

High-Density Planting Investigations in Pistachio

Bruce Lampinen, Specialist in Cooperative Extension, Dept. of Plant Sciences, UC Davis

Mae Culumber, UCCE Farm Advisor, Fresno County

Sam Metcalf, Staff Research Associate, Dept. of Plant Sciences, UC Davis

Loreto Contador, Assistant Specialist, Dept. of Plant Sciences, UC Davis

INTRODUCTION

The goal of this project was to evaluate existing high-density plantings in pistachio orchards to assess their efficiency. Growers are interested in increasing early production, and one way to potentially do this is to plant at higher densities. However, this often has tradeoffs later in orchard life.

METHOD

A survey was done among industry representatives, farm advisors and growers to locate any existing high-density plantings in pistachio orchards. A number of higher-than-normal density orchards were found and surveyed.

Orchard 1: The first orchard was near Kettleman City in western Kings County. The orchard is Kerman planted on Pioneer rootstock, in 1996, at a density of 11' x 17' (233 trees/acre). The grower planted a block nearby at the same time (also Kerman on Pioneer rootstock) at a spacing of 17' x 19' (135 trees/acre). The grower has observed that production in the high versus more normal density blocks have been similar over the life of the orchard. We installed time-lapse cameras to measure the orchard floor shadows over the course of the summer, and also ran our mobile platform light bar to measure midday canopy photosynthetically active radiation interception in midsummer. Because the closer row spacing and higher tree density require more trees, more passes through the orchard for maintenance operations, more passes for hedging, and more trees to harvest, the yields would need to be significantly higher to justify the increased costs of establishment and operations in the higher density orchard.

Orchard 2: The second orchard studied was a high-density planting in southern Tulare County. This was a small planting, inside of a larger conventional block, which was planted at a spacing of 5'4" down the tree row and 20' across the drive row (411 trees per acre). The purpose of the planting is to evaluate tree-training strategies for these high-density plantings and also to determine the feasibility of using over-the-row harvesters in this orchard configuration. The orchard is only 3 years old so these evaluations have not been done yet. The idea would be to eventually plant the trees closer across the drive row as well as down the tree row, after tree training and harvest details have been worked out.

Orchard 3: The third orchard is in a very high-density configuration with a planting spacing at 9 feet down the row and 12 feet across. The rootstocks were just planted in 2017. The eventual plan is to harvest with a modified pistachio harvester that will likely fit around 3 trees at a time (but only shake the middle tree).

RESULTS

Orchard 1: The high-density orchard had about 70 percent midday canopy PAR interception compared to 59 percent in the standard density planting measured with the mobile platform light

bar. This would suggest that the production should be higher in the high-density orchard, since the interception in the standard density was 85 percent of that in the high-density orchard. However, according to the grower, the production has been similar in the normal and high-density orchards. Since both of the orchards are hedged in both directions, to keep the trees separate so that nuts are not shaken off adjacent trees, which would miss the catch frame at harvest, it is possible that there is more disturbed bed canopy that would take several years to return to productivity, following hedging, in the high-density orchard. This would result in higher production per unit PAR intercepted in the wider spaced orchard and could thus result in similar yields. This would suggest that under these circumstances, the extra cost of trees and the increased amount of hedging cuts required per acre, due to the closer tree spacing, would not be cost effective.

Orchard 2: At this point trees are growing well and will fill in down the tree row within a year or two.

Orchard 3: Trees were only planted in the spring of 2017, so it is too early to draw any conclusions.

CONCLUSION AND APPLICATIONS

Further investigation of high-density plantings is required before evaluating whether or not they are worthwhile. Preliminary data, based on Orchard 1 results, suggests that the increased costs of establishment, increased passes through the orchard (for orchard floor maintenance), sprays, harvests, hedging, etc. are unlikely to be offset by significantly higher returns.

