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AGRICULTURAL EXPERIMENT STATION
FARGO, ND

NOTICE OF RELEASE OF Rf GIG2-MAX, Rf GIG2-GRO, Rf GIG2-ANG, AND Rf GIG2-ATR, OIL SUNFLOWER

The genetic base of the commercial sunflower crop is very narrow, especially its dependence on a single female cytoplasm, PET1, and a few fertility restoration genes for global hybrid production. New sources of cytoplasmic sterility and fertility restoration genes will reduce the genetic vulnerability of commercial sunflower hybrids. Helianthus species, the crop wild relatives of sunflower are native to North America and distributed over a large geographic area providing a readily available resource for broadening the genetic base and reducing the genetic vulnerability of commercial sunflower hybrids. New cytoplasmic male sterility often appears after several backcrosses to cultivated sunflower while conducting interspecific gene transfer. Corresponding fertility restoration genes are often identified among male-fertile progenies or from other sources derived from wild Helianthus. New CMS sources and corresponding restoration gene combination will provide unique genetic variation for breeders to incorporate into elite populations and parental lines, reducing the genetic vulnerability of the current commercial sunflower hybrids.

Four fertility restoration lines, Rf GIG2-MAX, Rf GIG2-GRO, Rf GIG2-ANG, and Rf GIG2-ATR for CMS GIG2 were first observed in F1 progeny after pollination with four interspecific amphiploids, AMP H. maximiliani/P21, AMP H. grosseserratus/P21, AMP H. angustifolius/P21, and AMP H. atrorubens/P21. Rf GIG2-MAX, Rf GIG2-GRO, Rf GIG2-ANG, and Rf GIG2-ATR are F5 or F6 bulks homozygous for fertility restoration genes for CMS GIG2. Rf GIG2-GRO and Rf GIG2-ANG produce normal plants, while Rf GIG2-MAX and Rf GIG2-ATR produce reduced-vigor plants due to the lack of nuclear vigor restoration genes. CMS GIG2 was crossed with 19 diverse cultivated lines including HA 89 and P21, and the progeny of F1 plants were all male-sterile, indicating that the cultivated parents of the amphiploids did not possess Rf gene for CMS GIG2, and the Rf genes identified were from the respective wild perennial Helianthus species.

Pedigree of Rf GIG2-MAX is CMS GIG2/AMP H. maximiliani/P21//2*HA 89, F6. Rf GIG2-MAX is single headed, plant height of 35 cm, flowers 79 days after planting, head diameter of 2.6 cm, 1000-seed weight of 14.0 grams, open-pollinated seed set 6 percent, and seed beige with black stripes. In comparison, check HA 89 is single headed, plant height of 114 cm, flowers 75 days after

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planting, head diameter of 20.2 cm, seed weight of 80 grams, open-pollinated seed set of 81 percent, and black seed with white stripes.

Pedigree of Rf GIG2-GRO is CMS GIG2/AMP H. grosseserratus/P21//2*HA 89, F5. Rf GIG2-GRO is single headed, plant height of 97 cm, flowers 79 days after planting, head diameter of 13.1 cm, 1000-seed weight of 57 grams, open-pollinated seed set 34 percent, and seed black with white stripes. This compares to check HA 89, which was single headed, plant height of 114 cm, flowers 75 days after planting, head diameter of 20.2 cm, seed weight of 80 grams, open-pollinated seed set of 81 percent, and black seed with white stripes.

Pedigree of Rf GIG2-ANG is CMS GIG2/AMP H. angustifolius/P21//2*HA 89, F6. Rf GIG2-ANG is single-headed, plant height of 127 cm, flowers 82 days after planting, head diameter of 8.3 cm, 1000-seed weight of 43 grams, open-pollinated seed set 16 percent, and black seed with white stripes. In comparison to check HA 89, which was single headed, plant height of 114 cm, flowers 75 days after planting, head diameter of 20.2 cm, seed weight of 80 grams, open-pollinated seed set of 81 percent, and black seed with white stripes.

Pedigree of Rf GIG2-ATR is CMS GIG2/AMP H. atrorubens/ P21//2*HA 89, F5. Rf GIG2-ATR is single headed, plant height of 51cm, flowers 82 days after planting, head diameter of 3.8 cm, 1000-seed weight of 15 grams, open-pollinated seed set 9 percent, and black seed with white stripes. This compares to check HA 89, which was single headed, plant height of 114 cm, flowers 75 days after planting, head diameter of 20.2 cm, seed weight of 80 grams, open-pollinated seed set of 81 percent, and black seed with white stripes.

Fertility restoration lines Rf GIG2-MAX, Rf GIG2-GRO, Rf GIG2-ANG, and Rf GIG2-ATR for CMS GIG2 will be maintained by the USDA-ARS, Fargo, North Dakota with small quantities of seed of each genetic stock available from the North Dakota Foundation Seed Stocks Project, NDSU Dept. 7670, P.O. 6050, Fargo, ND 58108-6050. Seed of these releases will be deposited in the National Plant Germplasm System, where it will be available for research purposes. U.S. Plant Variety Protection will not be requested for Rf GIG2-MAX, Rf GIG2-GRO, Rf GIG2-ANG, and Rf GIG2-ATR.


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Signatures:



Vice President for Agricultural Affairs
North Dakota State University

12/2/16
Date



Deputy Administrator, Crop Production and Protection
Agricultural Research Service, U.S. Department of Agriculture

12/15/16
Date