

## **Primocane-Fruiting Blackberries**

Dr. Bernadine Strik, Professor of Horticulture & Berry Research Program Leader, NWREC  
Oregon State University. [Bernadine.strik@oregonstate.edu](mailto:Bernadine.strik@oregonstate.edu)

Primocane-fruited blackberry is a relatively new crop, with the first commercial cultivars, 'Prime-Jan<sup>®</sup>' and 'Prime-Jim<sup>®</sup>' (Univ. Arkansas, Fayetteville), released in 2004. Since then, 'Prime-Ark<sup>®</sup>45' (2011), 'Prime-Ark<sup>®</sup> Freedom' (2014) and 'Prime-Ark<sup>®</sup> Traveler' (2015) have been released for commercial production.

The amount of research done on this type of blackberry in addition to grower experience is relatively little compared to the more typical, floricanes-fruited types. Here, I will present a summary of the up-to-date research information (see list at the end of this article), particularly as it relates to crop management, along with some recommendations based on my experience seeing the performance of this crop in various production regions.

Primocane-fruited, erect blackberries can be grown for a double-crop (floricanes in early summer plus primocane in late-summer through autumn) or a single-crop (primocane only). Whether plantings are managed for a double crop depends on the quality and fruiting-season or the potential market of the floricanes crop relative to other floricanes-fruited cultivars that are available. Management of the primocane crop, particularly related to modifying the fruiting season (see below), is limited when double-cropping (as the floricanes are present). Also, cost of primocane tipping may be higher when double cropping and yield of the primocane crop may be lower when double cropping than when managing for a primocane crop only.

### **Primocane crop only**

Yield. Primocane yield of the most commonly grown commercial cultivars to date has been limited in many production regions of the USA by their late fruiting season – canes do not have much time to fruit prior to the first frost or heavy rains in autumn. Reported yield in open, field-grown plantings has thus been low in many regions (e.g., 2-3 tons/acre in Oregon; 2-4 tons/acre in Arkansas). Yield can be increased in some of these regions by planting earlier-fruited cultivars (e.g., 'PrimeArk<sup>®</sup> Traveler' has a primocane harvest date 12 days earlier than 'PrimeArk<sup>®</sup> 45') or by advancing the growth of primocanes using spun-bound polypropylene row covers placed over the row from late winter through early tipping. In Michigan, plants grown only for a primocane crop in a tunnel (plastic sheeted from May through November) still did not produce an economical yield (0.5 to 1.5 tons/acre) from early August to mid-October. Yields in Oregon in a tunnel have ranged from 2 to 8.5 tons/acre depending on pruning method. In these cooler regions, it is clear that yield is limited by the weather – plants have many buds and flowers present on the first frost date. In the central coastal area of California, primocane yield of 'PrimeArk<sup>®</sup> 45' has ranged from 9 to 10 tons/acre when double-tipping.

Pruning. Our early research quickly showed that this type of blackberry has much greater yield on primocanes when they are soft-tipped (removing ~ 2 inches) during the growing season. Soft-tipping primocanes once to about 3 ft tall increased yield 2- to 3-fold compared to untipped canes through increasing branch number per cane and flower number. When we looked at alternative tipping heights of 1.5 ft and 5 ft as compared to 3 ft, we found that yields were similar at the 1.5 and 3 ft soft-tipping height, but tipping later (at 5 ft) reduced branch number, branch length, and yield in our climate. In a tunnel, we showed that double tipping (soft-tipping canes to 1.5 ft and then soft-tipping the branches to 1.5 ft) increased yield compared to a single tip at 1.5

ft and led to a more compact plant growth and uniform presentation of fruit, increasing picking efficiency. Double-tipping did not reduce fruit size – in fact we found larger fruit when compared to a single tip. Also, a single or double tip has had little impact on bloom date or harvest date in our climate – no impact of tipping vs. no tipping and a single tip vs. a double tip.

A single tip quickly became the standard for research and production in other areas, while a double tip was consistently used in the central coast of California. Growers go through a field on several occasions during the growing season to soft-tip primocanes, by hand, to the desired height and, in some cases, to tip the branches (double-tip). It is important to not tip canes or branches that have flower buds present as this will reduce yield. Late-emerging primocanes will not be tipped (and will likely not fruit as they will be too late).

When we compared soft-tipping canes (removing ~5 inches) to hard tipping canes (removing ~ 1.5 ft) to a height of 3 ft, canes that were hard-tipped produced more branches and had more fruit than soft-tipped canes. However, tipping as early as possible was also an important factor for high yield. When canes were hard-tipped early in the season (June 22-27 in Oregon), the number of fruit was increased three-fold compared to soft-tipping canes early. This supported our hypothesis that tipping to older growth and more mature buds improves branching and yield.

We then studied whether mechanical hedging can be used to provide an economic alternative to hand-tipping of primocanes. While hedging shows potential for reducing labor costs, growers must use caution when hedging to ensure that there are not too many canes in the row that have already formed a flower bud and to hedge as early as possible. Performing a hard-hedge early in the season, by cutting canes back to a shorter height than 3 ft, shows promise in this crop for maximizing economic returns.

We have shown that the primocane crop can be delayed one month by re-cutting the primocanes back to ground level once they reach a height of 1.5 ft (then tip/prune as per usual). Of course, this is only an advantage in a warm climate. In a cooler climate (shorter growing season), the primocane crop may be advanced using spun-bound polypropylene row covers placed over the row from late winter through early tipping or by growing plants in a tunnel with plastic on all season.

