NSW GOVERNMENT Department of Primary Industries

NSW citrus farm budget handbook 2018

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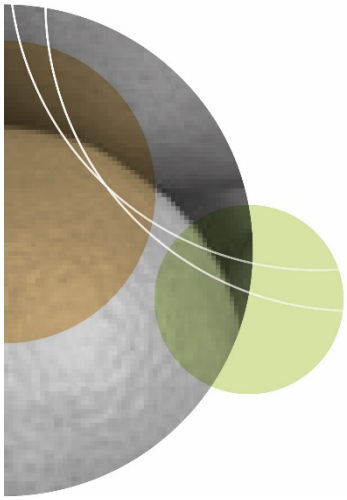


INTRODUCTION

This handbook presents citrus gross margin budgets for the Riverina and Sunraysia districts of NSW. Development budgets have also been constructed for replant and rework scenarios for these districts. These cashflow development budgets are discussed in more detail in the second section of this handbook.

The budgets published in this booklet are **only a guide** to the relative profitability of the different enterprises for a specific set of assumptions. The budgets are influenced not only by general factors such as prices, yields and costs, but also by each farm's individual characteristics. Be aware that the budgets **do not** incorporate taxation (either GST or income tax) into the cash flows.

Before using any information from this booklet, the user should read and understand all of the assumptions used to develop the budgets. If assumptions vary between the published budgets and the user, these must be taken into consideration and adjusted accordingly. Professional financial advise should be obtained to make the budgets more meaningful to your specific financial circumstances (i.e. taxation, whole farm cash flow).

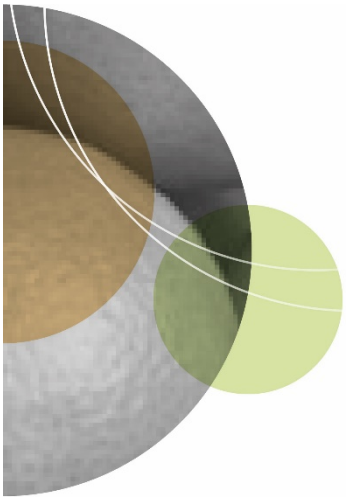
It is impractical to present budgets for the multitude of situations that could arise. The enterprises analysed here are based on average production and conform to management routines that industry currently uses.

The practices presented in the budgets are not reccomendations. If users are considering using a practice presented in the budgets, they should check if it is suited to their situation and should always **check the registration status of pesticides and follow label recommendations**.

The budgets will probably not exactly match any individual situation so users will have to **adjust the budget to include their individual situation**.

Minor changes to some of the variables can dramatically change an enterprise's profitability. Yield and prices are two of the main variable costs that can significantly affect gross margin returns. A sensitivity analysis is provided to help obtain an estimate of gross margin returns and long-term cash flows with different yields, prices and finance. Expensive inputs, such as pruning and hand thinning, can also significantly affect budgets.

This booklet is only the starting point to developing a citrus budget. To help producers develop a budget, an Excel copy of selected long-term budgets is available from the from NSW Department of Primary Industries citrus web site (http://www.dpi.nsw.gov.au/content/agriculture/horticulture/citrus) in the Business Management section. By using the spreadsheets you will be able to develop a more personalised budget guide and experiment with different scenarios to obtain a better understanding of the enterprise you are investigating. The Excel development budget spreadsheets available from the web are only a guide as they do not include a detailed analysis of overhead costs, fixed costs, labour commitments and taxation considerations, and have design constraints. Spreadsheet users should contact agricultural advisors and accountants for specific information on cultural practices and financial information.



Summary

This summary discussion is limited to the specific assumptions and practices used within each budget in this booklet. The development budgets show net present value (NPV) of enterprises at a 7% discount rate. NPV is the sum of the discounted values of future income and costs associated with a farm project or plan. Projects with a positive NPV value provide a net gain over 20 years and provide positive returns. Those with the highest NPV repay the highest return on investment. The budgets do not include the operator's management labour, most tractor-operated tasks (i.e. herbicide and foliar sprays), or the cost of purchasing land and capital (i.e. machinery, water licences).

The development budgets span 21 years, the first year is land preparation (e.g. removing old trees, cultivation and spelling the land), the trees are planted in year 2 and the remaining 20 years are tree growth and production. Amongst all citrus varieties assessed in the development budgets, Afourer mandarin had the highest NPV and 21-year cumulative income (21YCI) of all varieties. Harvest comprised 25–46% of mature tree variable costs. Finding ways to reduce harvest costs is a good opportunity to improve on-farm profitability.

Afourer mandarin

Seedless fruit is currently preferred in the market and seeded Afourer fruit currently has an approximately 20% lower price than seedless fruit. The budgets indicate that a 20% price reduction resulted in a marginally positive NPV ($11,427) and positive 21YCI ($65,388) (Table 1). However, if the price drops to 50% of seedless fruit, this results in a negative NPV (-$67,488) and negative 21YCI (-$123,012).

Table 1: Seedless fruit compared with seeded fruit NPV and net cash cumulative cash flow

Afourer growing system	7% NPV	21-year cumulative income (No finance)
Isolated seedless	$64,037	$14,174
Seeded 20% price reduction	$11,427	$65,388
Seeded 50% price reduction	-$67,488	-$123,012

Table 2: Afourer mandarin NPV and net cash cumulative cash flow

Afourer growing system	7% NPV	21-year cumulative income (No finance)
Isolated seedless	$64,037	$14,174
Drape net	$33,390	$122,135
Private variety 2.5% wholesale levy	$48,767	$157,164
Private variety 5% wholesale levy	$35,615	$125,764
Full cover net yr 1	$63,706	$19,971
Full cover net yr 5	$63,869	$19,971

Using a private mandarin variety (PVR) or covering the trees during flowering with Drape Net to produce seedless fruit had a positive NPV and 21YCI, but growing fruit in isolation has the highest NPV and 21YCI as there are fewer costs (Table 2). Drape Net had a lower NPV ($33,390) at 21YCI compared with a private variety that had a 2.5% wholesale price levy ($48,767; assumed a 5% farm gate levy) the 5% wholesale levy ($35,615; assumed 10% farm gate levy). The Drape Net assumes a 10% mature tree yield loss due to extra hedging requirements. Growing fruit under a full cover net structure (NPV: $63,706, 21YCI: $19,971) had a similar NPV and 21YCI to growing fruit in isolation (NPV: $64,037, 21YCI:$14,174). Full cover netting was analysed for installation at planting (year 1) and at the fifth year (year 5), the year 1 installation assumed to have a higher early tree growth rate and subsequent earlier yield than the year 5 installation. The year 1 and 5 installations had similar NPV (Yr 1: $63,706, Yr 5: $63,869).

Navel oranges

Navels at $450 t and a 40 t/ha yield, had a slightly negative NPV (-$2,907) and a positive 21YCI ($6,941). Growing fruit for the Korea–China–Thailand (KCT) export market had a higher NPV ($8,369) and 21YCI ($9,485) than non KCT navels, even though KCT practices have a $1,022.94 per hectare higher production cost (skirting, insecticide and 5× trunk banding). The budgets assumed KCT fruit had a $100 / t premium, selling fruit at $550 / t. Selected growers in the southern regions have been able to achieve greater than a $100 price premium for KCT fruit. These budgets, at the specified assumptions, indicate that an average fruit price in the vicinity of $550 / t and an average yield of 40 t/ha are required for Navels to be a worthwhile venture.

Anecdotal evidence suggests that using an inter-row windbreak at planting and extra practices during the first six years of production increases young tree growth and subsequent early yields. These assumptions were used to develop a higher early yield (HEY) scenario for navels. The HEY scenario had a positive NPV ($6,044), significantly higher than standard practice (-$2,907). This indicates that adopting improved early tree growth practices and gaining the assumed improvements in yield provides positive economic benefits.

A significant proportion of industry would not be achieving an average fruit Navel price of $550 t and an average yield of 40 t/ha. However there are many well managed blocks throughout the regions that achieve these yields and prices, so there is potential to improve. Late navel varieties that generally yield less than mid-season navels have a greater challenge. Both yield and prices are directly influence by on-farm practices. Improving on-farm production technology through research, development and technology transfer can target on farm profitability and increase the yield of first grade fruit. On farm profitability can also be improved by reducing costs and eliminating unproductive practices.

The budgets indicated that Navel reworking had a significantly higher NPV and 21YCI than redevelopment. However, reworking has many cultural limitations and challenges (grafting incompatibility, disease transmission, orchard health, age of rootstock) and in some cases has provided poor yields. Professional agronomic advice should be sought. The Primefact, *Reworking citrus trees* is available on the NSW DPI website.

Valencia oranges and Imperial mandarins

Valencia oranges and Imperial mandarins had a significantly negative NPV and 21YCI for the assumptions selected in the budgets. This is concerning, because Valencia still had a negative NPV (-$4,659) even at a 60 t/ha yield (fruit price $250 t); Imperial mandarin had a positive NPV ($25,534) at $800 ha. It is not likely that a production system could sustain average long-term Valencia yields well above 60 t/ha, and Imperial mandarin fruit prices in recent years have been under pressure.

Summary graph

Figure 1 below is a summary of the development budgets. These are single snapshots of each enterprise for a single set of assumptions.

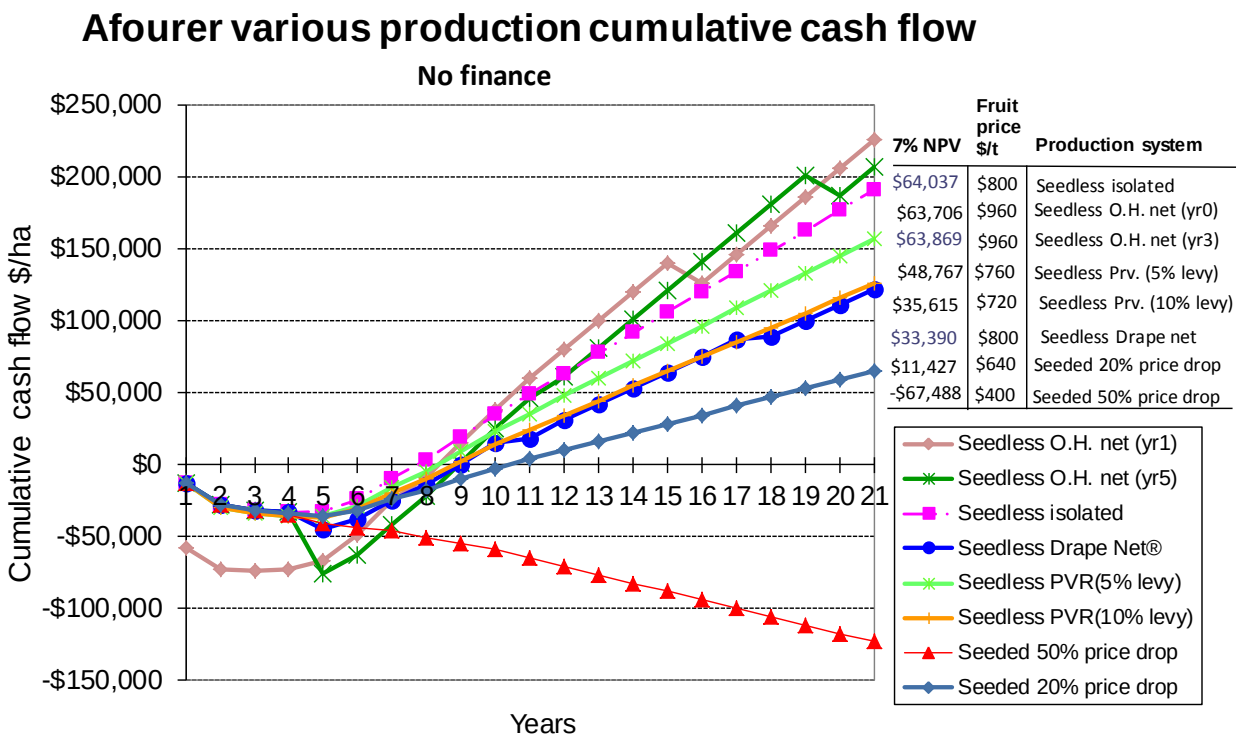
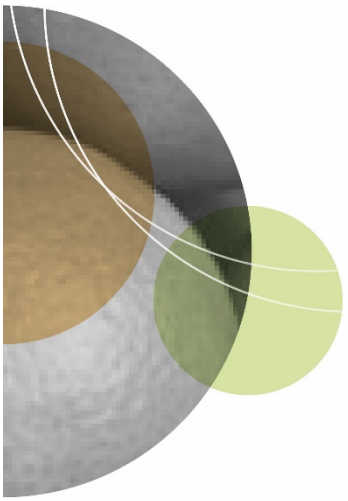


Figure 1. The cumulative cashflow and net present value of various citrus enterprises.



Gross margins

What is a gross margin?

A gross margin can be defined as the gross income from an enterprise minus the variable costs incurred to achieve it.

Variable costs are those costs directly attributable to an enterprise, and which vary in proportion to the size of an enterprise. For example, if the area of oranges grown doubles, then the variable costs associated with growing, such as chemicals, and fertilisers, will also roughly double.

The gross margin is not gross profit, because it does not include fixed or overhead cost such as depreciation, interest payments, rates, insurance and permanent labour, which have to be met regardless of the enterprise's size. Labour is an important consideration. To help provide an indication of labour required for machinery time (e.g. tractor, quad bike etc.) an estimate of total machinery hours is provided in the notes of each gross margin. The machinery hour estimate does not include machinery maintenance or setup or any other work not related to working machinery. As a guide citrus orchards require about 50 to 75 labour hours per ha. The lower estimates are for low input orchards (e.g. juice) or large area orchards that can gain labour efficiencies (e.g. greater than 100 ha).

Gross margins are generally quoted per unit of the most limited resource e.g. land, irrigation water, capital or labour. It is common for crop gross margins to be quoted on a per hectare basis.

How can gross margins be used?

Calculating a gross margin is the essential first step in farm budgeting and planning. It enables you to directly compare the relative profitability of similar enterprises, and consequently provides a starting point to deciding or altering the farm's overall enterprise mix.

Gross margins can be used to analyse actual enterprise performance. Comparing your own gross margins with standards for the district is a worthwhile exercise. Major differences can be explained by particular farm characteristics, but could also indicate areas where significant improvements might be made.

Use gross margins carefully!

Be careful when using gross margins to determine the farm's overall enterprise mix. Because overhead costs are excluded, it is advisable to only make comparisons of gross margins between enterprises that use similar resources.

Gross margins have been determined on a per tonne and per hectare basis. This implies per tonne harvested, not per tonne packed.

If major changes are being considered, more comprehensive budgeting techniques are required to indicate the real profitability situation.

Outlined below is a brief summary of factors that gross margins fail to take account of and which need to be considered when contemplating a major enterprise change.

1. Resource requirements

First establish whether there is sufficient land, labour and capital to implement the desired change.

The suggested most profitable enterprise mix must be technically feasible in terms of the whole farm. For example, if you are considering another crop, do you have the expertise to grow it? Is it suitable to your area and soil type? Does the crop fit in with the farm's labour availability and skills? Do you need to purchase special machinery?

2. Technical efficiency of current enterprises

Before any change is undertaken, have a look at the performance of the current enterprises run on the farm. There might be scope for returns to be improved through adopting new techniques or better management.

3. Risk

Different enterprises will have different levels of associated production and price risk, which need to be taken into account when deciding on enterprise mix. For example, some crops involve more production risks than others, due to susceptibility to insect pests. Other crops could receive widely fluctuating prices from season to season, and consequently, involve substantial price risk.

Additionally, in terms of the whole farm, consider spreading risks through strategies such as diversification, i.e. 'not putting all your eggs in the one basket', by growing a number of different crops.

4. Cash flow

A comparison of gross margin figures alone does not indicate the nature of the work nor its appeal to the prospective producer.

Cash flow budgets show expected cash on hand at the start of the year, the flow and timing of costs and income, and the cash balance at the end of the year. They are useful for calculating when an enterprise might break even, returns over time and the level of borrowing that would be required.

Riverina gross margins

Riverina citrus gross margin 2018

Enterprise: ORANGES - Navel
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Riverina **Unit size:** 1 ha

INCOME:			35.0	t/ha	@	$300.0	/t	**A:**	$10,500.0
VARIABLE COST:									
Irrigation									
Water and levies			7.0	ML/ha		$16.7	/ML	$117.0	
Fixed levies						$413.2	/ha	$413.2	
Pow er and service			7.0	ML/ha		$69.3	/ML	$385.0	
Maintenance (pump & system)			7.0	ML/ha		$13.0	/ML	$91.0	
								Total	$1,006.2
Herbicide	**Machinery**	**Sprayed area**	**Rate per application**						
2.0 x Bromacil	Herbicide boom	50%	1.1	kg/ha		$69.2	/kg	$76.1	
2.0 x Simazine	-na-	50%	2.0	kg/ha		$9.6	/kg	$19.2	
1.0 x Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha		$4.5	/L	$5.4	
3.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5	/L	$9.5	
3.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1	/ml	$1.5	
4.0 x Wetter (Hasten)			0.4	L/ha		$8.3	/L	$13.2	
								Total	$124.8
Fertiliser									
5.0 x UAN	Fertigation		35.0	L/ha		$0.9	/L	$148.8	
2.0 x Calcium nitrate	Fertigation		35.0	kg/ha		$0.8	/kg	$57.7	
3.0 x MAP	Fertigate w ith other		45.0	kg/ha		$1.7	/kg	$232.2	
3.0 x Potassium nitrate	Fertigate w ith other		70.0	kg/ha		$1.9	/kg	$399.8	
3.0 x Iron EDHHA	Fertigation		2.0	kg/ha		$16.4	/kg	$98.4	
Foliar									
3.0 x Potassium nitrate	-na-		35.0	kg/ha		$1.9	/kg	$199.9	
3.0 x Urea (low bi)	Spray (6km/h)		8.8	kg/ha		$0.9	/kg	$22.6	
3.0 x ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4	/kg	$42.8	
3.0 x Wetter (Agral)			0.4	L/ha		$7.7	/L	$8.0	
								Total	$1,210.2
Fungicides									
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha		$8.5	/kg	$42.4	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha		$4.9	/L	$43.9	
								Total	$86.3
Insecticides									
1.0 x Oil spray: high grade	Spray (4km/h)		55.0	L/ha		$4.1	/L	$223.5	
1.0 x Bio Control (Aphytis)			0.5	release/h		$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha		$10.8	/L	$43.2	
0.5 x Spinetoram	Spray (4km/h)		0.7	L/ha		$482.0	/L	$168.7	
0.3 x Imidacloprid	Fertigation		4.4	L/ha		$36.2	/L	$52.5	
2.0 x Wetter (Agral)			0.4	L/ha		$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5	/kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.0	L/ha		$16.5	/L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0	/trap	$2.0	
2.0 x Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha		$3.0	/kg	$60.8	
								Total	$705.2
Crop management sprays									
1.0 x G.A. (40% granular)	Osc. boom (4km/hr)		0.3	kg/ha		$772.0	/kg	$212.3	
1.0 x Cling spray	Spray (4km/hr)		0.4	L/ha		$32.8	/L	$11.5	
1.0 x Buffer (Primabuff)			2.1	L/ha		$12.5	/L	$26.3	
								Total	$250.0
Canopy management (note: self skirting or mulching in tractor section below)									
1.0 x Hand pruning			2.0	min/tree		$55.0	/h	$894.7	
1.0 x Mech. topping (contract)			1.0	h/ha		$250.0	/h	$250.0	
0.2 x Hedging (one side, contract)			1.2	h/ha		$250.0	/h	$60.0	
								Total	$1,204.7
Crop management									
1.0 x Leaf analysis			0.5	analysis		$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0			$300.0	/ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha		$0.4	/kg	$8.8	
								Total	$368.8

Tractor and machinery

	Practice	Machinery					
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9	/h	$45.8
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3	/h	$16.5
3.0 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0	/h	$115.4
3.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2	/h	$25.2
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0	/h	$40.2
10.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5	/h	$7.7
1.0 x	Spray (4km/h)	Airblast tower sprayer	1.5	h/ha	$32.9	/h	$49.3
1.0 x	Osc. boom (4km/h)	Oscillating boom sprayer	1.5	h/ha	$44.5	/h	$66.8
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2	/h	$4.2
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3	/h	$1.1
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1	/h	$90.4
2.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1	/h	$60.3
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5	/h	$14.5
1.0 x	Mechanical skirting (med)	Blade skirter	1.0	h/ha	$22.8	/h	$22.8
1.0 x	Bin & ladder placement	Bin trailer & ladders	0.2	h/t	$10.0	/h	$62.8
						Total	$623.0

Harvest

Contract harvest	35.0	t/ha	$83.0	/t	$2,905.0
Cartage and bin hire	35.0	t/ha	$30.4	/t	$1,062.3
Levies	35.0	t/ha	$3.5	/t	$122.5
				Total	$4,089.8

B. Total variable cost	**$9,668.8**
Gross margin per ha (A-B)	**$831.2**

Riverina citrus gross margin 2018

Enterprise: ORANGES - Navel KCT export
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Riverina **Unit size:** 1 ha

INCOME:			35.0	t/ha	@	$400.0 /t	**A:**	$14,000.0
VARIABLE COST:								
Irrigation								
Water and levies			7.0	ML/ha		$16.7 /ML	$117.0	
Fixed levies						$413.2 /ha	$413.2	
Pow er and service			7.0	ML/ha		$69.3 /ML	$385.0	
Maintenance (pump & system)			7.0	ML/ha		$13.0 /ML	$91.0	
							Total	$1,006.2
Herbicide	**Machinery**	**Sprayed area**	**Rate per application**					
2.0 x Bromacil	Herbicide boom	50%	1.1	kg/ha		$69.2 /kg	$76.1	
2.0 x Simazine	-na-	50%	2.0	kg/ha		$9.6 /kg	$19.2	
1.0 x Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha		$4.5 /L	$5.4	
3.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5 /L	$9.5	
3.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1 /ml	$1.5	
4.0 x Wetter (Hasten)			0.4	L/ha		$8.3 /L	$13.2	
							Total	$124.8
Fertiliser								
5.0 x UAN	Fertigation		35.0	L/ha		$0.9 /L	$148.8	
2.0 x Calcium nitrate	Fertigation		35.0	kg/ha		$0.8 /kg	$57.7	
3.0 x MAP	Fertigate w ith other		45.0	kg/ha		$1.7 /kg	$232.2	
3.0 x Potassium nitrate	Fertigate w ith other		70.0	kg/ha		$1.9 /kg	$399.8	
3.0 x Iron EDHHA	Fertigation		2.0	kg/ha		$16.4 /kg	$98.4	
Foliar								
3.0 x Potassium nitrate	-na-		35.0	kg/ha		$1.9 /kg	$199.9	
3.0 x Urea (low bi)	Spray (6km/h)		8.8	kg/ha		$0.9 /kg	$22.6	
3.0 x ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4 /kg	$42.8	
3.0 x Wetter (Agral)			0.4	L/ha		$7.7 /L	$8.0	
							Total	$1,210.2
Fungicides								
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha		$8.5 /kg	$42.4	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha		$4.9 /L	$43.9	
							Total	$86.3
Insecticides								
1.0 x Oil spray: high grade	Spray (4km/h)		55.0	L/ha		$4.1 /L	$223.5	
0.3 x Oil spray: high grade	Spray (4km/h)		65.0	L/ha		$4.1 /L	$87.2	
1.0 x Bio Control (Aphytis)			0.5	release/h		$135.0 /release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha		$10.8 /L	$43.2	
1.0 x Spinetoram	Spray (4km/h)		0.7	L/ha		$482.0 /L	$337.4	
0.3 x Imidacloprid	Fertigation		4.4	L/ha		$36.2 /L	$52.5	
5.0 x Cyhalothrin	Trunk band spray (TBS)		0.6	L/ha		$112.0 /L	$311.5	
5.0 x Kaolin (Sur)	used w ith TBS		6.5	kg/ha		$5.4 /kg	$173.9	
5.0 x Sticker	used w ith TBS		0.2	L/ha		$25.0 /L	$23.2	
2.0 x Wetter (Agral)			0.4	L/ha		$7.7 /L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7 /L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5 /kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.0	L/ha		$16.5 /L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0 /trap	$2.0	
2.0 x Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha		$3.0 /kg	$60.8	
							Total	$1,469.7
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (4km/hr)		0.3	kg/ha		$772.0 /kg	$212.3	
1.0 x Cling spray	Spray (4km/hr)		0.4	L/ha		$32.8 /L	$11.5	
1.0 x Buffer (Primabuff)			2.1	L/ha		$12.5 /L	$26.3	
							Total	$250.0
Canopy management (note: self skirting or mulching in tractor section below)								
1.0 x Hand pruning			2.0	min/tree		$55.0 /h	$894.7	
1.0 x Mech. topping (contract)			1.0	h/ha		$250.0 /h	$250.0	
0.2 x Hedging (one side, contract)			1.2	h/ha		$250.0 /h	$60.0	
							Total	$1,204.7
Crop management								
1.0 x Leaf analysis			0.5	analysis		$120.0 /analysis	$60.0	
1.0 x Pest monitoring			1.0			$300.0 /ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha		$0.4 /kg	$8.8	
							Total	$368.8

Tractor and machinery

	Practice	Machinery						
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9	/h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3	/h	$16.5	
3.0 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0	/h	$115.4	
3.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2	/h	$25.2	
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0	/h	$40.2	
10.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5	/h	$7.7	
1.0 x	Spray (4km/h)	Airblast tower sprayer	1.5	h/ha	$32.9	/h	$49.3	
1.0 x	Osc. boom (4km/h)	Oscillating boom sprayer	1.5	h/ha	$44.5	/h	$66.8	
5.0 x	Trunk band spray (TBS)	Trunk band sprayer	1.0	h/ha	$10.0	/h	$50.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2	/h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3	/h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1	/h	$90.4	
2.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1	/h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5	/h	$14.5	
1.0 x	Mechanical skirting (med)	Blade skirter	1.0	h/ha	$22.8	/h	$22.8	
1.0 x	Mechanical skirting (fast)	Blade skirter	0.8	h/ha	$22.8	/h	$17.1	
1.0 x	Bin & ladder placement	Bin trailer & ladders	0.2	h/t	$10.0	/h	$62.8	
							Total	$690.3

Harvest

Contract harvest	35.0	t/ha	$83.0	/t	$2,905.0	
Cartage and bin hire	35.0	t/ha	$30.4	/t	$1,062.3	
Levies	35.0	t/ha	$3.5	/t	$122.5	
					Total	$4,089.8

B. Total variable cost	**$10,500.7**
Gross margin per ha (A-B)	**$3,499.3**

Riverina citrus gross margin 2018

Enterprise: ORANGES - Navel KCT export
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Riverina **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD (t)	ON FARM PRICE ($/t)								
	$200	$250	$300	$350	**$400**	$450	$500	$550	$600
20	-$4,748	-$3,748	-$2,748	-$1,748	-$748	$252	$1,252	$2,252	$3,252
25	-$4,332	-$3,082	-$1,832	-$582	$668	$1,918	$3,168	$4,418	$5,668
30	-$3,916	-$2,416	-$916	$584	$2,084	$3,584	$5,084	$6,584	$8,084
35	-$3,501	-$1,751	-$1	$1,749	**$3,499**	$5,249	$6,999	$8,749	$10,499
40	-$3,085	-$1,085	$915	$2,915	$4,915	$6,915	$8,915	$10,915	$12,915
45	-$2,669	-$419	$1,831	$4,081	$6,331	$8,581	$10,831	$13,081	$15,331
50	-$2,253	$247	$2,747	$5,247	$7,747	$10,247	$12,747	$15,247	$17,747

Notes:

Tree density: 488 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over two years. Delayed harvest (post February) will reduce the following seasons yield.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 41 hours per ha.
Using a labour cost of $35 /hr an additional $1435 /ha can be deducted from the budget for tractor use labour.

Cultural: Bromacil and Simazine are applied together as a tank mix to reduce the cost of residual herbicide weed management. Liquid fertilisers are used with fertigation systems, however granual ground applied phosphate was chosen as it is commonly used.

Mechanical hedging is used annually to top mature trees. Hand pruning helps to maintain the width of the tree however one side of the tree is hedged every five years to further assist in maintaining tree width. This means that both sides of the tree is hedged every ten years. This is entered in the budget sheet as an 0.2 x entry.

Fruit fly baits are applied from November through to Autumn on a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass to break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers.

Cartage assumes 50 km travel and bins hired.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	128	25	**152**
P	35	0	**35**
K	55	27	**82**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on fresh market price.

Riverina citrus gross margin 2018

Enterprise: ORANGES - Valencia
Description: Drip irrigation **Tree density:** 447 trees/ha
Water price: Riverina **Unit size:** 1 ha

INCOME:				25.0	t/ha	@	$265.0 /t	**A:**	$6,625.0
VARIABLE COST:									
Irrigation									
	Water and levies			6.0	ML/ha		$16.7 /ML	$100.3	
	Fixed levies						$413.2 /ha	$413.2	
	Pow er and service			6.0	ML/ha		$71.7 /ML	$330.0	
	Maintenance (pump & system)			6.0	ML/ha		$13.0 /ML	$78.0	
								Total	$921.5
Herbicide		**Machinery**	**Sprayed area**	**Rate per application**					
2.0 x	Bromacil	Herbicide boom	50%	1.1	kg/ha		$69.2 /kg	$76.1	
2.0 x	Simazine	-na-	50%	2.0	kg/ha		$9.6 /kg	$19.2	
1.0 x	Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha		$4.5 /L	$5.4	
3.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5 /L	$9.5	
3.0 x	Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1 /ml	$1.5	
4.0 x	Wetter (Hasten)			0.4	L/ha		$8.3 /L	$13.2	
								Total	$124.8
Fertiliser									
4.0 x	UAN	Fertigation		60.0	L/ha		$0.9 /L	$204.0	
2.0 x	Calcium nitrate	Fertigation		50.0	kg/ha		$0.8 /kg	$82.4	
1.0 x	Single super	Fertiliser spinner		0.1	t/ha		$465.0 /t	$46.5	
Foliar									
1.0 x	ZM (foliar 17% Zn & Mn)	Spray (6km/hr)		6.0	kg/ha		$2.4 /kg	$14.3	
1.0 x	Wetter (Agral)			0.4	L/ha		$7.7 /L	$2.7	
								Total	$349.9
Fungicides									
2.0 x	Copper oxychloride	Spray (4km/hr)		5.0	kg/ha		$8.5 /kg	$84.8	
								Total	$84.8
Insecticides									
1.0 x	Oil spray: high grade	Spray (4km/hr)		80.0	L/ha		$4.1 /L	$325.1	
10.0 x	Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7 /L	$58.3	
10.0 x	Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5 /kg	$21.5	
10.0 x	Abamectin	used w ith bait spray		0.0	L/ha		$16.5 /L	$1.2	
24.0 x	QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0 /trap	$2.0	
								Total	$408.0
Canopy management (note: self skirting or mulching in tractor section below)									
1.0 x	Mech. topping (contract)			1.0	h/ha		$250.0 /h	$250.0	
0.3 x	Hedging (one side, contract)			1.2	h/ha		$250.0 /h	$75.0	
								Total	$325.0
Crop management									
1.0 x	Leaf analysis			0.5	analysis		$120.0 /analysis	$60.0	
1.0 x	Sod seed	Sod seeder		25.0	kg/ha		$0.4 /kg	$8.8	
								Total	$68.8
Tractor and machinery									
	Practice	**Machinery**							
6.0 x	Sod mow ing	Slasher		0.5	h/ha		$22.9 /h	$68.6	
25.0 x	Check emitters	4 w heel bike (4WB)		0.2	h/ha		$3.3 /h	$16.5	
3.0 x	Herbicide row s	Herbicide boom		1.2	h/ha		$32.0 /h	$115.4	
3.0 x	Spot spray 4WB	4WB+tank sprayer		2.0	h/ha		$4.2 /h	$25.2	
1.0 x	Ground fertilise	Fertiliser spinner		2.0	h/ha		$10.0 /h	$20.1	
6.0 x	Fertigation	Fertigation		0.3	h/ha		$2.5 /h	$4.5	
3.0 x	Spray (4km/h)	Airblast tow er sprayer		1.5	h/ha		$32.9 /h	$147.9	
1.0 x	Spray (6km/h)	Airblast tow er sprayer		1.0	h/ha		$32.9 /h	$32.9	
10.0 x	Bait spray	4WB+tank sprayer		0.1	h/ha		$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 w heel bike (4WB)		0.0	h/ha		$3.3 /h	$1.1	
1.0 x	Mulching (slow)	Mulcher PTO		2.5	h/ha		$30.1 /h	$75.3	
0.3 x	Mulching (med)	Mulcher PTO		1.5	h/ha		$30.1 /h	$13.6	
1.0 x	Sod sow ing	Sod seeder		1.0	h/ha		$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Bin trailer & ladders		0.2	h/t		$10.0 /h	$47.7	
								Total	$587.6
Harvest									
	Contract harvest			25.0	t/ha		$83.0 /t	$2,075.0	
	Cartage and bin hire			25.0	t/ha		$30.4 /t	$758.8	
	Levies			25.0	t/ha		$3.5 /t	$87.5	
								Total	$2,921.3
								B. Total variable cost	**$5,791.5**
								Gross margin per ha (A-B)	**$833.5**

Riverina citrus gross margin 2018

Enterprise: ORANGES - Valencia
Description: Drip irrigation **Tree density:** 447 trees/ha
Water price: Riverina **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD (t)	ON FARM PRICE ($/t)								
	$140	$165	$190	$215	**$265**	$315	$340	$365	$390
10	-$2,639	-$2,389	-$2,139	-$1,889	-$1,389	-$889	-$639	-$389	-$139
15	-$2,523	-$2,148	-$1,773	-$1,398	-$648	$102	$477	$852	$1,227
20	-$2,407	-$1,907	-$1,407	-$907	$93	$1,093	$1,593	$2,093	$2,593
25	-$2,292	-$1,667	-$1,042	-$417	**$833**	$2,083	$2,708	$3,333	$3,958
30	-$2,176	-$1,426	-$676	$74	$1,574	$3,074	$3,824	$4,574	$5,324
35	-$2,060	-$1,185	-$310	$565	$2,315	$4,065	$4,940	$5,815	$6,690
40	-$1,944	-$944	$56	$1,056	$3,056	$5,056	$6,056	$7,056	$8,056

Notes:

Tree Density: 447 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over two years. Delayed harvest (post February) will reduce the following seasons yield.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 32.4 hours per ha.
Using a labour cost of $35 /hr an additional $1134 /ha can be deducted from the budget for tractor use labour.

Cultural: Bromacil and Simazine are applied together as a tank mix to reduce the cost of residual herbicide weed management. Liquid fertilisers are used with fertigation systems, however granual ground applied phosphate was chosen as it is commonly used.

Mechanical hedging is used annually to top mature trees. The sides are hedged every three years to maintain tree width and entered in the budget sheet as an 0.3 x entry.

Fruit fly baits are applied from November through to Autumon a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third passto break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers.

Cartage assumes 50 km travel and bins hired.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	116	0	**116**
P	17	0	**17**
K	0	0	**0**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on a juice contract price.

Riverina citrus gross margin 2018

Enterprise: MANDARIN - Imperial
Description: Drip irrigation **Tree density:** 600 trees/ha
Water price: Riverina **Unit size:** 1 ha

INCOME:			25.0	t/ha	@	$550.0	/t	**A:**	$13,750.0
VARIABLE COST:									
Irrigation									
	Water and levies			8.0	ML/ha	$16.7	/ML	$133.7	
	Fixed levies					$413.2	/ha	$413.2	
	Pow er and service			8.0	ML/ha	$67.5	/ML	$440.0	
	Maintenance (pump & system)			8.0	ML/ha	$13.0	/ML	$104.0	
								Total	$1,090.9
Herbicide		**Machinery**	**Sprayed area**	**Rate per application**					
2.0 x	Bromacil	Herbicide boom	50%	1.1	kg/ha	$69.2	/kg	$76.1	
2.0 x	Simazine	-na-	50%	2.0	kg/ha	$9.6	/kg	$19.2	
1.0 x	Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha	$4.5	/L	$5.4	
3.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$9.5	
3.0 x	Carfentrazone	used w ith Glyphosate		5.0	ml/ha	$0.1	/ml	$1.5	
4.0 x	Wetter (Hasten)			0.4	L/ha	$8.3	/L	$13.2	
								Total	$124.8
Fertiliser									
5.0 x	UAN	Fertigation		40.0	L/ha	$0.9	/L	$170.0	
2.0 x	Calcium nitrate	Fertigation		40.0	kg/ha	$0.8	/kg	$65.9	
3.0 x	MAP	Fertigate w ith other		50.0	kg/ha	$1.7	/kg	$258.0	
3.0 x	Potassium nitrate	Fertigate w ith other		45.0	kg/ha	$1.9	/kg	$257.0	
3.0 x	Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$98.4	
Foliar									
3.0 x	Potassium nitrate	-na-		35.0	kg/ha	$1.9	/kg	$199.9	
3.0 x	Urea (low bi)	Spray (6km/hr)		8.8	kg/ha	$0.9	/kg	$22.6	
3.0 x	ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha	$2.4	/kg	$42.8	
3.0 x	Wetter (Agral)			0.4	L/ha	$7.7	/L	$8.0	
								Total	$1,122.7
Fungicides									
1.0 x	Copper oxychloride	Spray (4km/hr)		5.0	kg/ha	$8.5	/kg	$42.4	
1.0 x	Phosphonic acid 600g	Spray (4km/hr)		9.0	L/ha	$4.9	/L	$43.9	
1.0 x	Azoxystrobin			3.5	L/ha	$52.0	/L	$182.0	
								Total	$268.3
Insecticides									
1.0 x	Oil spray: high grade	Spray (4km/hr)		55.0	L/ha	$4.1	/L	$223.5	
1.0 x	Bio Control (Aphytis)			0.5	release/h	$135.0	/release	$67.5	
1.0 x	Chlorpyrifos	Spray (4km/hr)		4.0	L/ha	$10.8	/L	$43.2	
0.5 x	Spinetoram	Spray (4km/hr)		0.7	L/ha	$482.0	/L	$168.7	
0.3 x	Imidacloprid	Fertigation		5.4	L/ha	$36.2	/L	$64.5	
2.0 x	Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1	
10.0 x	Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3	
10.0 x	Thickener F.F. lure	used w ith bait spray		0.1	kg/ha	$21.5	/kg	$21.5	
10.0 x	Abamectin	used w ith bait spray		0.0	L/ha	$16.5	/L	$1.2	
24.0 x	QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha	$10.0	/trap	$2.0	
2.0 x	Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8	
								Total	$717.2
Crop management sprays									
1.0 x	G.A. (40% granular)	Osc. boom (4km/hr)		0.1	kg/ha	$772.0	/kg	$106.2	
1.0 x	Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3	
								Total	$132.4
Canopy management (note: self skirting or mulching in tractor section below)									
1.0 x	Hand pruning			2.0	min/tree	$55.0	/h	$1,100.0	
1.0 x	Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0	
0.2 x	Hedging (one side, contract)			1.2	h/ha	$250.0	/h	$60.0	
								Total	$1,410.0
Crop management									
1.0 x	Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0	
1.0 x	Pest monitoring			1.0		$300.0	/ha	$300.0	
0.5 x	Hand fruit thinning			10.0	min/tree	$25.0	/h	$1,250.0	
1.0 x	Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8	
								Total	$1,618.8

Tractor and machinery

	Practice	Machinery					
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9	/h	$45.8
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3	/h	$16.5
3.0 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0	/h	$115.4
3.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2	/h	$25.2
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0	/h	$40.2
10.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5	/h	$7.7
4.5 x	Spray (4km/h)	Airblast tower sprayer	1.5	h/ha	$32.9	/h	$221.9
3.0 x	Spray (6km/h)	Airblast tower sprayer	1.0	h/ha	$32.9	/h	$98.6
1.0 x	Osc. boom (4km/h)	Oscillating boom sprayer	1.5	h/ha	$44.5	/h	$66.8
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2	/h	$4.2
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3	/h	$1.1
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1	/h	$90.4
2.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1	/h	$60.3
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5	/h	$14.5
1.0 x	Mechanical skirting (med)	Blade skirter	1.0	h/ha	$22.8	/h	$22.8
1.0 x	Bin & ladder placement	Bin trailer & ladders	0.2	h/t	$10.0	/h	$47.7
						Total	$879.1

Harvest

Contract harvest	25.0	t/ha	$225.0	/t	$5,625.0
Cartage and bin hire	25.0	t/ha	$30.4	/t	$758.8
Levies	25.0	t/ha	$3.5	/t	$87.5
				Total	$6,471.3

B. Total variable cost	**$13,835.4**
Gross margin per ha (A-B)	**-$85.4**

Riverina citrus gross margin 2018

Enterprise: MANDARIN - Imperial
Description: Drip irrigation **Tree density:** 600 trees/ha
Water price: Riverina **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD (t)	ON FARM PRICE ($/t)								
	$350	$400	$450	$500	**$550**	$600	$650	$700	$750
10	-$6,453	-$5,953	-$5,453	-$4,953	-$4,453	-$3,953	-$3,453	-$2,953	-$2,453
15	-$5,997	-$5,247	-$4,497	-$3,747	-$2,997	-$2,247	-$1,497	-$747	$3
20	-$5,541	-$4,541	-$3,541	-$2,541	-$1,541	-$541	$459	$1,459	$2,459
25	-$5,085	-$3,835	-$2,585	-$1,335	**-$85**	$1,165	$2,415	$3,665	$4,915
30	-$4,630	-$3,130	-$1,630	-$130	$1,370	$2,870	$4,370	$5,870	$7,370
35	-$4,174	-$2,424	-$674	$1,076	$2,826	$4,576	$6,326	$8,076	$9,826
40	-$3,718	-$1,718	$282	$2,282	$4,282	$6,282	$8,282	$10,282	$12,282

Notes:

Tree density: 600 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over two years. Delayed harvest (post February) will reduce the following seasons yield.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 43.5 hours per ha.
Using a labour cost of $35 /hr an additional $1523 /ha can be deducted from the budget for tractor use labour.

Cultural: Bromacil and Simazine are applied together as a tank mix to reduce the cost of residual herbicide weed management. Liquid fertilisers are used with fertigation systems, however granual ground applied phosphate was chosen as it is commonly used.

Mechanical hedging is used annually to top mature trees. Hand pruning helps to maintain the width of the tree however one side of the tree is hedged every five years to further assist in maintaining tree width. This means that both sides of the tree is hedged every ten years. This is entered in the budget sheet as an 0.2 x entry.

Fruit fly baits are applied from November through to Autumon a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Fruit hand thinning at mid summer (e.g. January) is conducted every second year (0.5 x entry).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass is used to break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers.

Cartage assumes 50 km travel and bins hired.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	132	25	**156**
P	39	0	**39**
K	35	27	**62**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on a fresh market price.

