Horticulture & viticulture

Climate Vulnerability Assessment
Walnut (Chandler) Factsheet

Growing Chandler walnuts in New South Wales: preparing for a changing climate

Climate change offers opportunities and challenges to walnut growing in NSW, with some regions expected to decrease in climate suitability by 2050.

Developing industry-informed climate planning information

Climate change is altering the growing conditions for many agricultural commodities across NSW. Primary producers need evidence-based information about the changing climate, and the risks and opportunities it may bring.

Through its Vulnerability Assessment Project, the NSW Department of Primary Industries is enhancing the resilience of our primary industries by providing information and data to help the sector better plan for, and respond to, climate change. The project has assessed climate change impacts for extensive livestock, broadacre cropping, marine fisheries, forestry, horticulture and viticulture, and important biosecurity risks associated with these industries to inform sound planning, risk management and adaptation decisions.

Walnuts in NSW

Australia's walnut industry is the third largest nut crop industry. The industry continues to grow, with young trees reaching maturity and new plantings established over the last 5 years. In NSW in 2021-22, 9,322 tonnes of walnuts were produced, with a value of $32.2 million, representing 65% of Australia's production (Source: NSW DPI).

The Riverina region near Griffith is NSW's primary walnut production area, with smaller orchards around the Bathurst and Sassafras regions (Figure 1). These areas are suitable for walnut production due to cool winters. The NSW walnut season runs from late August to mid-April.

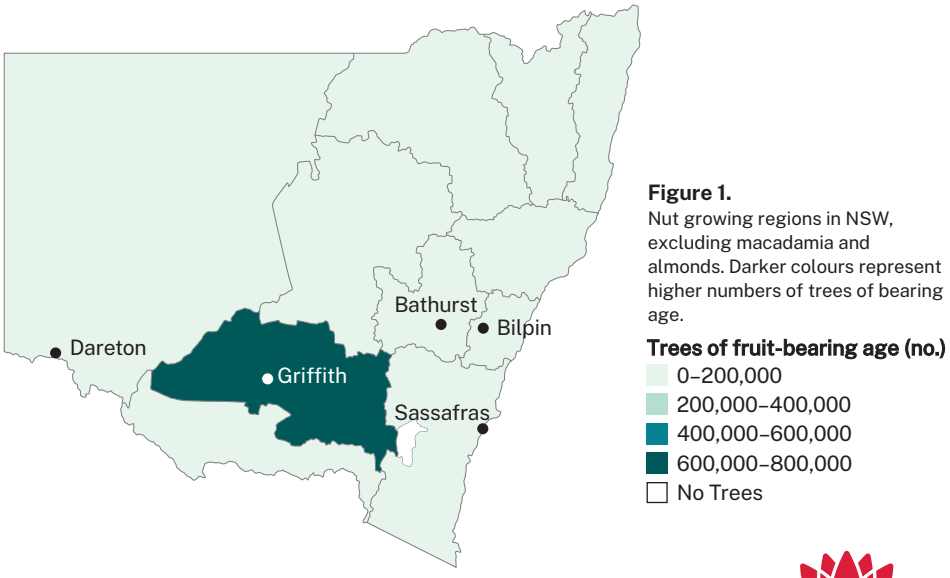

Figure 1.
Nut growing regions in NSW, excluding macadamia and almonds. Darker colours represent higher numbers of trees of bearing age.

NSW GOVERNMENT

Climate and the walnut industry

Climate change presents challenges and opportunities for walnut growing regions in NSW, with both likely increases and decreases in climate suitability by 2050. Climate risks to the NSW walnut industry affect the phenophases of the walnut lifecycle in different ways.

Climate change risks to the NSW walnut industry include:

Extreme heat: Increased temperatures and frequency of hot days may affect the size and quality of the nut.

Insufficient accumulated chill: A warmer climate will likely decrease chill accumulation during dormancy, resulting in insufficient accumulated chill for good bud burst and flowering.

Frost: Fewer days below 0°C will likely decrease frost damage during flowering.

Climate impacts: what to expect

Dormancy is critical in winter for optimal flowering and fruit production. The Bathurst and Sassafras growing regions are expected to maintain very high climate suitability (*high confidence*). A decrease in climate suitability is likely at Bilpin, Dareton and Griffith due to reduced accumulated chill (*high confidence*).

Bud burst in the Bilpin, Dareton, Griffith and Sassafras growing regions is likely to maintain very high climate suitability (*high confidence*). Increased climate suitability is projected at Bathurst due to reduced frost incidences (*high confidence*).

Flowering and pollination may be protected from frost damage under a warming climate, with all growing regions expected to maintain very high climate suitability (*moderate to high confidence).*

Fruit set and growth may be adversely affected by an increase in days over 38°C. A decrease in suitability is likely at Dareton due to an increase in hot days (*moderate to high confidence).* However, all other growing regions are expected to maintain very high climate suitability (*moderate to high confidence).*

Kernel development in the Bathurst, Bilpin and Sassafras growing regions is expected to maintain very high climate suitability (*high confidence*). A suitability decrease is likely at Dareton and Griffith due to increased hot days (*high confidence*).

Harvest is expected to maintain high climate suitability across all growing regions (*high confidence*).

Walnut Quality

Kernel darkening, kernel shrivel and sunburn affect the quality of walnuts. Due to projected temperature rises, without adaptation, Dareton and Griffith are likely to experience a reduction in walnut quality. Despite this, minimal or no overall impact is projected for the suitability of walnut growing regions in NSW in 2050 under a changing climate.

Irrigation water requirements

All walnut growing regions are expected to experience increased water demand under a warmer climate (*low to moderate confidence*). Water stress may affect nut size, quality and yield. However, this risk may be alleviated by optimising irrigation, and adopting new technologies.

How to adapt

Adapting to extreme heat

Increased hot days are expected to affect kernel quality and exacerbate water stress. Implementing supplementary irrigation systems may alleviate increases in water demand, and enhancing soil organic matter through the regular appliance of compost and mulch increases soil moisture during drier periods. Applying kaolin spray during kernel development can help protect the trees and nuts against high temperatures and sunburn. Consideration of walnut cultivars with greater heat resilience could also provide a buffer against increased extreme temperature events.

Adapting to insufficient accumulated chill

Applying growth regulators before budburst may curtail the negative effects of insufficient accumulated chill. Planting low-chill walnut cultivars may be beneficial in regions with declining accumulated chill.

Methodology and data

Climate projections were sourced from Climate Change in Australia's 'Application Ready Data'. This dataset is comprised of projections from an ensemble of 8 global climate models, each presenting a plausible future climate. The models differ in their projections, giving rise to uncertainty in our modelling which is reflected in the confidence statements given in brackets in the text. Care should be taken when interpreting these results.

The Vulnerability Assessment Project is intended to highlight potential industry-or regional-level changes. Intermediate and high emissions scenarios were used in the assessments (RCP4.5 and RCP8.5), but these are not the only future scenarios possible. The inclusion of climate variables important to the commodities production was based on published research, expert knowledge and data quality and availability.

FOR MORE INFORMATION

Please get in touch with vulnerability.assessment@dpi.nsw.gov.au

This work has been produced by the NSW Primary Industries Climate Change Research Strategy funded by the NSW Climate Change Fund.