

University of Nebraska - Lincoln

## DigitalCommons@University of Nebraska - Lincoln

---

Publications from USDA-ARS / UNL Faculty

U.S. Department of Agriculture: Agricultural  
Research Service, Lincoln, Nebraska

---

2006

### Registration of 'Choptank' Wheat

J.M. Costa

*University of Maryland, costaj@umd.edu*

C.A. Griffey

*Virginia Polytechnic Institute and State University*

H.E. Bockelman

*USDA-ARS National Small Grains Germplasm Research Facility*

S.E. Cambron

*Purdue University*

X. Chen

*USDA-ARS-Washington State*

*See next page for additional authors*

Follow this and additional works at: <https://digitalcommons.unl.edu/usdaarsfacpub>



Part of the [Agricultural Science Commons](#)

---

Costa, J.M.; Griffey, C.A.; Bockelman, H.E.; Cambron, S.E.; Chen, X.; Cooper, A.; Gaines, C.; Graybosch, Robert A.; Grybauskas, A.; Kratochvil, R.J.; Long, D.L.; Shirley, E.; and Whitcher, L., "Registration of 'Choptank' Wheat" (2006). *Publications from USDA-ARS / UNL Faculty*. 911.  
<https://digitalcommons.unl.edu/usdaarsfacpub/911>

This Article is brought to you for free and open access by the U.S. Department of Agriculture: Agricultural Research Service, Lincoln, Nebraska at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Publications from USDA-ARS / UNL Faculty by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

---

**Authors**

J.M. Costa, C.A. Griffey, H.E. Bockelman, S.E. Cambron, X. Chen, A. Cooper, C. Gaines, Robert A. Graybosch, A. Grybauskas, R.J. Kratochvil, D.L. Long, E. Shirley, and L. Whitcher

### Registration of 'Choptank' Wheat

'Choptank' (Reg. no. CV-976, PI 639724) is a soft red winter wheat (*Triticum aestivum* L.) that was jointly developed and released by the Maryland Agricultural Experiment Station, Department of Natural Resource Sciences and Landscape Architecture, and the Virginia Agricultural Experiment Station in 2004. Choptank is named after Maryland's longest scenic river, which flows 70 miles from the western part of Delaware through Maryland and into the Chesapeake Bay, on Maryland's Eastern Shore. Choptank has performed well in Maryland, Virginia, and Delaware and provides growers with a high-yielding cultivar with short stature, excellent powdery mildew [caused by *Blumeria graminis* (DC.) E.O. Speer f. sp. *tritici* Ém. Marchal] resistance and early heading date.

Choptank was derived from the cross 'Coker 9803' (PI 548845)/'Freedom' (PI 562382) that was made in 1990 at Virginia Polytechnic Institute and State University. The population was advanced from the F<sub>2</sub> to F<sub>5</sub> generation using a modified bulk breeding method. Wheat spikes were selected in Virginia from the population in each generation (F<sub>2</sub>–F<sub>5</sub>) based on the absence of obvious disease, early maturity, short straw, and desirable head shape and size. Selected spikes were threshed in bulk and the seed was planted the following fall of each selection year. Spikes selected from the F<sub>5,6</sub> bulk block were threshed individually and planted in separate headrows in the fall of 1996 at Beltsville, MD. Choptank was derived as a bulk of one of these F<sub>6,7</sub> headrows selected in 1997 and assigned the breeding line designation MD11–52. In addition to high grain yield, Choptank was selected on the basis of earliness of head emergence, short plant height, and resistance to powdery mildew. Choptank was evaluated in the Maryland Wheat Variety Test for 5 yr (from 2000–2004), in the Virginia and Delaware State Wheat Variety Tests for 3 yr, and in the USDA-ARS Uniform Eastern and Uniform Southern Soft Red Winter Wheat Nurseries in 2004.

Coleoptiles of Choptank are white. Juvenile plants exhibit a semierect growth habit. Plant color at boot stage (Feekes growth stage 9–10) is blue green and a waxy bloom is present on the stem and flag leaf sheath. Anther color is yellow. Spikes are tapering, middense, and awnleted. Glumes are long and wide, with oblique shoulders and obtuse beaks. Kernels of Choptank are red, soft, and ovate with a crease of medium width and depth, rounded cheeks, and a long noncollared brush. Choptank carries the 1BL.1RS wheat–rye chromosomal translocation.

