Primocane-Fruiting Blackberries

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'Prime-Jan'® & 'Prime-Jim'® – 2004 (Univ. Arkansas)
'Prime-Ark® 45' – 2011
'Prime-Ark® Freedom' – 2014
'Prime-Ark® Traveler' – 2015
Primocane is strongly apical dominant. To get much branching, primocane needs to be tipped in summer.

Primocanes emerge from basal buds on floricanes & on crown and roots.
Flower bud initiation (FBI) & development (FBD)

- FBI and FBD occur after a brief period of growth (Lopez-Medina et al., 1999)
- Are thought to be day-neutral

Order and length of bloom

In primocane-fruiting blackberry, 17 day range in bloom within an inflorescence and 21 days among branches in Oregon

(Thompson, Strik, Clark & Finn, 2007)
Open flower to black fruit: 36 - 51 days

Thompson et al., 2007; Strik et al., 2012 – Prime-Jan & Prime-Jim

Cane development

Un-tipped primocane

Tipped (3 ft) primocane

In cold climates, buds that did not break/fruit on primocane will fruit after winter/chilling period when a florican. (Strik, Finn, Clark, 2008; Thompson, Strik, Clark, 2007)
“Starting N rates:

New plantings:
50 lb / acre

Established:
70 – 100 lb /acre

Late-green to early red fruit stage (8 to 10 weeks after hedging)
Stage of growth at which leaf samples for nutrient analysis should be taken

Growing for a primocane crop only

Early primocane emergence

Floricane stub

Planting is mowed to stubs in late winter (can cut lower than in this photo)
Primocane growth

Rowcovers placed on plots:
31 March – 3 May 2004
22 Feb. – 20 April 2005

Rowcovers advanced growth and bloom by 2 weeks

Research on summer-tipping of primocanes

Un-tipped primocane

Tipped (1m) primocane

(Strik, Finn, Clark, 2008; Thompson, Strik, Clark, 2007)
Fig. 3. Cumulative yield of primocane–fruiting blackberries ‘Prime-Jan’ in 2004 (A) and 2005 (B) and ‘Prime-Jim’ in 2004 (C) and 2005 (D) as affected by primocane management treatment in Oregon. There were no floricanes in 2004 thus this treatment was omitted. Mean ± SE.

From: (Strik et al., 2012)
Soft-tipped canes had more flowers than un-tipped (78 vs. 49)

Impact of soft-tip height on branching

- **Avg. branch length = 2.5 ft**
- **Tip 1.5 ft**
- **21 May**

- **Avg. branch length = 1.5 ft**
- **Tip 3 ft (control)**
- **7 June**

- **Avg. branch length = < 1 ft**
- **Tip 5 ft**
- **26 June**

Branch length decreased with soft-tipping height
Fruiting season cut short by weather in many temperate or continental climates

Primocane yield (open field):
Oregon, 2 – 3 tons/acre
Arkansas, 2 – 4 tons/acre

End of October

Later flushes of primocane growth
Delaying & extending season

Treatments:

- Soft-tip 1.5 ft
- Re-cut to soil level when primocanes 1 ft tall; then soft-tip at 1.5 ft
- Re-cut to soil level when primocanes 1.5 ft tall; then soft-tip at 1.5 ft
- Tip at 1.5 ft then tip branches at 1.5 ft ("Double tip")

Ellen Thompson, M.S. graduate student
Effect of tipping on cane architecture

**Soft-tipped at 1.5 ft**

**“Double-tipped” at 1.5 ft**

Main cane tipped at 1.5 ft & branches at 1.5 ft

Fig 3. Cumulative yield (kg-plot$^{-1}$) of ‘Prime-Jan’ blackberry as affected by primocane pruning in the **A. tunnel** and **B. open field**, NWREC, 2007 (n=4).

