

'Marion' Trailing Blackberry

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'Marion' is the most widely planted blackberry cultivar in the world. In Oregon, which leads the world in production of blackberries, 'Marion,' often called "marionberry" by consumers and marketers, has been the dominant cultivar since the early 1980's when it replaced 'Thornless Evergreen' as the most widely planted cultivar (15). In 1995, 'Marion' was harvested from 1,420 hectares within Oregon. Approximately 200 ha was in the "off-year" of alternate year production (16) in 1995.

About 95% of the Pacific Northwest blackberry crop is processed (16). 'Marion' and 'Thornless Evergreen' account for approximately 70% and 20% of the hectareage, respectively (15). 'Marion' is regarded as a berry with a premium quality and is usually sold under the 'Marion' name, whereas 'Thornless Evergreen' and other blackberries are sold under a generic, "blackberry" label.

'Marion' has developed its outstanding reputation for several reasons, primarily related to fruit quality, including fruit flavor, aroma, and perception of fewer pyrenes. Waldo (23), the USDA-ARS small fruit breeder in Corvallis, Oregon, was able to incorporate the outstanding flavor and pleasant aroma of the trailing western blackberry (*Rubus ursinus* Cham. & Schldl.; syn. *R. macropetalus* Doug.) into 'Marion.' 'Marion' is perceived as being "less seedy" than 'Thornless Evergreen,' eastern U.S. erect, and semi-erect blackberry cultivars. While pyrene measurements have not identified any size differences between 'Marion' and eastern U.S. cultivars (Takeda, pers. comm.), there

have been several proposed reasons for this perceived difference. 'Marion' pyrenes have a different shape, they are flatter than the ellipsoidal and "clam" shaped eastern cultivars, thus sliding more easily between your teeth (20). 'Marion' has a soft, thin endocarp in comparison to the eastern cultivars (20), also the pyrenes are coated with a 'gelatinous' material so that there is a "cushioning" effect when the fruit is eaten.

'Marion,' a hexaploid, was released in 1956 by the cooperative breeding program of the U.S. Department of Agriculture-Agricultural Research Service and the Oregon Agricultural Experiment Station. The name 'Marion' was chosen to recognize Marion County, Oregon where the berry was tested extensively. In 1948, 'Marion' was selected by Waldo from a cross of 'Chehalem' x 'Olallie' made in 1945 (23). The pedigree of 'Marion' is quite diverse, leading consumers to feel unsure as to what type of blackberry is 'Marion' (Figure 1). The pedigree of 'Marion' is also confusing to scientists. Based on updated taxonomy of early reports (5, 6, 11, 12, 13, 14, 21, 23, 24), the pedigree contains, *R. ursinus* (approximately 44%), *R. armeniacus* Focke (25%; syn. *R. procerus* Muller), *A. flagellaris* Willd. (13%), *R. aboriginum* (13%) and *R. idaeus* L. (6%). However, 'Marion's' pedigree appears to be more complicated than this, and it may never be determined with complete accuracy. For instance, 'Santiam,' a chance seedling found by a grower, is perfect flowered while native *R. ursinus* is dioecious. Although 'Santiam' appears to be largely derived from *R.*

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ursinus, the perfect flowering characteristic may have come from 'Logan,' which was commercially grown at the time 'Santiam' was found. The cultivar 'Black Logan' also has an uncertain origin as does 'Phenomenal'; in these two cases, the maternal parent is known but the pollen parent has been hypothesized based on the different *Rubus* species and cultivars growing in the vicinity. While we cannot be positive about the entire ancestry of 'Marion,' the fruit characteristics and plant growth habit are most similar to *R. ursinus*.

Trailing blackberry cultivars tend to be extremely vigorous and 'Marion' is no exception. New, primocanes emerge in the spring, grow upright until cane weight pulls them to the ground where they grow along the soil surface. Primocanes can grow 6-11 m during the growing season (2, 4) with one plant producing as much as 200 m of primocane growth (4). Plants also produce a second flush of primocanes, naturally, during the fruit ripening period (4).

'Marion's poor winter tolerance is the main factor that has limited its production to the Willamette Valley. Depending on the environmental conditions leading up to and after a winter cold period, state of dormancy, and cultural practices, 'Marion' often will exhibit cane and/or bud injury (LT_{50}) at -5 to -22 C (3, 4). Apparently, 'Marion' has a very low chilling requirement that is often met before winter has even begun, making it particularly susceptible to fluctuating winter temperatures (17). The plants exhibit a remarkable ability to develop secondary buds and will often produce a full crop on secondary buds after the primary buds have been killed (18).

