Registration of RSSSCC₆ and RBS10C₆ Maize Germplasm

RSSSCC₆ (Reg. no. GP-326, PI 587157) and RBS10C₆ (Reg. no. GP-327, PI 587158) are recurrently selected maize (Zea mays L.) synthetics developed by the Illinois Agricultural Experiment Station of the University of Illinois, Urbana, IL. The two synthetics were released on 3 Nov. 1994 for their potential value in U.S. maize breeding programs. Both synthetics have been used as recurrent inbred testers developed from the other population. Both synthetics were selected in a high-yield environment (1,2) for grain yield and standability. In addition to the recurrent selection program in a high-yield environment, both synthetics have been mass selected for multiple leaf and stalk rot diseases. RSSSCC₆ and RBS10C₆ could serve as a good source of genes for improving inbreds derived from Stiff Stalk Synthetic and Lancaster backgrounds for grain yield and multiple disease resistance, respectively.

For each cycle of selection, about 250 hybrid families were grown in the nursery with about 20 plants in rows spaced 76 cm and 5.3 m long, for a total plant population of about 5000. All plants were inoculated in the leaf whorl at the five- to seven-leaf stage. Inoculum contained ground leaf tissue collected from diseased plants the previous year, along with various other maize leaf pathogens grown on sterilized oats. Each cycle of selection began with 1500 plants; the highest number of disease lesions were removed from each row leaving 10 to 15 plants row⁻¹. At anthesis, most remaining plants (approximately 2000 in total) were self-pollinated. Each self-pollinated plant was rated for percent leaf area blighted in mid-August and in mid-September in each cycle, and the data were used to select plants with the highest level of multiple leaf disease resistance.

The self-pollinated plants in each row were inoculated 10 to 20 d after anthesis with a spore suspension according to the procedures of White (3). The suspension contained spores of Stenocarpella maydis (Berk.) Sutton, Diplodia maydis (Berk.) Sacc., C. graminicola (Ces.) G.W. Wils., Gibberella zeae (Schweinitz) Petch., and Fusarium moniliforme J. Shield. At harvest, stalks were split below the ear, scored for number of internodes discolored, and rated using a visual estimate of the total pith area discolored.

Based on multiple leaf blight and stalk rot ratings, plants with the highest levels of resistance to multiple leaf and stalk rot diseases were selected within a row. Usually, 40 to 50 rows were discarded and one or two plants in the remaining 200 rows were selected in each cycle. S₁ seed from selected plants was used to make up testcross seed for testing in a high-yield environment for grain yield, ear length, and stalk lodging. Plant and ear characters of RBS10C₆ were similar to Co. However, plant height is taller by 24 cm and ear height is higher by 6 cm in RBS10C₆, indicating later maturity than Co. Grain moisture at harvest is 2.6% higher in RBS10C₆ than in Co, indicating that C₆ is later in maturity than Co.

Synthetic RBS10 was derived from BS10(FS)C₇₆ x BSSS(Si)C₇₆ (5). Full-sib reciprocal recurrent selection was used, using BS11 synthetic as the tester (6). RBS10 was developed using full-sib reciprocal recurrent selection to develop C₇₆ with RBS10 synthetic. Mass selection for multiple leaf disease resistance showed a 71% in C₇₆ to 37% in Co for per se evaluations and from 64% to 37% in the population cross. Stalk lodging decreased from 14.2% in C₇₆ to 8.1% in Co and from 6.3% in C₇₆ for the population cross. Plant and ear traits of RSSSCC₆ are similar to Co. However, plant height is taller by 24 cm and ear height is higher by 6 cm in RSSSCC₆, indicating that C₆ is later in maturity than Co.

Cycles 0, 2, 4, and 6 of RBS10 per se and of population crosses with RSSSC were evaluated at 39 locations in the U.S. Corn Belt in 1991 and 1992. Grain yield increases through six cycles of selection for RBS10 were 0.19 Mg ha⁻¹ (3 bu acre⁻¹) for the population cross and 0.14 Mg ha⁻¹ (2.5 bu acre⁻¹) for the population cross. Grain yield of RBS10 per se decreased over the six cycles from 7.12 Mg ha⁻¹ to 6.37 Mg ha⁻¹ (15.9 bu acre⁻¹ to 14.1 bu acre⁻¹). A decrease in grain yield was observed in the population cross, with an average yield of 7.12 Mg ha⁻¹ (15.9 bu acre⁻¹) in Cycle 0 decreasing to 6.40 Mg ha⁻¹ (14.4 bu acre⁻¹) in Cycle 6. Mass selection for multiple leaf disease resistance showed a reduction in area blighted for RBS10 per se from 40% to 35% in C₆ and a decrease in multiple stalk rots (based on percentage of pith area discolored). For population crosses, the percentage of pith area discolored decreased from 40% to 35% in C₆. Plant and ear traits of RBS10C₆ are similar to Co, except for greater plant height (15 cm) and ear height (6 cm) in RBS10C₆. Grain moisture at harvest for RBS10C₆ is 3% higher than for Co, indicating later maturity.

Breeder seed of RSSSCC₆ and RBS10C₆ are available in 500-kernel lots from the author.

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References and Notes