



INTEGRATION OF ROW SPACING, TREE SPACING, AND ROOTSTOCKS FOR WALNUT PRODUCTION

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Objectives

The objectives of this project are to evaluate the interactive effects of planting density and rootstocks on tree size, structural integrity, short-term and long-term yield, and orchard longevity; determine if row or tree spacing influences canopy climate, humidity, disease, and insect pressure; and evaluate economic advantages and disadvantages of higher density orchards.

Background

A trial was planted in the spring of 2016 evaluating the effects of rootstock and tree density on walnut growth and production. 'Chandler' June-budded to either seedling Paradox, VX211, or RX1 rootstocks were planted at the densities of 22'x22', 26'x26', and 30'x30'. Each of the nine treatments consisted of three rows of eight respectively spaced trees with four replicate blocks. The orchard was maintained under grower standard practices, and, for 2016-2017, irrigated with single line drip which applied the same amount of water per tree. In 2018, microsprinklers were installed to irrigate the same amount of water per acre. In 2020, trees with severe crown gall were removed and replaced, largely of the Paradox sSeedling rootstock (approximately 40%).

Results & Discussion

Differences in growth in 2020 were observed, and RX1 at 30'x30' spacing showed the greatest trunk caliper change from 2019 to 2020 (replanted trees were removed from the analyses to reflect real differences). Yield was greatest on RX1 with a 22'x22' spacing.

The establishment costs were recorded from actual expenses or extracted from local sources or UC cost studies, and yield returns were estimated from 2019 USDA-NASS (https://www.nass.usda.gov/Statistics_by_State/California/Publications/Specialty_and_Other_Releases/Walnut/index.php) dry in-shell walnut values per pound. As walnut density increased, so did establishment expenses and yield. 2019 yields offset expenses by about 5%. Using establishment and operational costs per acre of walnuts less 2019 yield returns, total net return for 22'x22', 26'x26', and 30'x30' from establishment to year five was estimated to be \$7,800.17, \$5,796.07, and \$4,639.90 per acre, respectively. Costs were not only influenced by the increasing number of trees, but the corresponding increase in rows, chemical supplies, water, fertilizer, and labor. Benefits of increased early yields in higher density orchards may be offset by these increasing operational costs.