Mechanical Thinning Dry Prunes

Richard P Buchner UCCE Tehama

Sizing prunes is largely a numbers game. There are various ways to remove excessive numbers of fruit (pole, shake individual limbs, etc.). The most typical technique is to mechanically shake whole trees for specific time durations to remove specific numbers of fruit. If properly done, mechanical thinning has a long history of success. Concerns include potentially barking trees, fruit damage if the crop is sold fresh pick, differential removal of large high value prunes and possible brown rot exposure from shaken fruit on the orchard floor. In general, the earlier fruit are removed, the greater the size benefit.

Success with mechanical thinning relies upon five steps:

- The target number of prunes per tree desired at harvest.
- Determine the number of prunes per tree prior to thinning.
- Determine how many prunes need removal to achieve target size.
- Estimate prune drop due to natural causes.
- Timed shake to remove excess prunes.

Target number of prunes per tree

Sizing potential is different for each orchard and largely relies on orchard history to determine how much tonnage an orchard can produce with acceptable fruit size. If an orchard can historically produce 4 dry tons of 75 dry count prunes per pound, and the farmer wishes to grow 75 dry count, the target tonnage would be 4 dry tons. A more realistic average target might be 3 dry tons to achieve 75 dry count fruit. Once the target tonnage is identified calculate how many prunes per tree are needed. That can be accomplished using the following equation:

$$\frac{\text{Dry pounds per acre x Dry count per pound}}{\text{Number of trees per acre}} = \text{Number of fruit per tree}$$

Assume a prune orchard planted at 20 ft x 20 ft (109 trees per acre) can produce 4 dry tons (8000 lbs.) per acre of 75 dry count prunes. For that orchard, 5504 fruit per tree are necessary to achieve the target dry size.

$$\frac{\text{8000 lbs. per acre x 75 Dry count/lb.}}{\text{109 per acre}} = 5504 \text{ prunes/tree}$$

A second orchard planted at 20 ft x 20 ft can produce 3 dry tons (6000 lbs.) per acre of 75 count prunes. For the lower sizing potential 4128 fruit per tree are necessary to achieve the target dry size.

$$\frac{\text{6000 lbs. per acre x 75 Dry count/lb.}}{\text{109 per acre}} = 4128 \text{ prunes/tree}$$

Number of Prunes per Tree Prior to Thinning

The previous procedure identified the target number of prunes per tree. The next step is to measure the actual per tree crop load in the orchard.

1) Select a “typical” tree or trees that accurately represent the crop load in the orchard. Multiple trees are used to improve accuracy. Selecting three representative trees per orchard is a good compromise of time and accuracy.
2) Place tarps under selected trees and using the mechanical shaker, shake off as much crop as possible. Shaking in mid May seldom removes 100% of the crop. Any prunes remaining on the tree can be stripped by hand.
3) Pull the tarps to collect shaken prunes and remove leaves, twigs, yellow or shriveled fruit. Remove anything that would not contribute to an accurate fruit weight. After cleaning, weigh the entire fruit green sample. If the tarp is part of the weight, be sure to subtract its weight from the sample.
4) Select three 1-pound fruit samples from the weighed whole tree sample. On a tared scale, add fruit and count how many prunes are required to weigh one pound. That will give you the green count per pound.
5) Multiply the total fruit weight times the count per pound to calculate the number of prunes per tree.

Tree fresh crop weight (lbs.) x number of prunes per pound
= Number of prunes per tree

If we assume that shaking and hand removal resulted in 130 pounds of fresh fruit and 75 sound prunes per pound we can calculate 9750 prunes were on the tree.

130 pounds x 75 prunes/lb. = 9750 prunes

Finally, if all the prunes were not stripped from the tree, visually estimate how many prunes are still on the tree. Assuming 487 prunes remain on the tree, adding the two values together results in 10,237 prunes per tree (9750 + 487 = 10,237).

How Many Prunes Need Removal to Achieve Target Size

To calculate how many prunes to remove simply subtract the target number of prunes per tree from the total number of prunes per tree. Using our previous example we need 4128 prunes per tree to achieve 3 tones of 75 dry count per pound prunes.

Estimated Prune Drop Due to Natural Causes

The final consideration is to account for any natural fruit drop following thinning. Fitch et.al., (1973) reported a 40 percent natural fruit drop between thinning and harvest. Observations have indicated a lower percent drop suggesting that 40% drop is too high for current orchard management techniques. Krueger and Nielson (1999) reported an average drop of 11.6%. Buchner et.al. (1997) found an average drop of 16.0%. For orchards with an excessive drop history 40 percent might be a good choice but for most orchards natural fruit drop of 10-20% is more realistic.

Selecting a 20 percent natural drop means 20 percent more prunes are left on the tree to achieve target harvest crop load. Dividing 4128 prunes by 0.80 gives a corrected target crop load at thinning of 5160 prunes per tree.

The results from the whole tree test shake indicated 10,237 prunes per tree. Subtracting the corrected target crop load (5160 prunes) from the total number of prunes per tree (10,237)

indicated that 5,077 prunes (10,237 prunes – 5160 prunes = 5077 prunes) need to be removed to achieve target tons and fruit size.

Accurately estimating fruit drop is important because it affects final fruit load.If there is no natural fruit drop, the risk is over cropping and smaller harvest fruit size. If more fruit drop occurs than originally estimated, final crop load is light, fruit is larger and marketable fruit is lost.

Timed Shakes to Remove Excess Prunes

The final step is to shake individual trees for specific time intervals to discover how many seconds of shaking are necessary to removes excess prunes. Place tarps under a test tree and apply a one second shake. Collect the thinned prunes and using the previously described technique, calculate the number of prunes removed. If more fruit needs removal, increase the shaking time until the correct number of prunes are removed. The average shake time is usually 2-4 seconds at full throttle. If a six or seven second shake does not remove the desired number of fruit, leave the time at 6-7 seconds and remove what you can. Multiple shakes or excessively long shakes can result in unacceptable skin damage and possible fruit drop.

In summary, mechanical shaker thinning is the most reliable technique currently available for controlling crop load after bloom. Success depends on carefully developing shake thin times and applying them uniformly throughout the orchard. Plan on investing a day to shake trees, calculate fruit loads and develop a good sense of what crop loads are and numbers to remove to achieve target size and tonnage. Remember, mechanical thinning can damage fruit. Minor skin damage has not been a problem for dried prunes but could be for fresh market prunes. For that reason, mechanical thinning is not recommended for fresh market prunes. Growers have been concerned that larger fruit on the upper outside of the canopy may be preferentially removed compared to smaller fruit on the lower inside part of the canopy. While that might appear to be a problem, numerous tests have confirmed the benefits of mechanical thinning compared to unthinned trees.