Restoration and recovery of *Sphagnum* on degraded blanket bog

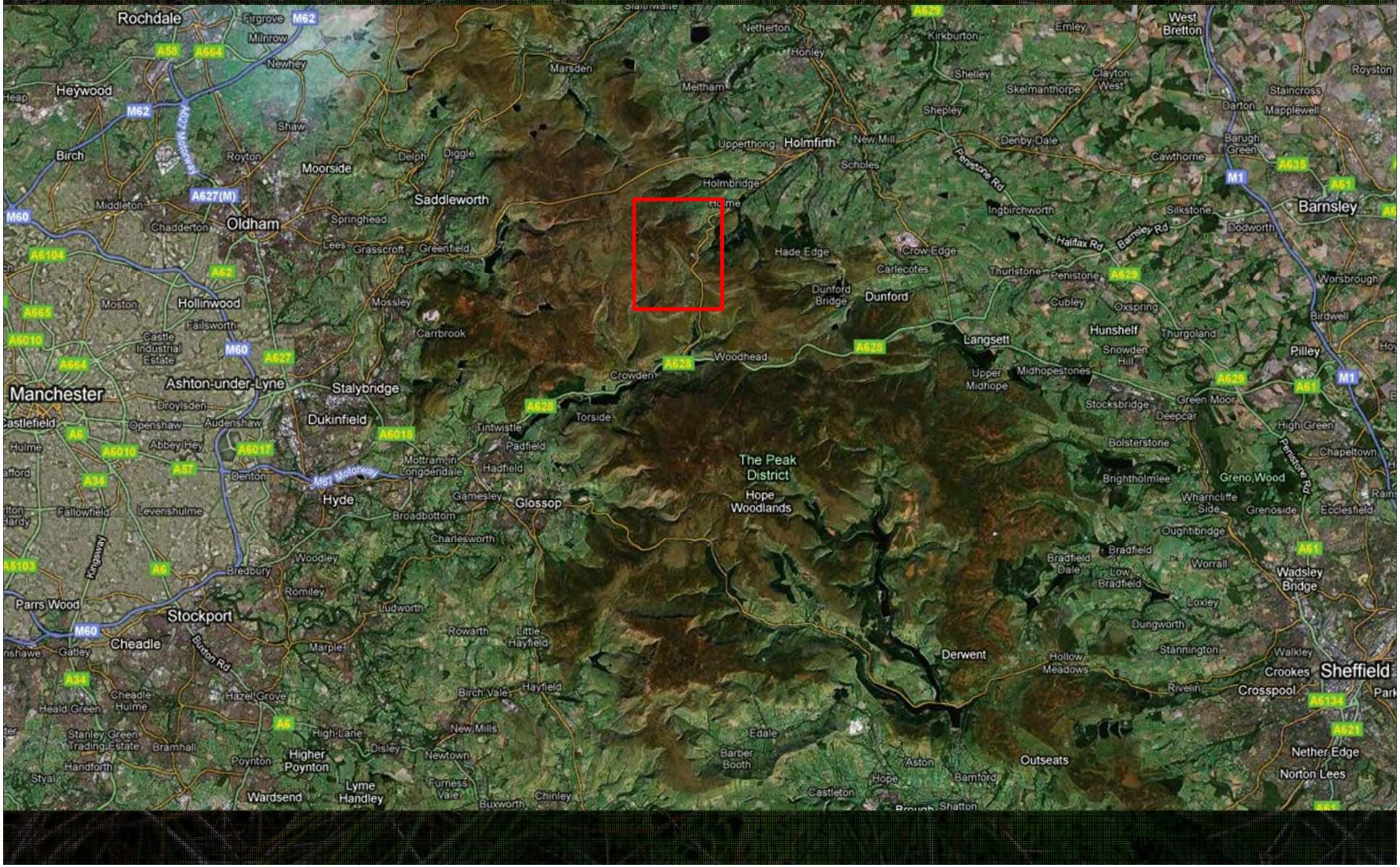
Angus Rosenburgh
Division of Biology & Conservation Ecology
Manchester Metropolitan University

