

WESTPAC AGRICULTURE CLIMATE CHANGE ASSESSMENT

Kiwifruit

December 2022



Summary

This information sheet has been prepared as part of the Westpac Agriculture Climate Change Assessment series, summarising the impact of a warming climate on the kiwifruit industry in New Zealand, as assessed by Lincoln University and the National Institute of Water and Atmospheric Research (NIWA).

Westpac has engaged Lincoln University and NIWA to provide an independent assessment of the cumulative impacts on both the agriculture and horticulture sectors to better understand the physical, transition and adaptation risks, as well as the opportunities for New Zealand from climate change.

For the kiwifruit sector the largest risk is loss of winter chilling. NIWA data shows winter in 2022 was the warmest on record, exceeding temperature records set in 2021 and 2020. This trend is forecast to continue, with all regions across NZ experiencing the seasonal warming trend.

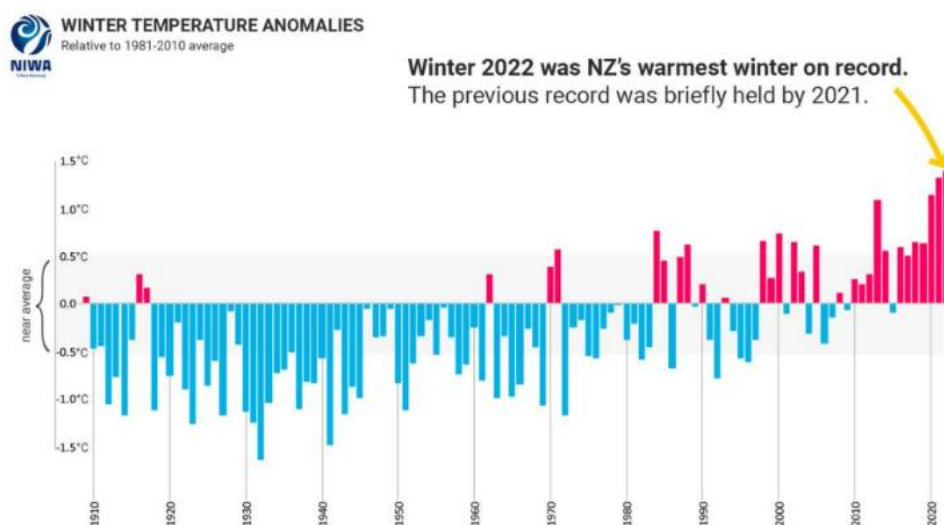
Winter chilling is critical to kiwifruit crop yield. Winter chilling units are measured as a count of the number of

hours between 0 °C and 7 °C (Richardson chill unit model) in May, June and July. However, reasonably reliable chill estimates can be made from daily maximum and minimum temperatures during these months. The amount of winter chilling experienced in a season is also used to predict the optimum time to apply bud break enhancers, which are used to moderate the seasonal fluctuations caused by winter chilling variations.

In warmer winters, kiwifruit tend to break bud less frequently and later in the season. Both green and gold varieties are affected by a reduction in winter chilling, however green varieties tend to see a greater decrease in fruit yields and quality. Currently, green kiwifruit makes up approximately 44% of New Zealand grown kiwifruit, so warming winter temperatures are likely to impact the kiwifruit industry.

Bud break enhancers containing hydrogen cyanamide may be phased out of New Zealand markets as a result of the Hydrogen Cyanamide Reassessment currently underway by the Environmental Protection Authority. This makes the need to assess different adaptation options even more critical for kiwifruit growers to transition successfully into the future.

Figure 1: Winter temperature anomalies: Source NIWA



Winter temperature anomalies from NIWA's seven-station series dating back to 1909, relative to the 1981-2010 average. The seven-station series is comprised of long running and high-quality temperature observations from Auckland, Masterton, Wellington, Hokitika, Nelson, Lincoln (Christchurch) and Dunedin.



Case studies

A case study conducted by Lincoln University examined the impact of a warming climate on kiwifruit production.

The trend of higher winter temperatures is expected to gradually affect the feasibility of growing green kiwifruit in regions that typically already experience milder winters, such as the Bay of Plenty, Northland and Gisborne. Over 90% of Hayward (Green) kiwifruit production is based in the Bay of Plenty. Under current climate change projections viability of green varieties in the Bay of Plenty is expected to steadily decrease over coming decades and may become unviable by the end of the century based on global warming forecasts.

If the Bay of Plenty becomes climatically unsuitable for green kiwifruit varieties, growers will look to switch to different varieties or convert to different land uses. The case study looked at a previous New Zealand Institute of Economic Research (NZIER) study considering the values of irrigated land used in the region. Kiwifruit was found to outperform both pip fruit and viticulture by over \$15,000 per hectare, and avocados by over \$22,000 a hectare (using 2014 adjusted to 2021 figures).

Effect of orchard conversion

Table 1: Gross Margins by hectare in Bay of Plenty 2021 figures adjusted from original NZIER 2014 report

Land use	Adjusted 2021 Gross Margins NZD	
	Average Gross Margin/ ha	Difference from kiwifruit Gross Margin/ ha
Green kiwifruit	\$25,890	-
Pip fruit and viticulture	\$10,776	-\$15,114
Avocados	\$3,230	-\$22,661

Currently orchard conversion from green to gold kiwifruit is limited by the availability of the gold licence by Zespri. Orchard conversion is also often limited by the large capital outlay required, which would furthermore restrict the transition to different kiwifruit varieties or different horticultural crops.

Adaptation options

Adaptation will be a continual process as the effects of warming winters are felt. Flexibility of management options that create 'win-wins' with the current climate projections will be needed to create robust future outcomes.

- **Orchard management techniques:** Techniques such as winter pruning, girdling, summer canopy management and managing crop load can all be employed to maximise budbreak and flower numbers.
- **Alternative budbreak enhancers:** The use of budbreak enhancers can be used to simulate the required winter chilling for kiwifruit. With the use of hydrogen cyanamide under review, growers could consider alternative budbreak enhancers best suited to their location and variety grown.
- **Build a resilient balance sheet:** Repaying debt in the good times to build your balance sheet for the tough times is a well exercised strategy.
- **Utilise available technology:** Technology advancements have meant the monitoring and forecast of winter chilling, and therefore expected budbreak, can help you maximise management techniques to mitigate the effects of a warm winter.
- **Consider your land use options:** As outlined in the case study, a changing climate may mean a change in the variety of kiwifruit grown or change in land use.
- **Investing in a new kiwifruit orchard:** You may consider the impact of a warming climate with any kiwifruit investment. You might consider elevation or temperature profile as part of that investment decision. As ever, using your professional team to advise on any long-term investment decision is strongly recommended.

Summary

The kiwifruit industry will face changes in coming decades as the effects of warming temperatures begin to limit the viability of green kiwifruit in traditional growing areas. As a result, growers may need to consider adaptation options. Eventually this may need to include either different kiwifruit varieties or different land uses.

However global warming also provides opportunities for the horticultural sector. A hotter climate may see other regions like Hawke's Bay, Whanganui, Wairarapa, Canterbury and Central Otago become more suitable for growing green kiwifruit.

Westpac strongly supports helping the New Zealand horticultural and agricultural sectors to become more resilient and adapt and transition to a warmer future.

For further information



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