Maximising Irrigation Efficiency

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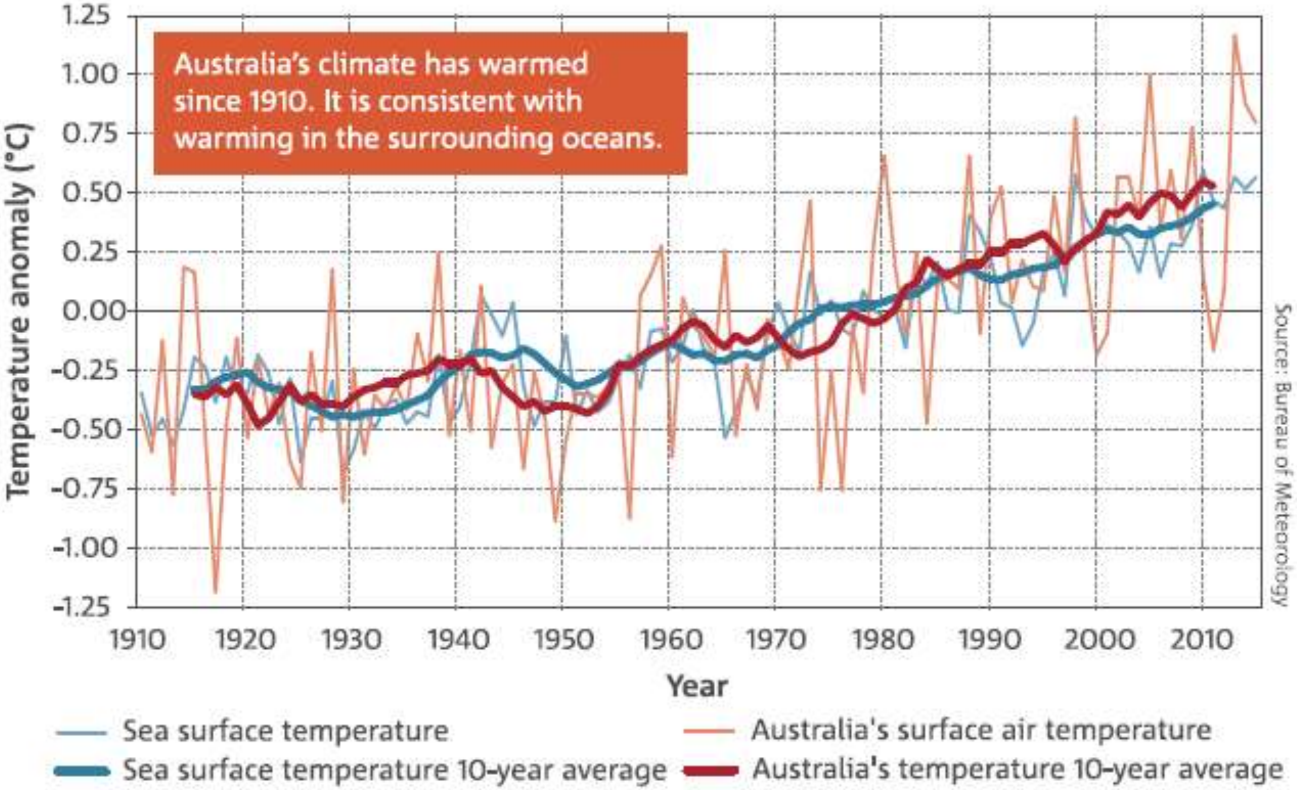
Australia's changing climate



Time series of anomalies in sea surface temperature and temperature over land in the Australian region. Anomalies are the departures from the 1961–1990 average climatological period. Sea surface temperature values are provided for a boxed region around Australia (4–46 °S and 94–174 °E).

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Key points

- Australia's climate has warmed, with around a 1 °C increase in both mean surface air temperature and surrounding sea surface temperature since 1910.

- The duration, frequency and intensity of extreme heat events have increased across large parts of Australia.

- The number of days per year over 35 °C has increased in recent decades, except in parts of northern Australia.

