

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Washington, D.C.

and

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

**NOTICE OF RELEASE OF OILSEED SUNFLOWER GERMPLASMS
RHA 472, RHA 473, RHA 474, AND RHA 475**

The United States Department of Agriculture, Agricultural Research Service, and the North Dakota Agricultural Experiment Station, Fargo, ND, announce the release of four oilseed sunflower germplasms in June 2011. These germplasms have been developed to provide diversity for resistance to Sclerotinia head rot [caused by *Sclerotinia sclerotiorum* (Lib.) de Bary], one of the most devastating diseases in sunflower production, and are available for use by industry and public researchers to create parental lines or germplasms.

Germplasm Pedigree Descriptions:

RHA 472 is a F7-derived F8 restorer oilseed sunflower line selected from the cross RHA 801/AS 4379//RHA 439. RHA 801 (PI 599768) is an oilseed restorer line released by the USDA and the North Dakota Agricultural Experiment Station in 1980. RHA 439 (PI 639162) is a Sclerotinia resistant oilseed restorer line released by the USDA and the North Dakota Agricultural Experiment Station in 2003. AS 4379 is a hybrid developed in France by Dr. Philippe Lesigne and entered into the 1995-1996 Food and Agriculture Organization (FAO) Hybrid Sunflower Yield Trial.

RHA 473 is a F7-derived F8 restorer oilseed sunflower line selected from the cross RHA 447//RHA 801/AS 4379. RHA 473 contains genes for high oleic acid composition in the seed oil (89.3 percent oleic acid average in 2010 nursery trials). RHA 447 (PI 639170) is a restorer oilseed line, with high oleic acid content in the seed oil, released by the USDA and the North Dakota Agricultural Experiment Station in 2003. The remaining parents are described above.

RHA 474 is a F7-derived F8 restorer oilseed sunflower line selected from the cross RHA 801/AS 4379//RHA 426. RHA 426 is an imidazolinone herbicide tolerant sunflower line released by the USDA and the North Dakota Agricultural Experiment Station in 2000. The remaining parents are described above. RHA 474 has genes for imidazolinone herbicide tolerance that are sourced from a wild population of herbicide tolerant wild *H. annuus* collected in Kansas and isolated in the development of RHA 426.

RHA 475 is a F7-derived F8 restorer oilseed sunflower line selected from the cross CAR 125/AS 4379//RHA 440/3/RHA 418/RHA 426//YUGO R POP. RHA 418 is a sunflower midge tolerant

restorer oilseed sunflower line released by the USDA and the North Dakota Agricultural Experiment Station in 1998. RHA 440 is a Sclerotinia resistant restorer oilseed sunflower line released by the USDA and the North Dakota Agricultural Experiment Station in 2003. CAR 125 is a short statured hybrid that was entered in the 1999-2000 Food and Agriculture Organization (FAO) Hybrid Sunflower Yield Trial. YUGO R POP is a population of restorer oilseed sunflower obtained through an Office of International Cooperation and Development (OICD) germplasm exchange with Yugoslavia. The remaining parents are described above. RHA 475 has genes for imidazolinone herbicide tolerance that are sourced from a wild population of herbicide tolerant wild *H. annuus* collected in Kansas and isolated in the development of RHA 426.

Sclerotinia Evaluations: Sclerotinia head rot resistance of RHA 472, RHA 473, RHA 474, and RHA 475 was determined by evaluating testcross hybrids of these lines with either HA 412HO (PI 642777) or HA 412 (PI 603993), the former being a BC4-derived, high oleic acid version of the latter. These hybrids were tested at the Carrington Research and Extension Center in Carrington, ND, in 2007, 2009, and 2010; and the Bayer CropScience research station at Sabin, MN in 2009 and 2010 under artificially inoculated conditions. Ascospores of *Sclerotinia sclerotiorum* were sprayed on each head in each plot during bloom, and the plots subjected to mist irrigation to ensure proper conditions for spore germination and infection. Incidence and severity were measured by scoring each individual plant on a 0 to 5 scale for severity (0 for uninfected; 5 for all quadrants of the head infected), and considering any plant with a score of 1 to 5 as being infected in order to determine percentage incidence.

