

2007 Full Report

Circle-tying of pistachio in comparison to mechanical hedging

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Introduction

The effect of mechanical hedging of pistachio has been well documented as an economical method of pruning that can open up a shaded canopy, stimulate fruit wood development, and reduce alternate bearing. Mechanical hedging is indiscriminate and its repeated use to stimulate new fruit-wood often requires a more severe hedging cut than what was previously performed. Repeated mechanical hedging can leave undesirable ‘crows feet’ branching and dead wood. Many growers prefer to individually hand prune their trees in order to selectively develop fruit-wood. These growers obviously believe that selective pruning will ultimately result in better tree structure, more fruit-wood, and higher yields.

As mature pistachios produce heavy yields in ‘on years’ their structural limbs can bend downwards and lose their original upright structure, ultimately causing limbs to interfere with harvest. Limbs that interfere with harvest must be removed and their removal could ultimately reduce yields. Circle-tying, the process of circling branches of a tree with rope pulled taut, has been used on young pistachio trees in order to develop upright tree structure before trees come into production. The same circle-tying principal has been applied to mature trees ranging from 12-20 years of age. This ‘second tier’ circle-tying of mature bearing trees is performed with 5/8 inch “one-ton” rope that won’t break under the pressure of a heavy crop. Circle-tying has been effective in keeping branches upright in an on production year. Growers who have invested in circle tying are hoping their investment ultimately pays off in enhanced tree structure, improved harvest shake, less subsequent hand pruning, and ultimately higher yields and economic returns. We have undertaken this study to compare circle-tying, hand pruning, and mechanical hedging in order to determine if circle tying is economically feasible under the less than ideal conditions of eastern Madera County.

Procedures

Two pruning trials were performed. In the large-scale grower trial circle tying was compared to mechanical hedging in three 50 acre blocks. The middle block was circle tied while the two blocks on either side were mechanically hedged. Per acre yields, costs, and grade sheets were compared using grower and processor data. In the second trial, mechanical hedging, circle tying with hand pruning, and hand pruning alone were performed in a replicated block design experiment with five replications of each treatment down a single row. Each replication consisted of 5 trees. Thus, 25 trees were

mechanically hedged, 25 were circle tied and hand pruned, and 25 were just hand pruned and not circle tied or hedged. Yield data was recorded for each five-tree replication.

Randomized Block Trial Results

In the replicated block single row trial the mechanically hedged treatment had the highest dry weight of 219.3 lbs per 5 tree replicate (43.9 lbs/tree), followed by the circle tied trees that averaged 214.1 lbs dry weight per 5 tree replicate (42.8 lbs/tree), while the hand pruned trees averaged 204.2 lbs dry weight per 5 tree replicates (40.8 lbs/ tree). In 2007 pruning treatments were not significantly different (figure 1).

Initial circle tying averaged \$425 per acre while the hand pruning averaged \$150 per acre, bringing the combined cost of circle tying and hand pruning up to \$575. The mechanical hedging and topping averaged \$170 per acre and was done in conjunction with hand pruning that averaged \$150 per acre, bringing the combined cost of mechanical hedging and minimal hand pruning up to \$320 per acre (figure 2).

In 2006 and 2007 hand pruning averaged \$135 per acre and \$150 per acre respectively, in both the circle tied and mechanical pruned blocks. Total pruning expenses from 2005-2007 for the randomized block trial are given in figure 3.

Grower Trial Results

In the large orchard trial in 2006 the circle tied block averaged 4,195 lbs acre while the two mechanically hedged blocks on either side averaged 4,786.18 lbs per acre. In 2007 the circle tied block averaged 5,166 lbs acre (CPC) while the two mechanically hedged blocks on either side averaged 4,942 lbs per acre (CPC).

Initial circle tying averaged \$425 per acre while the hand pruning averaged \$150 per acre, bringing the combined cost of circle tying and hand pruning up to \$575. The mechanical hedging and topping averaged \$170 per acre and was done in conjunction with minimal hand pruning that averaged \$12 per acre, bringing the combined cost of mechanical hedging and minimal hand pruning up to \$182 per acre (figure 4). In 2006 and 2007 hand pruning averaged \$135 per acre and \$150 per acre respectively, in the circle tied block. In the mechanically pruned block hand pruning averaged \$63 per acre in 2006 and \$100 per acre in 2007. In addition, heavy chain saw cuts were made in the mechanically hedged block that also had to be shredded resulting in an expense of \$370 per acre. Total pruning expenses from 2005-2007 for the grower comparison blocks are shown in figure 5.

