Options for simultaneous greenhouse gas abatement and profitability on Australian broadacre cropping farms

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Options for simultaneous greenhouse gas abatement and profitability on Australian broadacre cropping farms

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Photo: Elizabeth Meier

Case study farms

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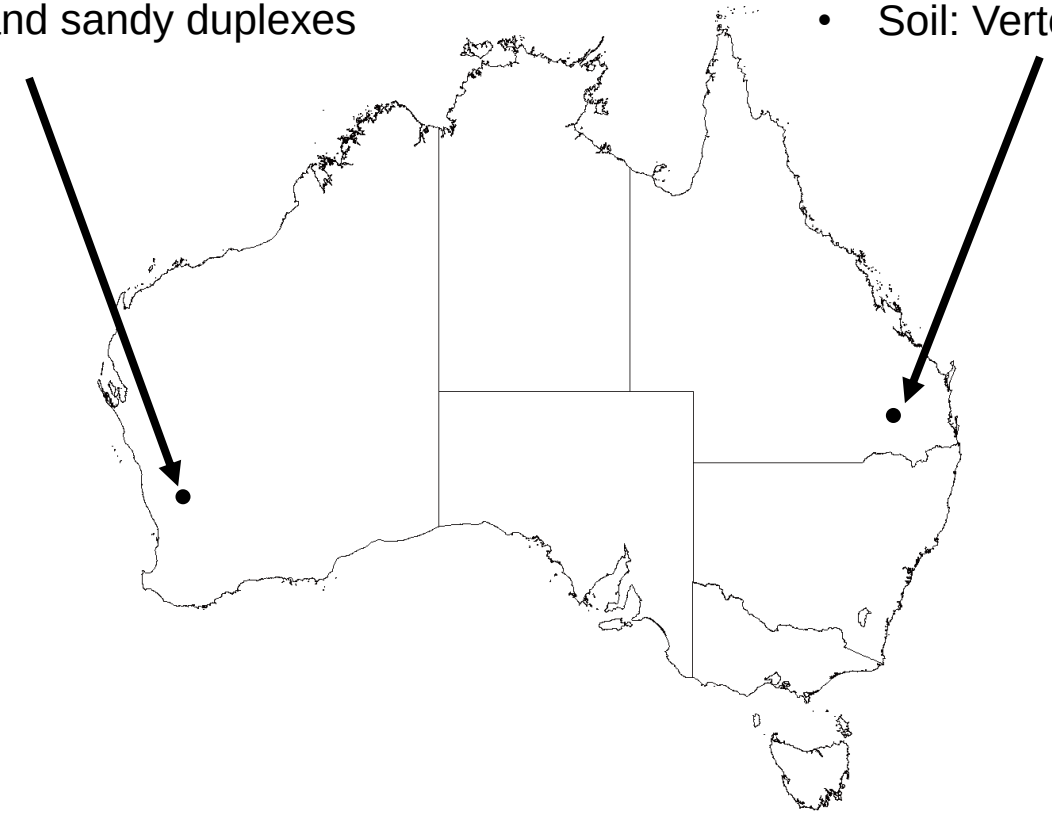
Dalwallinu, Western Australia

- Mediterranean climate
- Average rainfall 350mm
- Soil: Sand and sandy duplexes

Brigalow, Queensland

- Sub-tropical climate
- Average rainfall 700mm
- Soil: Vertosols



Methods

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For a group of management scenarios we used APSIM to predict:

- crop yield
- N_2O emissions
- changes in soil organic carbon

We convert the N_2O emissions and the change in soil organic carbon to CO_2 equivalents following the IPCC methodology

We teamed this with some economic analysis to look at how farm profitability is impacted under changed management

- We use operating profit to measure the change in profitability
- Operating profit = total revenue – total costs (before interest and tax)

