Northern Territory Government

Australian Government
Department of Agriculture and Water Resources

DEPARTMENT OF
PRIMARY INDUSTRY AND FISHERIES

Understanding greenhouse gas emissions through improved nitrogen management on NT farms

Mila Bristow, Stuart Smith, Alan Niscioli

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Greenhouse gases & Agricultural Production

	CO_2-Equ (100 years) *Global warming potential*	Sources
CO_2	x 1	Transportation, manufacturing inputs, electricity
CH_4	X 27	Transportation, manufacturing inputs,
N_2O	X 298	N fertiliser production, **land emissions**

Source: Forster et al. 2007. Changes in Atmospheric Constituents and in Radiative Forcing. In: *Climate Change 2007: The Physical Science Basis, IPCC*. Cambridge Uni Press.

Australia's National Accounts

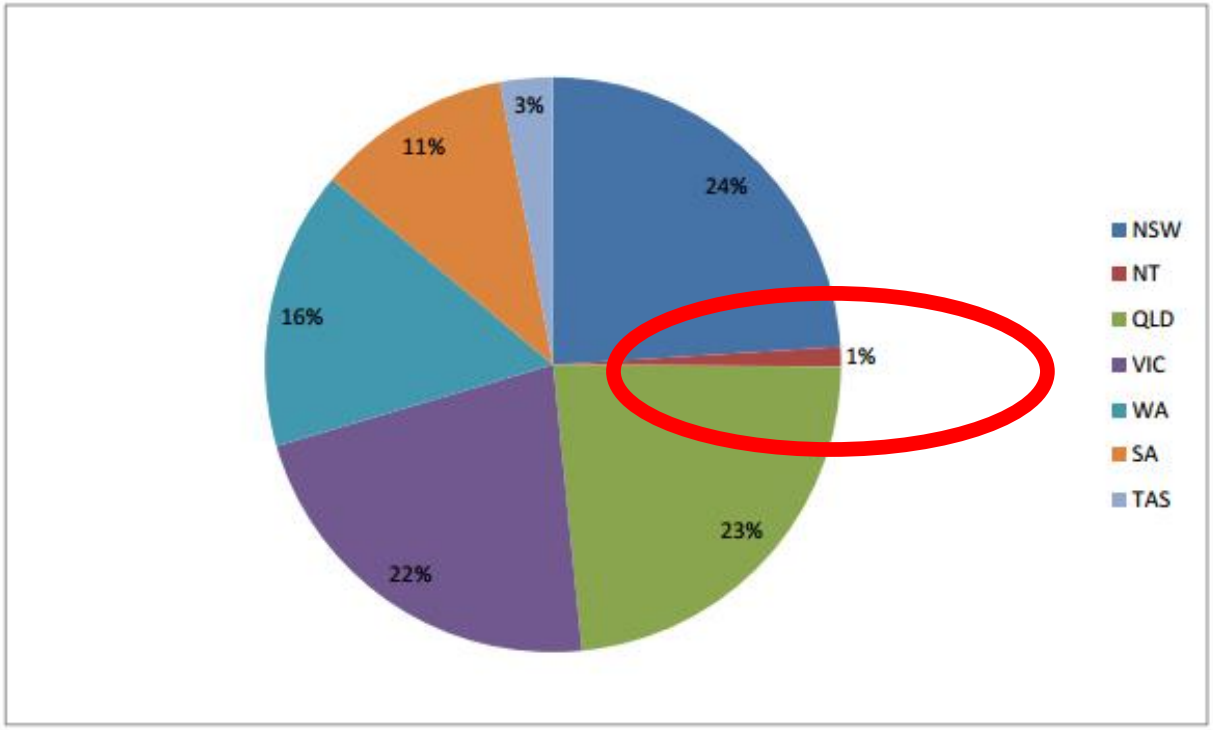

Figure 1. Carbon dioxide equivalent (CO_2-e) emissions from agricultural soils, 2013

This figure includes both direct emissions from organic and inorganic fertiliser application, crop residue, dung and urine deposited by grazing animals, indirect soil emissions, including atmospheric deposition, nitrogen leaching and runoff (State Greenhouse gas Inventory).

