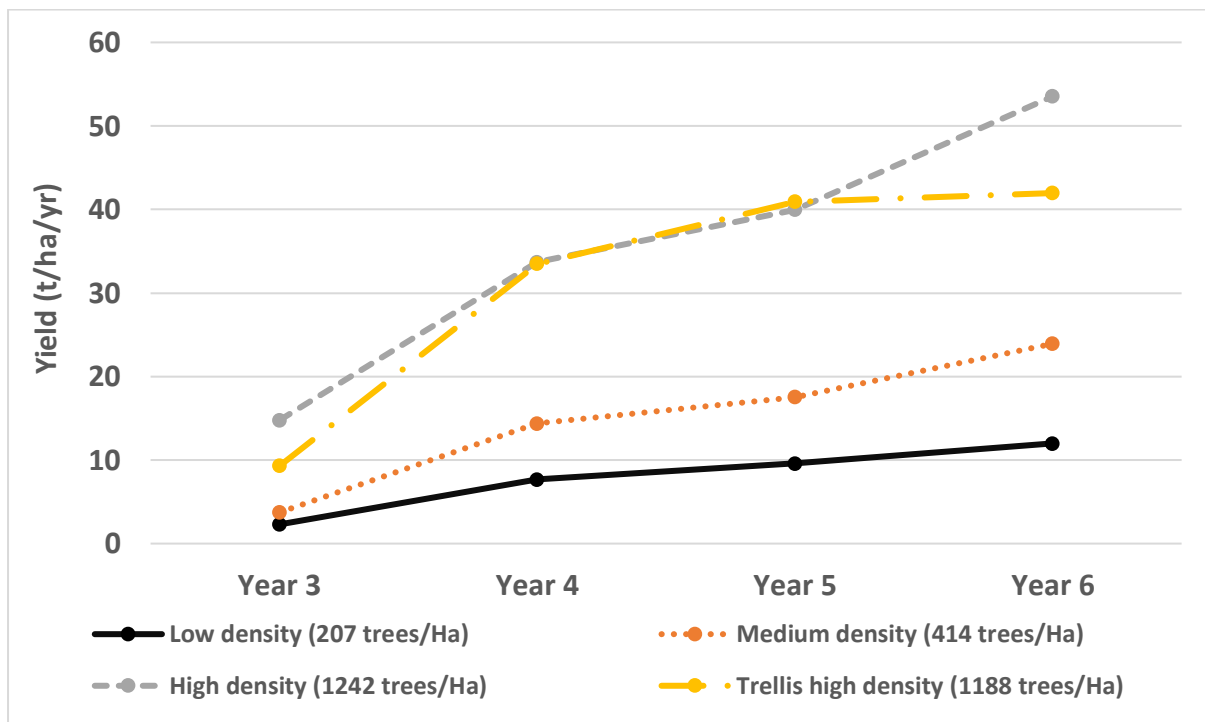


## Economics of high-density mango orchards

Results from the Small Trees High Productivity Initiative at the Queensland Department of Agriculture and Fisheries (DAF) Walkamin Research Facility near Mareeba, are demonstrating that mangoes can be grown with high productivity at high densities, using both traditional hedging and trellising methods. Varieties studied include Calypso®, NMBP-1243 and Keitt. Seven years of yield and management system input data have now been collected. Calypso® yield data is presented in Figure 1. Trial results are showing that the extra costs of establishing trees at higher densities can be quickly recouped via greatly increased early yields per hectare, resulting in increased orchard profitability from an early age.



**Figure 1. Calypso® yields (t/ha) to age 6 years, for 4 mango density systems at the DAF Walkamin Research Facility.**

### Gross margin analysis

A gross margin analysis of a range of intensive mango systems was undertaken that compared conventional mango planting systems at three different densities – low (207 trees/ha), medium (408 trees/ha) and high (1242 trees/ha) and one trellised planting system at high density (1188 trees/ha). The mango variety B74 (Calypso®) was selected as the

focus variety for the study. This analysis used data from the DAF Planting System Trial (PST), the Australian mango industry, growers, industry stakeholders and published reports.

