EVALUATION OF ROOTSTOCKS FOR PISTACHIO PRODUCTION

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INTRODUCTION

In 1989, Dr. Louise Ferguson wisely initiated five rootstock trials distributed throughout the state. They were located in western Kern County, the UC Westside Field Station (western Fresno County), the Kearney Agricultural Center (eastern Fresno County), eastern Madera County, and Shasta County (near Anderson). Rootstocks included in each trial were P. atlantica, P. integerrima, (Pioneer Gold I), P. integerrima x P. atlantica (Pioneer Gold II), and P. atlantica x P. integerrima (UCB-1). Each trial consisted of 400 trees (cv. Kerman) which were divided into 100, four-tree plots, containing one of each rootstock. Ten of these four-tree plots where then grouped into a single 40-tree irrigation set to facilitate irrigation and nutrition studies. Male trees (cv. Peters) were also replicated on each rootstock and placed every third tree within the row and every third row.

These trials provided milestone information about cold (Shasta County), verticillium (Westside Field Station) and salinity tolerance (western Kern County). The Kern County (prior to its use as a salinity experiment), Madera, and Kearney Agricultural Center (KAC) trials served to establish production differences among the four rootstocks. Cumulative yields from the first five bearing years showed UCB-1 significantly more productive than PG II or PG I, the latter two being very similar in yield. P. atlantica was significantly less productive than the other three rootstocks.

Of the three production orchards, the KAC trial has been least compromised by other valuable industry projects. Management and pruning have been directed and executed by the lead author. The orchard was also circled tied in 2006 to minimize the need for large pruning cuts. The orchard has always been hand pruned by a crew trained by Chris Wylie, Ranch Manager of Agri World. The 2009 season represented the forth year in which the block was free of any experiments with possible yield impact. The extremely heavy crop also provided an excellent opportunity to contrast rootstock performance of 20 year-old Kerman trees to that recorded during their first five bearing years.

Additionally, the KAC trial revealed significant differences in seedling rootstock performance within a given species or hybrid, which has spurred great interest in clonal development procedures and monitoring commercial fields for "superior seedlings". The authors identified one such UCB-1 seedling, and a long term, replicated trial was established by the lead author to compare its performance as a vegetatively propagated clone to standard UCB-1 and P. integerrima seedlings. The first yield data was collected from this plot in 2008.
RESULTS

Figure 1 shows the yield results from the four rootstocks after 20 years. The averages shown in the figure represent 90 individual trees mechanically shaken on September 9, 2009. The crop from each tree was collected onto tarps and then immediately weighed in plastic tubs. A sample was then taken from each tree and composited for each rootstock and each of the five major replications within the trial. The resulting 20 samples were then refrigerated and submitted the following day to Paramount Farms for commercial evaluation. The resulting grade sheets then provided the percentages used to determine the weight of each nut category per tree.

The total dry weight was significantly greater for UCB-1 and PGII compared to PGI and P. atlantica. P. atlantica produced the least. The relative production of split nuts between the rootstocks was the same as the total dry weight. UCB-1 and PGII produced an average of 10 pounds more split nuts than PGI, and 15 pounds more split nuts than P. atlantica. UCB-1, PGII, and PGI all yielded the same amount of edible inshell nuts. The results from this harvest once again suggest that blank nut production is typically quite stable under normal growing conditions with adequate micronutrition.

The second year of yield collection from the clonal versus seedling rootstock trial suggests that KAC101, the seedling UCB-1 selected from the main trial and vegetatively propagated by hardwood cuttings, may have some promise in producing crops even larger or of higher split nut percentages than UCB-1 seedlings. However, this early enthusiasm must be tempered by the embryonic status of evaluation and our lack of knowledge regarding its verticillium, salinity, and cold tolerance.

CONCLUSIONS AND PRACTICAL APPLICATION

Harvest evaluation of the KAC pistachio rootstock trial 20 years after establishment indicates UCB-1 and PGII are significantly more productive than PGI or P. atlantica at this site. P. atlantica was significantly less productive in total dry weight and split nuts than the other three rootstocks. The production of shelling stock, edible inshell nuts and blank nuts was very similar between all four rootstocks. Although more variable in tree size than UCB-1, PGII is equally productive, but unfortunately susceptible to verticillium wilt. Field experience suggests PGII seedlings have a higher incidence of bud incompatibility. Yield differences from 2009 correlate well with yield data taken from the KAC trial in 2007 but not reported here.

Preliminary results from KAC101, a vegetatively propagated clone of one UCB-1 seedling within the rootstock trial suggests there is value in pursuing the concept of “superior seedlings”. Data has been collected to determine which yield components are responsible for superior production.
Comparison of pistachio rootstock performance at the Kearney Agricultural Center, Parlier, CA. Yields represent an average of 90 trees per rootstock. Orchard age is 20 years.