‘HyRed’, an Early, High Fruit Color Cranberry Hybrid

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Cultivar & Germplasm Releases

The American cranberry, Vaccinium macrocarpon Ait., is a small fruit grown in temperate regions of the world. The United States is the major producer with the combined Wisconsin and Massachusetts harvests accounting for ≈80% of the total U.S. annual production. The fruit is used primarily for juices. In addition to the tart flavor, the principal component of value is the red pigment or anthocyanin content of the fruit, measured as total anthocyanin (TAcY) in milligrams per 100 g fresh fruit (Fuleki and Francis, 1968). The importance of pigment content is recognized by some processors by giving a color incentive payment to deliveries of fruit having a TAcY >30. This incentive payment can be economically important, especially during years of low fruit prices. Regions with a longer growing season (Washington and Oregon) average TAcY levels of 50–62 at delivery, whereas fruit grown in Wisconsin averages a TAcY of 33 (personal communication, Dr. Rodney Serres, Ocean Spray Cranberries, Lakeville-Middleboro, Mass.). In addition, regions with colder fall weather (northcentral United States) often harvest many of the current cultivars before full fruit color development to avoid freezing injury and icing problems in the low-lying cranberry beds.

The cranberry selections grown today have not undergone extensive breeding. The selections are maintained by cloning using cuttings (mowed vines disced into new beds). Many selections were derived directly from native plants of fruit having a TAcY >30. This incentive payment can be economically important, especially during years of low fruit prices. Regions with a longer growing season (Washington and Oregon) average TAcY levels of 50–62 at delivery, whereas fruit grown in Wisconsin averages a TAcY of 33 (personal communication, Dr. Rodney Serres, Ocean Spray Cranberries, Lakeville-Middleboro, Mass.). In addition, regions with colder fall weather (northcentral United States) often harvest many of the current cultivars before full fruit color development to avoid freezing injury and icing problems in the low-lying cranberry beds.

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**Description**

Fruit were sampled periodically from 4- to 7-year-old plots located in both central and northern Wisconsin and color analyses were performed using procedures based on the method of Fuleki and Francis (1968). These samples were taken primarily in mid-September, usually ≈2 weeks before the beginning of the commercial harvest. In every year, ‘HyRed’ showed TAcY readings at least twice that of comparable ‘Stevens’ plots (Fig. 2). In addition, ‘HyRed’ showed prominent early coloration even in late August and increased in pigment content at a greater rate than ‘Stevens’ through the September ripening period (Fig. 3). Fruit of ‘HyRed’ develops excellent coloration even when deeply covered with the vine mat, thus resulting in few poorly colored berries (pictorially shown in the Dec. 2001/Jan. 2002 issue of Cranberries magazine).

The anthocyanins of cranberry are located almost entirely in the epidermal layers of the fruit (Sapers et al., 1983). Thus, one factor that can contribute to high extractable fruit color in cranberry is small fruit size (Vorsa and Welker, 1985), in part a result of the influence of surface area to weight ratio on total pigment content of each fruit. In addition, a negative correlation between yield and some of the flavonoid compounds, including anthocyanins, has been suggested (Vorsa et al., 2002). However, differences in fruit size and yield between ‘HyRed’ and other cultivars have been minor when compared to the differences in extractable color. For example, early harvests of fruit from adjacent plots of ‘HyRed’ and the commercial cultivar ‘Pilgrim’ in northern Wisconsin showed the markedly greater pigment content of ‘HyRed’ in both years, while differences in fruit yield and fruit size were negligible or much less pronounced (Table 1). In all our plantings, the fruit size of ‘HyRed’ has averaged >1.5 g, which is similar to the average fruit size of ‘Ben Lear’ and ‘Stevens’ grown in comparable locations in Wisconsin (data not shown). Thus ‘HyRed’ appears to be able to develop high

**Origin**

‘HyRed’ originated from a cross of ‘Stevens’ and a seedling selection designated as ‘Ben Lear #8’, derived from an open-polli- nated population of ‘Ben Lear’ (selected by Dr. Don Boone and maintained at the type collection at DuBay Cranberries, Portage County, Wis.) (Fig. 1). Controlled pollinations were done in a greenhouse using potted plants. Seeds were germinated in vitro, the resultant plants micropropagated, and >700 cloned individuals were planted in a test plot in a grower’s field in central Wisconsin. In 1993, ‘HyRed’ was selected for its early color and high fruit bud set, again brought back into micropropagation, and replanted along with other selections in test plots of various sizes (20 to 200 m²) in grower fields in 1994 through 1997. Because of the unique and high cost production techniques required to grow cranberries, areas for test plots were necessarily limited to open space available in commercial beds. Replicated and comparative plots were utilized when feasible. The test plots included ‘Stevens’ or ‘Pilgrim’, which served as standards for comparison. In addition, plantings were done in two distinct growing regions, central Wisconsin and northern Wisconsin. The central Wisconsin region is typified by a 170-d season with nearly 3000 growing degree days (base of 45°C), whereas the northern region by a 110-d season with 2500 growing degree days.

**Fig. 1. Pedigree of ‘HyRed’. The seed parent is ‘Stevens’ and the pollen parent is the lower member of each couplet. ‘Ben Lear’, ‘Potter’s Favorite’, and ‘McFarlin’ are wild selections. ‘Ben Lear #8’ is an open pollinated seedling of ‘Ben Lear’ selected by Dr. Don Boone, Univ. of Wisconsin–Madison.**
Table 2. Titratable acidity and percentage of total soluble solids (°Brix) content of harvested fruit from 3 cranberry selections. Fruit was harvested during late Sept. 2000 from adjacent plots at two production locations in Wisconsin. Three pooled samples were taken from harvests in randomly tossed rings within the plots at each location. Analysis of variance indicated no significant differences for a fruit trait (*P* = 0.05) between selections at a location.

| Selection       | Location 1 | Location 2 | Location 1 | Location 2 |
|-----------------|------------|------------|------------|------------|
| Stevens         | 2.40       | NA         | 8.64       | NA         |
| Pilgrim         | 2.40       | 2.41       | 8.47       | 7.94       |
| HyRed           | NA         | 2.46       | NA         | 7.54       |

*Not applicable.*