Tree planting: impacts on biodiversity and climate change


Scot Ramsey

Ruth Mitchell

Alison Hester, Nina Friggens, Tom Parker, Jens-Arne Subke, Phil Wookey and many others

UNIVERSITY of STIRLING

The James Hutton Institute

Increased tree planting will benefit the environment and the economy

PM promises to treble the rate of tree-planting in the UK, with up to 30million more planted every year

GOV.UK

Search on GOV.UK

Departments Worldwide How government

Consultations Statistics News and commu

Press release

Government launches new scheme to boost tree-planting

BBC | BBC Account | Home | News | Sport | Weather | iPlayer

NEWS

Home | Coronavirus | US Election | UK | World | Business | Politics | Tech | Science | Health | Family &

England | Local News | Regions

Climate change: Tree planting rise 'needs to happen quickly'

Woodland Trust to plant 50 million trees over 5 years to fight climate crisis

Replanting Britain: 'It's about the right tree in the right place'

than £1 per person a year is spent on planting English trees, istakes loom large

ur appeal here

News story

Thousands of trees to be planted in England's towns and cities

Government to support tree-planting schemes through £10m Urban Tree Challenge Fund.

Environment

UK needs to plant 1.5 billion trees to tackle climate change, government told

'Let's not shy away from the truth. It will be a challenge, it will cost money'

Phoebe Weston Science Correspondent | @phoeb0 | Tuesday 30 July 2019 15:04 | 32 comments

Tree planting and climate change mitigation

The James Hutton Institute

Tree biomass = stored carbon → Less carbon dioxide in the atmosphere → Reduces climate change

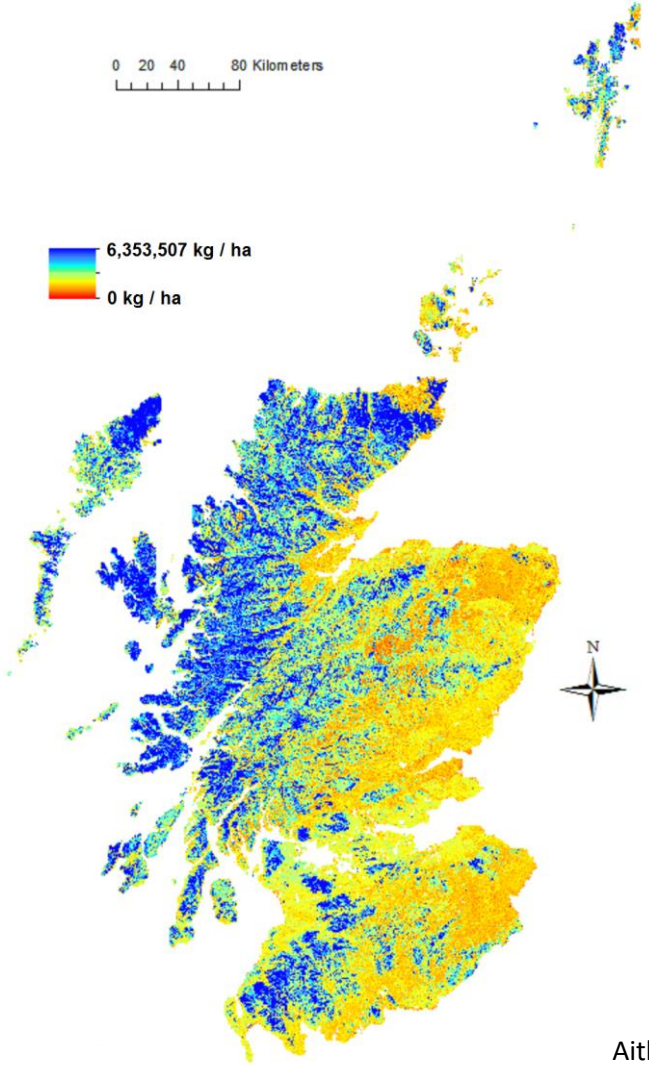
Is this always true?

