



Department of
Primary Industries

Development update

Wind breaks (Increase or decrease \$/ha)

NSW DPI Citrus roadshow 2017

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www.dpi.nsw.gov.au

Deciduous windbreaks – grafted poplar



Department of
Primary Industries

Citrus program

Casuarina root competition



Root ripping



Background

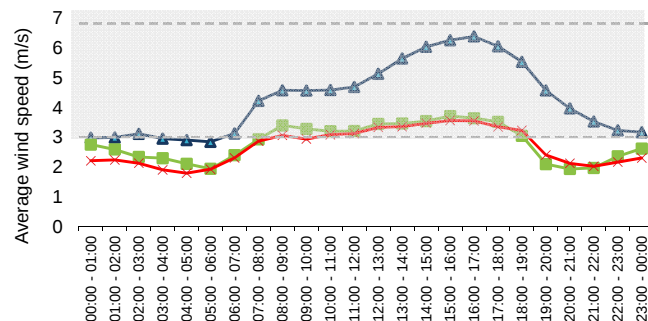
Opinions of using windbreaks in citrus:

- Increase my packouts... I think?
- reduce productivity
 - use land that could otherwise be planted with citrus
 - Competition with orchard trees.
 - Effect of pruning
 - Mature trees ; shelter each other
- economic benefit from reducing damage to fruit



Wind data

- Winds more than 10 km/hr (2.8 m/s) are speculated to cause damage
- Damage occurs 6 to 12 weeks after flowering.



▲ West Gingin Dec 14 ■ Harvey Dec 14 × Mildura Dec 14

gram

Anecdotal information suggests

- Windbreak can add 5% to 20% to the 1st grade pack-out
 - guess or estimate
 - Packouts = mix of; wind, insect ,shape , albedo , texture
- overhead net wind protection might add 15% to 25% to the 1st grade pack-out.

Desktop study questions ???????????????

This study analysed the cost/benefit of tree or vertical artificial windbreaks.

- Is it economically viable to use a tree or artificial windbreak?
- What level of gain in 1st grade packout outweighs a disadvantage of the windbreak?

Scenarios

Three windbreak scenarios were investigated based on the following variables:

1. Wind break take away citrus land and windbreak competitions in adjacent rows
 - Yield reduction by 25% then 5% in rows next to windbreak
2. Wind break take away citrus land and NO windbreak competitions in adjacent rows
3. Windbreak type: Artificial 6m high vs natural (minor land loss)

Fruit pricing

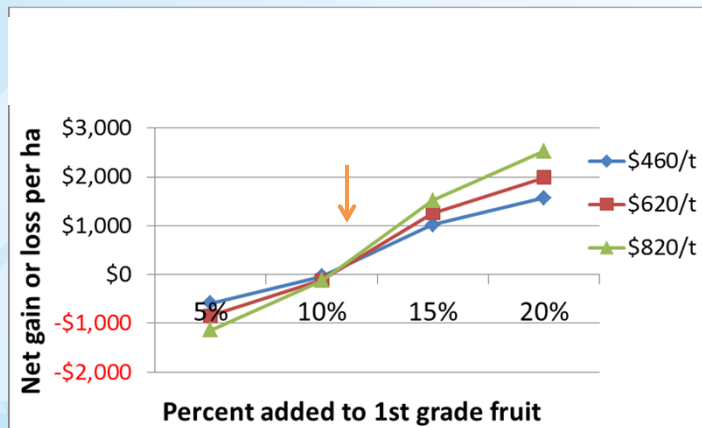
Three fruit box price scenarios were used. The \$/t equated to \$460/t, \$620/t & \$820/t.

Grade	Packout	Price scenarios \$/16kg box		
		\$460/t	\$620/t	\$820/t
1st	50%	\$12	\$16	\$21
2nd	35%	\$6	\$8	\$10
3rd	15%	\$1	\$1	\$3

Mildura Fruit Company & EJT Packers are thanked for assisting with the fruit price scenarios.