Riverina citrus gross margin 2018

Enterprise: MANDARIN - Afourer (isolated seedles)
Description: Drip irrigation **Tree density:** 600 trees/ha
Water price: Riverina **Unit size:** 1 ha

INCOME:				50.0	t/ha	@	$800.0 /t	**A:**	$40,000.0
VARIABLE COST:									
Irrigation									
	Water and levies			8.0	ML/ha		$16.7 /ML	$133.7	
	Fixed levies						$413.2 /ha	$413.2	
	Pow er and service			8.0	ML/ha		$67.5 /ML	$440.0	
	Maintenance (pump & system)			8.0	ML/ha		$13.0 /ML	$104.0	
								Total	$1,090.9
Herbicide		**Machinery**	**Sprayed area**	**Rate per application**					
2.0 x	Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha		$4.5 /L	$6.5	
5.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5 /L	$15.8	
5.0 x	Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1 /ml	$2.5	
0.3 x	Haloxyfop	Herbicide boom	30%	0.8	L/ha		$57.8 /L	$4.6	
1.0 x	Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha		$9.9 /L	$8.9	
7.0 x	Wetter (Hasten)			0.4	L/ha		$8.3 /L	$23.1	
								Total	$61.2
Fertiliser									
5.0 x	UAN	Fertigation		45.0	L/ha		$0.9 /L	$191.3	
2.0 x	Calcium nitrate	Fertigation		45.0	kg/ha		$0.8 /kg	$74.2	
3.0 x	MAP	Fertigate w ith other		60.0	kg/ha		$1.7 /kg	$309.6	
3.0 x	Potassium nitrate	Fertigate w ith other		65.0	kg/ha		$1.9 /kg	$371.3	
3.0 x	Iron EDHHA	Fertigation		2.0	kg/ha		$16.4 /kg	$98.4	
Foliar									
3.0 x	Potassium nitrate	-na-		35.0	kg/ha		$1.9 /kg	$199.9	
3.0 x	Urea (low bi)	Spray (6km/hr)		8.8	kg/ha		$0.9 /kg	$22.6	
3.0 x	ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4 /kg	$42.8	
3.0 x	Wetter (Agral)			0.4	L/ha		$7.7 /L	$8.0	
								Total	$1,318.1
Fungicides									
1.0 x	Copper oxychloride	Spray (4km/hr)		5.0	kg/ha		$8.5 /kg	$42.4	
1.0 x	Phosphonic acid 600g	Spray (4km/hr)		9.0	L/ha		$4.9 /L	$43.9	
								Total	$86.3
Insecticides									
1.0 x	Oil spray: high grade	Osc. boom (2km/h)		55.0	L/ha		$4.1 /L	$223.5	
1.0 x	Bio Control (Aphytis)			0.5	release/h		$135.0 /release	$67.5	
1.0 x	Chlorpyrifos	Spray (4km/h)		4.0	L/ha		$10.8 /L	$43.2	
0.5 x	Spinetoram	Spray (4km/h)		0.7	L/ha		$482.0 /L	$168.7	
0.3 x	Imidacloprid	Fertigation		5.4	L/ha		$36.2 /L	$64.5	
2.0 x	Wetter (Agral)			0.4	L/ha		$7.7 /L	$6.1	
10.0 x	Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7 /L	$58.3	
10.0 x	Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5 /kg	$21.5	
10.0 x	Abamectin	used w ith bait spray		0.0	L/ha		$16.5 /L	$1.2	
24.0 x	QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0 /trap	$2.0	
2.0 x	Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha		$3.0 /kg	$60.8	
								Total	$717.2
Crop management sprays									
1.0 x	G.A. (40% granular)	Osc. boom (4km/hr)		0.1	kg/ha		$772.0 /kg	$106.2	
1.0 x	Buffer (Primabuff)			2.1	L/ha		$12.5 /L	$26.3	
								Total	$132.4
Canopy management (note: self skirting or mulching in tractor section below)									
1.0 x	Hand pruning			4.0	min/tree		$55.0 /h	$2,200.0	
1.0 x	Mech. topping (contract)			1.0	h/ha		$250.0 /h	$250.0	
0.2 x	Hedging (one side, contract)			1.2	h/ha		$250.0 /h	$60.0	
								Total	$2,510.0
Crop management									
1.0 x	Leaf analysis			0.5	analysis		$120.0 /analysis	$60.0	
1.0 x	Pest monitoring			3.0			$300.0 /ha	$900.0	
0.5 x	Hand fruit thinning			10.0	min/tree		$25.0 /h	$1,250.0	
1.0 x	Sod seed	Sod seeder		25.0	kg/ha		$0.4 /kg	$8.8	
								Total	$2,218.8

Tractor and machinery

	Practice	Machinery					
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9	/h	$45.8
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3	/h	$16.5
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0	/h	$128.1
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2	/h	$42.0
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0	/h	$40.2
10.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5	/h	$7.7
2.0 x	Spray (4km/h)	Airblast tower sprayer	1.5	h/ha	$32.9	/h	$98.6
3.0 x	Spray (6km/h)	Airblast tower sprayer	1.0	h/ha	$32.9	/h	$98.6
1.0 x	Osc. boom (4km/h)	Oscillating boom sprayer	1.5	h/ha	$44.5	/h	$66.8
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2	/h	$4.2
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3	/h	$1.1
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1	/h	$90.4
2.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1	/h	$60.3
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5	/h	$14.5
1.0 x	Mechanical skirting (med)	Blade skirter	1.0	h/ha	$22.8	/h	$22.8
1.0 x	Bin & ladder placement	Bin trailer & ladders	0.2	h/t	$10.0	/h	$85.4
						Total	$823.0

Harvest

Contract harvest	50.0	t/ha	$225.0	/t	$11,250.0
Cartage and bin hire	50.0	t/ha	$30.4	/t	$1,517.5
Levies	50.0	t/ha	$3.5	/t	$175.0
				Total	$12,942.5

B. Total variable cost	**$21,900.3**
Gross margin per ha (A-B)	**$18,099.7**

Riverina citrus gross margin 2018

Enterprise: MANDARIN - Afourer (isolated seedles)
Description: Drip irrigation **Tree density:** 600 trees/ha
Water price: Riverina **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD (t)	ON FARM PRICE ($/t)								
	$500	$550	$600	$650	$700	$750	**$800**	$850	$900
35	-$518	$1,232	$2,982	$4,732	$6,482	$8,232	$9,982	$11,732	$13,482
40	$688	$2,688	$4,688	$6,688	$8,688	$10,688	$12,688	$14,688	$16,688
45	$1,894	$4,144	$6,394	$8,644	$10,894	$13,144	$15,394	$17,644	$19,894
50	$3,100	$5,600	$8,100	$10,600	$13,100	$15,600	**$18,100**	$20,600	$23,100
55	$4,305	$7,055	$9,805	$12,555	$15,305	$18,055	$20,805	$23,555	$26,305
60	$5,511	$8,511	$11,511	$14,511	$17,511	$20,511	$23,511	$26,511	$29,511
65	$6,717	$9,967	$13,217	$16,467	$19,717	$22,967	$26,217	$29,467	$32,717

Notes:

Tree density: 600 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over two years. Delayed harvest (post February) will reduce the following seasons yield.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 44.1 hours per ha.
Using a labour cost of $35 /hr an additional $1544 /ha can be deducted from the budget for tractor use labour.

Cultural: Bromacil and Simazine are applied together as a tank mix to reduce the cost of residual herbicide weed management. Liquid fertilisers are used with fertigation systems, however granual ground applied phosphate was chosen as it is commonly used.

Mechanical hedging is used annually to top mature trees. Hand pruning helps to maintain the width of the tree however one side of the tree is hedged every five years to further assist in maintaining tree width. This means that both sides of the tree is hedged every ten years. This is entered in the budget sheet as an 0.2 x entry.

Fruit fly baits are applied from November through to Autumn on a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Fruit hand thinning at mid summer (e.g. January) is conducted every second year (0.5 x entry).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass to break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha. The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers. Cartage assumes 50 km travel and bins hired.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	155	25	**180**
P	47	0	**47**
K	51	27	**78**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on a fresh market price.

Sunraysia gross margins

Sunraysia citrus gross margin 2018

Enterprise: ORANGES - Navel
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

INCOME:			40.0	t/ha	@	$400.0 /t	**A:**	$16,000.0
VARIABLE COST:								
Irrigation								
Water and levies			8.0	ML/ha		$68.9 /ML	$551.3	
Fixed levies						$304.2 /ha	$304.2	
Pow er and service			8.0	ML/ha		$51.6 /ML	$303.2	
Maintenance (pump & system)			8.0	ML/ha		$13.0 /ML	$104.0	
							Total	$1,262.7
Herbicide	**Machinery**	**Sprayed area**	**Rate per application**					
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha		$4.5 /L	$6.5	
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5 /L	$15.8	
5.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1 /ml	$2.5	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha		$57.8 /L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha		$9.9 /L	$8.9	
7.0 x Wetter (Hasten)			0.4	L/ha		$8.3 /L	$23.1	
							Total	$61.2
Fertiliser								
5.0 x UAN	Fertigation		35.0	L/ha		$0.9 /L	$148.8	
2.0 x Calcium nitrate	Fertigation		35.0	kg/ha		$0.8 /kg	$57.7	
3.0 x MAP	Fertigate w ith other		45.0	kg/ha		$1.7 /kg	$232.2	
3.0 x Potassium nitrate	Fertigate w ith other		70.0	kg/ha		$1.9 /kg	$399.8	
3.0 x Iron EDHHA	Fertigation		2.0	kg/ha		$16.4 /kg	$98.4	
Foliar								
3.0 x Potassium nitrate	-na-		35.0	kg/ha		$1.9 /kg	$199.9	
3.0 x Urea (low bi)	Spray (6km/h)		8.8	kg/ha		$0.9 /kg	$22.6	
3.0 x ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4 /kg	$42.8	
3.0 x Wetter (Agral)			0.4	L/ha		$7.7 /L	$8.0	
							Total	$1,210.2
Fungicides								
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha		$8.5 /kg	$42.4	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha		$4.9 /L	$43.9	
							Total	$86.3
Insecticides								
1.0 x Oil spray: high grade	Osc. boom (2km/h)		55.0	L/ha		$4.1 /L	$223.5	
1.0 x Bio Control (Aphytis)			0.5	release/h		$135.0 /release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha		$10.8 /L	$43.2	
0.5 x Spinetoram	Spray (4km/h)		0.7	L/ha		$482.0 /L	$168.7	
0.3 x Imidacloprid	Fertigation		4.4	L/ha		$36.2 /L	$52.5	
2.0 x Wetter (Agral)			0.4	L/ha		$7.7 /L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7 /L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5 /kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.0	L/ha		$16.5 /L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0 /trap	$2.0	
2.0 x Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha		$3.0 /kg	$60.8	
							Total	$705.2
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (4km/h)		0.3	kg/ha		$772.0 /kg	$212.3	
1.0 x Cling spray	Spray (4km/h)		0.4	L/ha		$32.8 /L	$11.5	
1.0 x Buffer (Primabuff)			2.1	L/ha		$12.5 /L	$26.3	
							Total	$250.0
Canopy management (note: self skirting or mulching in tractor section below)								
1.0 x Hand pruning			2.0	min/tree		$55.0 /h	$894.7	
1.0 x Mech. topping (contract)			1.0	h/ha		$250.0 /h	$250.0	
0.2 x Hedging (one side, contract)			1.2	h/ha		$250.0 /h	$60.0	
1.0 x Mech. skirting (contract)			1.0	h/ha		$105.0 /h	$105.0	
							Total	$1,309.7
Crop management								
1.0 x Leaf analysis			0.5	analysis		$120.0 /analysis	$60.0	
1.0 x Pest monitoring			1.0			$300.0 /ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha		$0.4 /kg	$8.8	
							Total	$368.8

Tractor and machinery

	Practice	Machinery					
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0 /h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0 /h	$40.2	
10.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5 /h	$7.7	
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3 /h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1 /h	$90.4	
2.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1 /h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5 /h	$14.5	
3.0 x	Mechanical skirting (med)	Blade skirter	1.0	h/ha	$22.8 /h	$68.3	
1.0 x	Bin & ladder placement	Bin trailer & ladders	0.2	h/t	$10.0 /h	$70.3	
						Total	$589.4

Harvest

Contract harvest	40.0	t/ha	$78.0 /t	$3,120.0	
Cartage and bin hire	40.0	t/ha	$25.0 /t	$1,000.0	
Levies	40.0	t/ha	$3.5 /t	$140.0	
				Total	$4,260.0

B. Total variable cost	**$10,103.5**
Gross margin per ha (A-B)	**$5,896.5**

Sunraysia citrus gross margin 2018

Enterprise: ORANGES - Navel
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD	ON FARM PRICE ($/t)								
(t)	$200	$250	$300	$350	**$400**	$450	$500	$550	$600
25	-$3,506	-$2,256	-$1,006	$244	$1,494	$2,744	$3,994	$5,244	$6,494
30	-$3,038	-$1,538	-$38	$1,462	$2,962	$4,462	$5,962	$7,462	$8,962
35	-$2,571	-$821	$929	$2,679	$4,429	$6,179	$7,929	$9,679	$11,429
40	-$2,103	-$103	$1,897	$3,897	**$5,897**	$7,897	$9,897	$11,897	$13,897
45	-$1,636	$614	$2,864	$5,114	$7,364	$9,614	$11,864	$14,114	$16,364
50	-$1,168	$1,332	$3,832	$6,332	$8,832	$11,332	$13,832	$16,332	$18,832
55	-$701	$2,049	$4,799	$7,549	$10,299	$13,049	$15,799	$18,549	$21,299

Notes:

Tree density: 488 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over five years.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 38.6 hours per ha.
Using a labour cost of $35 /hr an additional $1351 /ha can be deducted from the budget for tractor use labour.

Cultural: All weed control is conducted with knockdown herbicides. Liquid fertilisers for nitrogen have been chosen for ease of use with fertigation systems. Technical grade MAP is dissolved in water and fertigated for phosphorous application.

Mechanical hedging is used annually to top mature trees. Hand pruning helps to maintain the width of the tree however one side of the tree is hedged every five years to further assist in maintaining tree width. This means that both sides of the tree is hedged every ten years. This is entered in the budget sheet as an 0.2 x entry.

Fruit fly baits are applied from November through to Autumn on a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass is used to break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers.

Cartage assumes 50 km is traveled and includes bins hire.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	128	25	**152**
P	35	0	**35**
K	55	27	**82**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on fresh market price.

Sunraysia citrus gross margin 2018

Enterprise: ORANGES - Navel KCT export
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

INCOME:			40.0	t/ha	@	$500.0	/t	**A:**	$20,000.0
VARIABLE COST:									
Irrigation									
Water and levies			8.0	ML/ha		$68.9	/ML	$551.3	
Fixed levies						$304.2	/ha	$304.2	
Pow er and service			8.0	ML/ha		$51.6	/ML	$303.2	
Maintenance (pump & system)			8.0	ML/ha		$13.0	/ML	$104.0	
								Total	$1,262.7
Herbicide	**Machinery**	**Sprayed area**	**Rate per application**						
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha		$4.5	/L	$6.5	
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5	/L	$15.8	
5.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1	/ml	$2.5	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha		$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha		$9.9	/L	$8.9	
7.0 x Wetter (Hasten)			0.4	L/ha		$8.3	/L	$23.1	
								Total	$61.2
Fertiliser									
5.0 x UAN	Fertigation		35.0	L/ha		$0.9	/L	$148.8	
2.0 x Calcium nitrate	Fertigation		35.0	kg/ha		$0.8	/kg	$57.7	
3.0 x MAP	Fertigate w ith other		45.0	kg/ha		$1.7	/kg	$232.2	
3.0 x Potassium nitrate	Fertigate w ith other		70.0	kg/ha		$1.9	/kg	$399.8	
3.0 x Iron EDHHA	Fertigation		2.0	kg/ha		$16.4	/kg	$98.4	
Foliar									
3.0 x Potassium nitrate	-na-		35.0	kg/ha		$1.9	/kg	$199.9	
3.0 x Urea (low bi)	Spray (6km/h)		8.8	kg/ha		$0.9	/kg	$22.6	
3.0 x ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4	/kg	$42.8	
3.0 x Wetter (Agral)			0.4	L/ha		$7.7	/L	$8.0	
								Total	$1,210.2
Fungicides									
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha		$8.5	/kg	$42.4	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha		$4.9	/L	$43.9	
								Total	$86.3
Insecticides									
1.0 x Oil spray: high grade	Osc. boom (2km/h)		55.0	L/ha		$4.1	/L	$223.5	
0.3 x Oil spray: high grade	Osc. boom (2km/h)		65.0	L/ha		$4.1	/L	$87.2	
1.0 x Bio Control (Aphytis)			0.5	release/h		$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha		$10.8	/L	$43.2	
1.0 x Spinetoram	Spray (4km/h)		0.7	L/ha		$482.0	/L	$337.4	
0.3 x Imidacloprid	Fertigation		4.4	L/ha		$36.2	/L	$52.5	
5.0 x Cyhalothrin	Trunk band spray (TBS)		0.6	L/ha		$112.0	/L	$311.5	
5.0 x Kaolin (Sur)	used w ith TBS		6.5	kg/ha		$5.4	/kg	$173.9	
5.0 x Sticker	used w ith TBS		0.2	L/ha		$25.0	/L	$23.2	
2.0 x Wetter (Agral)			0.4	L/ha		$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5	/kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.0	L/ha		$16.5	/L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0	/trap	$2.0	
2.0 x Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha		$3.0	/kg	$60.8	
								Total	$1,469.7
Crop management sprays									
1.0 x G.A. (40% granular)	Osc. boom (4km/h)		0.3	kg/ha		$772.0	/kg	$212.3	
1.0 x Cling spray	Spray (4km/h)		0.4	L/ha		$32.8	/L	$11.5	
1.0 x Buffer (Primabuff)			2.1	L/ha		$12.5	/L	$26.3	
								Total	$250.0
Canopy management (note: self skirting or mulching in tractor section below)									
1.0 x Hand pruning			2.0	min/tree		$55.0	/h	$894.7	
1.0 x Mech. topping (contract)			1.0	h/ha		$250.0	/h	$250.0	
0.2 x Hedging (one side, contract)			1.2	h/ha		$250.0	/h	$60.0	
2.0 x Mech. skirting (contract)			1.0	h/ha		$105.0	/h	$210.0	
								Total	$1,414.7
Crop management									
1.0 x Leaf analysis			0.5	analysis		$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0			$300.0	/ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha		$0.4	/kg	$8.8	
								Total	$368.8

Tractor and machinery

	Practice	Machinery					
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0 /h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0 /h	$40.2	
10.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5 /h	$7.7	
5.0 x	Trunk band spray (TBS)	Trunk band sprayer	1.0	h/ha	$10.0 /h	$50.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3 /h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1 /h	$90.4	
3.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1 /h	$90.4	
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5 /h	$14.5	
1.0 x	Mechanical skirting (med)	Blade skirter	1.0	h/ha	$22.8 /h	$22.8	
1.0 x	Mechanical skirting (fast)	Blade skirter	0.8	h/ha	$22.8 /h	$17.1	
1.0 x	Bin & ladder placement	Bin trailer & ladders	0.2	h/t	$10.0 /h	$70.3	
						Total	$641.3

Harvest

Contract harvest	40.0	t/ha	$78.0 /t	$3,120.0		
Cartage and bin hire	40.0	t/ha	$25.0 /t	$1,000.0		
Levies	40.0	t/ha	$3.5 /t	$140.0		
				Total	$4,260.0	

B. Total variable cost	**$11,024.9**
Gross margin per ha (A-B)	**$8,975.1**

Sunraysia citrus gross margin 2018

Enterprise: ORANGES - Navel KCT export
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD	ON FARM PRICE ($/t)								
(t)	$300	$350	$400	$450	**$500**	$550	$600	$650	$700
25	-$1,927	-$677	$573	$1,823	$3,073	$4,323	$5,573	$6,823	$8,073
30	-$960	$540	$2,040	$3,540	$5,040	$6,540	$8,040	$9,540	$11,040
35	$8	$1,758	$3,508	$5,258	$7,008	$8,758	$10,508	$12,258	$14,008
40	$975	$2,975	$4,975	$6,975	**$8,975**	$10,975	$12,975	$14,975	$16,975
45	$1,943	$4,193	$6,443	$8,693	$10,943	$13,193	$15,443	$17,693	$19,943
50	$2,910	$5,410	$7,910	$10,410	$12,910	$15,410	$17,910	$20,410	$22,910
55	$3,878	$6,628	$9,378	$12,128	$14,878	$17,628	$20,378	$23,128	$25,878

Notes:

Tree density: 488 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over five years.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 43.4 hours per ha.
Using a labour cost of $35 /hr an additional $1519 /ha can be deducted from the budget for tractor use labour.

Cultural: All weed control is conducted with knockdown herbicides. Liquid fertilisers for nitrogen have been chosen for ease of use with fertigation systems. Technical grade MAP is dissolved in water and fertigated for phosphorous application.

Five trunk band sprays (TBS) are applied to control Fullers Rose Weevil. The use of high grade oil and some other insecticides are used to control secondary pests caused by the TBS.

Mechanical hedging is used annually to top mature trees. Hand pruning helps to maintain the width of the tree however one side of the tree is hedged every five years to further assist in maintaining tree width. This means that both sides of the tree is hedged every ten years. This is entered in the budget sheet as an 0.2 x entry.

Fruit fly baits are applied from November through to Autumn on a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass is used to break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers.

Cartage assumes 50 km is traveled and includes bins hire.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	128	25	**152**
P	35	0	**35**
K	55	27	**82**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on fresh market price.

Sunraysia citrus gross margin 2018

Enterprise: ORANGES - Late Navel
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

INCOME:				35.0	t/ha	@	$400.0	/t	**A:** $14,000.0
VARIABLE COST:									
Irrigation									
	Water and levies			8.0	ML/ha		$68.9	/ML	$551.3
	Fixed levies						$304.2	/ha	$304.2
	Power and service			8.0	ML/ha		$51.6	/ML	$303.2
	Maintenance (pump & system)			8.0	ML/ha		$13.0	/ML	$104.0
								Total	$1,262.7
Herbicide		**Machinery**	**Sprayed area**	**Rate per application**					
2.0 x	Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha		$4.5	/L	$6.5
5.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5	/L	$15.8
5.0 x	Carfentrazone	used with Glyphosate		5.0	ml/ha		$0.1	/ml	$2.5
0.3 x	Haloxyfop	Herbicide boom	30%	0.8	L/ha		$57.8	/L	$4.6
1.0 x	Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha		$9.9	/L	$8.9
7.0 x	Wetter (Hasten)			0.4	L/ha		$8.3	/L	$23.1
								Total	$61.2
Fertiliser									
5.0 x	UAN	Fertigation		35.0	L/ha		$0.9	/L	$148.8
2.0 x	Calcium nitrate	Fertigation		35.0	kg/ha		$0.8	/kg	$57.7
3.0 x	MAP	Fertigate with other		45.0	kg/ha		$1.7	/kg	$232.2
3.0 x	Potassium nitrate	Fertigate with other		70.0	kg/ha		$1.9	/kg	$399.8
3.0 x	Iron EDHHA	Fertigation		2.0	kg/ha		$16.4	/kg	$98.4
Foliar									
3.0 x	Potassium nitrate	-na-		35.0	kg/ha		$1.9	/kg	$199.9
3.0 x	Urea (low bi)	Spray (6km/h)		8.8	kg/ha		$0.9	/kg	$22.6
3.0 x	ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4	/kg	$42.8
3.0 x	Wetter (Agral)			0.4	L/ha		$7.7	/L	$8.0
								Total	$1,210.2
Fungicides									
2.0 x	Copper oxychloride	Spray (4km/h)		5.0	kg/ha		$8.5	/kg	$84.8
1.0 x	Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha		$4.9	/L	$43.9
								Total	$128.7
Insecticides									
1.0 x	Oil spray: high grade	Osc. boom (2km/h)		55.0	L/ha		$4.1	/L	$223.5
1.0 x	Bio Control (Aphytis)			0.5	release/h		$135.0	/release	$67.5
1.0 x	Chlorpyrifos	Spray (4km/h)		4.0	L/ha		$10.8	/L	$43.2
0.5 x	Spinetoram	Spray (4km/h)		0.7	L/ha		$482.0	/L	$168.7
0.3 x	Imidacloprid	Fertigation		4.4	L/ha		$36.2	/L	$52.5
2.0 x	Wetter (Agral)			0.4	L/ha		$7.7	/L	$6.1
10.0 x	Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7	/L	$58.3
10.0 x	Thickener F.F. lure	used with bait spray		0.1	kg/ha		$21.5	/kg	$21.5
10.0 x	Abamectin	used with bait spray		0.0	L/ha		$16.5	/L	$1.2
24.0 x	QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0	/trap	$2.0
2.0 x	Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha		$3.0	/kg	$60.8
								Total	$705.2
Crop management sprays									
1.0 x	G.A. (40% granular)	Osc. boom (4km/h)		0.3	kg/ha		$772.0	/kg	$212.3
2.0 x	Cling spray	Spray (4km/h)		0.4	L/ha		$32.8	/L	$23.0
1.0 x	Buffer (Primabuff)			2.1	L/ha		$12.5	/L	$26.3
								Total	$261.5
Canopy management (note: self skirting or mulching in tractor section below)									
1.0 x	Hand pruning			2.0	min/tree		$55.0	/h	$894.7
1.0 x	Mech. topping (contract)			1.0	h/ha		$250.0	/h	$250.0
0.2 x	Hedging (one side, contract)			1.2	h/ha		$250.0	/h	$60.0
								Total	$1,204.7
Crop management									
1.0 x	Leaf analysis			0.5	analysis		$120.0	/analysis	$60.0
1.0 x	Pest monitoring			1.0			$300.0	/ha	$300.0
1.0 x	Sod seed	Sod seeder		25.0	kg/ha		$0.4	/kg	$8.8
								Total	$368.8

Tractor and machinery

	Practice	Machinery					
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0 /h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0 /h	$40.2	
10.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5 /h	$7.7	
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3 /h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1 /h	$90.4	
2.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1 /h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5 /h	$14.5	
1.0 x	Mechanical skirting (med)	Blade skirter	1.0	h/ha	$22.8 /h	$22.8	
1.0 x	Bin & ladder placement	Bin trailer & ladders	0.2	h/t	$10.0 /h	$62.8	
						Total	$536.3

Harvest

Contract harvest	35.0	t/ha	$78.0 /t	$2,730.0	
Cartage and bin hire	35.0	t/ha	$25.0 /t	$875.0	
Levies	35.0	t/ha	$3.5 /t	$122.5	
				Total	$3,727.5

B. Total variable cost	**$9,466.8**
Gross margin per ha (A-B)	**$4,533.2**

Sunraysia citrus gross margin 2018

Enterprise: ORANGES - Late Navel
Description: Drip irrigation **Tree density:** 488 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha.

	ON FARM PRICE ($/t)								
(t)	$200	$250	$300	$350	**$400**	$450	$500	$550	$600
20	-$3,869	-$2,869	-$1,869	-$869	$131	$1,131	$2,131	$3,131	$4,131
25	-$3,402	-$2,152	-$902	$348	$1,598	$2,848	$4,098	$5,348	$6,598
30	-$2,934	-$1,434	$66	$1,566	$3,066	$4,566	$6,066	$7,566	$9,066
35	-$2,467	-$717	$1,033	$2,783	**$4,533**	$6,283	$8,033	$9,783	$11,533
40	-$1,999	$1	$2,001	$4,001	$6,001	$8,001	$10,001	$12,001	$14,001
45	-$1,532	$718	$2,968	$5,218	$7,468	$9,718	$11,968	$14,218	$16,468
50	-$1,064	$1,436	$3,936	$6,436	$8,936	$11,436	$13,936	$16,436	$18,936

Notes:

Tree density: 488 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over two years. Delayed harvest (post February) will reduce the following seasons yield.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 36.6 hours per ha.
Using a labour cost of $35 /hr an additional $1281 /ha can be deducted from the budget for tractor use labour.

Cultural: Bromacil and Simazine are applied together as a tank mix to reduce the cost of residual herbicide weed management. Liquid fertilisers have been chosen for ease of use with fertigation systems, however granual ground applied phosphate was chosen as it is commonly used.

Mechanical hedging is used annually to top mature trees. Hand pruning helps to maintain the width of the tree however one side of the tree is hedged every five years to further assist in maintaining tree width. This means that both sides of the tree is hedged every ten years. This is entered in the budget sheet as an 0.2 x entry.

Fruit fly baits are applied from November through to Autumon a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass is used to break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers.

Cartage assumes 50 km travel and bins hired.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	128	25	**152**
P	35	0	**35**
K	55	27	**82**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on a juice contract price.

Sunraysia citrus gross margin 2018

Enterprise: MANDARIN - Imperial
Description: Drip irrigation **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

INCOME:			40.0	t/ha	@	$600.0	/t	**A:**	$24,000.0
VARIABLE COST:									
Irrigation									
Water and levies			9.0	ML/ha		$68.9	/ML	$620.2	
Fixed levies						$304.2	/ha	$304.2	
Pow er and service			9.0	ML/ha		$50.1	/ML	$341.1	
Maintenance (pump & system)			9.0	ML/ha		$13.0	/ML	$117.0	
								Total	$1,382.5
		Sprayed	**Rate per**						
Herbicide	**Machinery**	**area**	**application**						
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha		$4.5	/L	$6.5	
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5	/L	$15.8	
5.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1	/ml	$2.5	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha		$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha		$9.9	/L	$8.9	
7.0 x Wetter (Hasten)			0.4	L/ha		$8.3	/L	$23.1	
								Total	$61.2
Fertiliser									
5.0 x UAN	Fertigation		40.0	L/ha		$0.9	/L	$170.0	
2.0 x Calcium nitrate	Fertigation		40.0	kg/ha		$0.8	/kg	$65.9	
3.0 x MAP	Fertigate w ith other		50.0	kg/ha		$1.7	/kg	$258.0	
3.0 x Potassium nitrate	Fertigate w ith other		45.0	kg/ha		$1.9	/kg	$257.0	
1.0 x Iron EDHHA	Fertigation		2.0	kg/ha		$16.4	/kg	$32.8	
Foliar									
2.0 x Potassium nitrate	-na-		35.0	kg/ha		$1.9	/kg	$133.3	
2.0 x Urea (low bi)	Spray (6km/h)		8.8	kg/ha		$0.9	/kg	$15.1	
2.0 x ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4	/kg	$28.6	
2.0 x Wetter (Agral)			0.4	L/ha		$7.7	/L	$5.4	
								Total	$966.0
Fungicides									
2.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha		$8.5	/kg	$84.8	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha		$4.9	/L	$43.9	
1.0 x Azoxystrobin	Spray (4km/h)		3.5	L/ha		$52.0	/L	$182.0	
								Total	$310.7
Insecticides									
1.0 x Oil spray: high grade	Osc. boom (2km/h)		55.0	L/ha		$4.1	/L	$223.5	
1.0 x Bio Control (Aphytis)			0.5	release/h		$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha		$10.8	/L	$43.2	
0.5 x Spinetoram	Spray (4km/h)		0.7	L/ha		$482.0	/L	$168.7	
0.3 x Imidacloprid	Fertigation		5.5	L/ha		$36.2	/L	$65.2	
2.0 x Wetter (Agral)			0.4	L/ha		$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5	/kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.0	L/ha		$16.5	/L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		1.0	traps/ha		$10.0	/trap	$10.0	
2.0 x Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha		$3.0	/kg	$60.8	
								Total	$725.9
Crop management sprays									
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha		$772.0	/kg	$212.3	
1.0 x Buffer (Primabuff)			2.1	L/ha		$12.5	/L	$26.3	
								Total	$238.6
Canopy management (note: self skirting or mulching in tractor section below)									
1.0 x Hand pruning			2.0	min/tree		$55.0	/h	$1,111.0	
1.0 x Mech. topping (contract)			1.0	h/ha		$250.0	/h	$250.0	
0.2 x Hedging (one side, contract)			1.2	h/ha		$250.0	/h	$60.0	
								Total	$1,421.0
Crop management									
1.0 x Leaf analysis			0.5	analysis		$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0			$300.0	/ha	$300.0	
0.5 x Hand fruit thinning			5.0	min/tree		$25.0	/h	$631.3	
1.0 x Sod seed	Sod seeder		25.0	kg/ha		$0.4	/kg	$8.8	
								Total	$1,000.0

Tractor and machinery

	Practice	Machinery					
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0 /h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0 /h	$40.2	
8.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5 /h	$6.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.1	h/ha	$3.3 /h	$5.5	
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1 /h	$90.4	
2.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1 /h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2	h/t	$11.9 /h	$83.2	
						Total	$536.9

Harvest

	Contract harvest	40.0	t/ha	$225.0 /t	$9,000.0	
	Cartage and bin hire	40.0	t/ha	$25.0 /t	$1,000.0	
	Levies	40.0	t/ha	$3.5 /t	$140.0	
					Total	$10,140.0

B. Total variable cost	**$16,782.7**
Gross margin per ha (A-B)	**$7,217.3**

Sunraysia citrus gross margin 2018

Enterprise: MANDARIN - Imperial
Description: Drip irrigation **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD	ON FARM PRICE ($/t)								
(t)	$400	$450	$500	$550	**$600**	$650	$700	$750	$800
25	-$2,980	-$1,730	-$480	$770	$2,020	$3,270	$4,520	$5,770	$7,020
30	-$2,248	-$748	$752	$2,252	$3,752	$5,252	$6,752	$8,252	$9,752
35	-$1,515	$235	$1,985	$3,735	$5,485	$7,235	$8,985	$10,735	$12,485
40	-$783	$1,217	$3,217	$5,217	**$7,217**	$9,217	$11,217	$13,217	$15,217
45	-$50	$2,200	$4,450	$6,700	$8,950	$11,200	$13,450	$15,700	$17,950
50	$682	$3,182	$5,682	$8,182	$10,682	$13,182	$15,682	$18,182	$20,682
55	$1,415	$4,165	$6,915	$9,665	$12,415	$15,165	$17,915	$20,665	$23,415

Notes:

Tree density: 606 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over five years.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 36.4 hours per ha.
Using a labour cost of $35 /hr an additional $1274 /ha can be deducted from the budget for tractor use labour.

Cultural: All weed control is conducted with knockdown herbicides. Liquid fertilisers for nitrogen have been chosen for ease of use with fertigation systems. Technical grade MAP is dissolved in water and fertigated for phosphorous application.

Mechanical hedging is used annually to top mature trees. Hand pruning helps to maintain the width of the tree however one side of the tree is hedged every five years to further assist in maintaining tree width. This means that both sides of the tree is hedged every ten years. This is entered in the budget sheet as an 0.2 x entry.

Fruit fly baits are applied from November through to Autumn on a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass is used to break down the remaining prunings.

Fruit hand thinning at mid summer (e.g. January) is conducted every second year (0.5 x entry).

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers.

Cartage assumes 50 km is traveled and includes bins hire.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	132	16	**148**
P	39	0	**39**
K	35	18	**53**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on fresh market price.

Sunraysia citrus gross margin 2018

Enterprise: MANDARIN - Afourer (isolated seedles)
Description: Drip irrigation **Tree density:** 600 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

INCOME:			50.0	t/ha	@	$800.0 /t	**A:**	$40,000.0
VARIABLE COST:								
Irrigation								
Water and levies			9.0	ML/ha		$68.9 /ML	$620.2	
Fixed levies						$304.2 /ha	$304.2	
Pow er and service			9.0	ML/ha		$50.1 /ML	$341.1	
Maintenance (pump & system)			9.0	ML/ha		$13.0 /ML	$117.0	
							Total	$1,382.5
Herbicide	**Machinery**	**Sprayed area**	**Rate per application**					
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha		$4.5 /L	$6.5	
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5 /L	$15.8	
5.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1 /ml	$2.5	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha		$57.8 /L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha		$9.9 /L	$8.9	
7.0 x Wetter (Hasten)			0.4	L/ha		$8.3 /L	$23.1	
							Total	$61.2
Fertiliser								
5.0 x UAN	Fertigation		45.0	L/ha		$0.9 /L	$191.3	
2.0 x Calcium nitrate	Fertigation		45.0	kg/ha		$0.8 /kg	$74.2	
3.0 x MAP	Fertigate w ith other		60.0	kg/ha		$1.7 /kg	$309.6	
3.0 x Potassium nitrate	Fertigate w ith other		65.0	kg/ha		$1.9 /kg	$371.3	
3.0 x Iron EDHHA	Fertigation		2.0	kg/ha		$16.4 /kg	$98.4	
Foliar								
3.0 x Potassium nitrate	-na-		35.0	kg/ha		$1.9 /kg	$199.9	
3.0 x Urea (low bi)	Spray (6km/h)		8.8	kg/ha		$0.9 /kg	$22.6	
3.0 x ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4 /kg	$42.8	
3.0 x Wetter (Agral)			0.4	L/ha		$7.7 /L	$8.0	
							Total	$1,318.1
Fungicides								
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha		$8.5 /kg	$42.4	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha		$4.9 /L	$43.9	
							Total	$86.3
Insecticides								
1.0 x Oil spray: high grade	Osc. boom (2km/h)		55.0	L/ha		$4.1 /L	$223.5	
1.0 x Bio Control (Aphytis)			0.5	release/h		$135.0 /release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha		$10.8 /L	$43.2	
0.5 x Spinetoram	Spray (4km/h)		0.7	L/ha		$482.0 /L	$168.7	
0.3 x Imidacloprid	Fertigation		5.4	L/ha		$36.2 /L	$64.5	
2.0 x Wetter (Agral)			0.4	L/ha		$7.7 /L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7 /L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5 /kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.0	L/ha		$16.5 /L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0 /trap	$2.0	
2.0 x Snail bait (15g Metaldehyc	Fertiliser spinner		10.0	kg/ha		$3.0 /kg	$60.8	
							Total	$717.2
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (4km/h)		0.1	kg/ha		$772.0 /kg	$106.2	
1.0 x Buffer (Primabuff)			2.1	L/ha		$12.5 /L	$26.3	
							Total	$132.4
Canopy management (note: self skirting or mulching in tractor section below)								
1.0 x Hand pruning			3.0	min/tree		$55.0 /h	$1,650.0	
1.0 x Mech. topping (contract)			1.0	h/ha		$250.0 /h	$250.0	
0.2 x Hedging (one side, contract)			1.2	h/ha		$250.0 /h	$60.0	
							Total	$1,960.0
Crop management								
1.0 x Leaf analysis			0.5	analysis		$120.0 /analysis	$60.0	
1.0 x Pest monitoring			3.0			$300.0 /ha	$900.0	
0.5 x Hand fruit thinning			10.0	min/tree		$25.0 /h	$1,250.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha		$0.4 /kg	$8.8	
							Total	$2,218.8

Tractor and machinery

	Practice	Machinery						
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9	/h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3	/h	$16.5	
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0	/h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2	/h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0	/h	$40.2	
10.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5	/h	$7.7	
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2	/h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3	/h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1	/h	$90.4	
2.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1	/h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5	/h	$14.5	
1.0 x	Mechanical skirting (med)	Blade skirter	1.0	h/ha	$22.8	/h	$22.8	
1.0 x	Bin & ladder placement	Bin trailer & ladders	0.2	h/t	$10.0	/h	$85.4	
							Total	$558.9

Harvest

Contract harvest	50.0	t/ha	$225.0	/t	$11,250.0	
Cartage and bin hire	50.0	t/ha	$25.0	/t	$1,250.0	
Levies	50.0	t/ha	$3.5	/t	$175.0	
					Total	$12,675.0

B. Total variable cost	**$21,110.4**
Gross margin per ha (A-B)	**$18,889.6**

Sunraysia citrus gross margin 2018

Enterprise: MANDARIN - Afourer (isolated seedles)
Description: Drip irrigation **Tree density:** 600 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD	ON FARM PRICE ($/t)								
(t)	$500	$550	$600	$650	$700	$750	**$800**	$850	$900
35	$192	$1,942	$3,692	$5,442	$7,192	$8,942	$10,692	$12,442	$14,192
40	$1,425	$3,425	$5,425	$7,425	$9,425	$11,425	$13,425	$15,425	$17,425
45	$2,657	$4,907	$7,157	$9,407	$11,657	$13,907	$16,157	$18,407	$20,657
50	$3,890	$6,390	$8,890	$11,390	$13,890	$16,390	**$18,890**	$21,390	$23,890
55	$5,122	$7,872	$10,622	$13,372	$16,122	$18,872	$21,622	$24,372	$27,122
60	$6,355	$9,355	$12,355	$15,355	$18,355	$21,355	$24,355	$27,355	$30,355
65	$7,587	$10,837	$14,087	$17,337	$20,587	$23,837	$27,087	$30,337	$33,587

Notes:

Tree density: 600 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over two years.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 36.6 hours per ha.
Using a labour cost of $35 /hr an additional $1281 /ha can be deducted from the budget for tractor use labour.

Cultural: All weed control is conducted with knockdown herbicides. Liquid fertilisers for nitrogen have been chosen for ease of use with fertigation systems. Technical grade MAP is dissolved in water and fertigated for phosphorous application.

Mechanical hedging is used annually to top mature trees. Hand pruning helps to maintain the width of the tree however one side of the tree is hedged every five years to further assist in maintaining tree width. This means that both sides of the tree is hedged every ten years. This is entered in the budget sheet as an 0.2 x entry.

Fruit fly baits are applied from November through to Autumn on a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Fruit hand thinning at mid summer (e.g. January) is conducted every second year (0.5 x entry).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass is used to break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors trailers.

Cartage assumes 50 km is traveled and includes bins hire.

Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	155	25	**180**
P	47	0	**47**
K	51	27	**78**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on fresh market price.

Sunraysia citrus gross margin 2018

Enterprise: ORANGES - Valencia
Description: Drip irrigation **Tree density:** 417 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

INCOME:			45.0	t/ha	@	$250.0	/t	**A:**	$11,250.0
VARIABLE COST:									
Irrigation									
Water and levies			8.0	ML/ha		$68.9	/ML	$551.3	
Fixed levies						$304.2	/ha	$304.2	
Pow er and service			8.0	ML/ha		$51.6	/ML	$303.2	
Maintenance (pump & system)			8.0	ML/ha		$13.0	/ML	$104.0	
								Total	$1,262.7
Herbicide	**Machinery**	**Sprayed area**	**Rate per application**						
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha		$4.5	/L	$6.5	
4.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha		$4.5	/L	$12.6	
7.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha		$0.1	/ml	$3.4	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha		$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha		$9.9	/L	$8.9	
7.0 x Wetter (Hasten)			0.4	L/ha		$8.3	/L	$23.1	
								Total	$59.1
Fertiliser									
4.0 x UAN	Fertigation		80.0	L/ha		$0.9	/L	$272.0	
1.0 x MAP	Fertigate w ith other		65.0	kg/ha		$1.7	/kg	$111.8	
1.0 x Muriate of potash	Fertigate w ith other		0.1	t/ha		$580.0	/t	$58.0	
Foliar									
1.0 x Urea (low bi)	Spray (6km/h)		8.8	kg/ha		$0.9	/kg	$7.5	
1.0 x ZM (foliar 17% Zn & Mn)	-na-		6.0	kg/ha		$2.4	/kg	$14.3	
1.0 x Wetter (Agral)			0.4	L/ha		$7.7	/L	$2.7	
								Total	$466.3
Fungicides									
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha		$8.5	/kg	$42.4	
								Total	$42.4
Insecticides									
1.0 x Oil spray: high grade	Osc. boom (2km/h)		60.0	L/ha		$4.1	/L	$243.8	
0.3 x Imidacloprid	Fertigation		3.8	L/ha		$36.2	/L	$34.0	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha		$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha		$21.5	/kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.0	L/ha		$16.5	/L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	traps/ha		$10.0	/trap	$2.0	
								Total	$360.7
Canopy management (note: self skirting or mulching in tractor section below)									
1.0 x Mech. topping (contract)			1.0	h/ha		$250.0	/h	$250.0	
0.3 x Hedging (one side, contract)			1.2	h/ha		$250.0	/h	$75.0	
0.5 x Mech. skirting (contract)			1.0	h/ha		$105.0	/h	$52.5	
								Total	$377.5
Crop management									
1.0 x Leaf analysis			0.3	analysis		$120.0	/analysis	$30.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha		$0.4	/kg	$8.8	
								Total	$38.8

Tractor and machinery

	Practice	Machinery					
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0 /h	$128.1	
4.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2 /h	$33.6	
4.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5 /h	$3.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3 /h	$1.1	
1.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1 /h	$45.2	
1.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1 /h	$30.1	
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2	h/t	$11.9 /h	$92.1	
						Total	$414.4

Harvest

Contract harvest	45.0	t/ha	$78.0 /t	$3,510.0	
Cartage and bin hire	45.0	t/ha	$25.0 /t	$1,125.0	
Levies	45.0	t/ha	$3.5 /t	$157.5	
				Total	$4,792.5

B. Total variable cost	**$7,814.3**
Gross margin per ha (A-B)	**$3,435.7**

Sunraysia citrus gross margin 2018

Enterprise: ORANGES - Valencia
Description: Drip irrigation **Tree density:** 417 trees/ha
Water price: Sunraysia **Unit size:** 1 ha

Sensitivity analysis

Table 1. Effect of yield and price on the gross margin per ha

YIELD	ON FARM PRICE ($/t)								
(t)	$125	$150	$175	$200	**$250**	$300	$325	$350	$375
30	-$2,467	-$1,717	-$967	-$217	$1,283	$2,783	$3,533	$4,283	$5,033
35	-$2,374	-$1,499	-$624	$251	$2,001	$3,751	$4,626	$5,501	$6,376
40	-$2,282	-$1,282	-$282	$718	$2,718	$4,718	$5,718	$6,718	$7,718
45	-$2,189	-$1,064	$61	$1,186	**$3,436**	$5,686	$6,811	$7,936	$9,061
50	-$2,097	-$847	$403	$1,653	$4,153	$6,653	$7,903	$9,153	$10,403
55	-$2,004	-$629	$746	$2,121	$4,871	$7,621	$8,996	$10,371	$11,746
60	-$1,912	-$412	$1,088	$2,588	$5,588	$8,588	$10,088	$11,588	$13,088

Notes:

Tree density: 417 trees /ha.

Tree age: 10 years.

Yield: Yield is averaged over five years. Delayed harvest (post February) will reduce the following seasons yield.

Machinery: Machinery costs include variable costs only for the tractor and implements.

Labour: The labour requirement for tractor use is 25.3 hours per ha.
Using a labour cost of $35 /hr an additional $886 /ha can be deducted from the budget for tractor use labour.

Cultural: All weed control is conducted with knockdown herbicides. Liquid fertilisers for nitrogen have been chosen for ease of use with fertigation systems. Technical grade MAP is dissolved in water and fertigated for phosphorous application.

Mechanical hedging is used annually to top mature trees. The sides are hedged every three years to maintain tree width and entered in the budget sheet as an 0.3 x entry.

Fruit fly baits are applied from November through to Autumn on a 7 to 10 day interval. It is assumed that one fruit fly trap is used per five ha for monitoring (0.2 traps/ha).

Mulching is generally conducted in two to three passes. The first pass is often done slowly in reverse to knock down prunings. The second or third pass is used to break down the remaining prunings.

0.5 leaf analysis is used because one analysis is used for 2 ha.

The cost of bin placement is assumed to be similar to maintaing and use of picking tractors and trailers.

Cartage assumes 50 km is traveled and includes bins hire.

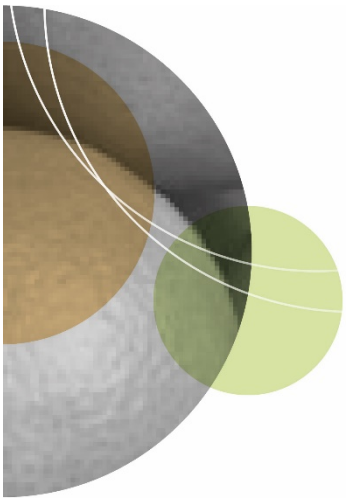
Summary of the total nitrogen (N), phosphorous (P) and potassium (K) applied is presented in the table below.

Fertiliser kg/ha

kg/ha	Ground	Foliar	Total
N	142	4	**146**
P	17	0	**17**
K	42	0	**42**

Economic: These costs are only a guide. They do not include overhead costs. Use your own figures to estimate your own production costs. All costs/prices do not include GST.

Fruit price: The fruit price selected in the gross margin is based on a juice contract price.



Development budgets

The following assumptions and comments are for all of the development budgets (i.e. Navels, mandarins, Valencia and Afourer) unless stated otherwise.

'Development' refers to investing capital in a farm to increase its profitability and value.

Development budgets are primarily used to evaluate an investment. The budgets **do not** incorporate taxation (such as GST and income tax) into the cash flows.

Development budgeting is a technique used to show future costs and returns associated with a development program. They are the basis for deciding whether or not to undertake a project, for obtaining finance and for monitoring performance. They also do not include labour provided by the grower and land purchases or capital (i.e. machinery). Including these and other costs into the budget is a type of whole farm budget.

Users are able to customise and include capital and land cost into the MS Excel downloadable version of these budgets. Taxation is not incorporated into these spreadsheets. Professional financial advice should be obtained to make the budgets more meaningful to your specific financial circumstances (i.e. taxation, whole farm cash flow).

