

NC 109 Tomato Breeding Line: 'Mountain Fresh' F₁ Hybrid

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'Mountain Fresh' is a fresh-market tomato hybrid (*Lycopersicon esculentum* Mill.) with a desirable combination of disease resistance and plant and fruit characteristics. It resulted from a breeding effort to improve fruit smoothness and flavor in a large-fruited tomato specifically adapted to vine-ripe production.

Origin

'Mountain Fresh' is the F₁ hybrid of NC 84173 PVP x NC 109 (Fig. 1). NC 84173 PVP was released in 1990 as a parent line of the F₁ hybrid 'Mountain Spring' and has been described previously (Gardner, 1992). NC 109, an inbred line in the F₈ generation, resulted from the cross of NC 50-7 (Gardner, 1982) x the Univ. of California breeding line, T5. 'Mountain Fresh' was tested as NC 88289 and as STEP 724.

Description

NC 109. Plant habit is determinate (*sp*) (Mutschler et al., 1987). Foliage is dark green and develops a dense canopy providing excellent fruit coverage. Plant height when staked and pruned is 30 cm or more greater than that of currently grown determinate cultivars such as 'Mountain Pride' (Gardner, 1982).

NC 109 has flattened globe-shaped fruit, which are smooth and symmetrical with a pinpoint blossom scar. A constriction at the base of the style breaks above the fruit surface, leaving a small styler scar. The constricted style character appears to be controlled by a single, incompletely dominant gene and is distinct from the genes *n* (nippled blossom) and *bk* (beaked blossom), which produce pinpoint blossom scars but are often associated with nipping or beakiness of the blossom end. Although no genetic tests for allelism have been done, the morphologies of the floral structure and styler scar of the fruit of NC 109

appear to be identical with those of NC 140, which has been designated as having the gene *n-2* (Barten et al., 1994). Nonripe fruit of NC 109 are uniformly light green (*u*). Fruit ripen to a uniformly red exterior and interior color and are firm in the ripe stage. Fruit pedicels are jointed.

NC 109 is late in maturing (Table 1). Fruit size is comparable to that of 'Flora-Dade'. Although its nongraded yield was equivalent to 'Flora-Dade', NC 109 yielded much more U.S. combination grade fruit (Table 1).

NC 109 is resistant (*I* gene) to race 1 of *Fusarium oxysporum* f. sp. *lycopersici* (Sacc.) Snyder and Hans., the incitant of fusarium wilt, and is resistant (*Ve* gene) to race 1 of *Verticillium dahliae* Kleb., the incitant of verticillium wilt. It is resistant to radial and concentric fruit cracking and moderately resistant to cuticle cracking (weather check).

'Mountain Fresh'. Plant habit is determinate (*sp*) with attractive, dark green foliage. Plant vigor is slightly less than that of 'Mountain Pride', providing good adaptability to the short stake, string weave system of trellis culture. Foliage cover is slightly less dense than that of 'Mountain Pride' and provides good fruit protection against weather-related defects.

Nonripe fruit of 'Mountain Fresh' are uniformly light green (*u*). Fruit pedicels are jointed. Fruit ripen to a uniformly red exterior and

interior color, free of white tissue. Flavor is good for a determinate cultivar and superior to that of 'Mountain Pride' and 'Mountain Delight' (subjective ratings by author). Fruit are flattened globe to deep oblate, are symmetrical, and have a small blossom scar. Fruit are very large, generally larger than 'Mountain Pride' and comparable to 'Mountain Delight' fruit (Gardner, 1990) in average fruit weight (Table 2). Much of the fruit of 'Mountain Fresh' grades into the maximum-large category (>85 mm in diameter) with most of the remainder going into the extra-large category (73-85 mm in diameter). Fruit are firm (subjective ratings) in the ripe stage. The fruit wall is thick (10 mm) resulting in good handling at the breaker and light pink stages during harvesting and packing.

