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UNITED STATES DEPARTMENT OF AGRICULTURE
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and

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION
North Dakota State University
Fargo, ND

NOTICE OF RELEASE OF TWO WHITE COTYLEDON SUNFLOWER GENETIC STOCKS, WC1 and WC2

The appearance of white cotyledons that subsequently produce near normal true leaves and grow to maturity has not been reported previously in sunflower. Two white cotyledon genetic stocks exhibiting cotyledon-specific total chlorophyll deficiency and partial true-leaf chlorophyll deficiency were discovered in an earlier study on cytoplasmic male sterility. These recessive gene-controlled white cotyledon sunflower genetic stocks along with accompanying molecular markers will allow their use by others as a genetic marker, and will further help in understanding the different processes of chlorophyll metabolism and photosynthesis between cotyledons and true leaves in sunflower and other crops.

WC1 and WC2 with white cotyledons were first observed in F₄ progeny of PI 413180/3*HA 89//PI 413180/2*HA 89/2/RHA 801, and PI 413180/4*HA 89//PI 413180/RCMG1/2/RCMG1, respectively. Cotyledons of the F₁ hybrids between the two WC parents had near zero chlorophyll in cotyledons, indicating the gene(s) controlling white cotyledons were at the same locus in both sources. All the F₁ progenies of WC1/HA 89 and WC2/HA 89 were normal with green cotyledons and true leaves, indicating the WC gene(s) were recessive with complete dominance of the normal green cotyledon gene. Both the F₂ progeny of WC1/HA 89 and the test-cross progeny of WC2//WC2/HA 89 suggest single recessive gene control.

Mapping of the white cotyledon gene (*wc*) was conducted in the two populations, WC1 and WC2, each consisting of 90 individuals. The *wc* gene was mapped to linkage group 10 of the sunflower map with three and five SSR markers in the F₂ population and BC₁F₁ population, respectively. SSR marker ORS1088 was the closest flanking marker in the F₂ and BC₁F₁ genetic maps, mapping 12.0 cM and 10.1 cM away from the *wc* gene, respectively, and located on the distal side by the *wc* gene in both genetic maps compared to the reference map.

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WC1 is an F₇ bulk homozygous for the white cotyledon gene with the pedigree of PI413180/3*HA89/3/PI413180/3*HA89//RHA801, F₇. WC1 is nonbranched, plant height of 66 cm, flowers 76 days after planting, and a head diameter of 5.6 cm. Seeds are beige with brown stripes, with a 1000-seed weight of 22 grams, and a seed set of 4%. In comparison, HA 89 is single headed, plant height of 103 cm, 71 days to flowering, head diameter of 19.8 cm. Seeds are black with grey stripes, 1000-seed weight of 75 grams, and a seed set of 70%. WC2 is an F₇ bulk homozygous for the white cotyledon gene with the pedigree of PI413180/4*HA89//PI413180/RCMG1, F₇. WC2 is also nonbranched, plant height of 59 cm, flowers 68 days after planting, and a head diameter of 7.5 cm. Seeds are black with grey stripes, 1000-seed weight of 41 grams, and a seed set of 23%. In comparison, HA 89 is single headed, plant height of 103 cm, 71 days to flowering, head diameter of 19.8 cm. Seeds are black with grey stripes, 1000-seed weight of 75 grams, and a seed set of 70%.

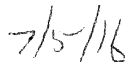
WC1 and WC2 will be maintained by the USDA-ARS, Fargo, North Dakota with small quantities of seed of each genetic stock available from the North Dakota Foundation Seed Stocks Project, NDSU Dept. 7670, P.O. 6050, Fargo, ND 58108-6050. Seed of these releases will be deposited in the National Plant Germplasm System, where it will be available for research purposes. U.S. Plant Variety Protection will not be requested for WC1 and WC2.

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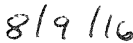
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Date



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



Date