

Impact of climate change on mango production in the Northern Territory



Mangoes are the Northern Territory's largest horticultural product, and the Territory is the country's largest grower of mangoes.

Induction of mango flowering is sensitive to minimum and maximum temperatures in May–August (depending on the variety). Flowering is important for fruit set and critical for mango production.

The Earth Systems and Climate Change Hub is working with the Northern Territory Department of Primary Industry and Resources and the Northern Territory mango industry to use science-based climate change information to better understand the impact of the changing climate on mango production.

The workshop

In February 2019, an expert meeting was convened in Darwin to learn about the Northern Territory mango industry, how the changing climate might impact it, and how climate change projections could be used to support industry resilience and sustainability into the future. The meeting was attended by representatives from the Northern Territory Department of Primary Industry and Resources, NT Farmers Association, the Australian Mango Industry Association and a number of growers along with a project team from the ESCC Hub.

The Northern Territory mango industry

The Northern Territory is Australia's largest grower of mangoes, producing almost half of the national crop in 2018/19, worth around A\$90 million.

The industry is based around four varieties: Kensington Pride, R2E2, Calypso® and Honey Gold®. Other varieties – including Keitt, Tommy Atkins, Palmer, Nam Dok Mai – are grown in much smaller quantities.

The peak season for mango production in the Northern Territory is from October to December, however some fruit is available from July.

Mango production and climate

Increases in extreme weather and mean temperatures are already affecting mango production in Cambodia, Pakistan, China and the Philippines. In Kununurra, Kensington Pride (the most widely grown variety) is already struggling physiologically. Increasing temperatures will exacerbate this. The response of other varieties needs to be examined.

Mango flowering in the Northern Territory is promoted by low night temperatures and can be inhibited by high day time temperatures. Mango cultivars differ in their temperature requirements. Changes in absolute maximum and minimum temperatures and the frequency of these events will affect flowering and fruit production in northern Australian mango production regions.

Climate drivers and climate trends for northern Australia

The El Niño–Southern Oscillation, Indian Ocean Dipole, Madden-Julian Oscillation, Australian monsoon, tropical cyclones and northwest cloudbands are major influences on the climate of northern Australia.

Average surface air temperature in Australia has risen just over 1°C since 1910, and the frequency of extreme heat events is increasing.

Average rainfall has increased across parts of northern Australia since 1900.

The ocean surface around Australia has warmed over recent decades at a similar rate to the air temperature.

Fire conditions are worsening across large parts of the country, including the northern part of the Northern Territory.

Climate change projections for northern Australia

Climate change is a long-term change in the average pattern of weather that occurs over many decades. Natural variability occurs over the top of this long-term trend.

Climate change projections tell us about the response of the climate system to possible future scenarios. They are not predictions that tell us a sequence of weather events.

Projections are developed by combining our current understanding of the climate system with possible future scenarios in a global climate model. These models simulate climate processes based on laws of physics.

Our confidence in climate projections is based on how well we understand climate processes and how well the climate model can simulate these processes.

We are more confident in some projections (e.g. temperature) than others (e.g. average rainfall).

Future climate for the Northern Territory

Average temperatures will continue to increase in all seasons (very high confidence).

More hot days and warm spells are projected (very high confidence).

Extreme temperatures - substantial increase in the temperature reached on hot days, the frequency of hot days, and the duration of warm spells.

Changes in average rainfall are possible, but uncertain (large decreases are less likely than increases or little change).

Increased intensity of extreme short-duration (hourly, sub-daily) rainfall events (high confidence).

In regions with abundant rain (e.g. Top End and the Kimberley), no change projected in fire frequency.

In more southerly locations, changes to future rainfall will be determining factor of change to fire frequency. (The primary determinant of bushfire in the Monsoonal North is fuel availability.)

Evaporation is projected to increase in all seasons as warming progresses (high confidence).

Humidity is projected to decrease (medium confidence).

Mean sea level will continue to rise and height of extreme sea-level events will also increase (very high confidence).

Using climate change information to plan ahead

The Northern Territory Government has been supplied with projected temperature threshold datasets out to 2090.

Additional relevant tools and datasets are on the *Climate Change in Australia* website (climatechangeinaustralia.gov.au).

To demonstrate the use of climate change information for sectoral decision-making, the ESCC Hub will work with the Northern Territory Department of Primary Industry and Resources on a case study examining the impact of climate change on flowering induction in mango in the Northern Territory.

The full report from this workshop is available on the Earth Systems and Climate Change Hub website at www.nespcclimate.com.au.

For more information on the ESCC Hub's work with mango industry stakeholders in the Northern Territory, please contact Hub Knowledge Broker, Mandy Hopkins on 03 9239 4649 or mandy.hopkins@csiro.au.