The following were the per hectare costs and returns expected for each of the planting systems: Low, medium, high density conventional and high-density trellis. The gross margin is the difference between the costs and returns at full production. The costs and returns used in this calculation are outlined in Table 1. The gross margin does not consider fixed costs or capital expenditure. Growers considering transitioning all or part of their farm to a higher density planting system or developing a new farm at increased density should consider undertaking a complete economic analysis specific to their situation.

**Table 1. Annual yields and gross margin (\$/ha) calculated at full production**

Item	Assumptions	Conv. low density 207 trees/ha	Conv. medium density 408 trees/ha	Conv. high density 1,242 trees/ha	Trellis high density 1,188 trees/ha
<b>Yield (tonnes/ha)</b>					
Total yield	Total tree yield	18.2	32.6	58.8	65.9
Harvested yield - HY	5% fruit left in paddock	17.3	31.0	55.9	62.6
<b>Income (\$/ha)</b>					
Premium	\$4.00/kg @ 77% of HY	53,300	95,505	171,893	192,958
Class 1	\$2.00/kg @ 14% of HY	4,845	8,682	15,627	17,541
Class 2	\$1.57/kg @ 4% of HY	1,087	1,947	3,505	3,934
Juice/processing	\$0.50/kg @ 4% of HY	346	620	1,116	1,253
Reject	\$0.00/kg @ 1% of HY	0	0	0	0
<b>Total income (\$/ha)</b>		<b>59,578</b>	<b>106,754</b>	<b>192,141</b>	<b>215,686</b>
<b>Variable costs (\$/ha)</b>					
Nutrition		1,410	2,106	3,132	3,016
Pest management		3,984	5,415	3,478	2,913
Disease management		4,560	6,366	3,179	2,706
Weed management		526	754	876	876
Irrigation		634	1,161	1,576	1,404
Canopy management		1,990	3,587	7,706	6,346
Harvesting		2,933	4,694	8,449	9,485
Packing		11,726	20,806	37,245	41,782
Freight to market		4,391	7,867	14,160	15,895
Commissions & Levies		6,283	11,259	20,264	22,747
<b>Total variable costs (\$/ha)</b>		<b>38,437</b>	<b>64,015</b>	<b>100,065</b>	<b>107,170</b>
<b>GROSS MARGIN (Total income – Total variable costs)</b>		<b>21,138</b>	<b>42,738</b>	<b>92,071</b>	<b>108,514</b>

Table 2 outlines the establishment costs required for setting up each of the four systems. Included in the capital outlay costs were land preparation including boom spraying, slashing, ripping and levelling the block in preparation for planting; Irrigation, including materials, labour and installation of mainline, sprinklers, taps, connectors and pump and associated infrastructure; Planting expenses included the cost of trees, pre-plant lime and application and tree planting labour; and for the trellis system, the trellis infrastructure.

**Table 2. Establishment costs per hectare for the four planting systems**

Planting system	Land Prep.	Irrigation	Planting	Trellising	Total
Conventional low density	\$1,100	\$5,800	\$3,591	-	\$10,491
Conventional medium density	\$1,262	\$7,513	\$7,078	-	\$15,853
Conventional high density	\$1,262	\$12,676	\$21,549	-	\$35,487
Trellis high density	\$1,262	\$12,792	\$20,612	\$31,981	\$66,647

The full CRCNA report '[Economic Case Study of Intensive Mango Systems: A comparison of the profitability of conventional \(low, medium & high-density\) and trellis \(high-density\) mango canopy systems in north Queensland based on early trial results](#)', is available at the above link or can be found on the Cooperative Research Centre for Northern Australia's (CRCNA) website under Resources > Publications > An economic case study of intensive mango systems.

## Key references

Bennett, D. M., and Dickinson, G.R. (2021). Economic case study of intensive mango systems: A comparison of the profitability of conventional (low, medium and high density) and trellis (high density) mango canopy systems in north Queensland based on early trial results. <https://crcna.com.au/resources/publications/economic-case-study-intensive-mango-systems>. 28pp.