

Investigation of Pruning Strategies for Prunes Including Hand, Mechanical and Combinations

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Introduction:

Prune trees are pruned to thin fruitwood, improve fruit size, reduce alternate bearing and control tree size and shape. Hand pruning with ladders and loppers has long been thought to be the best alternative for pruning because of the selective nature of the pruning which can not be matched by mechanical pruning. Because of the cost and availability of labor, growers have been looking for ways of reducing pruning costs without sacrificing yield or quality. Previous studies of mechanical pruning have shown the limitations of mechanical pruning. In a study conducted in Glenn County during the 1990's, pruning severely enough mechanically to achieve equal fruit size and value per ton compared to hand pruning resulted in reduced yield that was not completely compensated for by increased fruit value. In an attempt to reduce costs, growers have continued to look at different pruning strategies including hand held pneumatic pruners from the ground, different types of mechanical pruning and combinations of different pruning strategies.

Objectives:

The objectives of this study were to compare the effect of different pruning strategies including hand, mechanical dormant and summer and various combinations on costs, yield, fruit quality and grower returns. We realize that the results will be affected by growing conditions during the season and that what is the best treatment one year may not be the best in a different year. Our plan was to initially select a pruning strategy and then use the available tools such as mechanical thinning to optimize that treatment.

Methods:

During the winter of 2005-2006 a mature highly productive block of French Prunes was selected. The block was a north-south planting with a spacing of 14 X 17 ft. or 183 trees per acre. In the winter, 2006, trees were 17-18 ft. tall prior to pruning. A total of 10 different pruning strategies described below were selected and applied in a randomized complete block design with 3 replicates. Each replicate consisted of an entire row of 33 trees except for the V cut topping treatment where the row was divided into 2 treatments and half the row was V topped in the dormant season only and half was V topped dormant and summer. The plots were harvested and green weights were determined using a load cell attached to the forks of the receiver. Two samples (approximately 100 fruit each) were collected from each plot. Sample weights were obtained before and after commercial drying (courtesy of Sunsweet Dryers, Hamilton City). Commercial screen sizes (A,B,C etc.) were determined and fruit value calculated using the 2006 PBA price schedule, field fresh weights and sample dry away values.

Treatments:

1. Dormant topping at 14-15 ft, light summer pruning to thin canopy (suckers and 1 -2 cuts), 6-29-06.
2. Dormant topping at 14-15 ft with pneumatic pruning from the ground
3. Hand pruning- Ladders and loppers.
4. Dormant V cut, 45 degree angle, 12 ft at bottom
 - A. Dormant only.
 - B. Dormant and summer (7-7-06)
5. V cut dormant, one side (east) only
6. Dormant pneumatic pruning plus summer V cut (7-7-06)
7. Dormant pneumatic, 3-4 cuts to thin canopy.
8. Dormant roof top and chain saw thinning.
9. Dormant pneumatic hand pruning plus mechanical “mohawk” treatment. V notches were made in the shoulder of the canopy on both sides and a thin section of the canopy was left unpruned in the center.

Results:

In this trial the “ladders and loppers” treatment was estimated to cost \$2.75/tree (including overhead) or \$594/ac. The pneumatic pruning was estimated to cost \$1.25/tree or \$229/ac. The light summer pruning was estimated to cost \$.50/tree or \$91.50/ac.

Yield and fruit quality was good for all of the treatments (Table 1). There were no statistically significant differences between the drying ratios, count per pound and value per ton for any of the treatments. Generally, yield per acre and value per acre was reduced as the severity of pruning increased. The lowest yield and value per acre was from the “ladders and loppers” treatment. Even though the summer V topping appeared to put a significant amount of fruit on the ground, the dry yield and value per acre was not significantly different than where it was not done.

Table 1. Pruning Trial 2006 Results

Trt	Treatment Description	Green Tons/ac	Drying Ratio	Dry Tons/ac	Count/lb	\$/Ton	\$/Ac
7	Dormant pneumatic	15.88 c	3.08 a	5.16	43.2 a	1605 a	8294 d
6	Dormant pneumatic + summer V	16.14 c	3.17 a	5.08	46.0 a	1598 a	8116 cd
1	Dormant topping , light summer	15.52 c	3.06 a	5.08	48.1 a	1586 a	8025 cd
5	Dormant V notching, one side	15.25 bc	3.09 a	4.91	43.8 a	1600 a	7853 cd
8	Dormant roof top, chainsaw thinning	14.53 bc	3.01 a	4.83	44.8 a	1605 a	7751 cd
2	Dormant topping, pneumatic dormant	13.39 bc	3.02 a	4.43	44.2 a	1594 a	7060 bcd
4A	Dormant V cut	12.61 abc	3.02 a	4.17	44.4 a	1589 a	6633 bc
9	Dormant pneumatic + dormant pneumatic	11.72 ab	3.07 a	3.82	46.0 a	1585 a	6050 ab
4B	Dormant + summer V cut	13.05 bc	3.14 a	4.12	47.9 a	1463 a	5999 ab
3	Ladders + loppers	9.08 a	2.92 a	3.06	43.3 a	1588 a	4853 a

Numbers followed by different letters are significantly different at the 5% level using Fischer's test.

Discussion:

Although the “ladders and loppers” treatment had the lowest yield and return per acre this year in this block, it is not expected that this would be the case in every year. A fairly severe case of bacterial blast resulted in a reduced fruit set in the block to the point where none of the pruning treatments required mechanical thinning. Had this not been the case and had fruit set been heavy, the results could have been completely different. The idea of this study was to start with a pruning strategy and then make adjustments as necessary to maximize that particular strategy. Because of a lighter than expected fruit set, no crop adjustment was necessary during the growing season. All of the treatments had good yield and return. This would suggest that different levels and types of pruning could be used to establish different cropping potential and then adjustments could be made during the season if fruit set is excessive. This would reduce risks associated with variable fruit set.