- **A. Tunnel**
  - T0.5m/Tb0.5m
  - T0.5m (control)
  - C0.25m/Tb.5m
  - C0.5m/Tb.5m

- **B. Open field**

Double tipped

Re-cut at 1 ft; single tip

Single tip

Using a tunnel extended season by 3 weeks

Double tipping increased yield more than 3x

(Thompson et al., 2009)
One tip versus double tip had no effect on fruiting season

Fig. 1. Average date of primocane emergence (E), cutting (C), tipping main primocane at 0.5 m (T), tipping branches at 0.5 m (Tb), bloom (B), first fruit harvest (H0), 50% harvest (H1), and final harvest (Hf) of ‘Prime Jan’ blackberry grown in open field or a tunnel at the NWREC, 2006-2007 (n=8).

Thompson, Strik, Finn, Zhao & Clark (2009)

Fig 3. Cumulative yield (kg plot\(^{-1}\)) of ‘Prime Jan’ blackberry as affected by primocane pruning in the A. tunnel and B. open field, NWREC, 2007 (n=4).

Double-tipping increased berry weight by 33% compared to the single tipped canes

(Thompson et al., 2009)
Soft-tipped at 1.5 ft

Double-tipped

Yield of primocane crop only (tunnel)

Primocane yield (tunnel):
Michigan, 0.5 – 1.5 tons/acre
Oregon, 2 – 8.5 tons/acre
Arkansas, 2 – 4 tons/acre

• Can also be increased by growing earlier fruiting cultivars (e.g., ‘Prime-Ark® Traveler’ is 12 days earlier than ‘Prime-Ark® 45’)
• And/or adding a rowcover in spring to the “mix”
‘PrimeArk® 45’ second year planting, Oregon (tunnel planned)

Primocane crop in extended climate, CA

Primocane yield 9 to 10 tons/acre

‘Prime-Ark® 45’ primocane crop, Watsonville area, CA
Courtesy: Ellen Thompson, Pacific Berry Breeding LLC, CA
Early season canes tipped

Later season canes allowed to grow

‘Prime-Ark® 45’, Santa Maria, CA, courtesy: Ellen Thompson, Pacific Berry Breeding LLC

Research in closed tunnel

10/28/2008
Impact of severity and time of tipping and hedging
(Strik and Buller, 2012)

Treatments

Soft-tip
Remove 4 inches when canes were 3 ft 4” tall

Hard-tip
Remove 1.5 ft when canes were 4.5 ft tall

➢ Tipping was done on 4 dates in each year
➢ Canes with flower buds avoided

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Hand-tipping severity

**Soft-tipped**
- 2.2 branches/cane
- 30 fruit/cane
- 9.5 inch long branches

**Hard-tipped**
- 4.2 branches/cane
- 66 fruit/cane
- 16 inch long branches

**Soft-Hedge**
Sheared to remove 4 inches (to 3 ft high)
On June 22 to June 27 (depending on year)

**Hard-Hedge**
Sheared to remove 1.5 ft (to 3 ft high)
On June 29 to July 2

Hard hedge
Hard hedge

‘Prime-Ark® 45’ hedged in Oregon
Photo: Sept. 11
Growing for a primocane crop only – will see fruiting laterals from stubs left after mowing

Planting after mowing in late winter

Fruiting “laterals” from stubs left at pruning will fruit about 1 month before primocane fruit, depending on climate
Buds on floricanes (that didn’t fruit when they were primocanes) will break in spring. Photo shows canes that were NOT tipped the prior year and were NOT pruned in winter.

‘Prime-Ark® 45’ in April
Courtesy: Ellen Thompson, Pacific Berry Breeding LLC
Photo shows canes that were tipped as primocanes the prior year and were hedged when dormant.

Floricane Season and Yield

- **Floricane yield:**
  - 2 to 3 tons/acre in Oregon (small plots) (Strik et al., 2008)
  - 3 to 11 t/a in Arkansas (small plots) (Clark et al., 2005; 2014)
  - 3 to 4 t/a in California (commercial)

Fruiting season is similar to that of ‘Natchez’.
Summary

- Offer a late-season, niche primocane crop. Floricane crop is grown if fruit offers advantage for quality in season and for labor (done in some regions). Double cropping not common.
- Fruiting season can be manipulated in warm climates by advancing or delaying primocane growth.
- Tip primocane (at least once) and tip as early as possible to maximize fruiting.
- Nitrogen management – tissue sample at correct time; extra N for late primocane crop