- 2016 State of the Climate report showed Australia's top five warmest years on record included 2013, 2014 and 2015.

  Australia's warmest year on record was 2013.

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How does this effect horticulture production?

- Average temperatures will continue to increase in all seasons
- More hot days and warm spells
- Fewer but more intense tropical cyclones
- Increased intensity of extreme daily rainfall events
- Changes to rainfall are possible but unclear

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Risks for horticulture

Warmer temperatures may result in

- Shift in growing regions & harvest times
- Foliar and soil borne diseases may be active for longer periods during the year
- More active insect populations

Increased number of heat stress days

- Pollination failures, fruit drop and sunburn

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Opportunities for horticulture

Warmer temperatures may result in

- Reduced chance of cold damage or fruit set failure due to cold nights
- Shift in growing areas & earlier fruit set and maturity

Higher levels of atmospheric carbon dioxide

- Higher Yields

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Tips for Maximising Irrigation Efficiency

– Irrigation system management

– Irrigating for crop water requirement

– Planting for the future

– Case Studies

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- Irrigation system management
  - Reconfigure irrigation system
    - Changing from 1 sprinkler that applies 8l/hr to 2 sprinklers that apply 4l/hr each will provide a larger wetted area and reduce deep drainage
  - Partial Root Drying (PRD)

    Eg. PRD has been proven to be successful in Mangoes
    - Tended to yield larger fruit
    - Fruit drop occurred however undesirable sizes was reduced
  - Conduct uniformity assessment on irrigation system
    - Measure the application rate in mm/hr for more accurate scheduling
    - Poor uniformity results in over &/or under irrigating areas of crop
    - Ensure system is operating at design operating pressure, flow and application rate

- Irrigation system management
  - Reduce canopy area
    - The reduction of leaf area will reduce leaf transpiration
    - Tree will require less inputs
    - Will increase available light into the orchard
    - Tree would require less space
    - Potentially improve labour costs
  - Reduce soil evaporation
    - Apply a mulch layer
    - Maintain grass inter-rows
    - Protect crops from wind

- Apply water stress at certain times
  - Close to harvest (within 2 weeks) does not effect fruit size in some crops.
  - Does NOT apply during period flowering to 1st half of growing period

- Regulated Deficit Irrigation (RDI)
  - This is the practice of providing less water at times when fruit growth is slow or after harvest but providing full water requirement when developing fruit

- Monitor soil moisture
  - There are many tools available (tensiometers, capacitance probes, etc).
  - Choose one that suits the needs of your business, is cost effective and practical to use
  - These are critical tools when trying to manage water use

- Irrigation scheduling
  - The decision on when and how much irrigation to apply for maximum productivity
  - Many methods & tools available to assist in irrigation scheduling

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- Irrigate to meet crop water requirement

  That is the amount of water required to meet the loss through evapotranspiration, which is the combined loss of water to the atmosphere due to evaporation from soil and plant surfaces and through plant transpiration

  Eg, a mangoes crop in Mareeba

  - average daily evaporation rate of 4.2mm
  - production period April through to November
  - 5.9 ML/Ha still required for irrigation purposes
  - 86% of rain falls December to March
  - Industry surveys indicate growers have been able to achieve 11t/ha from 3ML/ha applied water

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Strategies to address limited water supply

- Planting for the future
  - More adaptable cultivars
  - Changes to time of planting & marketing
  - Cultural practices
  - Variety & growing systems selection

  Eg. Fan and or Espaliered mango trees look promising for various reasons

  - Easier to manage
  - Smaller foot print
  - Reduced inputs
  - More resilient to cyclones (espaliered)
  - Reduced OHS issues
  - More conducive to the implementation of robotics

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RWUE-IF

Currently the Rural Water Use Efficiency Irrigation Futures (RWUE-IF) program is being offered through to June 2018 in the Granite Belt.

