

What do fewer inductive days mean for mango cultivars in the Darwin region?



Photo: Maddison Clonan

The Darwin mango production region is highly vulnerable to a decline in inductive days due to rising temperatures.

By the end of the century, there will be fewer than five inductive days for May and August so flowering will be concentrated in June/July.

Calypso and Kensington Pride are the least vulnerable of the studied cultivars.

Taking on-farm action now may reduce the impact of these changes.

Warming trend set to continue

The average temperature in the Northern Territory has increased by around 1°C over the past 100 years, and the number of extreme heat days has increased. This trend is set to continue.

As it gets warmer, important temperature thresholds for mango production will be crossed, including the threshold for flower induction.

In the Darwin region this means that cultivars that are currently grown will become more vulnerable.

Temperatures limiting flower induction in Darwin

Given its proximity to the coast, temperatures in the Darwin production region (which includes the Batchelor, Berry Springs, Bynoe, Tipperary, Greater Darwin, Noonamah and Marrakai production areas) typically do not fall as low in the cool dry season as in other regions. This means the region is highly vulnerable to a decline in inductive conditions under rising temperatures.

Mango flowering in the Darwin production region is limited by the number of days with minimum temperatures below 18°C and maximum temperatures above 32°C.

Fewer inductive days

We analysed climate projections for both high and lower emissions futures to find how rising temperatures would affect the number of inductive days in the Darwin production region.

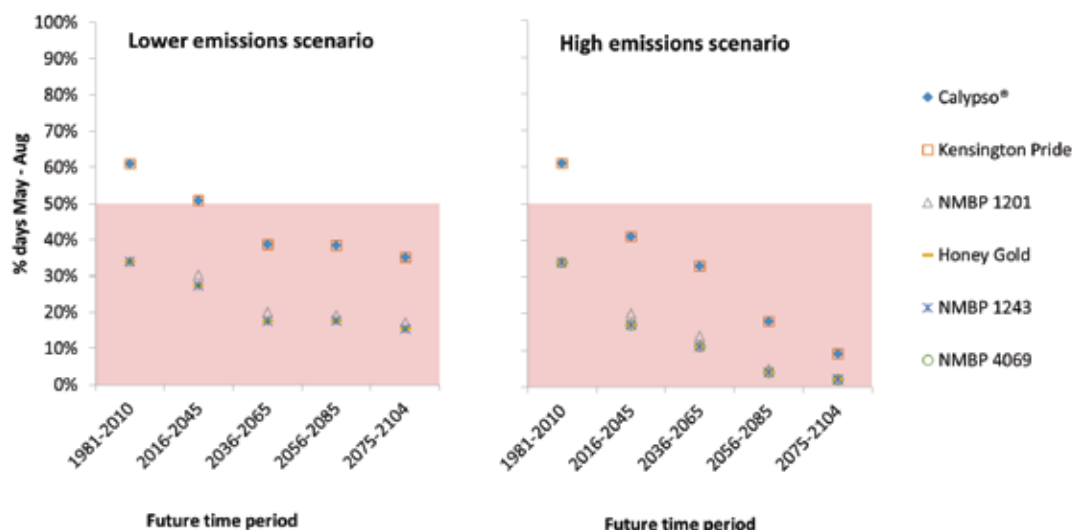
Current temperatures during the flowering period are already limiting mango flower induction of cultivars with low temperature thresholds.

Under both high and lower emissions scenarios, the number of inductive days for mango flowering in May and August could decline rapidly to fewer than five days by the end of the century. Orchards positioned closer to the coast are more vulnerable than those further inland. At the end of the century, floral induction may be restricted to the month of July where in some areas more than 20 inductive days could occur.



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Percentage of inductive days in May to August for each mango cultivar in Darwin, as projected by the upper range model for each emissions scenario compared with historical values (1981–2010). Cultivars with fewer than 50% inductive days in May to August are deemed vulnerable (indicated by red shading).



Vulnerable cultivars

Taking the number of inductive days into account, we looked at how six cultivars – Kensington Pride, Calypso®, Honey Gold and cultivars 1201, 1243 and 4069 from the National Mango Breeding Program (NMBP) – would fare under both high and lower emissions futures.

Calypso® and Kensington Pride are the least vulnerable as they have high thresholds for both minimum and maximum temperatures. However, they may still experience a 40% decline in the number of inductive days between May and August by the end of the century. The other cultivars are expected to experience a greater decline.

The upper range of projections under a high emissions scenario suggests there could be fewer than 10% of days with inductive conditions for all cultivars assessed within this study late in the century. In a high emissions scenario, none of the assessed cultivars would be suitable for production systems in the Darwin region.

Staying viable

Growers will need to consider on-farm adaptation actions to reduce the impacts of climate change and maintain the ongoing sustainability of mango production in the Northern Territory. These actions include canopy management, moving to new cultivars, relocating orchards and employing orchard cooling practices. As extreme heat becomes more prevalent, the health and safety of farm works will also need attention.

Farm-level actions will need to be supported by an industry response that may include education and extension, commercialisation of new cultivars, market development for resilient cultivars, and management of changes in fruit supply to market.

Grower and industry activity will need to be supported by policies and regulations at all levels of government that are considerate of short-term transformational change, while also accounting for the incremental change required to address longer term climate challenges.

Ongoing research to better understand climate-resilient genotypes, the climatic limits of artificial chemical flower induction, protective cropping, mango genetic adaptation and development in a changing climate, harvest timing and new production sites will continue to provide information to support adaptation.

Find out more

The impact assessment report contains full details of the climate change analysis and additional information about adaptation options. It is available at www.nesplimate.com.au.

For information about research on impacts of climate change on mango production

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