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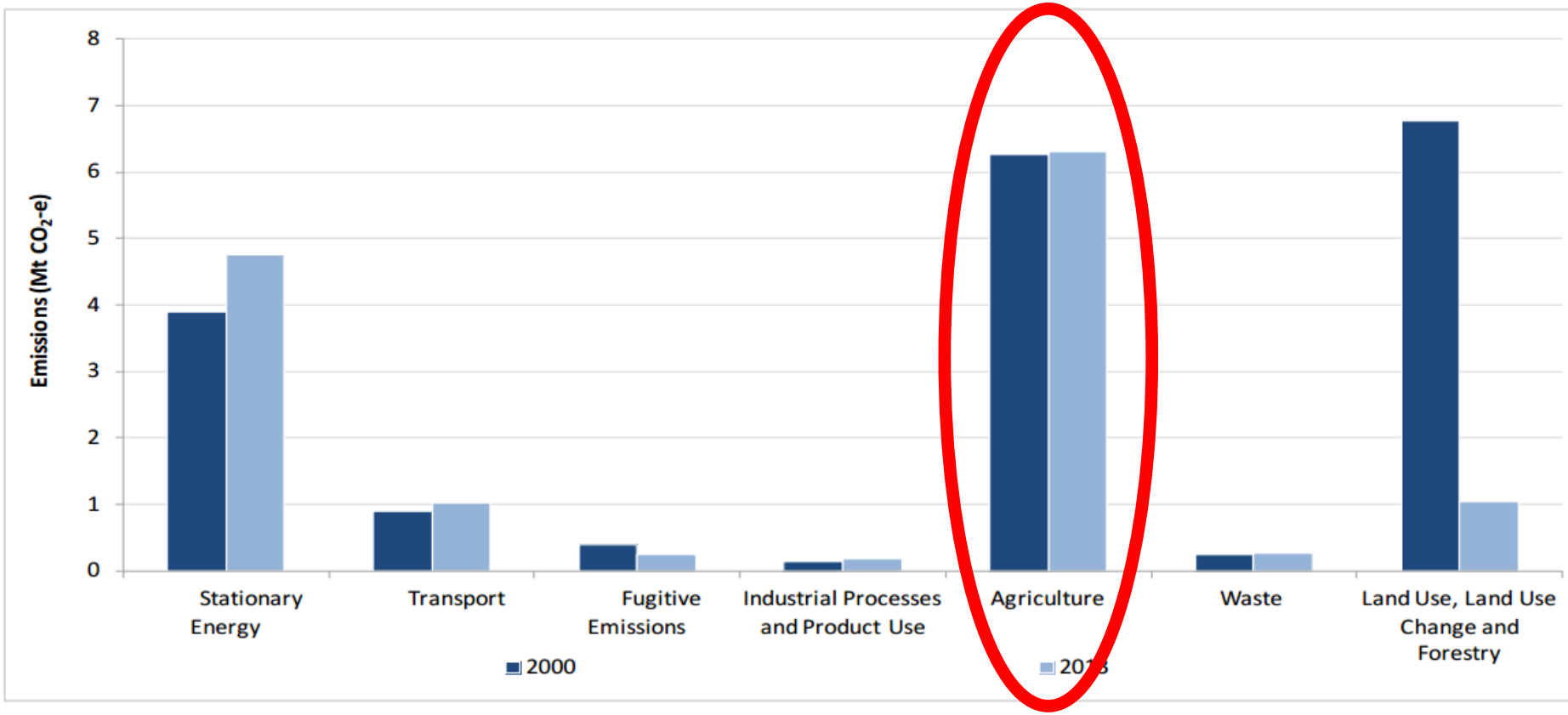
NT farming soils just 1%

Figure 18: Northern Territory – Emissions by Sector, 2000/2013



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More sustainable farming practices

Manage losses
= ***reduce emissions***
= improved efficiency
= ***increased profitability***

