

Innovations in Grape Tomato Breeding

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Grape tomato breeding in the North Carolina fresh market tomato breeding program is focused on developing hybrids with superior fruit quality, multiple disease resistance, and improved plant growth habit. Breeding materials have originated primarily from various cherry, large fruited and plum tomato backgrounds within the program. The first lines were developed by crossing compact growth habit brachytic (*br* gene) cherry tomato lines with 'Santa' to obtain high sugar and desired fruit shape followed by selfing and backcrossing to NC breeding lines to obtain other desired traits. Recently the hybrid 'Smarty' and three inbred lines (NC 1 grape, NC 2 grape, and NC 3 grape) were released from the breeding program. 'Smarty' is a compact indeterminate hybrid homozygous for *br* and heterozygous for the *rin* gene. Additional breeding has led to the incorporation of the crimson gene (*og*) into brachytic, indeterminate lines of normal ripening, *rin*, and *nor* types. Disease resistances being incorporated into grape tomato backgrounds include the *Sw-5* gene for TSWV resistance, the *I-3* gene for fusarium wilt race 3 resistance, early blight resistance, and the *Ph-2* and *Ph-3* genes combined for late blight resistance. Selection has also been made for tolerance to bacterial spot. The male sterile, green stem linked marker combination *ms-10*, *aa* has been incorporated into several grape tomato breeding lines to facilitate F₁ hybrid seed production. A few of the male sterile lines are capable of setting seedless fruit of high quality. The primary limitation for potential use of male-sterile plants for commercial seedless grape tomato production has been smaller fruit size than the seeded fruit, which limits yield. Breeding is underway in an effort to greatly increase the number of fruit per cluster as a means to increase yield. In addition to fresh use, the seedless fruit have potential for being used as a dried product.