Manchester Metropolitan University

The co-operative

MOORS FOR THE FUTURE PARTNERSHIP

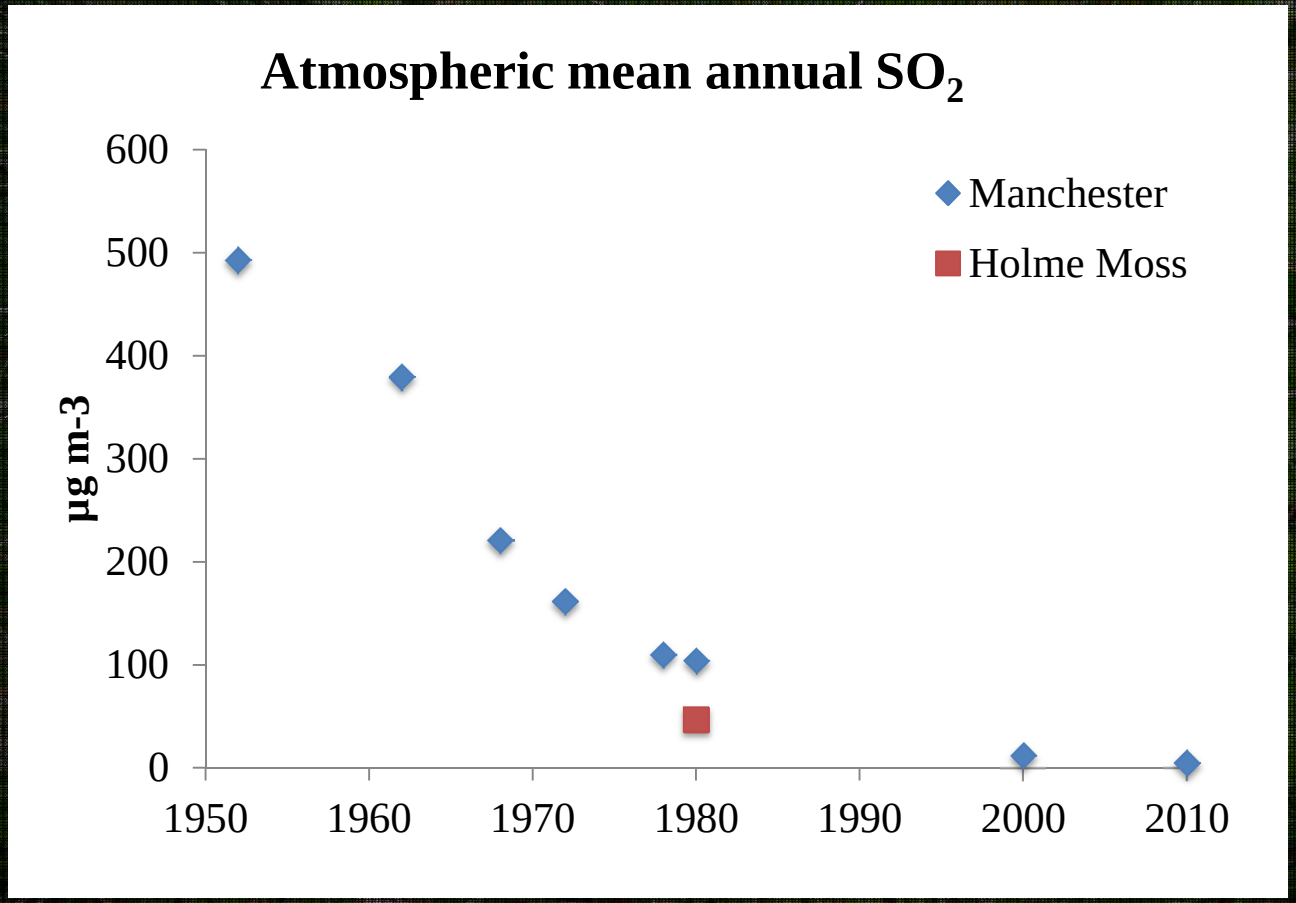
Where?