Soil carbon

Carbon stored in:

- Above ground vegetation
- Soil

- Need to look at both

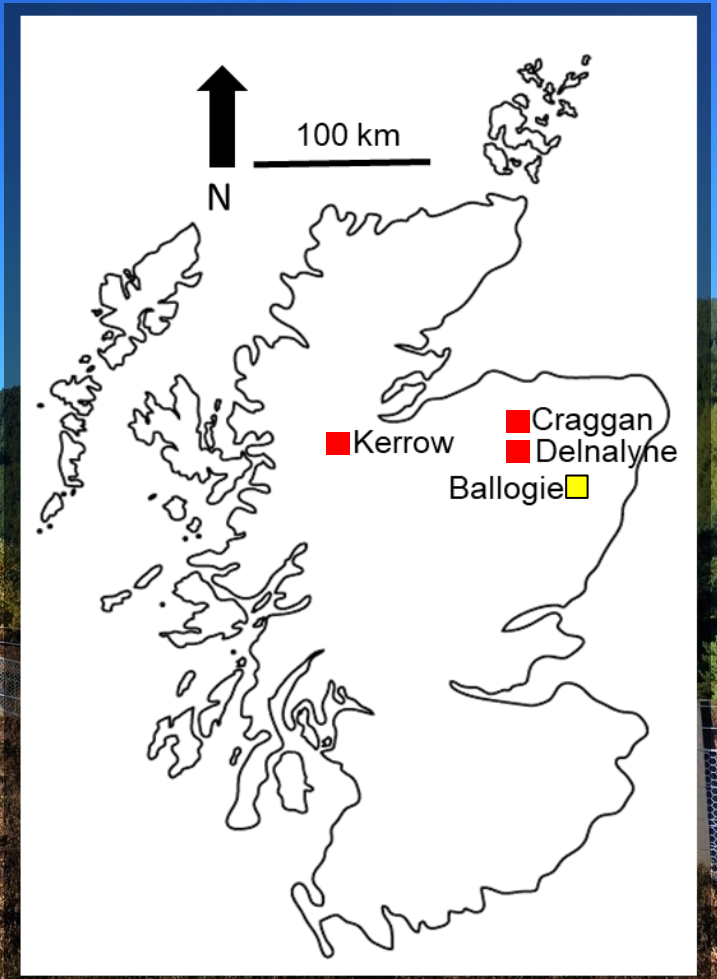


The James Hutton Institute

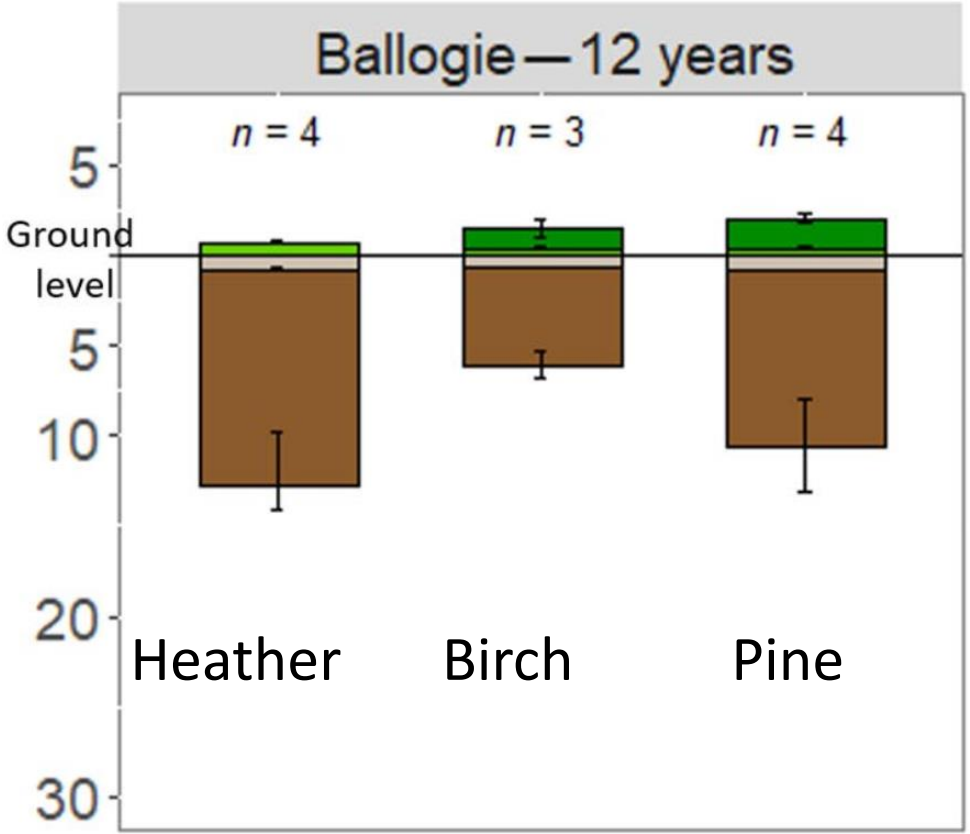