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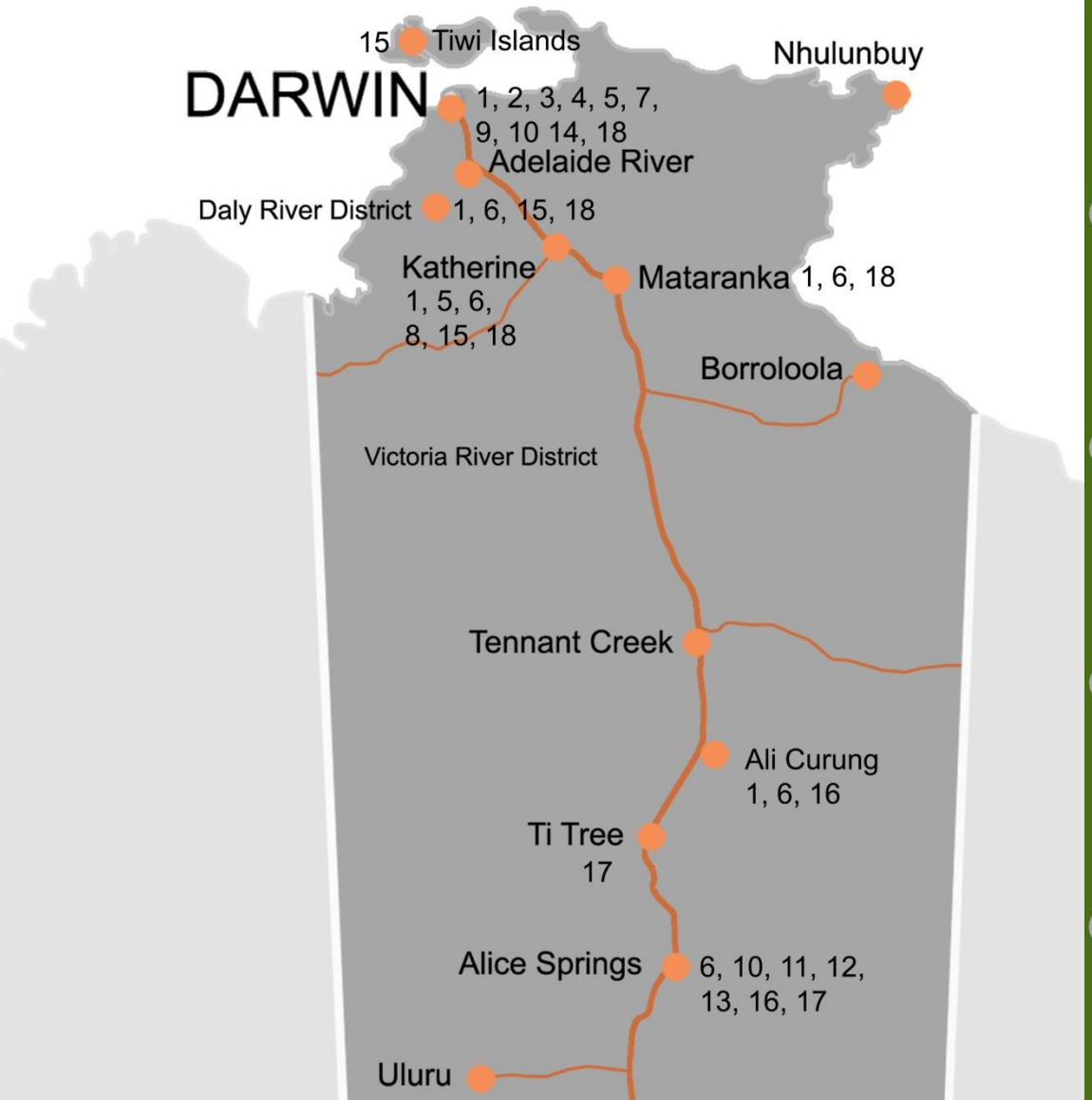

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Aim

- Evaluate NT farming practices in hay, vegetable and melons
  1. Use wet season cover crops to improve N management between crops
  2. Quantify emissions in melon & vegies
  3. Use enhanced efficiency fertilisers (EEF) to reduce emissions and maintain productivity

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Questions

1. Do wet season cover crops ‘mop up’ residual N from dry season melon or vegie cropping?
2. How efficient is N use in melon & vegies?
3. Do EEF reduce emissions and maintain productivity in hay?

