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 TWO RESTORER (RHA 439 AND RHA 440) AND ONE MAINTAINER (HA 441) SCLEROTINIA-TOLERANT OILSEED SUNFLOWER GERMPLASMS

The United States Department of Agriculture, Agricultural Research Service, and the North Dakota Agricultural Experiment Station, North Dakota State University, announce the release of two restorer (RHA 439 and RHA 440) and one maintainer (HA 441) 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. 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 439 is an F_7-derived F_8 restorer line selected from the cross RHA 377/AS 3211. RHA 440 is an F_7-derived F_8 restorer line selected from the cross RHA 377/AS 4379. RHA 377 is a restorer line released by the USDA and the North Dakota Agricultural Experiment Station in 1990. AS 3211 and AS 4379 are hybrids developed in France by Dr. Philippe Lesigne and entered into the 1995-1996 Food and Agriculture Organization (FAO) Hybrid Sunflower Yield Trial. RHA 439 and RHA 440 have fertility restoration factors for the PET1 male-sterile cytoplasm and have upper-stem branching. The pedigree breeding method was used to develop RHA 439 and RHA 440. Sclerotinia tolerance of these lines was selected by evaluating testcross hybrids that were artificially inoculated under mist irrigation at the Carrington Research and Extension Center, Carrington, ND, during the 2000 to 2002 summer seasons. Height of RHA 439 and RHA 440 was 140 and 150 cm, respectively, compared with a height of 138 cm for RHA 377. Days to flower of RHA 439 and RHA 440 was 63 and 67 d, respectively, compared with 62 d for RHA 377.

HA 441 is an F_7-derived F_8 maintainer line selected from the cross HA 412/SD. HA 412 is a maintainer line released by the USDA and the North Dakota Agricultural Experiment Station in 1995. SD is a maintainer line obtained through a germplasm exchange with Dr. Felicity Vear, Station d'Amelioration des Plantes, INRA, Clermont-Ferrand, France. The pedigree breeding method was used to develop HA 441. Sclerotinia tolerance of this line was selected by evaluating testcross hybrids that were artificially inoculated under mist irrigation. Height of HA 441 was 160 cm compared with a height of 145 cm for HA 412. Days to flower of HA 441 was 61 d compared with 56 d for HA 412.

Hybrids with the two restorer lines, RHA 439 and RHA 440, were produced by crossing with CMS HA 412. Hybrids with the maintainer line, HA 441, were produced by crossing the cytoplasmic male-sterile equivalent of HA 441 with the restorer line RHA 377. These hybrids were compared with the commercial hybrids Pioneer 63M80, Interstate Hysun 530, and Mycogen 8377 in 2000, 2001, and 2002 trials planted at Casselton, ND, for agronomic characteristics, and compared with the commercial hybrids Mycogen SF 270, Mycogen 8377, Pioneer 63M80, and Syngenta 278 at the Sclerotinia Mist Irrigation site, Carrington, ND, for Sclerotinia tolerance evaluation. Yield of hybrids with RHA 439, RHA 440, and HA 441 was 2175, 2371, and 1983 kg ha^{-1}, respectively, compared with a 2238 kg ha^{-1} average of the three check hybrids. Oil content of hybrids with RHA 439, RHA 440, and HA 441 was 47.3, 46.2, and 45.4%, respectively, compared with a 46.4% average of the three check hybrids. Height of hybrids with RHA 439, RHA 440, and HA 441 was 168, 165, and 190 cm, respectively, compared with a 173 cm average of the three check hybrids. Days to flower of hybrids with RHA 439, RHA 440, and HA 441 was 68, 70, and 68 d, respectively, compared with a 68 d average of the three check hybrids. Root lodging % of hybrids with RHA 439, RHA 440, and HA 441 in year 2002 was 8.2, 3.1, and 12.4%, respectively, compared with a 34.1% average of the three check hybrids.

Sclerotinia head rot tolerance was determined by inoculating ten hybrid plants per plot with a suspension of 5000 ascospores per mL of distilled water. A total of five mL was applied to each head at the 5.1 plant stage, and all plants within each plot were sprayed on the same day. Mist irrigation was applied for five minutes every half-hour commencing after inoculation began. Disease incidence, measured as percent of plants showing symptoms of head rot for each plot, was recorded 35 days after inoculation. Hybrids were evaluated utilizing one replication in year 2000 and three replications in years 2001 and 2002. Sclerotinia incidence averaged over all three years of inoculation of hybrids with RHA 439, RHA 440, and HA 441 was 16, 33, and 8%, respectively, compared with 88, 44, 71, and 30%, respectively, for the check hybrids Mycogen SF 270, Mycogen 8377, Pioneer 63M80, and Syngenta 278.

Limited quantities of seed of each germplasm are available from the Seedstocks Project, Department 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 439, RHA 440, or HA 441.

The release date for these germplasms will be on the date of final signature. Appropriate recognition should be made if this material contributes to the development of a new breeding line or cultivar.

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Director
North Dakota Agricultural Experiment Station
Fargo, ND

Date

_____ _____

Administrator
Agricultural Research Service
United States Department of Agriculture

Date