

THE UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

Washington, D.C.

and

THE NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

NORTH DAKOTA STATE UNIVERSITY

Fargo, North Dakota

NOTICE OF RELEASE OF FOUR RESTORER (RHA 461 TO RHA 464) SCLEROTINIA TOLERANT OILSEED SUNFLOWER GERMPLASMS

The United States Department of Agriculture, Agricultural Research Service, and the North Dakota Agricultural Experiment Station, Fargo, ND, announce the release of four restorer (RHA 461 to RHA 464) sunflower germplasms. These germplasms have been selected for their tolerance to *Sclerotinia* head rot [caused by *Sclerotinia sclerotiorum* (Lib.) de Bary], a major sunflower disease, and provide diversity for agronomic characteristics. These germplasms are available for use by industry and public researchers to create hybrids, parental lines, or germplasms with increased tolerance to *Sclerotinia* head rot.

RHA 461 is an F₆-derived F₇ maintainer line advanced by pedigree selection from the cross RHA 418/RO 12-13//RHA 274/Dobritch. RHA 418 (PI 607508) is a restorer germplasm line released by USDA and the North Dakota Agricultural Experiment Station in 1999. The hybrid RO 12-13 was developed in Romania and was entered into the 1999 Food and Agriculture Organization (FAO) Hybrid Sunflower Yield Trial. RHA 274 (PI 599759) is a restorer germplasm line released by USDA and the Texas and North Dakota Agricultural Experiment Stations in 1973. The hybrid Dobritch was developed in Bulgaria and was entered into the 1997 Food and Agriculture Organization (FAO) Hybrid Sunflower Yield Trial. The hybrids RO 12-13 and Dobritch were found to be *Sclerotinia* head and stalk rot tolerant in screening nurseries planted in 1999 near Glyndon, MN.

RHA 462 is an F₆-derived F₇ restorer line advanced by pedigree selection from the cross RHA 439/IS PH RES. RHA 439 (PI 639162) is a *Sclerotinia* head rot tolerant restorer germplasm line released by USDA and the North Dakota Agricultural Experiment Station in 2003. IS PH RES is a restorer line population with tolerance to *Phomopsis* stem canker (caused by *Phomopsis helianthi* Munt.-Cvet., et al.) obtained through a germplasm exchange with Dr. Florin Stoenescu, Advanta North America, West Fargo, North Dakota.

RHA 463 is an F₆-derived F₇ restorer line advanced by pedigree selection from the cross RHA 440/PSC 8. RHA 440 (PI 639163) is a restorer germplasm line released by USDA and the North Dakota Agricultural Experiment Station in 2003. PSC 8 is a *Sclerotinia* head rot tolerant restorer line obtained through a germplasm exchange with Dr. Felicity Vear, Station d'Amelioration des Plantes, INRA, Clermont-Ferrand, France.

RHA 464 is an F₆-derived F₇ restorer line advanced by pedigree selection from the cross RHA 418/RHA 419/3/ RHA 801//RHA 365/PI 413047. RHA 418 (PI 607508) is a restorer germplasm line released by

USDA and the North Dakota Agricultural Experiment Station in 1998. RHA 419 (PI 619204) is a restorer germplasm line released by USDA and the North Dakota Agricultural Experiment Station in 1999. RHA 801 (PI 599768) is a restorer germplasm line released by USDA and the North Dakota Agricultural Experiment Station in 1980. RHA 365 (PI 534651) is a Sclerotinia head rot tolerant restorer germplasm line released by USDA and the North Dakota Agricultural Experiment Station in 1988. PI 413047 is a wild *Helianthus annuus* L. accession collected near Slough Bridge, CA, in 1974. PI 413047 and RHA 464 were selected for resistance to the most virulent North American race of rust (caused by *Puccinia helianthi* Schw.), race 777. RHA 464 also has resistance to downy mildew [caused by *Plasmopara halstedii* (Farl.) Berl. & De Toni] races 730, 733, and 770 prevalent in North America and to the French race 304.

The pedigree breeding method was used to develop RHA 461, RHA 462, RHA 463, and RHA 464. RHA 461 to RHA 464 have genes for fertility restoration of the PET1 cytoplasmic male sterility and have upper stem branching conditioned by a recessive gene. Height of RHA 461, RHA 462, RHA 463, and RHA 464 was 105, 122, 125, and 100 cm, respectively, compared with 120 and 100 cm for RHA 439 and RHA 440, respectively. Days to flower of RHA 461, RHA 462, RHA 463, and RHA 464 was 66, 67, 69, and 66 d, respectively, compared with 65 and 70 for RHA 439 and RHA 440, respectively.

Sclerotinia head rot tolerance of RHA 461 to RHA 464 was determined by evaluating testcross hybrids that were artificially inoculated under mist irrigation at the North Dakota Agricultural Experiment Station, Carrington Research and Extension Center, Carrington, ND, during the 2003 to 2005 summer seasons. Hybrids with the four restorer lines were produced by crossing with CMS HA 412. Hybrids were evaluated utilizing one replication in year 2003 and three replications in years 2004 and 2005. Disease incidence, measured as percentage of plants showing symptoms of head rot for each plot, was recorded 35 d after inoculation. Sclerotinia incidence averaged over all 3 yr of hybrids with RHA 461 to RHA 464 was 10, 18, 8, and 10%, respectively, compared to 73% for the susceptible check, SF 270, and 22% for the tolerant check, NK 277.

Testcross hybrids were compared with the commercial hybrids Pioneer 63M80, Interstate 525, and Mycogen 8377 in 2003 to 2005 trials planted at Casselton, ND, for agronomic characteristics. Yield of hybrids with RHA 461 to RHA 464 was 3250, 3240, 3448, and 3226 kg ha⁻¹, respectively, compared to a 3444 kg ha⁻¹ average for the three check hybrids. Oil content of hybrids with RHA 461 to RHA 464 was 450, 458, 444, and 445 g kg⁻¹, respectively, compared to a 428 g kg⁻¹ average for the three check hybrids. Height of hybrids with RHA 461 to RHA 464 was 180, 178, 183, and 165 cm, respectively, compared to a 175 cm average for the three check hybrids. Days to flower of hybrids with RHA 461 to RHA 464 was 66, 63, 66, and 64 d, respectively, compared to a 67 d average for the three check hybrids. Days to maturity of hybrids with RHA 461 to RHA 464 was 108, 115, 109, and 108 d, respectively, compared to a 110 d average for the three check hybrids.

Limited quantities of seed of each germplasm are available from the Seedstocks Project, Dep. of Plant Sciences, Loftsgard Hall, North Dakota State University, Fargo, ND 58105. Seed of this release will be deposited in the National Plant Germplasm System where it will be available for research purposes, including development and commercialization of new cultivars. U.S. Plant Variety Protection will not be requested for RHA 461, RHA 462, RHA 463, and RHA 464.

The release date for these germplasms will be on the date of final signature. It is requested that appropriate recognition be made if these germplasms contribute to the development of a new breeding line or cultivar.