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Thoughts on Apple Tree Training and Pruning

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Pruning and training apples is both an art and a science. This old adage is even truer in today's modern high density orchard planting systems. Orchard productivity and development are direct functions of sunlight. Light management through proper pruning is the key to high annual yields of high quality fruit. Annual pruning is a necessary practice that maintains the profitability of an orchard. Knowing not only what must be cut out but also what should be left in and how the tree will respond is the science behind pruning. The productivity of an orchard can be affected for the next three years by cuts made this season! It is critical for growers to know what will result from management decisions made now, and understand what technique will maximize profits in the long run.

The objective of tree training and pruning is to *maximize* sunlight interception of the tree. This allows for light distribution within the tree canopy to maximize fruit quality for this season and fruit bud initiation for next season's crop. Proper light interception and distribution are essential for growing high quality fruit. Correct pruning and tree manipulation techniques must be done at minimum on an annual basis in the dormant season followed by a tune up in the summer. Growers should also keep in mind other important factors that justify the need for pruning, such as the maintenance of tree height, structure, and appropriate balance between vegetative growth and fruit, which allows for annual cropping of high quality fruit with better color. Penetration of spray materials and natural reduction of pest pressure, especially diseases, are other factors that are directly affected by pruning.

In our higher density planting systems like slender spindle and super slender spindle where we have planting densities of 1000-2000 trees per acre, there is a much greater need for detailed pruning and management of the trees. But for the sake of time we will just discuss important general rules of pruning as they apply to all orchard densities.

A Few Basic Rules for Apple Pruning

- 1) Remove the 2-3 largest limbs in the tree (apple 2-1 rule)
- 2) Use the 2-1 rule also called diameter based pruning. This is removing any scaffold branch or limb that is *half the size or larger in diameter as compared to the central leader*. A branch of this size chokes out the leader, not allowing the tree to reach optimal fruiting capacity. Use Dutch Cuts to remove these limbs.
- 3) No heading cuts, remove the entire limb instead.
- 4) No complex branches on lateral limbs. If any branch divides, cut off one side.
- 5) Remove downward hanging (pendant) branches.
- 6) Straight down or straight up is removed.
- 7) Leave one central leader as a wick, do not prune (see below).

There are two types of pruning cuts made, heading and renewal cuts

A heading cut is when a cut is made into a branch or the leader, cutting back to a weaker shoot along that branch or leader. Heading cuts stimulate excessive growth at the site of the cut, and will stiffen the wood that has been headed. Juvenile (1 year old) wood will respond much more prolifically to such a cut as opposed to mature wood. Heading cuts should be avoided unless the intent is to cause one of these two responses to occur. Unnecessary heading cuts into an established limb or scaffolds juvenile wood will cause an excessive amount of flush growth, that will shade out the tree and be counterproductive to good tree management techniques. If tree growth suppression and the maintenance of a compact tree are the only desired effects from a heading cut, always cut an established limb or scaffold back into a mature, bearing side shoot or limb. When making a heading cut *never* cut a limb back to blind wood (deadhead). The result will be tip dieback and wood rots will occur.

Renewal cuts, on the other hand, are cuts made at the point of branch origin. Most renewal cuts are intended to remove a branch that is no longer desirable because of vigor concerns or excessive crowding. Renewal cuts on established trees are always into mature wood and will not spark the vegetative re-growth that a heading cut will.

Central Leader

The central leader is the tree's natural regulator. Tree performance and structure depends heavily on the manipulation of the leader. Cutting into the central leader can cause a loss of control with that tree or delay cropping on non-bearing trees. Heading cuts on a central leader should be done at planting when conditions warrant its use, (except on Slender Spindle trees where no cuts are made) and should be the last option used to induce branching on established trees. If more branching is desired, other techniques such as notching, bending and the use of plant growth regulators may provide a better alternative for inducing branching on the leader. *Never* cut into the central leader without knowing what responses the tree will express.

Spur pruning is a good way to rejuvenate trees that are heavy spur bearers such as Red Delicious, Empire and Gala. A tree will produce its highest quality fruit on spurs that are 2-5 years old. Any spur that is older than 5 years yields reduced quality fruit and should be removed. Some spur pruning should be done every year on trees older than five years. The age of a spur can be determined by its size. Spurs on the bottom of limbs should be removed, as they will never produce high quality fruit.

Although proper pruning can be an overall dwarfing process, it is locally invigorating, stimulating vegetative growth at the site of the cut. On a non-bearing tree, this type of stimuli causes the tree to remain in the vegetative mode, which delays cropping. For this reason, pruning young non-bearing trees should be avoided unless correcting major structural defects. Tree training and minimal corrective pruning of tree structure in the non-bearing years are critical to the overall performance of an orchard throughout its life.

Branch manipulation (training) plays the major role on tree structure and precocity (how quickly the orchard bears a crop) in the non-bearing years of an orchard. Only minor pruning should be done until after the tree crops for the first time. Once the tree has produced a crop, then it is time to begin an annual dormant pruning regiment. Since we have not done much pruning up to this point, the tree may need a lot of attention (depending on variety), at this time. However an excessive amount of pruning at any single time will cause an overstimulation of vegetative growth and a loss of balance within the tree between fruiting and vegetative growth. Excessive pruning can also cause sunburn to the fruit and wood of sensitive varieties such as Gala, Fuji and Golden Delicious.