Trade-off between abatement and profitability

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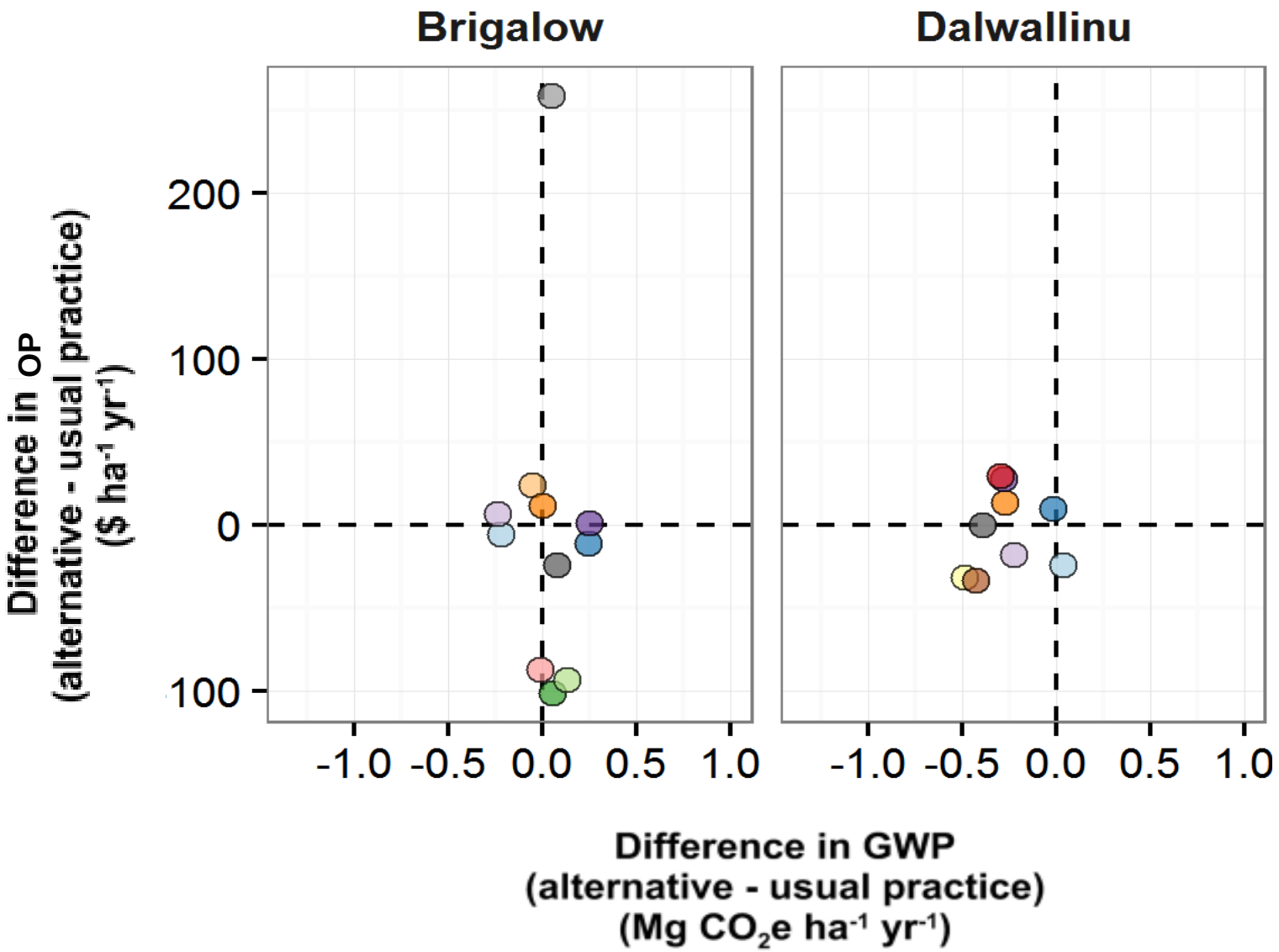