RWUEIF will deliver:

- Irrigation System assessments including irrigation system uniformity, pump efficiency and fertigation performance testing
- Irrigation scheduling training & use of the Scheduling Irrigation Diary (SID) and the Water Manager Tool (WMT)
- Farm water use efficiency reports
- Specialised technical services for pump and irrigation system troubleshooting

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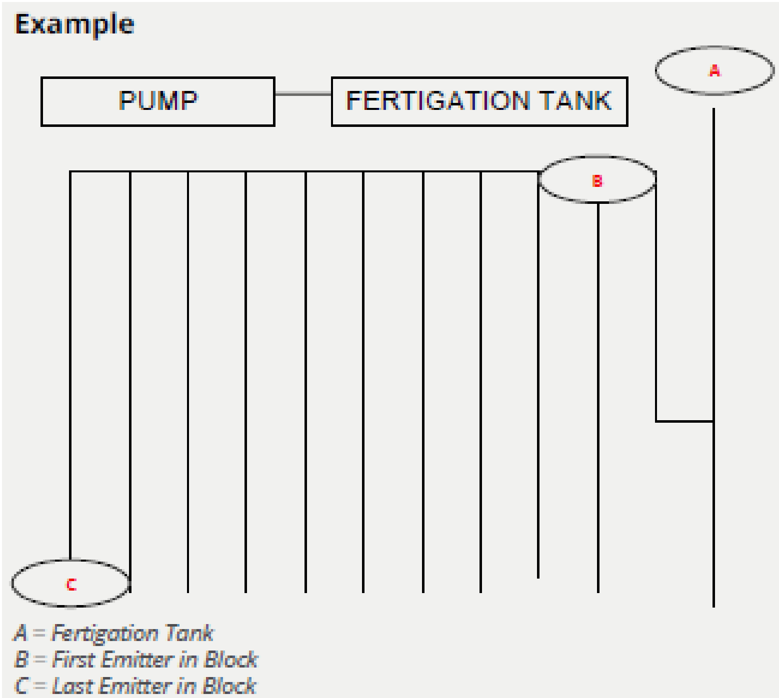
Case Study Pump Efficiency Test

Common causes of pump inefficiency:

- Poor pump selection to match pressure, discharge and speed requirements
- Pumps out of adjustment, worn impellers
- Improperly sized engines or motors
- Engines in need of replacement or repair

https://www.youtube.com/watch?v=GpYAK7kgtE0&t=57s

Fertigation Performance



Minimum injection time: time its takes fertiliser to move from B to C.

Minimum flushing time: The time it takes fertiliser to move from A to C. That is the tank is empty or 6 tank flushes have been completed on dilution systems.

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Case Study Fertigation Performance Testing

- Simple dye test to determine minimum injection and flushing times
- Can also be done with EC meter (salts), pool test kit (acid & chlorine)
- Test the time taken for fertiliser to travel from the tank to the first and last emitters in a block
- Growers are often surprised by the results