Cash flows used in development budgeting demonstrate the difference between total income and total costs. The surplus or debt in the tables represents a cumulative total of the difference between income and costs in a year and the surplus or debt of the previous year. The development budgets use gross margins to develop budget projections.

The following budgets are only a guide and aim to represent a conservative average situation. This conservative average situation is a good indication of prospective costs and return, but is not suitable to represent a specific proposed development that you might be considering. Variables, such as yield and prices, can have a dramatic effect on the budget and sensitivity graphs in the spreadsheets. The best and worst case scenarios for the sensitivity graphs are developed from industry feedback based on current and projected possibilities. Recognising that future projections can change at any time, it is the user's responsibility to reassess assumptions and the scope of sensitivity analyses.

To achieve a more accurate assessment of your own situation it is recommended that you develop a budget for your own situation. A copy of the development budgets in MS Excel format is available from NSW Department of Primary Industries citrus website (http://www.dpi.nsw.gov.au/content/agriculture/horticulture/citrus) in the Business Management section. By using the spreadsheets you will be able to develop a more personalised budget guide and experiment with different scenarios to obtain a better understanding of the enterprise you are investigating. The Excel spreadsheets are a guide only as they do not include a detailed analysis of overhead costs, fixed costs, labour commitments and taxation considerations. These spreadsheets also have design constraints. Spreadsheet users should contact agricultural advisors and accountants for specific information on cultural practices and financial information.

The development budgets provided include:

- Washington navels
- Washington navels Korea China Thailand (KCT) export program
- Imperial mandarins
- Afourer mandarins (various production systems)
- Valencia oranges
- Reworking Navels

Budget sheet assumptions

Labour provided by the grower is not budgeted in the analysis. Examples of labour provided by the grower can include conducting irrigations, spraying, cultivations, checking fruit fly traps, mulching small sized pruning (otherwise indicated by contract mulching), organising pickers, miscellaneous repairs (i.e. machinery, fences, irrigation lines and heads) and bookkeeping. However, where an operation would warrant contract labour (i.e. pruning, mulching, pest monitoring, hedging, thinning, reworking), this has been included in the budgets.

Each budget is presented in the form of tables and sensitivity graphs. There are two sets of tables. The first set is a 21-year financial summary for each enterprise. The second set of tables shows the individual year variable cost budgets that formulate the 21-year summary tables. Variable cost budgets have not been developed for every year, instead they have been grouped into relevant major stages. The individual variable cost budgets presented are; year 1 (land preparation and planting at year 1 or 2), 2–4 (early growth), 5–7 (early bearing), 8–10 (pre maturity) and 11–21 (maturity). The costs have been grouped into years because the variable costs within these years do not change dramatically and it makes the budgets easier to use. Note that yield and water use are not included in the individual year variable cost budgets, but are included in the 21-year summary budgets. Yield and water use can change quickly in the early years and therefore must be budgeted for each year. Years 11–14 and 16–19 are not presented in the summary budget table, however, they are presented in the downloadable Excel spreadsheets.

Most of the numbers presented in the budgets have been rounded (up or down) to one decimal place (i.e. 0.1) for display purposes. Although presented in one decimal place, it could actually be an extended decimal place (i.e. 0.1544).

Sensitivity graphs highlight cost sensitivity, income and loan repayment variables on returns. The graphs clearly demonstrate that slight changes in price, yield or finance can have a dramatic effect on an enterprise's profitability. Since a slight change in variable inputs can significantly affect returns, you cannot assume that the budgets presented in this booklet are suitable for your circumstances. The budgets presented in this booklet are only a guide. To enable you to develop your own budgets a copy of the budget spreadsheets in an Excel format (http://www.dpi.nsw.gov.au/content/agriculture/horticulture/citrus) are available from the NSW DPI website.

The yield, prices and variable inputs used in the budgets are derived from a combination of current and best practice. The prices and yields are considered conservative at the time of publication.

Conduct your own investigations on yields, prices and variables in your district and your individual management practices to obtain a more realistic budget projection.

Growers should contact agricultural consultants and accountants for specific information on cultural practices, how these investments will affect their individual financial position, and the implications such investments have for taxation purposes.

Number of applications

The first column of the yearly group variable cost budget sheets is the number of applications. This nominates how many times a practice has been conducted within the year. For example, a '1×' application for 'GA spray' means that GA was sprayed once within the year. Increasing the number of applications to '2×' doubles the cost. This applies for all practices in the budgets.

If the number of applications is a decimal number, such as 0.3, this means that the practice is implemented once every three years (i.e. 0.3 × hedging = hedged once every three years). An application number of '0.5' means once every two years.

Although a decimal number indicates that a practice is conducted on alternate or three or more years, the cost is spread equally throughout the years. For example, if the total cost of a hedging exercise is $150, and it is conducted once every three years (0.3×), the budget assumes that the cost, ($150 ÷ 3) $50, will be incurred every year.

Land preparation and planting

Year 1 is designated as land preparation. In year 1, old trees are removed, pushed into a mound and burned. A cutter bar pulls up loose roots and remaining stumps and then labour is used to remove the debris. A contractor will cross-rip the land, and then labour is used to remove the remaining debris. A contractor will level the land, which is then cultivated for planting in the next year. Mechanical planting is assumed using a mechanical hole-digging machine. Planting with manual labour only would at least double the cost of mechanical-aid planting.

It is assumed that as the block is redeveloped, the existing irrigation system within the block is no longer viable for the redeveloped block. A new irrigation system is purchased but only includes the pipes and sprinklers on the block. It does not include the pump, pump shed and piping to the block. The budget assumes the irrigation is installed at the end of year 1.

Windbreaks are assumed to be installed only in a north–south direction every 200 m at a plant spacing of 1.2 m (100 m length of windbreak for every 2 ha). It is not installed in the Valencia enterprise.

The windbreak tree is a grafted, non-suckering poplar costing $13/tree delivered. Planting is estimated at $1.00 per tree. A total cost of $600 ha is allocated to establish the windbreak. A drip, or micro sprinkler irrigation system, is installed in the windbreak. This cost is included in the irrigation installation within the citrus block. The wind break is ripped from year seven by the farm operator along both sides to reduce root intrusion into the citrus. The cost/benefit of windbreaks will be discussed in a separate, future, NSW DPI Primefact.

Irrigation

Irrigation prices are based on Riverina and Sunraysia water prices (Appendix 1). A $13/ML irrigation maintenance and pump maintenance charge is included. The drip irrigation system used for the Riverina budgets assumes that water is available upon demand and no on-farm storage is required. Checking emitters in the tractor costs section is for the farm operator to check sprinklers or drip irrigation lines for blockages or breakages for each irrigation using a quad bike. Remember that the cost of an irrigation pump and pump shed is not included.

Fertiliser application

Nitrogen fertiliser is assumed to be applied in split doses (3–5) throughout the year. Other fertilisers could be single application. Foliar fertilisers are applied more frequently on young trees.

Spraying

An oscillating boom or airblast sprayer is used for foliar spraying. The spraying speed is related to the volume of application and affects the time and cost to conduct spraying. The spraying speed is categorised as 2, 4, or 6 km/h. For younger trees, use a lower water volume rate for spraying.

Fruit fly bait and monitoring

Baiting for fruit fly is conducted numerous times throughout the season using a quad bike. Two fruit fly monitoring traps per hectare are monitored regularly throughout the year.

Tractor implements

The type of implement and associated costs used in the budget for the tractor usage are as follows:

- Sod mowing = tractor-mounted slasher
- Check emitters = quad bike

- Herbicide rows = herbicide spraying with tractor-mounted tank and boom
- Spot spray 4WB = herbicide spot spraying with a quad and mounted tank and gun
- Ground fertilise = ground application of fertiliser with a tractor-mounted fertiliser spreader
- Oscillating boom = oscillating boom spraying
- Airblast tower sprayer = airblast tower spraying
- Mulching = hammer type mulcher.

'Bin placement' is placing empty bins into the orchard before harvest and the removing the full bins as necessary.

In the budgets, it is assumed that the farm operator conducts most tractor work.

Harvesting and levies

Contract harvesting is assumed to include the base $/bin rate plus cartage. Cartage assumes a 50 km travel distance.

The levies are the Horticulture Innovation Australia research, development, biosecurity and marketing levy ($3.50/t).

Table 3. Harvest ($/t) cartage and bin hire assumptions.

Region	Harvest costs $/tonne		Cartage & bin hire $/t
	Mandarin	Orange	
Riverina	$225.00	$83.00	$30.35
Sunraysia	$225.00	$78.00	$25.00

Yield

Yield is based on data from various trials (e.g. rootstock, variety) at the NSW DPI Dareton Research Station and industry data. Yields are conservative estimates and a well-managed orchard could achieve 10–20% above these budget sheet yield estimates. Yield is assumed to be from the area planted to citrus and does not incorporate the windbreak land.

Overhead and fixed costs

Overhead and fixed costs include such costs as shire rates, telephone, insurance, vehicle registration, accountancy and bank charges. For the budgets, these costs are an estimate based on industry consultation at $1,260 per ha per year. It does not include capital costs such as purchasing land, farm machinery, sheds, tools or any other kind of capital costs.

Finance

The budgets are presented with and without finance. Financing assumes that all of the money that is used in the budget is borrowed and interest is charged. **All** net returns is put back into repaying the loan (i.e. all of the money used to repay the loan is not taxed). The cumulative cash flow (after finance) includes the interested charges on borrowings.

The tables and graphs also present scenarios without finance.

Harvest occurs at the end of each financial year and therefore income is assumed to be generated at the end of each financial year. Some cultural practices occur evenly throughout the year, whilst other cultural practices might occur at the beginning or towards the end of the year. Practices that would occur at the beginning of the year would have a higher interest cost than those practices occurring at the end of the year. For example, a pruning exercise conducted at the beginning of the financial year would incur 12 months of interest, while a fungicide spray applied only four months before the end of the financial year would incur only four months of interest.

To accommodate these timing differences in relation to the amount of interest they would incur, the budget has assumed that particular groups of cultural practices would incur interest at different amounts. The cultural practices that are assumed to occur evenly throughout the year are: irrigation, herbicide, fertilisers, insecticides, crop management and tractor use.

Cultural practices that occur at different times include: pruning in the first month of the year; crop management sprays in the fourth month of the year; fungicide spraying in the eighth month of the year; and harvesting in the twelfth month of the year.

The budgets assume a 0% inflation rate for easier interpretation and to standardise net present value calculations.

Net present value

Also important to cash flow analysis are net present values (NPVs). These values are displayed in the sensitivity graphs and in the summary table. NPVs are the sum of the discounted values of future income and costs associated with a farm project or plan. The NPV is derived from discounting the cash surplus/deficit each year, then adding all of the NPVs for each year together. Projects with a positive NPV provide positive returns. Those with the highest NPV repay the highest return on investment.

NSW Treasury guidelines for economic appraisal recommends a rate of 7% per year in undertaking economic evaluation of proposals. This is a real rate. It presumes that all future costs and benefits will be measured in relation to the current purchasing power of money (i.e. that the effect of inflation on future costs and benefits will be ignored). NPV is calculated on non-financed (no fin.) budgets. Please note that inflation should be at 0% when conducting an NPV analysis.

Net present value is a very important tool when trying to compare different enterprises that produce income and costs in different time frames. For example, if you were offered $1000 now or $2000 in 10 years' time with an assumption that you could invest your $1000 at 7% interest over 10 years and with no inflation, which would you choose?

One method is to increase the value of the $1000 by 7% over the next 10 years as if it were invested in a bank account that provided 7% interest, which would amount to $1967. It follows that $2000 in 10 years is worth more than $1000 now, so on a pure economic basis, you would decide to take the $2000 in 10 years' time.

NPV is a similar calculation, except it works in reverse. Instead of increasing the value of the $1000, it reduces the value of the $2000 at a 7% rate. If the $2000 payment in 10 years' time was discounted at 7% over 10 years it would be worth $1087 today, but still worth more than the $1000 offered now.

Although two enterprises could provide the same amount of cumulated cash over 21 years, the NPV value can provide a better indication of the actual value of the enterprise in 'today' terms. An enterprise that produces a balanced income spread evenly over the years will have a higher NPV than an enterprise that provides the same amount of income, but in the later years.

Summary graph

Figure 2 below is a summary of the development budgets. These are single snapshots of each enterprise for a single set of assumptions.

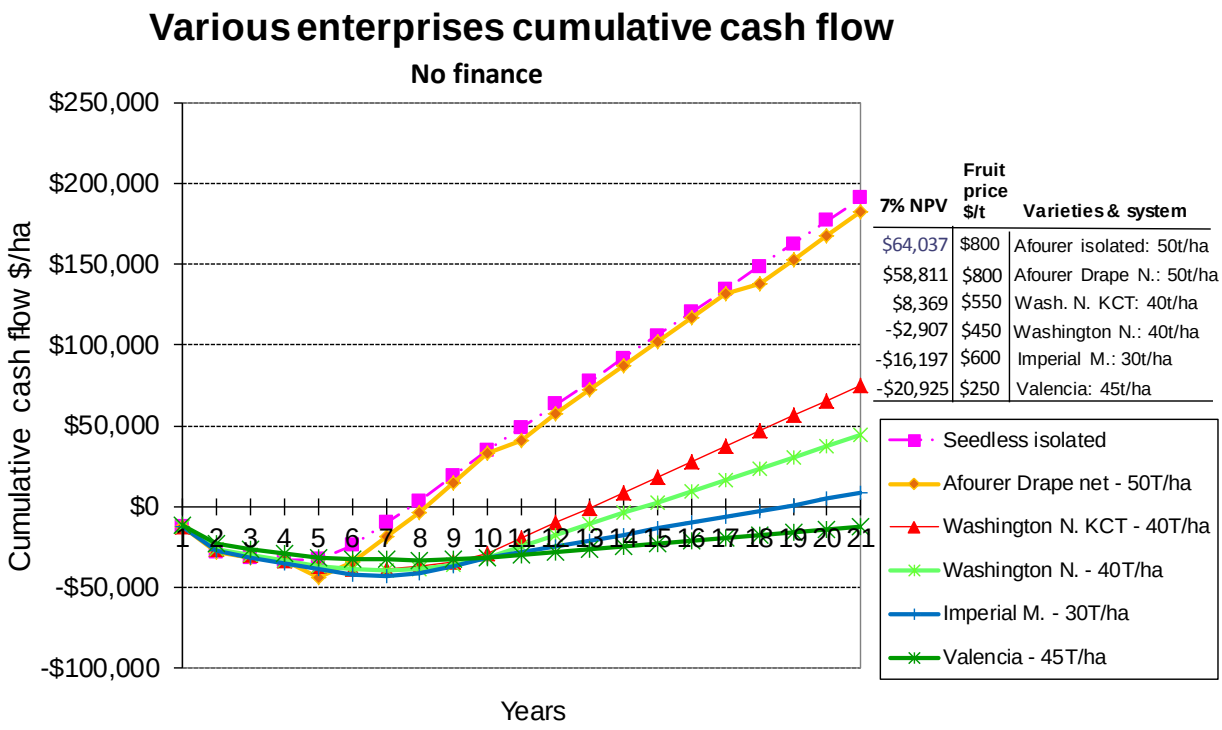


Figure 2. The cumulative cashflow and net present value of various citrus enterprises.

Development budget:

Washington navel

Table 4. Washington navel summary development budget.

Enterprise (per ha): Washington navels

Date: May-18

Description: Sod culture, undertree sprinkler — WB Ver. (May-2018)

Water price: Sunraysia — Harvest (Mandarin,Orange or Machine) = Orange

Tree density: 519 trees/ha — Loan interest Rate = 8%

Unit size: 1 Hectare — 7% NPV (no fin.) = -$2,907 — Inflation = 0%

Print Date: 3/07/18

Year	1	2	3	4	5	6	7	9	11	16	21
Water use											
Water use ML/ha	0	3	5	6	6	7	7	9	10	10	10
Income											
Yield t/ha	0	0	0	2.0	4.0	8.0	12.0	25.0	40.0	40.0	40.0
Fruit prices $/t	$450	$450	$450	$450	$450	$450	$450	$450	$450	$450	$450
Total enterprise income	$0	$0	$0	$900	$1,800	$3,600	$5,400	$11,250	$18,000	$18,000	$18,000
Costs											
Yr1 site preparation, reworking & planting	$10,393	$9,627									
Irrigation	$691	$866	$983	$1,042	$1,042	$1,143	$1,143	$1,383	$1,502	$1,502	$1,502
Herbicide	$0	$150	$150	$150	$134	$134	$134	$130	$130	$130	$130
Fertiliser	$0	$272	$272	$272	$383	$383	$383	$704	$842	$842	$842
Fungicides	$0	$0	$0	$0	$42	$42	$42	$42	$86	$86	$86
Insecticides	$0	$603	$603	$603	$447	$447	$447	$535	$604	$604	$604
Crop management sprays	$0	$0	$0	$0	$181	$181	$181	$219	$239	$239	$239
Pruning	$0	$143	$143	$143	$238	$238	$238	$643	$901	$901	$901
Crop management	$0	$9	$9	$9	$309	$309	$309	$369	$369	$369	$369
Tractor	$0	$643	$643	$659	$601	$608	$615	$767	$866	$866	$866
Harvesting and cartage	$0	$0	$0	$206	$412	$824	$1,236	$2,575	$4,120	$4,120	$4,120
Levies	$0	$0	$0	$7	$14	$28	$42	$88	$140	$140	$140
Overhead and fixed costs	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260
Machinery hours	0 h	28 h	28 h	28 h	26 h	26 h	26 h	38 h	40 h	40 h	40 h
Other costs converted per unit size & inflation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS	$12,344	$13,574	$4,063	$4,350	$5,062	$5,597	$6,030	$8,715	$11,059	$11,059	$11,059
ANNUAL CASH SURPLUS/DEFICIT	-$12,344	-$13,574	-$4,063	-$3,450	-$3,262	-$1,997	-$630	$2,535	$6,941	$6,941	$6,941
CUMULATIVE CASH FLOW (NO FINANCE)	-$12,344	-$25,918	-$29,981	-$33,431	-$36,693	-$38,690	-$39,320	-$35,839	-$24,775	$9,928	$44,631
Interest charge	-$733	-$1,813	-$2,570	-$3,126	-$3,702	-$4,288	-$4,813	-$5,721	-$6,198	-$5,835	-$5,293
CUMULATIVE CASH FLOW (After FINANCE)	-$13,078	-$28,464	-$35,097	-$41,673	-$48,638	-$54,923	-$60,366	-$67,952	-$69,082	-$64,339	-$57,272

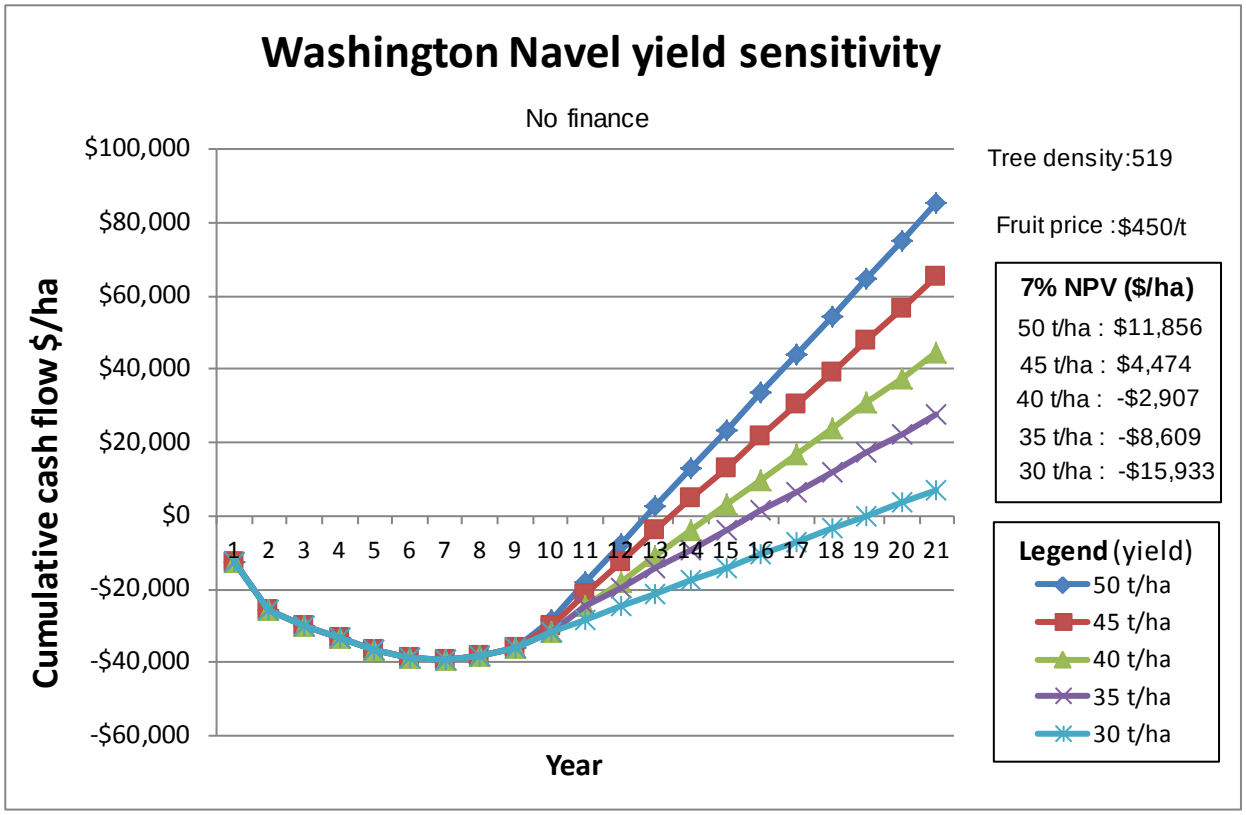


Figure 3. Washington navel yield sensitivity graph, no finance.

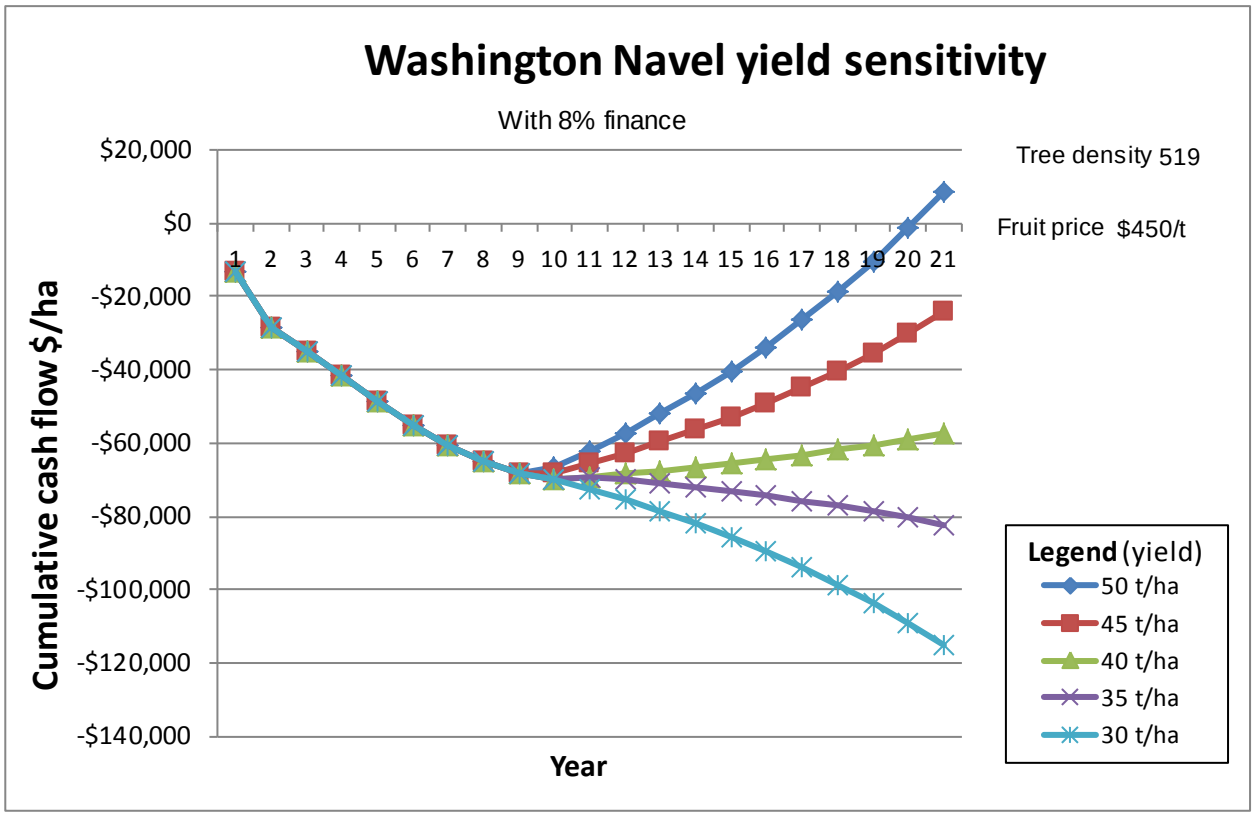


Figure 4. Washington navel yield sensitivity graph, with finance charges on borrowings.

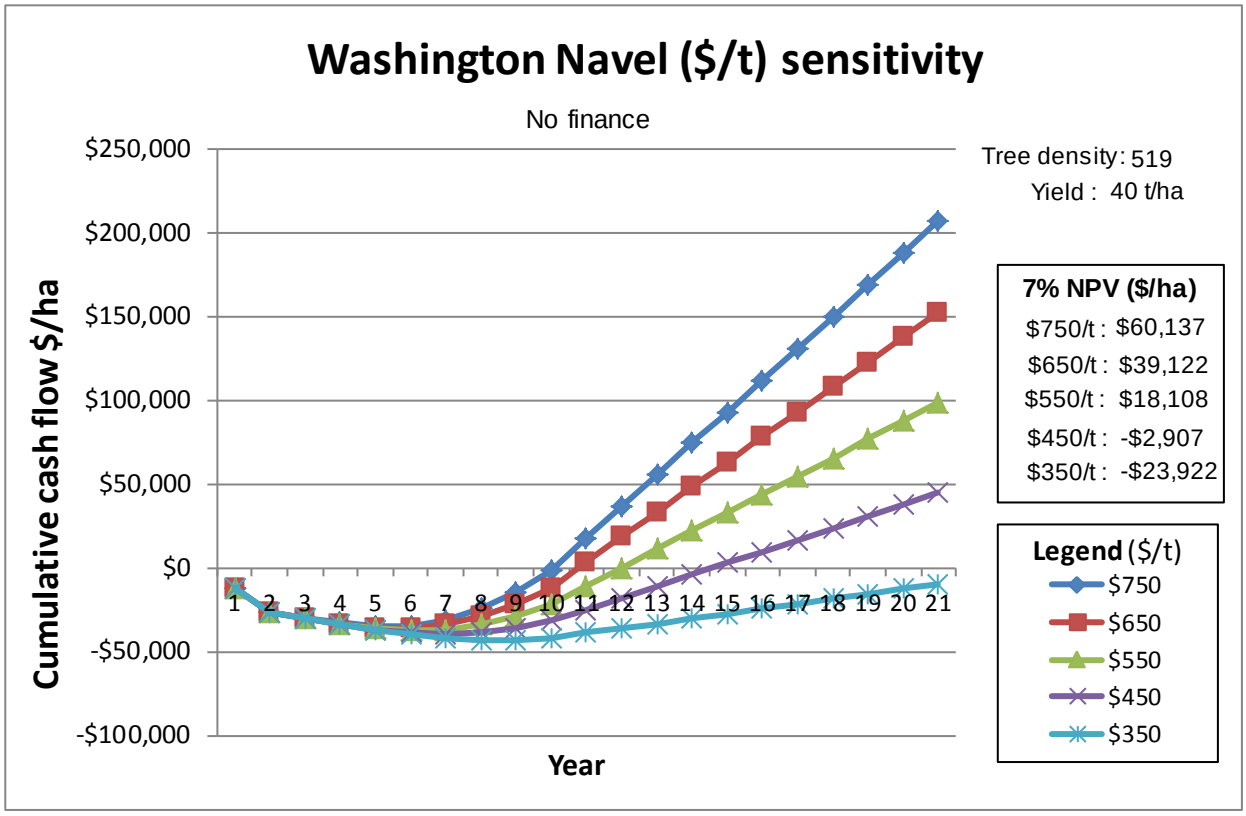


Figure 5. Washington navel price sensitivity graph, no finance.

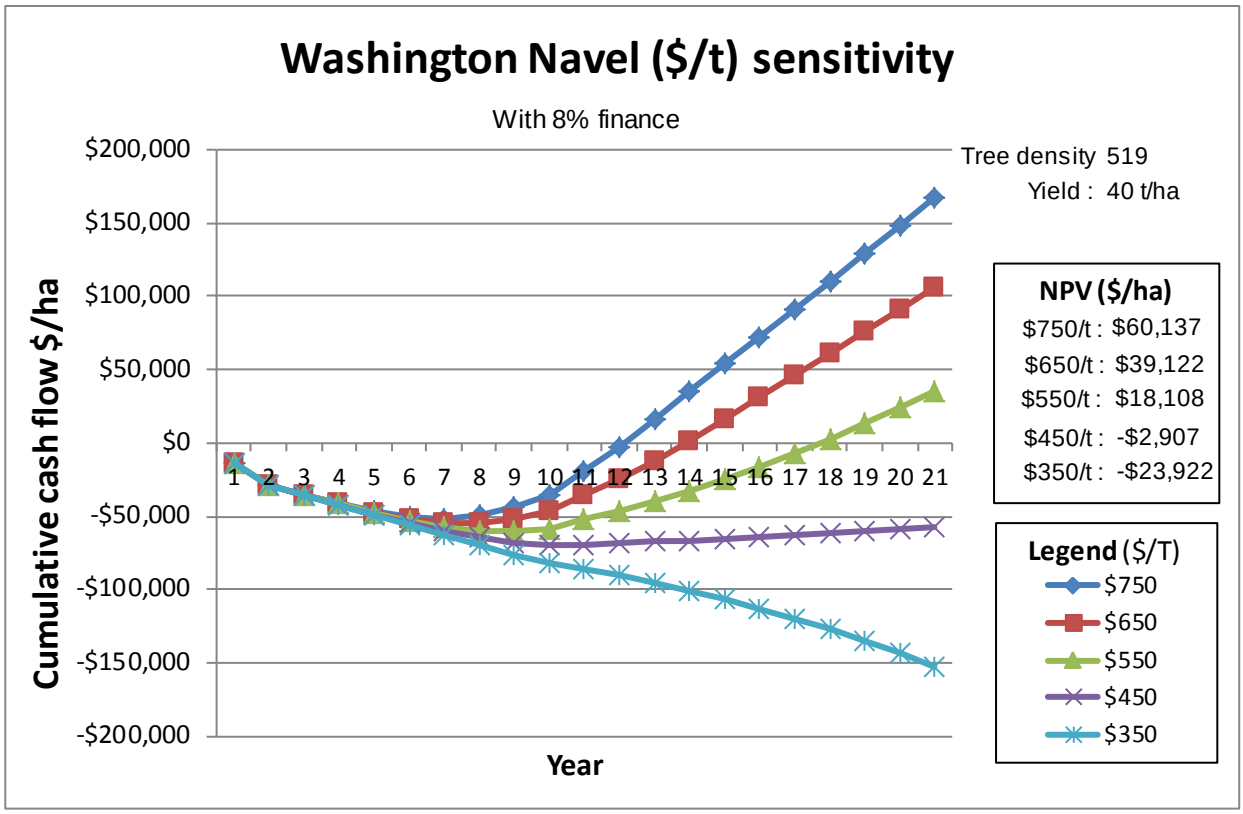


Figure 6. Washington navel price sensitivity graph, with finance charges on borrowings.

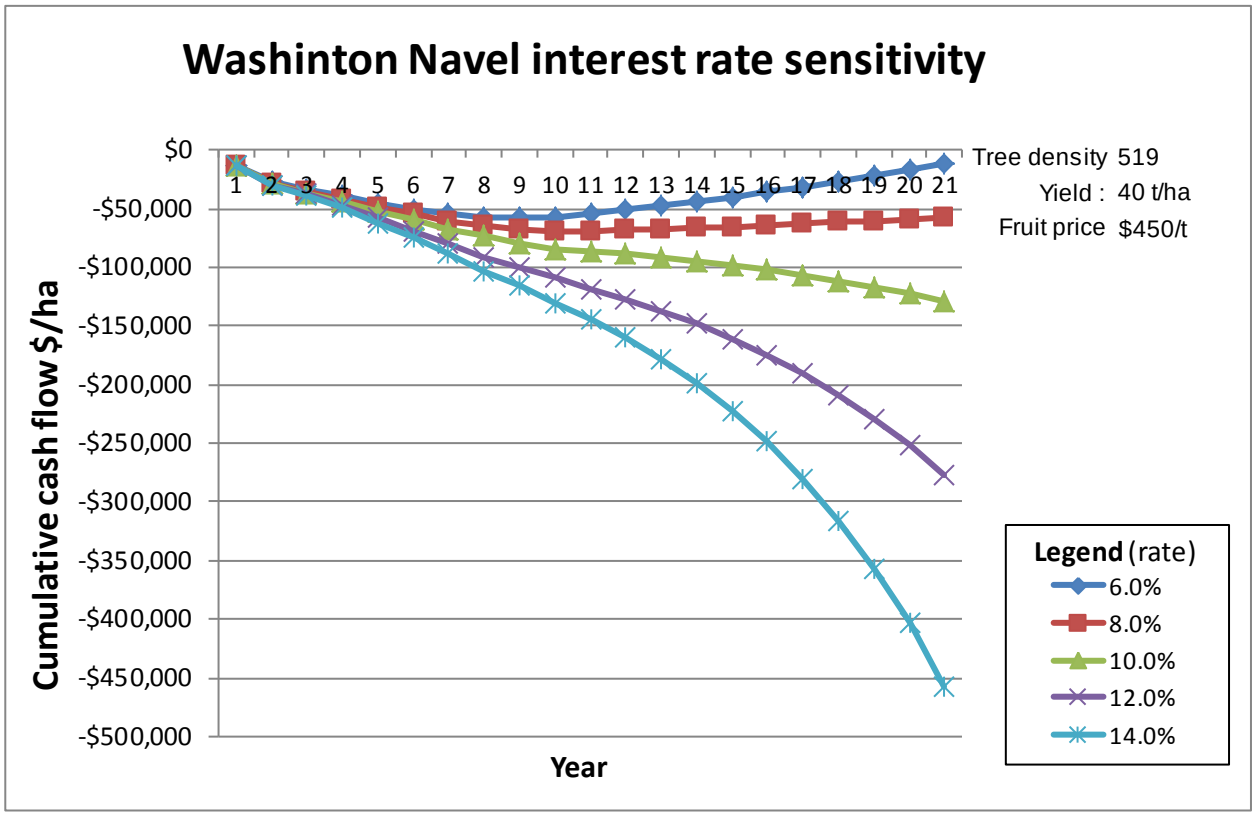


Figure 7. Washington navel interest rate sensitivity graph for finance charges on borrowings.

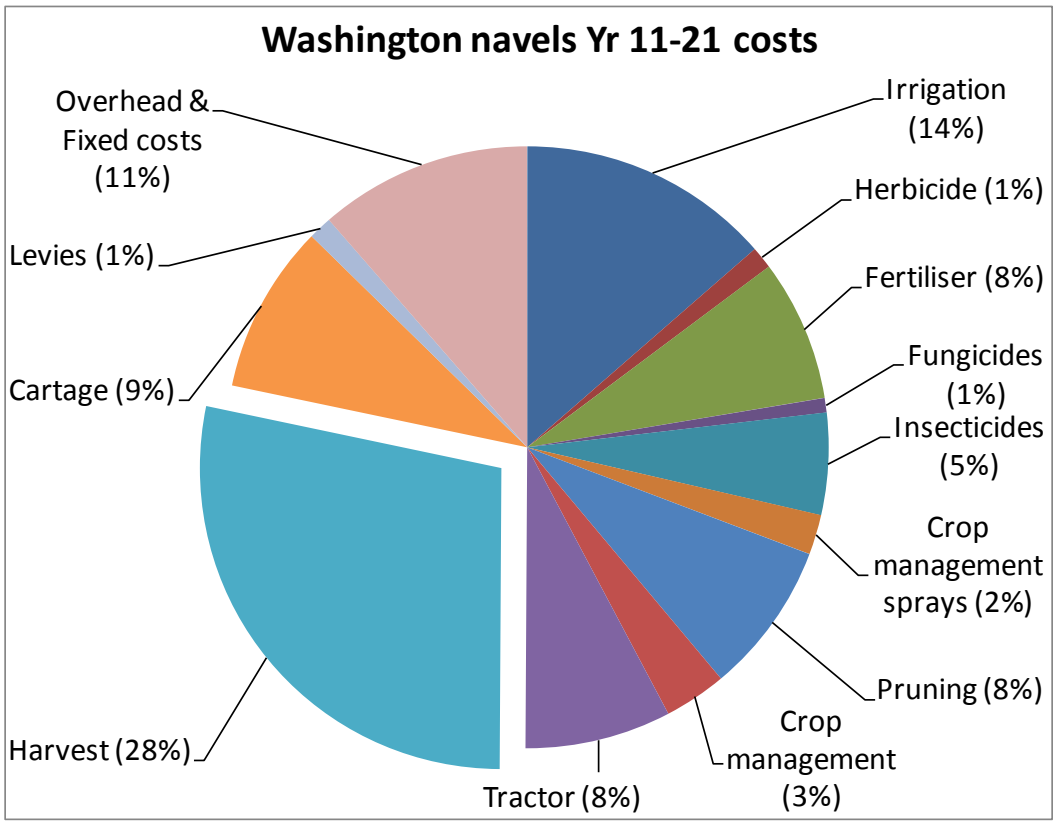


Figure 8. Washington navel cost structure.

Sunraysia citrus development budget establishment & planting Yr 1

Enterprise: Washington navels **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

COSTS - Year 0						
Redevelopment						
1.0 x	Removal of irrigation lines	8	h/ha	$25.0 /h	$200.0	
1.0 x	Install irrigation lines	16	h/ha	$25.0 /h	$400.0	
1.0 x	Removal of old trees	6	h/ha	$165.0 /h	$990.0	
1.0 x	Root/stump pulling	1.2	h/ha	$255.0 /h	$306.0	
1.0 x	Ripping	2	h/ha	$255.0 /h	$510.0	
2.0 x	Debris removal (sticks, broken roots)	3	h/ha	$35.0 /h	$210.0	
1.0 x	Levelling	1.6	h/ha	$145.0 /h	$232.0	
1.0 x	Cultivating	3	h/ha	$17.9 /hr	$53.6	
1.0 x	Discing	4	h/ha	$17.9 /hr	$71.5	
1.0 x	Surveying			$40.0 /ha	$40.0	
1.0 x	Pegging - cnt. labour			$80.0 /ha	$80.0	
1.0 x	Wind breaks			$600.0 /ha	$600.0	
1.0 x	Sod culture (seed & contract sowing)			$200.0 /ha	$200.0	
					Total	$3,893.1
Irrigation system						
1.0 x	Micro spray irrigation system (sprinkler, pipe etc)			$6,500 /ha	$6,500.0	
					Total	$6,500.0
				Total costs - Land preparation & yr1 planting		**$10,393.1**
Planting - Added to year 2						
1 x	Trees	519	tree	$17.0 /tree	$8,823.0	
1 x	Planting	519	tree	$1.0 /tree	$519.0	
1 x	Tree guards	519	each	$0.6 /each	$285.5	
				Total Costs - Planting yr2		**$9,627.5**
				Total partial variable cost y1		**$10,393.1**

Sunraysia citrus development budget year 2 to 4

Enterprise: Washington navels **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

			Sprayed area	Rate per application				
Herbicide		**Machinery**						
2.0 x	Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha	$4.5 /L	$10.8	
5.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5 /L	$15.8	
5.0 x	Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1 /ml	$2.5	
0.3 x	Haloxyfop	Herbicide boom	50%	0.8	L/ha	$57.8 /L	$7.6	
1.0 x	Paraquat/Diquat	Herbicide boom	50%	3.0	L/ha	$9.9 /L	$14.8	
8.0 x	Wetter (Hasten)			1.5	L/ha	$8.3 /L	$99.0	
							Total	$150.4
Fertiliser								
3.0 x	UAN	Fertigation		25.0	L/ha	$0.9 /L	$63.8	
1.0 x	Calcium nitrate	-na-		15.0	kg/ha	$0.8 /kg	$12.4	
1.0 x	MAP	Fertigation		25.0	kg/ha	$1.7 /kg	$43.0	
1.0 x	Potassium nitrate	-na-		20.0	kg/ha	$1.9 /kg	$38.1	
Foliar								
4.0 x	Potassium nitrate	-na-		8.0	kg/ha	$1.9 /kg	$60.9	
4.0 x	Urea (low bi)	-na-		8.8	kg/ha	$0.9 /kg	$30.1	
4.0 x	ZM (foliar 17% Zn	Spray (6km/h)		2.0	kg/ha	$2.4 /kg	$19.0	
4.0 x	Wetter (Agral)			0.2	L/ha	$7.7 /L	$4.6	
							Total	$271.9
Insecticides								
4.0 x	Oil spray: high gra	Spray (4km/h)		8.8	L/ha	$4.1 /L	$142.2	
1.0 x	Pirimicarb	Spray (4km/h)		0.2	kg/ha	$241.0 /kg	$48.2	
1.0 x	Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0 /L	$337.4	
1.0 x	Imidacloprid	Fertigation		2.1	L/ha	$36.2 /L	$75.2	
							Total	$603.0
Pruning								
1.0 x	Hand pruning			0.3	min/tree	$55.0 /h	$142.7	
							Total	$142.7
Crop management								
1.0 x	Sod seed	Sod seeder		25.0	kg/ha	$0.4 /kg	$8.8	
							Total	$8.8
Tractor and machinery								
	Practice	**Machinery**						
2.0 x	Sod mowing	Slasher		0.5	h/ha	$22.9 /h	$22.9	
25.0 x	Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom		1.2	h/ha	$32.0 /h	$128.1	
5.0 x	Fertigation	Fertigation		0.3	h/ha	$2.5 /h	$3.8	
6.0 x	Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9 /h	$295.9	
4.0 x	Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9 /h	$131.5	
1.0 x	Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1 /h	$30.1	
1.0 x	Sod sowing	Sod seeder		1.0	h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placer	Fork & ladders		1.7	h/t	$11.9 /h	$13.1	
							Total	$656.3
						Total partial variable cost		**$1,833.0**

Sunraysia citrus development budget year 5 to 7

Enterprise: Washington navels **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Sprayed area	Rate per application				
Herbicide	**Machinery**						
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5
4.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$12.6
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
8.0 x Wetter (Hasten)			1.5	L/ha	$8.3	/L	$99.0
						Total	$134.0
Fertiliser							
5.0 x UAN	Fertigation		25.0	L/ha	$0.9	/L	$106.3
1.0 x Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$16.5
1.0 x MAP	-na-		25.0	kg/ha	$1.7	/kg	$43.0
1.0 x Potassium nitrate	-na-		20.0	kg/ha	$1.9	/kg	$38.1
1.0 x Iron EDHHA	Fertigation		5.0	kg/ha	$16.4	/kg	$82.0
Foliar							
3.0 x Potassium nitrate	-na-		10.0	kg/ha	$1.9	/kg	$57.1
3.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$22.6
3.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$14.3
3.0 x Wetter (Agral)			0.2	L/ha	$7.7	/L	$3.4
						Total	$383.2
Fungicides							
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4
						Total	$42.4
Insecticides							
1.0 x Oil spray: high grade	Spray (4km/h)		8.8	L/ha	$4.1	/L	$35.6
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$43.2
0.3 x Clothianidin	Fertigation		2.6	kg/ha	$201.6	/kg	$172.6
0.3 x Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$55.8
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x Abamectin	used with bait spray		0.1	L/ha	$16.5	/L	$12.4
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
						Total	$447.3
Crop management sprays							
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.2	kg/ha	$772.0	/kg	$154.4
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3
						Total	$180.7
Pruning							
1.0 x Hand pruning			0.5	min/tree	$55.0	/h	$237.9
						Total	$237.9
Crop management							
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$308.8
Tractor and machinery							
Practice	**Machinery**						
4.0 x Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$45.8
25.0 x Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5
3.3 x Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$128.1
7.7 x Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$5.7
3.0 x Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$147.9
3.0 x Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$98.6
1.0 x Osc. boom (2km/h)	Oscillating boom sprayer		2.0	h/ha	$44.5	/h	$89.1
10.0 x Bait spray	4WB+tank sprayer		0.1	h/ha	$4.2	/h	$4.2
24.0 x QFF trap monitoring	4 wheel bike (4WB)		0.0	h/ha	$3.3	/h	$1.1
1.0 x Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$30.1
1.0 x Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5
1.0 x Bin & ladder placement	Fork & ladders		0.3	h/t	$11.9	/h	$26.1
						Total	$607.9
						Total partial variable cost	**$2,342.1**

Sunraysia citrus development budget year 8 to 10

Enterprise: Washington navels **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Sprayed area	Rate per application					
Herbicide	**Machinery**							
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5	
3.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$9.5	
4.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.0	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9	
8.0 x Wetter (Hasten)			1.5	L/ha	$8.3	/L	$99.0	
						Total		$130.3
Fertiliser								
5.0 x UAN	Fertigation		45.0	L/ha	$0.9	/L	$191.3	
1.0 x Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$16.5	
1.0 x MAP	-na-		75.0	kg/ha	$1.7	/kg	$129.0	
1.0 x Potassium nitrate	-na-		150.0	kg/ha	$1.9	/kg	$285.6	
1.0 x Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$32.8	
Foliar								
2.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1	
2.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$28.6	
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$5.4	
						Total		$704.1
Fungicides								
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4	
						Total		$42.4
Insecticides								
1.0 x Oil spray: high grade	Osc. boom (2km/h)		45.0	L/ha	$4.1	/L	$182.9	
1.0 x Bio Control (Aphytis)			0.5	release	$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		2.0	L/ha	$10.8	/L	$21.6	
0.3 x Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$55.8	
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5	
10.0 x Abamectin	used with bait spray		0.1	L/ha	$16.5	/L	$12.4	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0	
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8	
						Total		$534.8
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha	$772.0	/kg	$193.0	
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3	
						Total		$219.3
Pruning								
1.0 x Hand pruning			1.0	min/tree	$55.0	/h	$475.8	
0.3 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$62.5	
1.0 x Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$105.0	
						Total		$643.3
Crop management								
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8	
						Total		$368.8
Tractor and machinery								
Practice	**Machinery**							
4.0 x Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$45.8	
25.0 x Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5	
1.0 x Ripping	Ripper tyne		0.2	h/ha	$20.4	/h	$4.1	
3.3 x Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$128.1	
3.0 x Spot spray 4WB	4WB+tank sprayer		2.0	h/ha	$4.2	/h	$25.2	
2.0 x Ground fertilise	Fertiliser spinner		2.0	h/ha	$10.0	/h	$40.2	
7.3 x Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$5.5	
2.0 x Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$98.6	
2.0 x Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$65.8	
2.0 x Osc. boom (2km/h)	Oscillating boom sprayer		2.0	h/ha	$44.5	/h	$178.2	
10.0 x Bait spray	4WB+tank sprayer		0.1	h/ha	$4.2	/h	$4.2	
24.0 x QFF trap monitoring	4 wheel bike (4WB)		0.0	h/ha	$3.3	/h	$1.1	
1.0 x Mulching (med)	Mulcher PTO		1.5	h/ha	$30.1	/h	$45.2	
1.3 x Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$37.7	
1.0 x Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5	
1.0 x Bin & ladder placement	Fork & ladders		0.2	h/t	$11.9	/h	$56.4	
						Total		$767.0
						Total partial variable cost		**$3,409.9**

Sunraysia citrus development budget year 11 to 21

Enterprise: Washington navels **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Machinery	Sprayed area	Rate per application					
Herbicide									
2.0 x	Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5	
3.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$9.5	
4.0 x	Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.0	
0.3 x	Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6	
1.0 x	Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9	
8.0 x	Wetter (Hasten)			1.5	L/ha	$8.3	/L	$99.0	
							Total		$130.3
Fertiliser									
5.0 x	UAN	Fertigation		40.0	L/ha	$0.9	/L	$170.0	
2.0 x	Calcium nitrate	Fertigation		10.0	kg/ha	$0.8	/kg	$16.5	
3.0 x	MAP	-na-		30.0	kg/ha	$1.7	/kg	$154.8	
3.0 x	Potassium nitrate	-na-		50.0	kg/ha	$1.9	/kg	$285.6	
1.0 x	Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$32.8	
Foliar									
2.0 x	Potassium nitrate	-na-		35.0	kg/ha	$1.9	/kg	$133.3	
2.0 x	Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1	
2.0 x	ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$28.6	
2.0 x	Wetter (Agral)			0.4	L/ha	$7.7	/L	$5.4	
							Total		$841.9
Fungicides									
1.0 x	Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4	
1.0 x	Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha	$4.9	/L	$43.9	
							Total		$86.3
Insecticides									
1.0 x	Oil spray: high grade	Osc. boom (2km/h)		60.0	L/ha	$4.1	/L	$243.8	
1.0 x	Bio Control (Aphytis)			0.5	release	$135.0	/release	$67.5	
1.0 x	Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$43.2	
0.3 x	Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$42.3	
2.0 x	Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1	
10.0 x	Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3	
10.0 x	Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5	
10.0 x	Abamectin	used with bait spray		0.1	L/ha	$16.5	/L	$12.4	
24.0 x	QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0	
2.0 x	Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8	
							Total		$603.8
Crop management sprays									
1.0 x	G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha	$772.0	/kg	$212.3	
1.0 x	Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3	
							Total		$238.6
Pruning									
1.0 x	Hand pruning			1.5	min/tree	$55.0	/h	$713.6	
0.3 x	Mech. topping (contract)			1.0	h/ha	$250.0	/h	$82.5	
1.0 x	Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$105.0	
							Total		$901.1
Crop management									
1.0 x	Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0	
1.0 x	Pest monitoring			1.0		$300.0	/ha	$300.0	
1.0 x	Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8	
							Total		$368.8
Tractor and machinery									
	Practice	**Machinery**							
4.0 x	Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5	
1.0 x	Ripping	Ripper tyne		0.2	h/ha	$20.4	/h	$4.1	
3.3 x	Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$128.1	
3.0 x	Spot spray 4WB	4WB+tank sprayer		2.0	h/ha	$4.2	/h	$25.2	
2.0 x	Ground fertilise	Fertiliser spinner		2.0	h/ha	$10.0	/h	$40.2	
8.3 x	Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$6.2	
3.0 x	Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$147.9	
2.0 x	Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$65.8	
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer		2.0	h/ha	$44.5	/h	$178.2	
10.0 x	Bait spray	4WB+tank sprayer		0.1	h/ha	$4.2	/h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)		0.0	h/ha	$3.3	/h	$1.1	
1.0 x	Mulching (med)	Mulcher PTO		1.5	h/ha	$30.1	/h	$45.2	
2.0 x	Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$60.3	
1.0 x	Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders		0.2	h/t	$11.9	/h	$83.2	
							Total		$866.3
							Total partial variable cost		**$4,037.1**

Development budget:

Washington Navel (best practice: higher early yield)

Anecdotal evidence suggests that faster, young tree growth can be achieved by planting a temporary giant sorghum wind break every third row and applying extra foliar sprays.

