

Mango varieties for future climates

Dr Cameron McConchie and Maddison Clonan

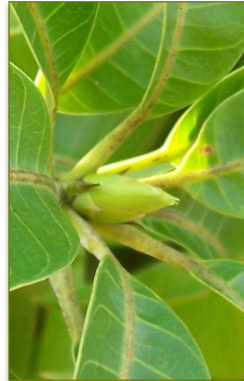
Department of Primary Industry and Resources

17 May 2019

What drives mango flowering?

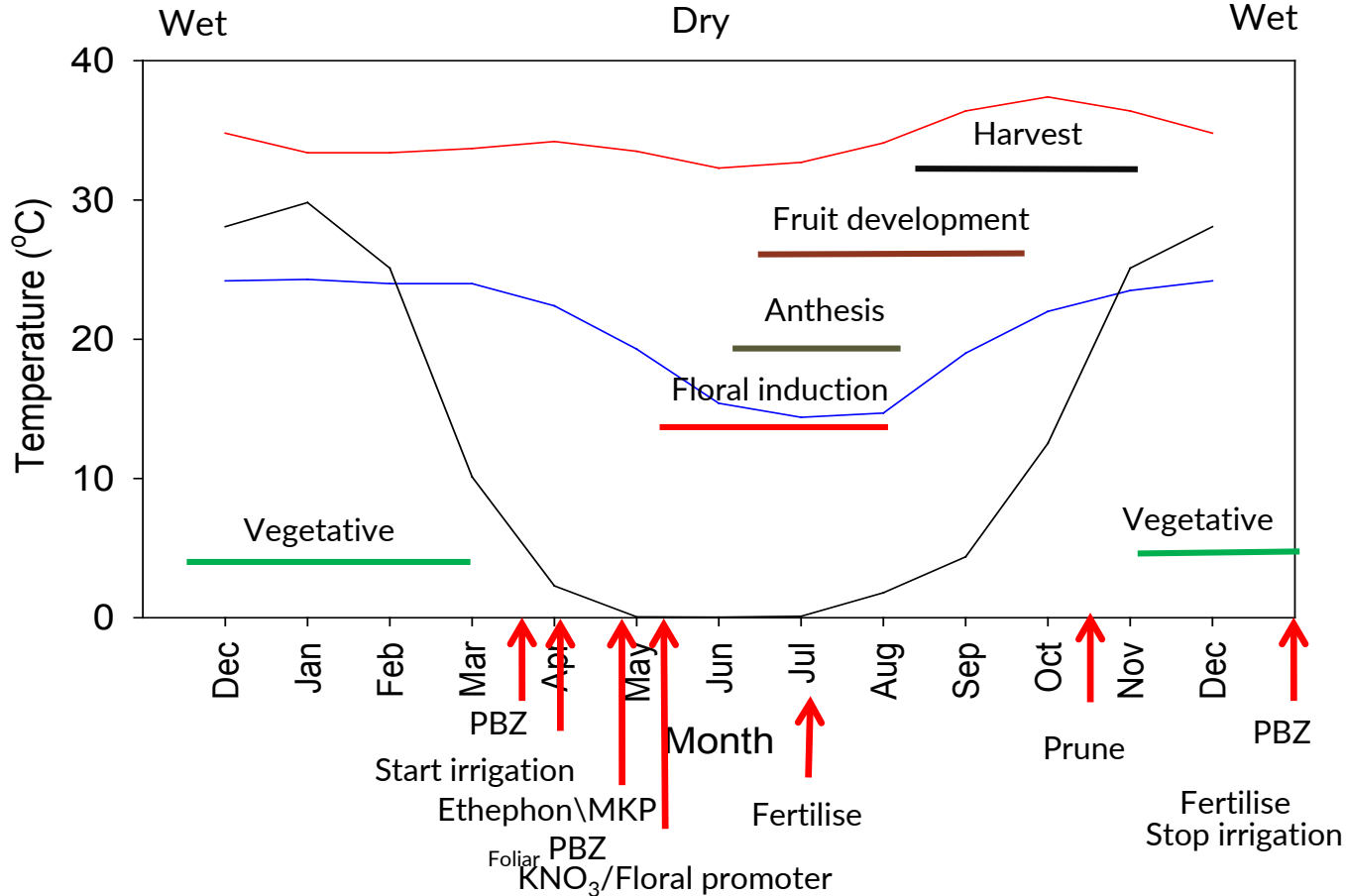


Mature leaves
Cold induced
Leaf signal
Transmission
Growing buds



Key production processes are linked to climate

