Registration of Multicarpellate, Mob-headed, and Viridis Euphorbia lagascae L.
Genetic Stocks: mcp, mob, vir, idmcp, idmob, idvir, and idmcpvir

Three dehiscent and four indehiscent Euphorbia lagascae L. (vernin spurge) genetic stocks were developed, with unique mutant traits not present in wild accessions of this oilseed plant species: mcp (Reg. no. GS-1, PI 604650), mob (Reg. no. GS-2, PI 604652), vir (Reg. no. GS-3, PI 604654), idmcp (Reg. no. GS-4, PI 604651), idmob (Reg. no. GS-5, PI 604653), idvir (Reg. no. GS-6, PI 604655), and idmcpvir (Reg. no. GS-7, PI 604656). Genetic stocks with multicarpellate, mob-headed and viridis characteristics were developed cooperatively by Centro de Investigación y Desarrollo Agroalimentario at Murcia, Spain, and Institut für Pflanzenbau und Pflanzenzüchtung at the University of Göttingen, Germany. The development of this germplasm was conducted through the SONCA (Seed Oils New Chemical Applications) project (AGRE-CT/90-0039) of the ECLAIR (European Collaborative Linkage of Agriculture and Industry through Research) program of the European Economic community, with joint release in 1997.

Mutagenic treatments were applied to a wild population of E. lagascae from southeastern Spain. Ungerminated seeds were presoaked for 12 h at room temperature (20–22°C) in a thin layer on wet filter paper. Seed lots were submersed in solutions of ethyl methanesulfonate (EMS) (CH3SO3C2H5) for 2 to 6 h, using a concentration between 0.4 and 1% EMS at pH 7. Seeds were then thoroughly washed in running tap water for 12 h and surface-dried prior to sowing. A second mutagenic treatment was applied in the same way to seed from the M2 generation of unselected plants.

Multicarpellate mutants (mcp, idmcp, idmcpvir) have a mixture of 3-seeded (51.1%), 4-seeded (46.8%), and 5-seeded (0.3%) capsules instead of the 100% 3-seeded capsules of wild types. No differences in plant growth or flowering were detected between the mutants and wildtypes. This material will be useful in genetic studies for an oilseed species to determine the potential effect of this yield component on seed and/or oil yield.

The multicarpellate character is controlled by a single recessive gene (1). Single mutant plants were selected in M2 generations, after the first or the second EMS treatments. Selection of individual mutant lines was continued using the pedigree method. The dehiscent multicarpellate genetic stock mcp is a bulk of 17 lines (M5-1, M5-2, M5-3, M5-4, M6-1, M6-2, M6-3, M6-4, M6-5, M35-1, M35-2, M35-3, M35-4, M72, M75, N1, and N11). The indehiscent multicarpellate idmcp is a bulk of seven F2 plants (F2-1, F2-2, F2-3, F2-4, F2-5, F2-6, and F2-7) from a cross between indehiscent and multicarpellate parents and three M2 plants (M7-1, M7-2, and M7-3) selected in both cases for having the two characters simultaneously. On average, seed oil content (430 g kg⁻¹), vernolic acid (632 g kg⁻¹) in the fatty acid profile, and 1000-seed weight (12 g) did not differ from wild accessions.

Mob-headed mutants (mob, idmob) have five to nine branches from the main stem instead of three branches present in wild types. No differences in plant growth or flowering were detected among mutant genotypes, 10 indehiscent and mob-headed plants (F2-24, F2-25, F2-26, F2-27, F2-28, F2-29, F2-30, F2-31, F2-32, and F2-33) were selected and bulked to produce the idmob germplasm. Seed oil content averaged 452 g kg⁻¹, and the oil averaged 628 g kg⁻¹, comparable in both cases to wild types.

Plants of viridis mutants have a pale green color (as opposed to the purple shade of wild types and other mutants) early after seed germination and therefore could be useful as markers. Flower manipulation and emasculation of vernin spurge are extremely difficult because latex is released, covering the plant and preventing (or hindering) pollination.

The viridis character is controlled by a single recessive gene and so can be used as a marker for crossing. When a viridis plant is used as a female parent with a nonviridis plant as the male parent without emasculation, the viridis character is absent in any resulting hybrid genotype and is characterized by gray seeds instead of brown. No differences in plant growth or flowering were detected in comparison with wild types. One mutant plant of the M2 generation after the second EMS treatment was used for further selection under the pedigree method.

The genetic stock vir is derived from one indehiscent and viridis (pale green color) parent (F2-22) and 10 indehiscent (F2-24, F2-25, F2-26, F2-27, F2-28, F2-29, F2-30, F2-31, F2-32), selected in the F2 generation from crosses and the idmob germplasm. Finally, one phenotype showed viridis (indehiscent, viridis, and multicarpellate) characters in the same way to develop the idmcpvir germplasm.

Small quantities of seed will be available through the USDA National Plant Germplasm System (www.ars-grin.gov/npgs). It is asked that appropriate recognition of the source be made when these stocks contribute to advancing research involving E. lagascae.

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References and Notes

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