Aitkenhead et al 2019

Test the assumption
Planting trees = increased carbon storage

- Birch and Pine 12 years old
- Birch trees 39 years old

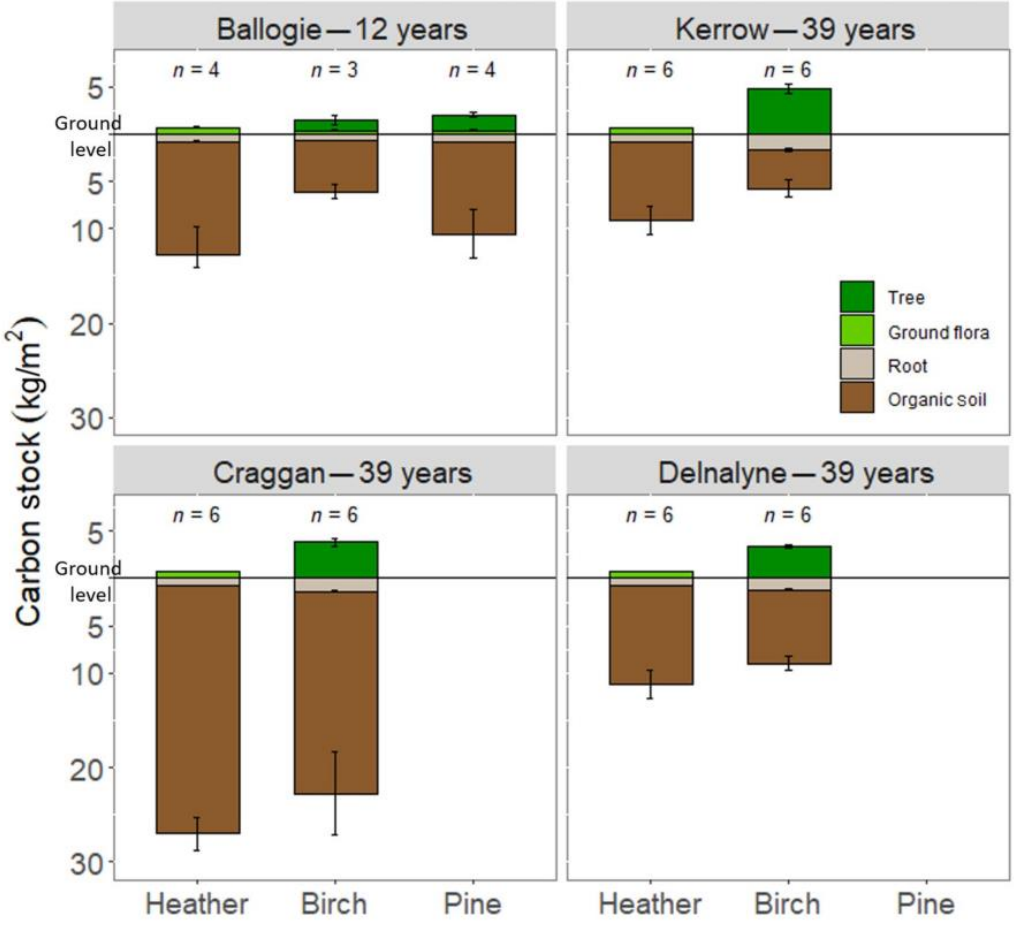


Results – impacts on carbon storage