Revised Darwin mango crop management



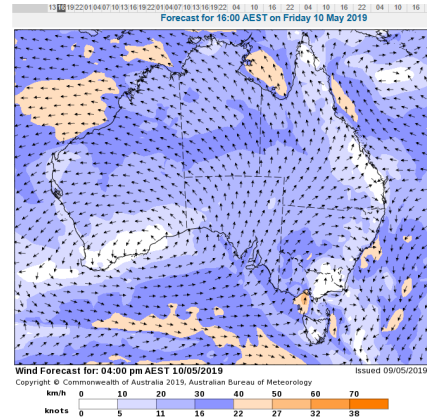
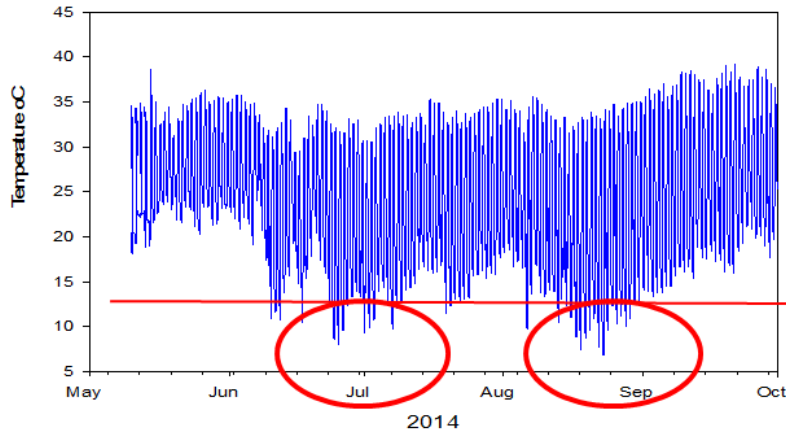
What makes mangoes flower early in regional Darwin?

Chemicals

- Growth regulators to reduce vigour
- Chemicals to promote bud break and flowering

Weather

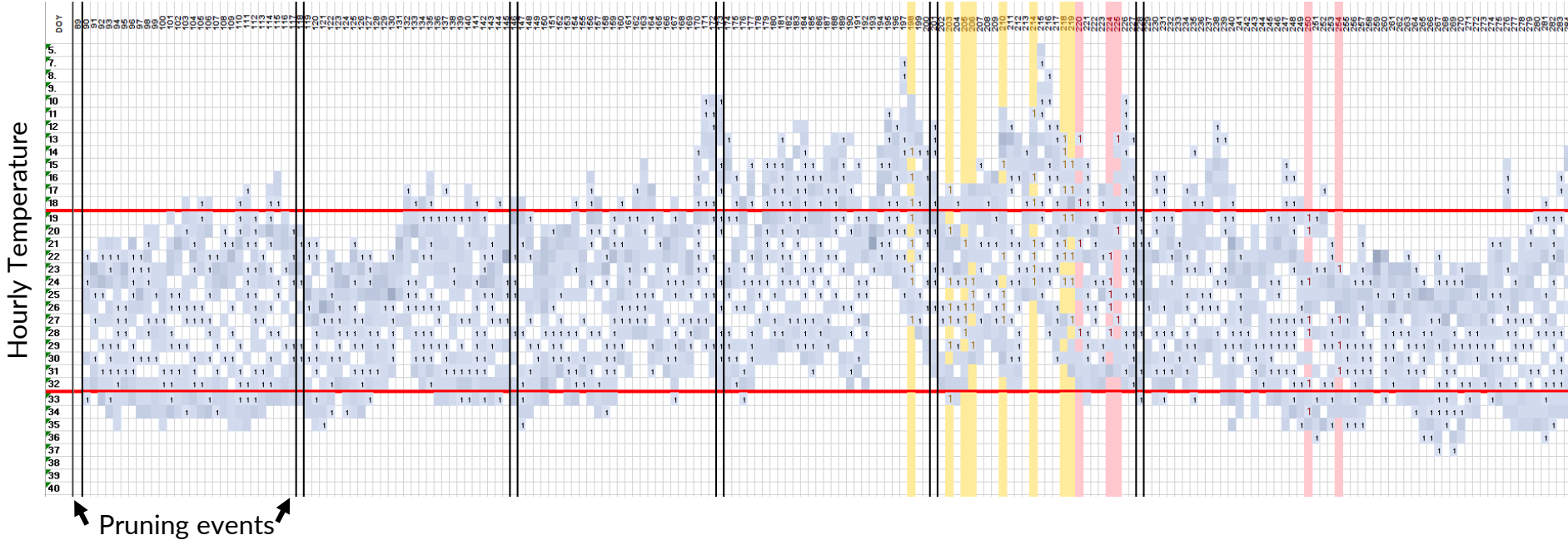
- Synchronise with inductive temperatures