Table 5 shows the yield of the standard and higher early yield (HEY) scenarios.

Table 5: Yield t/ha of higher early yield (HEY) Washington navel scenario and the standard.

Scenario	Yr	3	4	5	6	7	8	9	10
Standard		2.0	4.0	8.0	12.0	20.0	25.0	30.0	40.0
HEY		4.0	8.0	12.0	20.0	30.0	35.0	40.0	40.0

This budget assumes that in the first three years of tree growth (years 2-4) 6.0 x foliar sprays are applied in the best practice Navel budget instead of 4.0 x foliar sprays for the standard Navel orange budget. Giant sorghum is grown in every third row as wind break. In years 5–7, 4.0 x foliar sprays are applied to the best practice Navel budget instead of 3.0 x for the standard Navel budget. Extra costs are$120 /ha to sow and establish the giant sorghum, $123 for extra foliar sprays and for $29/ha for extra water (0.5 ML/ha). The higher early yield would invoke higher per hectare harvest costs. The giant sorghum is removed at year six at a cost of $75.0 /ha. The giant sorghum is watered from the overspray of the sprinklers. However, in drip irrigation developments a single drip line is used. When the giant sorghum is removed in year five, the drip line is carried over to the citrus row so two drip lines are being used on one row of citrus. Only the summary table and comparative graphs (Table 6, Figure 9 and Figure 10) are presented as all other assumptions are the same as for the standard Washington Navel budget.

Table 6. Washington navel best practice (high early yields) summary development budget.

Enterprise (per Ha): Washington navel best practice (higher early yields)

Date: May-18
WB Ver. (Jun-2018)

Description: Sod culture, undertree sprinkler
Water price: Sunraysia
Tree density: 519 trees/ha
Unit size: 1 Hectare
Print Date: 3/07/18

Harvest (Mandarin,Orange or Machine) = Orange
Loan interest Rate = 8%
7% NPV (no fin.) = $6,044
Inflation = 0%

Year	1	2	3	4	5	6	7	9	11	16	21
Water use											
Water use ML/ha	0	3.5	5.5	6.5	6.5	7	7.5	9	10	10	10
Income											
Yield t/ha	0	0	0	4.0	8.0	12.0	20.0	35.0	40.0	40.0	40.0
Fruit prices $/t	$450	$450	$450	$450	$450	$450	$450	$450	$450	$450	$450
Total enterprise income	$0	$0	$0	$1,800	$3,600	$5,400	$9,000	$15,750	$18,000	$18,000	$18,000
Costs											
Yr1 site preparation, reworking & planting	$10,513	$9,627									
Irrigation	$691	$895	$1,012	$1,083	$1,083	$1,143	$1,203	$1,383	$1,502	$1,502	$1,502
Herbicide	$0	$150	$150	$150	$134	$134	$134	$130	$130	$130	$130
Fertiliser	$0	$329	$329	$329	$416	$416	$416	$704	$842	$842	$842
Fungicides	$0	$0	$0	$0	$42	$42	$42	$42	$86	$86	$86
Insecticides	$0	$603	$603	$603	$447	$447	$447	$535	$604	$604	$604
Crop management sprays	$0	$0	$0	$0	$181	$181	$181	$219	$239	$239	$239
Pruning	$0	$143	$143	$143	$238	$238	$238	$643	$901	$901	$901
Crop management	$0	$9	$9	$9	$309	$309	$309	$369	$369	$369	$369
Tractor	$0	$709	$709	$728	$641	$648	$662	$785	$866	$866	$866
Harvesting and cartage	$0	$0	$0	$412	$824	$1,236	$2,060	$3,605	$4,120	$4,120	$4,120
Levies	$0	$0	$0	$14	$28	$42	$70	$123	$140	$140	$140
Overhead and fixed costs	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260
Machinery hours	0 h	29 h	29 h	29 h	27 h	27 h	27 h	38 h	40 h	40 h	40 h
Other costs converted per unit size & inflation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS	$12,464	$13,726	$4,215	$4,731	$5,602	$6,170	$7,022	$9,798	$11,059	$11,059	$11,059
ANNUAL CASH SURPLUS/DEFICIT	-$12,464	-$13,726	-$4,215	-$2,931	-$2,002	-$770	$1,978	$5,952	$6,941	$6,941	$6,941
CUMULATIVE CASH FLOW (NO FINANCE)	-$12,464	-$26,190	-$30,406	-$33,337	-$35,339	-$36,109	-$34,131	-$23,815	-$9,334	$25,369	$60,071
Interest charge	-$741	-$1,822	-$2,592	-$3,164	-$3,700	-$4,182	-$4,599	-$4,942	-$4,683	-$3,578	-$1,930
CUMULATIVE CASH FLOW (After FINANCE)	-$13,205	-$28,753	-$35,560	-$41,656	-$47,358	-$52,311	-$54,931	-$54,446	-$49,516	-$35,089	-$13,594

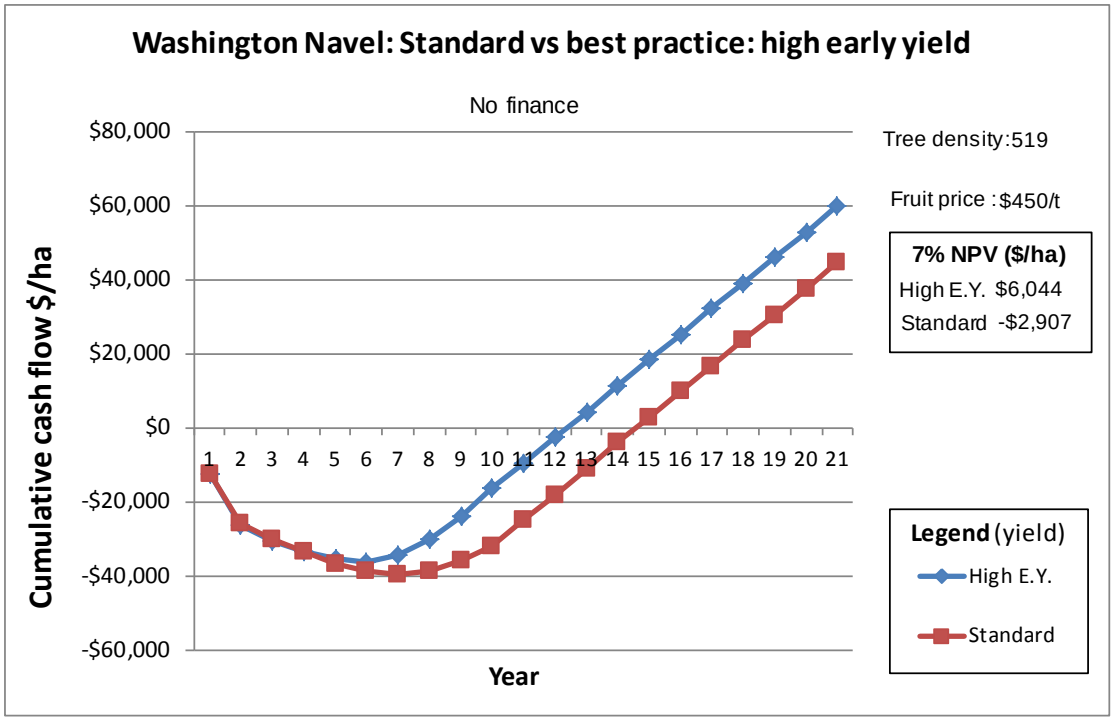


Figure 9. Washington best practice (high early yield) navel yield sensitivity graph, no finance.

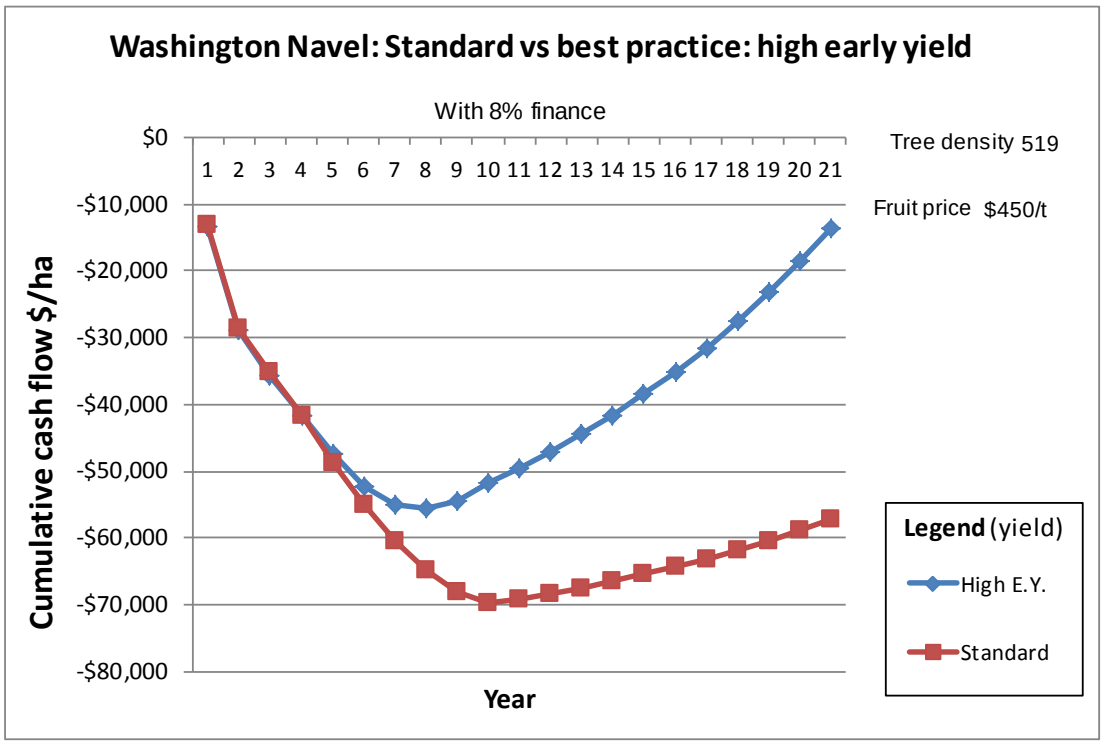


Figure 10. Washington best practice (high early yield) navel yield sensitivity graph, with finance.

Development budget:

Washington navel KCT export

Extra specialised practices need to be implemented for blocks targeting fruit for the Korea–China–Thailand (KCT) export program. These practices are mainly to control quarantine pests of concern. The Washington Navel KCT export budget differs as shown below to the previously presented Washington Navel budget in years 11–21.

- Five trunk band sprays (TBS) are applied ($431.8 ha/yr).
- Extra insecticide (discussed below) is applied to counteract the secondary pest effects of TBS (ha/yr).
- 1 x extra tree skirting is conducted ($105.0 ha/yr)
- 3 x extra glyphosate herbicide applications ($77.67ha/yr).
- 1 x extra copper fungicide application ($42.40 ha/yr).

The total cost of all extra practices is $1,022.94 ha/yr and the fruit price is $100 per tonne higher (all years) than the standard Navel budget. 1 x extra tree skirting is conducted.

It is recognised that some orchards do not need TBS because there is no Fullers rose weevil or because some blocks have a very low prevalence and might only require two or three TBS, while others have moderate pressure and require five TBS. 1 x extra tree skirting is conducted ($105.0/ha).

TBS can induce secondary pests. To control these secondary pests, extra pesticides are applied in years 10–20 in the form of:

- a high grade oil (e.g. parrafinic oil) spray that is applied once every three years to suppress mites
- imadacloprid, which is used once every three years instead of once every four years
- two sprays of spinotramamat (e.g. Movento) once every four years.

Table 7. Washington navel KCT export program summary development budget.

Enterprise (per ha): Washington Navels KCT export

Date: May-18

Description: Sod culture, undertree sprinkler — WB Ver. (Jun-2018)

Water price: Sunraysia — Harvest (Mandarin,Orange or Machine) = Orange

Tree density: 519 trees/ha — Loan interest Rate = 8%

Unit size: 1 Hectare — 7% NPV (no fin.) = $8,369 — Inflation = 0%

Print Date: 3/07/18

Year	1	2	3	4	5	6	7	9	11	16	21
Water use											
Water use ML/ha	0	3	5	6	6	7	7	9	10	10	10
Income											
Yield t/ha	0	0	0	2.0	4.0	8.0	12.0	25.0	40.0	40.0	40.0
Fruit prices $/t	$550	$550	$550	$550	$550	$550	$550	$550	$550	$550	$550
Total enterprise income	$0	$0	$0	$1,100	$2,200	$4,400	$6,600	$13,750	$22,000	$22,000	$22,000
Costs											
Yr1 site preparation, reworking & planting	$10,393	$9,627									
Irrigation	$691	$866	$983	$1,042	$1,042	$1,143	$1,143	$1,383	$1,502	$1,502	$1,502
Herbicide	$0	$150	$150	$150	$156	$156	$156	$153	$153	$153	$153
Fertiliser	$0	$272	$272	$272	$383	$383	$383	$704	$947	$947	$947
Fungicides	$0	$0	$0	$0	$42	$42	$42	$85	$129	$129	$129
Insecticides	$0	$603	$603	$603	$770	$770	$770	$2,087	$1,407	$1,407	$1,407
Crop management sprays	$0	$0	$0	$0	$181	$181	$181	$219	$239	$239	$239
Pruning	$0	$143	$143	$143	$238	$238	$238	$748	$1,174	$1,174	$1,174
Crop management	$0	$9	$9	$9	$309	$309	$309	$369	$369	$369	$369
Tractor	$0	$643	$643	$659	$699	$706	$713	$1,067	$1,075	$1,075	$1,075
Harvesting and cartage	$0	$0	$0	$206	$412	$824	$1,236	$2,575	$4,120	$4,120	$4,120
Levies	$0	$0	$0	$7	$14	$28	$42	$88	$140	$140	$140
Overhead and fixed costs	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260
Machinery hours	0 h	28 h	28 h	28 h	30 h	30 h	30 h	54 h	53 h	53 h	53 h
Other costs converted per unit size & inflation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS	$12,344	$13,574	$4,063	$4,350	$5,506	$6,040	$6,473	$10,737	$12,515	$12,515	$12,515
ANNUAL CASH SURPLUS/DEFICIT	-$12,344	-$13,574	-$4,063	-$3,250	-$3,306	-$1,640	$127	$3,013	$9,485	$9,485	$9,485
CUMULATIVE CASH FLOW (NO FINANCE)	-$12,344	-$25,918	-$29,981	-$33,231	-$36,537	-$38,177	-$38,050	-$34,113	-$19,526	$27,901	$75,328
Interest charge	-$733	-$1,813	-$2,570	-$3,126	-$3,709	-$4,299	-$4,796	-$5,729	-$6,058	-$4,379	-$1,878
CUMULATIVE CASH FLOW (After FINANCE)	-$13,078	-$28,464	-$35,097	-$41,473	-$48,488	-$54,427	-$59,096	-$66,239	-$63,674	-$41,767	-$9,129

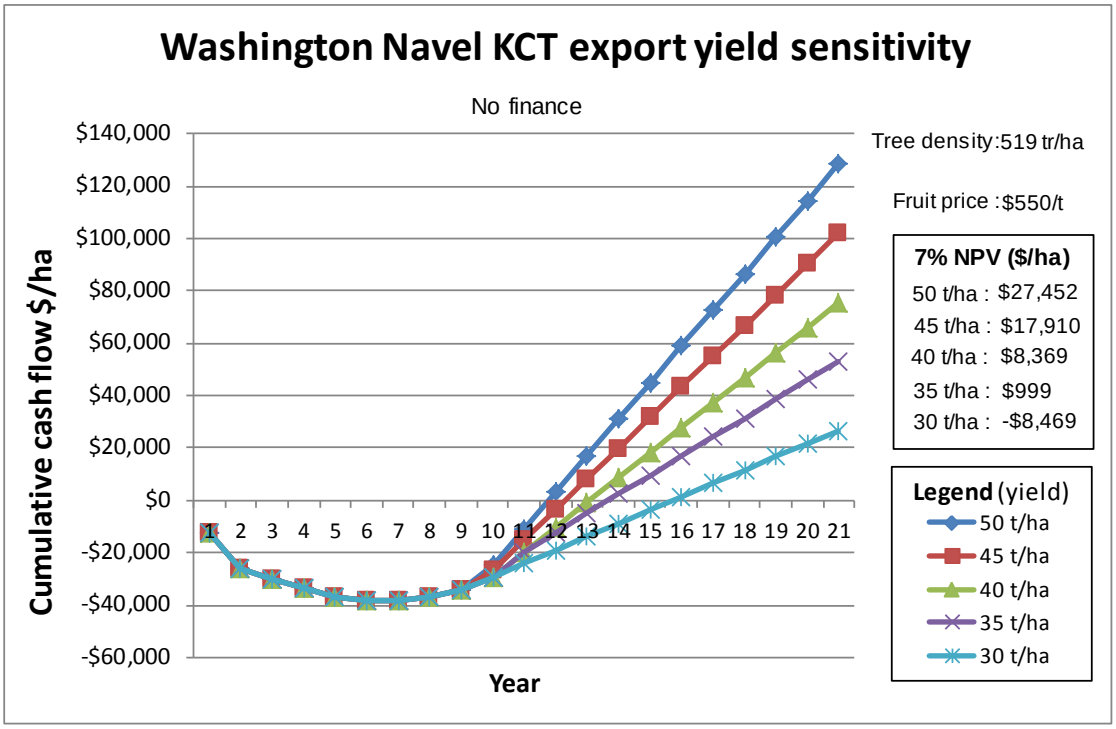


Figure 11. Washington navel KCT export yield sensitivity graph, no finance.

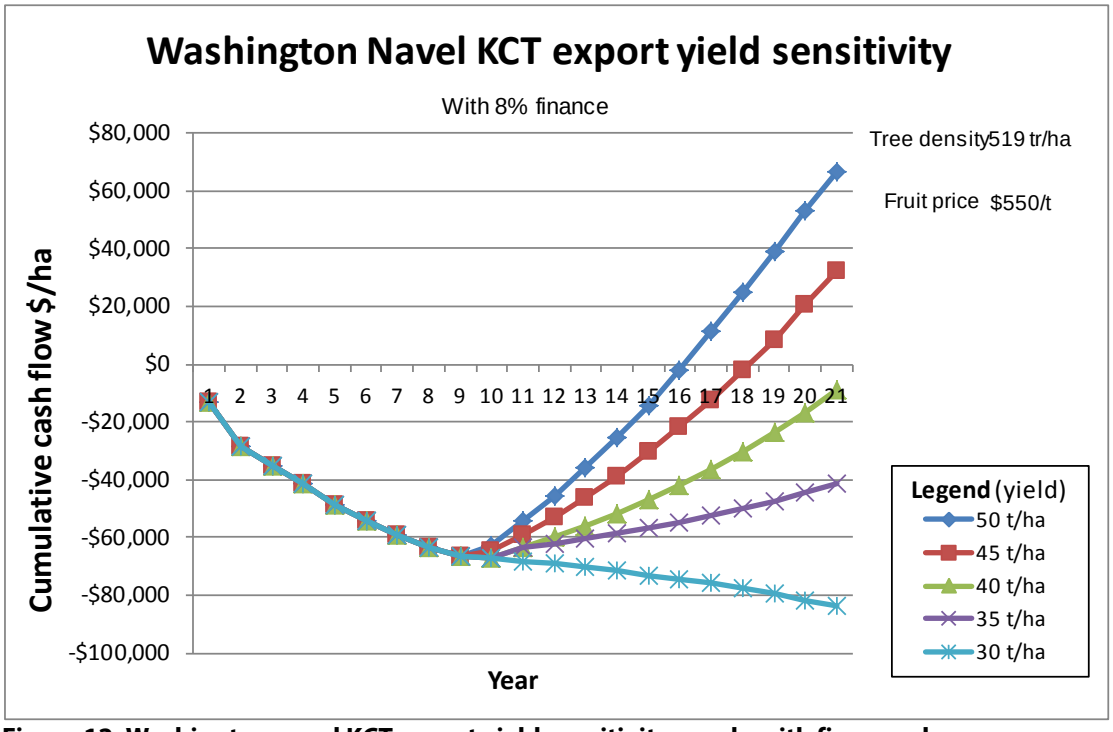


Figure 12. Washington navel KCT export yield sensitivity graph, with finance charges on borrowings.

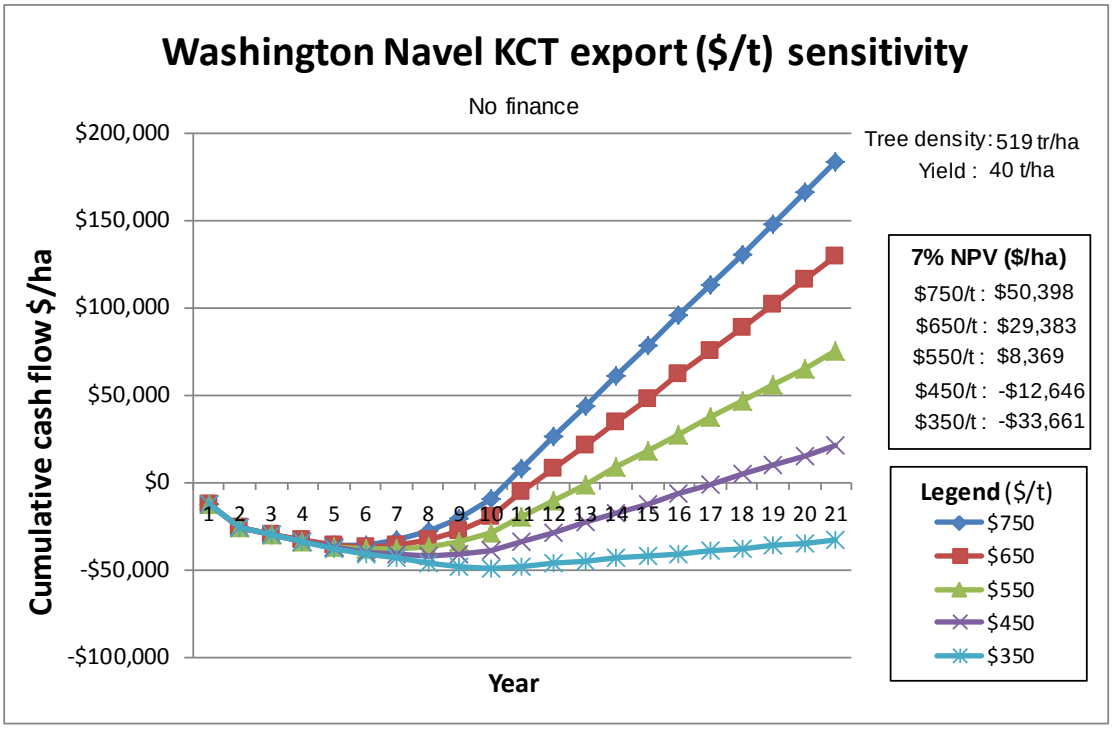


Figure 13. Washington navel KCT export price sensitivity graph, no finance.

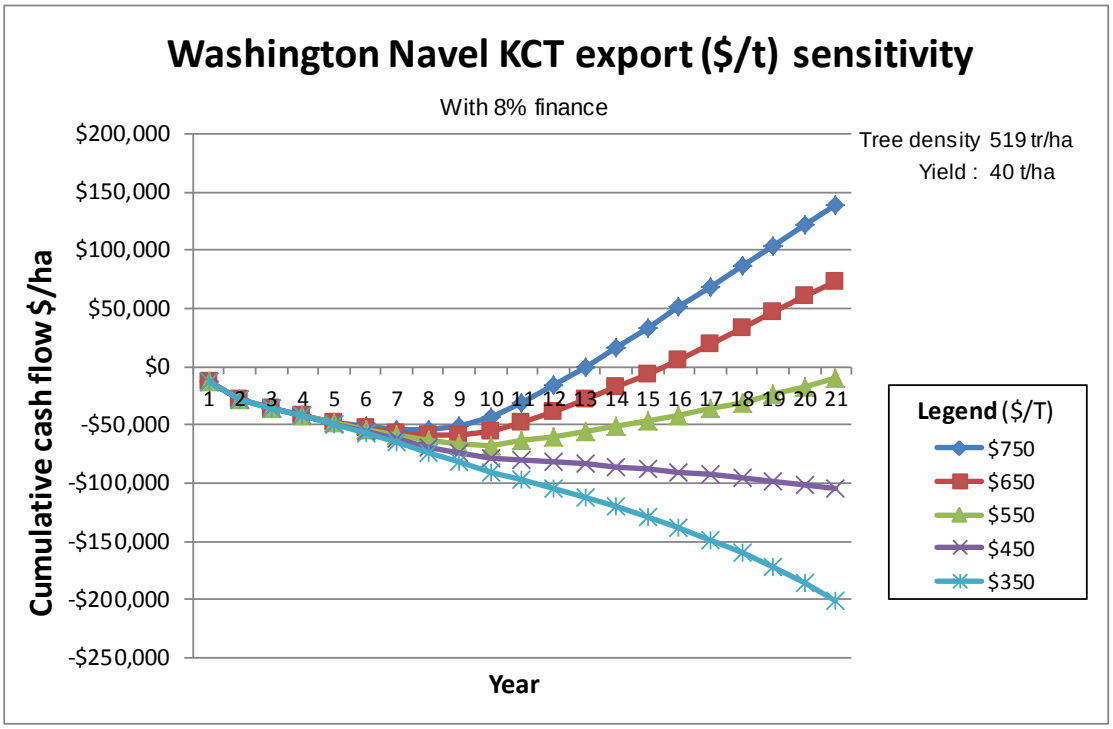


Figure 14**. Washington navel KCT export price sensitivity graph, with finance charges on borrowings.**

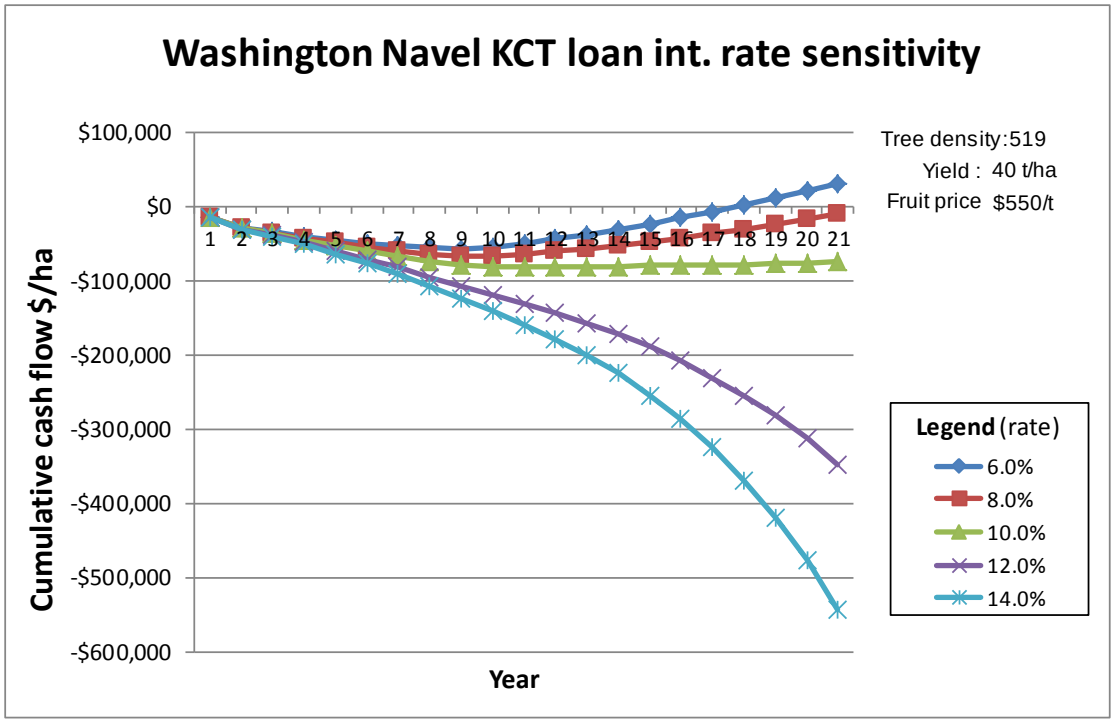


Figure 15. Washington navel KCT export interest rate sensitivity graph for finance charges on borrowings.

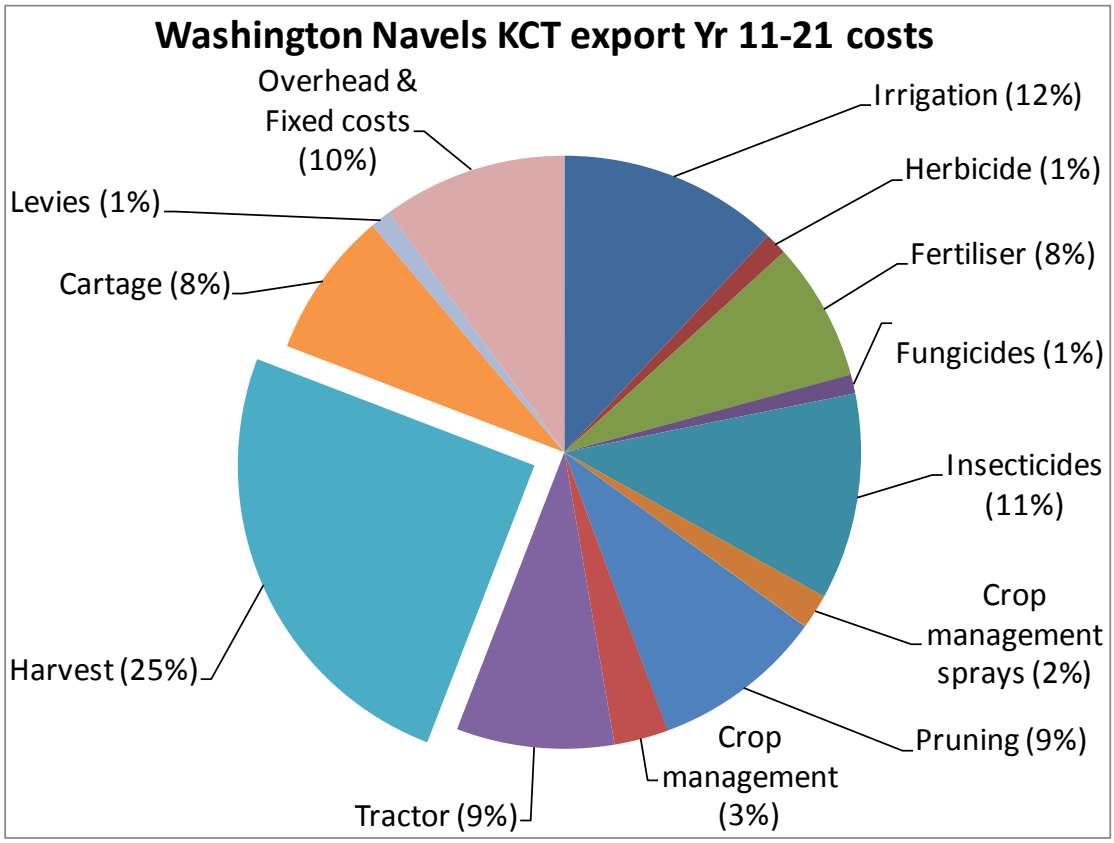


Figure 16. Washington navel KCT export cost structure pie chart.

Sunraysia citrus development budget establishment & planting Yr 1

Enterprise: Washington Navels KCT export **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

COSTS - Year 0

Redevelopment

1.0 x	Removal of irrigation lines	8	h/ha	$25.0 /h	$200.0	
1.0 x	Install irrigation lines	16	h/ha	$25.0 /h	$400.0	
1.0 x	Removal of old trees	6	h/ha	$165.0 /h	$990.0	
1.0 x	Root/stump pulling	1.2	h/ha	$255.0 /h	$306.0	
1.0 x	Ripping	2	h/ha	$255.0 /h	$510.0	
2.0 x	Debris removal (sticks, broken roots)	3	h/ha	$35.0 /h	$210.0	
1.0 x	Levelling	1.6	h/ha	$145.0 /h	$232.0	
1.0 x	Cultivating	3	h/ha	$17.9 /hr	$53.6	
1.0 x	Discing	4	h/ha	$17.9 /hr	$71.5	
1.0 x	Surveying			$40.0 /ha	$40.0	
1.0 x	Pegging - cnt. labour			$80.0 /ha	$80.0	
1.0 x	Wind breaks			$600.0 /ha	$600.0	
1.0 x	Sod culture (seed & contract sowing)			$200.0 /ha	$200.0	
					Total	$3,893.1

Irrigation system

1.0 x	Micro spray irrigation system (sprinkler, pipe etc)			$6,500 /ha	$6,500.0	
					Total	$6,500.0

Total costs - Land preparation & yr1 planting **$10,393.1**

Planting - Added to year 2

1 x	Trees	519	tree	$17.0 /tree	$8,823.0	
1 x	Planting	519	tree	$1.0 /tree	$519.0	
1 x	Tree guards	519	each	$0.6 /each	$285.5	
					Total Costs - Planting yr2	**$9,627.5**

Total partial variable cost y1 **$10,393.1**

Sunraysia citrus development budget year 2 to 4

Enterprise: Washington Navels KCT export **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Sprayed area	Rate per application				
Herbicide	**Machinery**						
2.0 x Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha	$4.5	/L	$10.8
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x Haloxyfop	Herbicide boom	50%	0.8	L/ha	$57.8	/L	$7.6
1.0 x Paraquat/Diquat	Herbicide boom	50%	3.0	L/ha	$9.9	/L	$14.8
8.0 x Wetter (Hasten)			1.5	L/ha	$8.3	/L	$99.0
						Total	$150.4
Fertiliser							
3.0 x UAN	Fertigation		25.0	L/ha	$0.9	/L	$63.8
1.0 x Calcium nitrate	-na-		15.0	kg/ha	$0.8	/kg	$12.4
1.0 x MAP	Fertigation		25.0	kg/ha	$1.7	/kg	$43.0
1.0 x Potassium nitrate	-na-		20.0	kg/ha	$1.9	/kg	$38.1
Foliar							
4.0 x Potassium nitrate	-na-		8.0	kg/ha	$1.9	/kg	$60.9
4.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$30.1
4.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$19.0
4.0 x Wetter (Agral)			0.2	L/ha	$7.7	/L	$4.6
						Total	$271.9
Insecticides							
4.0 x Oil spray: high grade	Spray (4km/h)		8.8	L/ha	$4.1	/L	$142.2
1.0 x Pirimicarb	Spray (4km/h)		0.2	kg/ha	$241.0	/kg	$48.2
1.0 x Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0	/L	$337.4
1.0 x Imidacloprid	Fertigation		2.1	L/ha	$36.2	/L	$75.2
						Total	$603.0
Pruning							
1.0 x Hand pruning			0.3	min/tree	$55.0	/h	$142.7
						Total	$142.7
Crop management							
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$8.8
Tractor and machinery							
Practice	**Machinery**						
2.0 x Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$22.9
25.0 x Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5
3.3 x Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$128.1
5.0 x Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$3.8
6.0 x Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$295.9
4.0 x Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$131.5
1.0 x Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$30.1
1.0 x Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5
1.0 x Bin & ladder placement	Fork & ladders		1.7	h/t	$11.9	/h	$13.1
						Total	$656.3
						Total partial variable cost	**$1,833.0**

Sunraysia citrus development budget year 5 to 7

Enterprise: Washington Navels KCT export **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Machinery	Sprayed area	Rate per application				
Herbicide								
3.0 x	Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$9.7
6.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$18.9
5.0 x	Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x	Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x	Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
9.0 x	Wetter (Hasten)			1.5	L/ha	$8.3	/L	$111.4
							Total	$155.9
Fertiliser								
5.0 x	UAN	Fertigation		25.0	L/ha	$0.9	/L	$106.3
1.0 x	Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$16.5
1.0 x	MAP	-na-		25.0	kg/ha	$1.7	/kg	$43.0
1.0 x	Potassium nitrate	-na-		20.0	kg/ha	$1.9	/kg	$38.1
1.0 x	Iron EDHHA	Fertigation		5.0	kg/ha	$16.4	/kg	$82.0
Foliar								
3.0 x	Potassium nitrate	-na-		10.0	kg/ha	$1.9	/kg	$57.1
3.0 x	Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$22.6
3.0 x	ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$14.3
3.0 x	Wetter (Agral)			0.2	L/ha	$7.7	/L	$3.4
							Total	$383.2
Fungicides								
1.0 x	Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4
							Total	$42.4
Insecticides								
1.0 x	Oil spray: high grade	Osc. boom (2km/h)		35.0	L/ha	$4.1	/L	$142.2
1.0 x	Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$43.2
0.3 x	Clothianidin	Fertigation		2.6	kg/ha	$201.6	/kg	$172.6
0.3 x	Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$55.8
2.0 x	Cyhalothrin	Trunk band spray (TBS)		0.6	L/ha	$112.0	/L	$132.5
2.0 x	Kaolin (Sur)	used with TBS		6.9	kg/ha	$5.4	/kg	$74.0
2.0 x	Sticker	used with TBS		0.2	L/ha	$25.0	/L	$9.9
10.0 x	Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x	Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x	Abamectin	used with bait spray		0.1	L/ha	$16.5	/L	$12.4
24.0 x	QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
							Total	$770.4
Crop management sprays								
1.0 x	G.A. (40% granular)	Osc. boom (2km/h)		0.2	kg/ha	$772.0	/kg	$154.4
1.0 x	Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3
							Total	$180.7
Pruning								
1.0 x	Hand pruning			0.5	min/tree	$55.0	/h	$237.9
							Total	$237.9
Crop management								
1.0 x	Pest monitoring			1.0		$300.0	/ha	$300.0
1.0 x	Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
							Total	$308.8
Tractor and machinery								
	Practice	**Machinery**						
4.0 x	Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$45.8
25.0 x	Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5
4.3 x	Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$166.5
7.7 x	Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$5.7
2.0 x	Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$98.6
3.0 x	Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$98.6
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer		2.0	h/ha	$44.5	/h	$178.2
2.0 x	Trunk band spray (TBS)	Trunk band sprayer		1.0	h/ha	$10.0	/h	$20.1
10.0 x	Bait spray	4WB+tank sprayer		0.1	h/ha	$4.2	/h	$4.2
24.0 x	QFF trap monitoring	4 wheel bike (4WB)		0.0	h/ha	$3.3	/h	$1.1
1.0 x	Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$30.1
1.0 x	Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5
1.0 x	Bin & ladder placement	Fork & ladders		0.3	h/t	$11.9	/h	$26.1
							Total	$706.2
							Total partial variable cost	**$2,785.4**

Sunraysia citrus development budget year 8 to 10

Enterprise: Washington Navels KCT export **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application					
Herbicide								
3.0 x	Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$9.7
5.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x	Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x	Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x	Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
9.0 x	Wetter (Hasten)			1.5	L/ha	$8.3	/L	$111.4
							Total	$152.7
Fertiliser								
5.0 x	UAN	Fertigation		45.0	L/ha	$0.9	/L	$191.3
1.0 x	Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$16.5
1.0 x	MAP	-na-		75.0	kg/ha	$1.7	/kg	$129.0
1.0 x	Potassium nitrate	-na-		150.0	kg/ha	$1.9	/kg	$285.6
1.0 x	Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$32.8
Foliar								
2.0 x	Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1
2.0 x	ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$28.6
2.0 x	Wetter (Agral)			0.4	L/ha	$7.7	/L	$5.4
							Total	$704.1
Fungicides								
2.0 x	Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$84.8
							Total	$84.8
Insecticides								
1.0 x	Oil spray: high grade	Osc. boom (2km/h)		45.0	L/ha	$4.1	/L	$182.9
0.3 x	Oil spray: high grade	Spray (4km/h)		8.8	L/ha	$4.1	/L	$11.7
1.0 x	Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5
1.0 x	Chlorpyrifos	Spray (4km/h)		2.0	L/ha	$10.8	/L	$21.6
1.0 x	Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0	/L	$337.4
0.3 x	Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$55.8
5.0 x	Cyhalothrin	Trunk band spray (TBS)		0.6	L/ha	$112.0	/L	$331.3
5.0 x	Kaolin (Sur)	used with TBS		6.9	kg/ha	$5.4	/kg	$185.0
5.0 x	Sticker	used with TBS		0.2	L/ha	$25.0	/L	$24.7
2.0 x	Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1
10.0 x	Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x	Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x	Abamectin	used with bait spray		0.1	L/ha	$16.5	/L	$12.4
24.0 x	QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
2.0 x	Isomate		500 tie/ha	7.0	hr/ha	$0.3	/tie	$662.5
2.0 x	Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8
							Total	$2,087.4
Crop management sprays								
1.0 x	G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha	$772.0	/kg	$193.0
1.0 x	Cling Spray	Spray (4km/h)		0.0	L/ha	$32.8	/L	$0.0
1.0 x	Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3
							Total	$219.3
Pruning								
1.0 x	Hand pruning			1.0	min/tree	$55.0	/h	$475.8
0.3 x	Mech. topping (contract)			1.0	h/ha	$250.0	/h	$62.5
2.0 x	Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$210.0
							Total	$748.3
Crop management								
1.0 x	Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0
1.0 x	Pest monitoring			1.0		$300.0	/ha	$300.0
1.0 x	Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
							Total	$368.8

Tractor and machinery

	Practice	Machinery				
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9 /h	$45.8
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3 /h	$16.5
1.0 x	Ripping	Ripper tyne	0.2	h/ha	$20.4 /h	$4.1
4.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0 /h	$166.5
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0	h/ha	$4.2 /h	$42.0
2.0 x	Ground fertilise	Fertiliser spinner	2.0	h/ha	$10.0 /h	$40.2
7.3 x	Fertigation	Fertigation	0.3	h/ha	$2.5 /h	$5.5
5.3 x	Spray (4km/h)	Airblast tower sprayer	1.5	h/ha	$32.9 /h	$262.8
2.0 x	Spray (6km/h)	Airblast tower sprayer	1.0	h/ha	$32.9 /h	$65.8
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0	h/ha	$44.5 /h	$178.2
5.0 x	Trunk band spray (TBS)	Trunk band sprayer	1.0	h/ha	$10.0 /h	$50.2
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2 /h	$4.2
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3 /h	$1.1
1.0 x	Mulching (med)	Mulcher PTO	1.5	h/ha	$30.1 /h	$45.2
2.3 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1 /h	$67.8
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5 /h	$14.5
1.0 x	Bin & ladder placement	Fork & ladders	0.2	h/t	$11.9 /h	$56.4
					Total	$1,066.8
					Total partial variable cost	**$5,432.1**

Sunraysia citrus development budget year 11 to 21

Enterprise: Washington Navels KCT export **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application				
Herbicide							
3.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$9.7
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
9.0 x Wetter (Hasten)			1.5	L/ha	$8.3	/L	$111.4
						Total	$152.7
Fertiliser							
5.0 x UAN	Fertigation		50.0	L/ha	$0.9	/L	$212.5
2.0 x Calcium nitrate	Fertigation		10.0	kg/ha	$0.8	/kg	$16.5
3.0 x MAP	-na-		20.0	kg/ha	$1.7	/kg	$103.2
3.0 x Potassium nitrate	-na-		70.0	kg/ha	$1.9	/kg	$399.8
1.0 x Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$32.8
Foliar							
2.0 x Potassium nitrate	-na-		35.0	kg/ha	$1.9	/kg	$133.3
2.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1
2.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$28.6
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$5.4
						Total	$947.1
Fungicides							
2.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$84.8
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha	$4.9	/L	$43.9
						Total	$128.7
Insecticides							
1.0 x Oil spray: high grade	Osc. boom (2km/h)		60.0	L/ha	$4.1	/L	$243.8
0.3 x Oil spray: high grade	Osc. boom (2km/h)		60.0	L/ha	$4.1	/L	$80.5
1.0 x Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$43.2
0.5 x Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0	/L	$168.7
0.3 x Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$55.8
5.0 x Cyhalothrin	Trunk band spray (TBS)		0.6	L/ha	$112.0	/L	$331.3
5.0 x Kaolin (Sur)	used with TBS		6.9	kg/ha	$5.4	/kg	$185.0
5.0 x Sticker	used with TBS		0.2	L/ha	$25.0	/L	$24.7
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x Abamectin	used with bait spray		0.1	L/ha	$16.5	/L	$12.4
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8
						Total	$1,407.5
Crop management sprays							
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha	$772.0	/kg	$212.3
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3
						Total	$238.6
Pruning							
1.0 x Hand pruning			1.5	min/tree	$55.0	/h	$713.6
1.0 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0
2.0 x Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$210.0
						Total	$1,173.6
Crop management							
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$368.8

Tractor and machinery

	Practice	Machinery				
4.0 x	Sod mowing	Slasher	0.5 h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2 h/ha	$3.3 /h	$16.5	
1.0 x	Ripping	Ripper tyne	0.2 h/ha	$20.4 /h	$4.1	
4.3 x	Herbicide rows	Herbicide boom	1.2 h/ha	$32.0 /h	$166.5	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0 h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0 h/ha	$10.0 /h	$40.2	
8.3 x	Fertigation	Fertigation	0.3 h/ha	$2.5 /h	$6.2	
4.5 x	Spray (4km/h)	Airblast tower sprayer	1.5 h/ha	$32.9 /h	$221.9	
2.0 x	Spray (6km/h)	Airblast tower sprayer	1.0 h/ha	$32.9 /h	$65.8	
2.3 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0 h/ha	$44.5 /h	$207.6	
5.0 x	Trunk band spray (TBS)	Trunk band sprayer	1.0 h/ha	$10.0 /h	$50.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1 h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0 h/ha	$3.3 /h	$1.1	
1.0 x	Mulching (med)	Mulcher PTO	1.5 h/ha	$30.1 /h	$45.2	
2.0 x	Mulching (fast)	Mulcher PTO	1.0 h/ha	$30.1 /h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0 h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2 h/t	$11.9 /h	$83.2	
					Total	$1,075.3
					Total partial variable cost	**$5,492.2**

Development budget:

Imperial mandarin

Table 8. Imperial mandarin summary development budget.