Growers typically bundle and tie the primocanes to a trellis in mid-August to early September; occasionally they are left on the ground until February before being trained. The timing of the trellising reflects the risk a grower is willing to take relative to potential winter injury. August-September trained 'Marion' plantings are more productive the following year (2)

but since they are on the trellis as opposed to the ground during the winter, they are more susceptible to winter injury (1). Primocane suppression date can also affect subsequent cold hardiness and yield (2, 3).

During the fruiting year, the plants break bud in early spring but do not normally flower until after the danger of frost has passed. The crop typically begins to ripen at the end of June with commercial harvest beginning the first week of July and finishing in late July. Over 85% of the crop is harvested with mechanized harvesters (16). Fruit for the IQF (individually quick frozen) market and the very limited fresh market is usually harvested by hand, the lack of fruit firmness is a major limitation for 'Marion.' The drupelet skin will often break under the weight of other fruit in the harvest flat thus hindering 'Marion's use for fresh market. More importantly, it is difficult in the processing plants to use air blowers to separate leaves and other contaminants from the fruit when the fruit are compacted and have leaked juices from their broken skins.

'Marion' canes have small prickles. These are a nuisance during training but they are a serious problem when these prickles dislodge during mechanical harvesting. The prickles become a contaminant in the harvested fruit.

'Marion' fruit, which average 4.5-5.5 g, typically have about 65-80 drupelets per fruit early in the season and 60-70 later in the season (7, 8, 9, 19). Ripe fruit retain their color well when processed and the fruit averages 13.6% soluble solids and 1.5% titratable acidity, with a pH near 3.2.

Fruit yield of 'Marion' is not particularly high. In replicated trials, 'Marion' plants produced 15,000 kg/ha in their second cropping season (7, 8, 9). In commercial production, the average yield for 1993-1995 was 7500 kg/ha; however some cold injury occurred in these years. In comparison, 'Thornless Evergreen,' a more cold hardy derivative of *R. laciniatus* (1), averaged 9600 kg/ha over this

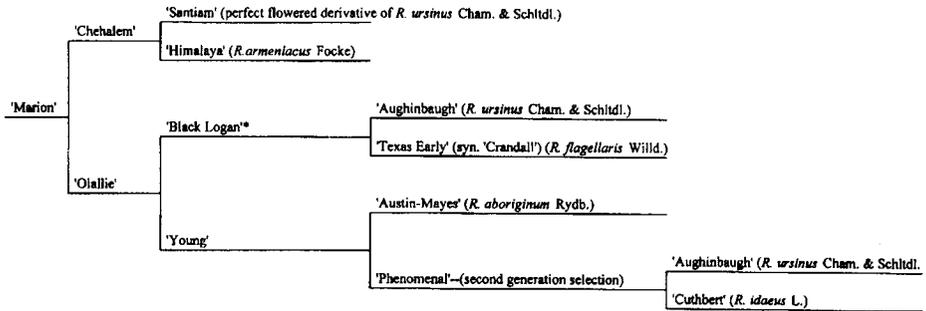


Figure 1. Pedigree of 'Marion' trailing blackberry.

*'Black Logan' is either 1) synonymous with 'Mammoth' and it is a 2nd generation selection from 'Aughinbaugh' x 'Texas Early' (12, 13) or 2) it is a selection from open pollinated seed of 'Mammoth' that in turn was a selection from 'Aughinbaugh' x 'Texas Early' (6). Information derived in part from: Darrow, 1918; 1937; Hedrick, 1925; Hall, 1990; Jennings, 1981; 1988; Logan, 1909; Thompson, 1997; Waldo, 1957; Waldo and Darrow, 1948.

same period, and growers report yields of 'Chester Thornless,' a semi-erect blackberry, at 22,500 kg/ha.

While 'Marion' is susceptible to cane and foliar diseases, such as septoria leaf spot (*Septoria rubi* Westend) and purple blotch (*Septocytia ruborum* (Lib.) Petr.), and fruit pests, such as botrytis fruit rot, dryberry mite (*Phyllocoptes gracilis* (Nalepa)), and redberry mite (*Acalitus essigi* (Hassan)), these pests can be controlled with good management. As with most blackberries, 'Marion' is tolerant of root diseases. While the trailing blackberries can be infected with tobacco streak virus (TSV), raspberry bushy dwarf virus (RBDV), and blackberry calico virus (BCV), these viruses have not been shown to affect growth or yield in 'Marion'.

