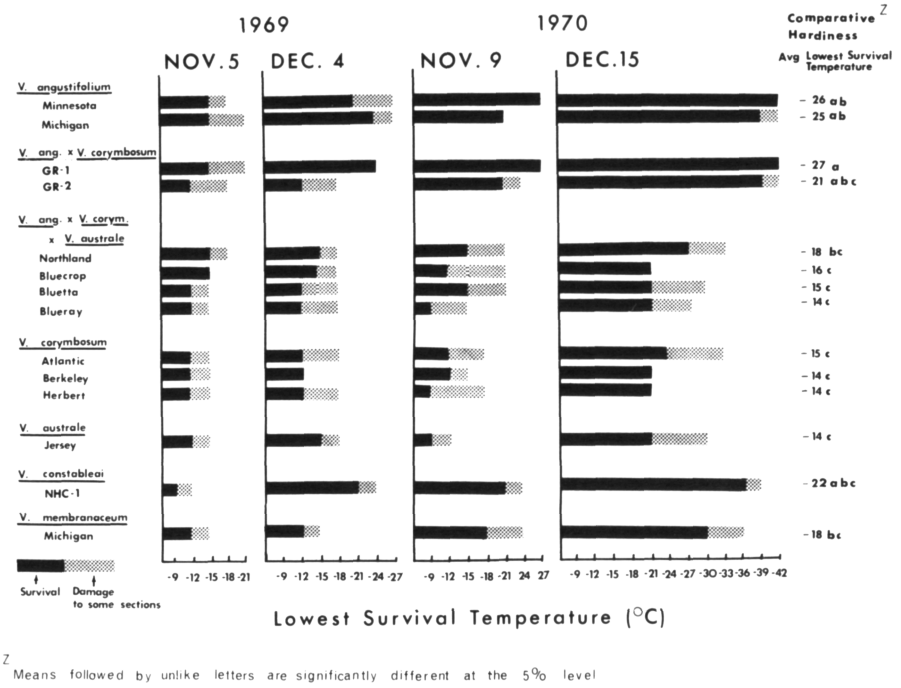

Z Means followed by unlike letters are significantly different at the 5% level

Fig. 3. The hardiness of different species and cultivars of blueberries on 2 dates during the autumn of 1969 and 1970. Intervals of 3°C were used to determine the lowest survival temp.

hardiness of the selections of 2 other highbush species *V. membranceum* and *V. constablaei* were superior to that of other highbush species. But they may be more difficult to utilize in a breeding program because of the difficulty involved in hybridizing them with the other highbush types.

A typical differential thermal profile of a blueberry stem (Fig. 4) shows that an exotherm is present at temp as low as -35°C in hardy blueberries. Similar exotherms have been found useful to predict hardiness in azalea[4] and apple stems (8). The exotherm in blueberries is associated with xylem injury and is not closely associated with bark injury which occurs at a considerably higher temp (Table 1). Furthermore, bark injury cannot be associated with any of the exotherms appearing on the profile. Thus, this technique is not as useful in blueberry as in azalea and apple for determining stem hardiness.

[4]Graham, R. 1972. Cold injury and its determination in selected *Rhodendron* species. MS Thesis, University of Minnesota.

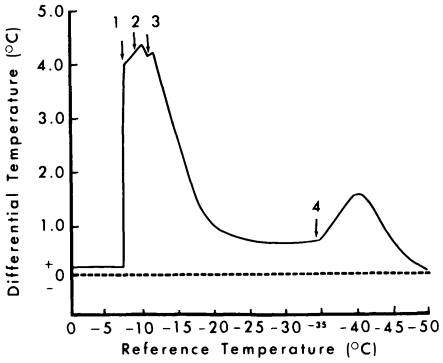

Fig. 4. The differential thermal profile of 'Rancocas' blueberry determined Dec. 20, 1970, at a cooling rate of 1.5°C/min. The exotherms are numbered in order of their appearance on the profile.

Table 1. The relationship of the low temp exotherm to lowest survival temp of xylem and bark tissues in stem pieces of 'Rancocas' blueberry.

Date	Initiation temp of the low temp exotherm (°C) (frozen at 1.5°/min)	Lowest survival temp (°C) (frozen at 0.16°/min) Bark	Xylem
Nov. 4	-27.3± .7	-17.5	-27.5
Dec. 5	-35.6±1.5	-20.0	-32.5
Dec. 20	-34.4±1.7	-20.0	-32.5

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Two Red Leaf Characters Associated with Early Ripening Peaches[1]

W. B. Sherman, R. H. Sharpe, and V. E. Prince[2]
University of Florida, Gainesville

Abstract. **Two leaf color characters, solid red and variegated red, are associated with early fruit ripening in peach [*Prunus persica* (L.) Batsch]. These color characters appear in leaves approaching senescence and can be scored in 1-year-old seedlings.**

Early ripening peaches usually command premium prices. An important contribution of peach breeders has been the development of cultivars which ripen 60 or more days before 'Elberta' (approx 125 days after bloom). However, breeding for early ripening is difficult because cultivars or seedlings which ripen from 40 to 63 days before 'Elberta', or less than 80 to 85 days from bloom, are characterized by problems of seed development and subsequent germination. Embryo culture has been used to improve germination of embryos of early cultivars with limited success. More commonly, seed parents which ripen about 100 days after bloom, and known to carry genes for earliness, are pollinated by very early types to obtain cultavars with less time between anthesis and maturity (1, 3, 5).

The identification of characters in young seedlings associated with early ripening should increase selection efficiency. Here we describe 2 previously unreported leaf characters which appear to be closely associated with early fruit ripening.