Average incidence of head rot in plots of RHA 472, RHA 473, RHA 474, and RHA 475 was 33.2, 27.6, 36.0, and 19.9 percent, respectively, compared to an average of 56.2 percent for Cargill 270, 32.5 for NK 277, 49.2 for Croplan 305, and 31.8 for Croplan 343 (LSD_{0.05} = 22.6, CV = 45.6 percent). The same hybrids were also evaluated at the Winfield Solutions experiment farm in Crookston, MN, in 2009 under natural conditions. Ascospores from this and surrounding fields infected the plants during and after flowering. The plots were scored for incidence only as a percentage of the plants with *Sclerotinia* infected heads. Incidence on RHA 472, RHA 473, RHA 474, and RHA 475 was 21.4, 73.3, 54.2, and 15.4 percent, respectively, compared to 29.8 percent for Cargill 270, 54.0 for NK 277, 36.2 for Croplan 305, and 23.2 for Croplan 343 (LSD_{0.05} = 31.2, CV = 36.8 percent).

Yield and Agronomic Evaluations: Yield and oil content of RHA 472, RHA 473, RHA 474, and RHA 475 was determined by evaluating testcross hybrids of these lines with HA 412 (or HA 412HO), and HA 445 (PI 639168) at the North Dakota Agricultural Experiment Station Agronomy Seed Farm in Casselton, ND, in 2008, 2009, and 2010; the Carrington Research and Extension Center in Carrington, ND, in 2009 and 2010 (under different field conditions than the *Sclerotinia* head rot tests); and Okaton, SD in 2010. Data on yield at Okaton, SD, in 2010 was not considered in the averages because of poor germination in the plots; however, the oil percentage values are included in the averages. Average yield of testcrosses with RHA 472, RHA 473, RHA 474, and RHA 475 was 2432 kg ha⁻¹ (2171 lbs A-1), 2626 kg ha⁻¹ (2344 lbs A-1), 2072 kg ha⁻¹ (1850 lbs A-1), and 2075 kg ha⁻¹ (1853 lbs A-1), respectively. This compares to the average yield of 2219 kg ha⁻¹ (1981 lbs A-1) for testcrosses with RHA 373 and 2217 kg ha⁻¹ (1979 lbs A-1) for testcrosses with RHA 377 using the same testers (LSD_{0.05} = 264 kg ha⁻¹).

1 (236 lbs A-1); CV = 12.5 percent). Average seed oil content of hybrids with RHA 472, RHA 473, RHA 474, and RHA 475 was 395 g kg⁻¹, 396 g kg⁻¹, 370 g kg⁻¹, and 348 g kg⁻¹, respectively, compared to 385 g kg⁻¹ and 391 g kg⁻¹ for hybrids with RHA 373 and RHA 377, respectively (LSD0.05 = 11 g kg⁻¹; CV = 3.3 percent).

Plant height and days to flowering were measured on the finished germplasms at the PIGA Seeds Homefarm, near El Monte, Chile. RHA 472, RHA 473, RHA 474, and RHA 475 reached 50 percent bloom 67, 67, 71, and 67 days after planting, and grew to 113, 123, 229, and 124 cm in height, respectively. RHA 472, RHA 473, RHA 474, and RHA 475 contain genes for recessive branching and restoration of PET1 male sterile cytoplasm.

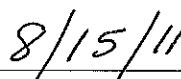
Availability: Small quantities of seed of each germplasm will be available from the North Dakota Foundation Seed Stocks Project, NDSU Dept. 7670, P.O. Box 6050, Fargo, ND 58108-6050. Seed of these releases will be deposited in the National Plant Germplasm System, where it will be available for research purposes. U.S. Plant Variety Protection will not be requested for RHA 472, RHA 473, RHA 474, and RHA 475.

It is requested that appropriate recognition be made if these genetic stocks contribute to the development of a new germplasm, breeding line, or cultivar. These germplasms were developed with support from the National Sclerotinia Initiative, USDA-ARS.

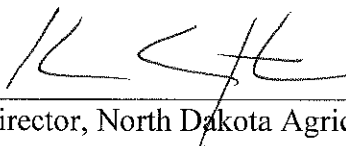
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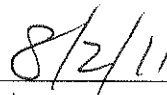
Deputy Administrator, Crop Production and Protection
Agricultural Research Service, U.S. Department of Agriculture



Date



Director, North Dakota Agricultural Experiment Station



Date