Source (right): Bureau of Meteorology

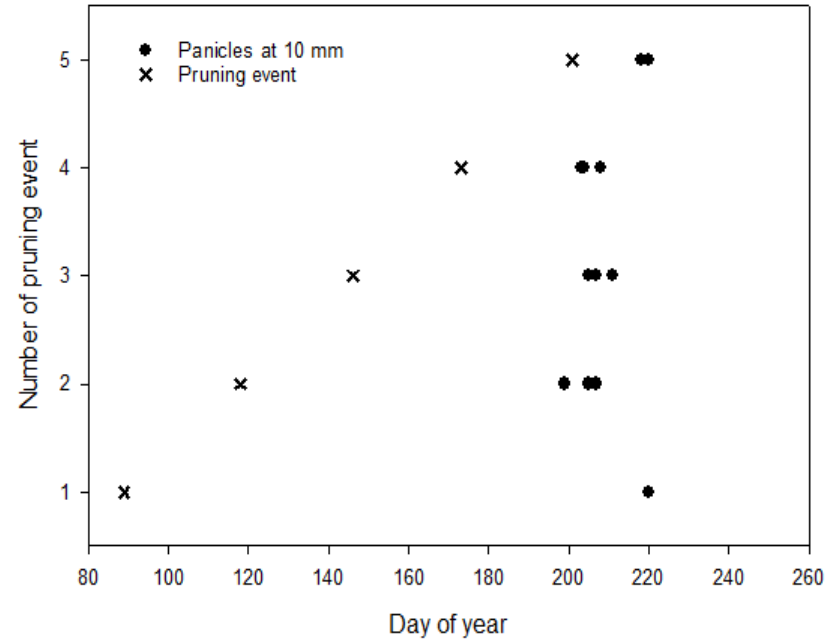
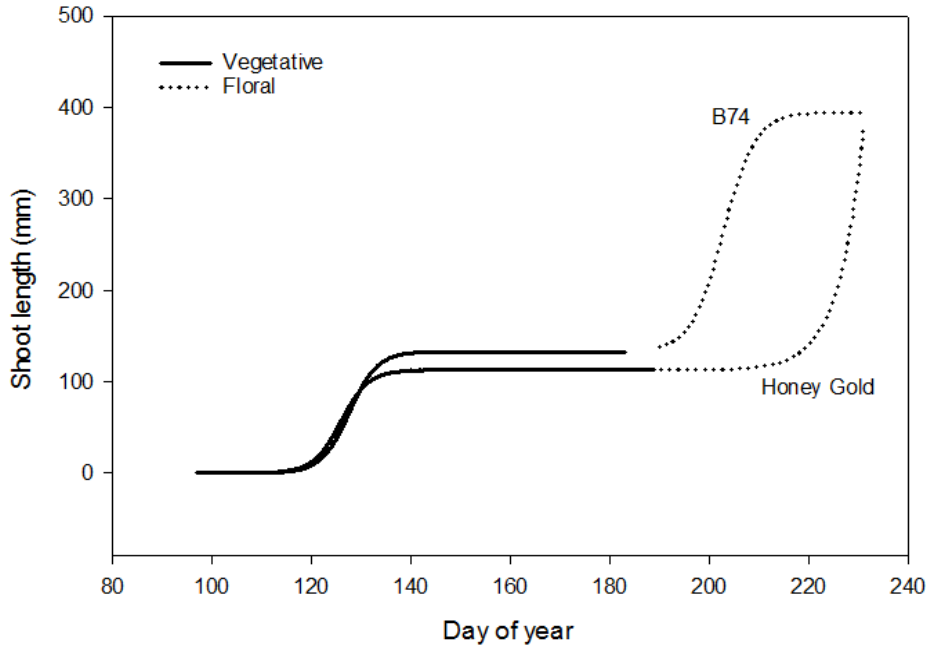
Data: hourly temperatures and flowering

