Flesh Browning of Peach and Nectarine Cultivars[1]

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Flesh discoloration in peach [*Prunus persica* (L.) Batsch.] and nectarine [*Prunus persica* (L.) Batsch. var. *nectarina*] fruits results from the enzymatic oxidation of polyphenolic compounds (2, 3). Flesh color is one of the major factors determining consumer acceptance of peaches and nectarines. Since many peach and nectarine cultivars exhibit flesh discoloration when peeled or sliced, various means of inhibiting oxidation are commonly used during commercial or home processing (4). Differences exist in the magnitude of oxidative — flesh browning among peach and nectarine cultivars, and these differences have been shown to be heritable (5). Non-browning peach and nectarine cultivars can be processed with little or no chemical additives, and bruises are less noticeable on fruit with non-browning flesh.

A major objective of the North Carolina State University peach and nectarine breeding program has been the development of non-browning cultivars. Thus, numerous peach and nectarine cultivars have been screened for resistance to flesh browning to determine their potential for use in the breeding program.

The cultivars used in this study were grown at the Sandhills Research Station, Jackson Springs, NC between 1970 and 1980. Not all cultivars were analyzed in each of the 11 seasons. To measure browning, a peeled slice was taken from each of 5 ripe fruit which were picked at random from an individual tree. The flesh slices were combined with an equal weight of distilled water and blended thoroughly. The puree was transferred to an Erlenmeyer flask and agitated on a wrist-action shaker. The degree of browning was measured with a Hunter D-25-2 Color and Color Difference Meter (Hunter Labs, Fairfax, VA) as the "b" value taken after 1 hr of agitation (1). Plate D33C-241 (L = 63.7, a = 6.4, b = 38.7) was used to standardize the instrument. In a particular year 1 to 4 trees were sampled to obtain data for an individual cultivar. Since significant year-to-year variation has been found to exist in the degree of flesh browning (5), analysis of covariance was used to analyze the data (6). This analysis adjusts for the effect of year-to-year variation, allowing for comparison between cultivars sampled in different years. Eight cultivars which were measured in all 11 years were used to obtain the covariate value.

A total of 111 cultivars were evaluated. Non- or low-browning cultivars showed a high "b" value (24 or higher), and had an attractive bright yellow color after agitation. High browning cultivars showed a low "b" value (15 or lower) and were very dark brown after agitation. Values ranged from a high of 26.85 for Flamekist nectarine, to a low of 11.13 for Marpride peach (Tables 1 and 2). A high percentage of the low browning

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Table 1. Flesh browning resistance rating of peach cultivars as measured by the Hunter Color and Color Difference Meter.

Cultivar	No. of years measured	Adjusted mean	Standard error
Hamlet	10	24.75	0.81
Candor	10	24.62	0.73
Rubired	11	24.41	0.68
Norman	10	24.33	0.73
Sunhaven	3	23.35	1.89
Clayton	11	23.27	0.66
Winblo	7	23.01	0.90
Camden	4	22.64	1.32
Early Redhaven	2	22.59	2.30
Reliance	1	22.45	3.25
Suwanee	1	22.15	3.25
Springbrite	6	22.09	1.15
LaGem	4	21.94	1.23
Correll	11	21.87	0.84
Redhaven	9	21.84	0.94
Derby	10	21.66	0.81
Sunbrite	5	21.58	1.03
Compact Redhaven	2	21.33	1.88
Red Gold	1	21.05	3.25
Sunqueen	1	20.95	3.25
Pekin	11	20.81	0.79
Carolyn	2	20.71	2.30
Royal Vee	5	20.63	1.46
Ellerbe	10	20.53	0.69
Dixired	5	20.50	1.45
Topaz	3	20.47	1.88
Carson	1	20.45	3.25
Troy	6	20.40	1.03
Dixon	1	20.25	3.25
LaGold	3	19.73	1.88
Springcrest	6	19.54	1.32
Southland	5	19.53	1.08
Harvester	8	19.53	1.08
Marsun	3	19.36	1.88
LaRed	6	19.36	1.33
Surecrop	5	19.23	1.33
Fairtime	3	19.17	1.89
Jefferson	6	19.09	1.33
Vivid	1	19.05	3.25
Fayette	5	18.84	1.45
Babygold 8	1	18.75	3.25
Canadian Harmony	6	18.65	1.33
Golden Monarch	4	18.61	1.63
Whynot	6	18.56	0.98
Springold	3	18.49	1.88
Richhaven	6	18.47	1.33
Sunshine	3	18.45	1.88
Junegold	4	18.39	1.63
Marglow	4	18.33	1.33
Dixiland	6	18.24	1.15
LaPremier	6	18.17	1.33
Madison	5	18.03	1.45
Comanche	6	18.02	1.33
Prairie Dawn	3	17.82	1.88
Velvet	6	17.69	1.08
Redglobe	10	17.41	0.71
Andross	1	17.35	3.25
Albru	2	17.27	2.31
Sunhigh	6	17.14	1.03
Marqueen	5	17.11	1.33
Suncrest	1	17.05	3.25
Redcrest	6	16.90	1.23
Marhigh	6	16.86	1.15
Cresthaven	9	16.85	1.08
Summerset	8	16.52	1.08
Fillette	4	16.36	1.63
Jack Daly	4	15.93	1.63
McNeely	2	15.73	1.88
Shippers Late Red	6	15.65	1.23
Blake	8	15.58	1.03
Sentinel	6	15.25	1.33
Monroe	6	15.23	1.23
Loring	7	15.05	1.08
Rio Oso Gem	4	15.01	1.63
Ranger	8	14.96	0.94
Biscoe	10	14.94	0.75
Redskin	9	14.94	0.90
Sullivan	3	14.86	1.88
Marland	6	14.53	1.15
Keystone	6	14.35	1.33
Jerseyqueen	5	13.98	1.23
Gem	1	13.75	3.25
Fay Elberta	1	13.25	3.25
Emery	9	13.14	0.90
Tyler	5	13.10	1.23
So Good	3	12.69	1.88
Marcus	6	12.59	1.33
Elberta	6	12.57	1.08
Ozark	4	12.33	1.63
Goldenrod	5	12.22	1.45
Marpride	3	11.13	1.88

Table 2. Flesh browning resistance rating of nectarine cultivars as measured by the Hunter Color and Color Difference Meter.

Cultivar	No. of years measured	Adjusted mean	Standard error
Flamekist	1	26.85	3.25
Flavorcrest	1	25.75	3.25
Harko	1	25.65	3.25
Nectared 5	3	25.53	1.88
Nectared 6	2	20.80	2.30
Nectared 4	3	20.66	1.88
EarliBlaze	2	20.48	1.88
Firebrite	1	20.25	3.25
Pocahontas	4	19.97	1.33
Nectared 7	1	19.15	3.25
Late Le Grand	1	18.75	3.25
Cherokee	6	17.57	1.33
Columbia	2	17.43	2.30
Early Sungrand	1	16.65	3.25
Independence	4	16.35	1.33
Fantasia	6	15.76	1.23
Flavortop	6	15.20	1.23
Sunglo	1	14.65	3.25
Garden State	1	14.05	3.25
Francesco	1	13.05	3.25

types (high "b" value) were found to be early or mid-season cultivars. Late season cultivars tended to be either intermediate or high in flesh browning. Future efforts should be directed at developing late season cultivars with resistance to flesh browning.

Great diversity is present within peach and nectarine for flesh browning resistance. Germplasm of high quality exists with flesh browning resistance that should allow for the future development of improved resistant cultivars ripening in all seasons.

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