



# Managing Crop Load of Apple Orchards by Pruning

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One of the most important challenges for 2013 will be effective crop load management to guarantee good fruit size and good returns for the majority of Northeastern apple fruit growers. The abnormal 2012 growing season which occurred in New York, Michigan, and other Northeastern apple fruit regions resulted in a small crop and facilitated a higher than normal level of flower bud initiation last year. In most apple orchards there are many more flower buds than needed and you now have the opportunity to reduce flower bud load by using your pruning shears.

Last season the trees had a long growing season, which facilitated ample carbohydrate accumulation and reserves. We anticipate that high carbohydrate levels in the tree this spring will likely facilitate high initial fruit set if normal spring weather conditions occur. A very high initial fruit set will be difficult to thin down to the optimum crop load even with aggressive chemical thinning and may result in a huge hand thinning job or small fruit size. In addition a large crop load this year has the potential to begin a biennial bearing cycle (especially for Honeycrisp) if an excessive fruit set is not well managed via thinning (chemical and manual) this year. Lastly, a severe summer drought coupled with over-cropped trees would result in small fruit size and low returns. In this article, we suggest beginning the reduction in cropload now by the removal of excessive flower bud loads through a more “aggressive” dormant pruning as a first step to achieving an optimal crop load later with further chemical and hand thinning. You can also start imposing a more “precise” bud load per tree in a high-density apple orchard the coming weeks.

The ability to identify flower buds will be important in order to prevent the removal of too many via pruning. At this time of the year it is not easy to know which of the buds will be flowers or not (unless you use a microscope). It will be easier for you to recognize their shape by mid-March. Flower buds will be larger than leaf buds and will be swollen near the base. In contrast, leaf buds will be smaller and narrow. Apple and pear trees generally bear flower buds at the tips of spurs and short shoots. It is important not to prune off all these short shoots since they are the sites of future flower buds. Although most orchards have a very high flower bud load this year it is important for you to evaluate each block and variety before pruning to determine the severity of pruning needed.

In orchards with a high flower bud load, we suggest removing at about 30% of the flower buds per tree by utilizing mainly three types of pruning cuts: (1) limb renewal of 2-3 whole limbs by leaving a beveled renewal cut, (2) spur pruning or spur extinction for spur apple types with many weak and multibranched spurs with short

shoots (a semi-aggressive pruning technique applicable to the majority of apple growing systems), and (3) stubbing back (a more aggressive pruning technique more applicable to Gala). Our previous pruning studies have shown that the complete removal of 1-2 branches is a less aggressive pruning technique that has little impact on yield. Hence we recommend removing 1-2 branches every year. If more than 3-4 branches per tree are removed then in some cases yield can be reduced. In 2013 with the expected high flower bud load we would suggest removing 2-3 branches per tree. If there were large branches that you were hesitant to remove last year this would be a great year to remove them.

In addition to removing 2-3 whole limbs an effective way to further reduce flower bud load is to remove some of the spurs on each branch that remains in the tree. This can be accomplished by “simplifying” or “columnarizing” each branch (secondary side branches larger than ½ the diameter of the branch should be removed leaving each branch as a long fruiting column “a long finger instead of a branch with several fingers”) to improve fruit coloring. We suggest the removal of secondary side branches or “forks” in the branch so that the branch has a single axis and is composed of spurs and short fruiting shoots but no substantial side branches. A more columnar branch covered with spurs and fruit will cast less shade on the lower part of the tree than a complex branch which has secondary and tertiary laterals. Such complex branches create a “roof” of shade for the lower branches. When columnarized branches become too long or too large in diameter they are removed through limb renewal pruning. When this branch columnarizing strategy is teamed with limb renewal pruning, narrow, slender trees with good light distribution can be maintained over the life of the tree.

In addition to this branch simplification the down-oriented spurs can be removed by knocking them off with pruning loppers. This can be done quickly by “running” the loppers along the underside of the limb to knock off the down-oriented spurs.

The last technique that we recommend for effective crop load management, is stubbing back pruning. This technique has been very useful with Gala which produces an abundance of lateral flower buds on 1 year-old wood. However this technique carries perils of invigorating the branch since it disrupts the natural growth pattern of an apple tree. So you must be very careful with stubbing back pruning. There are two levels of stubbing back pruning: (1) **Severe stubbing back** into older wood which often results in a vigorous regrowth response from the tree and in most cases lowers flower bud load too much on the branch that is stubbed severely. A severe stubbing back cut made in the upper part of a tree will stimulate excessive shoot growth. These shoots will develop with narrow crotch angles and will grow strongly. The response will be more pronounced with a more vigorous rootstock, more vigorous soil conditions, and a more severe cut. (2) **Stubbing back to pencil size diameter wood** on each weak fruiting branch will result in little or no vigor response but will allow the removal of excessive flower buds. This pruning technique is particularly important for mature Gala which has medium or low vigor. These trees produce excessive crops each year and the fruiting branches are bend down with cropload which results in short terminal growth the previous year. The short growth is usually small in diameter and weak and covered with flower buds which produce small apples. Cutting back such fruiting branches to the point where it has “pencil diameter” wood eliminates many small flower buds and is a very useful technique to managing flower bud load on Gala.

In the upper part of the tree canopy (the upper 1/3 portion) it is very important to remove whole limbs once they grow too long rather than shortening them back and creating permanent scaffold branches in the top of trees. By removing completely any long or large diameter branches in the top of the tree you eliminate a significant number of flower bud but more importantly you remove branches that shade the lower part of your trees. Leave only small diameter fruiting wood in the upper 1/3 of the tree. To maintain high-density apple orchards over the long term the trees must be kept narrow and columnar with the top narrower than the bottom. When trees are mature, the tree height must be limited annually by cutting the trunk to a small side branch at the optimum height which is about 90% of the between row spacing in the orchard.

In summary, we suggest the following pruning steps for orchards in the Northeast which have high flower bud loads in 20013: (1) Remove 2-3 large branches (leave a beveled renewal cut), (2) “columnarize” or “simplify” each remaining branch, (3) remove all down oriented spurs with your hands or loppers and (4) with Gala shorten back each pendant branch to the point where it has “pencil size” diameter wood.

## Authors

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