Friggens et al. 2020

Results – impacts on carbon storage

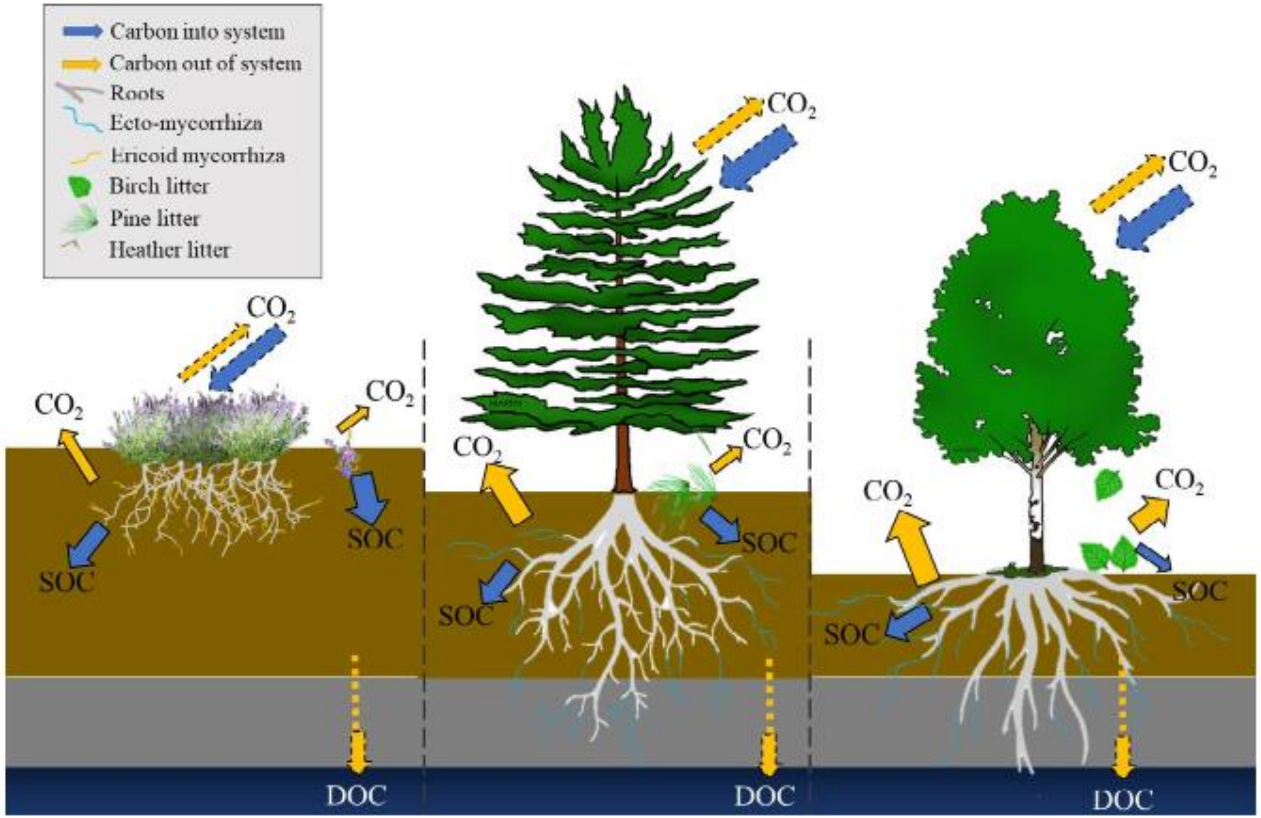


- Above ground – increase in carbon
- Below ground – losses of carbon
- Overall no net gain in carbon

