# MECHANICAL TOPPING
# WHEN IS THE BEST TIME TO TOP?

**Bill Olson**

## BACKGROUND:

Due to the large amount of time spent and the high cost of hand pruning mature prune trees many growers have been mechanically topping their orchards with cycle-bar or circular saw machines in an effort to: control tree height; speed up the pruning operation; reduce the use of ladders and reduce the overall cost of pruning. Mechanical topping is most often done in the dormant season and although it does provide the results growers are trying to achieve it also results in significant return growth. The amount of return growth is so significant that topping or hand pruning is required each dormant season to control tree height.

In prune, few studies have examined when topping can be used to minimize return growth and help control tree height. In addition the time of topping may have an influence on fruit quality and yield. This has not been studied in prune.

## OBJECTIVES:

Between three mechanical topping timings (June, post-harvest and dormant) determine if any topping timing results in less return growth and determine if any of the three topping timings have an influence on bloom strength, percent fruit set, fruit size, fruit soluble solids and/or yield.

## PROCEDURE:

Three, five acre blocks of 18 foot by 18 foot diamond planted (155 trees/acre) prune trees were topped at 12 feet in height in a 13 year old, French prune orchard planted on Myro29C rootstock. The three blocks were topped in 2005 and 2006 in either June, post-harvest or during dormancy.

On each topping date five topped shoots per tree from 20 trees per block were collected randomly and measured in length to determine the length of return growth from one year to the next. Also, after each topping operation, 5 rows in each plot were evaluated for problems associated with the topping operation.

At the end of each quarter of the year five shoots per tree from the same 20 trees per block were randomly measured in length to determine the percent of the total shoot growth that had occurred during the previous three months.

Bloom strength was visually determined on 10 trees per block using a scale of 1 to 5 at full bloom in 2006. A rating of 5 would be a very showy bloom while a rating of 1 would be a very poor bloom. A rating of 3 would be an average bloom.

Percent fruit set in 2006 was determined on one branch per tree, from 10 trees in each block by determining the number of fruit that ultimately resulted from over 100 blossoms on each branch.

During harvest fresh yield was measured by counting the number of full and partially full bins of fruit harvested from 178 trees (1.15 acres) in each plot.

From the harvester a fresh fruit sample weighing approximately 6 pounds was collected from every 10 trees (17 samples per plot), weighed and fruit counted to determine the number of fresh fruit per pound.

A drop of juice was extracted from 5 fruit from each of these samples, mixed and viewed through a refractometer to determine percent soluble solids.

Fruit pressure was measured from 5 fruit from each of these samples.

Fruit dry away ratio was calculated using tables published by Claypool in 1978.

**RESULTS:**

Table 1 shows the amount of return growth and problems associated with each topping timing. The dormant topping had considerably more return growth than did the other topping timings. Some return growth was nearly 6 foot long with the dormant topping.

The post harvest topping had the shortest length of return growth with only 1.5 feet average. The June topping was the only topping timing that revealed any problems. Occasionally (1-2 times/acre) the "arm" of the topper would catch on a branch causing the branch to crack or break. Also a few small green fruit (15-30 per tree) from each topped tree was observed on the ground after the June topping.

**Table 1.** Return growth measurements and problems observed from three topping dates.

| Topping timing | 2005-06 topping date | Ave. length of topped shoots in 2006 (inches) | Range in length of topped shoots (inches) | Problems observed |
|---|---|---|---|---|
| June | June 8th, 05 - June 20th, 06 | 24.9 | 6.0 – 49.0 | 1) Broken branches 2) Removed fruit |
| Post Harvest | Sept, 5th, 05 - Oct. 5th, 06 | 19.0 | 3.0 – 40.0 | None |
| Dormant | Nov. 15th, 05 - Nov 10th, 06 | 34.0 | 8.0 – 71.0 | None |

All treatments had the highest percent of shoot length growth during the spring with the post harvest topping treatment timing having the highest percent of shoot length growth

during this period (Table 2). The June and dormant topping timing had shoot length growth occurring during three of the four seasons while the post harvest topping timing had shoot length growth occurring only during two of the seasons. The post harvest treatment had no shoot length growth in the fall, after topping. Not surprising, no topping timing had shoot length growth during the winter months.

**Table 2.** Percent shoot length growth by season as influenced by topping timing.

| Topping timing | Winter (Jan. thru Mar.) % shoot length growth | Spring (Apr. thru June) % shoot length growth | Summer (July thru Sept) % shoot length growth | Fall (Oct. thru Dec.) % shoot length growth |
|---|---|---|---|---|
| June | 0.0 | 55.8 | 19.7 | 24.5 |
| Post Harvest | 0.0 | 66.4 | 33.6 | 0.0 |
| Dormant | 0.0 | 52.1 | 21.3 | 26.6 |

Bloom strength was measured once at full bloom on April 4th, 2006. Results are in Table 3. From the 10 trees evaluated per plot there was no clear difference in bloom strength between treatments. The dormant treatment bloom strength range and average has a slightly higher rating than the other treatments. The average bloom strength for each treatment was judged to be nearly average to slightly above average.