https://www.youtube.com/watch?v=pOmwphe4u6A&t=12s

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Irrigation Uniformity

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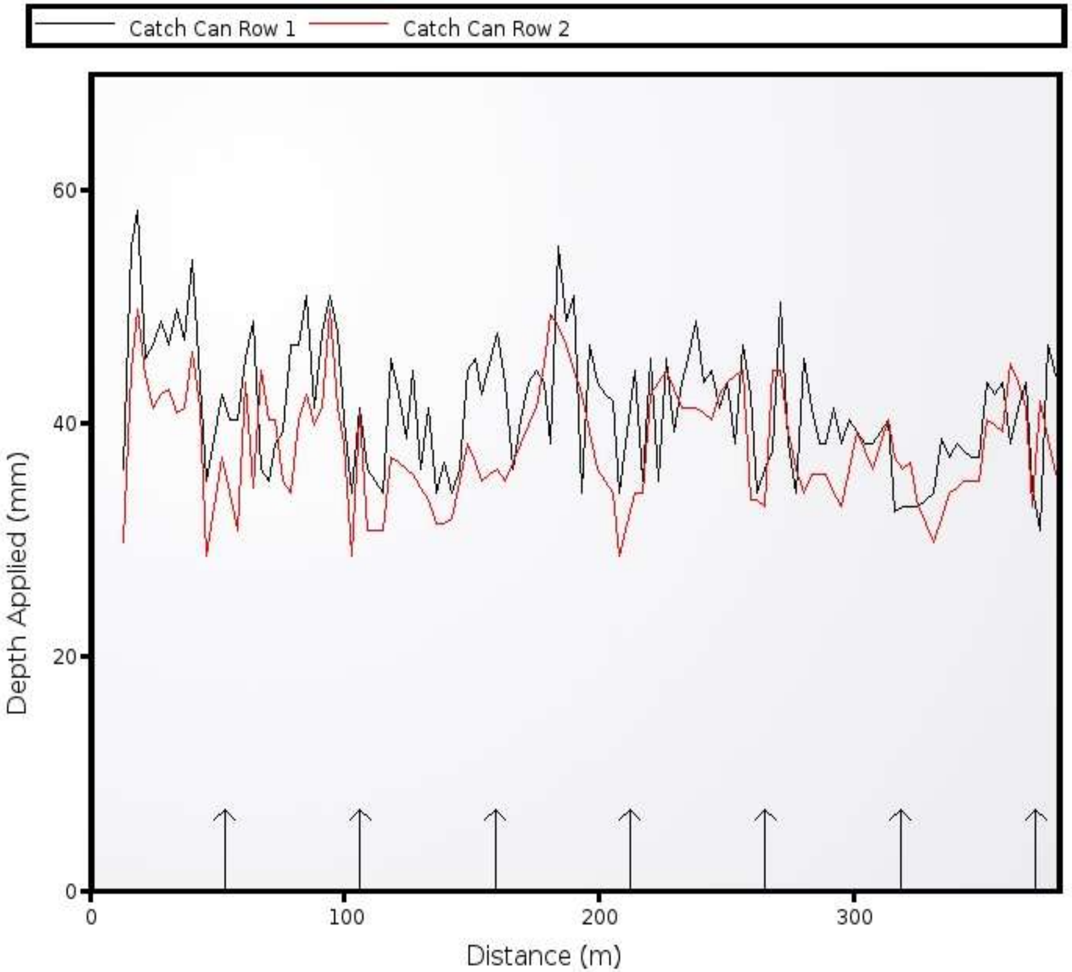

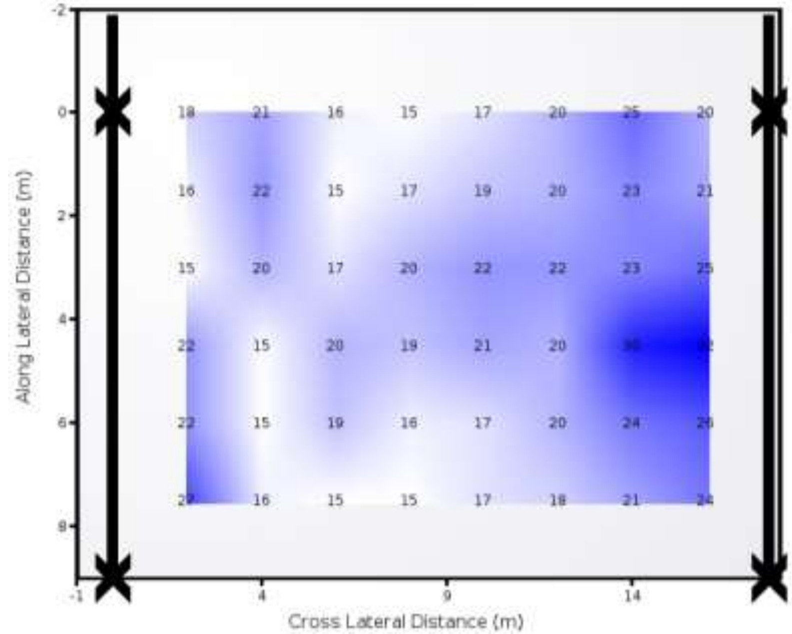

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Thank you.

For more Growcom RWUE-IF case studies, factsheets, resource & Hort360 info visit the website www.growcom.com.au

To arrange a RWUE-IF farm visit contact:

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