Practices that provide abatement

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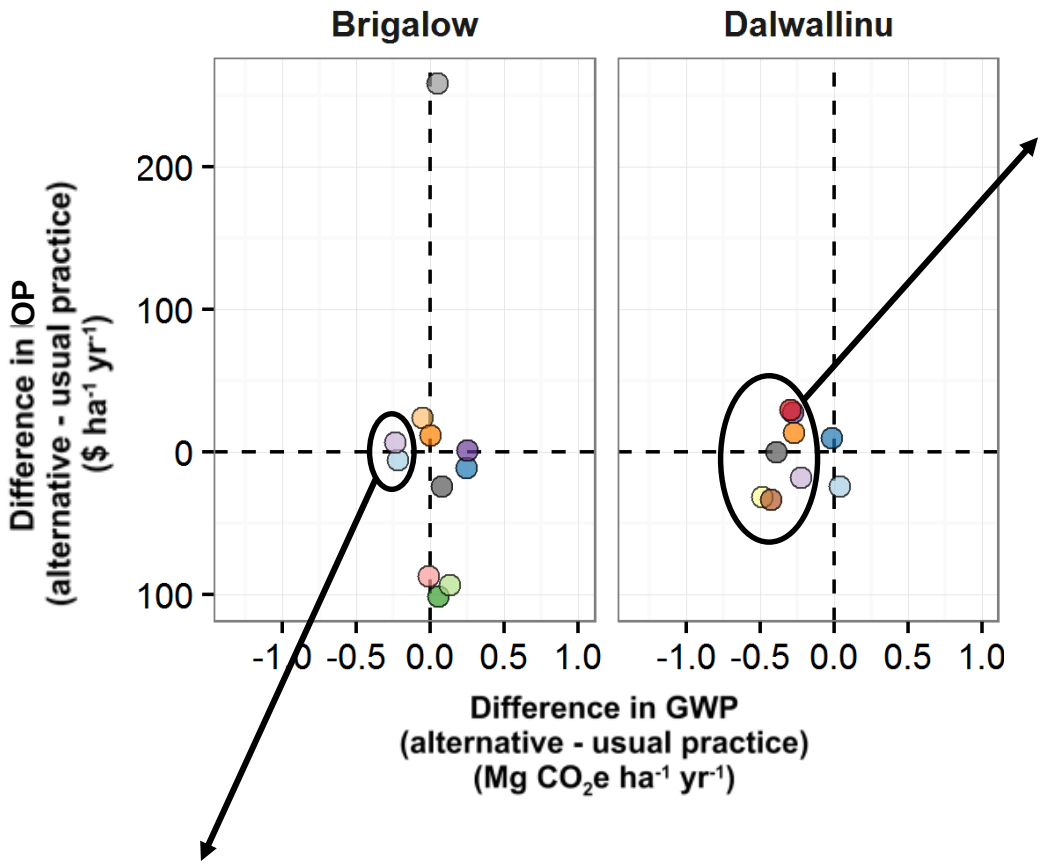

Dalwallinu

Practices that provide abatement:

- Stubble retained, and
- Improved legume pastures in rotation
- 25% more nitrogen fertiliser
- Feedlot manure applied every 5 years
- 25% less nitrogen fertiliser
- Opportunistic summer cropping with cowpeas
- Improved legume pastures in rotation and opportunistic summer cropping with cowpeas

Brigalow

Practices that provide abatement:

- Stubble burnt with 25% less nitrogen fertiliser
- Stubble retained with 25% less nitrogen fertiliser

What is interesting about these results?

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Dalwallinu

- Maximum abatement achievable is
  0.49 t CO_2-e ha^{-1} yr^{-1}
- Maximum abatement achievable whilst **increasing** profitability?
  0.30 t CO_2-e ha^{-1} yr^{-1}
- The introduction of improved pastures and increasing N fertiliser by up to 25% were predicted to achieve abatement and increase profitability.

Brigalow

- Maximum abatement achievable is
  0.24 t CO_2-e ha^{-1} yr^{-1}
- Maximum abatement achievable whilst **maintaining** profitability?
  0.24 t CO_2-e ha^{-1} yr^{-1}
- No practices were predicted to achieve abatement and **increase** profitability.

Key messages

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- There are options for farmers to reduce greenhouse gas emissions and maintain/increase profitability

- But, there is a gap in the abatement that can be achieved biophysically and the abatement that can be achieved profitably

- So, if we want to increase farmers contribution to greenhouse gas emissions reductions we need to think about ways for them to adopt the practices that are currently unprofitable
  - Do we need to invest in R&D that could help to lower the costs of adopting these practices?
  - Do we need to look at sources of funding to compensate the farmer's costs?
    - The Emissions Reduction Fund provides compensation to farmers if they adopt approved practices that reduce greenhouse gas emissions
    - But, there are no approved practices for grain growers (at the moment)