Blossoms were counted on shoots on March 31st and sound fruit resulting from those blossoms were counted on May 10th, 2006. Percent fruit set is calculated by dividing the number of sound fruit present on May 10th by the number of blossoms counted on March 31st. Results from this procedure are presented in Table 3. These topping treatments resulted in 41 – 50 percent fruit set. No clear difference in fruit set could be determined. Although the dormant topping timing had the highest percent fruit set it also had the widest range in fruit set amongst the branches measured in any of the three plots.

**Table 3.** Bloom strength and percent fruit set for each topping timing.

| Topping timing | Range in bloom strength | Average bloom strength | Range in % fruit set | Average % fruit set |
|---|---|---|---|---|
| June | 2.33-3.66 | 2.86 | 32.2 – 56.9 | 41.1 |
| Post Harvest | 2.33-3.66 | 2.89 | 32.2 – 64.3 | 45.9 |
| Dormant | 3-3.66 | 3.18 | 28.7 – 72.1 | 50.3 |

The plots were harvested on September 22nd, 2006. As seen in Table 4 there was no clear difference in any of the harvest and fruit quality measurements taken. The grower reported that the bins of fruit weighed 1300 pounds each which would calculate to a dry yield per acre of 4.02 for June, 3.52 for post harvest and 3.58 for dormant topping timing. The late harvest was due to the many acres that needed to be harvested on the ranch and this resulted in the very low fruit pressure readings.

**Table 4.** Fresh yield, count per pound, % soluble solids, fruit pressure and drying ratio for each topping timing at harvest 2006.

| Topping timing | Fresh yield (bins/acre) | Fresh fruit Count/lb | % soluble solids | Fruit pressure | Drying ratio* |
|---|---|---|---|---|---|
| June | 16.44 | 21.3 | 27.2 | < 2.0 | 2.66 |
| Post Harvest | 14.92 | 19.8 | 28.4 | < 2.0 | 2.75 |
| Dormant | 14.33 | 20.9 | 28.0 | < 2.0 | 2.60 |

* Calculated values based on Claypool 1978

**CONCLUSIONS:**

The post harvest topping timing clearly resulted in the minimum amount of return shoot length growth with the June timing intermediate and the dormant topping timing having considerably more return shoot length growth. In addition June topping resulted in some broken branches and fruit removal by the topping operation. This damage was probably due to the combined weight of leaves and fruit causing the branches to spread bringing them into contact with the topping machine. For mature trees post harvest topping should be preferred over June or dormant topping in order to reduce the amount of return shoot length growth, tree damage and fruit removal.

Prior experience indicated that percent fruit set in French prunes is commonly 25 – 30 percent. The very high percent fruit set observed in each of these three plots is believed to be a result of the year (climate during bloom) not a result of topping timing.

The slightly higher yield from the June topping timing is not believed to be real, since the June topping timing caused some broken branches and had fruit removed by the topper as it passed each tree.

It is disappointing that the post harvest topping reduction in shoot length growth did not express itself in a positive way in increased bloom, fruit set, fruit quality and/or yield. This may be due to the fact that, even though the amount of return shoot length growth was less, the time that 66 percent of the return shoot length growth occurred was during the same period that some fruit quality components may be greatly influenced. Although Neiderholzer (2004) did not study the results of topping timing on bloom strength, fruit set, yield or fruit quality he reported that topping timing from mid April to mid June resulted in minimal return shoot growth with the mid April topping timing resulting in the least amount of return shoot growth.

This experiment shows that the timing and quantity of return shoot length growth can be altered by topping timing. Presumably shoot length growth from an April topping timing would occur in July and later. Shoot length growth at a later date should have little influence on fruit quality. An April topping date may have a positive influence on fruit quality. It would be desirable to compare an April topping timing to a post harvest topping timing to compare return shoot growth, timing of return shoot growth, bloom strength, percent set, yield and fruit quality.

**REFERENCES:**

Claypool, L.L., M.W. Miller, D.E. Ramos and R.M. Carlson. 1978. Predicting Dry Prune Size and Dry –Away On a Fresh Fruit Basis. Sunsweet Standard July 1978.

Neiderholzer, Franz. 2004. Preliminary Study to Evaluate Spring Topping For Prune Tree Height Control. 2004 Prune Research Reports and Index of Prune Research. Published by the California Dried Plum Board.