acid (pH < 5.6; Al saturation > 35%; and P < 15 mg kg⁻¹) and nonacid fertile soils.

The germplasm included in SA-3 and SA-8 was selected from a total of 192 cultivars from Mexico, Colombia, Peru, Bolivia, and Thailand, grown in 40 and 80% Al saturation field plots at Santander de Quilichao, Colombia, in 1977 (1). Germplasm from CIMMYT, Mexico, included 37 cultivars homozygous for the recessive allele at the brachytic-2 (br) locus and with hard endosperm, 34 experimental cultivars from 28 tropical and subtropical maize populations, 25 full-sib (FS) families from Tuxpeño-1, 9 FS families from La Posta, and 8 FS families from Compuesto Seleccion Precoc. Twenty-six cultivars homozygous for the recessive allele at the brachytic-2 (br) locus and six double-cross hybrids from Instituto Colombiano Agropecuario (ICA) and 18 br cultivars from the Centro Internacional de Agricultura Tropical (CIAT) were from Colombia. Twenty-two tropical yellow-endosperm cultivars were from Peru and five white-endosperm cultivars were from Bolivia. Suwan-1 was the only cultivar from Thailand.

The population underwent 16 cycles of selection, using a modification of modified ear-to-row (MER) selection for tolerance to acid, high Al saturation soils (1). Cycle 16 (C₁₆) of the population was named SA-3. During each cycle of selection, 120 half-sib families were planted as single rows (females) in each of 40 and 80% Al saturation plots, in a ratio of two females to one male. The male was a composite prepared by mixing = 50 kernels from each ear, selected from high-yielding families and plants in the previous cycle. For cycle 8 (C₈), 18 collections from the Cateto race from Brazil were introgressed into the population.

After 16 selection cycles, the MER breeding method was replaced with FS family selection. The C₈ cycle of MER selection constituted C₀ of FS selection. Four cycles of FS selection have been completed. During each cycle of selection, 250 FS families were evaluated in replicated trials in four to five edaphic environments in South America and Asia, both in acid and nonacidic plots. Using an index based on grain yield, plant height, ear height, days to 50% silking, ear rot resistance, and reaction to foliar diseases, about 25 to 30 superior FS families were selected during each cycle.

During C₁ of FS selection of SA-3, 500 Sₐ plants were selfed and white-endosperm kernels were selected from 87 segregating ears. The kernels were planted ear-to-row, and plant-to-plant crosses were made among rows. At harvest, 99 ears with white-endosperm kernels were selected. During the next season, seed from selected ears was planted ear-to-row, and 8 plants were selfed in each of 50 selected rows. At harvest, 163 Sₐ ears with white-endosperm kernels were selected. During the following season, seed from the 163 Sₐ ears was planted ear-to-row, and plant-to-plant crosses made among superior 50 Sₐ families. At harvest, 20 seeds from each of 256 selected ears were bulked to produce C₀ of SA-8.

During 1992–1993, C₀ of FS selection of SA-3 and C₀ of SA-8 were evaluated in replicated trials in two acid soil environments in Colombia, one acidic site in Indonesia, and one fertile environment each in Colombia and Thailand. One acid-soil-tolerant Brazilian maize cultivar (CMS-36) and two nontolerant tropical maize cultivars (Suwan-1 and Tuxpeño Sequía) were included as checks. Populations SA-3 (2.82 Mg ha⁻¹) and SA-8 (2.76 Mg ha⁻¹) outyielded (P < 0.01) Tuxpeño Sequía (1.08 Mg ha⁻¹) and Suwan-1 (1.61 Mg ha⁻¹) across the three acid sites. SA-3 and SA-8 yielded more (P < 0.05) than the tolerant check, CMS-36 (1.91 Mg ha⁻¹) across the same environments. On fertile soils, SA-3 (6.63 Mg ha⁻¹) and SA-8 (6.53 Mg ha⁻¹) outyielded (P < 0.05) Tuxpeño Sequía (6.11 Mg ha⁻¹) and Suwan-1 (5.47 Mg ha⁻¹). Plant and ear height, days to 50% silking, and tolerance to diseases, insects, and lodging in SA-3 and SA-8 are comparable with that of standard maize hybrids and open-pollinated cultivars grown under nonacidic fertile soils in the tropics.

Both populations can be used for further improvement by research institutions, directly or in crosses with local germplasm. Small quantities (100 gm) of seed of C₀ or C₈ of SA-3 and C₀ or C₈ of SA-8 can be obtained from the corresponding author. We request that appropriate recognition be given to CIMMYT when the populations contribute to research or the development of new cultivars.

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References and Notes
2. G. Granados, CIMMYT, Apdo. Postal 6-641, Mexico 06600 D.F., and S. Pandey and H. Ceballos, CIMMYT, A.A. 6713, Cali, Colombia. Accepted 30 Nov. 1994. *Corresponding author (Email: ceballos@cimmyt.org).

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Registration of KS93WGRC27 Wheat Streak Mosaic Virus Resistant T4DL-4Aii2S Wheat Germplasm

KS93WGRC27 (Reg. no. GP-416, PI 583794) is a hard red winter wheat (Triticum aestivum L.) germplasm line homozygous...