### **Double-cropping**

The floricanes are most economically pruned in winter by hedging to a height estimated to be below the region of fruit production the prior fall. Yield of the floricane crop is dependent on the cultivar grown, the vigor of the stand (number of floricanes/length of row), how the canes were managed when they were primocanes, winter pruning method, and growing region. The chilling requirement for the recently released cultivars is estimated at 300 hours. Yield in some warmer regions may be limited by insufficient chilling and in colder regions by winter damage, depending on the year. Yield of floricanes was 2 to 3 tons/acre in Oregon, but has been reported as 3 to 11 tons/acre in smaller, research plots and 3 to 4 tons/acre in commercial fields in the coastal region of California. The fruiting season of ‘PrimeArk<sup>®</sup> Traveler’ and ‘PrimeArk<sup>®</sup> 45’ is similar to ‘Natchez’.

The floricanes would either need to be removed by hand from the row after summer fruiting or be left in the row (dead canes) – some growers might do this to reduce labor costs (e.g., rotate between double cropping and single cropping to reduce pruning costs).

In Oregon, producing a floricane crop reduced the number of primocanes per foot of row and thus would be expected to reduce yield relative to a primocane-only crop. One would also expect

primocane pruning (tipping once or twice) to be more labor intensive in a double-cropped system. However, double cropping is common in the coastal region of California.

### **Nutrient management**

Current recommendations are to apply N fertilizer in spring and again near primocane bloom (if using a granular) or to fertigate from spring through early fruit set (primocanes). Application of other nutrients should be based on soil fertility and leaf tissue analysis. Our research in Oregon has shown that leaf samples for tissue analysis should be collected at the early green fruit stage (on primocanes), sampling leaves from primocane branches. If leaves are sampled on this crop during the commonly recommended time of late July to early August, the tissue levels for most nutrients are highly variable making interpretation and monitoring changes over the years difficult.

### **Published research on primocane-fruiting blackberry (most-recent to oldest)**

- Strik, B.C. 2015. Seasonal variation in mineral nutrient content of primocane-fruiting blackberry leaves. *HortScience* 50:540-545.
- Lowe, J.D., K.W. Pomper, S.B. Crabtree, J.R. Clark, and J.G. Strang. 2014. Primocane yield of 'Prime-Ark<sup>®</sup> 45' and 'Prime-Jan<sup>®</sup>' blackberries grown using USDA national organic program practices in Kentucky. *J. Amer. Pom. Soc.* 68:221-226.
- Strik, B.C. and G. Buller. 2012. The impact of severity and time of tipping and hedging on performance of primocane-fruiting blackberry in a tunnel. *HortTechnology* 22:325-329.
- Strik, B.C., J.R. Clark, C.E. Finn, and G. Buller. 2012. Management of Primocane-fruiting Blackberry – Impacts on Yield, Fruiting Season, and Cane Architecture. *HortScience* 47:593-598.
- Strik, B.C. and C.E. Finn. 2012. Blackberry production systems – a worldwide perspective. *Acta Hort.* 946:341-347.
- Clark, J.R., B. Strik, E. Thompson, and C.E. Finn. 2012. Progress and challenges in primocane-fruiting blackberry breeding and cultural management. *Acta Hort.* 926:387-392.
- Lowe, J.D., K.W. Pomper, S.B. Crabtree, J.R. Clark, and J.G. Strang. 2012. Yield characteristics of thorny primocane-fruiting blackberries from the University of Arkansas breeding program grown under organic growing conditions in Kentucky. *J. Amer. Pom. Soc.* 66:2-7.
- Hanson, E. 2012. Primocane-fruiting blackberry performance in high tunnels in cold regions. *Acta Hort.* 946:397-401.
- Vincent, C.I. and M.E. Garcia. 2011. A system of defined phenological stages for cold tolerance and development of floricanes inflorescences of primocane-fruiting blackberries. *J. Amer. Pom. Soc.* 65:54-60.
- Fernandez, G.E. and J.R. Ballington. 2010. Performance of primocane-fruiting experimental blackberry cultivars in the Southern Appalachian Mountains. *HortTech.* 20:996-1000.
- Thompson, E., B.C. Strik, C.E. Finn, Y. Zhao, and J.R. Clark. 2009. High tunnel vs. open field: management of primocane-fruiting blackberry using pruning and tipping to increase yield and extend the fruiting season. *HortScience*, 44:1581-1587.
- Strik, B.C. and E. Thompson. 2009. Primocane-fruiting blackberries – Potential for extending harvest season and production regions. *HortScience* 44:23-24.
- Strik, B.C., J.R. Clark, C.E. Finn, and G. Buller. 2008. Management of primocane-fruiting blackberry to maximize yield and extend the fruiting season. *Acta Hort.* 777:423-428.
- Stanton, M.A., J.C. Scheerens, R.C. Funt, and J.R. Clark. 2007. Floral competence of primocane-fruiting blackberries Prime-Jan and Prime-Jim grown at three temperature regimes. *HortScience* 42:508-513.
- Thompson, E., B.C. Strik, J.R. Clark, and C.E. Finn. 2007. Flowering and fruiting patterns of primocane-fruiting blackberries. *HortScience* 42:1174-1176.
- Drake, C.A. and J.R. Clark. 2003. Effects of pruning and cropping on field-grown primocane-fruiting blackberries. *HortScience* 38:260-262.
- Lopez-Medina, J. and J.N. Moore. 1999. Chilling enhances cane elongation and flowering in primocane-fruiting blackberries. *HortScience* 34:638-640.
- Lopez-Medina, J., J. N. Moore, and K-S Kim. 1999. Flower bud initiation in primocane-fruiting blackberry germplasm. *HortScience.* 34:132-136.