

Effect of Hedging and Topping on Pistachio Alternate Bearing: 2012-2017

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INTRODUCTION

Although mechanical side hedging of pistachios is common, questions persist about whether alternate bearing (AB) can be mitigated by hedging prior to an off-year, rather than an on-year. This seems counterintuitive to the bearing habit of pistachio, since the yield loss from heavy pruning prior to an on-year is partially compensated for by a higher set percentage in the remaining flower clusters. The capacity for compensation is also dependent upon the severity of pruning. The higher crop load associated with on-years also appears to reduce the total seasonal growth compared to trees severely pruned prior to an off-year.

To address this question, a randomized complete block, split-plot experiment was established in the rootstock trial (UCB-1, PGII, PGI, and *P. atlantica*) at the Kearney Agricultural Center in Parlier during the winter of 2011-12, an off-year for this orchard. This east-west planted orchard was divided from north to south to create two identically designed experimental halves. The east half was mechanically side-hedged and topped in 2011-12, and the west half was hand pruned. Side hedging consisted of cutting every other middle at 6 feet from the tree trunk. Topping was then performed at 14.5 feet. Hedging and topping (H&T) severity varied by rootstock due to its effect on tree size. UCB-1 and PGII were thus more severely pruned than PGI and *P. atlantica*. Up to 5 feet of growth was removed from topping the largest trees. Hand pruning was performed on the non-hedged side to insure efficient nut removal and duplicate best commercial cultural practices.

During the winter of 2012-13, the same H&T methods were applied to the west half of the trial (hand pruned the previous year), using the same tree middles. Observations confirmed that this half of the orchard was going into a pronounced on-year. During the 2013-14 winter, the alternate rows not yet mechanically pruned on the east half of the trial were side-hedged. Thus, by delaying hedging of the alternate rows one season, both sides of the east half of the trial were hedged prior to an off-bearing year. This same procedure was applied to the west half of the trial during the 2014-15 winter to complete the mechanical pruning of the on-year treatment.

Hand pruning was performed annually on rows not freshly hedged. In addition, tipping of the one-year-old growth on the sides and tops of the trees, mechanically pruned in previous years, was also performed according to commercial practices.

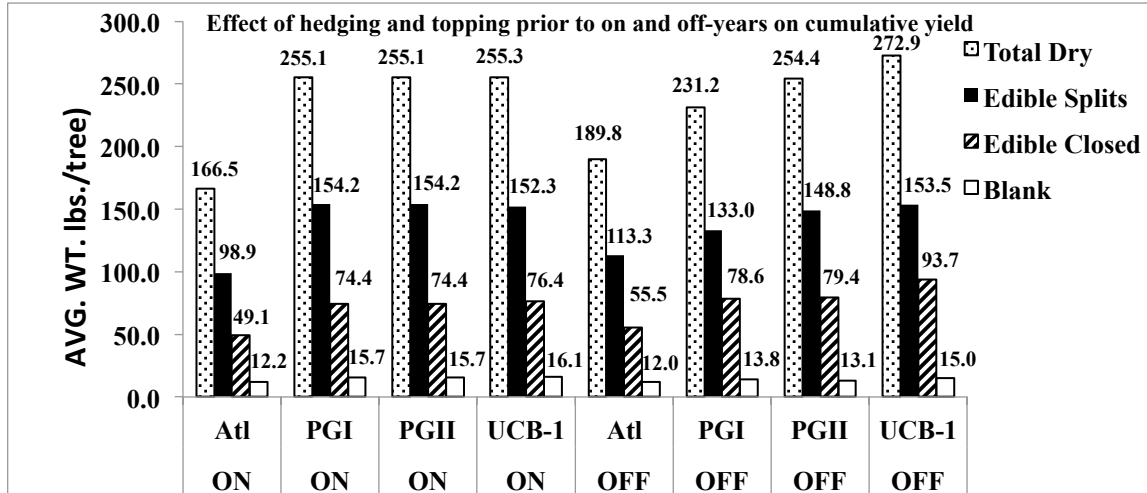
Individual tree yields were collected annually using tarps and a shaker. Twenty-pound composite samples were taken by rootstock in each of the 5 replications for each pruning treatment. The 40 samples were then commercially evaluated. The grade sheet data was then used to calculate the total dry yield, as well as the pounds of split nuts, edible closed shell nuts, and blank nuts.

RESULTS

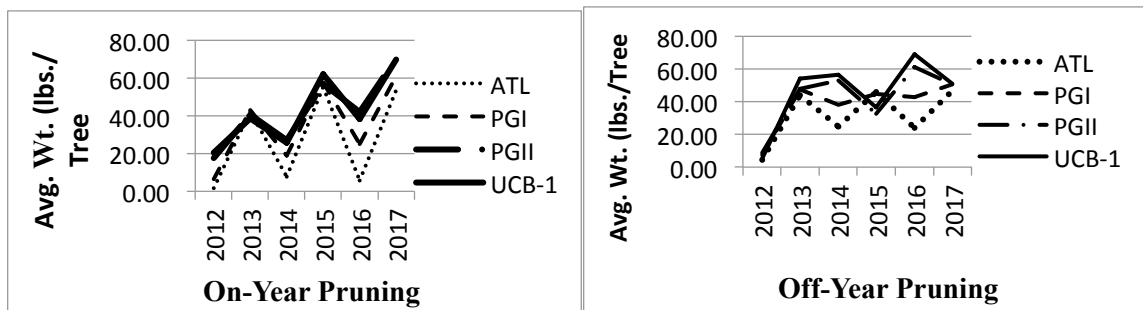
As reported in previous summaries, aerial thermal imagery documented that the trees on UCB-1 and PGII were very similar in size, and significantly larger than *P. atlantica* and PGI at the

beginning of the experiment. Consequently, the trees on UCB-1 and PGII were more severely pruned than the trees on the other two rootstocks.

The chart below is the cumulative yield (2012-17) by rootstock and nut categories affecting yield.



Yield of Kerman, on the rootstocks of highest vigor (UCB-1 and PGII), was not affected by the year in which hedging and topping was performed. PGI was slightly less productive when pruned prior to the off-year, but not significantly so. Being the smallest tree, *P. atlantica* yielded the least, but slightly more when pruned in the off-year. The next three charts show the bearing pattern by rootstock following H&T prior to the on and off-bearing year, and the AB index. *P. atlantica* and PGI were less alternate bearing when H&T was performed prior to the off-year.



Effect of hedging and topping on the Alternate Bearing (AB) index. Three complete AB cycles.

Rootstock	Year Topped and Hedged	Alternate Bearing Index	Rootstock	Year Topped and Hedged	Alternate Bearing Index
Atlantica	On	0.79	PGII	On	0.27
Atlantica	Off	0.41	PGII	Off	0.27
PGI	On	0.55	UCB-1	On	0.29
PGI	Off	0.21	UCB-1	Off	0.30

CONCLUSION AND PRACTICAL APPLICATIONS

The more vigorous rootstocks UCB-1 and PGII yield equally, and their bearing habit does not appear affected by whether they are hedged and topped prior to an on- or off-year. The AB index of rootstocks P. *atlantica* and PGI benefited from off-year reconstructive pruning. The yield depression from pruning prior to the off-year depends upon its severity. Except for P. *atlantica*, the yield of the other three rootstocks was not significantly different in 2017, presumably due to there being no difference in shaded area (PAR) after two years of not hedging. There were essentially no differences in nut quality attributable to hedging and topping during the trial.