Rochdale
Firgrove
M62
Milnrow
A58
A664
Newhey
Heywood
M62
A627 Motorway
Shaw
Birch
Royton
Moorside
Delph
Diggle
A627(M)
Middleton
M60
Chadderton
Oldham
Springhead
Saddleworth
Lees
Grasscroft
Greenfield
A6104
A62
A665
Moston
Hollinwood
Failsworth
Mossley
Carrbrook
A6010
Castle Industria Estate
M60
A627
A664
Manchester
Ashton-under-Lyne
Stalybridge
Droylsden
Audenshaw
Dukinfield
A6
Openshaw
A6010
Abbey Hey
A6017
A57
Denton
M67 Motorway
A34
Hyde
Fallowfield
Levenshulme
Gamesley
Glossop
Broadbottom
Charlesworth
Woodley
A5103
Kingsway
A6
Bredbury
Romiley
Parrs Wood
Stockport
M60
Cheadle
Gatley
Ludworth
Rowarth
Little Hayfield
Marple
Burton Rd
A34
Cheadle Hulme
Heald Green
Hazel Grove
Birch Vale
Hayfield
A5
Stanley Green Trading Estate
Bramhall
High Lane
New Mills
Disley
Newtown
Poynton
Higher Poynton
Handforth
Styal
Wardsend
Lyme Handley
Furness Vale
Buxworth
Chinley
Netherton
Honley
Marsden
Meltham
Kirkburton
Emley
West Bretton
A629
Shelley
Skelmanthorpe
Clayton West
Royston
Staincross
Mapplewell
Shepley
Darton
Upperthong
Holmfirth
New Mill
Denby Dale
Barugh Green
Scholes
Cawthorne
A635
Penistone Rd
M1
A61
Holmbridge
Ingbirchworth
Silkstone
Barnsley
Dodworth
Halifax Rd
Barnsley Rd
Hade Edge
Crow Edge
Carlecotes
Thurlstone
Penistone
A629
Worsbrough
Dunford Bridge
Dunford
Cubley
Oxspring
Birdwell
Hunshelf
Thurgoland
Langsett
Snowden Hill
Pilley
A628
Woodhead
Crowden
Upper Midhope
Midhopestones
A629
M1
A61
Stocksbridge
Green Moor
Deepcar
High Green
Torside
Tintwistle
Padfield
Bolsterstone
Chapeltown
Mottram in Longendale
Hadfield
The Peak District
Hope Woodlands
Brightholmlee
Greno Wood
Wharncliffe Side
Grenoside
Ecclesfield
Penistone Rd
Oughtibridge
Bradfield
Bradfield Dale
Low Bradfield
Worrall
A61
Wadsley Bridge
Loxley
Dungworth
Stannington
Walkley
Derwent
Hollow Meadows
Crookes
Sheffield
Rivelin
Crosspool
A6135
Park
A621
Nether Edge
Norton Lees
Edale
Barber Booth
Aston
Hope
Castleton
Bamford
Outseats
Brough
Shatton

Where did it go?

