Worldwide Trends in Cherry Training Systems

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A generation ago most cherry growers had no choice to make when it came to training system selection. Due to a lack of dwarfing rootstocks the training system option was simply open vase. A generation prior to that, training and pruning cherry trees was not even a regular practice for most growers.

In recent years the introduction of dwarfing rootstocks and a resurgent interest in cherry production has provided the incentive for the development of many systems. These include trellis systems such as the palmate, Drapeau Marchand and Tatura, multi-leader bush systems such as the Spanish Bush and KGB and free standing central leader systems such as the Vogel and Zahn spindles as well as the Solaxe.

There is little doubt that cherry production is more complicated now than a generation ago. But with increased diversity comes increased opportunities for greater labor efficiency, the ability to protect cherries from rain, hail and bird damage, and the potential for improved disease control.

Labor Efficiency

One of the primary motivating factors for the selection of a training system is a reduction in labor requirements and costs. Most cherry growers throughout the world are forced to use unskilled pickers that are paid by the hour. In addition, color picking tends to significantly reduce productivity. Training systems that help to maintain small tree size significantly increases productivity. For example, in Australia, it is common for a picker to harvest only 13 kg (29 pounds) of fruit per hour when working from a ladder. However, productivity increases to 25 kg/hr (55 lbs/hr) in pedestrian orchards where harvest can occur from the ground.

Both the Spanish Bush and the Australian variation of that system called the KGB create a true pedestrian orchard. Even on seedling rootstocks tree vigor is diverted throughout multiple branches allowing for a mature height of 2.5 m (8 ft.). Both systems are planted at moderately high density, 4.5 – 5.5 m (15 – 18 ft.) between rows and 1.8 – 2.5 m (6 – 8 ft.) between trees. Multiple heading cuts form the structure of the tree in the developmental stage retarding fruit production. However, it is at maturity where the two systems diverge. The Spanish Bush tree consists of 8 – 15 permanent leaders with the majority of the fruit grown on renewable weak lateral branches. In contrast, the KGB system consists of no permanent branches. Each year 2 – 4 of the largest scaffold branches are stubbed back to within 15 – 20 cm (6 – 8 in.) of their base and allowed to regrow. Lateral

All branches are renewable on the multi-leader bush KGB system.

branches grown from these temporary scaffold branches are removed so that fruit production proceeds from the temporary scaffolds.

Spot labor shortages over the last few years, coupled with the threat of immigration reform laws, are a cause for concern among U.S. growers who rely on migrant labor from Mexico to harvest the crop. Dr. Matthew Whiting of Washington State University has been working with industry leaders to address this concern. The mechanical harvest of fresh cherries is one potential solution to the labor shortage problem. Trees are sprayed with an ethylene compound causing the formation of an abscission layer between the fruit and pedicel. Dr. Don Peterson of the United States Department of Agriculture has developed a machine that aids in the harvest. Branches are struck by a piston causing the fruit to drop onto a conveyor belt that deposits the fruit into a bin.

It was determined that a Y-trellis system is the most efficient system for mechanical harvest purposes. Trees are planted 5 m x 1.5 m (16 ft x 5 ft.). Branches are trained along wires to a 55° angle. This slant allows for the unhindered fall of the fruit onto the belt. The amount of fruit bruising caused by this system was found to be similar to hand picking when fruit was evaluated at the time of harvest, but significantly less bruising was found on mechanically harvested fruit after storage.

Experimental harvester used to pick fresh cherries trained to the Y-trellis system.

With this system, two operators can harvest 3 tons of fruit per hour or 48 tons per day.
Since the resulting fruit is stemless, studies have been conducted in Canada and the USA by Washington and Oregon State universities to determine consumer acceptance of a stem-free product. Preliminary studies done by OSU found that when consumers were simply asked if they preferred cherries with or without stems, only 5% stated that they preferred stemless cherries. However, in a follow-up study conducted in Portland, Oregon by OSU and WSU scientists, consumers gave equal preference to stem-on and stem-free cherries when allowed to taste the fruit immediately following harvest, and actually preferred the stem-free product after fruit had been in cold storage for two weeks (Table 1). Consumers were also more willing to pay $2.99/pound for stem-free cherries immediately following harvest as compared to stem-on cherries, but were equally willing to pay that price for stem-on and stem-free cherries after 2 weeks of storage (data not shown).

Covers

From Norway to Germany, South Africa to New Zealand, cherry growers are covering cherries for rain, hail and bird protection. The spindle system, grown on dwarfing rootstocks, is most commonly used for this situation. It provides the precocity needed to help regain the large monetary investment necessary for covering the trees, and also imparts good light penetration to the bottom of the tree in a reduced light environment.

Usual spacing is 4.5 – 5.5 m x 2.5 – 3 m (15 – 18 ft. x 8 – 10 ft). The maximum tree height is limited by the covers but is typically 3 – 3.5 m (10 – 12 ft.). Bending branches to horizontal coupled with minimal pruning makes this system highly precocious. As is common with the multi-leader bush systems, branch renewal helps to encourage fruit size by reducing the current season's crop and renewing spurs.

Disease Control

In many parts of the world, such as northern Germany and Chile, bacterial canker caused by *Pseudomonas syringae* is a serious problem potentially limiting production. The Zahn Spindle was developed in the production region near Hamburg Germany to reduce the incidence of *Pseudomonas* infection.

Although originally developed for use with Colt and mazzard rootstocks, Gisela® 5 and other dwarfing rootstocks are now commonly used. Tree size is controlled through pruning and competition in a high density planting. On full size rootstocks such as Colt, trees are planted as close as one meter. Unlike the Vogel Spindle, branches are not bent. Upright and vigorous laterals arising from the trunk are cut, leaving 5 to 6 buds. Flat branches that grow from these buds are selected; others are removed or stubbed back. Bacterial canker is controlled through maintaining the proper branch to trunk ratio with lateral branches no more than ½ the diameter of trunk. Canker is also limited through proper branch removal. Stub cuts are purported to reduce disease incidence and young branches that need to be removed are ripped from the tree rather than cut.

Contrasting with the heavy pruning associated with the Zahn system is the Solaxe system. This system was developed in France on apples and adapted to cherries in Chile in order to reduce bacterial canker incidence. Branches are bent to 120° and seldom pruned. Crop load is managed through spur removal rather than pruning as in other systems. Unfortunately, as these trees have matured, Chilean growers have discovered that the tree is compensating for fewer spurs by retaining more cherries per spur. This has led to oversetting and tree growth problems.

Throughout the world cherry growers are choosing training systems to address at least one of their specific needs. With the continued expansion of the cherry industry around the world it is essential that growers efficiently produce high quality cherries in order to market the fruit profitably. Choosing the right training system will help growers meet their need for increased labor efficiency, rain crack prevention or disease control while helping them to produce high quality fruit, an essential component for success.

Chilean workers hand thinning spurs for crop load management on trees trained to the Solaxe system.

Table 1. Overall liking on a scale of 1 – 10 by consumers after tasting stem-on and stem-free cherries. (Whiting, et al).

	Time 0 * n = 227	Time 2 weeks ** n = 141
	Mean rating	
Stem-free	7.06	7.04*
Stem-on	6.88	6.71

* No significant difference in liking ratings
** Stem-free rated significantly higher at $p < 0.05$

Citations

Whiting, M.W., A. B. Marin and L.E. Long. Unpublished data.