PRUNING TO IMPROVE FRUIT YIELD AND QUALITY

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I. Minimal Pruning of Young Peach and Nectarine Trees

Pruning young peaches and nectarines can dramatically affect their early production. The goal in these early years should be to maximize yield without negatively affecting tree structure. Our hypothesis is that this is best achieved by pruning as little as possible. Some pruning cuts are necessary to provide proper scaffold selection, to prevent crowding, or to eliminate poor crotch angles, but otherwise the tree is left alone.

Some have argued that the above-described approach does not work because:

1. The roots won't develop properly because they will be "out of balance" with the top. Numerous studies have proved otherwise, and have demonstrated that a tree grows with a fairly constant root to shoot ratio. Therefore, the greater the top growth, the greater the root growth.

2. The scaffolds will not be strong enough to support future crops unless they are cut back annually. This can be a concern with such a pruning approach. But in any orchard, proper roping, fruit thinning, and propping must be performed.

3. The overall orchard will not be uniform. This is true while the orchard is young, but at maturity will not be an issue. In order to make the orchard uniform; all trees must be pruned to the vigor of the weakest tree(s). This does not take advantage of the orchards full potential.

4. Scaffolds won't develop in the proper location around the tree. Since trees tend to grow fairly uniformly on all sides, within an open center orchard, individual scaffold location is of little importance.

To test our hypothesis and to address these concerns, we began a preliminary experiment in 1989 within an Elegant Lady orchard at the Kearney Ag Center. In the third leaf, we obtained more than 20 tons per acre production. Because of these positive responses, in 1992 we initiated a more thorough study in a block of Fairtime peaches.

The orchard was planted in January of 1992 in the Traver area of Tulare County. The spacing was 18'x18' and the configuration was offset. The following pruning treatments were imposed:

1. LL – trees lightly pruned at the end of the first and second growing seasons. This consisted of removing scaffolds in the tree center, cutting off very low hangers, and eliminating limbs with poor crotch angles. Little to no fruitwood was removed.

2. LM – trees lightly pruned at the end of the first growing season, and pruned moderately (scaffold selection and some fruit wood removal) at the end of the second growing season.

3. HM – trees pruned hard (cut back to three or four scaffolds which were left 18" to 24" long) at the end of the first growing season, but only pruned moderately at the end of the second growing season as with treatment 2 above.

4. HH – trees pruned hard at the end of the first growing season as in treatment 3, and pruned hard after the second growing season to a height of 5'-6'.

At the end of the third growing season in 1994, all trees had reached the about the same overall height (>14') so all treatments were pruned thereafter like normal mature trees.

In second leaf (1993), all fruit were thinned off all treatments in order to maximize vegetative growth. In 1994, thinning was performed by spacing fruits about 3"- 4" apart. In 1994 the LL treatment had considerably more fruit than any other treatment, and some light pruning was performed prior to thinning to eliminate some hangers on very heavily cropped scaffolds. In 1995-1997 normal thinning was preformed on all trees.

Throughout the experiment, the most lightly pruned trees (treatment LL) were the most productive, table 1. Similarly, the heaviest pruned trees (treatment HH) were the least productive. It wasn't until the 1997 harvest that the HH trees finally caught up to the other treatments. Possibly of even greater importance, the LL treatment brought the trees into full-bearing in 1994, the third leaf. This provides an opportunity for those growers who want to take advantage of the early-bearing benefits of a high density planting, but without having to absorb the extra cost for additional trees.

Table 1. Summary of fruit yield in tons per acre, 1994-1997.

Treatment	1994 *	1995	1996	1997	Total
LL	27.7 a	21.8 a	28.1 a	24.2 a	101.2 a
LM	24.1 b	21.4 a	21.9 ab	23.9 a	91.3 ab
HM	16.2 c	24.6 a	26.8 a	21.5 a	89.0 b
HH	12.3 d	12.3 b	17.8 b	21.9 a	64.2 c

*Letters indicate mean separation within columns, significant at the 5% level.

In each year, fruit size was inversely related to total yield (table 2), but in every instance, fruit size was more than adequate. These differences were mainly related to differences in total crop load. Mathematical adjustment of crop load indicates that the LL and LM treatments were significantly more efficient at carrying and sizing a crop (data not presented). This is likely due to the overall increase in total tree leaf area and subsequent improvement in light interception.

Table 2. Summary of average fruit size in grams per fruit, 1994-1997.

Treatment	1994 *	1995	1996	1997	Average
LL	220 a	334 a	230 a	200 a	226 a
LM	261 a	312 ab	276 b	212 a	253 b
HM	273 b	271 b	233 a	209 a	237 a
HH	320 c	335 a	274 b	200 a	253 b

*Letters indicate mean separation within columns, significant at the 5% level.

Overall tree size was greatest in the LL treatment and smallest in the HH treatment, table 3. One of the greatest fears among growers is that lightly pruned trees will not develop sufficient scaffold diameter in the upper portions of the tree to support normal crops. Data indicate that this fear is unfounded, as individual scaffolds in the LL trees were the largest in the experiment.

Table 3. Summary of trunk cross sectional area @ 18" high, and scaffold cross sectional area at 6' high, in cm2.

Treatment	Trunk Area (cm2) 1995	Trunk Area (cm2) 1997	Scaffold Area (cm2) 1995	Scaffold Area (cm2) 1997
LL	231 a	303 a	19 a	30 ns
LM	206 b	270 b	17 a	27 ns
HM	188 bc	254 b	19 a	30 ns
HH	183 c	256 b	12 b	27 ns

In summary, the results support our hypothesis that pruning as little as possible in the early years of orchard establishment produces the greatest yields. Trees, which were headed severely for two years in a row (HH), were substantially reduced in yield for three years. Additionally, lightly pruned trees had no problem with tree structure, scaffold location, or limb breakage. We therefore conclude that young trees should be allowed to grow as much as possible during the first few years of orchard development, and that pruning should be performed only to prevent such later problems as poor scaffold location or crowding, or elimination of poor crotch angles.