Conclusions and Practical Applications

'Second-tier' circle-tying of mature bearing trees performed with 5/8 inch one-ton rope resulted in an additional expense to the grower of \$425 per acre when compared to hand pruning alone. Circle-tying and hand pruning resulted in an additional expense of \$255 per acre when compared to mechanical hedging and minimal hand pruning. We have not observed yield differences between mechanically hedged treatments and circle tied treatments. Circle-tying appears effective in keeping branches upright in on production years, but growers who have invested in circle tying are hoping their investment

ultimately pays off in enhanced tree structure, improved harvest shake, less subsequent hand pruning, and ultimately higher yields and economic returns. It obviously may take a number of years, if at all, to observe the economic benefits of circle-tying.

Acknowledgements

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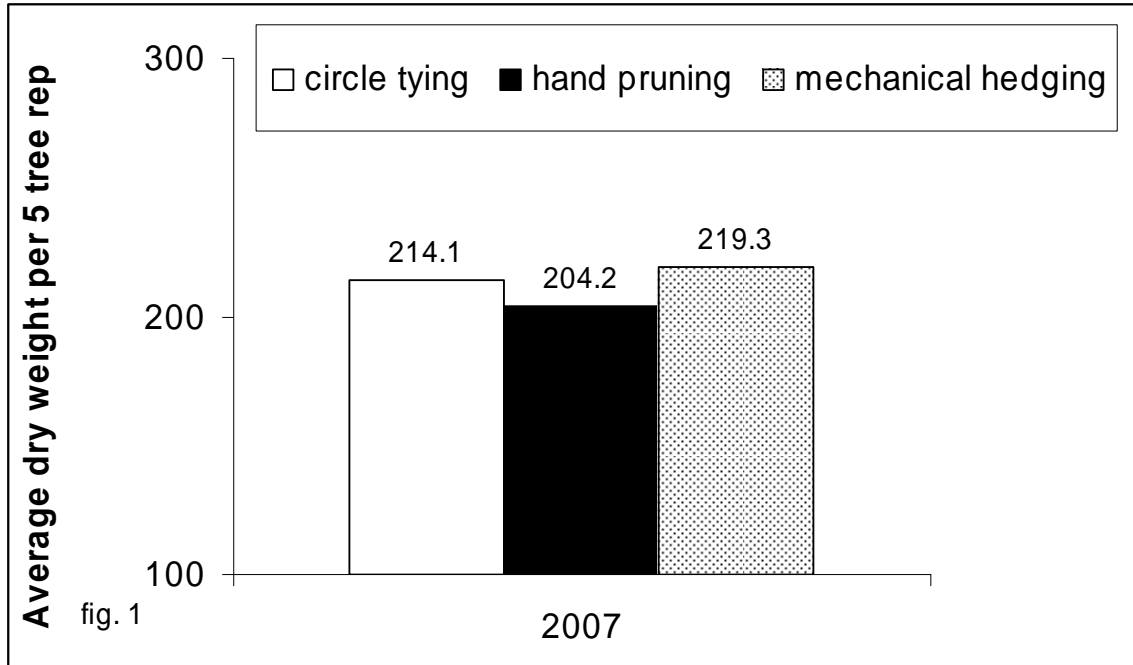


Figure 1. In randomized complete block Trial the mechanically hedged treatment had the highest dry weight of 219.3 lbs per 5 tree replicate (43.9 lbs/tree), followed by the circle tied trees that averaged 214.1 lbs dry weight per 5 tree replicate (42.8 lbs/tree), while the hand pruned trees averaged 204.2 lbs dry weight per 5 tree replicates (40.8 lbs/tree). The pruning treatments were not significantly different.

