Fruiting Wall Training Systems For Tart and Fresh Sweet Cherry Production

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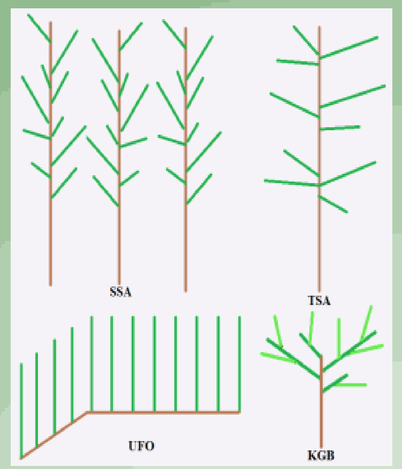
'Benton' trained to the TSA system, summer 2011

'Benton' trained to the KGB system, summer 2011

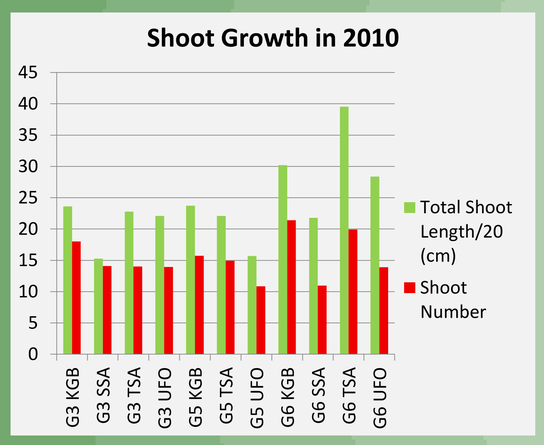
Introduction: Production of fresh market sweet cherries (*Prunus avium* L.) requires high labor inputs and incurs significant risks. The development of high-density fruiting wall canopy architectures has the potential to lower costs of protection (from birds or rain), provide more efficient use of space, improve labor efficiency and therefore reduce labor costs, optimize light distribution, and facilitate better spray penetration, thereby improving fruit quality, consistency, and profitability. In this study, we examined four novel training systems on three precocious, dwarfing rootstocks to determine how they interact during early orchard establishment of 'Benton' sweet cherry trees. The UFO system was studied further using both 'Rainier' and 'Montmorency' tart cherry to see if planting angle and the bud selection technique influence shoot growth and placement. Shoot placement in the UFO is key to developing a well-filled canopy and achieving efficient use of space.



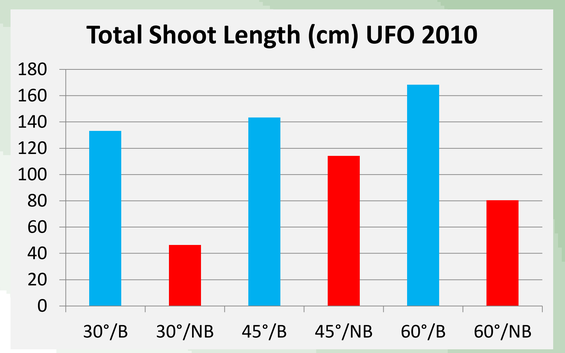
'Benton' sweet cherry trees on three rootstocks (Gisela 3, G3/dwarfing; G5/dwarfing; and G6/vigorous) were trained to four different tree architectures: Tall Spindle Axe/TSA, Upright Fruiting Offshoots/UFO, Kym Green Bush/KGB, and Super Slender Axe/SSA at the Clarksville Research Center (planted in 2010).

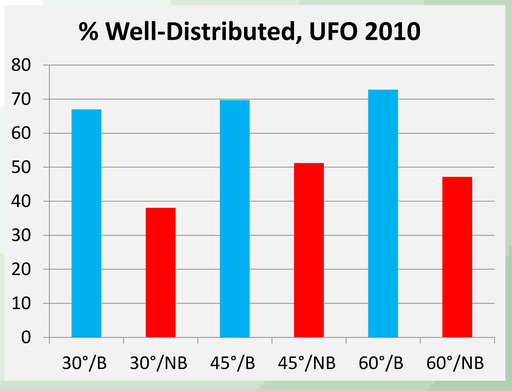
In 2010, 'Rainier' sweet cherry trees on Gisela 3 dwarfing rootstocks were planted to study trunk orientation and bud selection for their influence on early shoot formation and growth in the UFO training system. Nursery trees were planted at 30, 45, or 60 degree angles. Bud selection involved retention of a top or side bud about every 6 inches and removal of all others; control trees were not bud-selected. Trunks were attached to the bottom trellis wire and bent horizontal to form a cordon like a grapevine. New shoots arising from the cordon were trained vertically to the next trellis wire.

