

## Trait mining for high-density macadamia planting systems: How important are more detailed architectural characteristics?

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The successful translation of concepts from temperate high-density systems to subtropical macadamia (*Macadamia integrifolia*, *M. tetraphylla* and hybrids) orchards may depend on an understanding of the crop's specific plant architecture. A number of architectural characteristics converge and interact to create final canopy structure and resource allocation to yield. This study illustrates the abundant natural diversity in macadamia architecture, and determines useful traits for potential high-density planting systems.

Fifteen clonally propagated macadamia genotypes were selected from a high-density spatially designed precocity trial planted in 2011 at the Department of Agriculture and Fisheries (DAF) research facility at Nambour, South East Queensland, Australia. Three independent clones of each genotype were phenotyped in the 2015-2016 and 2016-2017 growing seasons for architectural and reproductive traits, around the age of transition from juvenility to maturity.

Trees were distinguishable as groups based on tree size, yield efficiency and branching characteristics, and particular genotypes stood-out as potential candidates for high-density systems. This research attempts to establish which architectural traits are the main drivers of yield and canopy size in macadamia, and emphasises the importance of canopy development at multiple scales. The detailed selection of macadamia plant types may maximise economic return in increasingly complex future planting systems.