Summary

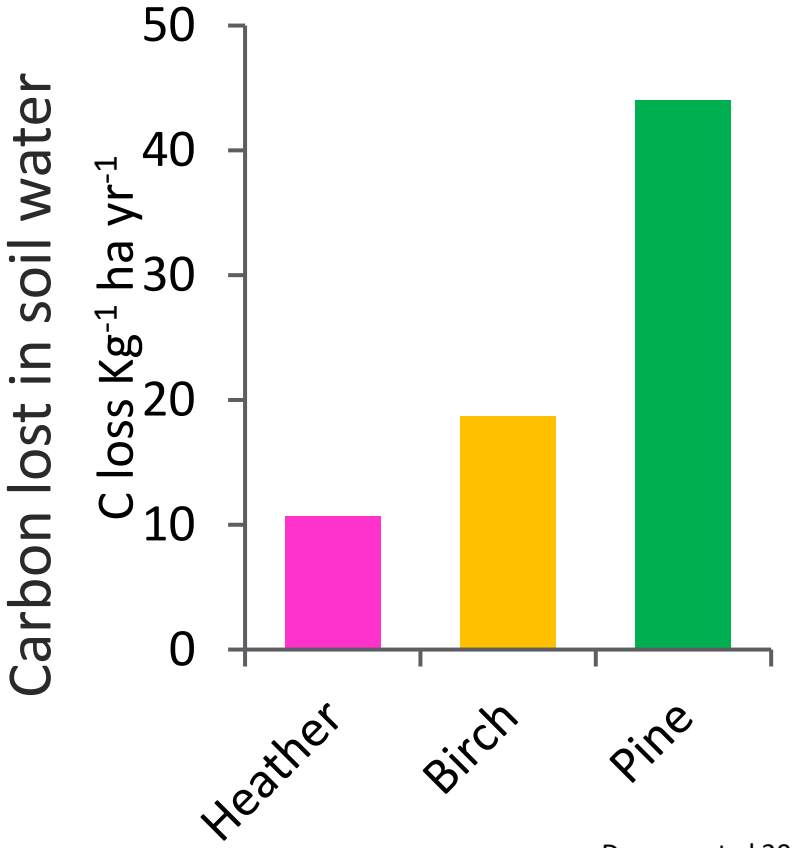
- Below ground impacts of trees very important
- On decadal timescales, trees were not mitigating climate change

Where did all that carbon go?



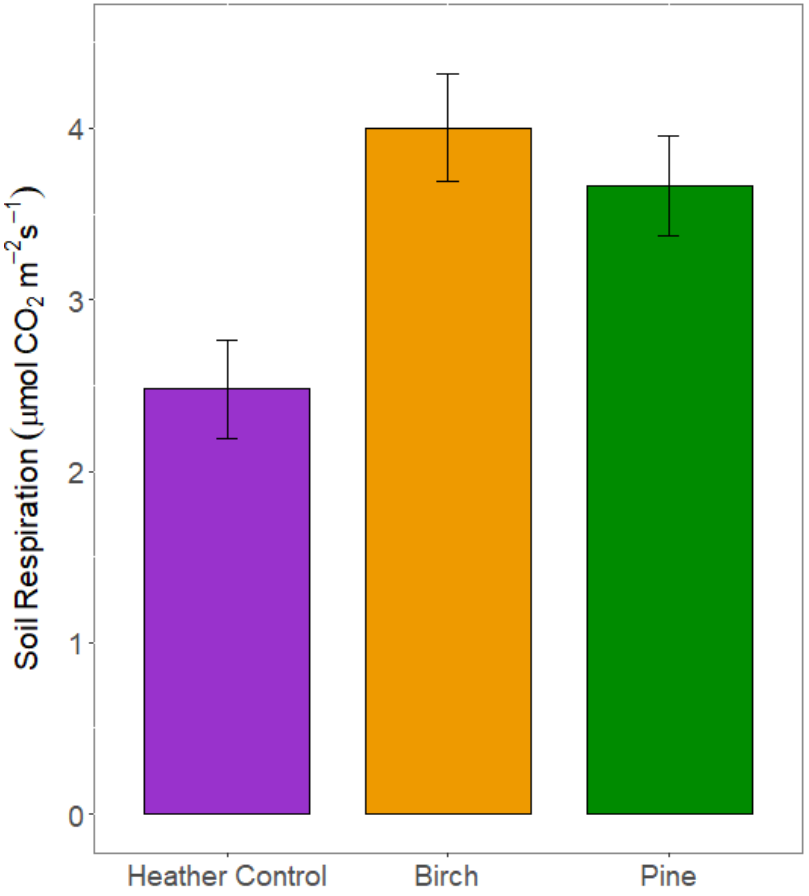
Friggens et al. 2020

Where did all that carbon go?



