



# Growing navel oranges in New South Wales: preparing for a changing climate

NSW citrus growing regions will likely maintain very high suitability for citrus production under a changing climate.

## 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.



## Citrus in NSW

Citrus is one of the most important horticultural industries in NSW with a production value for oranges of \$218.8 million in 2021-22, representing 52% of Australian production (Source: NSW DPI).

The primary production regions in NSW are the Murray Valley and Riverina regions (Figure 1). Irrigation is critical to citrus production and is supplied from the Murray, Murrumbidgee and Lachlan Rivers.

Most citrus production is in the semi-arid to arid zones of NSW. The dry climate means fewer disease and insect issues than in coastal regions. Navel oranges were selected for this assessment due to their importance to the industry.



**Figure 1.** Citrus growing regions in NSW. Darker colours represent a higher production of fruit.

**Annual production (t)**  
1-50,000  
50,000-100,000  
100,000-150,000  
150,000-200,000  
No Citrus

# Climate and the citrus industry

All major navel orange growing regions in NSW are expected to remain highly suitable for production by 2050 under a changing climate. Climate risks to the NSW citrus industry affect the phenophases of the fruit's lifecycle in different ways.

Climate change risks to the NSW citrus industry include:



**Extreme heat:** A higher frequency of days above 38°C and 40°C will likely increase the risk of sunburn, which affects yield and quality.



**Frost:** There are likely to be fewer days below threshold temperatures affecting frost-sensitive phenophases such as bud burst and flowering.

## Climate impacts: what to expect

**Flower induction** all regions are expected to maintain the historical very high climate suitability (*high confidence*).

**Bud burst and initial shoot growth** all regions are expected to maintain very high climate suitability (*high confidence*). Suitability at Griffith is likely to increase due to fewer days below -3°C.

**Late shoot growth and flowering** all regions are expected to maintain very high climate suitability (*high confidence*).

**Fruit set/cell division** all regions are expected to maintain very high climate suitability (*high confidence*).

**Cell enlargement** are expected to regions will maintain very high climate suitability (*moderate to high confidence*).

**Maturity and harvest** all regions are expected to maintain very high climate suitability (*high confidence*).

### Citrus Quality

Fruit size and colour will likely remain similar to what has historically been experienced. There are likely to be minimal to moderate improvements in fruit colour around the Gunnedah growing region.

### Irrigation water requirements

All citrus growing regions are likely to experience an increase in water demand (*low to moderate confidence*).

## How to adapt

### Adapting to extreme heat

As temperatures rise, the industry could consider expanding citrus production in the more southern mid-Murray regions of Deniliquin and Barham. Installing overhead netting may reduce the risks of sunburn, although they are expensive and can negatively impact production.

### Adapting to increased irrigation water requirements

Improving on-farm irrigation efficiency (such as through soil moisture monitoring and evapotranspiration scheduling software) may help to build resilience against water availability challenges.

### FOR MORE INFORMATION

Please get in touch with [vulnerability.assessment@dpi.nsw.gov.au](mailto: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.

## 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.