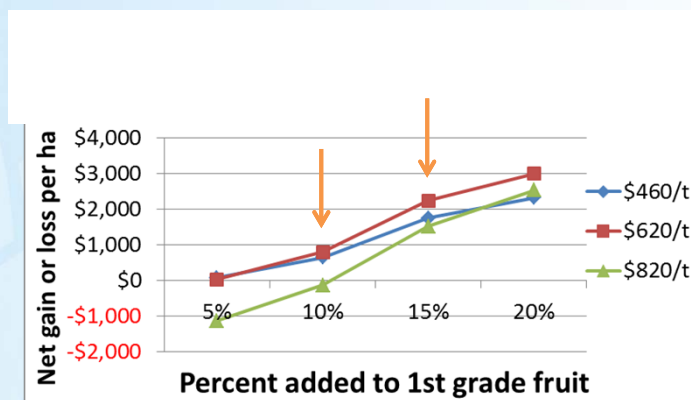
Results scenario 1: Land loss & competition

What % extra 1st grade needed to add \$/ha



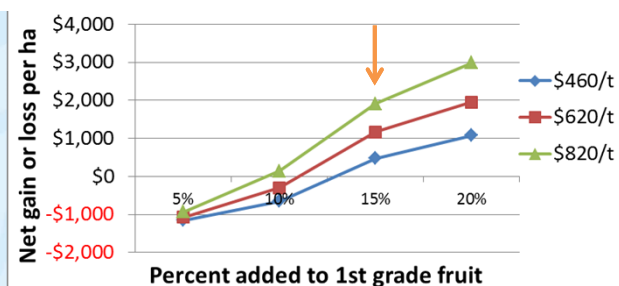
Results scenario 2: Land loss & No competition

What % extra 1st grade needed to add \$/ha



Results scenario 3: Artificial windbreak

What % extra 1st grade needed to add \$/ha



Conclusion

- Need 10-15% + 1st grade pack-out to make it windbreaks financially viable.
 - Results may be dependant on site conditions.
 - Artificial windbreaks could be a viable option but needs further investigation.

Conclusion

- Australia has little field data on wind blemish
 - Data is low on the in-field effects of windbreaks in citrus (row by row) & effect of pruning
 - 10% increase in exports = \$A33 million
- Opportunity for Australia to invest in better understanding wind blemish
 - Effect of wind with pruned trees and varieties
 - What situations need a windbreak and what not !
 - = ↑ \$/ha & ↑ exports

Do not agree with my assumptions!

- Download the spreadsheet
- Customise to your needs
- Training can be provided

	C	D	E	F	G	H	I	J	K	L
1		Sunraysia citrus development budget year 4 to 6								
2		Enterprise: Washington Navels						Date: 1/08/16		
3		Description: Sod culture, undertree sprinkler						Tree density: 519 trees/ha		
4		Water price: Sunraysia						Unit size: 1 ha		
5								WB Ver. (Aug-2016)		
6		PARTIAL VARIABLE COSTS (excluding irrigation & harvest costs)								
7										
8		Herbicide	Machinery	area /app	Sprayed Rate					
14		2.00 x Glyphosate 450g/L	Herbicide boom	30%	2.4 L/ha	\$4.50 /L			\$6.5	
15		5.00 x Glyphosate 450g/L	Spot spray 4WB		0.7 L/ha	\$4.50 /L			\$15.8	
16		5.00 x Carfentrazone	used with Glyphosate		0.005 L/ha	\$98.00 /L			\$2.5	
18		0.33 x Haloxypfop	Herbicide boom	30%	0.8 L/ha	\$57.80 /L			\$4.6	
19		1.00 x Paraquat/Diquat	Herbicide boom	30%	3 L/ha	\$9.85 /L			\$8.9	
22		8.00 x Wetter (Hasten)			1.5 L/ha	\$8.25 /L			\$99.0	
25									Total	\$137
26		Fertiliser								
28		5.00 x UAN	Fertigation		25 L/ha	\$0.9 /L			\$106.3	
29		1.00 x Calcium nitrate	Fertigation		20 kg/ha	\$0.8 /kg			\$16.5	
30		1.00 x MAP	-na-		25 kg/ha	\$1.7 /kg			\$43.0	
34		1.00 x Potassium nitrate	-na-		20 kg/ha	\$1.90 /kg			\$38.1	
38		1.00 x Iron EDHHA	Fertigation		5 kg/ha	\$16.40 /kg			\$82.0	
39		Foliar								
40		3.00 x Potassium nitrate	-na-		10 kg/ha	\$1.90 /kg			\$57.1	
41		3.00 x Urea (low bil)	-na-		8.75 kg/ha	\$8.9 /kg			\$27.6	