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Measurements

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Results: cover crops

- no impact on residual soil N remaining after the dry season
- Soil GHG emissions were correlated with soil moisture (driven by rainfall), and management events, rather than by type of cover crop grown.
- biomass N shows soils with cover crops store ***far greate***r whole plant + soil N, than do bare soils, preventing loss through leaching

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Results: melons & vegies

- Farmers are applying at recommended rates
- Mean soil N_2O emissions were generally low
- rank in the **lower range** of emissions reported for other irrigated crops worldwide
- Some high emissions = room to improve

Results: melons & vegies

- Emission factor$_{fert}$:

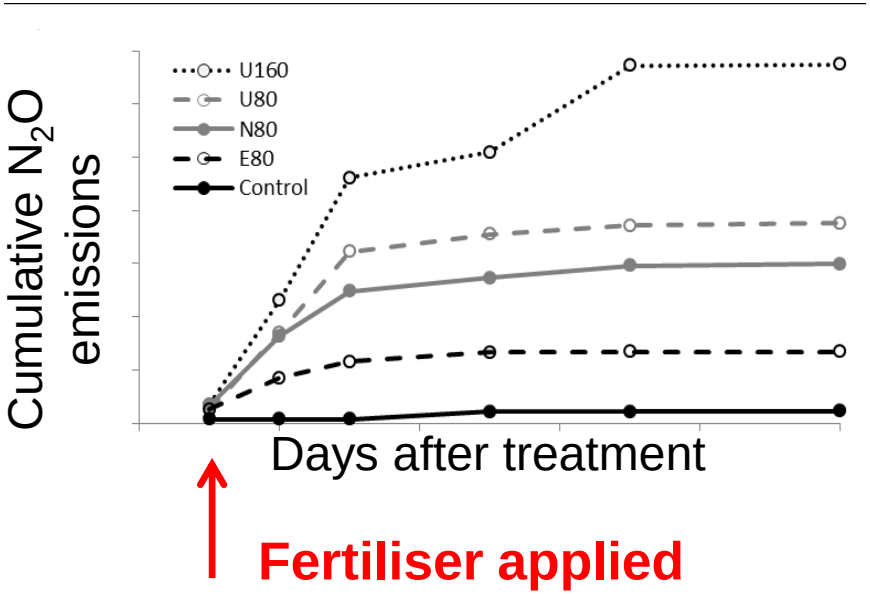
$$\frac{(N_2O\text{-}N_{\text{fertilised soil}} - N_2O\text{-}N_{\text{non-fertilised soil}}) * 100}{\text{Nitrogen applied}}$$

Default IPCC value **1% N loss per crop** (IPCC 2006)

	Emissions Factor (%) (proportion of N fert emitted as N_2O)
Watermelon	0.11 – 3.81
Rockmelon	0.17 - 0.27
Cucumber	0.13 - 0.17
Pumpkin	0.09
Taro	0.02
Tomato	0.21

Results: EEF in hay

- GHG emissions from soils hay crops occur immediately after application of fertiliser
- Hay quality and production is maintained



Using EFF

- soil N_2O emissions were **reduced by 25 – 60%**

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Understanding emissions

- high ***rainfall*** events and ***management*** were the strongest drivers of GHG
- Cover crops ***reduce soil erosion*** and **maintain organic matter**
- Emission factors, were very low at ***one-fifth of international standards*** in most melon and vegies in the Top End.
- ***Reduced GHG emissions by up to 60%*** using EEF in hay

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Understanding emissions

Top Paddock Newsletter

Kununurra Soils Workshop Summary 2015

Katherine Rural Review

Action on the Ground sees new equipment perform

Agnote

No: C38
July 2015

Reducing Nitrous Oxide Emissions when Fertilising Hay Crops with Nitrogen Fertiliser

P. Richter and M. Bristow, Plant Industries Development, Darwin

No: D47
July 2015

Greenhouse Gas Emissions in Top End

Katherine Rural Review

EDITION 323 — May 2015

Entec Urea reduces nitrous oxide emissions by 2

conventional urea when applied to Sabi grass (*U*

***mosambicensis*) in northern Australia**

Dr Ali Sarkhosh, Research Scientist (Horticulture & Agronomy),

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Department of Primary Industry and Fisheries (DPIF)

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Action on the Ground project

News

Plants

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Preparing industries

help farmers understand how to manage losses

= ***reduce emissions***

= improved efficiency

= ***increased profitability***

Acknowledge the support

Thanks to the farmers & collaborators:

Sweet Life
Cormack's
Thao Nguyen
Minh Do
Dao Nguyen
Coastal Plains Research Farm
Berrimah Agricultural Research Farm
Red Dirt Melons
Dawson Family
Kalano
Howie Family: Maneroo Station
Katherine Research Station
NT Farmers

Australian Government
Department of Agriculture and Water Resources

Full report and further work see:
www.nt.gov.au/d/Primary_Industry/index.cfm?header=Action%20on%20the%20Ground