The proper balance between fruit and vegetative growth is another important relationship. An imbalance between the two can result in inferior quality fruit and biannual bearing. No two systems or cultivars will respond in the same manner to the above presented techniques, but understanding these procedures and the response they induce will help reduce the gamble of making an improper decision. Growers need to be conscious of details that relate specifically to their cultural systems, and proper ways of managing them.

There are many more techniques and tree responses that need to be understood when managing an orchard. Each orchard system provides new and unique techniques to the growing process. Sometimes, less is more, and

understanding what can be manipulated is just as important as knowing what needs to be removed. An orchard's optimal performance will never be achieved if this relationship is not understood and maintained.

Resources

"Training and Pruning Apple and Pear Trees" by Forshey, Elfvig and Stebbins. This is an excellent reference on apple pruning in. It is a 166 page paperback obtainable from the American Society for Horticultural Science. It contains a lot of theory on the whys of apple growth and pruning, in addition to giving sound advice.

<http://www.ashs.org/ashspress/apple.html>

"Pruning Mature Apples and Pears" Ohio Sate University <http://ohioline.osu.edu/hyg-fact/1000/1150.html>

"Training and Pruning Apple Trees in Intensive Orchards" by Dr. Rich Marini

<http://www.ext.vt.edu/pubs/treefruit/422-024/422-024.html>

"Training and Pruning Apple Trees" Dr. Chick Forshey, Cornell

<http://www.cce.cornell.edu/store/customer/product.php?productid=16415&cat=328&page=1>

"Fact Sheets from UMASS on Apple Training and Balance"- Jon Clements and Wes Autio

<http://www.umass.edu/fruitadvisor/factsheets/factsheets.html>

Appletesters.net – A New Website to Assist Apple Growers in Variety Selection

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Appletesters.net is a new website designed to assist apple growers in variety and cultivar selection for new orchard plantings. It is also designed to provide a location for anyone conducting cooperative apple evaluation and testing to report and archive their findings using a unified protocol for apple variety fruit and trees.

Variety and cultivar selection is the largest economic decision a grower can make when establishing a new high-density orchard block of a thousand trees or more per acre using tall spindle systems.

Appletesters.net allows growers or potential growers to log on and view records of a variety from different locations over multiple years to assist making their planting decisions.

The online records allow cooperators and growers to see what variety characteristics are performing best in their area. The database will include pictures and casual observations in addition to fruit quality measurements and important horticultural characteristics including tree habit, bloom time, disease tolerance, mortality, precociousness, fruit appearance, taste, storability, and more.

Directions for use

Point your web browser to: <http://appletesters.net>

Click on the apple testers database **Guest Login**

This brings you to our login page, select the **guest account** button and click **login**.

This brings you to a data base record; you are now in the system. The first thing you should do is familiarize yourself with the database layout. In the tool bar at the top, all the way to the right is a help button.

Click the help button to open a new window that contains the directions as to how the database works. Read through and see what it's all about. This window will stay open for reference for you at any time.

Example of Use

Lets look at one search as an example of one way to use the database. In the tool bar select the button **Find**. This will bring up a blank data base record, you can search on any criteria but lets select the cultivar box by typing a cultivar/variety, let's say Zestar. Then go back up to the tool bar and click the **Perform Find** button. This brings up 7 records for Zestar. You know this by again looking at the toolbar on top in the left hand corner at **Found Records**. With Zestar (As of 12/15/12) you will see 7 records that you can cycle through using the arrows to the left of the **Found Records** icon.

Appletesters.net will become an important repository of cultivar/strain information on tree growth and fruit quality over many seasons. Such information should be very useful to apple growers looking for more and/or unbiased variety/strain information to make future planting decisions.

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23rd Annual Food & Agriculture Winter Conference

Building on the History of Innovation in the Garden State
Sponsored by Northeast Organic Farming Association of New Jersey
Saturday & Sunday, January 26 - 27, 2013
Brookdale Community College, Lincroft, NJ

Join us for our **23rd Annual Winter Conference, *Building on a History of Innovation in the Garden State***. New Jersey's largest agricultural & food conference featuring two days of classes and nationally recognized speakers in sustainable agriculture.

Including Featured Speaker: Michael Phillips, widely acclaimed author of *The Apple Grower* and *The Holistic Orchard* and renowned bio-intensive orchardist, will be presenting at NOFA-NJ's 2013 Annual Winter Conference on organic apples and healing herbs. He and his family own Heartsong Farm Healing Herbs. Michael teaches about apple growing from a holistic perspective. Small farmers can benefit from having a grower consultation when this apple growing expert offers specific advice tailored to localized challenges.

For further information on the conference, speakers and registration, visit:
<http://www.nofanj.org/winterconference.htm>

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Plant & Pest Advisory

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