

**North Carolina Agricultural Research Service
North Carolina State University
Raleigh, North Carolina**

Notice of Release of NC 123S Tomato Breeding Line

NC 123S is a large fruited, fresh market tomato breeding line, which combines the dominant genes *Sw-5*, *I-3*, and *Mi* for resistance to tomato spotted wilt virus, fusarium wilt race 3, and root knot nematodes, respectively. It combines well as a parent in F₁ hybrids and is useful in developing multiple disease resistant fresh market tomato hybrids.


NC 123S was developed from selfing the F₁ hybrid 'Amelia,' a co-developed hybrid using NC 111 F-2(98) as one parent and a proprietary line belonging to Clause Seed Co. as the other parent. 'Amelia' is heterozygous for the *Sw-5* gene for resistance to tomato spotted wilt virus (TSWV), the *Mi* gene for root knot nematode resistance, and the *I-3* gene for resistance to race 3 of fusarium wilt. NC 111 F-2(98) provided the *I-3* gene in 'Amelia.' An F₂ population of 200 plants from selfing 'Amelia' was grown in the greenhouse and tissue samples were sent to Dr. Mikel Stevens at Brigham Young University to test for a molecular marker closely linked to the *Sw-5* gene. From the plants identified as homozygous for the *Sw-5* gene based on the marker results, 30 plants were selected based on horticultural traits in the greenhouse, and the F₃ populations from selfing these selections were grown in field plots in coastal SC and at Mills River, NC. Additional testing was done for markers linked to the *I-3* and *Mi* genes in the 30 F₂ selections. One of the lines which tested homozygous resistant for all three genes based on marker results was selected at Mills River in 2000 and was further selected in advanced generations resulting in the line 123S(2002)-1C. This selection was tested under severe conditions for TSWV in grower fields in coastal SC and was repeatedly shown to be resistant to TSWV. NC 123S was also tested using a seedling root dip technique in growth chamber tests at Mills River for resistance to fusarium wilt race 3 and was shown to be homozygous resistant.

F₁ hybrids using NC 123S as a parent were grown under severe conditions for TSWV in coastal SC from 2002 to 2005 and were consistently free of TSWV symptoms. Tests in grower fields in Polk County, NC showed hybrids with NC 123S to be resistant to fusarium wilt race 3 and nematodes in heavily infested fields. In addition to the *I-3*, *Sw-5* and *Mi* genes, NC 123S has the *Ve* gene for resistance to verticillium wilt and the *I* and *I-2* genes for resistance to races 1 and 2 of fusarium wilt.

NC 123S has a tall, determinate plant with dark green, non-curved foliage. Fruit are deep oblate in shape, have the *u* gene for uniform light green color of immature fruit and have jointed pedicels. Fruit are smooth and symmetrical in shape and ripen to a uniform, bright red exterior and interior color. Fruit are firm in the ripe stage and have shown good resistance to fruit cracking and weather check. Hybrids made with NC 123S have been consistently rated as having good flavor.

NC 123S has been shared with commercial breeders through pollen and seed transfer agreements. The F₁ hybrid 'Crista,' which uses NC 123S as one parent, was marketed by Harris Moran Seed Co. in 2005 and widely grown in NC and other southern states where TSWV is a severe problem. Other hybrids using NC 123S as a parent are being tested and advanced by other seed companies (Sakata Seed America, Inc.; Bejo Seeds, Inc.; Sunseeds). NC 123S is unique in combining multiple genes for resistance to major diseases and nematodes with desirable horticultural traits and good combining ability in F₁ hybrids. NC 123S will prove useful as a parent in producing new F₁ hybrids with multiple disease resistances and in further breeding to combine disease resistance genes into improved tomato breeding lines.

Breeder seed of NC 123S tomato breeding line are available by contacting Dr. Randy Gardner or Dr. Dilip Panthee, Mountain Horticultural Crops Research and Extension Center, 455 Research Drive, Mills River, NC 28759 or by telephone: 828.684.3562; fax: 828.684.8715; email addresses: randy_gardner@ncsu.edu or dilip_panthee@ncsu.edu. A fully executed tomato seed transfer agreement with NC State University's Office of Technology Transfer will be required to acquire seed of NC 123S.



Director, North Carolina Agricultural Research Service

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Date