Registration of a Sunflower Germplasm Resistant to Rust, Downy Mildew, and Virus

Sunflower (Helianthus annuus L.) germplasm line, TX16R (Reg. no. GP-305, PI 642072), resistant to sunflower rust (caused by Puccinia helianthi Schw.), downy mildew [caused by Plasmopara halstedii (Farl.) Berl. & de Toni in Sacc.], and Sunflower mosaic virus (SuMV, Potyviridae) were cooperatively developed and released by the USDA-ARS and the North Dakota Agricultural Experiment Station, Fargo, ND, in 2005. A population of wild H. annuus designated as ‘Texas-16’ (TX16) was collected near Runn, TX, in 1999, and was found to possess resistance to sunflower rust, downy mildew, and SuMV. In recent years, the discovery of new downy mildew and rust races capable of infecting resistant sunflower hybrids is accelerating at an alarming rate (Labrouhe et al., 2000; Molinera-Ruiz et al., 2002; Sendall et al., 2006). TX16R should provide new and total resistance genes for existing North American (NA) races of these two major sunflower diseases and also provide protection if SuMV becomes economically important in sunflower production areas.

TX16 plants were first evaluated for resistance to a mixture of NA downy mildew isolates. The resistant plants were then inoculated with a mixture of NA rust isolates and SuMV. The mixtures of downy mildew and rust isolates represent all major NA races which will infect all commercial hybrids. Plants resistant to all three pathogens were pollinated with the commonly used inbred line HA 89 (PI 599773), and the resistant F1 plants were sib-pollinated to produce SIB F2. Resistant F2 families were identified and the bulked F4 seeds of 30 F3 families form the release TX16R, with a pedigree of TX16/HA 89/TX16/HA 89, F4. Inheritance studies suggested that the resistance of each of the diseases is under the control of a single gene(s), and are at different loci.

TX16R is homozygously resistant to all known sunflower downy mildew and rust races and SuMV. TX16R is branched, flowers in 80 d, with a plant height of 114 cm, segregating for black and gray-mottle seed coat color, with a 1000-seed weight of 4.3 g, and 64% self-pollinated seed set.

Limited quantities of seed of the TX16R germplasm are available on request from the corresponding author for 5 yr. Recipients of seed are asked to make appropriate recognition of the source of the germplasm if it is used in the development of a new cultivar, hybrid, germplasm, parental line, or genetic stock.

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References


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