

'Nantahala' Red Raspberry

Gina E. Fernandez^{1,4}

North Carolina State University, Horticulture, 170 Kilgore Hall, Box 7609, Raleigh, NC 27665

James R. Ballington²

North Carolina State University, Kilgore Hall, Box 7609, Raleigh, NC 27665

Susan J. Bryson³

455 Research Drive, Mills River, NC 28759

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'Nantahala' (Fig. 1) is a new primocane fruiting red raspberry (*R. idaeus* L.) released by North Carolina State University. This is the first red raspberry to be released from this breeding program in over 50 years. The primary characteristics that distinguish 'Nantahala' from other red raspberry cultivars are its late harvest season and large berry size. In the Cherokee language, 'Nantahala' means land of the midday sun.

Origin

'Nantahala' was selected from a cross between NC 245 and 'Rosanna' (Fig. 2). The female parent of 'Nantahala' is NC 245 (Algonquin × Royalty) and the male parent is 'Rosanna'. Although predominantly *R. idaeus* in origin, it also includes *R. occidentalis* through its 'Royalty' grandparent. Ballington made the cross in 1994. The seeds were germinated in winter 1994–1995 and the seedlings established at the Upper Piedmont Research Station at Reidsville, NC (long. 36.37° N, lat. 81.25° W, elevation 271 m) in Spring 1995. 'Nantahala' was selected in 1998 and evaluated as NC 451 in two locations. 'Nantahala' was tested as NC 451 at the Mountain Horticultural Crops Research Station at Mills River, NC (long. 35.25° N, lat. 82.30° W, elevation 630 m), and Laurel Springs, NC (long. 36°23' N, lat. 80°18' W, elevation 975 m).

Performance and Description

Replicated yield trials were conducted at the Upper Mountain Research Station in Laurel Springs in 2002 and 2003 and at the

Mountain Horticultural Crops Research Station in Mills River, NC, in 2004 and 2005 for a total of 4 years. Plantings were arranged in randomized block designs with two replications in Mills River and four replications in Laurel Springs. Five plants were originally set in each plot at 1.2 m between plants and 2.4 m between rows. Plants were allowed to



Fig. 1. Fruit of 'Nantahala' red raspberry.

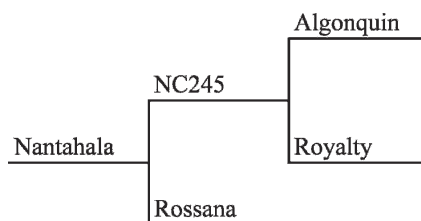


Fig. 2. 'Nantahala' red raspberry pedigree.

fill in the plots as a wide hedgerow to 0.9 m width and 6.09 m length.

Yields were estimated based on the model from Daubney et al. (1986). One year after planting, three canes in the middle of each plot were identified for yield estimation. Number of fruit, flowers, and buds were counted on each cane from all plots at the beginning and end of each season. Numbers of canes in each plot were counted at the end of the harvest season. The average number of fruit, flowers, and buds from these dates was used in the yield estimation. A subsample of fruit was harvested and weighed three times on the three canes during the harvest season. Fruit weight was averaged for these three dates and multiplied by the average fruit, flower, and bud number on each cane to get yield on each cane. Yield estimation per plot was based on yield/cane*no. canes/plot.

Based on these yield estimation protocols, total yield of 'Nantahala' was 1434 and 3621 g/plot in Laurel Springs and Mills River, NC, respectively, which is lower than other cultivars in this trial (Table 1). Although these results are based on yield estimation, they are consistent with yields recorded in previously published results comparing 'Caroline' and 'Heritage' (Swartz et al., 1998). Fruit weight of 'Nantahala' was the same or larger than 'Caroline'.

Fruit of 'Nantahala' ripens later than most primocane fruiting cultivars based on data collected at the research stations in North Carolina. Harvest typically begins the first week of September in Laurel Springs, NC, and in the third week of August in Mills River, NC, and continues 3 to 4 weeks or until a hard frost occurs.

Red ripe fruit was harvested in Laurel Springs, NC, on 25 Sept. 2006, placed in a cooler, transported to Raleigh, and placed in 1.67 °C walk-in coolers. The next day, sensory evaluations were conducted by a trained panel at the North Carolina State University Department of Food Science in the Sensory Evaluation Center (<http://www.ncsu.edu/sensory/>). The panel consisted of 57 individuals, including faculty, staff, and students primarily from the Department of Food Science. Two standard cultivars (Caroline and Heritage), NC 450, an unknown California grown cultivar purchased at a local market, and 'Nantahala' were evaluated in blind tests. The 57 panelists scored all products for overall acceptability, red color,

Table 1. Yield and fruit weight of raspberries harvested from Laurel Springs (2002 and 2003) and Mills River, NC (2004 and 2005).