Red color observed in old leaves of the early-ripening cultivars 'Early Amber' and 'Springtime' in late summer and fall prompted us to screen advanced peach selections in 1970, at Gainesville. Of 18 early ripening peach selections

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[2]Associate Professor and Professor, Department of Fruit Crops, IFAS, and Horticulturist, USDA, Agricultural Research Service, Byron, Georgia, respectively.

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selected on the basis of low seed germination, each had red pigment in the old leaves. Nine selections had solid red leaves, 7 had variegated red leaves and 2 had both red and variegated leaves.

In 1971 leaves of cultivars and selections were evaluated at Gainesville, Florida and Byron, Georgia. Ratings were made in the fall after a series of cool nights and clear days when conditions appeared to be most suitable for pigment development. With both characters, leaves first developed red pigments in the petiole and basal veins and then the reddening progresses toward the distal end. Pigments are visible on the upper leaf surface, but only in the veins of the lower surface. This differs from a red-leaf character described by Blake (2) and leaf variegations in peaches reported by Fogle and Dermen (4) which are readily expressed on young leaves and are visible on both surfaces of the leaf. Variegated red differs from the solid red by consisting of sharply defined patches of red pigment randomly scattered on the leaf (Fig. 1). Trees with solid red generally lose their leaves before trees with red variegated and the latter before trees with normal green leaves. The solid red character eventually covers the entire upper leaf surface. Chromatographic separation indicates that the red anthocyanins involved in these 2 characters were the same.

At Gainesville, of 53 numbered selections with red or variegated leaves, all ripened their fruit in less than 90 days from bloom. There were no known early ripening peach selections in the selection trial that did not show either the solid red or variegated red character. The selections with solid red outnumbered those with red variegated 37 to 13. Three out of the 53 selections had both characters.

At Byron, solid red and variegated red leaves had been noted in seedlings resulting from crosses in which very early maturing pollen parents were used. Fifty-three of 55 numbered selections ripening more than 30 days before 'Elberta' exhibited 1 or both of these color characters. Named cultivars and numbered selections ripening after 30 days before 'Elberta' had normal green leaves. In fact, 15 of 19 cultivars ripening 30 or more days before 'Elberta' had red leaves (Table 1). There was a tendency for these color characters to be more intense in the very earliest maturing clones and those were also the first to defoliate in the fall.

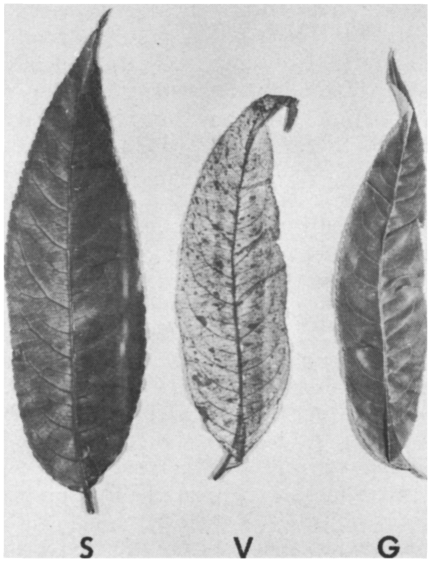

Fig. 1. Solid red (S), variegate red (V) characters, and normal green (G) in mature peach leaves.

The average time of fruit development was shorter in the selections with solid red than of those with variegated leaves. Occasionally, both characters appeared together in an individual. The solid red and variegated red characters were expressed on 1-year-old nursery seedlings. Both solid red and variegated red foliage appear to be heritable and gene controlled because solid red or variegated red leafed seedlings respectively, were found in progeny of solid red or variegated red-leafed clones.

Studies are in progress to determine the inheritance of these 2 characters. Our present hypothesis is that these 2 red leaf characters are either controlled by the same or closely linked gene(s) for earliness.

Table 1. Red solid and variegated and normal green ratings in some peach cultivars at Byron, Georgia.

Cultivar	Approx days before Elberta	Red		Normal green
		Solid	Varie-gated	
Springtime	61	x		
Mayflower	58	x	x	
Earlired	55	x		
Springold	53	x		
Collins	50			x
Cardinal	46	x		
Cherokee[z]	46			x
June Gold	45	x		
Hiland	44		x	
Redcap	42			x
Maygold	42		x	
Dixired	42		x	
Springcrest	39	x	x	
Sunhaven	38	x		
Candor	36	x		
Coronet	33	x		
Dixigem	32		x	
Redhaven	30	x		
Troy	30			x
Biscoe	29			x
Ranger	26			x
Nector	24			x
Suwanee	24			x
Velvet	21			x
Washington	21			x
Glohaven	18			x
E. Hiley	17			x
Sunhigh	13			x
Sullivans Early	10			x
Madison	2			x
Dixieland	0			x
Redskin	0			x
Jerseyqueen	0			x

[z]Nectarine

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Resistance to Root-knot Nematode in Bitter Almond Progenies and Almond x Okinawa Peach Hybrids[1]

J. Kochba and P. Spiegel-Roy

Institute of Horticulture, The Volcani Center, Israel

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Abstract. **Resistance to the root-knot nematode (*Meloidogyne javanica* Chitwood) was established for 7 bitter almond (*Prunus amygdalus* Batsch. var. *amara* DC) F_1 progenies selected from trees in a heavily infested nursery soil and subjected to repeated inoculations in containers. Resistance was very high; (complete in some open-pollinated progenies) suggesting dominance or the presence of a cytoplasmic factor. F_1 hybrid progenies of 2 highly susceptible almond cultivars crossed with 'Okinawa' peach showed almost complete dominance of resistance to *M. javanica.***

Root-knot nematodes (*Meloidogyne* spp.) are a major hazard to almond culture in warm climates, especially on light or medium-type irrigated soils (6,

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