Dawson et al 2007

Where did all that carbon go?

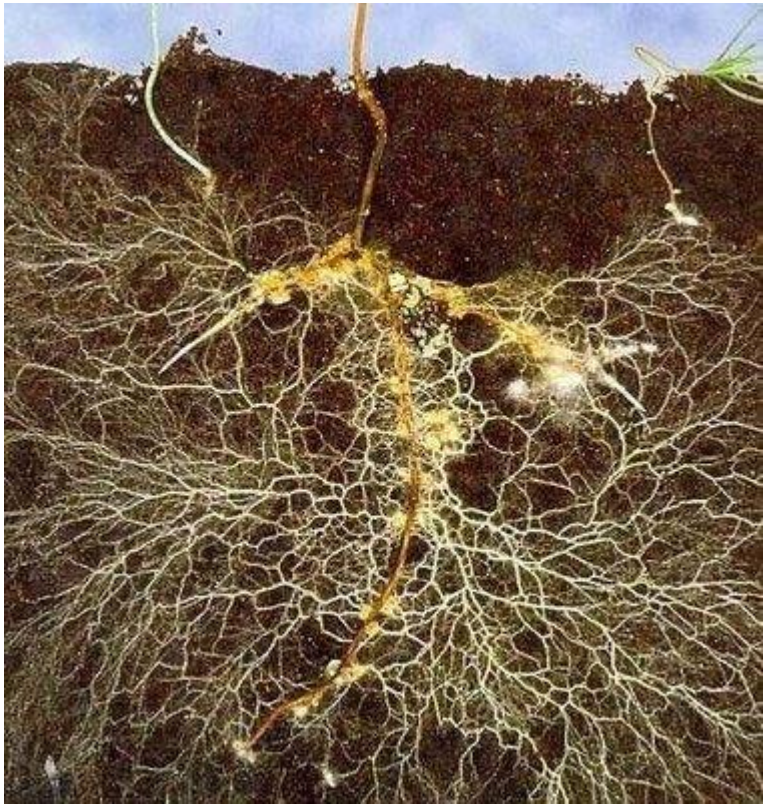


Increase in soil respiration

The soil community is changing

Changes in the fungi in the soil

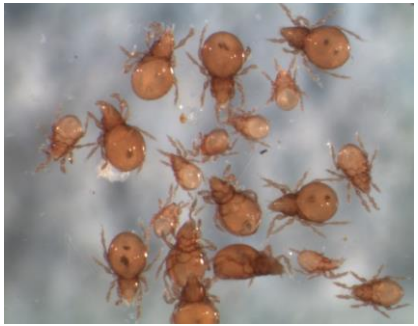
The James Hutton Institute

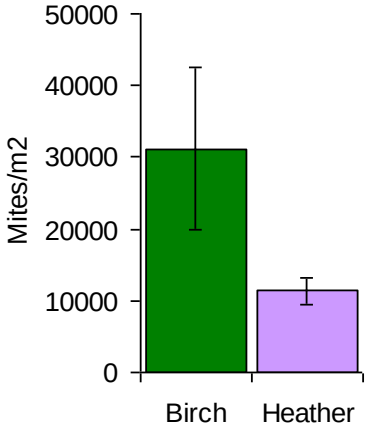


Other impacts on soil communities

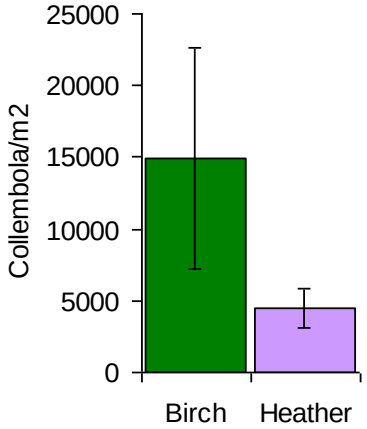
The James Hutton Institute

Mites





Springtails

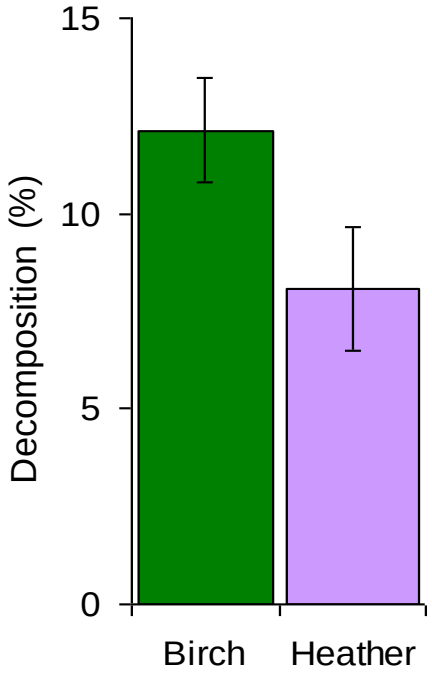


Mitchell et al. (2007 & 2010)

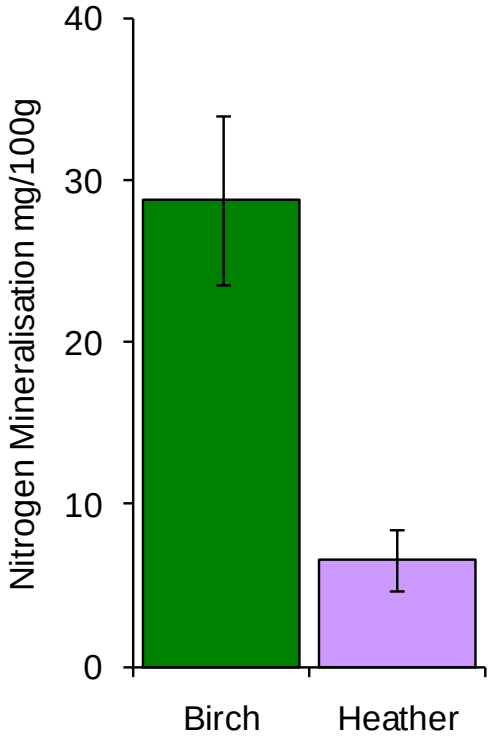
Consequences for nutrient cycling rates

The James Hutton Institute

Decomposition



Nitrogen mineralisation



Mitchell et al. (2007 & 2010)

Relevance to policy

- Experiment time scales ≈ Net zero timescales of 2050
- No net carbon gain for c 25% of potential tree planting area?

However

- Mineral soils likely to lead to net gain
- Differences between tree species
- Ground disturbance when planting increase soil carbon losses

Challenges the assumption that tree planting will always mitigate climate change

Thank you to you for listening and…

The Team

Adam Van Bergen
Alison Hester
Anastasia Korycinska
Clare Cameron
Colin Campbell
Dave Riach
Debbie Fielding
Diana Gilbert
Ellinor Dobie
Francy Lisboa
Graham Osler
Jasmine Ross
Joan Beaton
John Miles
Julia Fischer
Julie Craig
Kenny Hood
Laura Hayton
Lisa Cole
Lorna Dawson
Louise Ross
Maddie Thurlow
Martin Sommerkorn
Nina Lindstrom Friggens
Rebekka Artz
René van der Wal
Richard Gwatkin
Richard Hewison
Rob Brooker
Robin Pakeman
Roger Cummins
Sheila Reid
Steve Chapman
Steve Palmer
William Young
And many other

The Funders

- Nature Conservancy
- ITE/CEH/NERC
- British Ecological Society
- Strategic Research Programmes of the Scottish Government.

The Landowners

- Ballogie Estate
- Invercauld Estate
- RSPB
- Crown Estate

Athena SWAN Bronze Award

Stonewall DIVERSITY CHAMPION SCOTLAND

Scottish Government
Riaghaltas na h-Alba
gov.scot