Enterprise (per ha): Imperial mandarin

Date: May-18

Description: Sod culture, undertree sprinkler — WB Ver. (May-2018)

Water price: Sunraysia — Harvest (Mandarin,Orange or Machine) = Mandarin

Tree density: 606 trees/ha — Loan interest Rate = 8%

Unit size: 1 Hectare — 7% NPV (no fin.) = -$16,197 — Inflation = 0%

Print Date: 13/05/18

Year	1	2	3	4	5	6	7	9	11	16	21
Water use											
Water use ML/ha	0	3	5	6	6	7	7	9	10	10	10
Income											
Yield t/ha	0	0	0	3.0	8.0	12.0	17.0	30.0	35.0	35.0	35.0
Fruit prices $/t	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600
Total enterprise income	$0	$0	$0	$1,800	$4,800	$7,200	$10,200	$18,000	$21,000	$21,000	$21,000
Costs											
Yr1 site preparation, reworking & planting	$10,393	$11,241									
Irrigation	$691	$866	$983	$1,042	$1,042	$1,143	$1,143	$1,383	$1,502	$1,502	$1,502
Herbicide	$0	$78	$78	$78	$65	$65	$65	$61	$61	$61	$61
Fertiliser	$0	$225	$225	$225	$266	$266	$266	$887	$966	$966	$966
Fungicides	$0	$0	$0	$0	$42	$42	$42	$85	$311	$311	$311
Insecticides	$0	$586	$586	$586	$358	$358	$358	$533	$764	$764	$764
Crop management sprays	$0	$0	$0	$0	$181	$181	$181	$239	$239	$239	$239
Pruning	$0	$278	$278	$278	$556	$556	$556	$1,083	$1,361	$1,361	$1,361
Crop management	$0	$9	$9	$9	$2,389	$2,389	$2,389	$369	$1,000	$1,000	$1,000
Tractor	$0	$643	$643	$660	$696	$704	$712	$911	$993	$993	$993
Harvesting and cartage	$0	$0	$0	$750	$2,000	$3,000	$4,250	$7,500	$8,750	$8,750	$8,750
Levies	$0	$0	$0	$11	$28	$42	$60	$105	$123	$123	$123
Overhead and fixed costs	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260
Machinery hours	0 h	28 h	28 h	28 h	28 h	28 h	28 h	46 h	48 h	48 h	48 h
Other costs converted per unit size & inflation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS	$12,344	$15,186	$4,061	$4,897	$8,882	$10,004	$11,280	$14,414	$17,330	$17,330	$17,330
ANNUAL CASH SURPLUS/DEFICIT	-$12,344	-$15,186	-$4,061	-$3,097	-$4,082	-$2,804	-$1,080	$3,586	$3,670	$3,670	$3,670
CUMULATIVE CASH FLOW (NO FINANCE)	-$12,344	-$27,530	-$31,591	-$34,688	-$38,770	-$41,574	-$42,654	-$37,087	-$28,227	-$9,875	$8,477
Interest charge	-$733	-$1,905	-$2,715	-$3,286	-$3,964	-$4,644	-$5,271	-$6,160	-$6,570	-$7,990	-$10,106
CUMULATIVE CASH FLOW (After FINANCE)	-$13,078	-$30,168	-$36,944	-$43,327	-$51,373	-$58,821	-$65,172	-$71,592	-$75,691	-$94,224	-$121,835

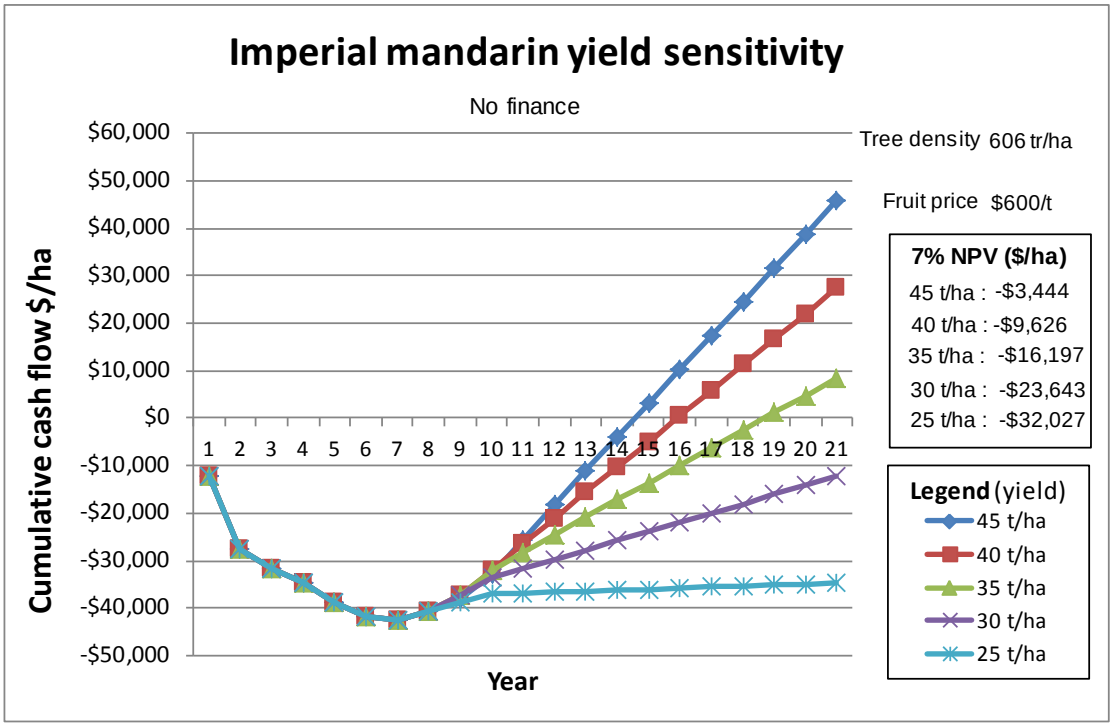


Figure 17. Imperial mandarin yield sensitivity graph, no finance.

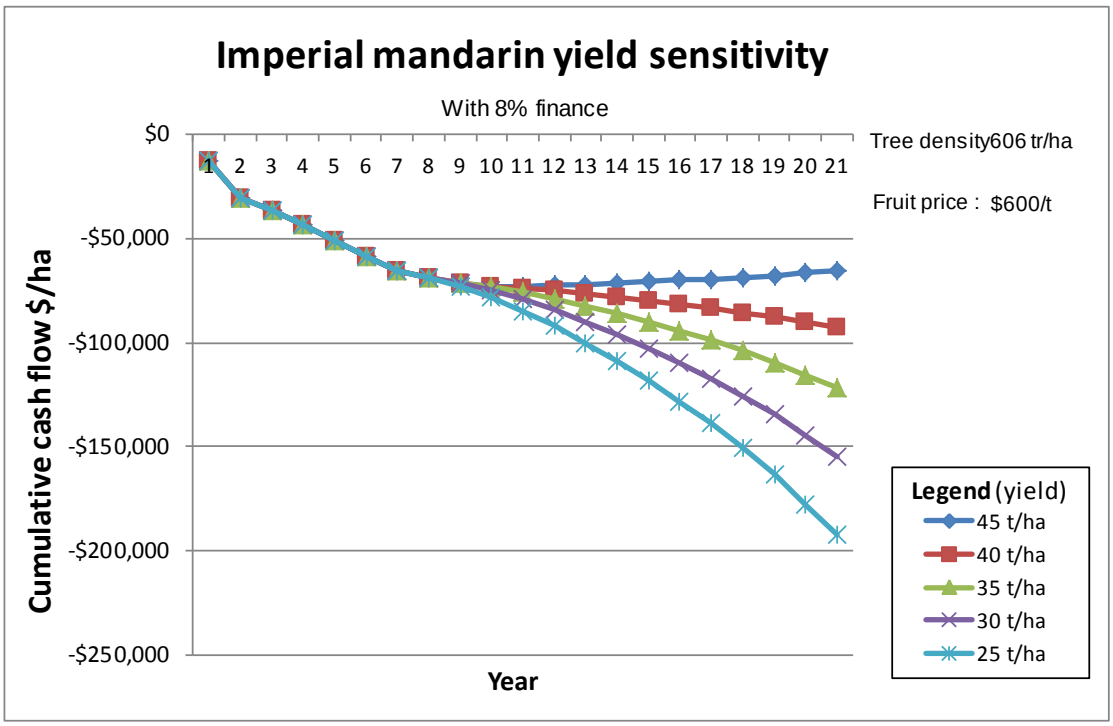


Figure 18. Imperial mandarin yield sensitivity graph, with finance charges on borrowings.

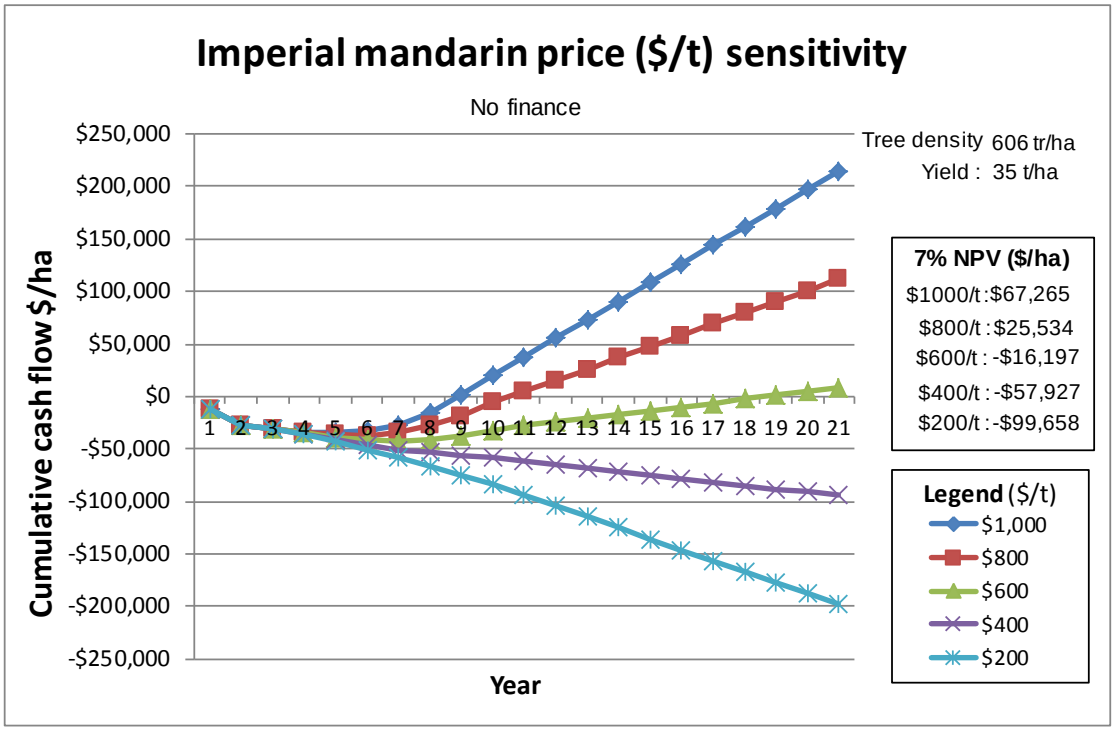


Figure 19. Imperial mandarin price sensitivity graph, no finance.

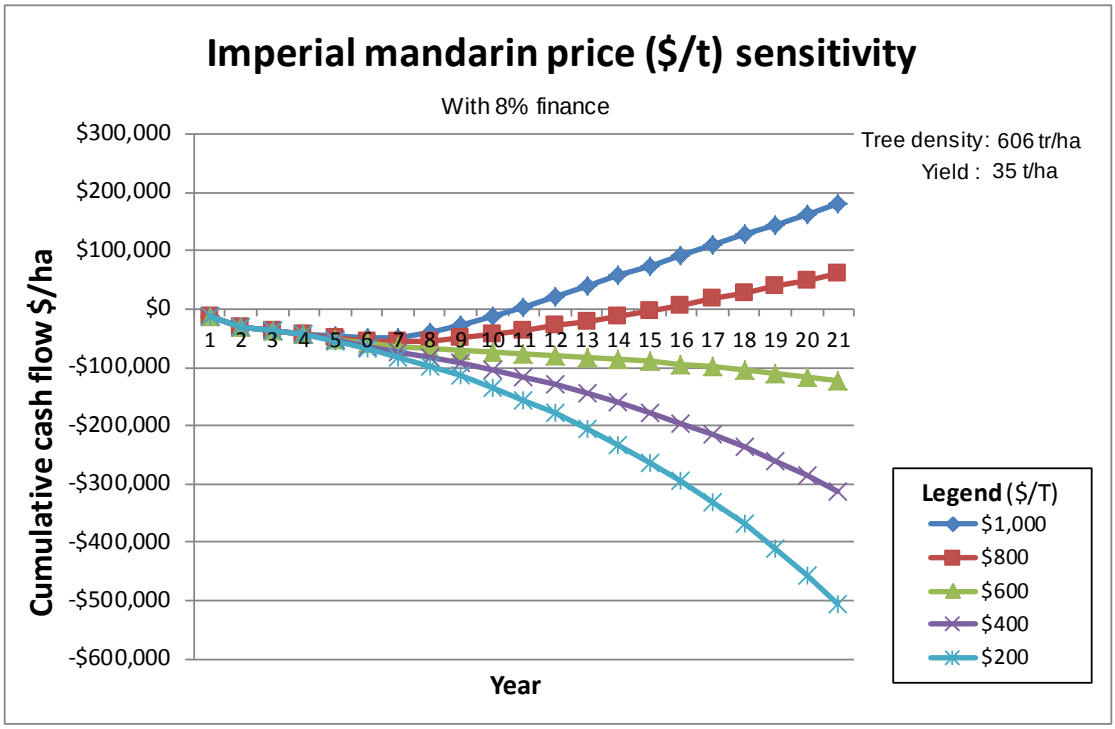


Figure 20. Imperial mandarin price sensitivity graph, with finance charges on borrowings.

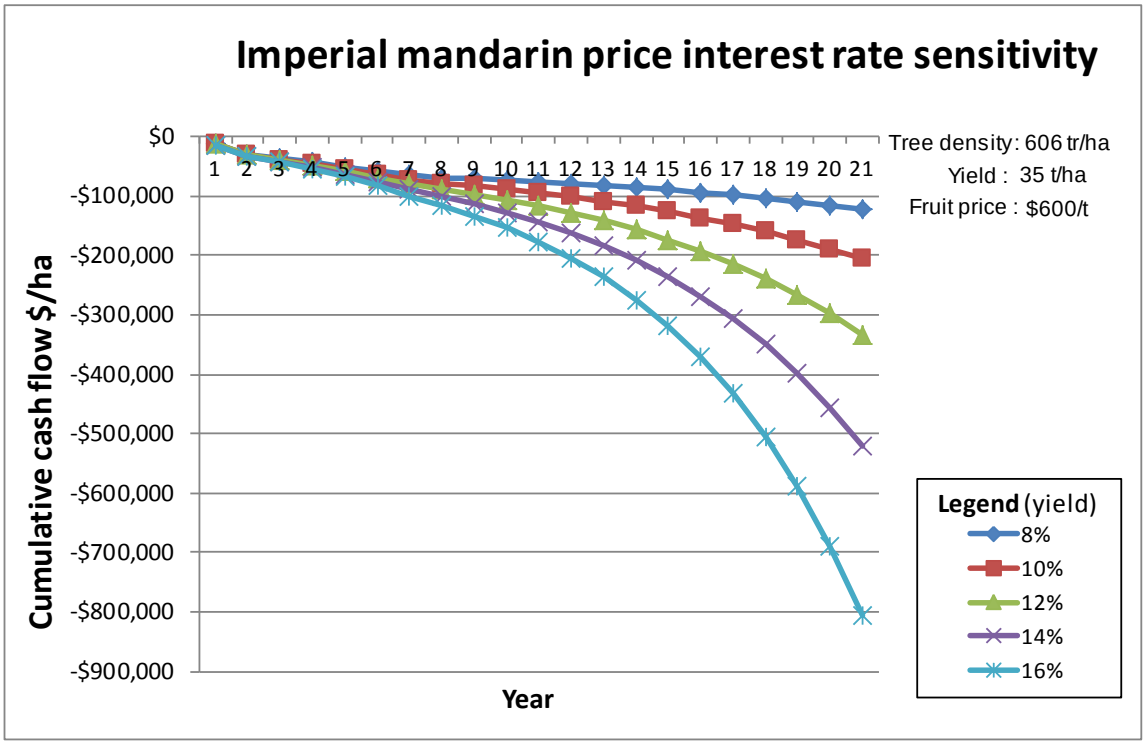


Figure 21.. Imperial mandarin interest rate sensitivity graph for finance charges on borrowings

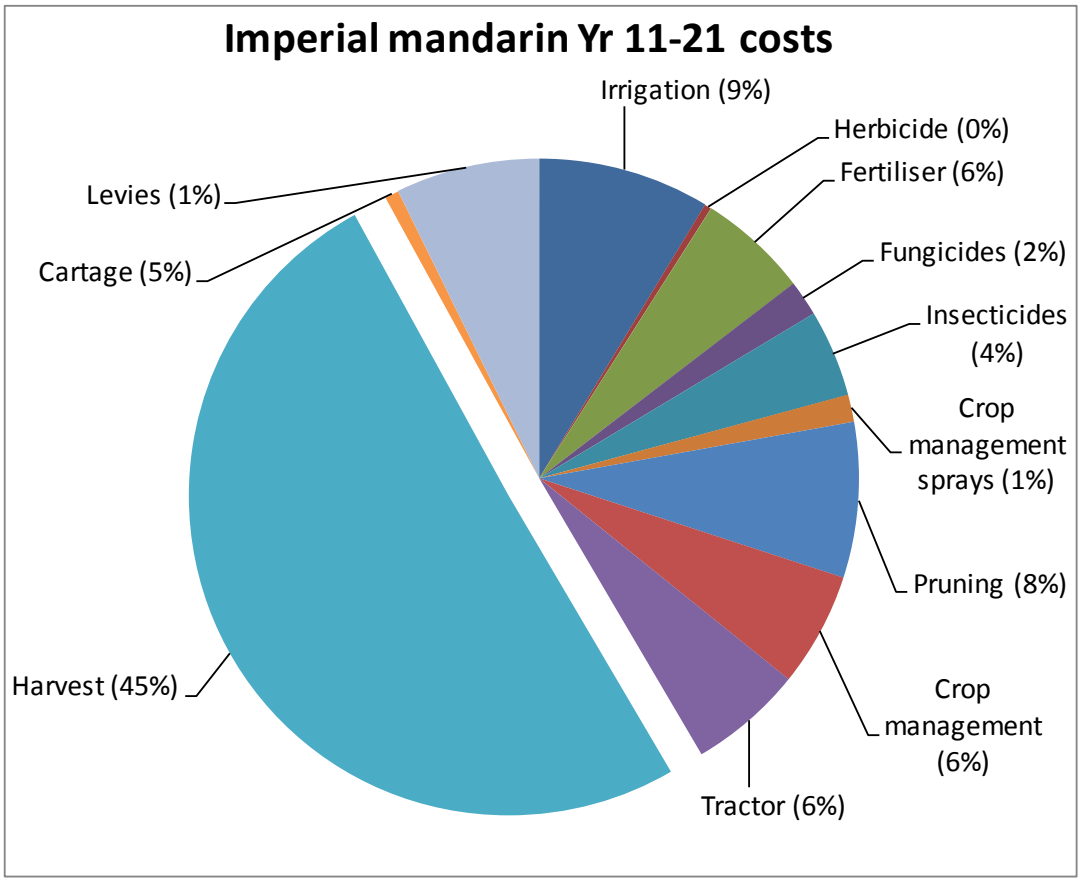


Figure 22. Imperial mandarin cost structure pie chart

Sunraysia citrus development budget establishment & planting Yr 1

Enterprise: Imperial mandarin **Date:** 1/05/18
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

COSTS - Year 0

Redevelopment

1.0 x	Removal of irrigation lines	8	h/ha	$25.0 /h	$200.0	
1.0 x	Install irrigation lines	16	h/ha	$25.0 /h	$400.0	
1.0 x	Removal of old trees	6	h/ha	$165.0 /h	$990.0	
1.0 x	Root/stump pulling	1.2	h/ha	$255.0 /h	$306.0	
1.0 x	Ripping	2	h/ha	$255.0 /h	$510.0	
2.0 x	Debris removal (sticks, broken roots)	3	h/ha	$35.0 /h	$210.0	
1.0 x	Levelling	1.6	h/ha	$145.0 /h	$232.0	
1.0 x	Cultivating	3	h/ha	$17.9 /hr	$53.6	
1.0 x	Discing	4	h/ha	$17.9 /hr	$71.5	
1.0 x	Surveying			$40.0 /ha	$40.0	
1.0 x	Pegging - cnt. labour			$80.0 /ha	$80.0	
1.0 x	Wind breaks			$600.0 /ha	$600.0	
1.0 x	Sod culture (seed & contract sowing)			$200.0 /ha	$200.0	
					Total	$3,893.1

Irrigation system

1.0 x	Micro spray irrigation system (sprinkler, pipe etc)			$6,500 /ha	$6,500.0	
					Total	$6,500.0

Total costs - Land preparation & yr1 planting		**$10,393.1**

Planting - Added to year 2

1 x	Trees	606	tree	$17.0 /tree	$10,302.0	
1 x	Planting	606	tree	$1.0 /tree	$606.0	
1 x	Tree guards	606	each	$0.6 /each	$333.3	
				Total Costs - Planting yr2		**$11,241.3**

Total partial variable cost y1	**$10,393.1**

Sunraysia citrus development budget year 2 to 4

Enterprise: Imperial mandarin **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

			Sprayed area	Rate per application				
Herbicide		**Machinery**						
2.0 x	Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha	$4.5	/L	$10.8
5.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x	Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x	Haloxyfop	Herbicide boom	50%	0.8	L/ha	$57.8	/L	$7.6
1.0 x	Paraquat/Diquat	Herbicide boom	50%	3.0	L/ha	$9.9	/L	$14.8
8.0 x	Wetter (Hasten)			0.4	L/ha	$8.3	/L	$26.4
							Total	$77.8
Fertiliser								
3.0 x	UAN	Fertigation		25.0	L/ha	$0.9	/L	$63.8
1.0 x	Calcium nitrate	-na-		15.0	kg/ha	$0.8	/kg	$12.4
1.0 x	MAP	Fertigation		25.0	kg/ha	$1.7	/kg	$43.0
1.0 x	Potassium nitrate	-na-		20.0	kg/ha	$1.9	/kg	$38.1
Foliar								
4.0 x	Potassium nitrate	-na-		4.0	kg/ha	$1.9	/kg	$30.5
4.0 x	Urea (low bi)	-na-		4.0	kg/ha	$0.9	/kg	$13.8
4.0 x	ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$19.0
4.0 x	Wetter (Agral)			0.2	L/ha	$7.7	/L	$4.6
							Total	$225.0
Insecticides								
4.0 x	Oil spray: high grade	Spray (4km/h)		8.8	L/ha	$4.1	/L	$142.2
1.0 x	Pirimicarb	Spray (4km/h)		0.2	kg/ha	$241.0	/kg	$48.2
1.0 x	Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0	/L	$337.4
0.7 x	Imidacloprid	Fertigation		2.4	L/ha	$36.2	/L	$57.9
							Total	$585.7
Pruning								
1.0 x	Hand pruning			0.5	min/tree	$55.0	/h	$277.8
							Total	$277.8
Crop management								
1.0 x	Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
							Total	$8.8
Tractor and machinery								
	Practice	**Machinery**						
2.0 x	Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$22.9
25.0 x	Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5
3.3 x	Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$128.1
4.7 x	Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$3.5
6.0 x	Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$295.9
4.0 x	Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$131.5
1.0 x	Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$30.1
1.0 x	Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5
1.0 x	Bin & ladder placement	Fork & ladders		1.2	h/t	$11.9	/h	$13.7
							Total	$656.7
							Total partial variable cost	**$1,831.7**

Sunraysia citrus development budget year 5 to 7

Enterprise: Imperial mandarin **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Sprayed area	Rate per application				
Herbicide	**Machinery**						
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5 /L	$6.5	
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5 /L	$15.8	
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1 /ml	$2.5	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8 /L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9 /L	$8.9	
8.0 x Wetter (Hasten)			0.4	L/ha	$8.3 /L	$26.4	
						Total	$64.5
Fertiliser							
5.0 x UAN	Fertigation		25.0	L/ha	$0.9 /L	$106.3	
1.0 x Calcium nitrate	Fertigation		30.0	kg/ha	$0.8 /kg	$24.7	
1.0 x MAP	-na-		30.0	kg/ha	$1.7 /kg	$51.6	
1.0 x Iron EDHHA	Fertigation		2.0	kg/ha	$16.4 /kg	$32.8	
Foliar							
3.0 x Potassium nitrate	-na-		4.0	kg/ha	$1.9 /kg	$22.8	
3.0 x Urea (low bi)	-na-		4.0	kg/ha	$0.9 /kg	$10.3	
3.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4 /kg	$14.3	
3.0 x Wetter (Agral)			0.2	L/ha	$7.7 /L	$3.4	
						Total	$266.3
Fungicides							
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5 /kg	$42.4	
						Total	$42.4
Insecticides							
1.0 x Oil spray: high grade	Osc. boom (2km/h)		35.0	L/ha	$4.1 /L	$142.2	
2.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8 /L	$86.4	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7 /L	$58.3	
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5 /kg	$21.5	
10.0 x Abamectin	used with bait spray		0.0	L/ha	$16.5 /L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0 /trap	$48.0	
						Total	$357.5
Crop management sprays							
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.2	kg/ha	$772.0 /kg	$154.4	
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5 /L	$26.3	
						Total	$180.7
Pruning							
1.0 x Hand pruning			1.0	min/tree	$55.0 /h	$555.5	
						Total	$555.5
Crop management							
1.0 x Leaf analysis			0.5	analysis	$120.0 /analysis	$60.0	
1.0 x Pest monitoring			1.0		$300.0 /ha	$300.0	
1.0 x Hand Fruit Thinning			8.0	min/tree	$25.0 /h	$2,020.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4 /kg	$8.8	
						Total	$2,388.8
Tractor and machinery							
Practice	**Machinery**						
4.0 x Sod mowing	Slasher		0.5	h/ha	$22.9 /h	$45.8	
25.0 x Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3 /h	$16.5	
3.3 x Herbicide rows	Herbicide boom		1.2	h/ha	$32.0 /h	$128.1	
7.0 x Fertigation	Fertigation		0.3	h/ha	$2.5 /h	$5.3	
3.0 x Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9 /h	$147.9	
3.0 x Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9 /h	$98.6	
2.0 x Osc. boom (2km/h)	Oscillating boom sprayer		2.0	h/ha	$44.5 /h	$178.2	
10.0 x Bait spray	4WB+tank sprayer		0.1	h/ha	$4.2 /h	$4.2	
24.0 x QFF trap monitoring	4 wheel bike (4WB)		0.0	h/ha	$3.3 /h	$1.1	
1.0 x Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1 /h	$30.1	
1.0 x Sod sowing	Sod seeder		1.0	h/ha	$14.5 /h	$14.5	
1.0 x Bin & ladder placement	Fork & ladders		0.2	h/t	$11.9 /h	$33.9	
						Total	$704.2
						Total partial variable cost	**$4,559.8**

Sunraysia citrus development budget year 8 to 10

Enterprise: Imperial mandarin **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application					
Herbicide								
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5	
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8	
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9	
7.0 x Wetter (Hasten)			0.4	L/ha	$8.3	/L	$23.1	
							Total	$61.2
Fertiliser								
5.0 x UAN	Fertigation		30.0	L/ha	$0.9	/L	$127.5	
2.0 x Calcium nitrate	Fertigation		35.0	kg/ha	$0.8	/kg	$57.7	
3.0 x MAP	-na-		50.0	kg/ha	$1.7	/kg	$258.0	
3.0 x Potassium nitrate	-na-		40.0	kg/ha	$1.9	/kg	$228.5	
1.0 x Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$32.8	
Foliar								
2.0 x Potassium nitrate	-na-		35.0	kg/ha	$1.9	/kg	$133.3	
2.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1	
2.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$28.6	
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$5.4	
							Total	$886.7
Fungicides								
2.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$84.8	
							Total	$84.8
Insecticides								
1.0 x Oil spray: high grade	Osc. boom (2km/h)		45.0	L/ha	$4.1	/L	$182.9	
1.0 x Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		2.0	L/ha	$10.8	/L	$21.6	
0.3 x Imidacloprid	Fertigation		5.5	L/ha	$36.2	/L	$65.2	
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5	
10.0 x Abamectin	used with bait spray		0.0	L/ha	$16.5	/L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0	
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8	
							Total	$532.9
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha	$772.0	/kg	$212.3	
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3	
							Total	$238.6
Pruning								
1.0 x Hand pruning			1.5	min/tree	$55.0	/h	$833.3	
1.0 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0	
							Total	$1,083.3
Crop management								
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8	
							Total	$368.8

Tractor and machinery

	Practice	Machinery				
4.0 x	Sod mow ing	Slasher	0.5 h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 w heel bike (4WB)	0.2 h/ha	$3.3 /h	$16.5	
1.0 x	Ripping	Ripper tyne	0.2 h/ha	$20.4 /h	$4.1	
3.3 x	Herbicide row s	Herbicide boom	1.2 h/ha	$32.0 /h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0 h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0 h/ha	$10.0 /h	$40.2	
8.3 x	Fertigation	Fertigation	0.3 h/ha	$2.5 /h	$6.2	
3.0 x	Spray (4km/h)	Airblast tow er sprayer	1.5 h/ha	$32.9 /h	$147.9	
2.0 x	Spray (6km/h)	Airblast tow er sprayer	1.0 h/ha	$32.9 /h	$65.8	
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0 h/ha	$44.5 /h	$178.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1 h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 w heel bike (4WB)	0.0 h/ha	$3.3 /h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5 h/ha	$30.1 /h	$90.4	
2.0 x	Mulching (fast)	Mulcher PTO	1.0 h/ha	$30.1 /h	$60.3	
1.0 x	Sod sow ing	Sod seeder	1.0 h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2 h/t	$11.9 /h	$65.4	
					Total	$910.6
					Total partial variable cost	**$4,166.8**

Sunraysia citrus development budget year 11 to 21

Enterprise: Imperial mandarin **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application				
Herbicide							
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
7.0 x Wetter (Hasten)			0.4	L/ha	$8.3	/L	$23.1
						Total	$61.2
Fertiliser							
5.0 x UAN	Fertigation		40.0	L/ha	$0.9	/L	$170.0
2.0 x Calcium nitrate	Fertigation		40.0	kg/ha	$0.8	/kg	$65.9
3.0 x MAP	-na-		50.0	kg/ha	$1.7	/kg	$258.0
3.0 x Potassium nitrate	-na-		45.0	kg/ha	$1.9	/kg	$257.0
1.0 x Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$32.8
Foliar							
2.0 x Potassium nitrate	-na-		35.0	kg/ha	$1.9	/kg	$133.3
2.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1
2.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$28.6
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$5.4
						Total	$966.0
Fungicides							
2.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$84.8
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha	$4.9	/L	$43.9
1.0 x Azoxystrobin	Spray (4km/h)		3.5	L/ha	$52.0	/L	$182.0
						Total	$310.7
Insecticides							
1.0 x Oil spray: high grade	Osc. boom (2km/h)		55.0	L/ha	$4.1	/L	$223.5
1.0 x Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$43.2
0.5 x Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0	/L	$168.7
0.3 x Imidacloprid	Fertigation		5.5	L/ha	$36.2	/L	$65.2
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x Abamectin	used with bait spray		0.0	L/ha	$16.5	/L	$1.2
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8
						Total	$763.9
Crop management sprays							
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha	$772.0	/kg	$212.3
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3
						Total	$238.6
Pruning							
1.0 x Hand pruning			2.0	min/tree	$55.0	/h	$1,111.0
1.0 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0
						Total	$1,361.0
Crop management							
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0
0.5 x Hand fruit thinning			5.0	min/tree	$25.0	/h	$631.3
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$1,000.0

Tractor and machinery

	Practice	Machinery				
4.0 x	Sod mowing	Slasher	0.5 h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2 h/ha	$3.3 /h	$16.5	
1.0 x	Ripping	Ripper tyne	0.2 h/ha	$20.4 /h	$4.1	
3.3 x	Herbicide rows	Herbicide boom	1.2 h/ha	$32.0 /h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0 h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0 h/ha	$10.0 /h	$40.2	
8.3 x	Fertigation	Fertigation	0.3 h/ha	$2.5 /h	$6.2	
4.5 x	Spray (4km/h)	Airblast tower sprayer	1.5 h/ha	$32.9 /h	$221.9	
2.0 x	Spray (6km/h)	Airblast tower sprayer	1.0 h/ha	$32.9 /h	$65.8	
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0 h/ha	$44.5 /h	$178.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1 h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0 h/ha	$3.3 /h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5 h/ha	$30.1 /h	$90.4	
2.0 x	Mulching (fast)	Mulcher PTO	1.0 h/ha	$30.1 /h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0 h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2 h/t	$11.9 /h	$74.3	
					Total	$993.4
					Total partial variable cost	**$5,694.8**

Development budget:

Valencia

Table 9. Valencia (juice) summary development budget.

Enterprise (per ha): Valencia - Juice

Date: Aug-16

WB Ver. (Jun-2018)

Description: Sod culture, undertree sprinkler
Water price: Sunraysia
Tree density: 417 trees/ha
Unit size: 1 Hectare
Print Date: 3/07/18

Harvest (Mandarin,Orange or Machine) = Orange
Loan interest Rate = 8%
7% NPV (no fin.) = -$20,925
Inflation = 0%

Year	1	2	3	4	5	6	7	9	11	16	21
Water use											
Water use ML/ha	0	3	5	6	6	7	7	9	10	10	10
Income											
Yield t/ha	0	0	0	3.0	9.0	18.0	22.0	35.0	45.0	45.0	45.0
Fruit prices $/t	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250
Total enterprise income	$0	$0	$0	$750	$2,250	$4,500	$5,500	$8,750	$11,250	$11,250	$11,250
Costs											
Yr1 site preparation, reworking & planting	$9,793	$7,735									
Irrigation	$691	$866	$983	$1,042	$1,042	$1,143	$1,143	$1,383	$1,502	$1,502	$1,502
Herbicide	$0	$78	$78	$78	$65	$65	$65	$61	$58	$58	$58
Fertiliser	$0	$173	$173	$173	$244	$244	$244	$655	$466	$466	$466
Fungicides	$0	$0	$0	$0	$42	$42	$42	$42	$42	$42	$42
Insecticides	$0	$251	$251	$251	$287	$287	$287	$319	$407	$407	$407
Crop management sprays	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pruning	$0	$0	$0	$0	$0	$0	$0	$105	$378	$378	$378
Crop management	$0	$9	$9	$9	$9	$9	$9	$69	$39	$39	$39
Tractor	$0	$594	$594	$611	$510	$526	$533	$609	$586	$586	$586
Harvesting and cartage	$0	$0	$0	$309	$927	$1,854	$2,266	$3,605	$4,635	$4,635	$4,635
Levies	$0	$0	$0	$11	$32	$63	$77	$123	$158	$158	$158
Overhead and fixed costs	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260
Machinery hours	0 h	26 h	26 h	26 h	23 h	23 h	23 h	31 h	30 h	30 h	30 h
Other costs converted per unit size & inflation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS	$11,744	$10,966	$3,347	$3,742	$4,417	$5,493	$5,926	$8,230	$9,530	$9,530	$9,530
ANNUAL CASH SURPLUS/DEFICIT	-$11,744	-$10,966	-$3,347	-$2,992	-$2,167	-$993	-$426	$520	$1,720	$1,720	$1,720
CUMULATIVE CASH FLOW (NO FINANCE)	-$11,744	-$22,710	-$26,057	-$29,050	-$31,216	-$32,209	-$32,635	-$32,610	-$29,781	-$21,180	-$12,578
Interest charge	-$696	-$1,613	-$2,241	-$2,710	-$3,190	-$3,647	-$4,035	-$4,879	-$5,610	-$7,516	-$10,354
CUMULATIVE CASH FLOW (After FINANCE)	-$12,441	-$25,020	-$30,608	-$36,310	-$41,667	-$46,307	-$50,768	-$60,077	-$68,109	-$92,972	-$130,013

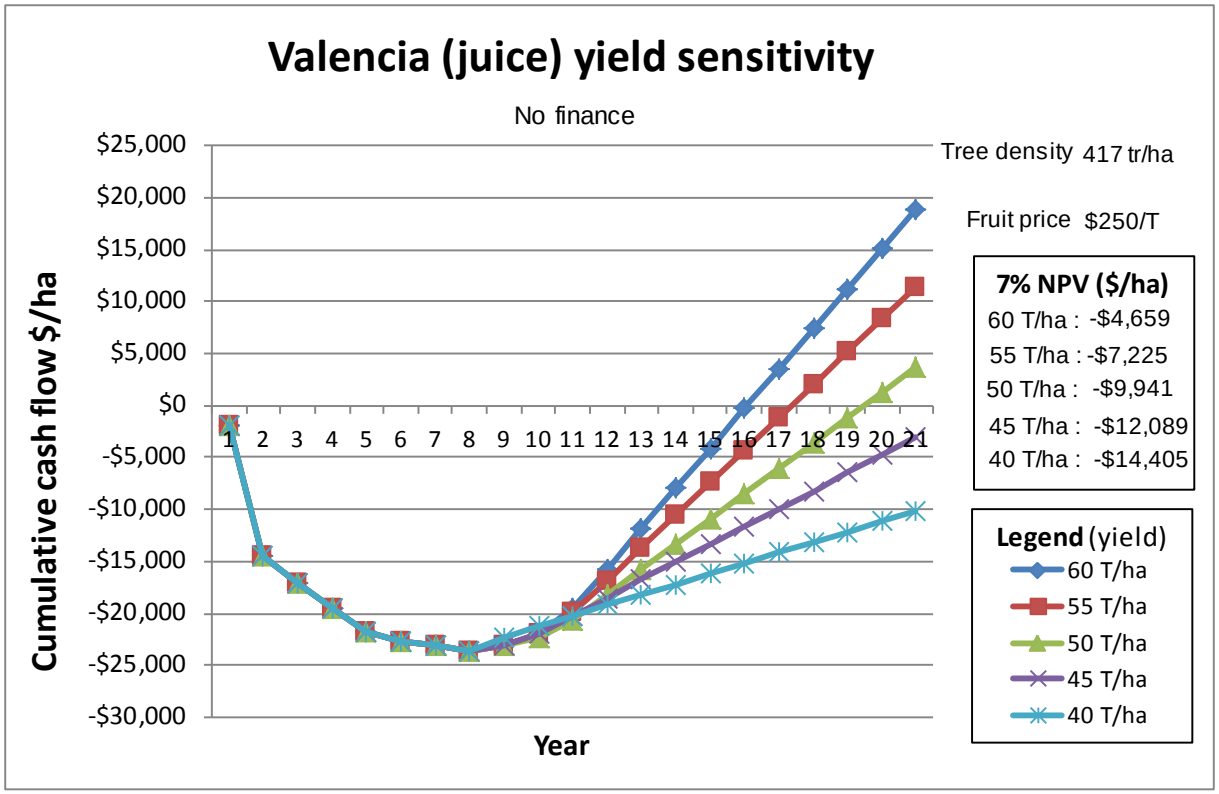


Figure 23. Valencia yield sensitivity graph, no finance

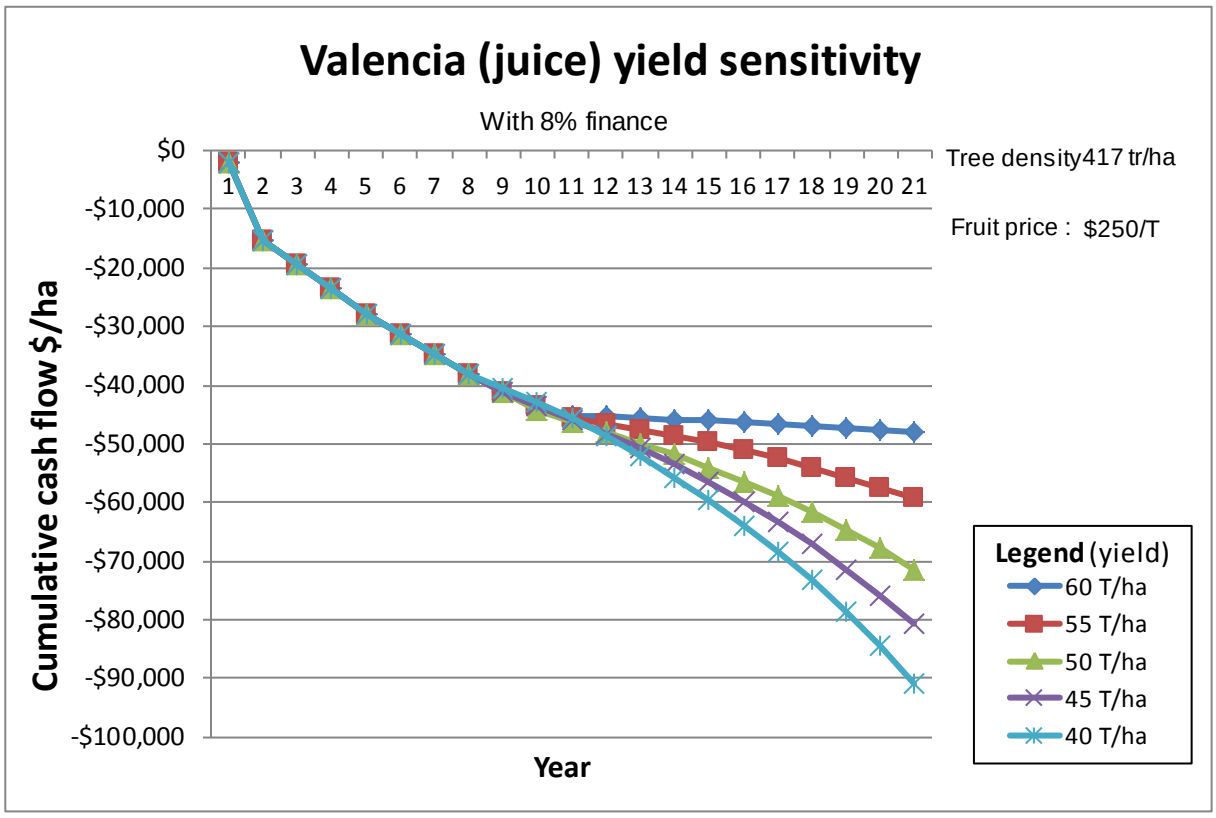


Figure 24. Valencia yield sensitivity graph, with finance charges on borrowings.

