RELEASE OF FOUR OIL SUNFLOWER MAINTAINER AND RESTORER LINES

The United States Department of Agriculture, Agricultural Research Service (USDA-ARS) announces the release of four oil sunflower maintainer and restorer lines.

Rust caused by the fungus *Puccinia helianthi* and downy mildew (DM) caused by the obligate pathogen *Plasmopara halstedii* are two of the most important yield-limiting sunflower diseases globally. There has been a long history of using resistant varieties or hybrids to control rust and DM in sunflower. However, resistance is generally not durable due to the emergence of new pathotypes that overcome current resistance sources. Stacking more than one resistance gene (R gene) in a hybrid is expected to considerably extend the durability of resistance due to the low probability of the pathogen being able to overcome multiple resistance genes at the same time. HA-R14, HA-R15, HA-R16, and HA-R17 were developed to pyramid different rust resistance genes, with the first three also combining DM resistance genes, providing multiple and durable resistance to both rust and DM.

HA-R14 is a F₃-derived F₄ maintainer selection from the cross of HA-R3 and RHA464. HA-R3 (PI 650754) is an oilseed maintainer line resistant to rust released by USDA and the North Dakota Agricultural Experiment Station in 1985. The rust resistance gene (R gene) in HA-R3 was named R₄ and mapped to linkage group (LG) 13 of the sunflower genome. RHA464 (PI 665015) is an oilseed restorer line released by USDA-ARS and the North Dakota Agricultural Experiment Station in 2010 resistant to all North America rust and downy mildew (DM) races identified so far. The DM and rust resistance genes in RHA 464 were named *PlA* and *R₁₂* and mapped to LGs 1 and 11 of the sunflower genomes, respectively. HA-R14 was developed by the pedigree breeding method and DNA marker-assisted selection for pyramid of the rust R genes R₄ from HA-R3 and R₁₂ from RHA 464 and the DM R gene *PlA* from RHA 464. The F₃-derived HA-R14 is homozygous for the both the rust R genes, R₄ and R₁₂, and DM R gene *PlA* verified by DNA markers, and is resistant to all known races of North American sunflower rust and all known races of the pathogen causing DM.
HA-R15 is a F₃-derived F₄ maintainer selection from the cross of HA-R2 and RHA 464. HA-R2 (PI 650753) is an oilseed maintainer line resistant to rust released by USDA and the North Dakota Agricultural Experiment Station in 1985. The rust resistance gene in HA-R2 was named Rs and mapped to LG2 of the sunflower genome. RHA 464 is described above. HA-R15 was developed by the pedigree breeding method and DNA marker-assisted selection for pyramiding of the rust R-genes Rs from HA-R2 and R₁₂ from RHA 464 and the DM R gene PIA,₁₂ from RHA 464. The F₃-derived HA-R15 is homozygous for both the rust R genes, Rs and R₁₂, and DM R gene PIA,₁₂ verified by DNA markers, and is resistant to all known races of North American sunflower rust and all known races of the pathogen causing DM.

HA-R16 is a F₃-derived F₄ restorer selection from the cross of RHA 397 and RHA 464. RHA 397 (PI 597374) is an oilseed restorer line resistant to rust released by USDA and the North Dakota Agricultural Experiment Station in 1997. The rust resistance gene in RHA 397 was named R₁₃b and mapped to LG13 of the sunflower genome. RHA 464 is described above. HA-R16 was developed by the pedigree breeding method and DNA marker-assisted selection for pyramiding of the rust R genes R₁₃b from RHA 397 and R₁₂ from RHA 464 and the DM R gene PIA,₁₂ from RHA 464. The F₃-derived HA-R16 is homozygous for both the rust R genes, R₁₃b and R₁₂, and DM R gene PIA,₁₂ verified by DNA markers, and is resistant to all known races of North American sunflower rust and all known races of the pathogen causing DM.

HA-R17 is a F₃-derived F₄ restorer selection from the cross of RHA 397 and HA-R8. HA-R8 (PI 607511) is an oilseed restorer line resistant to rust released by USDA and the North Dakota Agricultural Experiment Station in 2001. The rust resistance gene in HA-R8 was named R₁₅ and mapped to LG8 of the sunflower genome. RHA 397 is described above. HA-R17 was developed by the pedigree breeding method and DNA marker-assisted selection for pyramiding of the rust R-genes R₁₃b from RHA 397 and R₁₅ from HA-R8. The F₃-derived HA-R17 is homozygous for both the rust R genes, R₁₃b and R₁₅, verified by DNA markers, and is resistant to all known races of North American sunflower rust.

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