Days of the year (2016 Katherine)

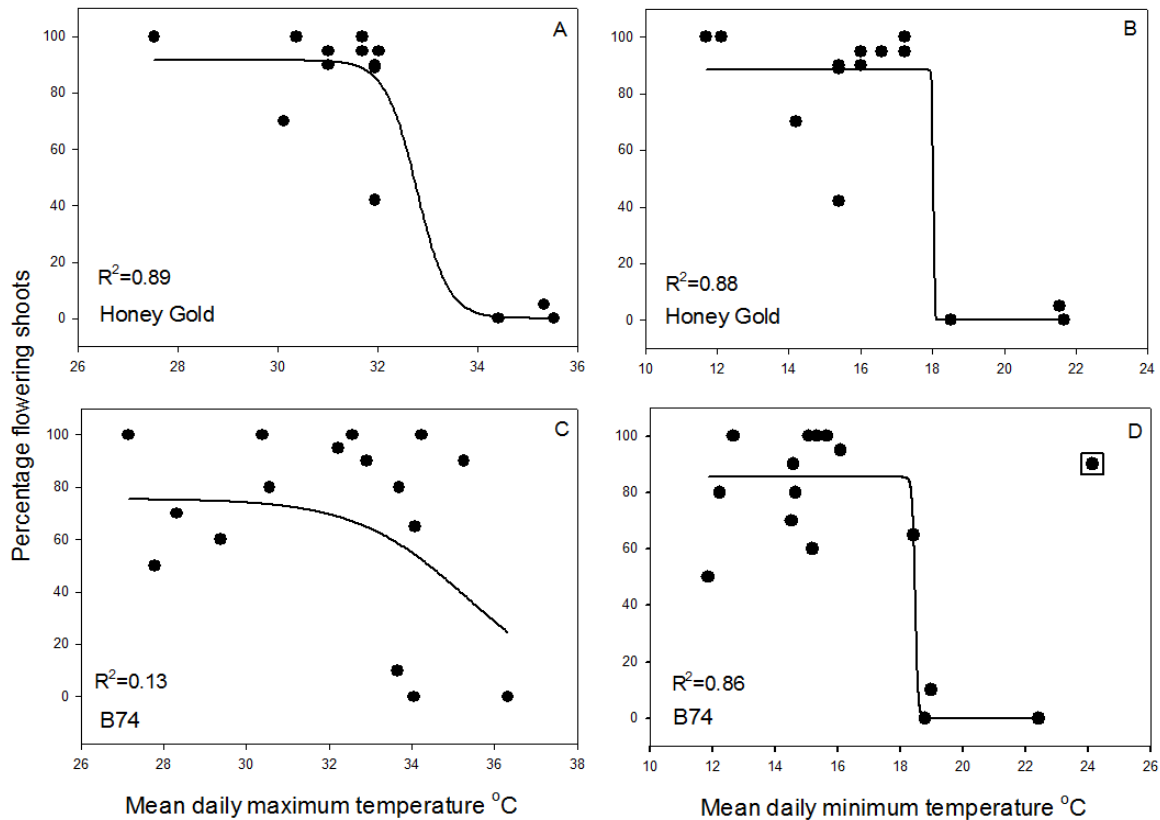


■ Flowering bud @ 10mm ■ Non-Flowering bud @ 10mm ■ Number of hours @ temperature

Results: Identify what triggers flowering



Results: Tip pruned trees actively growing buds under different temperature conditions.



Results: cultivars have different thresholds for flower induction at high minimum and maximum temperatures

This project: Impact of climate change on flowering induction in mangoes in the Northern Territory

- 6 cultivars
- Flowering thresholds
- Threshold maps
- RCP4.5 and 8.5
- 2030, 2050, 2070, 2090
- Final report April 2020



