REGISTRATION OF GENETIC STOCKS

REGISTRATION OF GENETIC STOCK OF OAT (LAO-456-MUT-01) WITH MONSTER-PLANT TRAITS

Genetic stock LAO-456-MUT-01 (Reg no. GS-1, PI 546363) is a monster oat (Avena sativa L.) developed at Agriculture Canada, Lacombe Research Station, Lacombe, AB, and released in 1990. It was found as a spontaneous mutant in an F2 population generated from a cross between Tibor and OT 745. Tibor is a hulless oat cultivar cultivated for production in eastern Canada (1). OT 745 is an experimental line developed at the Lacombe Research Station. This genetic stock was released because it may be useful as a marker in genetic studies and also in physiological studies of growth and development in oat.

Typical plants of LAO-456-MUT-01 are phenotypically indistinguishable from normal oat plants until about Growth Stage 61 on Zadoks' scale (2). Thereafter, they tend to be more vigorous than normal oat plants and grow to a height of >1.75 m under field conditions (normal height of Tibor is 1.25 m). In growth chambers (18 °C day, 15 °C night temperatures; 16-h light period; and photosynthetic photon flux density of =400 μE m⁻² s⁻¹ at leaf level), they grow to a height of >2.0 m.

Distinguishing characteristics of genetic stock LAO-456-MUT-01 include drooping and proliferous panicles; very long rachis; extended pedicels; twisted peduncle; very long, wide, and thick leaves; long internodes; unusually thick culms; delayed anthesis and ripening; partial sterility; restricted tillering; and high bio-mass yield. Anthesis in LAO-456-MUT-01 occurs =40 d later than Tibor under field conditions and =45 d later than Tibor when the two genotypes are grown in growth chambers. Anthers of LAO-456-MUT-01 produce few pollen grains. Microsporogenesis is normal, but seed set of LAO-456-MUT-01 with natural self-pollination and with hand cross-pollination using it as a pollen source indicate reduced male fertility. Seeds of LAO-456-MUT-01 and Tibor germinate equally.

To determine whether the monster plant traits in LAO-456-MUT-01 are genetically transmitted, F2, F4, and F7 populations were developed by single-seed descent using 20 kernels harvested from the original F2 plant. All progeny lines in these populations were true breeding and presumably homozygous for the monster plant traits. Cytological studies of meiosis and mitosis of LAO-456-MUT-01 and standard oat cultivars (Tibor and OT 745) revealed that aneuploidy or other forms of chromosomal aberration were not involved in the expression of the monster plant traits. Genetic analysis of progeny from a cross between 'Cascade' and LAO-456-MUT-01 gave a good fit to 3:1 (normal/mutant) ratio, suggesting that the morphological abnormalities of LAO-456-MUT-01 are conditioned by a single recessive gene.

The unique characteristics of LAO-456-MUT-01 are similar to the abnormalities observed in M-7060 (3). M-7060 is a monster mutant that was found in an F2 population of the cross R.L.2278/624-4-1. The symbol 'gr-2' was assigned to the gene conditioning the abnormal genotype (gr-2/gr-2) of M-7060. The allelic relationship of the monster plant gene in LAO-456-MUT-01 and M-7060 could not be established because M-7060 had low fecundity and the line was lost in the late 1980s (F.W. Zillinsky, personal communication). It is proposed that the symbol 'gr-2' be retained to identify the monster plant gene in M-7060, and the symbol 'gr-3' be assigned to the gene in LAO-456-MUT-01.

Seed of LAO-456-MUT-01 is stored at the Plant Gene Resources of Canada, Plant Research Centre, Agriculture Canada, Ottawa K1A 0C6 and at the USDA National Seed Storage Laboratory, Colorado State University, Fort Collins, CO 80523. Small amounts of seed of LAO-456-MUT-01 can be obtained upon written request to the author.

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References and Notes


REGISTRATION OF FOUR PAIRS OF ‘MAPLE PRESTO’ DERIVED SOYBEAN GENETIC STOCKS

EIGHT SOYBEAN [Glycine max (L.) Merrill] germplasm lines, OT89-08 to OT89-15 (Reg. no. GS-10 to GS-17) (PI 546046 to PI 546053), were developed by Agriculture Canada, Plant Research Centre, Ottawa, ON, and released in 1989. The eight genetic stocks are near-isogenic lines of ‘Maple Presto’ (MG 000). They are divided in four pairs, one for each of the loci controlling stem growth habit (Dt, dt,), nodulation response (Rj, rj,) and leaf abscission (Ab, ab). Each pair consists of a homozygous dominant and a homozygous recessive F2 or F3 bulk-derived line obtained from mixing an equal amount of seed from each of ~20 BC2F2 or BC2F3, full-sib lines identified to be either homozygous dominant or homozygous recessive, respectively. Each matched pair of near-isogenic lines was derived from the same BC2F2 or BC3F3 plant. They can be used in agronomical or physiological studies where background genetic differences have to be minimal. The very early maturity of Maple Presto enables their use in short-growing season areas.

Each pair of germplasm lines was obtained by visually selecting a single recessive plant in the F2 and backcrossing it to the recurrent parent. After the last backcross, a heterozygous F2 plant was selected and the other two sister lines were derived from it. OT89-08 and OT89-09 were derived from the cross L67-153/7*Maple Presto, with L67-153 being a determinate (dt) ‘Harosoy’ near-isogenic line. OT89-08 and OT89-09 are indeterminate (Dt) and determinate, respectively. OT89-10 and OT89-11 were obtained from the cross OX611/8*Maple Presto, with OX611 being a narrow leaflet (Ln) line developed by Agriculture Canada, Harrow Research Station, using ‘SRF200’ as the source of narrow leaflet. OT89-10 and OT89-11 are ovate leaflet (Ln) and narrow leaflet, respectively. OT89-12 and OT89-13 originated from the cross L64-2671/7*Maple Presto. L64-2671 is a Harosoy near-isogenic line (sister line of L65-1274) carrying the nonnodulating (rj) allele. OT89-12 and OT89-13 are nodulating (Rj) and nonnodulating, respectively. OT89-14 and OT89-15 derived from the cross ‘Kingwa’/7*Maple Presto, with Kingwa showing delayed leaf abscission (ab) on ripening.