Registration of EL53 Sugarbeet Germplasm with Smooth-Root and Moderate Resistance to Rhizoctonia Crown and Root Rot

Sugarbeet (Beta vulgaris L.) germplasm EL53 (Reg. No. GP-258, PI 641927) was developed by the USDA-ARS, East Lansing, MI, in cooperation with the Beet Sugar Development Foundation, Denver, CO. EL53 was released in December 2005 and shares common ancestry with previously released USDA-ARS smooth-root (SR) germplasm releases (Theurer, 1993; Saunders et al., 1999; 2000a; 2000b; McGrath, 2003; McGrath and Lewellen, 2004) with two cycles of selection for freedom from crown and root rot disease caused by Rhizoctonia solani Kühn (AG2–2). Previous low soil tare releases have been uniformly susceptible to Rhizoctonia crown and root rot, and the moderately resistant germplasm EL52 (Saunders et al., 2003) was used as a source of resistance during the development of EL53. EL53 was developed at the USDA-ARS Sugarbeet and Bean Research Unit, East Lansing, MI, by J.M. McGrath. EL53 has shown good agronomic performance, and it is expected to be a resource for developing low soil tare parental lines for hybrid cultivars with economically recoverable levels of sucrose. The smooth-root character is desirable because less soil adheres to the root surface at harvest, which results in lower soil tare weights, less tare dirt disposal costs, and reduced spread of pathogen infected soils (Theurer, 1993).

EL53 is diploid self-sterile with predominantly red hypocotyls (>80% red) and segregates for monogerm seed type as well as the smooth-root trait. EL53 has a complex pedigree involving seven previously released smooth-root germplasm lines, two unreleased smooth-root breeding populations, and three traditional East Lansing germplasm releases. Most (59%) of EL53’s parentage stems from smooth rooted materials. Specifically, contributors and their proportional contribution to EL53 are as follows: SR90 (PI 607899), 6%; SR95 (PI 603947), 3%; SB123 (PI 589073), 5%; SB124 (PI 628273), 3%; EL204 (PI 632750), 9%; EL50 (PI 589073), 9%; EL52 (PI 628274), 15%, and USH20 (PI 631354), 18%. Two breeding populations were also used: 99J19–00 (3%) and 99J31–00 (12%). These two breeding populations were derived from mother roots simultaneously selected at East Lansing over two cycles for smooth-root and Rhizoctonia crown and root rot resistance, originating from separate F1 populations of pair crosses between breeding lines 95H07 as the smooth-root donor and GP-258, PI 641927) was developed by the USDA-ARS, East Lansing, MI, by J.M. McGrath. EL53 was released as a germplasm source for breeders to use in developing parental lines, primarily pollinators, combining smooth-root with higher levels of Rhizoctonia crown and root rot resistance than is currently available in smooth-root material. EL53 also contains a series of useful characters at low allele frequencies derived from EL53’s components, such as those necessary to breed for seed parents used to create cytoplasmic male sterility-mediated hybrids as well as the Rz1 source of rhizomania resistance. Seed will be available for use by writing to Dr. J. Mitchell McGrath, USDA-ARS, 494 PSSB, Michigan State University, East Lansing, MI 48824–1325 (mitchmcg@msu.edu). Genetic material of this release has been deposited in the National Plant Germplasm System where it will be available for research purposes, including development and commercialization of new cultivars. It is requested that the author be notified if this germplasm contributes to the development of a new breeding line or cultivar. U.S. Plant Variety Protection will not be requested for EL53.

EL53 is being released as a germplasm source for breeders to use in developing parental lines, primarily pollinators, combining smooth-root with higher levels of Rhizoctonia crown and root rot resistance than is currently available in smooth-root material. EL53 also contains a series of useful characters at low allele frequencies derived from EL53’s components, such as those necessary to breed for seed parents used to create cytoplasmic male sterility-mediated hybrids as well as the Rz1 source of rhizomania resistance. Seed will be available for use by writing to Dr. J. Mitchell McGrath, USDA-ARS, 494 PSSB, Michigan State University, East Lansing, MI 48824–1325 (mitchmcg@msu.edu). Genetic material of this release has been deposited in the National Plant Germplasm System where it will be available for research purposes, including development and commercialization of new cultivars. It is requested that the author be notified if this germplasm contributes to the development of a new breeding line or cultivar. U.S. Plant Variety Protection will not be requested for EL53.

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