Head emergence of Choptank in Maryland is similar to that of 'Sisson' and 2 d earlier than Pioneer brand '25R37'. In Maryland, average plant height of Choptank (77.5 cm) is 5 cm shorter than that of Sisson and 2 cm shorter than that of USG '3209'. Average straw strength (0.0 lodging score) of Choptank in Maryland is similar to that of Sisson (0.3).

In State Variety Trials conducted in Maryland under a conventional tillage regime over 3 yr (2001–2003) at four to five locations per year, average grain yields of Choptank (4600 kg ha<sup>-1</sup>) were similar ( $P < 0.05$ ) to those of high-yielding cultivars such as USG 3209 and 250 to 350 kg ha<sup>-1</sup> higher than those of 'Coker 9663' and 'Roane', respectively. In these tests, the average grain volume weight of Choptank was 723 kg cm<sup>-3</sup> which was higher than that of Southern States '560' (704 kg cm<sup>-3</sup>) but lower than that of Roane (735 kg cm<sup>-3</sup>). In State Wheat Tests conducted in Virginia under standard treatment (no fungicides) over 2 yr (2002–2003) at 4 locations per year, average grain yield of Choptank (5400 kg ha<sup>-1</sup>) was similar to those of high-yielding cultivars McCormick and Sisson and 270 and 400 kg ha<sup>-1</sup> higher than those of Pioneer Brand '2580' and USG 3209, respectively. Choptank had a test weight of 755 kg cm<sup>-3</sup> in 2002, similar to that of Sisson, and its test weight

was 721 kg cm<sup>-3</sup> in 2003 which was 25 kg cm<sup>-3</sup> higher than that of Southern States 560. On the basis of disease assessments (0 = no visible symptoms to 9 = severe infection) made under field conditions in Maryland State Variety Trials conducted from 2001 to 2004 (20 environments), Choptank is resistant to powdery mildew (score = 0.4) compared to a score of 7.4 for the susceptible check, 'Florida 304'. It is moderately resistant to *Wheat spindle streak mosaic virus* based on data from those same four crop years (2001–2004) in Maryland.

Choptank was evaluated in the Uniform Southern Soft Red Winter Wheat Nursery (36 locations) in 2004. Choptank had an average grain yield of 4480 kg ha<sup>-1</sup>, similar to that of the check cultivar McCormick. Choptank had a grain volume weight (722 kg cm<sup>-3</sup>) similar to that of the check cultivar AGS 2000. Choptank was also evaluated in the Uniform Eastern Soft Red Winter Wheat Nursery (39 locations) in 2004. Its average grain yield (4440 kg ha<sup>-1</sup>) was lower than that of the check cultivar Roane (4814 kg ha<sup>-1</sup>). Its grain volume weight (721 kg cm<sup>-3</sup>) was similar to that of the check cultivar Agripro Foster.

Choptank was evaluated for its reaction (0 = no visible symptoms to 9 = severe infection) to several disease and insect pests prevalent in the soft red winter wheat production area in the 2004 Uniform Southern and Uniform Eastern Soft Red Winter Wheat Nurseries. Choptank is resistant (score = 0.7,  $n = 5$  environments) to powdery mildew compared to a score of 2.6 for Pioneer '26R61'. Based on seedling tests conducted by the USDA-ARS Plant Science Research Unit in Raleigh, NC, Choptank was resistant to 6 out of 13 isolates of powdery mildew. Choptank has expressed resistance to leaf rust (caused by *Puccinia triticina* Eriks.) (average score of 0.7 over 5 locations) compared to a score of 3.0 for USG 3209. On the basis of seedling tests conducted at the USDA-ARS Cereal Disease Laboratory in St. Paul, MN, it is postulated that Choptank has genes *Lr18*, *Lr26*, and other unidentified genes governing resistance to leaf rust. Choptank is moderately resistant (score = 2.5,  $n = 2$ ) to leaf blotch (caused by *Septoria tritici* Roberge in Desmaz.) compared to a score of 3.5 for McCormick. Choptank is moderately susceptible in the southern U.S. region (score = 4.6,  $n = 2$ ) to stripe rust (caused by *Puccinia striiformis* Westend. f. sp. *tritici* Eriks.) compared to a score of 5.8 for AGS 2000 but is susceptible in the Pacific Northwest. Choptank is resistant to *Wheat spindle streak mosaic virus* (score = 0.0,  $n = 2$ ) compared to a score of 3.8 for AGS 2000. Seedling tests indicate that Choptank is resistant to stem rust (caused by *Puccinia graminis* Pers.:Pers. f. sp. *tritici* Eriks. & Henn) composite of races QFCS, QTHJ, RCRS, TPMK, and TTTT. Choptank is susceptible to Fusarium head blight (FHB) (caused by *Fusarium graminearum* Schwabe, Group II anamorph) on the basis of disease assessments made in the 2002 Northern Uniform Winter Wheat Scab Nursery at 13 locations. Its scab index was 32.9 compared to 20.0 for 'Ernie'. Its scabby seed score was 24.8% and had an average deoxynivalenol (DON) value of 21.9 mg kg<sup>-1</sup>, compared to a scabby seed score of 16.9% and DON of 11.1 mg kg<sup>-1</sup> for Ernie. Seedling tests conducted by the USDA-ARS at West Lafayette, IN, indicate that Choptank is susceptible to Hessian fly [caused by *Mayetiola destructor* (Say)] biotypes GP, B, C, D, E, and L. On the basis of data ( $n = 3$  locations) in the 2004 Uniform Eastern Soft Red Winter Wheat Nursery, average freeze damage of Choptank (2.8) was higher than that of Roane (1.9).