Desktop study factsheet



Department of
Primary Industries

Citrus research and development program

Desktop cost benefit analysis of vertical windbreaks

Silvan Fahlens¹ and Browne Wozni²

Background
Industry opinion varies on the benefits of using windbreaks in citrus. Some growers believe they reduce productivity by using land that could otherwise be planted with citrus and from competition with orchard trees. Others firmly believe they provide economic benefit from reduced wind damage to fruit. Anecdotal information suggests that using a windbreak can add 5% to 12% to the 1st grade pack-out (Dewen Turner and Hardy 2006), whilst overhead net wind protection might add 15% to 25% to the 1st grade pack-out. This study analysed the costs/benefit of tree or artificial windbreaks. Analysis of overhead nets are in a separate study.

Analysis methods & assumptions
The analyses attempt to answer:

1. Is it economically viable to use a tree or artificial windbreak and,
2. what level of gain in 1st grade pack-out outweighs the disadvantage of the windbreak?

The analyses are based on a 1.3 ha block of mature trees (100 m x 120 m) and the cost of maintaining the tree windbreak for the block is \$122/year (irrigation and fertiliser). The windbreak is on two sides of the block however only one side is costed because the other side is attributed to the adjacent block of citrus. Three fruit box prices were used for all windbreak and non-wind break scenarios (Table 1). The \$1 equated to \$4600, \$6200 and \$8200. Based on local packers feedback the non-windbreak orchard has a 1st grade pack-out of 50%, 2nd grade of 30% and 3rd grade of 15%.

Three windbreak scenarios were analysed and are presented in Table 2. The main variables of the scenarios are:

- Potential yield: it is related to the land used by the tree windbreak that could be used to grow citrus.
- Windbreak competition: the yield of citrus in the 1st adjacent row to the windbreak is reduced by 25% and the 2nd row by 5%.
- Windbreak type: A 6 m high artificial windbreak instead of a tree windbreak that costs \$13,000/ha is installed. An annual cost of \$1400 is included for installation and maintenance. It uses half the area of a tree windbreak.

The graphs (Figure 1, Figure 2 and Figure 3) present the net loss or gain in income for the specified additional 1st grade pack-out (5% to 20%) for the three scenarios. For example, in Figure 1 at the 15% additional 1st grade pack-out level, if fruit price scenarios are positive, specifically the \$4600/box price provided a \$1000/ha net benefit. As 1st grade pack-out increased then 2nd and 3rd grade pack-out was decreases respectively (data not presented).

Results and conclusion

- An additional 15% 1st grade pack-out is required to provide a net increase in income over all scenarios. An additional 10% 1st grade pack-out is marginal. Current anecdotal information suggests that windbreaks only add 5% to 12% to 1st grade pack-out and based on these values the viability of windbreaks is variable and dependent on specific block situation (i.e. highly exposed or partly protected).
- Artificial windbreaks could be a viable option but needs further investigation.
- Data is low on the in-field effects of windbreaks in citrus (row by row). Windbreak adoption guidelines and a practical decision support tool can be developed by conducting on-farm wind blower case study research and recording wind data. Overhead nets can be included. These tools will help growers identify the parts of their orchard that will financially benefit from windbreaks including site specific factors such as in-field wind data analysis, canopy pruning, net pruning, windbreak type and topography.



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