FACT SHEET

Growing an Almond Opportunity

Growing an Almond Opportunity is a research project investigating the feasibility of establishing a local almond industry based on a premium quality product, produced using sustainable agronomic practices.

Background

Currently 80% of the world's almond supply is grown in California, where there is increasing focus on the unsustainability of production. There are growing pressures to reduce water use and address the impacts on bee populations and the wider eco-systems. Australia is the world's second largest almond exporter and is also increasingly experiencing extreme drought conditions. New Zealand imports $41M worth of almonds annually, mostly from these two countries.

Almonds are known to grow well in the same geographical areas as wine grapes and this project is a preliminary study to explore the opportunities for sustainable almond production in the Hawke's Bay and Gisborne regions.

The project produced three reports:

- Land use and climate suitability modelling
- An economic analysis
- Consumer market research.

Key Findings

Land Use Suitability Modelling

Suitability modelling was carried out for a number of criteria related to climate, soil and terrain considerations. Climate criteria included sufficiency of winter chill and warmth accumulation for flowering, adequacy of temperatures for pollination, frost risk, moisture-related disease risk, warmth accumulation for crop maturity, risk of rain damage to nuts around harvest, and adequacy of annual rainfall. Soil and terrain criteria included sufficiency of soil depth, sufficiency of drainage, steepness of land, and appropriate land use capability class.

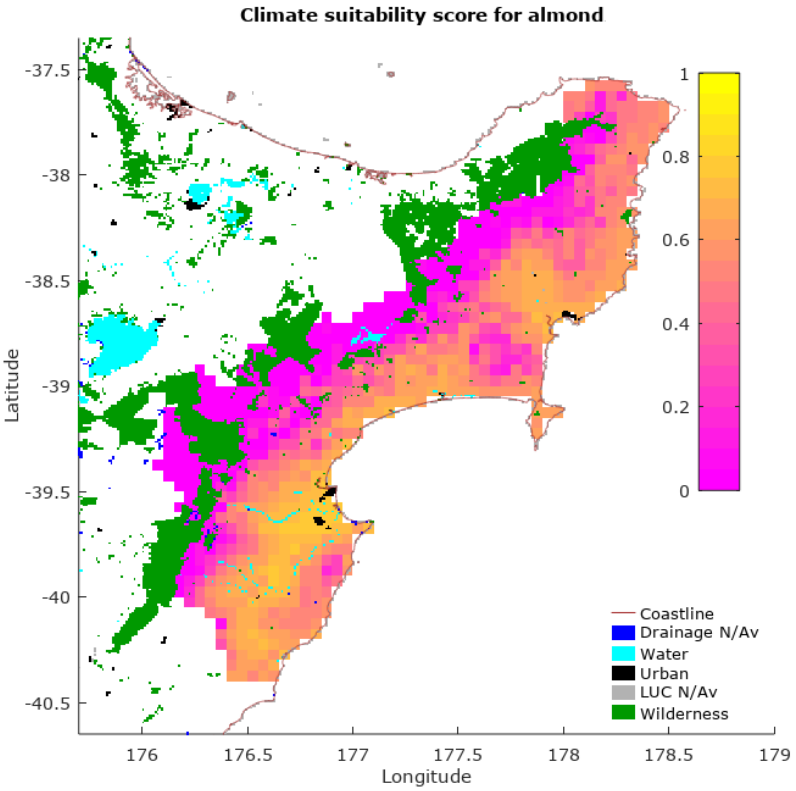
The modelling showed that suitability for cultivating almonds is highly variable across both Hawke's Bay and Gisborne regions; however, a number of locations were identified that could provide good conditions. The Heretaunga Plains, especially around Hastings and Havelock North, were found to have the highest cultivation suitability scores, with a number of locations in Central Hawke's Bay District having slightly lower

cultivation suitability scores. Locations around Tairawhiti and inland of the Poverty Bay flats were also identified as having good suitability scores. There also may be potential for almond cultivation in other areas, such as around Wairoa, if favourable microclimates are found to exist.

Large areas of Central Hawke's Bay District and areas around Hastings and Napier were identified as having insufficient annual rainfall to obtain maximum yields without irrigation. However, growers can choose not to irrigate almonds and accept low yields.

Life Cycle Assessment (LCA)

The study also evaluated the potential carbon footprint associated with growing almonds by performing a partial 'cradle' to the farm gate LCA. This showed that 1 kg of almonds at the farm gate has a potential carbon footprint of between 0.59 kg CO_2^{-eq}/kg for an unirrigated site and 1.83 kg CO_2^{-eq}/kg for a maximally irrigated site. 68% of this is associated with energy required for the irrigation pump. This compares with between 1.6 and 1.9 kg CO_2^{-eq}/kg for almond production overseas.



Suitability modelling, where 1 is highly suitable and 0 is not suitable at all.

Economics

This study identified that with the right inputs and management structure, it is feasible to invest in an almond enterprise.

The study highlighted the importance of yield on financial performance in the short and long terms. Therefore, it is recommended more research is focused on areas such as irrigation best practice, nutrition and pest and disease control, in a New Zealand context.

A yield by price sensitivity analysis suggests that for an almond business to be successful in terms of IRR, the minimum yield achieved must be no lower than 2.5 t/ha and the return no lower than $20/kg.