'Marion' represents an amazingly diverse ancestry. The breeders of the past were able to capture several of the most positive characteristics of a species and combine it into one genotype. The outstanding fruit quality, particularly flavor, of 'Marion' has been the reason it has risen to such dominance in the worldwide market. 'Marion' will continue to be the predominant cultivar in the Pacific Northwest until a cultivar is developed that is firmer fruited, more winter cold tolerant, thornless, and, most importantly, retains 'Marion's' fruit quality characteristics.

Literature Cited

- Bell, N., E. Nelson, B. Strik and L. Martin. 1992. Assessment of winter injury to berry crops in Oregon, 1991. Agr. Exp. Sta. Spec. Rpt. 902. Oregon State University.
- Bell, N.C., B.C. Strik, and L.W. Martin. 1995a. Effect of primocane suppression date on 'Marion' trailing blackberry. I. Yield, components. J. Amer. Soc. Hort. Sci. 120:21-24.
- Bell, N.C., B.C. Strik, and L.W. Martin. 1995b. Effect of primocane suppression date on 'Marion' trailing blackberry. I. Cold hardiness. J. Amer. Soc. Hort. Sci. 120:25-27.
- Cortell, J. and B. Strik. 1997. Effect of florican number in 'Marion' trailing blackberry I. Primocane growth and cold hardiness. J. Amer. Soc. Hort. Sci. (in press).
- Darrow, G.M. 1918. Culture of Logan Blackberry and Related Varieties. USDA Farmers' Bulletin 998. Washington, D.C. (24 pp).
- Darrow, G.M. 1937. Blackberry and raspberry improvement. pp. 496-533. In: Better plants and animals-II. U.S.D.A. Yearbook of Agriculture. U.S. Government Printing Office, Washington, D.C.
- Finn, C., K. Wennstrom, T. Mackey, D. Peacock and G. Koskela. 1996. New Small fruit cultivars and advanced selections for the Pacific Northwest. Proc. Ore. Hort. Soc. 87:117-120.
- Finn, C. 1997. New small fruit cultivars from down South; USDA releases from Corvallis. Proc. W. Wash. Hort. Assoc. 141-144.
- Finn, C. and F. J. Lawrence. 1997. 'Black Butte' trailing blackberry. Hort Science (submitted).
- H.K. 1990. Blackberry breeding. pp. 249-302. In: J. Janick (ed.) Plant Breeding Reviews, Vol. 8. Timber Press, Portland, Ore.
- Hedrick, U.P. 1925. The Small Fruit of New York. State Department of New York—Farms and Markets. Thirty-third Annual Report—Part II, J.B. Lyon Co., Albany, NY.

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12. Jennings, D.L. 1981. A hundred years of loganberries. *FVJ* 35(2):34-37
13. Jennings, D.L. 1988. Raspberries and Blackberries: Their breeding, diseases, and growth. Academic Press, New York, N.Y.
14. Logan, J.H. 1909. Loganberry, Logan Blackberry, and Mammoth Blackberry. *The Pacific Rural Press and California Fruit Bulletin*. September 25, 1909. Vol 78:193, 196.
15. Oregon Agricultural Statistics Service. 1981-1996. *Berry Crop Summary*. Portland, Oregon.
16. Strik, B.C. 1992. Blackberry cultivars and production trends in the Pacific Northwest. *Fruit Variety Journal*. 46:202-206.
17. Strik, B, H. Cahn, N. Bell, and J. deFrancesco. 1994. Caneberry research at North Willamette Research and Extension Center—an update. *Proc. Ore. Hort. Soc.* 85:141-149.
18. Strik, B. H. Cahn, N. Bell, J. Cortell, and J. Mann. 1996a. What we've learned about 'Marion' blackberry—potential alternative production systems. *Proc. Ore. Hort. Soc.* 87:131-136.
19. Strik, B., J. Mann, and C. Finn 1996b. Percent drupelet set varies among blackberry genotypes. *J. Amer. Soc. Hort. Sci* 121:371-373.
20. Takeda, F. 1993. Characterization of blackberry pyrenes. *HortScience* 28:128 (Abstract).
21. Thompson, M.M. 1997. Survey of chromosome numbers in *Rubus* (Rosaceae: Rosoideae); *Ann. Missouri Bot. Gard.* 84:128-164.
22. Waldo, G.F. 1977. 'Thornless Evergreen'—Oregon's leading blackberry. *Fruit Variety Journal* 31:26-30.
23. Waldo, G.F. 1957. The Marion Blackberry. Oregon State College, Corvallis, Ore. *Circular of Information* 571, 7 pages.
24. Waldo, G. and G.M. Darrow. 1948. The origin of the Logan and Mammoth blackberries. *J. Hered.* 39:99-107.