Milling and baking quality evaluations of Choptank were conducted in 2002 and 2003 by the USDA-ARS Soft Wheat Quality Laboratory at Wooster, OH. Milling and baking quality scores of Choptank were superior to those of Roane and USG 3209, similar to those of Southern States '550', but lower than those of Southern States '520' and Sisson. In a 2002

quality evaluation of lines in the Virginia state test, Choptank was similar to Southern States 550 for flour yield ( $769 \text{ g kg}^{-1}$ ), but had lower Alkaline Water Retention Capacity (56.1% versus 60.2%), and a larger cookie diameter (18.4 cm versus 18.0 cm). Its flour gluten strength is weak (based on the Lactic Acid Retention Capacity of 77.4%), and similar to those of Sisson and Southern States 550. Its endosperm separation index (10.0%) was lower than that of Southern States 550 (10.6%). Grain of Choptank had higher protein concentration ( $81 \text{ g kg}^{-1}$ ) than that of Southern States 550 ( $75 \text{ g kg}^{-1}$ ) in that test.

Initial Breeder seed of Choptank was developed via removal of visual variants from a 0.05-ha  $F_{10}$  purification block. Authorized seed classes of Choptank in the U.S. are Breeder, Foundation, and Certified. Application for cultivar protection will be made under the U.S. Plant Variety Protection Act. Breeder seed of Choptank will be maintained by the Maryland Agricultural Experiment Station. Foundation seed will be maintained by the Maryland Crop Improvement Association Inc., P.O. Box 169, Queenstown, MD 21658.

J.M. COSTA,\* C.A. GRIFFEY, H.E. BOCKELMAN, S.E. CAMBRON,  
X. CHEN, A. COOPER, C. GAINES, R.A. GRAYBOSCH,  
A. GRYBAUSKAS, R.J. KRATOCHVIL, D.L. LONG,  
E. SHIRLEY, AND L. WHITCHER

### Acknowledgments

The development of this cultivar was supported in part by the Maryland Grain Producers Utilization Board and the Maryland Crop Improvement Association.

---

J.M. Costa, A. Cooper, A. Grybauskas, and R.J. Kratochvil, and E. Shirley, Department of Natural Resource Sciences and Landscape Architecture, University of Maryland, College Park, MD 20742-4452; H.E. Bockelman, USDA-ARS National Small Grains Germplasm Research Facility, Aberdeen, ID 83210; X. Chen, USDA-ARS-Washington State, Pullman, WA 99164-6430; C. Gaines, USDA-ARS Soft Wheat Quality Lab, Wooster, OH 44691; R.A. Graybosch, USDA-ARS Wheat, Sorghum & Forage Research, Lincoln, NE 68583-0915; C.A. Griffey, Crop and Soil Environmental Sciences Dep., Virginia Polytechnic Inst. and State Univ., Blacksburg, VA 24061; D.L. Long, USDA-ARS Cereal Disease Lab, St. Paul, MN 55108; S.E. Cambron, USDA-ARS, Dep. of Entomology, Purdue Univ., W. Lafayette, IN 47907; and L. Whitcher, USDA-ARS, Plant Science Research Unit, Raleigh, NC 27695. Registration by CSSA. Accepted 31 July 2005. \*Corresponding author (costaj@umd.edu).

doi:10.2135/cropsci2005.04-0026  
Published in Crop Sci. 46:474-476 (2006).