	Normal input system	Low input system
3-y average yield	2.7 t/ha	2.0 t/ha
Price per kg	$20.00/kg	$20.00/kg
Cost of production	$6.88/kg	$9.14/kg
Development costs	$71,716/ha	$62,096/ha
Breakeven year	12	17*
Internal rate of return (IRR) after 15 years	5.5%	-4.9%

*Estimated i.e. outside of the 15 year scope of the capital budget

Two models (fully irrigated and no irrigation) were stress-tested with variations in price/kg and yield/ha to analyse their impacts on economic performance indices over a 15-year period.

Consumer market research report

Using focus groups this research sought to understand whether consumers would prefer to buy a sustainably produced New Zealand almond in favour of an imported alternative – and pay a premium for the locally produced product.

Amongst the research focus group, there was a curiosity and willingness to try or explore New Zealand grown almonds. Many participants were immediately attracted by the idea that locally grown almonds would be fresher. There's a perception that New Zealand's rich natural resources, with plenty of water and rich soil, would also translate into good-tasting almonds – and that a locally grown product may have a uniquely New Zealand flavour, in a similar way to New Zealand Sauvignon blanc. Also that a focus on sustainable production and high-quality would provide differentiation from imported almonds. There's an expectation that a local almond would be more expensive and most of the participants said they would be willing to pay a premium for New Zealand almonds, with least resistance to a 20% to 30% price premium

Growing almonds in New Zealand — some considerations

Profitability The study highlights the importance of good almond yields and high per kilo orchard gate return.	• At a Gross Margin of $12,270/ha, almonds compare favourably with grape growing in Hawke's Bay. • A better understanding of the New Zealand market size and future potential returns is needed. • Understanding potential costs for drying and processing is also required.
Site selection	• Suitable areas have been identified to a resolution of one square kilometre for soil and five square kilometres for climate – more careful interrogation of sites by a local horticultural consultant will probably be required. • Ideally flat land with good drainage, adequate soil depth for root development and improved drought tolerance.
Climate and weather Frost, chill requirements for flowering, good weather for pollination, sufficiency of warmth to grow a crop to maturity, risk of rain around harvest and other times that can cause damage or disease to nuts	• In colder climates where there is a risk of rain events or long periods of cold temperatures with high humidity, hard-shell varieties may be more suited as they are less affected by weather and the shell can hold up to more aggressive handling and drying techniques, but this would need to be balanced against market acceptance, quality and yield potential of these varieties. • Alternative pollinators such as commercially available bumble bees could help address weather-related pollination issues.
Water supply & irrigation Demand may increase under future scenarios.	• There is potential to manage trees differently to reduce water consumption – e.g. reduced leaf to fruit ratio as with planar/cordon tree architecture. • Almonds are closely related to peaches and nectarines – possibly more drought tolerant and are likely to consume no more water than other types of summerfruit trees. • For good yields, Hawke's Bay growers will probably need access to water rights. • Almonds have been the focus of media scrutiny because of the large amount of water required to grow individual nuts and, by extension, the sustainability of an industry as a whole. While almonds do have a high footprint per unit of weight, they also have very high nutritional and marketing value per unit of weight – similar to walnuts and pistachios.

The right cultivars	• Cultivars are available that could be used for commercial production. In addition, Plant & Food Research has collected 'wild types' growing in Central Otago that could be evaluated for commercial production.
The right rootstocks	• Currently 'Golden Queen' and Myrobolan plum are used – but are probably too vigorous. Alternative rootstocks that could be imported and investigated are Rootpac® and Controller™.
Yield Optimised orchard design and tree architecture	• There is an opportunity to evaluate intensive plantings with narrow rows and planar trees based on cordon and upright designs. These '2D' trees have already demonstrated a significant lift in summerfruit and apple orchard productivity in New Zealand. Optimising harvest with different growing system structures will also need careful consideration.
Labour and machinery Crops such as olives, almonds and grapes need to utilise specific mechanical equipment to have a positive IRR.	• Specialist mechanical harvesting equipment is available, e.g. 'shake and catch' technology – see Tenias Almond Harvester/YouTube. • Plant & Food Research is currently investigating new harvesting concepts for high-producing planar/cordon almond orchard designs in Australia.
Processing	• The study has not evaluated processing requirements for almond groves, e.g. the tonnage and hectares required to support an almond processing facility. Small-scale processing should be possible, e.g. as is currently undertaken for New Zealand-grown walnuts – see Hyundai Country Calendar S2022E29/TVNZ+.
Price premium Profitability will probably depend on achieving a premium over and above commodity pricing of imported Californian and Australian almonds.	• New Zealand-produced almonds will need to be, at a minimum, as good as imports or consumers will not pay a premium. • Compelling reasons to support premium positioning can be, freshness, better taste, nutrition, and eco-credentials such as, supporting local, bee-friendly, and lower environmental footprint. • Sensory research (flavour, texture, appearance), and food chemistry analysis chemistry (nutritionals, shelf-life, residues), could facilitate the premium positioning of New Zealand grown almonds.

For more information

Download the full project reports from https://www.chbdc.govt.nz/our-district/economic-development/growing-an-almonds-opportunity

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TE KAUNIHERA Ā-ROHE O TE MATAU-A-MĀUI

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