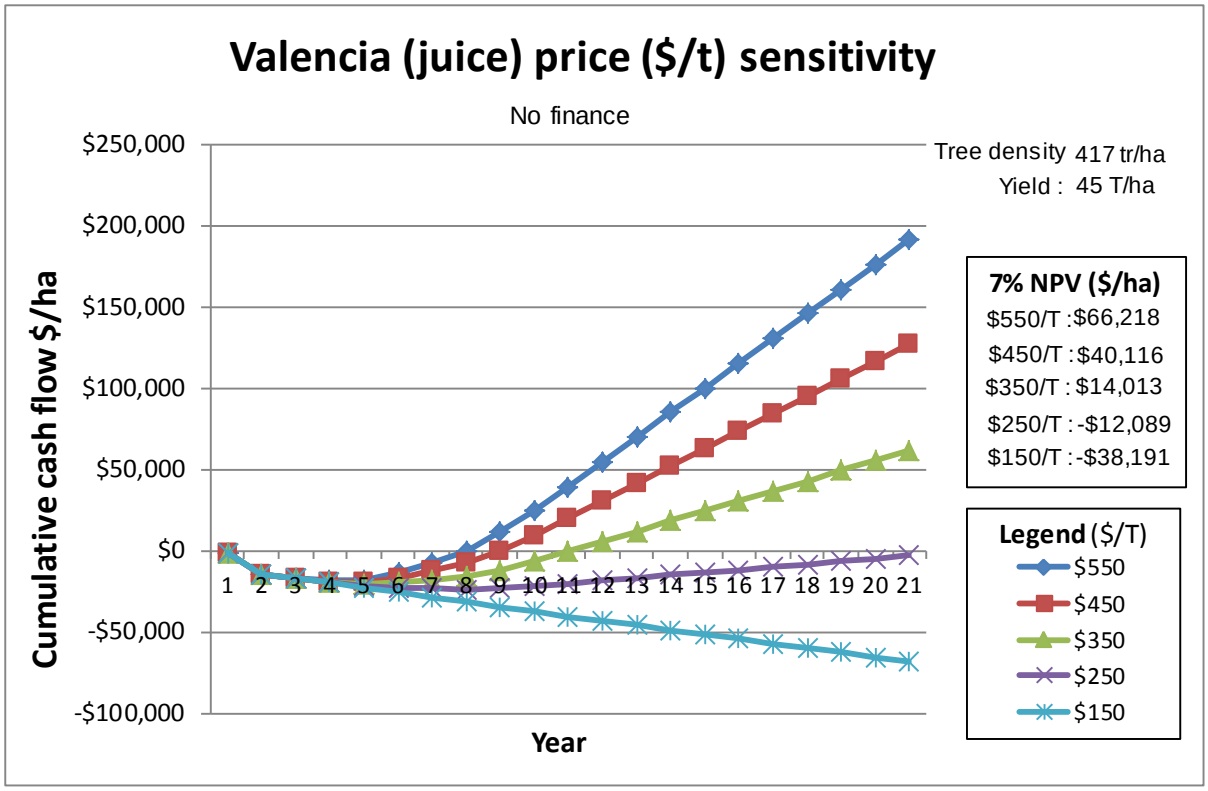


Figure 25. Valencia price sensitivity graph, no finance.

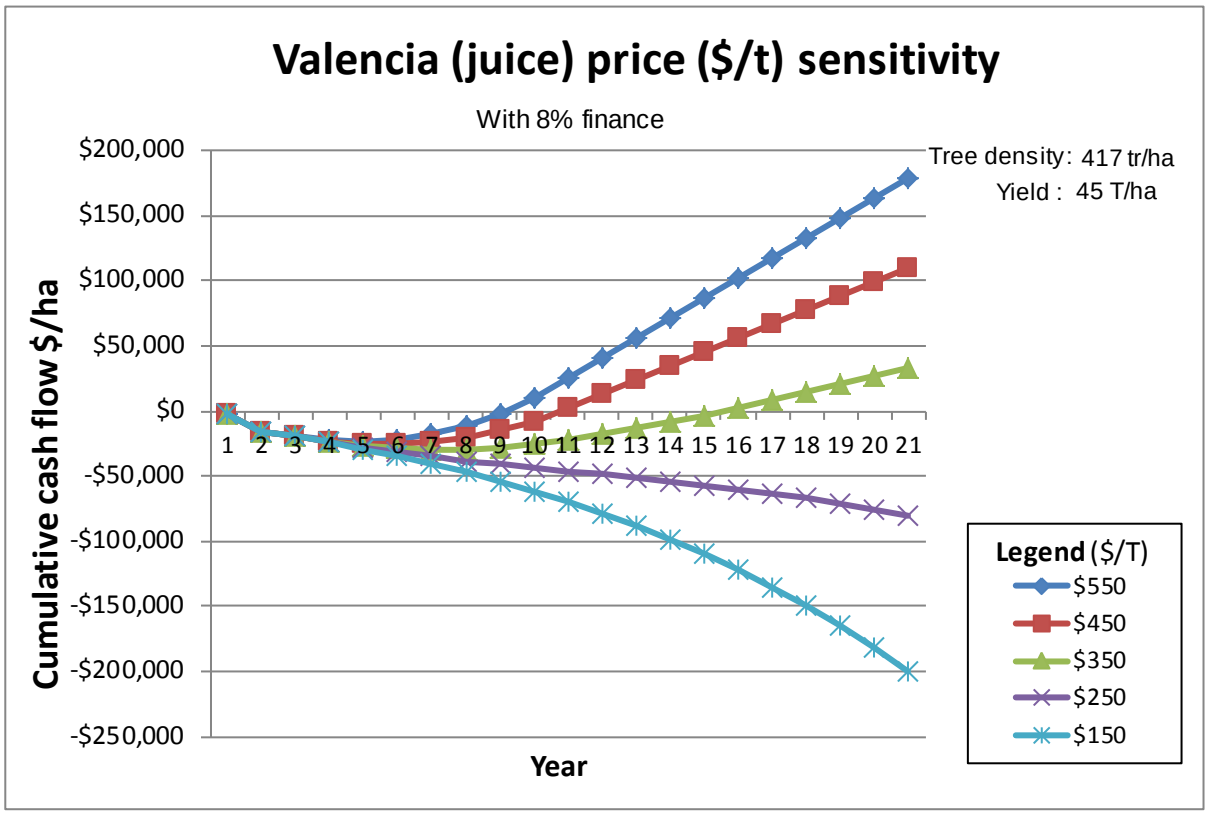


Figure 26. Valencia price sensitivity graph, with finance charges on borrowings.

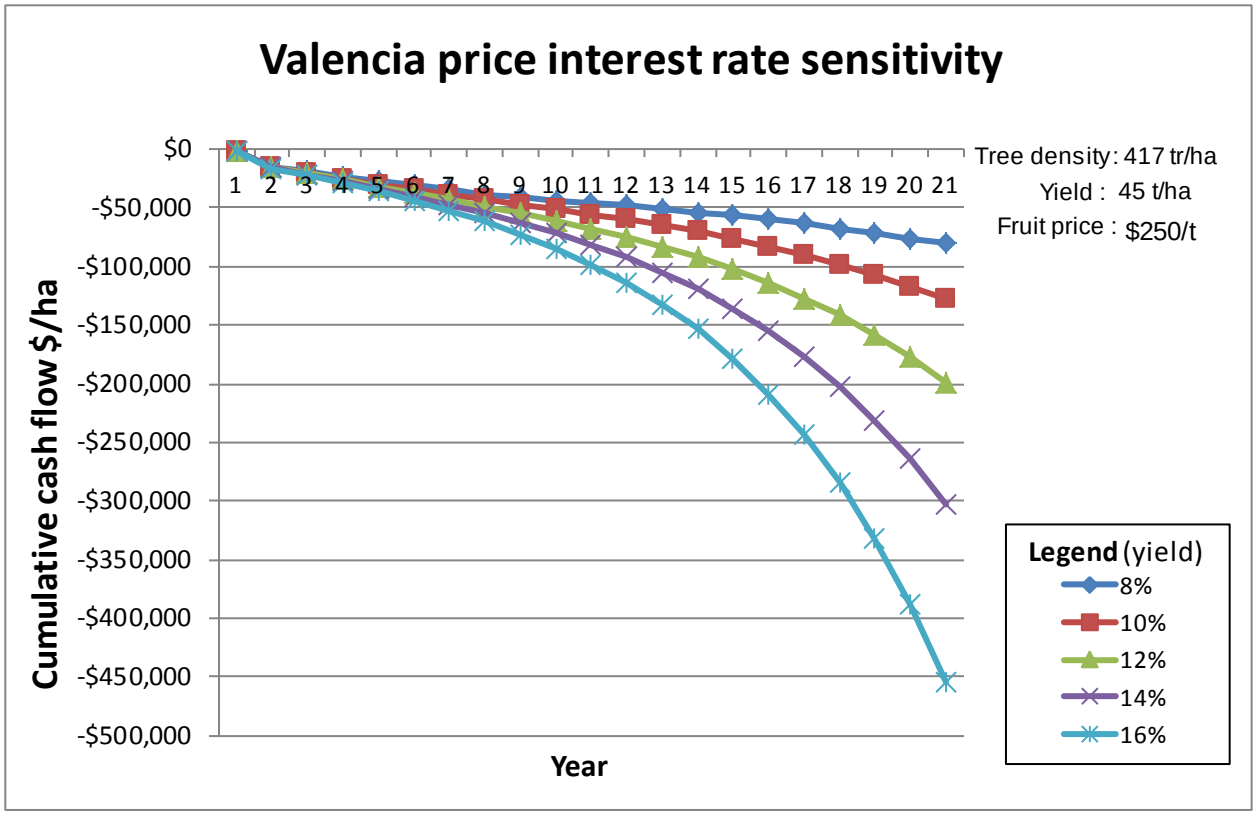


Figure 27.. Valencia interest rate sensitivity graph for finance charges on borrowings

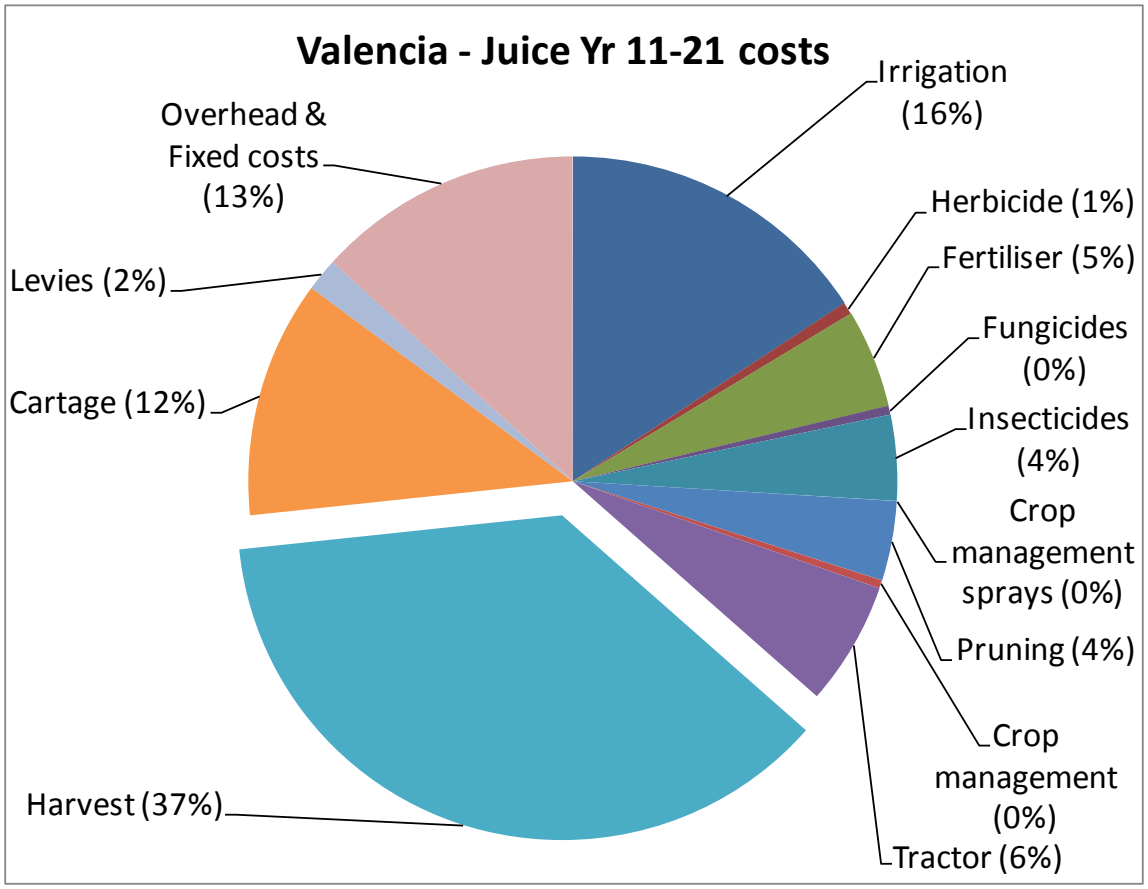


Figure 28. Valencia cost structure pie chart

Sunraysia citrus development budget establishment & planting Yr 1

Enterprise: Valencia - Juice **Date:** 1/08/16
Description: Sod culture, undertree sprinkler **Tree density:** 417 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

COSTS - Year 0

Redevelopment

1.0 x	Removal of irrigation lines	8	h/ha	$25.0 /h	$200.0	
1.0 x	Install irrigation lines	16	h/ha	$25.0 /h	$400.0	
1.0 x	Removal of old trees	6	h/ha	$165.0 /h	$990.0	
1.0 x	Root/stump pulling	2	h/ha	$255.0 /h	$510.0	
1.0 x	Ripping	1.2	h/ha	$255.0 /h	$306.0	
2.0 x	Debris removal (sticks, broken roots)	3	h/ha	$35.0 /h	$210.0	
1.0 x	Levelling	1.6	h/ha	$145.0 /h	$232.0	
1.0 x	Cultivating	3	h/ha	$17.9 /hr	$53.6	
1.0 x	Discing	4	h/ha	$17.9 /hr	$71.5	
1.0 x	Surveying			$40.0 /ha	$40.0	
1.0 x	Pegging - cnt. labour			$80.0 /ha	$80.0	
1.0 x	Sod culture (seed & contract sowing)			$200.0 /ha	$200.0	
					Total	$3,293.1

Irrigation system

1.0 x	Micro spray irrigation system (sprinkler, pipe etc)			$6,500 /ha	$6,500.0	
					Total	$6,500.0

Total costs - Land preparation & yr1 planting **$9,793.1**

Planting - Added to year 2

1 x	Trees	417	tree	$17.0 /tree	$7,089.0	
1 x	Planting	417	tree	$1.0 /tree	$417.0	
1 x	Tree guards	417	each	$0.6 /each	$229.4	
					Total Costs - Planting yr2	**$7,735.4**

Total partial variable costs y1 **$9,793.1**

Sunraysia citrus development budget year 1 to 3

Enterprise: Valencia - Juice **Date:** 1/08/16
Description: Sod culture, undertree sprinkler **Tree density:** 417 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Sprayed area	Rate per application				
Herbicide	**Machinery**						
2.0 x Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha	$4.5	/L	$10.8
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x Haloxyfop	Herbicide boom	50%	0.8	L/ha	$57.8	/L	$7.6
1.0 x Paraquat/Diquat	Herbicide boom	50%	3.0	L/ha	$9.9	/L	$14.8
8.0 x Wetter (Hasten)			0.4	L/ha	$8.3	/L	$26.4
						Total	$77.8
Fertiliser							
3.0 x UAN	Fertigation		25.0	L/ha	$0.9	/L	$63.8
1.0 x Calcium nitrate	-na-		15.0	kg/ha	$0.8	/kg	$12.4
1.0 x MAP	Fertigation		25.0	kg/ha	$1.7	/kg	$43.0
Foliar							
4.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$30.1
4.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$19.0
4.0 x Wetter (Agral)			0.2	L/ha	$7.7	/L	$4.6
						Total	$172.8
Insecticides							
4.0 x Oil spray: high grade	Spray (4km/h)		8.8	L/ha	$4.1	/L	$142.2
1.0 x Pirimicarb	Spray (4km/h)		0.2	kg/ha	$241.0	/kg	$48.2
1.0 x Imidacloprid	Fertigation		1.7	L/ha	$36.2	/L	$60.4
						Total	$250.8
Crop management							
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$8.8
Tractor and machinery							
	Practice	**Machinery**					
2.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9	/h	$22.9
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3	/h	$16.5
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0	/h	$128.1
5.0 x	Fertigation	Fertigation	0.3	h/ha	$2.5	/h	$3.8
5.0 x	Spray (4km/h)	Airblast tower sprayer	1.5	h/ha	$32.9	/h	$246.6
4.0 x	Spray (6km/h)	Airblast tower sprayer	1.0	h/ha	$32.9	/h	$131.5
1.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1	/h	$30.1
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5	/h	$14.5
1.0 x	Bin & ladder placement	Fork & ladders	1.2	h/t	$11.9	/h	$13.7
						Total	$607.6
						Total partial variable cost	**$1,117.8**

Sunraysia citrus development budget year 5 to 7

Enterprise: Valencia - Juice **Date:** 1/08/16
Description: Sod culture, undertree sprinkler **Tree density:** 417 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Sprayed area	Rate per application				
Herbicide	**Machinery**						
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
8.0 x Wetter (Hasten)			0.4	L/ha	$8.3	/L	$26.4
						Total	$64.5
Fertiliser							
5.0 x UAN	Fertigation		25.0	L/ha	$0.9	/L	$106.3
1.0 x Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$16.5
1.0 x MAP	-na-		25.0	kg/ha	$1.7	/kg	$43.0
1.0 x Potassium nitrate	-na-		20.0	kg/ha	$1.9	/kg	$38.1
Foliar							
3.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$22.6
3.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$14.3
3.0 x Wetter (Agral)			0.2	L/ha	$7.7	/L	$3.4
						Total	$244.1
Fungicides							
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4
						Total	$42.4
Insecticides							
1.0 x Oil spray: med grade	Osc. boom (2km/h)		35.0	L/ha	$3.2	/L	$113.4
0.3 x Imidacloprid	Fertigation		3.8	L/ha	$36.2	/L	$44.8
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x Abamectin	used with bait spray		0.0	L/ha	$16.5	/L	$1.2
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
						Total	$287.1
Crop management							
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$8.8
Tractor and machinery							
Practice	**Machinery**						
4.0 x Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$45.8
25.0 x Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5
3.3 x Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$128.1
6.3 x Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$4.7
1.0 x Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$49.3
3.0 x Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$98.6
1.0 x Osc. boom (2km/h)	Oscillating boom sprayer		2.0	h/ha	$44.5	/h	$89.1
10.0 x Bait spray	4WB+tank sprayer		0.1	h/ha	$4.2	/h	$4.2
24.0 x QFF trap monitoring	4 wheel bike (4WB)		0.0	h/ha	$3.3	/h	$1.1
1.0 x Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$30.1
1.0 x Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5
1.0 x Bin & ladder placement	Fork & ladders		0.2	h/t	$11.9	/h	$41.0
						Total	$523.1
						Total partial variable cost	**$1,170.0**

Sunraysia citrus development budget year 8 to 10

Enterprise: Valencia - Juice **Date:** 1/08/16
Description: Sod culture, undertree sprinkler **Tree density:** 417 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Sprayed area	Rate per application				
Herbicide	**Machinery**						
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5
4.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$12.6
4.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.0
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
8.0 x Wetter (Hasten)			0.4	L/ha	$8.3	/L	$26.4
						Total	$60.9
Fertiliser							
5.0 x UAN	Fertigation		45.0	L/ha	$0.9	/L	$191.3
1.0 x MAP	-na-		75.0	kg/ha	$1.7	/kg	$129.0
1.0 x Potassium nitrate	-na-		150.0	kg/ha	$1.9	/kg	$285.6
Foliar							
2.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1
2.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$28.6
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$5.4
						Total	$654.8
Fungicides							
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4
						Total	$42.4
Insecticides							
1.0 x Oil spray: med grade	Osc. boom (2km/h)		45.0	L/ha	$3.2	/L	$145.8
0.3 x Imidacloprid	Fertigation		3.8	L/ha	$36.2	/L	$44.8
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x Abamectin	used with bait spray		0.0	L/ha	$16.5	/L	$1.2
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
						Total	$319.5
Pruning							
1.0 x Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$105.0
						Total	$105.0
Crop management							
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$68.8
Tractor and machinery							
Practice	**Machinery**						
4.0 x Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$45.8
25.0 x Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5
3.3 x Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$128.1
4.0 x Spot spray 4WB	4WB+tank sprayer		2.0	h/ha	$4.2	/h	$33.6
5.3 x Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$4.0
1.0 x Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$49.3
2.0 x Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$65.8
1.0 x Osc. boom (2km/h)	Oscillating boom sprayer		2.0	h/ha	$44.5	/h	$89.1
10.0 x Bait spray	4WB+tank sprayer		0.1	h/ha	$4.2	/h	$4.2
24.0 x QFF trap monitoring	4 wheel bike (4WB)		0.0	h/ha	$3.3	/h	$1.1
1.0 x Mulching (med)	Mulcher PTO		1.5	h/ha	$30.1	/h	$45.2
1.3 x Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$37.7
1.0 x Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5
1.0 x Bin & ladder placement	Fork & ladders		0.2	h/t	$11.9	/h	$72.5
						Total	$607.3
						Total partial variable cost	**$1,858.6**

Sunraysia citrus development budget year 11 to 21

Enterprise: Valencia - Juice **Date:** 1/08/16
Description: Sod culture, undertree sprinkler **Tree density:** 417 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (Jun-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Sprayed area	Rate per application				
Herbicide	**Machinery**						
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5
4.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$12.6
4.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.0
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
7.0 x Wetter (Hasten)			0.4	L/ha	$8.3	/L	$23.1
						Total	$57.6
Fertiliser							
4.0 x UAN	Fertigation		80.0	L/ha	$0.9	/L	$272.0
1.0 x MAP	-na-		65.0	kg/ha	$1.7	/kg	$111.8
1.0 x Muriate of potash	-na-		0.1	t/ha	$580.0	/t	$58.0
Foliar							
1.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$7.5
1.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$14.3
1.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$2.7
						Total	$466.3
Fungicides							
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4
						Total	$42.4
Insecticides							
1.0 x Oil spray: high grade	Osc. boom (2km/h)		60.0	L/ha	$4.1	/L	$243.8
0.3 x Imidacloprid	Fertigation		3.8	L/ha	$36.2	/L	$34.0
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x Abamectin	used with bait spray		0.0	L/ha	$16.5	/L	$1.2
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
						Total	$406.7
Pruning							
1.0 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0
0.3 x Hedging (one side, contract)			1.2	h/ha	$250.0	/h	$75.0
0.5 x Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$52.5
						Total	$377.5
Crop management							
1.0 x Leaf analysis			0.3	analysis	$120.0	/analysis	$30.0
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$38.8
Tractor and machinery							
Practice	**Machinery**						
4.0 x Sod mowing	Slasher		0.5	h/ha	$22.9	/h	$45.8
25.0 x Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3	/h	$16.5
3.3 x Herbicide rows	Herbicide boom		1.2	h/ha	$32.0	/h	$128.1
4.0 x Spot spray 4WB	4WB+tank sprayer		2.0	h/ha	$4.2	/h	$33.6
4.3 x Fertigation	Fertigation		0.3	h/ha	$2.5	/h	$3.2
1.0 x Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9	/h	$49.3
1.0 x Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9	/h	$32.9
1.0 x Osc. boom (2km/h)	Oscillating boom sprayer		2.0	h/ha	$44.5	/h	$89.1
10.0 x Bait spray	4WB+tank sprayer		0.1	h/ha	$4.2	/h	$4.2
24.0 x QFF trap monitoring	4 wheel bike (4WB)		0.0	h/ha	$3.3	/h	$1.1
1.0 x Mulching (med)	Mulcher PTO		1.5	h/ha	$30.1	/h	$45.2
1.0 x Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1	/h	$30.1
1.0 x Sod sowing	Sod seeder		1.0	h/ha	$14.5	/h	$14.5
1.0 x Bin & ladder placement	Fork & ladders		0.2	h/t	$11.9	/h	$92.1
						Total	$585.7
						Total partial variable cost	**$1,974.8**

Development budget:

Afourer mandarin (isolated seedless)

The budget assumes the orchard is isolated; away from viable pollen sources, which makes the fruit seedless. Using netting (tree or whole orchard), or a privately owned seedless Afourer variety can be used to produce seedless fruit. These options are analysed in the next budget.

Afourer mandarins are recognised as becoming biennial bearing once they mature (10–15 years). Many Afourer orchards in Australia are approaching this age and the effects from biennial bearing will be better understood in future years.

Afourer mandarins grown in Australian have been known to yield 80 t/ha over a few years in their early years to tree maturity. However the trees eventually enter into a pattern biennial bearing and require an intensive pruning program. Long term yield data from 15-20 year old Afourer orchards are 50 to 60 tonnes per annum. A conservative yield of 50 t/ha is used in the budgets.

Some growers hand thin fruit, whilst other do not. The budgets assume a moderate level of hand thinning.

Table 10. Afourer mandarin (isolated seedless) summary development budget.

Enterprise (per ha): Afourer mandarin: isolated seedless

Date: May-18

Description: Sod culture, undertree sprinkler — WB Ver. (May-2018)

Water price: Sunraysia — Harvest (Mandarin,Orange or Machine) = Mandarin

Tree density: 606 trees/ha — Loan interest Rate = 8%

Unit size: 1 Hectare — 7% NPV (no fin.) = $64,037 — Inflation = 0%

Print Date: 3/07/18

Year	1	2	3	4	5	6	7	9	11	16	21
Water use											
Water use ML/ha	0	3	5	6	6	7	7	9	10	10	10
Income											
Yield t/ha	0	0	0	5.0	15.0	30.0	40.0	50.0	50.0	50.0	50.0
Fruit prices $/t	$800	$800	$800	$800	$800	$800	$800	$800	$800	$800	$800
Total enterprise income	$0	$0	$0	$4,000	$12,000	$24,000	$32,000	$40,000	$40,000	$40,000	$40,000
Costs											
Yr1 site preparation, reworking & planting	$10,393	$11,241									
Irrigation	$691	$866	$983	$1,042	$1,042	$1,143	$1,143	$1,383	$1,502	$1,502	$1,502
Herbicide	$0	$78	$78	$78	$65	$65	$65	$65	$65	$65	$65
Fertiliser	$0	$264	$264	$264	$824	$824	$824	$1,210	$1,323	$1,323	$1,323
Fungicides	$0	$0	$0	$0	$85	$85	$85	$129	$129	$129	$129
Insecticides	$0	$616	$616	$616	$425	$425	$425	$702	$844	$844	$844
Crop management sprays	$0	$0	$0	$0	$181	$181	$181	$239	$253	$253	$253
Pruning	$0	$278	$278	$278	$556	$556	$556	$2,472	$2,472	$2,472	$2,472
Crop management	$0	$9	$9	$9	$2,389	$2,389	$2,389	$2,894	$4,156	$4,156	$4,156
Tractor	$0	$643	$643	$664	$758	$785	$803	$1,115	$1,147	$1,147	$1,147
Harvesting and cartage	$0	$0	$0	$1,250	$3,750	$7,500	$10,000	$12,500	$12,500	$12,500	$12,500
Levies	$0	$0	$0	$18	$53	$105	$140	$175	$175	$175	$175
Overhead and fixed costs	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260
Machinery hours	0 h	27 h	27 h	27 h	30 h	30 h	30 h	52 h	53 h	53 h	53 h
Other costs converted per unit size & inflation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS	$12,344	$15,255	$4,130	$5,477	$11,386	$15,316	$17,869	$24,142	$25,826	$25,826	$25,826
ANNUAL CASH SURPLUS/DEFICIT	-$12,344	-$15,255	-$4,130	-$1,477	$614	$8,684	$14,131	$15,858	$14,174	$14,174	$14,174
CUMULATIVE CASH FLOW (NO FINANCE)	-$12,344	-$27,599	-$31,729	-$33,206	-$32,591	-$23,907	-$9,777	$19,336	$49,249	$120,119	$190,988
Interest charge	-$733	-$1,909	-$2,725	-$3,306	-$3,898	-$4,202	-$3,848	-$2,435	-$355	$0	$0
CUMULATIVE CASH FLOW (After FINANCE)	-$13,078	-$30,241	-$37,096	-$41,879	-$45,163	-$40,681	-$30,398	-$6,970	$21,262	$92,101	$162,971

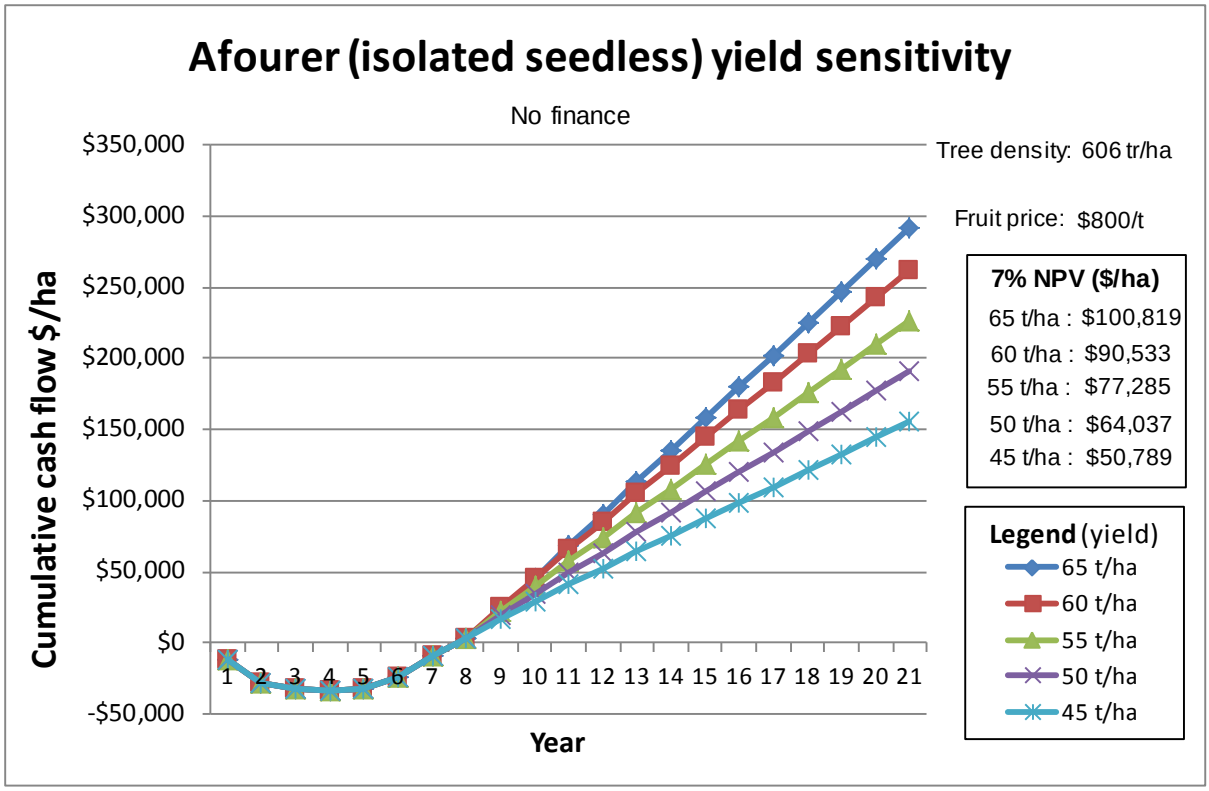


Figure 29. Afourer (isolated seedless) sensitivity graph, no finance.

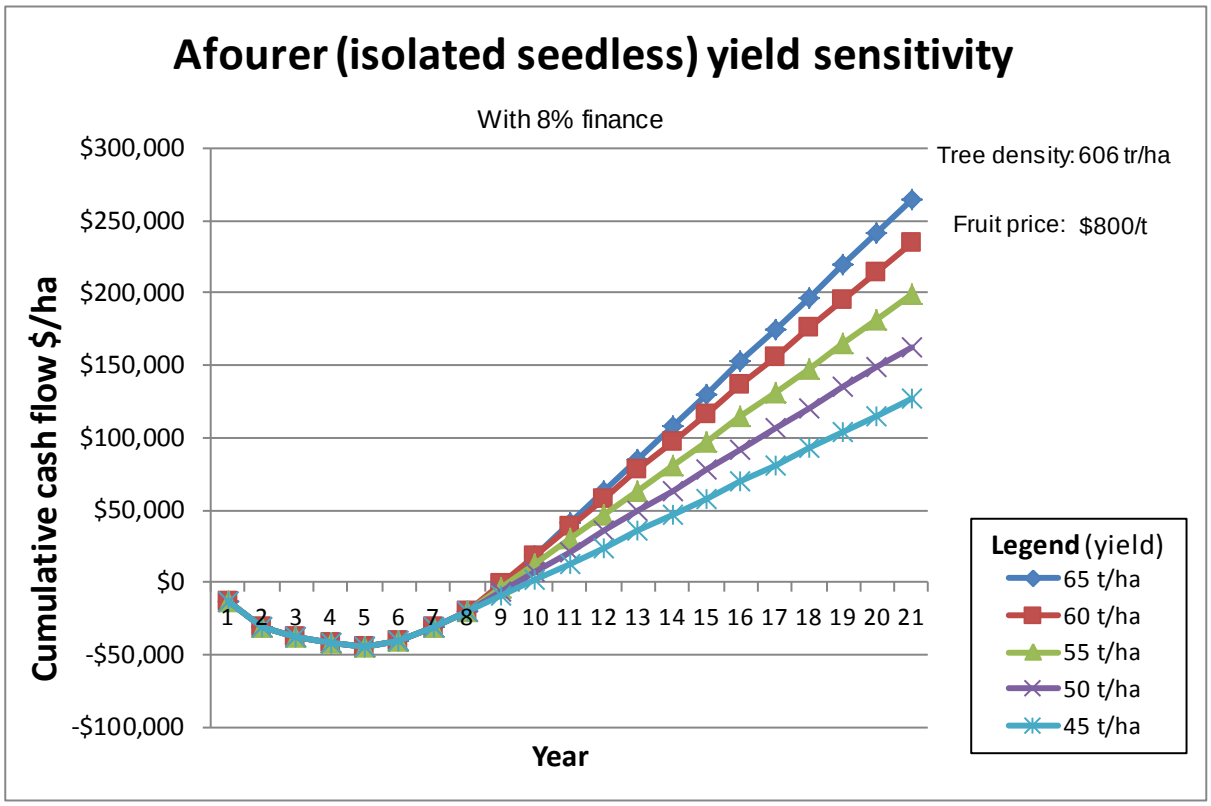


Figure 30. Afourer (isolated seedless) sensitivity graph, with finance charges on borrowings.

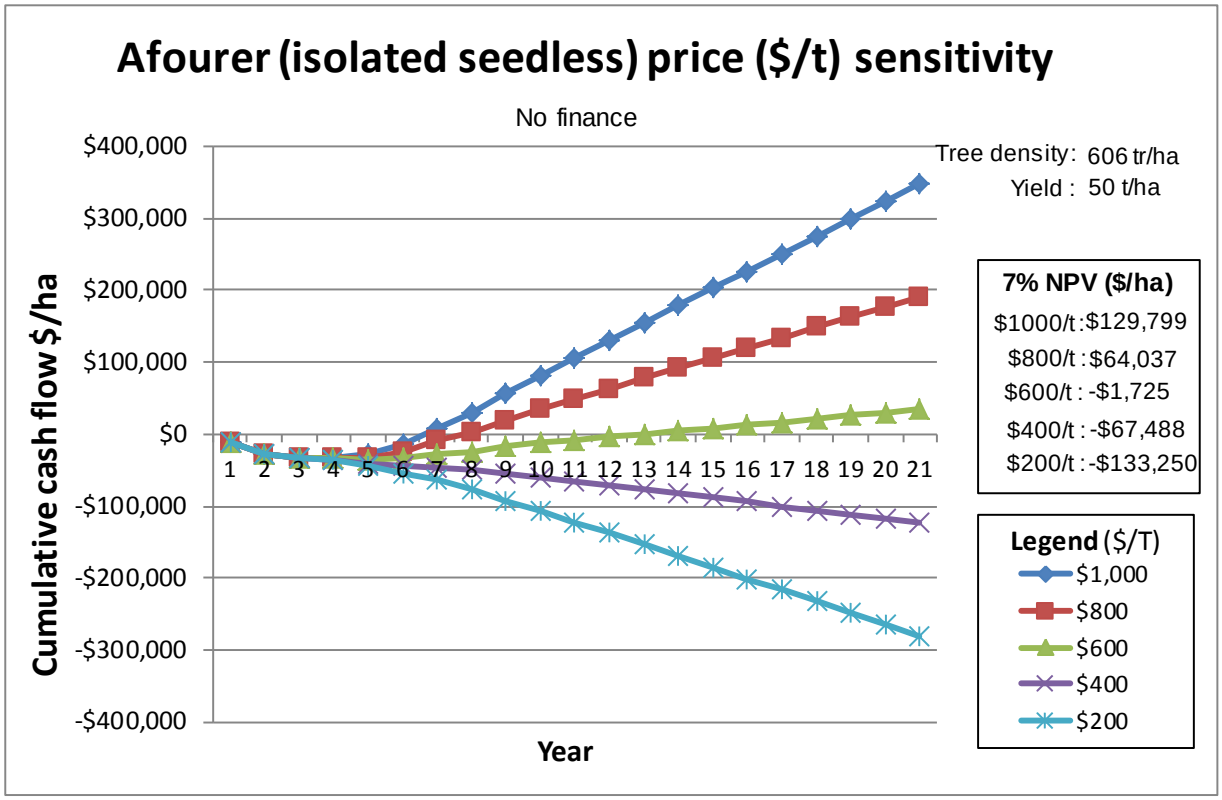


Figure 31. Afourer (isolated seedless) price sensitivity graph, no finance.

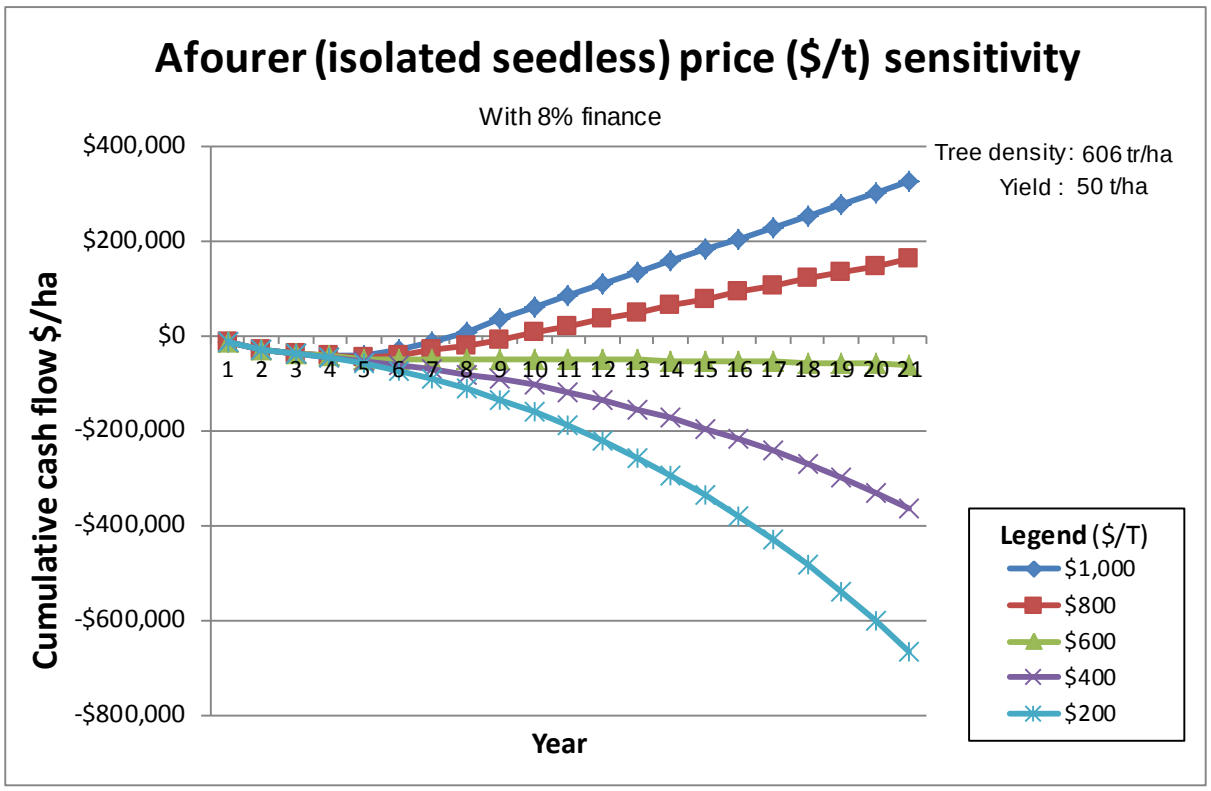


Figure 32. Afourer (isolated seedless) price sensitivity graph, with finance charges on borrowings.

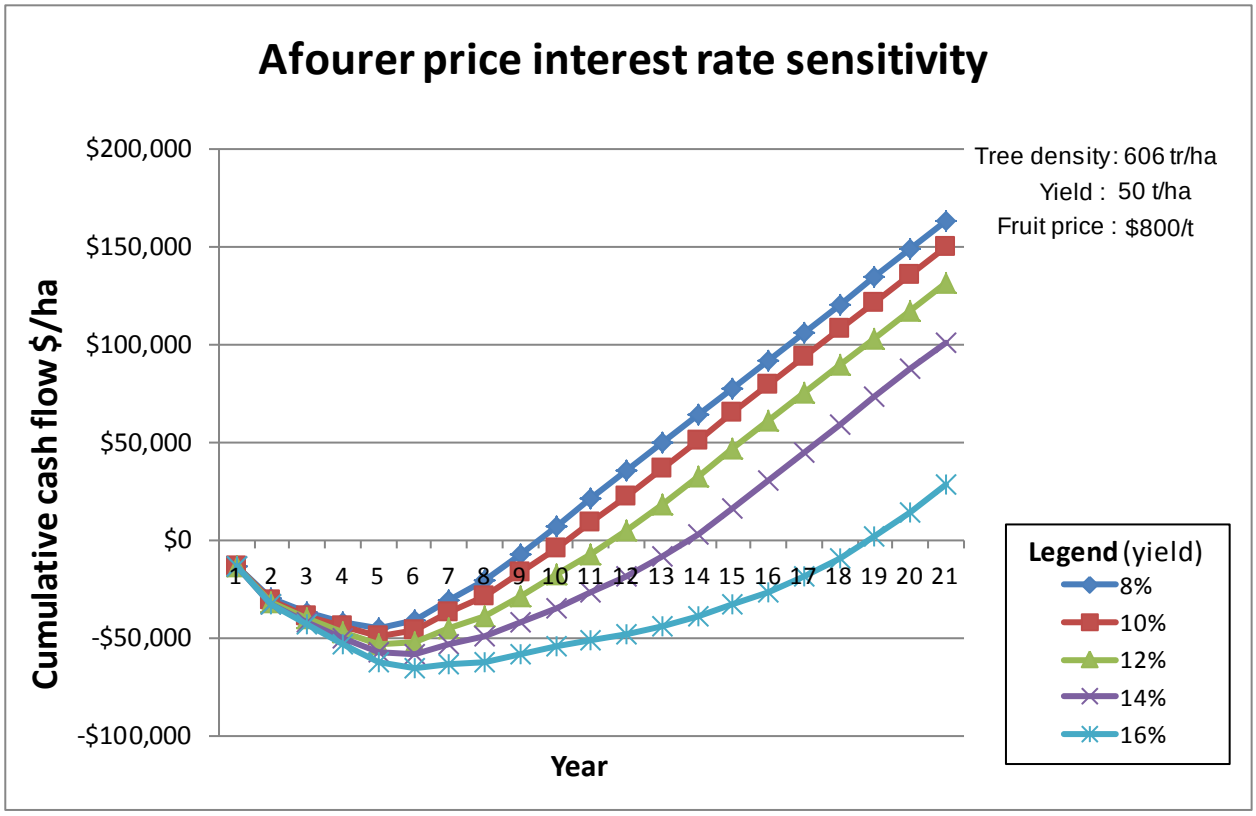


Figure 33. Afourer (isolated seedless) interest rate sensitivity graph for finance charges on borrowings.

