



# The Vertical Axis Planting System

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Developed originally by J.M. Lespinasse in France and imported to the United States through Quebec, this system has become one of the most widely planted systems in the United States. The system relies on high density, dwarfing rootstocks, minimal pruning, limb renewal, and an effective support system. Advantages include early production, high quality fruit, lower tree cost than higher density systems, and lower management costs than free standing systems. The major disadvantage is that it is a tall system that requires working off the ground and the associated costs. Vigor control can also be a problem. Maintaining sufficient vigor in the bottoms and controlling excess vigor in the tops is a challenge on some varieties such as McIntosh and Gala. Excellent management in the tops and maintaining light distribution throughout the tree results in maintaining sufficient vigor in the bottoms.

Characteristics of the system include between row spacing of 12-14 feet, in-row tree spacing of 5-7 feet, a tree height of 12-14 feet, a narrow canopy width along the axis of only 3-5 feet, tree density of 500-700 trees/acre, and arranged in single rows.

Key to the success of the Vertical Axis system is the use of high quality trees planted early with all vegetative pests controlled.

The rootstock should be no larger than M.26 with spacing adjusted accordingly. Malling 9 is an excellent rootstock for this system as are G.41, G.11, G.16. Malling 26 rootstock should only be used for weaker growing varieties. It is more difficult to manage the larger rootstocks. It is done only with appropriate detailed pruning and cropping.

Trees should be minimally pruned at planting removing scaffold limbs more than ½ the size of the axis where they originate. All scaffolds should be shortened by 1/3 and the leader headed 18 inches above the top scaffold.

The object is to fruit this system as early as possible so the trellis system should be established as soon as possible. The single high wire with a conduit stake at each tree is the preferred method although there are many variations that are effective. Be sure and space support posts for the high wire no further than 35 feet apart since this system carries a substantial crop load in the upper portion of the tree.

Competitive shoots that are within 4 inches of the leader should be removed as they appear. In the 2<sup>nd</sup> and 3<sup>rd</sup> leaf, competitive shoots should be removed and all vigorous shoots along the top half of the axis should be “pinched” back removing the growing tip of the emerging shoot. This process should be repeated as needed to keep competitive shoots from becoming dominant.

Pruning in subsequent years is limited to complete limb renewal by removing all dominant limbs as they appear along the Axis leaving a “bevel cut” to allow for shoot replacement throughout the tree.

## Simplified Pruning and Training Plan

**Year of Planting** – Plant well-feathered trees with 4 inches of the rootstock shank out of the ground. Remove all feathers below 18 inches and those that are more than  $\frac{1}{2}$  the diameter of the trunk where they insert. Head the leader 18 inches above the topmost feather and head all scaffolds by removing  $\frac{1}{3}$  their length. If whip trees must be used head at 30 inches above the ground, select the primary leader by removing competitors within 4 inches of the leader, clothe-pin or toothpick all new shoots to ensure good crotch angles. Fertilize with 2 splits 2 weeks apart of  $\frac{1}{4}\#$  of Calcium nitrate after the soil has settled with a soaking rain. Install 10 foot long individual tree stakes 12 inches into the ground immediately after planting and post and wire support system during the first leaf. Attach tree to stakes with Max-Tapener or Tree Fix bands and stakes to wire using the potato bag tie or trellis clip. Control all leaf feeding insects and diseases and weeds for optimum growth the year of planting.

**2<sup>nd</sup> Leaf** – **DO NOT HEAD THE LEADER.** Bend upright shoots under adjacent laterals avoiding cutting if possible. Do not do heavy corrective pruning unless absolutely necessary; this will delay cropping. When new shoots are 3-6 inches long pinch out the growing shoot tips of those in the upper  $\frac{1}{2}$  of last year's leader. This procedure should be repeated as these shoot regrow. Particularly vigorous varieties may require three trips through the orchard. If scaffold branches are too upright, tie to slightly above horizontal using Avis Strap, onion bag or elastics. Fasten the tree to the stake with permanent tree tie near the primary bottom scaffolds.

**3<sup>rd</sup> Leaf** – **DO NOT HEAD THE LEADER.** Remove any upright shoots that compete with the chosen leader and single all forked scaffold branches during dormant pruning. Remove an occasional vigorous limb completely using a bevel cut. Only remove ones that are too large for the tree. Remove overly vigorous upright sucker growth along the scaffolds and tuck what you can. "Pinch" back new shoots in the top half of last year's leader if they can be reached from the ground, otherwise ignore these shoots. Hand thin to single fruit spaced 6 inches apart and carry this fruit to harvest. Fasten the tree to the stake with permanent tree tie to support crop that exists along the leader.

**4<sup>th</sup> Leaf** – Do not head the leader. Remove limbs that overly vigorous or of no use during the dormant. Be sure and retain at least 4 flat and productive bottom tier scaffolds oriented 45 degrees to the drive row. Use renewal pruning and bevel cuts when large limbs are completely removed. Remove upright vigorous suckers along the scaffolds. Cut up and back primary scaffolds to allow for herbicide and pesticide applications. Make these cuts at primary forks which change the direction of the tree branch away from the tractor alley. Chemical and hand thin appropriate to the variety, crop load, and tree age. Lightly summer prune to maintain tree shape and encourage light penetration into the canopy.

**5<sup>th</sup> Leaf to 20<sup>th</sup> Leaf** - During the dormant, continue to shorten primary scaffolds facilitating equipment movement and preserving fruit quality. Remove limbs along the leader that are more than 1-2 inches in diameter and overly vigorous for their position within the tree using limb renewal principles. Cut back the tops of the trees to upright side branches only after they have cropped and fallen below the horizontal with crop load. Maintain a tree height of 12-14 feet.

Summer prune as necessary to maintain tree shape and fruit color.

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