National Environmental Science Programme



Potential options for adaptation

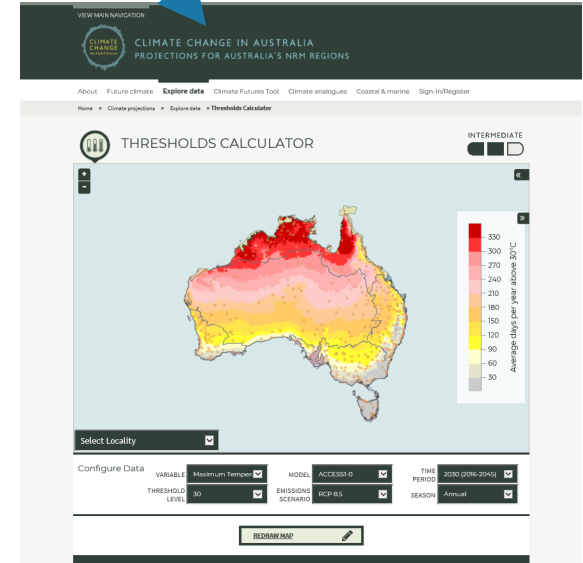
- Select existing adapted cultivars
- Develop new cultivars
- New chemicals that disconnect flowering from climate
- Develop cost effective structures that modify weather extremes to improve cropping



What can you do now?

Step 1:

- Access the ESCC online tools here www.climatechangeinaustralia.gov.au
- 2019 Pre-harvest meetings
- 2020 Food Futures Conference
- 2020 Final Case Study release



What can you do next?

Step 2:

- Read the NESP/DPIR Case Study on mango flower induction when it is finalised in April 2020
- Consider integrating projected climates in your 5, 10, 20+ year orchard management plan



CASE STUDY FACT SHEET

Earth Systems and Climate Change Hub
National Environmental Science Programme

Understanding the impact of climate change on the Northern Territory mango industry

The Earth Systems and Climate Change Hub is working with the Northern Territory Department of Primary Industry and Resources (NT DPIR) and the Northern Territory mango industry to demonstrate the use of science-based climate change information to answer commercially relevant questions about the impact of the changing climate on primary production.

Northern Territory mango production, climate and the future

Mangos are the Northern Territory's largest horticultural product, and the Territory is Australia's largest grower of mangos. In 2017/18, the Northern Territory produced almost half of the national mango crop, worth around A\$80 million.

In the Northern Territory, mango flowering is promoted by low night time (minimum) temperatures and can be inhibited by high day time (maximum) temperatures, so flowering of commercially produced mango cultivars and those from the National Mango Breeding Program (a partnership between the Northern Territory, Western Australia, Queensland and CSIRO) is sensitive to the changing climate.

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. With our understanding of the climate system and powerful computer models, we can simulate what these changes may be. Combining these projections of future climate with what we know about the response of different mango cultivars to particular temperature thresholds provides an important insight into the performance of these cultivars into the future.

In this case study, an impact assessment to determine how climate change will affect mango flowering induction will provide information that will help individual enterprises and the industry as a whole to plan ahead and identify appropriate management and adaptation responses to potential changes.

Making 'cents' of climate change

An important component of this case study is to improve understanding of climate change and climate change information within the industry, so the results of the impact assessment can be more readily interpreted and used.

Working with our collaborators, the Hub will deliver *Making cents of climate change*, an information program that aims to familiarise mango growers with foundation knowledge about climate drivers and processes, climate change and projections of the future climate, and show how using science-based climate change information in decision-making is good for business.

Information resources will be available on the Hub website and from industry collaborators.

The Earth Systems and Climate Change Hub is funded by the Australian Government's National Environmental Science Programme

BOM/CSIRO weather and climate guides

'*Providing Farmers with Regional Weather and Climate Guides*', is part of the Australian Government's Drought Assistance Package.

BOM is consulting with stakeholders in Darwin to tailor these guides to the needs of the region.

Guides will be released before the end of 2019.

REGIONAL CLIMATE GUIDES 4 FARMERS

Better decisions in good years and bad

How can we best help farmers and rural communities plan and make the most of the good years and bad years that Australia's climate provides?

The Bureau of Meteorology (BOM) is developing a set of Regional Climate Guides with the aim of helping farmers and communities improve their ability to make quantitative risk management decisions, by creating a localised source of facts about the likelihood, severity and duration of key weather variables that affect the resilience of businesses and communities. But the BOM needs your help.

You are invited to attend a two-hour workshop to inform the design of a Regional Climate Guide for your region which will be part of a set that will eventually cover all of Australia.

We seek your input into the design of the guide for the Northern Territory region, based on your standing in the community, experience on the land, and ability to represent farmers and communities more broadly. Your insights will be invaluable in transforming weather and climate statistics into meaningful information that will benefit the communities in your region, and across Australia.

Thank you

For more information contact:

Dr Cameron McConchie

Cameron.McConchie@nt.gov.au

08 8999 2310