UFO 'Rainier' on Gisela 3 planted at a 60° angle.



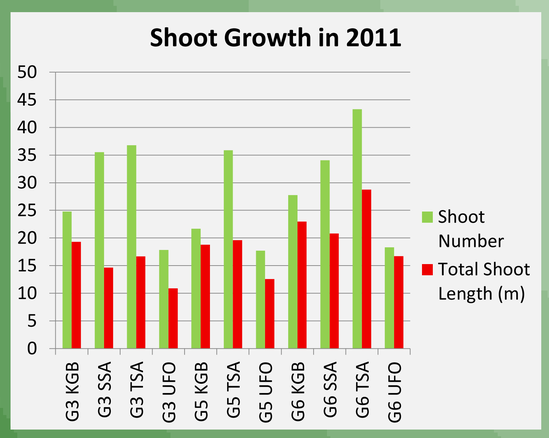
In 2010, new shoot number (i.e., the development of future fruiting units) was greatest on trees on G6 (11 to 21), followed by G3 (14 to 18), then G5 (11 to 16). By training system, shoot number was highest for KGB trees (15 to 23), followed by the TSA (14 to 20), then the SSA and UFO (both 11 to 14). Total shoot length was highest for G6, averaging 600 cm per tree, followed by G3 at 418 cm, and G5 at 409 cm. The effect of training system on average total shoot length was: 562 cm for TSA, 516 cm for KGB, 441 cm for UFO, and 370 cm for SSA.





Across trunk angles, average total shoot length was 148 cm when bud selection (B) was used and only 80 cm without bud selection (NB). Trunk angle was more critical when bud selection was not utilized, with the best growth on trees planted at 45 degrees. Regardless of bud treatment, growth was least on trees planted at 30 degrees.

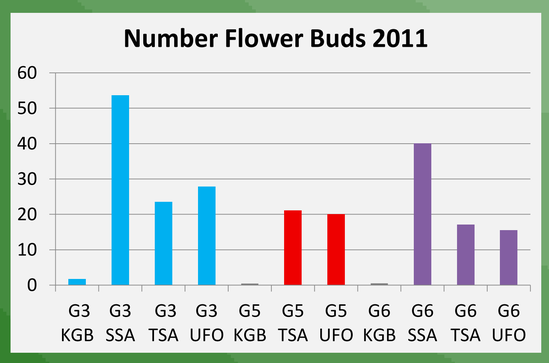
% Well-distributed shoots was a measure of the number of new upright shoots that developed uniformly in each section of the cordon (the cordon was divided into 5 sections). Without bud selection, 40% of the new shoots were well-distributed, but when bud selection was used, 70% of the new shoots were well-distributed. Trunk angle had little effect on shoot distribution.



In 2011, all previous shoots were cut back (to coordinate with protocols to promote better shoot formation at other research sites across North America) and the same data was taken . Shoot numbers were highest on G6 (18 to 43), followed by G3 and G5 (both 18 to 36). Training systems increased shoot number most for the TSA (36 to 43 total) and the SSA (34 to 36), then the KGB (21 to 27) and the UFO (18). Average total shoot length was highest for Gisela 6 at 2231 cm, then for G5 at 1699 cm, and G3 at 1536 cm. Comparing across training systems, TSA grew 2168 cm, KGB 2035 cm, SSA 1771 cm, and UFO 1338 cm.

The UFO system is also being tested with tart cherry to create a fruiting wall for potential adaptation to over-the-row type mechanical harvesters that will facilitate harvest of younger trees (earlier during orchard establishment) than is currently feasible with trunk shaking harvesters.

UFO 'Montmorency' on Mahaleb, 2nd Year (2011)



The SSA system had the highest number of flower buds in spring 2011, indicating its exceptional potential for early fruiting (year 2).

SSA training system in year 2

Summary:

Training Systems:

- KGB and TSA developed the most fruiting units, especially when combined with Gisela 6
- G6 had highest Total Shoot Length
- SSA had the ighest early fruiting potential

UFO and Bud Selection

- Better shoot distribution with bud selection
- Greater shoot length with bud selection
- Greater shoot length with 45 degree trunk angle at planting if not using bud selection

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