'Mountain Fresh' produced nongraded fruit yields equivalent to those of 'Mountain Pride' and 'Mountain Delight' in trials averaged over a 5-year period (Table 2). Yield of U.S. combination grade fruit for 'Mountain Fresh' exceeded that for other standard cultivars grown in North Carolina (Table 2). 'Mountain Fresh' was tested in the 1990 Southern Tomato Exchange Program (STEP) observational trials as STEP 724. Based on its outstanding performance at various locations, it was recommended for advancement to the 1991 STEP replicated trials. In 1991, it had higher marketable yields than did the control cultivar Flora-Dade at four of six locations, and its fruit appearance was rated superior to that of 'Flora-Dade'.

'Mountain Fresh' has the *Ve* gene for resistance to verticillium wilt and the *I* and *I-2* genes, conferring resistance to races 1 and 2 of *F. oxysporum* f. sp. *lycopersici*. Although 'Mountain Fresh' was not developed specifically for early blight resistance, repeated observations in research station and grower plantings indicate that it is less susceptible to early blight [*Alternaria solani* (Ellis and Martin) Jones and Grout] than many other cultivars.

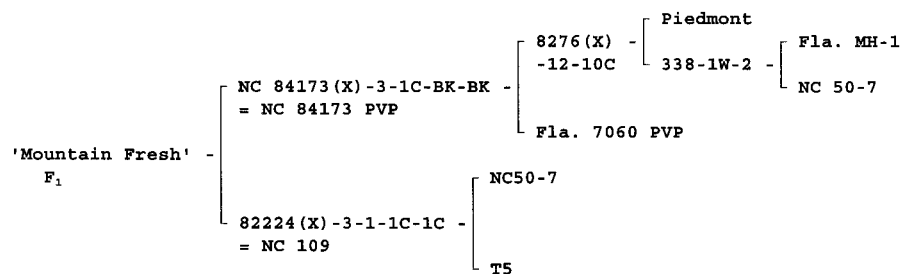


Fig. 1. Pedigree of 'Mountain Fresh' F₁ hybrid tomato and its parental lines, NC 84173 PVP and NC 109.

Table 1. Comparison of vine-ripe yields of NC 109 and 'Flora-Dade' tomatoes in a staked trial at Fletcher, N.C.

Genotype	Yield (Mg·ha ⁻¹)			
	Early season Nongraded	Total season		Wt/ fruit (g)
		Nongraded	U.S. combination grade ^z	
NC 109	6 a ^y	95	72 a	227
Flora-Dade	22 b	95	45 b	213

^zU.S. No. 1 + U.S. No. 2.

^yMean separation within columns by a *t* test, *P* ≤ 0.05.

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Table 2. Comparison of vine-ripe yields of 'Mountain Fresh' vs. standard tomato cultivars in staked trials at Fletcher, N.C.

Cultivar	Yield (Mg·ha ⁻¹) ^z			Wt/ fruit (g)
	Total season		U.S. combination grade ^y	
	Early season Nongraded	Nongraded		
Mountain Fresh	20	107	72	292
Mountain Delight	24	102	55	285
Mountain Pride	26	104	60	266
Sunny	31	107	46	245
LSD _{0.05}	5	NS	9	12

^zBased on eight replicated trials conducted over a 5-year period.

^yU.S. No. 1 + U.S. No. 2 fruit.

Use

'Mountain Fresh' is intended for vine-ripe production for markets desiring very large fruit. It has performed well in research station trials and grower plantings throughout the midwestern and eastern United States, indicating wide adaptability.

NC 109 is intended not for direct use as a cultivar, but for use as a parent line in F₁ hybrids and in breeding for smooth blossom scar. It has shown good combining ability in crosses with determinate lines having early

maturity and large fruit. In F₁ hybrids with lines having the *n* gene for nipped blossom end, blossom scars are consistently pinpoint without the objectionable nipping that sometimes occurs with *n* in homozygous condition. In addition, the noncurled foliage of NC 109 is dominant to the often undesirable curled foliage in lines having *n*.

Availability

'Mountain Fresh' was released on an exclusive basis to Ferry-Morse Seed Co. A Plant

Variety Protection Certificate (9300162) is pending for NC 109. Small samples of 'Mountain Fresh' and NC 109 for trial and breeding purposes are available from R.G. Gardner, Mountain Horticultural Crops Research and Extension Center, Fletcher, NC 28732-9244.

Literature Cited

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