	Mills River		Laurel Springs	
	Yield estimate ² (g/plot)	Fruit wt (g)	Yield estimate (g/plot)	Fruit wt (g)
Nantahala	1,434 b ^y	3.5 a	3,621 b	3.5 a
Caroline	4,173 a	3.2 a	8,027 a	2.5 b
Heritage	NA ^x	NA	5,092 ab	2.9 ab

²Yield estimates were calculated using: yield/plot = yield/cane of three canes/plot*no. canes/plot-1 plot = 5.48 m².

^yMeans in a column followed by different letters are significantly different at the $P \leq 0.05$ level, Fisher's least significant difference.

^xNA, data not available (cultivar not included in Mills River trial).

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¹Associate Professor.

²Professor.

³Agricultural Research Technician, retired.

⁴To whom reprint requests should be addressed; e-mail Gina_Fernandez@ncsu.edu.

shape, flavor, firmness, juiciness, seediness, and fuzziness on a 9-point hedonic scale in which 9 = like extremely and 1 = dislike extremely. ‘Nantahala’ was rated as good or better than the other cultivars in most categories (Table 2). Appearance (color and shape) of ‘Nantahala’ was rated superior to ‘Caroline’ and ‘Heritage’. ‘Nantahala’ fruit had flavor, texture, and seediness that were as good or were better than other cultivars in the panel.

‘Nantahala’ is an erect thorny primocane fruiting red raspberry. Purple to brown prickles are present mainly at the base of the cane. Leaves are primarily trifoliate with occasional pentafoliate leaves. Based on Royal Horticultural Society (2001) color charts, the mature foliage of ‘Nantahala’ is dark green with weak relief between ridges, whereas actively growing terminals is light green (Table 3). Fruit is borne on the uppermost nine to 11 nodes, which comprises ≈25% of the cane. Morphological characteristics of ripe ‘Nantahala’ fruit were compared with ‘Heritage’ (Table 3). Fruit of ‘Nantahala’ is dark red. ‘Nantahala’ fruit were longer and wider than ‘Heritage’. ‘Nantahala’ had a smaller number of drupelets and individual seeds were smaller than ‘Heritage’.

Under a minimal spray program of dormant fungicides, ‘Nantahala’ has shown no significant infection from fungal diseases such as late leaf rust [*Pucciniastrum americanum* (Farl.) Arth] or leaf spot [*Spaerulina rubi* Demarre & Wilcox], which are present in our plots. Virus infection and susceptibility are unknown.

‘Nantahala’ is recommended for the mountain regions of North Carolina and

Table 2. Sensory evaluation of ‘Nantahala’ and four other primocane fruiting red raspberries.^z

	Nantahala	NC 450	Caroline	Unknown California cultivar	Heritage
Overall liking ^z	6.4 a ^y	6.4 a	5.7 a	5.8 a	5.8 a
Appearance/red color	7.4 a	6.7 ab	6.6 bc	6.5 bc	5.9 c
Appearance/shape	7.2 a	7.0 ab	6.0 c	7.1 a	6.3 bc
Flavor	6.1 a	6.2 a	5.7 a	5.6 a	5.5 a
Texture/firmness	6.2 a	5.7 a	4.9 b	6.5 a	5.8 a
Texture/juiciness	6.7 a	6.7 a	5.9 b	6.0 ab	6.2 ab
Seediness	3.0 a	2.8 ab	2.5 b	2.5 b	2.7 ab
Fuzziness	2.2 b	2.2 b	2.1 b	2.8 a	2.3 b

^zSensory Evaluation Method (NCSU Sensory Evaluation Center; <http://www.ncsu.edu/sensory/>). Consumers scored all products for overall acceptability, red color, shape, flavor, firmness, juiciness, seediness, and fuzziness on a 9-point hedonic scale in which 9 = like extremely and 1 = dislike extremely. Scores are presented as means of panelist scores (n = 57).

^yMeans in a row followed by different letters are significantly different at the $P \leq 0.05$ level, Fisher’s least significant difference.

Table 3. Morphological characteristics of fruit harvested from two primocane fruiting red raspberry cultivars grown in Laurel Springs, NC.

	Nantahala	Heritage
Fruit weight (g)	3.5	2.9
Length (mm)	21	17
Width (mm)	19.8	15
Length-to-width ratio	1.06	1.13
Number of drupelets	70	100
Individual seed weight (mg)	2.0	8.0
Fruit color patch no. ^z		
Immature	47B	42B
Maturing	46A	46A
Mature	59A	59A

^zColor based on Royal Horticultural Society Color Chips (Royal Horticultural Society, 2001).

adjacent states. The later harvest will enable growers in that area to harvest high-quality

fruit later into the fall than current primocane red raspberry cultivars.

Availability

Names of propagators producing ‘Nantahala’ plants will be supplied on request. U.S. plant patent protection is being sought for ‘Nantahala’.

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