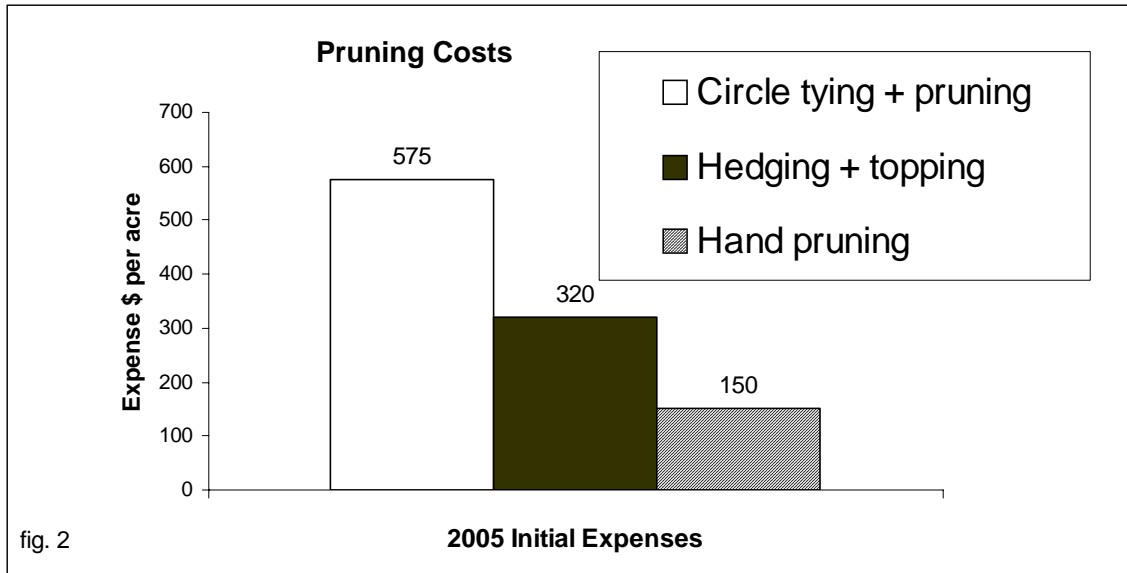


Figure 2. Initial circle tying with hand pruning combined cost averaged \$575 per acre while mechanical hedging average \$320 per acre. The hand pruning alone averaged \$150 per acre.

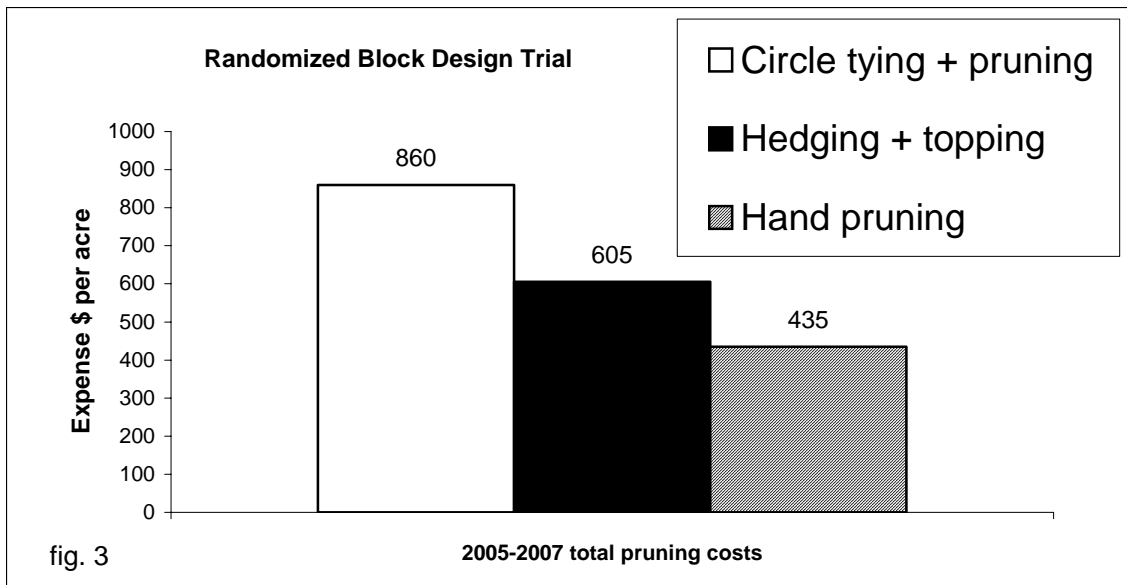


Figure 3. Combined 2005-2007 total pruning costs for the randomized complete block design trial. Total circle tying and hand pruning combined cost averaged \$860 per acre while mechanical hedging and hand pruning average \$605 per acre. The hand pruning alone has totaled \$435 per acre.

