

Effect on yield from shaking almond trees for mummy nut removal

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Tree shaking has little effect on yield, but late shaking isn't recommended

An integrated crop management system now in place reduces by 50 to 90 percent the extensive losses previously caused by navel orangeworm infestation of almond kernels. This four-point program includes orchard sanitation, timely applications of chemical insecticides (dormant and in-season), early harvest, and on-farm fumigation of harvested nuts. In one research study, orchard sanitation alone — removal of mummy nuts that harbor overwintering navel orangeworm, *Amyelois transitella* (Walker), during the dormant season — reduced damage by up to 80 percent.

Mummy nuts can be removed by mechanical tree shaking in the dormant season, December and January. Since some flower buds are also removed by shaking, growers are reluctant to use this method of orchard sanitation, fearing that the following crop will be affected. The purpose of our experiment was to determine if dormant mechanical shaking to remove mummy nuts affected subsequent almond yield.

We selected uniform 14-year-old trees of the Nonpareil and Merced cultivars planted in Famoso, Kern County, California. The treatments were four shaking dates (December 11, January 6, 16, and 31) and an unshaken control. Each treatment was replicated 18 times (single tree replications) arranged in a randomized complete block design. A conventional trunk shaker was used exclusively, and duration was based on previous experience to gain adequate mummy removal: Nonpareil trees were shaken 10 to 12 seconds; Merced trees, 4

to 5 seconds. The latter cultivar has a more upright growth habit and mummy nut removal is easier.

At harvest, the almond crop was knocked to the ground. Nonpareil trees were harvested on September 12 and Merced trees on October 8. The nuts from each tree were hand-raked and weighed in the field. Volumetric samples were taken from the crop of each tree, resulting in a sample size of 4 pounds for Nonpareil and 6 pounds for Merced. The nutmeats from each sample were weighed and counted to calculate the total meat-weight per tree and number of meats per pound. The figures were analyzed and mean separations made using Duncan's Multiple Range Test.

Yield and weight of nutmeats per tree were not statistically different ($P > 0.05$) for any treatments and control trees of either cultivar (see table). The mean weight of kernels per tree for all four shaking dates was 40.5 pounds for the Nonpareil cultivar and 38.5 pounds for Merced. For unshaken trees, mean weight was 39.8 and 37.4 pounds, respectively.

It is clear from these results that yield, as measured by the number of nuts and weight of nutmeats per tree, is not reduced by dormant shaking to remove mummy nuts. Although we observed no loss of yield when buds were swollen, as occurred on the last shaking date, we do not recommend late shaking. The potential for bud removal and possible yield reduction increases as bloom approaches. This test plot was situated in an early-blooming district (about February 8) in the southern San Joaquin Valley almond growing area of California. Dormant tree-shaking probably should not be undertaken after January 25 in this district, whereas January 31 could be the last shaking date in the central and northern almond growing areas of California where bloom is characteristically later.

Effects of dormant tree-shaking on almond crop production*

Shaking dates	No. nuts/tree	Nutmeat wt/tree	Number nutmeats/lb
'Nonpareil'		<i>lb</i>	
Unshaken control	13,944 a	39.8 a	346.9 a
12/11	12,760 a	38.1 a	333.7 a
1/6	15,459 a	45.1 a	342.8 a
1/16	14,304 a	41.8 a	341.4 a
1/31	12,862 a	37.2 a	344.6 a
'Merced'			
Unshaken control	15,048 a	37.4 a	401.8 a
12/11	15,193 a	37.4 a	405.9 a
1/6	16,883 a	41.0 a	411.3 a
1/16	15,442 a	38.3 a	403.2 a
1/31	15,169 a	37.4 a	405.0 a

* Means within a column followed by same letter do not differ significantly ($P > 0.05$) (Duncan's multiple range test).

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