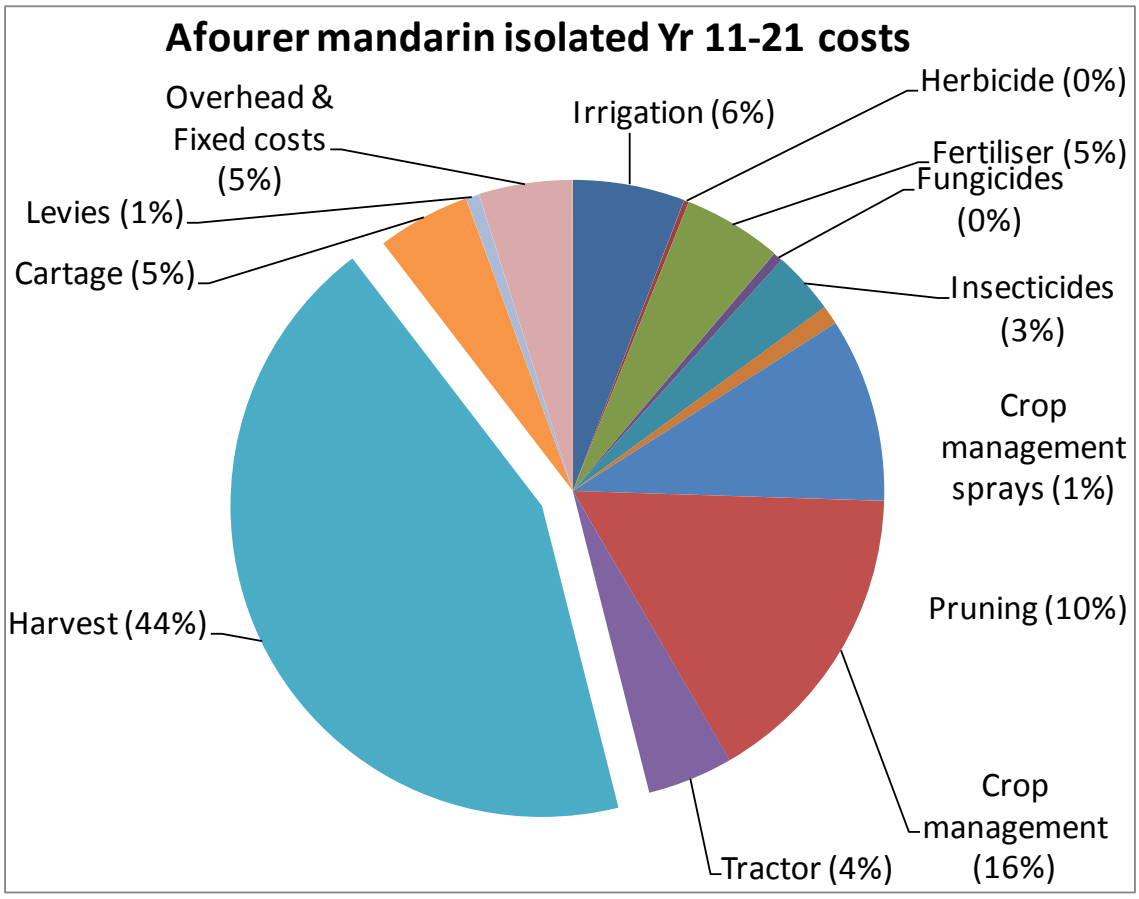


Figure 34. Afourer (isolated seedless) cost structure pie chart.

Sunraysia citrus development budget establishment & planting Yr 1

Enterprise: Afourer mandarin: isolated seedless **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

COSTS - Year 0

Redevelopment

1.0 x	Removal of irrigation lines	8	h/ha	$25.0 /h	$200.0	
1.0 x	Install irrigation lines	16	h/ha	$25.0 /h	$400.0	
1.0 x	Removal of old trees	6	h/ha	$165.0 /h	$990.0	
1.0 x	Ripping	2	h/ha	$255.0 /h	$510.0	
1.0 x	Root/stump pulling	1.2	h/ha	$255.0 /h	$306.0	
2.0 x	Debris removal (sticks, broken roots)	3	h/ha	$35.0 /h	$210.0	
1.0 x	Levelling	1.6	h/ha	$145.0 /h	$232.0	
1.0 x	Cultivating	3	h/ha	$17.9 /hr	$53.6	
1.0 x	Discing	4	h/ha	$17.9 /hr	$71.5	
1.0 x	Surveying			$40.0 /ha	$40.0	
1.0 x	Pegging - cnt. labour			$80.0 /ha	$80.0	
1.0 x	Wind breaks			$600.0 /ha	$600.0	
1.0 x	Sod culture (seed & contract sow ing)			$200.0 /ha	$200.0	
					Total	$3,893.1

Irrigation system

1.0 x	Micro spray irrigation system (sprinkler, pipe etc)			$6,500 /ha	$6,500.0	
					Total	$6,500.0

Total costs - Land preparation & yr1 planting		**$10,393.1**

Planting - Added to year 2

1 x	Trees	606	tree	$17.0 /tree	$10,302.0	
1 x	Planting	606	tree	$1.0 /tree	$606.0	
1 x	Tree guards	606	each	$0.6 /each	$333.3	
					Total Costs - Planting yr2	**$11,241.3**

Total partial variable cost y1	**$10,393.1**

Sunraysia citrus development budget year 2 to 4

Enterprise: Afourer mandarin: isolated seedless **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

			Sprayed area	Rate per application				
Herbicide		**Machinery**						
2.0 x	Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha	$4.5 /L	$10.8	
5.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5 /L	$15.8	
5.0 x	Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1 /ml	$2.5	
0.3 x	Haloxyfop	Herbicide boom	50%	0.8	L/ha	$57.8 /L	$7.6	
1.0 x	Paraquat/Diquat	Herbicide boom	50%	3.0	L/ha	$9.9 /L	$14.8	
8.0 x	Wetter (Hasten)			0.4	L/ha	$8.3 /L	$26.4	
							Total	$77.8
Fertiliser								
3.0 x	UAN	Fertigation		25.0	L/ha	$0.9 /L	$63.8	
1.0 x	Calcium nitrate	-na-		15.0	kg/ha	$0.8 /kg	$12.4	
1.0 x	MAP	Fertigation		25.0	kg/ha	$1.7 /kg	$43.0	
1.0 x	Potassium nitrate	-na-		20.0	kg/ha	$1.9 /kg	$38.1	
Foliar								
4.0 x	Potassium nitrate	-na-		10.0	kg/ha	$1.9 /kg	$76.2	
4.0 x	Urea (low bi)	-na-		2.0	kg/ha	$0.9 /kg	$6.9	
4.0 x	ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4 /kg	$19.0	
4.0 x	Wetter (Agral)			0.2	L/ha	$7.7 /L	$4.6	
							Total	$263.9
Insecticides								
4.0 x	Oil spray: high grade	Spray (4km/h)		8.8	L/ha	$4.1 /L	$142.2	
1.0 x	Pirimicarb	Spray (4km/h)		0.2	kg/ha	$241.0 /kg	$48.2	
1.0 x	Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0 /L	$337.4	
1.0 x	Imidacloprid	Fertigation		2.4	L/ha	$36.2 /L	$87.7	
							Total	$615.6
Pruning								
1.0 x	Hand pruning			0.5	min/tree	$55.0 /h	$277.8	
							Total	$277.8
Crop management								
1.0 x	Sod seed	Sod seeder		25.0	kg/ha	$0.4 /kg	$8.8	
							Total	$8.8
Tractor and machinery								
	Practice	**Machinery**						
2.0 x	Sod mowing	Slasher		0.5	h/ha	$22.9 /h	$22.9	
25.0 x	Check emitters	4 wheel bike (4WB)		0.2	h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom		1.2	h/ha	$32.0 /h	$128.1	
5.0 x	Fertigation	Fertigation		0.3	h/ha	$2.5 /h	$3.8	
6.0 x	Spray (4km/h)	Airblast tower sprayer		1.5	h/ha	$32.9 /h	$295.9	
4.0 x	Spray (6km/h)	Airblast tower sprayer		1.0	h/ha	$32.9 /h	$131.5	
1.0 x	Mulching (fast)	Mulcher PTO		1.0	h/ha	$30.1 /h	$30.1	
1.0 x	Sod sowing	Sod seeder		1.0	h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders		0.8	h/t	$11.9 /h	$14.9	
							Total	$658.1

Sunraysia citrus development budget year 5 to 7

Enterprise: Afourer mandarin: isolated seedless **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

		Machinery	Sprayed area	Rate per application				
Herbicide								
2.0 x	Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5
5.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x	Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x	Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x	Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
8.0 x	Wetter (Hasten)			0.4	L/ha	$8.3	/L	$26.4
							Total	$64.5
Fertiliser								
5.0 x	UAN	Fertigation		40.0	L/ha	$0.9	/L	$170.0
1.0 x	Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$16.5
1.0 x	MAP	-na-		45.0	kg/ha	$1.7	/kg	$77.4
2.0 x	Potassium nitrate	-na-		100.0	kg/ha	$1.9	/kg	$380.8
1.0 x	Iron EDHHA	Fertigation		5.0	kg/ha	$16.4	/kg	$82.0
Foliar								
3.0 x	Potassium nitrate	-na-		10.0	kg/ha	$1.9	/kg	$57.1
3.0 x	Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$22.6
3.0 x	ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$14.3
3.0 x	Wetter (Agral)			0.2	L/ha	$7.7	/L	$3.4
							Total	$824.1
Fungicides								
2.0 x	Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$84.8
							Total	$84.8
Insecticides								
1.0 x	Oil spray: high grade	Osc. boom (2km/h)		35.0	L/ha	$4.1	/L	$142.2
1.0 x	Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5
2.0 x	Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$86.4
10.0 x	Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x	Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x	Abamectin	used with bait spray		0.0	L/ha	$16.5	/L	$1.2
24.0 x	QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
							Total	$425.0
Crop management sprays								
1.0 x	G.A. (40% granular)	Osc. boom (2km/h)		0.2	kg/ha	$772.0	/kg	$154.4
1.0 x	Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3
							Total	$180.7
Pruning								
1.0 x	Hand pruning			1.0	min/tree	$55.0	/h	$555.5
							Total	$555.5
Crop management								
1.0 x	Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0
1.0 x	Pest monitoring			1.0		$300.0	/ha	$300.0
1.0 x	Hand Fruit Thinning			8.0	min/tree	$25.0	/h	$2,020.0
1.0 x	Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
							Total	$2,388.8

	Practice	Machinery					
Tractor and machinery							
4.0 x	Sod mowing	Slasher	0.5	h/ha	$22.9	/h	$45.8
25.0 x	Check emitters	4 wheel bike (4WB)	0.2	h/ha	$3.3	/h	$16.5
3.3 x	Herbicide rows	Herbicide boom	1.2	h/ha	$32.0	/h	$128.1
7.0 x	Fertigation	Fertigation	0.3	h/ha	$2.5	/h	$5.3
4.0 x	Spray (4km/h)	Airblast tower sprayer	1.5	h/ha	$32.9	/h	$197.3
3.0 x	Spray (6km/h)	Airblast tower sprayer	1.0	h/ha	$32.9	/h	$98.6
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0	h/ha	$44.5	/h	$178.2
10.0 x	Bait spray	4WB+tank sprayer	0.1	h/ha	$4.2	/h	$4.2
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0	h/ha	$3.3	/h	$1.1
1.0 x	Mulching (fast)	Mulcher PTO	1.0	h/ha	$30.1	/h	$30.1
1.0 x	Sod sowing	Sod seeder	1.0	h/ha	$14.5	/h	$14.5
1.0 x	Bin & ladder placement	Fork & ladders	0.2	h/t	$11.9	/h	$62.4
						Total	$782.0

Total partial variable cost **$5,305.3**

Sunraysia citrus development budget year 8 to 10

Enterprise: Afourer mandarin: isolated seedless **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application					
Herbicide								
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5	
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8	
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9	
8.0 x Wetter (Hasten)			0.4	L/ha	$8.3	/L	$26.4	
							Total	$64.5
Fertiliser								
5.0 x UAN	Fertigation		35.0	L/ha	$0.9	/L	$148.8	
2.0 x Calcium nitrate	Fertigation		35.0	kg/ha	$0.8	/kg	$57.7	
3.0 x MAP	-na-		45.0	kg/ha	$1.7	/kg	$232.2	
3.0 x Potassium nitrate	-na-		70.0	kg/ha	$1.9	/kg	$399.8	
3.0 x Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$98.4	
Foliar								
3.0 x Potassium nitrate	-na-		35.0	kg/ha	$1.9	/kg	$199.9	
3.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$22.6	
3.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$42.8	
3.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$8.0	
							Total	$1,210.2
Fungicides								
2.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$84.8	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha	$4.9	/L	$43.9	
							Total	$128.7
Insecticides								
1.0 x Oil spray: high grade	Osc. boom (2km/h)		45.0	L/ha	$4.1	/L	$182.9	
1.0 x Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		2.0	L/ha	$10.8	/L	$21.6	
0.5 x Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0	/L	$168.7	
0.3 x Imidacloprid	Fertigation		5.5	L/ha	$36.2	/L	$65.2	
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5	
10.0 x Abamectin	used with bait spray		0.0	L/ha	$16.5	/L	$1.2	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0	
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8	
							Total	$701.6
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha	$772.0	/kg	$212.3	
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3	
							Total	$238.6
Pruning								
2.0 x Hand pruning			2.0	min/tree	$55.0	/h	$2,222.0	
1.0 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0	
							Total	$2,472.0
Crop management								
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0	
1.0 x Hand Fruit Thinning			10.0	min/tree	$25.0	/h	$2,525.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8	
							Total	$2,893.8

Tractor and machinery

	Practice	Machinery				
4.0 x	Sod mowing	Slasher	0.5 h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2 h/ha	$3.3 /h	$16.5	
1.0 x	Ripping	Ripper tyne	0.2 h/ha	$20.4 /h	$4.1	
3.3 x	Herbicide rows	Herbicide boom	1.2 h/ha	$32.0 /h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0 h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0 h/ha	$10.0 /h	$40.2	
10.3 x	Fertigation	Fertigation	0.3 h/ha	$2.5 /h	$7.7	
4.5 x	Spray (4km/h)	Airblast tower sprayer	1.5 h/ha	$32.9 /h	$221.9	
3.0 x	Spray (6km/h)	Airblast tower sprayer	1.0 h/ha	$32.9 /h	$98.6	
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0 h/ha	$44.5 /h	$178.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1 h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0 h/ha	$3.3 /h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5 h/ha	$30.1 /h	$90.4	
4.0 x	Mulching (fast)	Mulcher PTO	1.0 h/ha	$30.1 /h	$120.5	
1.0 x	Sod sowing	Sod seeder	1.0 h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2 h/t	$11.9 /h	$98.0	
					Total	$1,111.8
					Total partial variable cost	**$8,821.2**

Sunraysia citrus development budget year 11 to 21

Enterprise: Afourer mandarin: isolated seedless **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 606 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application				
Herbicide							
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5
5.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$15.8
5.0 x Carfentrazone	used with Glyphosate		5.0	ml/ha	$0.1	/ml	$2.5
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9
8.0 x Wetter (Hasten)			0.4	L/ha	$8.3	/L	$26.4
						Total	$64.5
Fertiliser							
5.0 x UAN	Fertigation		40.0	L/ha	$0.9	/L	$170.0
2.0 x Calcium nitrate	Fertigation		40.0	kg/ha	$0.8	/kg	$65.9
3.0 x MAP	-na-		50.0	kg/ha	$1.7	/kg	$258.0
3.0 x Potassium nitrate	-na-		80.0	kg/ha	$1.9	/kg	$457.0
3.0 x Iron EDHHA	Fertigation		2.0	kg/ha	$16.4	/kg	$98.4
Foliar							
3.0 x Potassium nitrate	-na-		35.0	kg/ha	$1.9	/kg	$199.9
3.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$22.6
3.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		6.0	kg/ha	$2.4	/kg	$42.8
3.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$8.0
						Total	$1,322.7
Fungicides							
2.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$84.8
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha	$4.9	/L	$43.9
						Total	$128.7
Insecticides							
1.0 x Oil spray: high grade	Osc. boom (2km/h)		55.0	L/ha	$4.1	/L	$223.5
0.3 x Oil spray: high grade	Spray (4km/h)		60.0	L/ha	$4.1	/L	$80.5
1.0 x Bio Control (Aphytis)			0.5	release	$135.0	/release	$67.5
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$43.2
0.5 x Spinetoram	Spray (4km/h)		0.7	L/ha	$482.0	/L	$168.7
0.3 x Imidacloprid	Fertigation		5.5	L/ha	$36.2	/L	$65.2
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3
10.0 x Thickener F.F. lure	used with bait spray		0.1	kg/ha	$21.5	/kg	$21.5
10.0 x Abamectin	used with bait spray		0.0	L/ha	$16.5	/L	$1.2
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8
						Total	$844.3
Crop management sprays							
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.3	kg/ha	$772.0	/kg	$212.3
0.3 x Ethephon	Spray (4km/h)		3.0	L/ha	$14.5	/L	$14.3
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3
						Total	$252.9
Pruning							
2.0 x Hand pruning			2.0	min/tree	$55.0	/h	$2,222.0
1.0 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0
						Total	$2,472.0
Crop management							
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0
1.0 x Hand fruit thinning			15.0	min/tree	$25.0	/h	$3,787.5
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8
						Total	$4,156.3

Tractor and machinery

	Practice	Machinery				
4.0 x	Sod mowing	Slasher	0.5 h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2 h/ha	$3.3 /h	$16.5	
1.0 x	Ripping	Ripper tyne	0.2 h/ha	$20.4 /h	$4.1	
3.3 x	Herbicide rows	Herbicide boom	1.2 h/ha	$32.0 /h	$128.1	
5.0 x	Spot spray 4WB	4WB+tank sprayer	2.0 h/ha	$4.2 /h	$42.0	
2.0 x	Ground fertilise	Fertiliser spinner	2.0 h/ha	$10.0 /h	$40.2	
10.3 x	Fertigation	Fertigation	0.3 h/ha	$2.5 /h	$7.7	
5.2 x	Spray (4km/h)	Airblast tower sprayer	1.5 h/ha	$32.9 /h	$254.5	
3.0 x	Spray (6km/h)	Airblast tower sprayer	1.0 h/ha	$32.9 /h	$98.6	
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0 h/ha	$44.5 /h	$178.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1 h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0 h/ha	$3.3 /h	$1.1	
2.0 x	Mulching (med)	Mulcher PTO	1.5 h/ha	$30.1 /h	$90.4	
4.0 x	Mulching (fast)	Mulcher PTO	1.0 h/ha	$30.1 /h	$120.5	
1.0 x	Sod sowing	Sod seeder	1.0 h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2 h/t	$11.9 /h	$101.0	
					Total	$1,147.4
					Total partial variable cost	**$10,388.7**

Development budget:

Afourer mandarin (various)

A number of options for growing Afourer mandarins are available. The standard Afourer mandarin isolated seedless budget was modified to develop these options. Since all these options are variants of the isolated seedless budget already presented, only the graphs will be shown here. The detailed budgets can be provided upon request.

Seeded

Growing Afourer mandarins near viable pollen (i.e. Valencia or mandarins) will produce seeds in the fruit. Currently, seeded fruit sells about 20% less ($640/t) than seedless fruit ($800/t). It is speculated that seeded fruit will sell for at least 50% less ($400/t) than seedless fruit in the future.

Drape net

A net is placed over the trees during flowering and is removed once flowering is completed. Some growers have already adopted this technology. The production system and methodology is still being refined. A specialised tractor-drawn net applicator is used ($14,000) and it can manage at least/ 10 ha of orchard. Net tearing requires extra labour to repair the net each year. The budget assumes that 60.0 labour hours per ha annually is used to apply, remove and fix the nets.

The net can survive UV degradation for up to 10 years or more, however, the net tears during removal and this reduces the net's life. Some speculate the nets could only last five years, while others estimate10 years, so a lifespan of seven years is assumed in the budgets.

Mature trees also need annual hedging to keep their size within the net's width. The long-term effects from annual light hedging are assumed to have a 10% reduction of mature tree yield as compared to Afourer isolated seedless. In the future, effects from drape netting will be better understood and these budgets will be updated accordingly.

Protected cropping

Full cover permanent hail netting (e.g. 15% shade) has been adopted to reduce fruit blemish (increasing first grade pack out), but it also helps to reduce sunburn, increases hail storm protection and restricts bees from entering the orchard. The blemish reduction effect from full cover nets is analysed in more detail a separate wind protection economic analysis publication.

The cost of installing overhead netting can vary considerably from $40,000 to $50,000 per ha, depending on the whole size of the net (16, 20 or 24 mm) and hectares covered. An installation cost of $45,000 ha is assumed.

The nets also need to be re-tensioned about every six years. Estimated re-tensioning costs range from $5000 ha to $10,000 ha. The budget assumes a re-tensioning cost of $7,500/ha. Some established nets will be re-tensioned in the next couple of years and a better cost estimate will be established.

Blemish reduction assumes 1st grade pack out is increased from 70% to 90%, increasing the per tonne fruit price from $800/t to $960/t (20% increase in price).

The budget assumes that the permanent full cover netting is installed in year five (four years of tree growth). It requires repairs and maintenance (tears and re-tensioning) with applied costs for years:

- 5–7 years $60.0/ha/yr
- 8–10 $100.0/ha/yr
- 11–21 $140.0/ha/yr.

Manufacturers suggest that white coloured nets need replacement after about 12–15 years as the UV has weakened the nets and are therefore more prone to tearing. The budget assumes net replacement after 15 years.

Some orchards install the nets at planting at year one. Anecdotal evidence suggests that the trees grown under permanent netting from planting (year one) will grow faster and come into production one year earlier, thereby increasing early production. This scenarios (installing permanent netting in year 1) is also analysed and results are provided in Figure 35 . The two scenarios are provided:

Scenario one: install net in year five: assumes the net is replaced at year 19 and re-tensioning occurs in year 12.

Scenario two: install net at planting: assumes the net is replaced at year 16 and re-tensioning occurs in year 8. It is assumed that the trees will grow faster and come into production one year earlier, thereby increasing early production.

Afourer mandarin tends to grow more upright in the net, posing issues with canopy structure and maintenance. A more rigorous pruning regime is required. It is speculated that there could be a slightly reduced yield from this extra pruning; the budget assumes a 5% yield reduction in the overhead permanent netting scenario as compared to the open field isolated seedless scenario.

Grower experience indicates that a higher insect pest pressure occurs with an overhead permanent net production system. To account for the higher pest pressure, extra pest control costs in years:

- 5–7 is $256.53/ha/year
- 8–10 is $278.2 /ha/year
- 11–21 is $301.4 /ha/year.

Private seedless varieties

There are a number of private seedless Afourer varieties. These varieties could have contractual arrangements that charge a purchase royalty for each tree and/or a wholesale sales levy. The contractual arrangement could require you to sell the fruit through a nominated packer and marketer. There is a variety of contractual arrangements between private variety providers and you must obtain these details to conduct a complete assessment.

The budget assumes a $4.0 per tree royalty. Most private seedless variety programs implement a levy on the wholesale fruit box price, these levies mostly vary between 2.5%.to 5%. Two sensitivity analysis scenarios are assessed in the budgets; a 2.5% and 5% sales levy on wholesale market price. A wholesale price includes the cost of packing, freight and wholesaler deductions. These budgets only use farm gate price. If a box of fruit is sold at $30 per box the budget assumes that the farm gate price was $15/box and $15/box was charged for packing, freight and wholesaler deductions. If a 5% levy was administered to a $30 box it would cost ($30 x 5%) $1.50/box. If the grower farm gate price is $15/box then this equates to a ($1.50/$15 x 100) 10% levy on farm gate price. Therefore, the budget assumes a 2.5% and 5% wholesale price levy equates to a 5% and 10% reduction in returns from the standard price ($800/t). This equates to a$760/t and $720/t fruit price respectively.

These private marketing groups propose that the sales levy will be absorbed in the higher price of fruit obtained from marketing through an organised packing and marketing structure. The standard, or higher, fruit prices presented in the budgets could be used to represent this scenario.

Summary graph

The following graph summarises all the options using one scenario for each. Both the accumulated cash and the 7% NPV (net present value) tables are good indicators of the production systems' economic result.

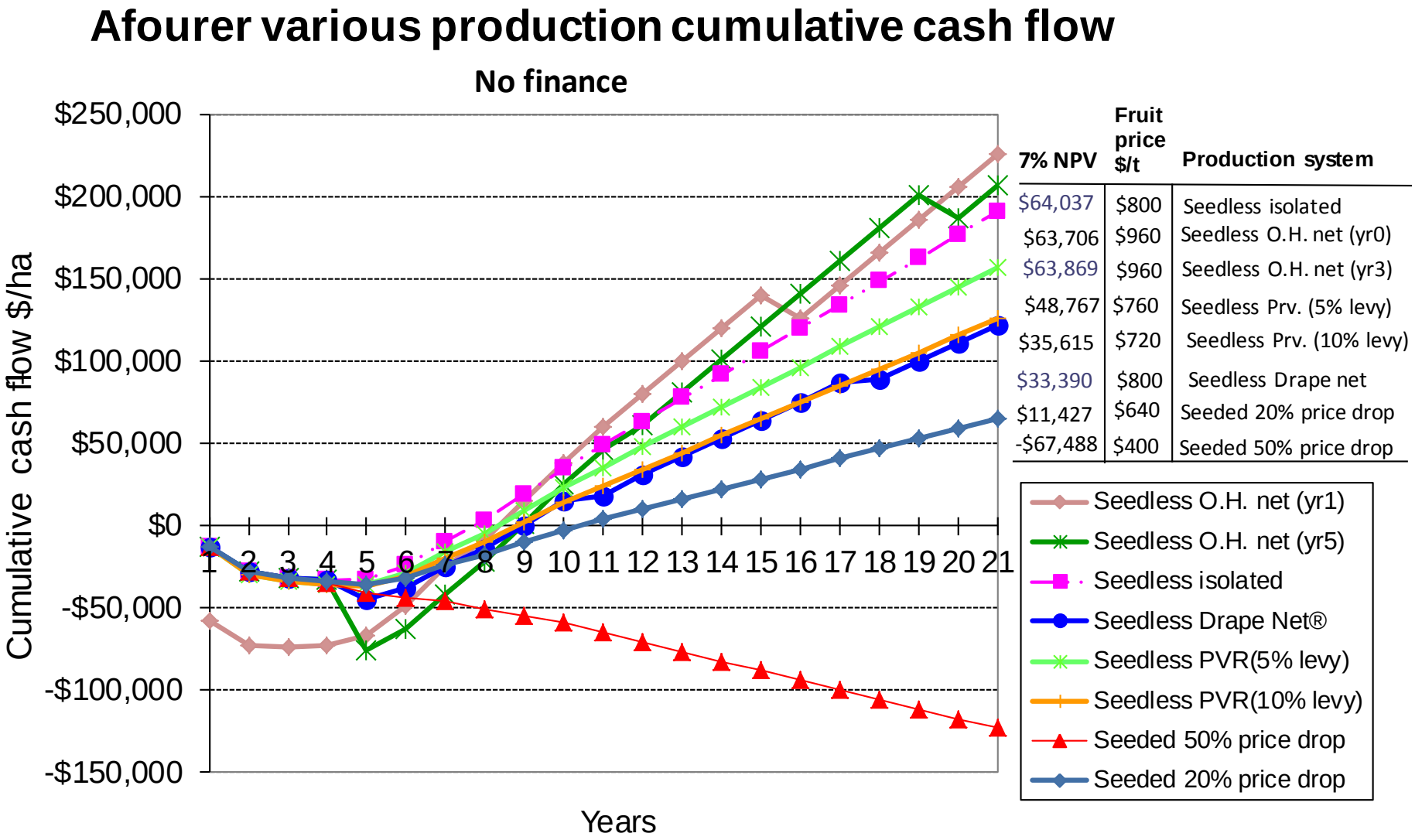


Figure 35. Afourer various production scenarios and cumulative cash flows.

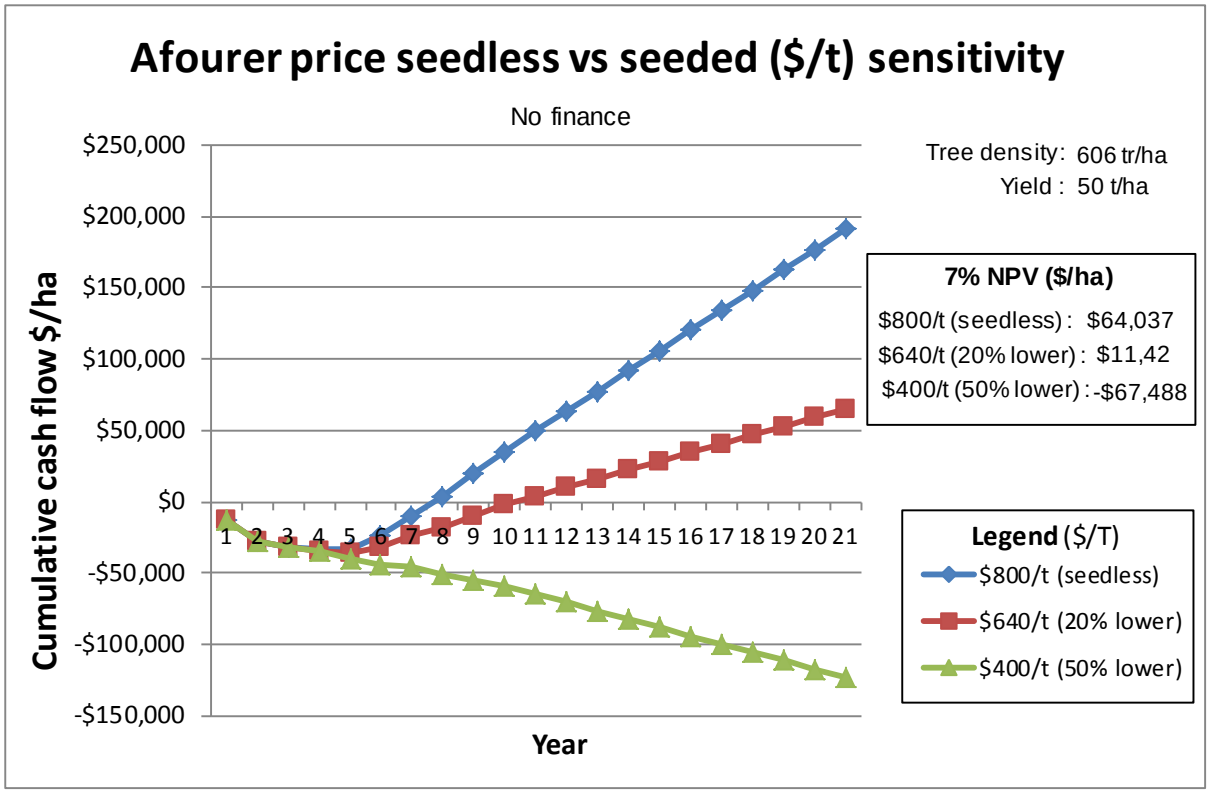


Figure 36. Afourer mandarin cumulative cash flows of seedless and seeded fruit.

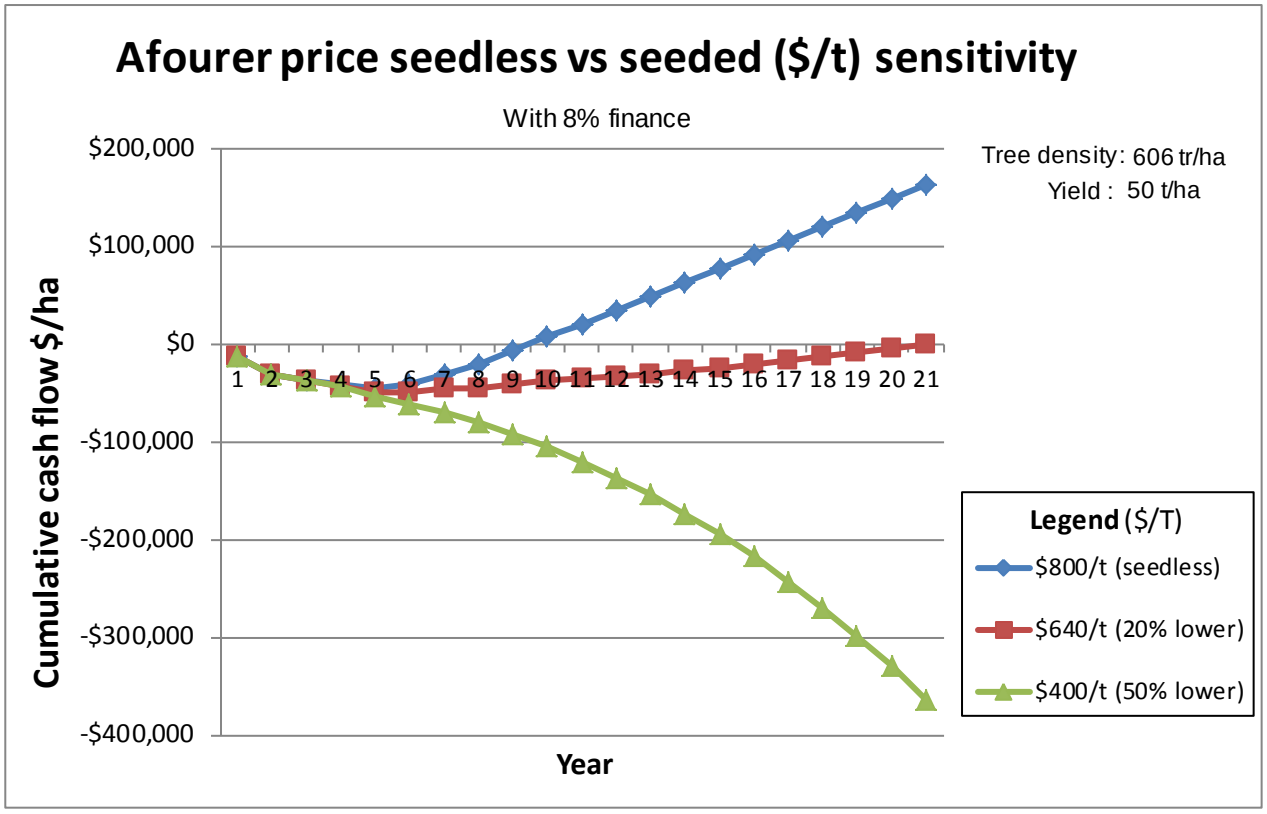


Figure 37. Afourer mandarin cumulative cash flows of seedless and seeded fruit, with finance charges on borrowings.

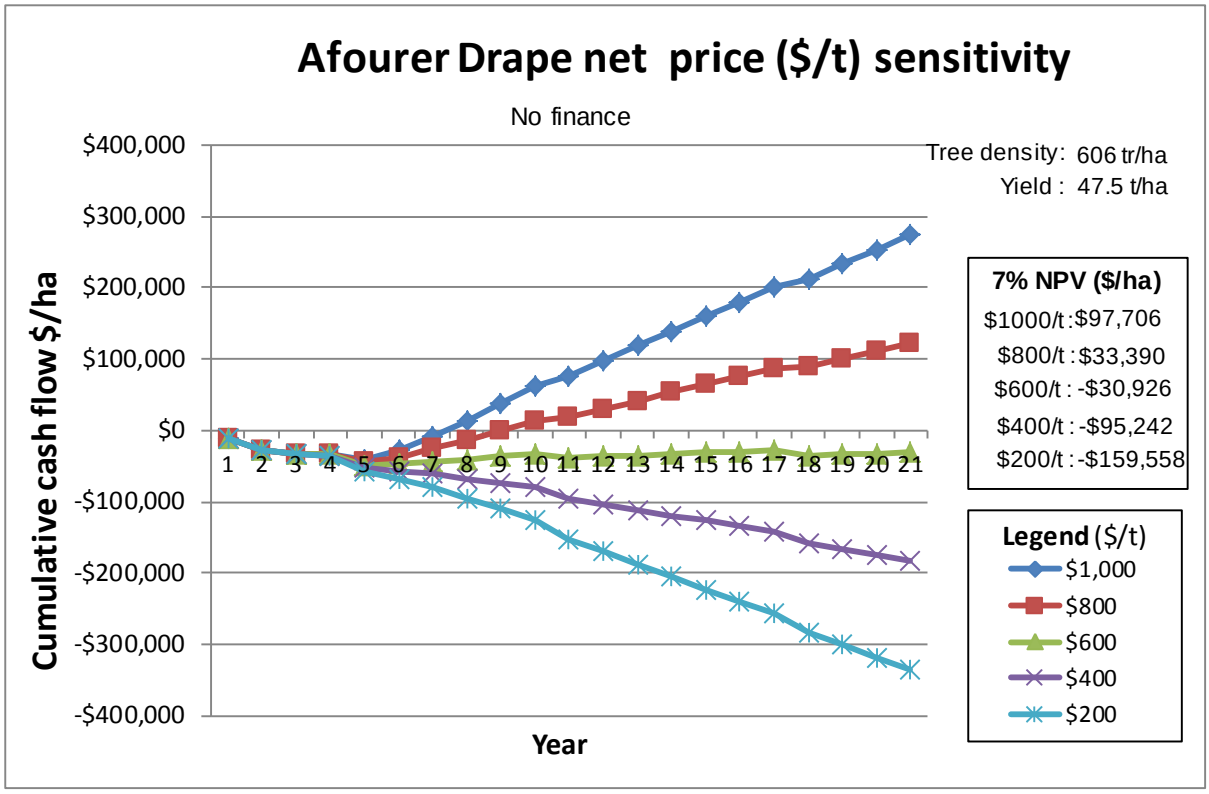


Figure 38. Afourer mandarin cumulative cash flows for a Drape net covered orchard.

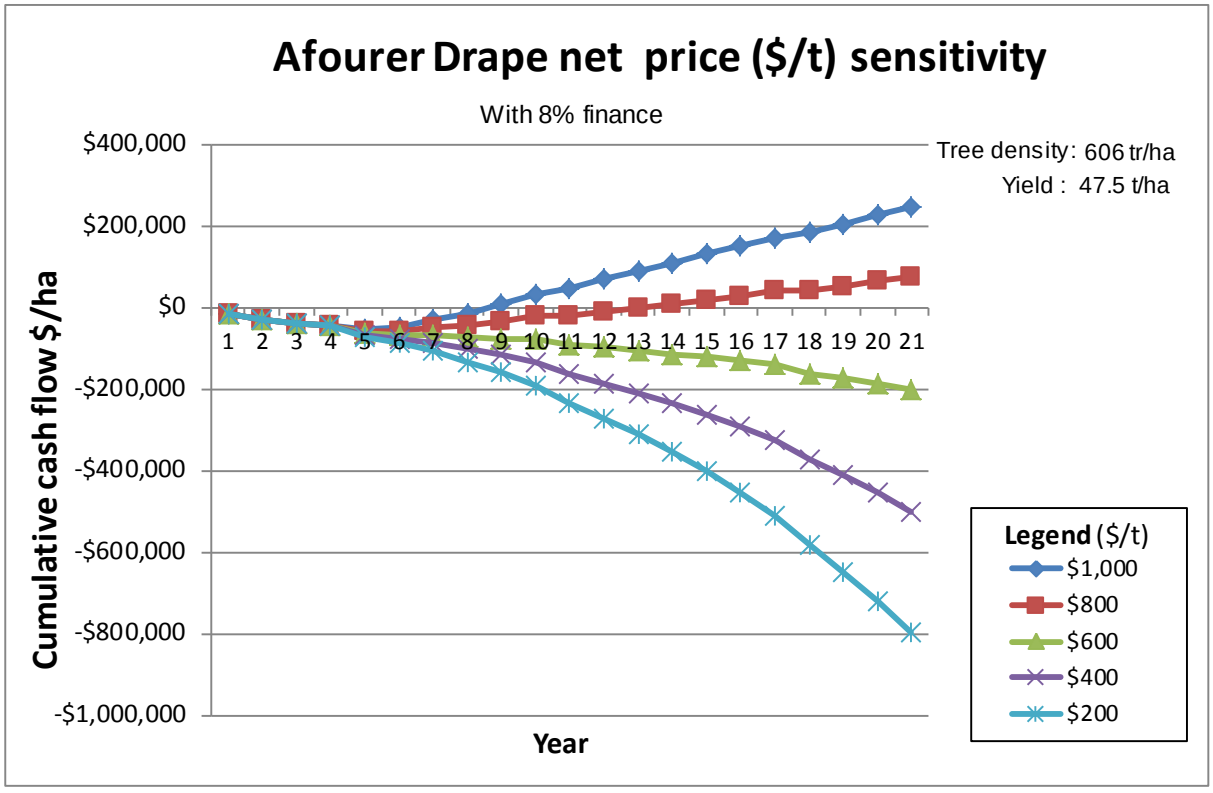


Figure 39. Afourer mandarin cumulative cash flows for a Drape net covered orchard with interest charged on borrowings.

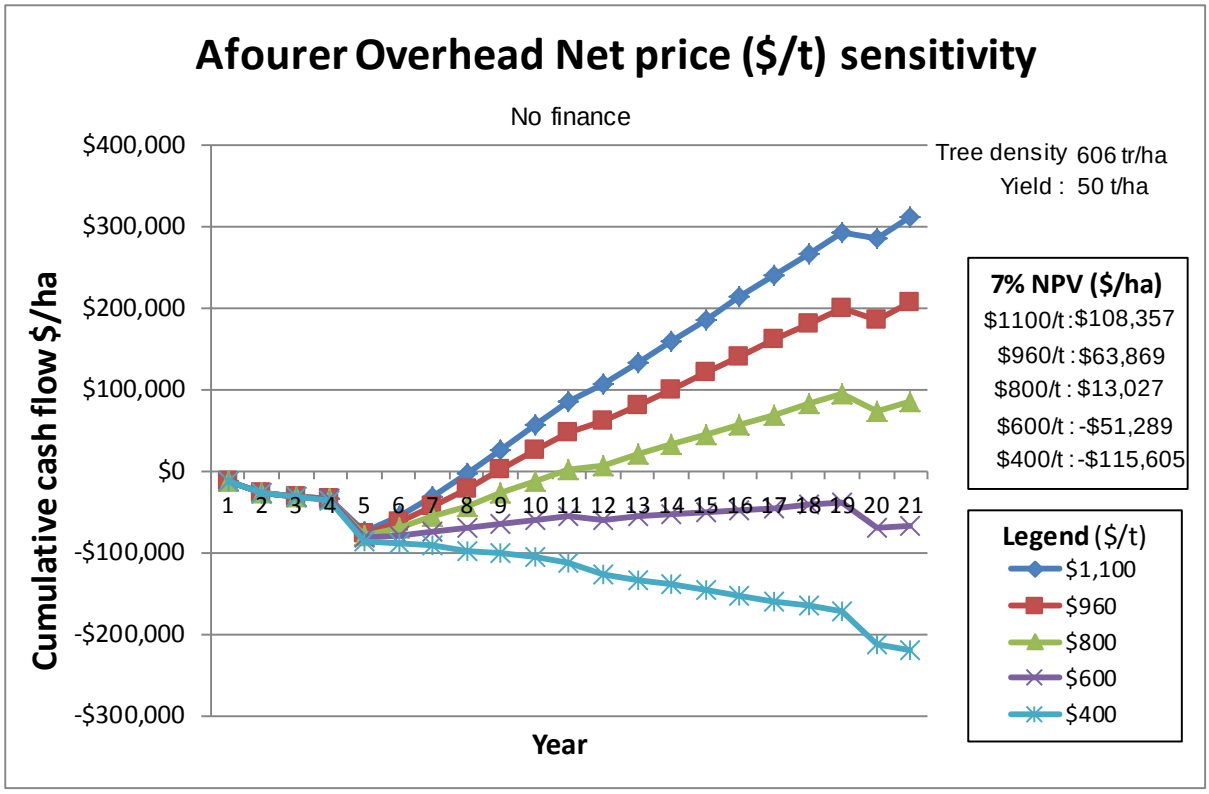


Figure 40. Afourer mandarin cumulative cash flows for permanent overhead netting installed at year five.

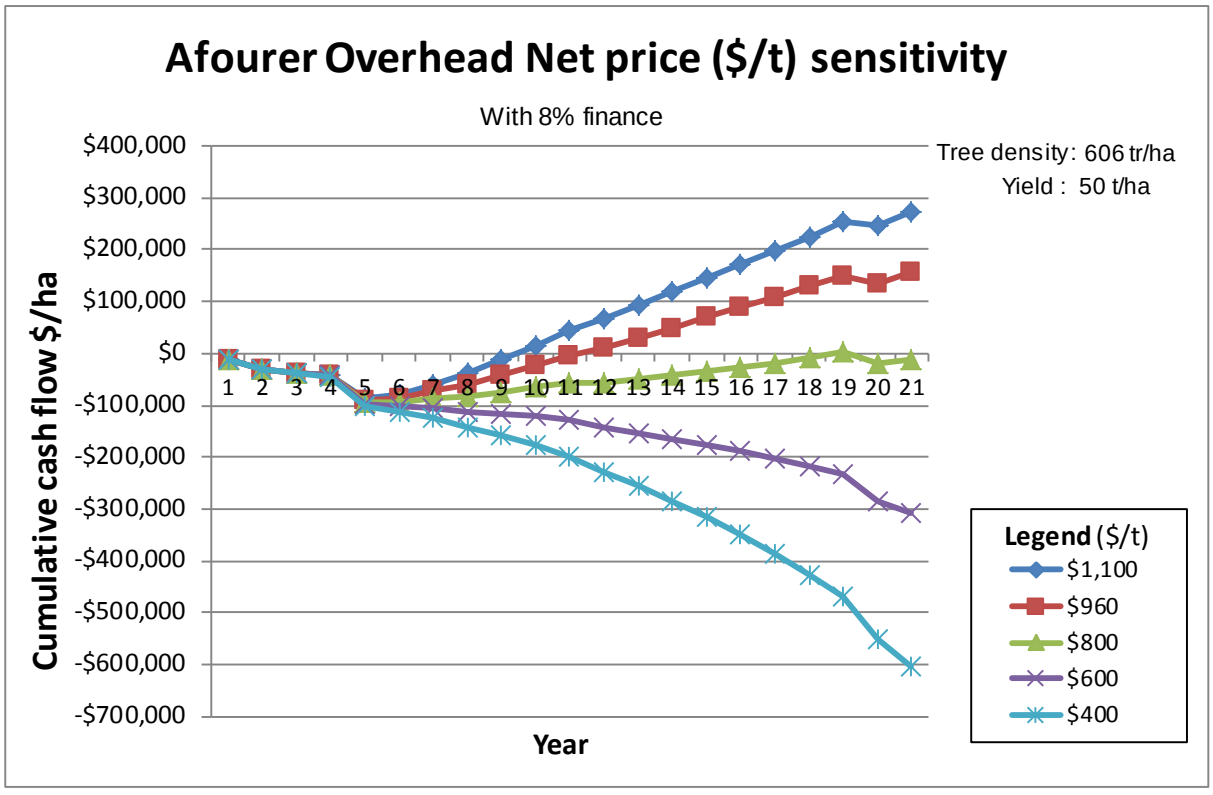


Figure 41. Afourer mandarin cumulative cash flows for permanent overhead netting installed at year five with interest charged on borrowings.

