

California Pistachio Rootstock Trials: 1989-2001

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Introduction

Currently, the California pistachio industry relies upon three rootstocks, two species and one interspecific hybrid, all members of the genus *Pistacia*. They are *P. atlantica* (Atlantica), *P. integerrima* (Pioneer Gold I or PGI), and *P. atlantica* x *P. integerrima* (University of California, Berkeley 1 or UCB1). The last is produced by a closed pollination process. A second hybrid of the same interspecific cross but different individual parents, (Pioneer Gold II or PGII) was included in these trials when established, but this rootstock is no longer commercially available. However, within this trial, specific individual PGII rootstocks have demonstrated superior productivity. By nature, all trees are highly heterozygous and these rootstocks are no exception. Great variability in growth and productivity has been observed within all the rootstocks in this trial.

All knowledge of these rootstocks' productivity prior to this trial was anecdotal. As the industry has matured and new production niches are being explored,

the climatic and soil adaptability of rootstocks becomes more important. Further, effects of rootstock on yield, nut quality and physiological problems, like alternate bearing, had not been determined experimentally.

Table 1 details when these trials were planted and budded. There are 400 trees, divided into 100, four-tree plots containing one of each of the four rootstocks. Ten of these four-tree plots are grouped into a 40-tree irrigation set. All of the trees are budded with the same female and male. The trials were established in three different counties, Kern, Fresno and Madera, representative of the major production microclimates. With these locations, and this design, we are attempting to observe the behavior of the different rootstocks under a range of climatic conditions.

Table 1.

Location	Planted	Budded
Madera County	5/28/88+	+
Fresno County	2/22/89	7/10/89
Kern County	3/4/89	8/14/89

+This demonstration plot was established independently a year before this trial using budded trees, and a different field design.

Results

Table 2. Effect of rootstock on crop year 2001 yield and grade-out. **

	County	UCB1	PGII	PGI	Atlantica
2001 Yield/Tree	Fresno	6.1 a	5.7 a	3.5 b	2.0 b
Total Edible Weight	Kern	14.0	12.0	11.3	10.5
2001 Yield/Acre	Fresno	683	638	381	224
Total Edible Weight @ 112/Bearing Trees/Acre (kg dry inshell split)	Kern	1568	1344	1266	1176
Alternate Bearing Index	Fresno	0.63	0.62	0.66	0.70
	Kern	0.55 b	0.61 ab	0.61 ab	0.64 a
	Madera	0.79	0.65	0.79	0.70
% Total Edible Split Inshell; USDA Sample	Fresno	57	55	54	51
	Kern	66 b	69 a	67 ab	67 ab
# Nuts/Ounce	Fresno	20 b	21 ab	22 a	21 ab
	Kern	21	21	21	20
Cumulative Yield to 2001 (lbs/acre @ 112 trees/acre)	Fresno	11,095 a	9,539 b	9,442 b	7,394 c
	Kern	15,258 a	13,301 b	13,052 b	11,418 c
	Madera	7,106 a	6,285 b	5,643 c	4,258 d

*Values within a row followed by different letters are significantly different. Lack of letters indicates no significant differences within a horizontal row. +Estimated yield in Madera County in 2001 was less than 40 pounds per acre, or essentially no yield.

Conclusions and Practical Application

As the trees in these three plots were budded with Kerman and Peters buds from the same trees all growth and yield differences in the Kerman scion can be attributed to the rootstock. It is clear that among all the rootstocks, Kerman trees on UCB1 rootstocks consistently produce significantly higher yields than Kerman trees on the other three rootstocks in all three microclimates. Trees on PGII and PGI rootstocks are equal in performance, producing significantly lower yields than trees on UCB1 rootstocks, and significantly better yields than trees on Atlantica rootstocks.

As in all the previous years of this trial there were few consistent, significant differences among the rootstocks in their effect on nut size or the percent of split or blank nuts.

Through the four full bearing years of this trial, 1998 through 2001, there have been no significant differences in nuts per cluster among the trees on the four different rootstocks. From 1998 through 2001, nuts per cluster has consistently ranged from 10-18. This demonstrates that when yields are significantly higher for Kerman trees on a given rootstock, it is the result of number of clusters per tree, not nuts per cluster, or individual nut size.

Now that these trials have had four years of full bearing an alternate bearing index can be calculated. The results clearly demonstrate there are few consistent, significant differences in alternate bearing among Kerman trees on the four different rootstocks, supporting the hypothesis that alternate bearing is primarily a function of the scion.

These trials have also confirmed that the climate and soil conditions on the west side of the southern San Joaquin Valley are better for production of pistachios than those in the central portion of the Valley.

This trial is now complete. These plots were designed to facilitate future research that requires a plot with the currently commercial rootstocks in a well replicated design with a known yield history. These plots will now be made available to other pistachio researchers .

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