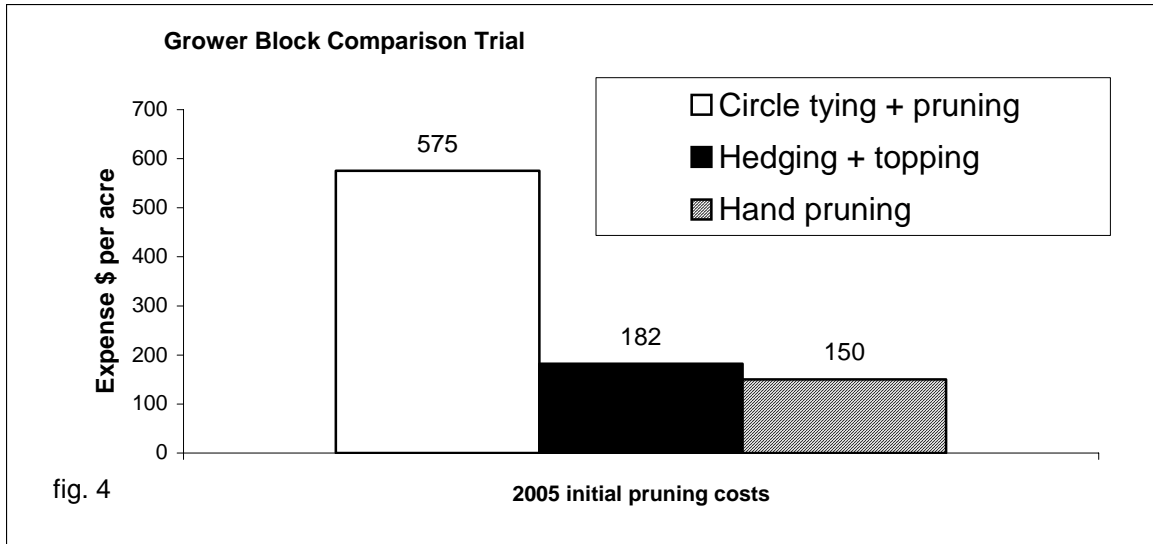


Figure 4. In the grower comparison block initial circle tying with hand pruning combined cost averaged \$575 per acre while mechanical hedging plus hand pruning average \$182 per acre. The hand pruning alone averaged \$150 per acre.

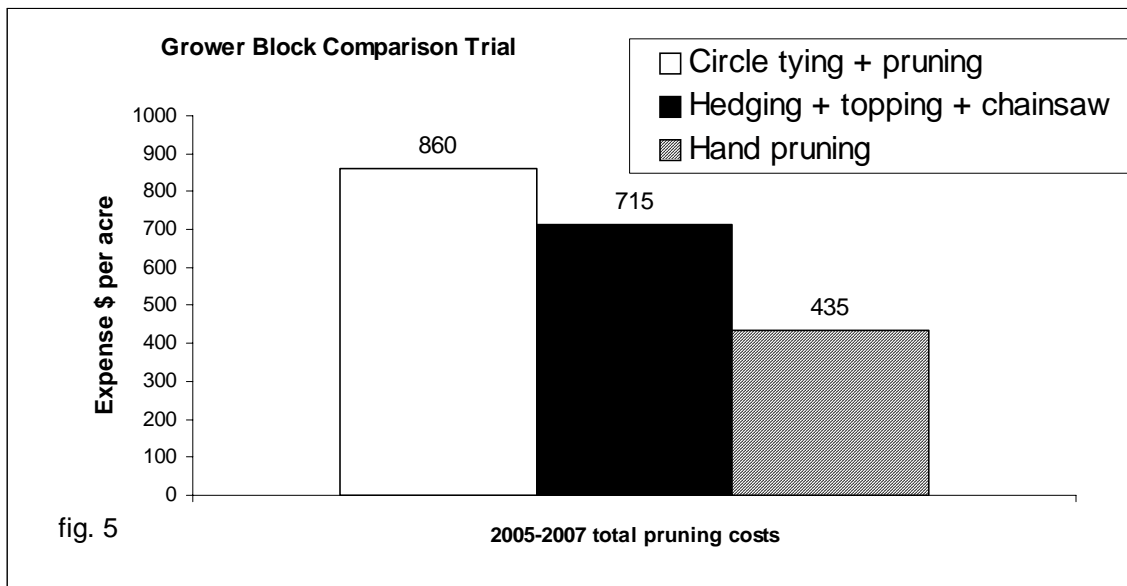


Figure 5. Combined 2005-2007 total pruning costs for the grower comparison block. Total circle tying and hand pruning combined cost averaged \$860 per acre while mechanical hedging, hand pruning, and chain saw cuts averaged \$715 per acre. The hand pruning alone has totaled \$435 per acre.