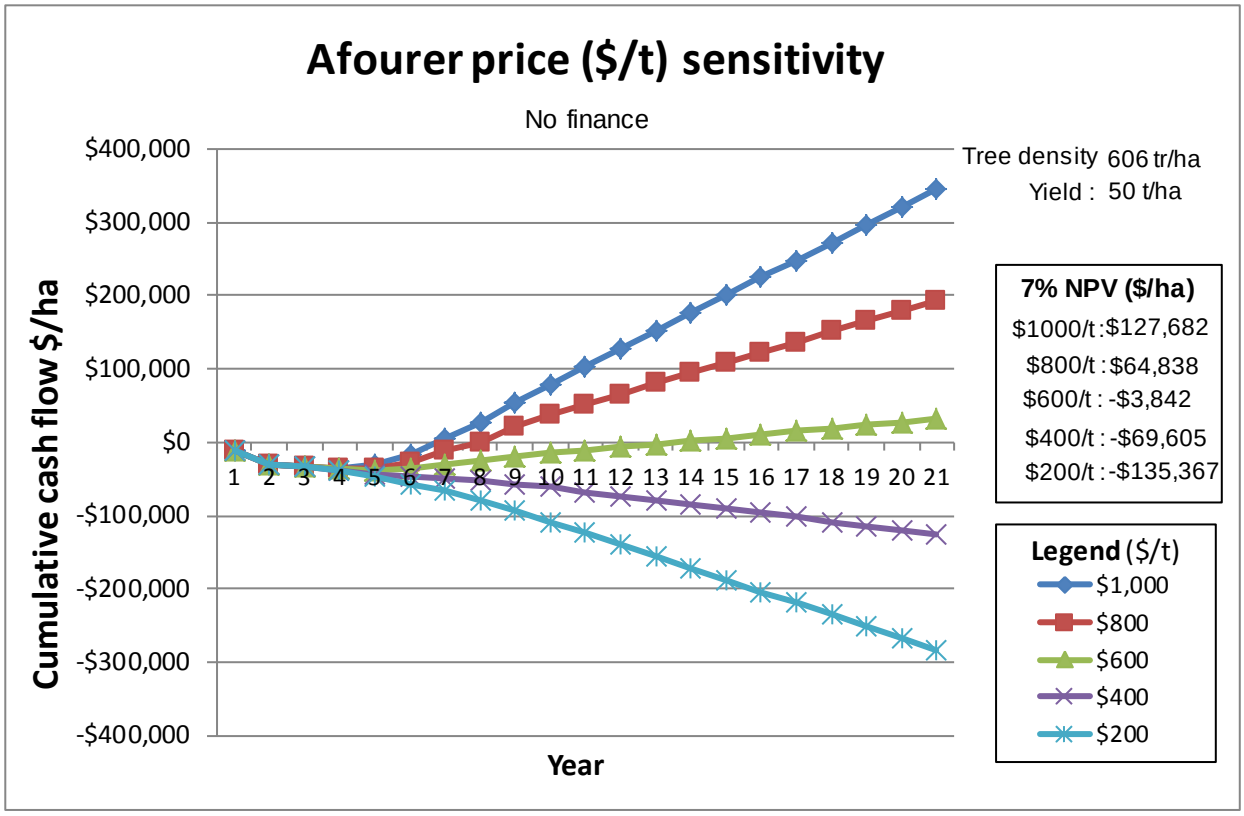


Figure 42. Afourer mandarin cumulative cash flows for private varieties at a 5% and 10% farm gate levy.

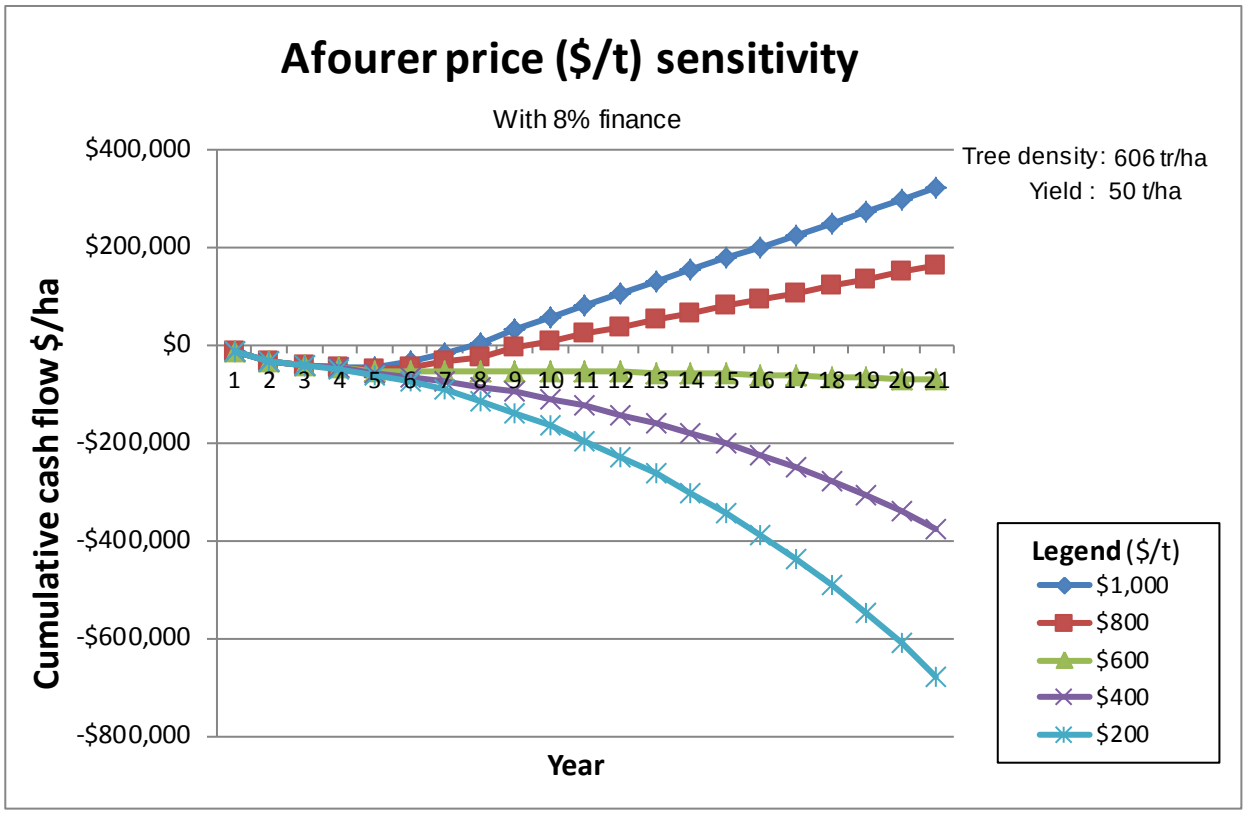


Figure 43. Afourer mandarin cumulative cash flows for private varieties at a 5% and 10% farm gate levy with interest charged on borrowings.

Development Budget:

Reworking navels

Reworking budget

Reworking is becoming a common practice to quickly change existing orchards to a new variety. Techniques and cultural information about reworking are available at the NSW DPI citrus website.

Yield, prices and variable inputs are a combination of current practices and best practice. The prices and yields used in the budgets are considered conservative at the time of publication.

> **Conduct your own investigations on yields, prices and variables inputs in your district and your individual management practices to obtain a more realistic budget projection.**

The Excel spreadsheets used in the budgets are available from the NSW DPI citrus website. These spreadsheets are only a guide as they do not include a detailed analysis of overhead costs, fixed costs and taxation considerations. They are also limited by their design constraints.

Assumptions

The basic assumptions for the budgets are the same as mentioned in the Development budgets section apart from those as discussed below:

- Reworked blocks often continue to use the existing irrigation system. However, when comparing reworking with a new development, the comparison is distorted because the development budget includes a new irrigation system and the reworked block does not. To make a more reliable comparison, the budget for the Navel development used in this reworking comparison will also assume that a new irrigation system is installed to the same value as the redeveloped orchard.
- The budget assumes that Valencias are being reworked to Navel oranges. Only one crop of Valencias from the remaining half tree will be harvested in the reworking process.
- The calendar of operations used in the initial stages of the reworking budget are presented below. See year 1 for a costing of all of the operations.

Year 1:

1. Heavily hedging one side of the tree to within 50 cm of the trunk.

2.Contract pruning to clean up the tree to leave suitable limbs. Very large limbs are left in the row whilst small limbs are placed in the middle of the row.

3.Paint the exposed part of the trunk with white paint diluted to 40 parts paint to 60 parts water. The trees are spray painted using a home garden hand pump sprayer.

4.Contract mulching limbs within the row.

5.Labour to remove large limbs left behind within the row.

6.Contract grafting on two limbs with two graft sticks used per limb. The contractor will manage the grafts until the protective bag is removed.

7.Pruning, training and topping the grafts.

Year 2:

1. Pruning, training and topping the grafts.
2. Removing the other side of the tree. No harvest occurs of the removed side.
3. Contract mulching limbs within the row.

Year 3:

1. Pruning, training and topping the grafts.

Using your own labour or machinery will increase the reworking budget profitability. When constructing your own reworking budget, carefully consider the time commitment for reworking that you will allocate for

yourself. Do not over commit yourself with jobs that will either cause you to overspend and/or result in a poorly managed reworking exercise.

Summary graph

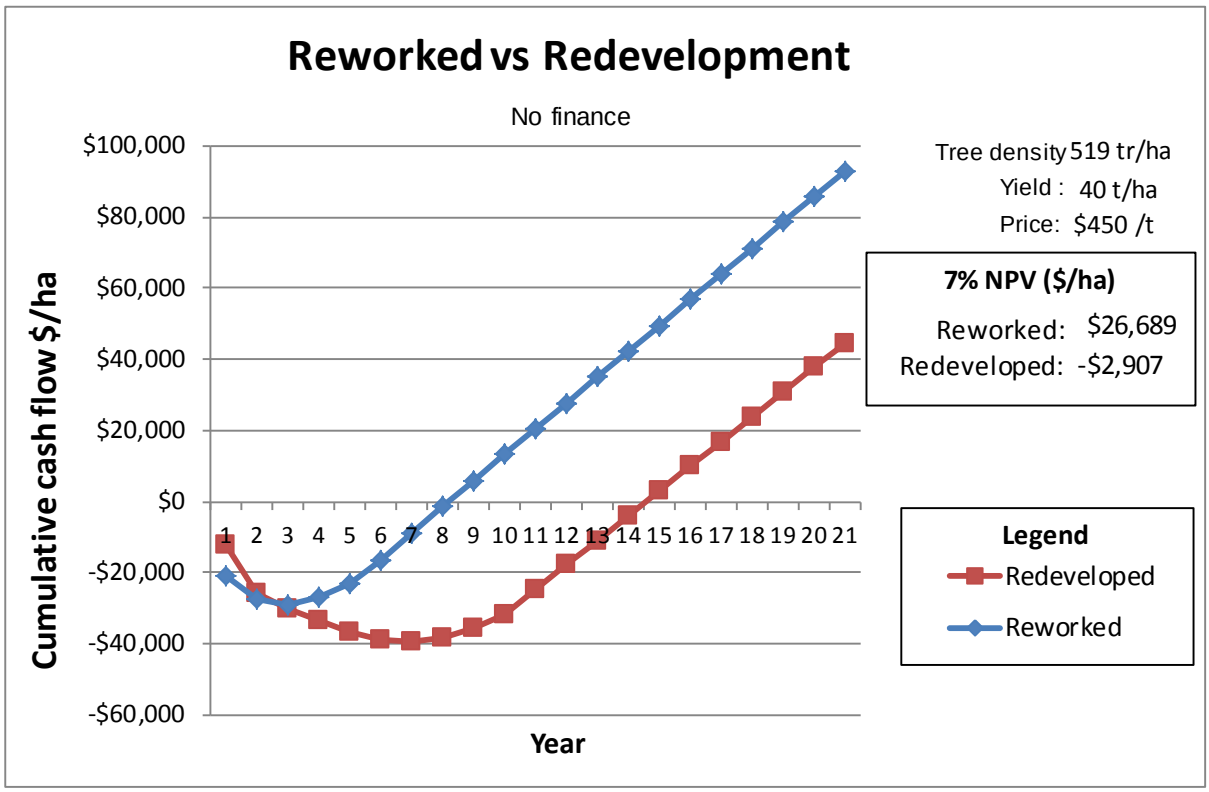


Figure 44. Cumulative cash flows of a reworked Valencia to navel orange orchard compared to a redeveloped navel orange citrus orchard.

Table 11. Summary budget spreadsheet for Valencia orange reworked to Navel orange.

Enterprise (per Ha): Reworked Washington navels

Date: May-18

Description: Sod culture, undertree sprinkler — WB Ver. (May-2018)

Water price: Sunraysia — Harvest (Mandarin,Orange or Machine) = Orange

Tree density: 519 trees/ha — Loan interest Rate = 8%

Unit size: 1 Hectare — 7% NPV (no fin.) = $26,689 — Inflation = 0%

Print Date: 13/05/18

Year	1	2	3	4	5	6	7	9	11	16	21
Water use											
Water use ML/ha	6	4	5	7	8	10	10	10	10	10	10
Income											
Yield t/ha	10	0	7	18.0	27.0	35.0	40.0	40.0	40.0	40.0	40.0
Fruit prices $/t	$150	$150	$450	$450	$450	$450	$450	$450	$450	$450	$450
Total enterprise income	$1,500	$0	$3,150	$8,100	$12,150	$15,750	$18,000	$18,000	$18,000	$18,000	$18,000
Costs											
Yr1 site preparation, reworking & planting	$17,666	$0									
Irrigation	$1,042	$925	$983	$1,143	$1,263	$1,502	$1,502	$1,502	$1,502	$1,502	$1,502
Herbicide	$138	$147	$147	$147	$137	$137	$137	$133	$133	$133	$133
Fertiliser	$172	$279	$279	$279	$419	$419	$419	$636	$636	$636	$636
Fungicides	$21	$0	$0	$0	$42	$42	$42	$86	$86	$86	$86
Insecticides	$1,029	$480	$480	$480	$380	$380	$380	$345	$367	$367	$367
Crop management sprays	$0	$0	$0	$0	$181	$181	$181	$181	$181	$181	$181
Pruning	$0	$324	$324	$324	$643	$643	$643	$1,069	$1,069	$1,069	$1,069
Crop management	$0	$0	$0	$0	$369	$369	$369	$369	$369	$369	$369
Tractor	$291	$639	$660	$676	$718	$730	$737	$825	$871	$871	$871
Harvesting and cartage	$1,030	$0	$721	$1,854	$2,781	$3,605	$4,120	$4,120	$4,120	$4,120	$4,120
Levies	$35	$0	$25	$63	$95	$123	$140	$140	$140	$140	$140
Overhead and fixed costs	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260	$1,260
Machinery hours	15 h	26 h	26 h	26 h	31 h	31 h	31 h	40 h	42 h	42 h	42 h
Other costs converted per unit size & inflation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS	$22,683	$5,994	$4,878	$6,226	$8,287	$9,391	$9,931	$10,666	$10,733	$10,733	$10,733
ANNUAL CASH SURPLUS/DEFICIT	-$21,183	-$5,994	-$1,728	$1,874	$3,863	$6,359	$8,069	$7,334	$7,267	$7,267	$7,267
CUMULATIVE CASH FLOW (NO FINANCE)	-$21,183	-$27,177	-$28,905	-$27,030	-$23,167	-$16,808	-$8,739	$5,928	$20,528	$56,862	$93,196
Interest charge	-$1,294	-$2,171	-$2,765	-$3,154	-$3,333	-$3,307	-$3,058	-$2,309	-$1,443	$0	$0
CUMULATIVE CASH FLOW (After FINANCE)	-$22,478	-$30,642	-$35,134	-$36,414	-$35,884	-$32,832	-$27,820	-$18,156	-$6,891	$28,008	$64,341

Sunraysia citrus development budget establishment & planting Yr 1

Enterprise:	Rew orked Washington navels	**Date:**	$43,221.0
Description:	Sod culture, undertree sprinkler	**Tree density:**	$519.0
Water price:	Sunraysia	**Unit size:**	$1.0
			WB Ver. (May-2018)

COSTS - Year 0

Irrigation system

1.0 x	Micro spray irrigation system (sprinkler, pipe etc)		$6,500	/ha	$6,500.0	
					Total	$6,500.0

Total costs - Land preparation & yr1 planting **$6,500.0**

Reworking

Tree reworking

1.0 x	Hedging heavy (one side, contract)		5.0	h/ha	$250.0 /h	$1,250.0
1.0 x	Contract prune 1				$1.0 /tree	$519.0
1.0 x	Painting stumps		2.0	min/tree	$25.0 /hr	$432.5
1.0 x	White Paint		105.0	ml/tree	$5.0 /L	$272.5
1.0 x	Mulching contract		6.0	h/ha	$280.0 /h	$1,680.0
1.0 x	Rew orking		519.0	tree	$11.0 /tree	$5,709.0
1.0 x	Bud Sticks		524.2	stick	$1.0 /stick	$524.2
3.0 x	Bag management		1.0	min/tree	$25.0 /hr	$648.8
3.00 x	Desuckering & topping		0.2	min/tree	$25.0 /hr	$129.8
					Total	$11,165.7

	Herbicide	**Machinery**	**Sprayed area**	**Rate per application**			
2.0 x	Glyphosate 450g/L	Herbicide boom	50%	2.4	L/ha	$4.5 /L	$10.8
4.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5 /L	$12.6
4.0 x	Carfentrazone	used w ith Glyphosate		5.0	ml/ha	$0.1 /ml	$2.0
0.3 x	Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8 /L	$4.6
1.0 x	Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9 /L	$8.9
8.0 x	Wetter (Hasten)			1.5	L/ha	$8.3 /L	$99.0
						Total	$137.8

Fertiliser

3.0 x	UAN	Fertigation	25.0	L/ha	$0.9 /L	$63.8
1.0 x	MAP	Fertigation	50.0	kg/ha	$1.7 /kg	$86.0

Foliar

2.0 x	Urea (low bi)	-na-	4.0	kg/ha	$0.9 /kg	$6.9
2.0 x	ZM (foliar 17% Zn	Spray (6km/h)	3.0	kg/ha	$2.4 /kg	$14.3
1.0 x	Wetter (Agral)		0.2	L/ha	$7.7 /L	$1.3
					Total	$172.2

Fungicides

1.0 x	Copper oxychlorid	Spray (4km/hr)	2.5	kg/ha	$8.5 /kg	$21.2
					Total	$21.2

Insecticides

1.0 x	Oil spray: high gra	Osc. boom (2km/h)	2.1	L/ha	$4.1 /L	$8.5
1.0 x	Chlorpyrifos	Spray (4km/h)	1.0	L/ha	$10.8 /L	$10.8
2.0 x	Spinetoram	Spray (4km/h)	0.7	L/ha	$482.0 /L	$674.8
1.0 x	Wetter (Agral)		0.4	L/ha	$7.7 /L	$3.1
10.0 x	Yeast autolysate 1	Bait spray	0.5	L/ha	$11.7 /L	$58.3
10.0 x	Thickener F.F. lure	used w ith bait spray	0.1	kg/ha	$21.5 /kg	$21.5
10.0 x	Abamectin	used w ith bait spray	0.1	L/ha	$16.5 /L	$12.4
24.0 x	QFF trap monitorin	4WB QFF trap monitor	1.0	trap/ha	$10.0 /trap	$240.0
					Total	$1,029.3

Tractor and machinery

	Practice	**Machinery**				
6.0 x	Sod mow ing	Slasher	0.5	h/ha	$22.9 /h	$68.6
25.0 x	Check emitters	4 w heel bike (4WB)	0.2	h/ha	$3.3 /h	$16.5
3.3	Herbicide row s	Herbicide boom	1.2	h/ha	$32.0 /h	$128.1
4.0	Fertigation	Fertigation	0.3	h/ha	$2.5 /h	$3.0
1.0	Spray (4km/h)	Airblast tow er sprayer	1.5	h/ha	$32.9 /h	$49.3
1.0 x	Bin & ladder placer	Bin trailer & ladders	0.3	hrs/t	$10.0 /h	$25.1
					Total	$290.6

Total partial variable cost y1 **$19,316.8**

Sunraysia citrus development budget year specific costs

Enterprise	Rew orked Washington navels	**Date:**	1/05/2018
Description	Sod culture, undertree sprinkler	**Tree density**	519 trees/ha
Location	Sunraysia	**Unit size**	1 ha
		WB Ver.	(May-2018)

Costs Yr2

1.0 x	Mulching contract	5	h/ha	$280.00 /h	$1,400.0	
1.0 x	Nurse limb removal	2.5	min/tree	$25.00 /hr	$540.6	
					Total	$1,940.6

Sunraysia citrus development budget year 2 to 4

Enterprise:	Rew orked Washington navels	**Date:**	1/05/2018
Description:	Sod culture, undertree sprinkler	**Tree density:**	519 trees/ha
Water price:	Sunraysia	**Unit size:**	1 ha
		WB Ver.	(May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

			Sprayed area	Rate per application			
Herbicide		**Machinery**					
2.0 x	Glyphosate 450g/L	Herbicide boom	50%	2.4 L/ha	$4.5 /L	$10.8	
4.0 x	Glyphosate 450g/L	Spot spray 4WB		0.7 L/ha	$4.5 /L	$12.6	
4.0 x	Carfentrazone	used w ith Glyphosate		5.0 ml/ha	$0.1 /ml	$2.0	
0.3 x	Haloxyfop	Herbicide boom	50%	0.8 L/ha	$57.8 /L	$7.6	
1.0 x	Paraquat/Diquat	Herbicide boom	50%	3.0 L/ha	$9.9 /L	$14.8	
8.0 x	Wetter (Hasten)			1.5 L/ha	$8.3 /L	$99.0	
						Total	$146.8
Fertiliser							
3.0 x	UAN	Fertigation		50.0 L/ha	$0.9 /L	$127.5	
1.0 x	Calcium nitrate	Fertigation		20.0 kg/ha	$0.8 /kg	$16.5	
1.0 x	MAP	-na-		25.0 kg/ha	$1.7 /kg	$43.0	
1.0 x	Potassium nitrate	-na-		20.0 kg/ha	$1.9 /kg	$38.1	
Foliar							
4.0 x	Urea (low bi)	-na-		8.8 kg/ha	$0.9 /kg	$30.1	
4.0 x	ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0 kg/ha	$2.4 /kg	$19.0	
4.0 x	Wetter (Agral)			0.2 L/ha	$7.7 /L	$4.6	
						Total	$278.8
Insecticides							
4.0 x	Oil spray: high grade	Spray (4km/h)		8.8 L/ha	$4.1 /L	$142.2	
1.0 x	Spinetoram	Spray (4km/h)		0.7 L/ha	$482.0 /L	$337.4	
						Total	$479.6
Pruning							
3.0 x	Desuckering & topping			0.5 min/tree	$25.0 /h	$324.4	
						Total	$324.4
Tractor and machinery							
	Practice	**Machinery**					
2.0 x	Sod mow ing	Slasher		0.5 h/ha	$22.9 /h	$22.9	
25.0 x	Check emitters	4 w heel bike (4WB)		0.2 h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide row s	Herbicide boom		1.2 h/ha	$32.0 /h	$128.1	
4.0 x	Fertigation	Fertigation		0.3 h/ha	$2.5 /h	$3.0	
5.0 x	Spray (4km/h)	Airblast tow er sprayer		1.5 h/ha	$32.9 /h	$246.6	
4.0 x	Spray (6km/h)	Airblast tow er sprayer		1.0 h/ha	$32.9 /h	$131.5	
3.0 x	Mulching (fast)	Mulcher PTO		1.0 h/ha	$30.1 /h	$90.4	
1.0 x	Bin & ladder placement	Bin trailer & ladders		0.3 h/t	$10.0 /h	$22.6	
						Total	$661.5
					Total partial variable cost		**$1,891.1**

Sunraysia citrus development budget year 5 to 7

Enterprise: Rew orked Washington navels **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application					
Herbicide								
3.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$9.7	
4.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$12.6	
4.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha	$0.1	/ml	$2.0	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9	
8.0 x Wetter (Hasten)			1.5	L/ha	$8.3	/L	$99.0	
							Total	$136.7
Fertiliser								
5.0 x UAN	Fertigation		50.0	L/ha	$0.9	/L	$212.5	
1.0 x Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$16.5	
1.0 x MAP	-na-		25.0	kg/ha	$1.7	/kg	$43.0	
1.0 x Potassium nitrate	-na-		20.0	kg/ha	$1.9	/kg	$38.1	
1.0 x Iron EDHHA	Fertigation		5.0	kg/ha	$16.4	/kg	$82.0	
Foliar								
2.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1	
2.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$9.5	
2.0 x Wetter (Agral)			0.2	L/ha	$7.7	/L	$2.3	
							Total	$418.9
Fungicides								
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4	
							Total	$42.4
Insecticides								
1.0 x Oil spray: med grade	Osc. boom (2km/h)		2.1	L/ha	$3.2	/L	$6.8	
1.0 x Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$43.2	
0.3 x Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$55.8	
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha	$21.5	/kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.1	L/ha	$16.5	/L	$12.4	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0	
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8	
							Total	$380.4
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.2	kg/ha	$772.0	/kg	$154.4	
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3	
							Total	$180.7
Pruning								
1.0 x Hand pruning			1.0	min/tree	$55.0	/h	$475.8	
0.3 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$62.5	
1.0 x Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$105.0	
							Total	$643.3
Crop management								
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8	
							Total	$368.8

Sunraysia citrus development budget year 8 to 10

Enterprise: Rew orked Washington navels **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application					
Herbicide								
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5	
4.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$12.6	
4.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha	$0.1	/ml	$2.0	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9	
8.0 x Wetter (Hasten)			1.5	L/ha	$8.3	/L	$99.0	
							Total	$133.5
Fertiliser								
5.0 x UAN	Fertigation		50.0	L/ha	$0.9	/L	$212.5	
2.0 x Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$33.0	
3.0 x MAP	-na-		25.0	kg/ha	$1.7	/kg	$129.0	
3.0 x Potassium nitrate	-na-		20.0	kg/ha	$1.9	/kg	$114.2	
Magnesium sulphate	-na-		20.0	kg/ha	$1.0	/kg	$0.0	
Magnesium nitrate	-na-		20.0	kg/ha	$1.0	/kg	$0.0	
1.0 x Iron EDHHA	Fertigation		5.0	kg/ha	$16.4	/kg	$82.0	
Foliar								
2.0 x Potassium nitrate	-na-		10.0	kg/ha	$1.9	/kg	$38.1	
2.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1	
2.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$9.5	
2.0 x Wetter (Agral)			0.2	L/ha	$7.7	/L	$2.3	
							Total	$635.7
Fungicides								
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha	$4.9	/L	$43.9	
							Total	$86.3
Insecticides								
1.0 x Oil spray: med grade	Osc. boom (2km/h)		2.1	L/ha	$3.2	/L	$6.8	
1.0 x Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		2.0	L/ha	$10.8	/L	$21.6	
0.3 x Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$42.3	
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha	$21.5	/kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.1	L/ha	$16.5	/L	$12.4	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0	
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8	
							Total	$345.2
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.2	kg/ha	$772.0	/kg	$154.4	
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3	
							Total	$180.7
Pruning								
1.0 x Hand pruning			1.5	min/tree	$55.0	/h	$713.6	
1.0 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0	
1.0 x Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$105.0	
							Total	$1,068.6
Crop management								
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8	
							Total	$368.8

Tractor and machinery

	Practice	Machinery				
4.0 x	Sod mowing	Slasher	0.5 h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2 h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom	1.2 h/ha	$32.0 /h	$128.1	
4.0 x	Spot spray 4WB	4WB+tank sprayer	2.0 h/ha	$4.2 /h	$33.6	
2.0 x	Ground fertilise	Fertiliser spinner	2.0 h/ha	$10.0 /h	$40.2	
8.3 x	Fertigation	Fertigation	0.3 h/ha	$2.5 /h	$6.2	
3.0 x	Spray (4km/h)	Airblast tower sprayer	1.5 h/ha	$32.9 /h	$147.9	
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0 h/ha	$44.5 /h	$178.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1 h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0 h/ha	$3.3 /h	$1.1	
2.0 x	Mulching (fast)	Mulcher PTO	1.0 h/ha	$30.1 /h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0 h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2 h/t	$11.9 /h	$83.2	
					Total	$825.5

Total partial variable cost **$3,644.1**

Sunraysia citrus development budget year 11 to 21

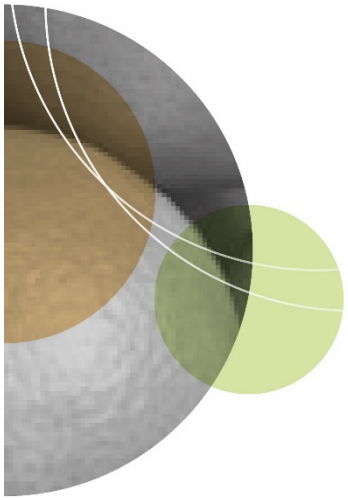
Enterprise: Rew orked Washington navels **Date:** 1/05/2018
Description: Sod culture, undertree sprinkler **Tree density:** 519 trees/ha
Water price: Sunraysia **Unit size:** 1 ha
WB Ver. (May-2018)

PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)

	Machinery	Sprayed area	Rate per application					
Herbicide								
2.0 x Glyphosate 450g/L	Herbicide boom	30%	2.4	L/ha	$4.5	/L	$6.5	
4.0 x Glyphosate 450g/L	Spot spray 4WB		0.7	L/ha	$4.5	/L	$12.6	
4.0 x Carfentrazone	used w ith Glyphosate		5.0	ml/ha	$0.1	/ml	$2.0	
0.3 x Haloxyfop	Herbicide boom	30%	0.8	L/ha	$57.8	/L	$4.6	
1.0 x Paraquat/Diquat	Herbicide boom	30%	3.0	L/ha	$9.9	/L	$8.9	
8.0 x Wetter (Hasten)			1.5	L/ha	$8.3	/L	$99.0	
							Total	$133.5
Fertiliser								
5.0 x UAN	Fertigation		50.0	L/ha	$0.9	/L	$212.5	
2.0 x Calcium nitrate	Fertigation		20.0	kg/ha	$0.8	/kg	$33.0	
3.0 x MAP	-na-		25.0	kg/ha	$1.7	/kg	$129.0	
3.0 x Potassium nitrate	-na-		20.0	kg/ha	$1.9	/kg	$114.2	
1.0 x Iron EDHHA	Fertigation		5.0	kg/ha	$16.4	/kg	$82.0	
Foliar								
2.0 x Potassium nitrate	-na-		10.0	kg/ha	$1.9	/kg	$38.1	
2.0 x Urea (low bi)	-na-		8.8	kg/ha	$0.9	/kg	$15.1	
2.0 x ZM (foliar 17% Zn & Mn)	Spray (6km/h)		2.0	kg/ha	$2.4	/kg	$9.5	
2.0 x Wetter (Agral)			0.2	L/ha	$7.7	/L	$2.3	
							Total	$635.7
Fungicides								
1.0 x Copper oxychloride	Spray (4km/h)		5.0	kg/ha	$8.5	/kg	$42.4	
1.0 x Phosphonic acid 600g	Spray (4km/h)		9.0	L/ha	$4.9	/L	$43.9	
							Total	$86.3
Insecticides								
1.0 x Oil spray: med grade	Osc. boom (2km/h)		2.1	L/ha	$3.2	/L	$6.8	
1.0 x Bio Control (Aphytis)			0.5	release/	$135.0	/release	$67.5	
1.0 x Chlorpyrifos	Spray (4km/h)		4.0	L/ha	$10.8	/L	$43.2	
0.3 x Imidacloprid	Fertigation		4.7	L/ha	$36.2	/L	$42.3	
2.0 x Wetter (Agral)			0.4	L/ha	$7.7	/L	$6.1	
10.0 x Yeast autolysate 1	Bait spray		0.5	L/ha	$11.7	/L	$58.3	
10.0 x Thickener F.F. lure	used w ith bait spray		0.1	kg/ha	$21.5	/kg	$21.5	
10.0 x Abamectin	used w ith bait spray		0.1	L/ha	$16.5	/L	$12.4	
24.0 x QFF trap monitoring	4WB QFF trap monitor		0.2	trap/ha	$10.0	/trap	$48.0	
2.0 x Snail bait (15g Metaldehyde)	Fertiliser spinner		10.0	kg/ha	$3.0	/kg	$60.8	
							Total	$366.8
Crop management sprays								
1.0 x G.A. (40% granular)	Osc. boom (2km/h)		0.2	kg/ha	$772.0	/kg	$154.4	
1.0 x Buffer (Primabuff)			2.1	L/ha	$12.5	/L	$26.3	
							Total	$180.7
Pruning								
1.0 x Hand pruning			1.5	min/tree	$55.0	/h	$713.6	
1.0 x Mech. topping (contract)			1.0	h/ha	$250.0	/h	$250.0	
1.0 x Mech. skirting (contract)			1.0	h/ha	$105.0	/h	$105.0	
							Total	$1,068.6
Crop management								
1.0 x Leaf analysis			0.5	analysis	$120.0	/analysis	$60.0	
1.0 x Pest monitoring			1.0		$300.0	/ha	$300.0	
1.0 x Sod seed	Sod seeder		25.0	kg/ha	$0.4	/kg	$8.8	
							Total	$368.8

Tractor and machinery

	Practice	Machinery				
4.0 x	Sod mowing	Slasher	0.5 h/ha	$22.9 /h	$45.8	
25.0 x	Check emitters	4 wheel bike (4WB)	0.2 h/ha	$3.3 /h	$16.5	
3.3 x	Herbicide rows	Herbicide boom	1.2 h/ha	$32.0 /h	$128.1	
4.0 x	Spot spray 4WB	4WB+tank sprayer	2.0 h/ha	$4.2 /h	$33.6	
2.0 x	Ground fertilise	Fertiliser spinner	2.0 h/ha	$10.0 /h	$40.2	
8.3 x	Fertigation	Fertigation	0.3 h/ha	$2.5 /h	$6.2	
3.0 x	Spray (4km/h)	Airblast tower sprayer	1.5 h/ha	$32.9 /h	$147.9	
2.0 x	Spray (6km/h)	Airblast tower sprayer	1.0 h/ha	$32.9 /h	$65.8	
2.0 x	Osc. boom (2km/h)	Oscillating boom sprayer	2.0 h/ha	$44.5 /h	$178.2	
10.0 x	Bait spray	4WB+tank sprayer	0.1 h/ha	$4.2 /h	$4.2	
24.0 x	QFF trap monitoring	4 wheel bike (4WB)	0.0 h/ha	$3.3 /h	$1.1	
1.0 x	Mulching (med)	Mulcher PTO	1.5 h/ha	$30.1 /h	$45.2	
2.0 x	Mulching (fast)	Mulcher PTO	1.0 h/ha	$30.1 /h	$60.3	
1.0 x	Sod sowing	Sod seeder	1.0 h/ha	$14.5 /h	$14.5	
1.0 x	Bin & ladder placement	Fork & ladders	0.2 h/t	$11.9 /h	$83.2	
					Total	$870.7
					Total partial variable cost	**$3,710.9**



Appendices

Appendix 1: Water costs

The water prices are sourced from Murrumbidgee Irrigation and Western Murray Irrigation. This information can also be sourced in the Water and pumping costs fact sheet at the NSW DPI Farm Business & Trade website.

1. Water prices

A) Riverina (2016/17) – Integrated horticultural supply (High security)

Fixed water costs based on a 15 ha orchard @ 12M L/ha allocation, 180 (15 × 12) delivery entitlement (DE) and 180 ML water entitlement for 15 ha, one outlet, Premium pricing groups – normal usage.

Per landholding fee	$798.00/farm
	=$53.20/ha
Outlet fee – pipe or wheel	$259.00/outlet
	=$17.27/ha
Facilities charge fee	$23.60 DE
	= $283.20/ha
Gov. Bulk water rec. (T3)	$4.96/Entitlement
	= $59.52/ha
Fixed charge	**$413.19/ha**

Variable water costs (i.e. related to volume of water used)

Water usage charge	
Normal use	$10.30/ML
Gov. bulk water rec. (T3)	$ 6.41/ML
Total variable water distribution charge	
	$16.71/ML

B) Coomealla irrigation area – water price (2016/17)

Fixed water costs based on 14 ML/ha allocation: **$304.22/ha**

Variable water costs (i.e. related to volume of water used)

Water use charge*	$61.40/ML
Variable Government	$7.51/ML
Total variable water distribution charge	
	$68.91/ML

* A minimum standing water charge of 45% of the allocation (14 ML/ha) is charged for Coomealla users (i.e. all water use below 7 ML/ha will be charged at the 7 ML/ha rate). This minimum water use charge equates to $386.82/ha.

2. Irrigation systems and pumping costs

This information is sourced from the NSW DPI Farm Business & Trade website – Pumping Costs (Southern NSW).

The most common watering system used in the Riverina for citrus is flood (surface) irrigation. Other methods of watering include the use of micro-systems, drip and overhead sprinklers.

Sources of water include the river system, bores, channels and on-farm storages. The main sources of energy for pumping are diesel and electricity.

Diesel

The on-farm cost of diesel is $0.90 ¢/L. This figure is derived from a bowser price of $1.30 ¢/L less a federal off-road rebate of $0.40 ¢/L.

Electricity (Murrumbidgee example)

The MIA and surrounding areas are served by Great Southern Energy. A concessional tariff is available and applicable only to Irrigation Pumpers.

Irrigation time-of-use tariff

	¢/kWh
Peak charge (7 am to 10 pm on working weekdays)	30.32
Off-peak charge (10 pm to 7 am plus weekends)	16.89

The average electricity charge is calculated assuming irrigation occurs during off-peak 25% of the time.

75% @ 30.32 ¢/kWh

25% @ 16.89 ¢/kWh

Average charge 26.96 ¢/kWh. An average rate of 26.96 ¢/kWh is used for the calculations.

Installing an electric-powered pump involves the capital cost of a power line extension and the cost of installing the required metering equipment, as opposed to virtually no installation costs for a diesel-powered pump. However, in many cases, an electric-powered pump costs less to run with respect to energy costs and repairs/maintenance than does a diesel powered pump.

Calculating pump power and energy requirements

The following methods can be used to determine pump power and energy requirements:

Gross power = Flow rate (litres/sec) x total head (metres)

Required (kW) = 102 × pump efficiency (decimal) × derating (decimal)

Total head at the pump includes suction lift, static lift, pressure delivered (e.g. sprinkler irrigation) and friction losses.

Most large pumps operate at efficiencies within 75–85% when new. A pump efficiency of 80% is used for the calculations.

Derating accounts for efficiency losses between the energy required at the pump shaft and the total energy required. A derating factor of 80% for electric motors, which includes a power factor, and 75% for diesel engines is used.

For diesel units, it is assumed that 0.34 L of fuel will be consumed per hour per kilowatt. Therefore, a diesel motor needing to generate 50 kilowatts of power would consume 17 L of diesel per hour.

Examples of pumping costs

1. Sprinkler irrigation from channel

Assume a sprinkler irrigation lateral with an average output of 90 L per second and a ~ pressure at the start of the lateral of 250 kPa (25.5 m). Assume also that friction loss in the mainline and pump is 5 m and that the water is being lifted 2.5 m (ignoring velocity per second it takes 3.09 hours to pump one megalitre..

Gross electric power = $\frac{90 \text{ L/sec} \times 33 \text{ m}}{102 \times 0.80 \times 0.80}$

= 45.5 Kw

Cost per hour is 26.96 ¢/kWh x 45.5 kW

= $12.27

Cost per megalitre is $12.27/hr x 3.09hr/ML

= $37.90

Gross diesel power = $\frac{90 \text{ L/sec} \times 33 \text{m}}{102 \times 0.80 \times 0.75}$

= 48.5 Kw

Hourly fuel use is 48.5 kW x 0.34 L/hr/Kw

= 16.49 L/h

Cost per hour is $0.90 ¢/L x 16.49 L/hr

= $14.91/hr

Cost per megalitre is $14.91/hr x 3.09 ML/hr

=$46.06/ML

2. Pumping from bores (flood irrigation)

Pumping from bores is relatively costly compared to pumping similar quantities of water from supplies near the surface. Bore pumping costs will vary significantly for different draw-down depths and pump column friction losses. Assume a bore lifting from a draw-down of 34 metres with a friction loss of one metre. Total head at the pump is: 34 + 1 = 35 metres. With a flow rate of 90 litres per second, it takes 3.09 hours to pump one megalitre.

Gross electric power = $\frac{90\text{L/sec} \times 35\text{m}}{102 \times 0.80 \times 0.80}$

= 48.3 Kw

Cost per hours is 26.96 ¢/kWh x 48.3 kW

=16.42

Cost per megalitre is 16.42/hr x 3.09 hr/ML

= $13.02

Gross diesel power = $\frac{90 \text{ L/sec} \times 35 \text{ m}}{102 \times 0.80 \times 0.80}$

= 48.3 Kw

Hourly fuel use is 48.3 kW x 0.34 L/hr/kW

= 16.49 L/h

Cost per hour is $0.90/L x 16.49 L/hr

=$14.91/hr

Cost per megalitre is $14.91/hr x 3.09 ML/hr

= $46.06/ML

Appendix 2: Tractor operating costs

95 HP tractor mechanical front drive

New price: $82,000

Note: Overhead costs (e.g. depreciation, insurance) are not included.

Variable costs:

Table 12. 95 hp tractor variable costs

Item	No.	Cost	Use	Variable costs summary
Diesel fuel		$0.90	13 L/hr	Fuel: $11.75/hr
Engine oil		$8.00/L	10 L/250 h	
Transmission oil	$8.00/L	100 L/1000 h	Oil: $1.12/hr	
Air filter – inner	1	$75/filter	1500 h/filter	
Air filter – outer	1	$126/filter	1500 h/filter	
Rear cab filter	2	$55/filter	1500 h/filter	
Fuel filter	1	$52/filter	500 h/filter	
Hydraulic oil filter	1	$148/filter	750 h/filter	
Oil filter	1	$40/filter	250 h/filter	
Transmission oil filter	1	$118/filter	750 h/filter	Filters: $0.83/hr
Tyres – large	2	$2,400/tyre	3500 h/tyre	
Tyres – small	2	$1,400/tyre	3500 h/tyre	Tyres: $2.17/hr
Batteries	2	$550/battery	3 yrs/battery	Batteries: $0.37/hr
Repairs		2% tractor price/yr	Repairs:$1.64/hr	

Total tractor variable costs: **$17.88/hr**

65 HP tractor, open cabin

New price: $45,000

Note: Overhead costs (e.g. depreciation, insurance) are not included.

Variable costs:

Table 13. 65 hp tractor variable costs

Item	No.	Cost	Use	Variable costs summary
Diesel fuel		$0.90/L	6 L/hr	Fuel: $5.42/hr
Engine oil		$8.00/L	11 L/250 h	
Transmission oil	$8.00/L	45 L/1000 h	Oil: $0.71/h	
Air filter – inner	1	$60/filter	1500 h/filter	
Air filter – outer	1	$70/filter	1500 hrs/filter	
Fuel filter	1	$48/filter	500 h/filter	
Hydraulic oil filter	1	$110/filter	750 h/filter	
Oil filter	1	$40/filter	250 h/filter	
Transmission oil filter	1	$118/filter	750 h/filter	Filters: $0.65/hr
Tyres – large	2	$1,900/tyre	3500 h/tyre	
Tyres – small	2	$400/tyre	3500 h/tyre	Tyres: $1.60/hr
Batteries	2	$550/battery	3 yrs/battery	Batteries: $0.27/hr
Repairs		2% tractor price/yr	Repairs: $0.90/hr	

Total tractor variable costs**: $9.55/hr**

Appendix 3: Implements operating costs

- All implement costs are based on a percentage of the new price.
- The percentages are based on the amount of use and the complexity of the implement.
- Operating costs include all labour and parts for repairs and general maintenance.
- Hours used is based on a 30 ha citrus orchard.
- The costs are based on communication with growers and machinery operators.

Table 14. Implement variable costs

Item	New price	% annual maintenance of new cost	Annual maintenance cost	Hours used per year	Fuel per hour	Operating cost/hr use
Oscillating boom spray unit – 3500 L	$80,000	5%	$4,000	150		**$26.67**
Airblast spray unit – 3500 L	$45,000	5%	$2,250	150		**$15.00**
Sod mowing – slasher	$4,000	5%	$200	40		**$5.00**
Four Wheel Bike (4WB)	$12,000	5%	$600	300	$1.30	**$3.30**
4WB towable herbicide spot spray unit	$4,000	3%	$90	100		**$0.90**
Skirting blade (circular)	$14,000	5%	$700	80		**$8.75**
Trunk band sprayer unit	$2,000	5%	$100	200		**$0.50**
Fertigation unit	$25,000	3%	$90	300		**$2.50**
Mulcher	$14,000	7%	$980	80		**$12.25**
Herbicide Spray Boom: 600 L 3 point linkage	$30,000	3%	$900	40		**$22.50**
Cultivator	$2,000	5%	$100	40		**$2.50**
Sod drill seeder (1.8 m wide)	$25,000	1%	$250	40		**$6.25**