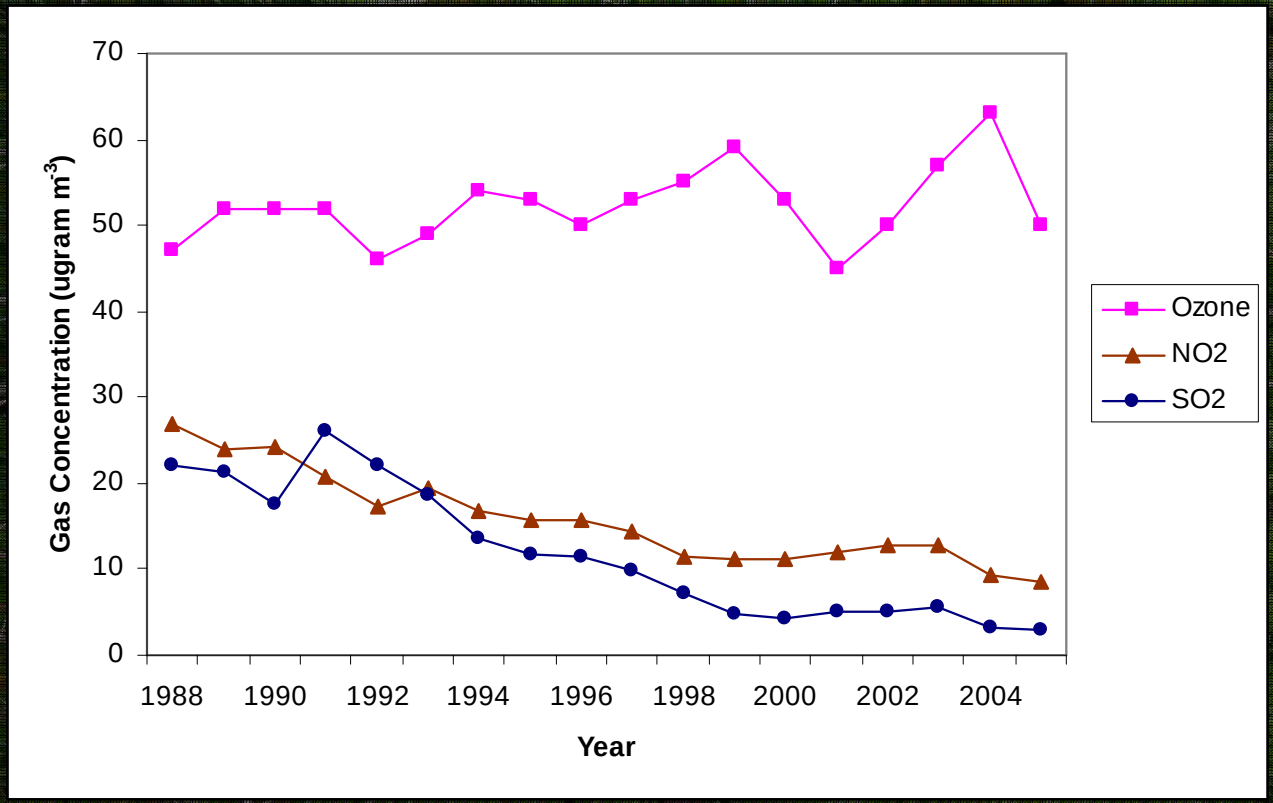
- Pollution post-industrial revolution
- Inappropriate land management
  - Stocking density too high
  - Poor burning regime
- Wildfire
  - Deliberate/ Accidental
  - Natural

Where did it go?



Data from Ferguson & Lee, 1983

Where did it go?



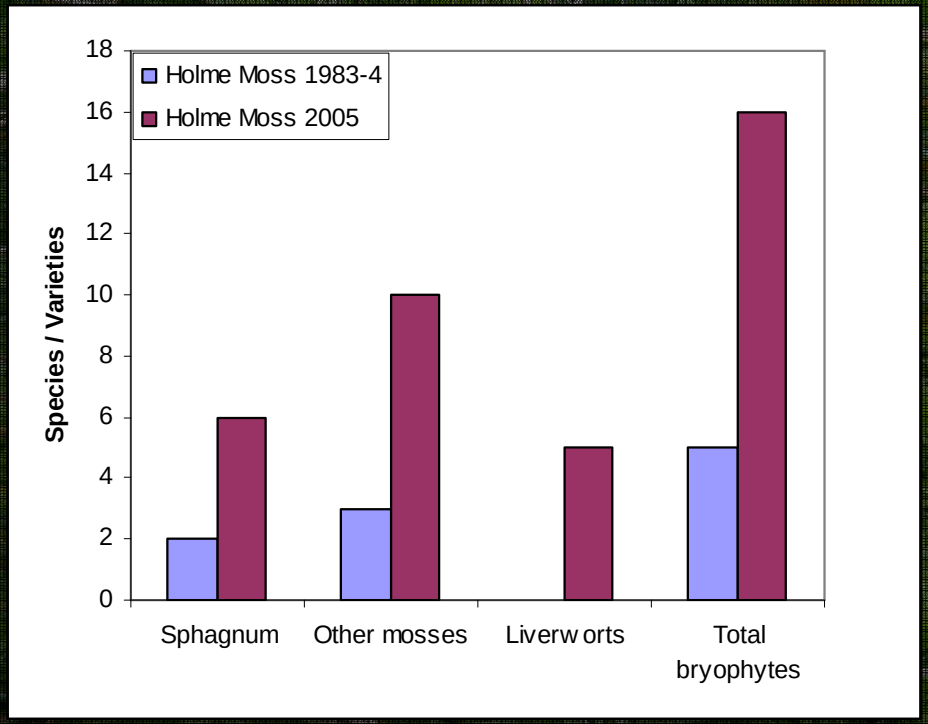
Data from the UK Air Quality Archive

What are the problems now?

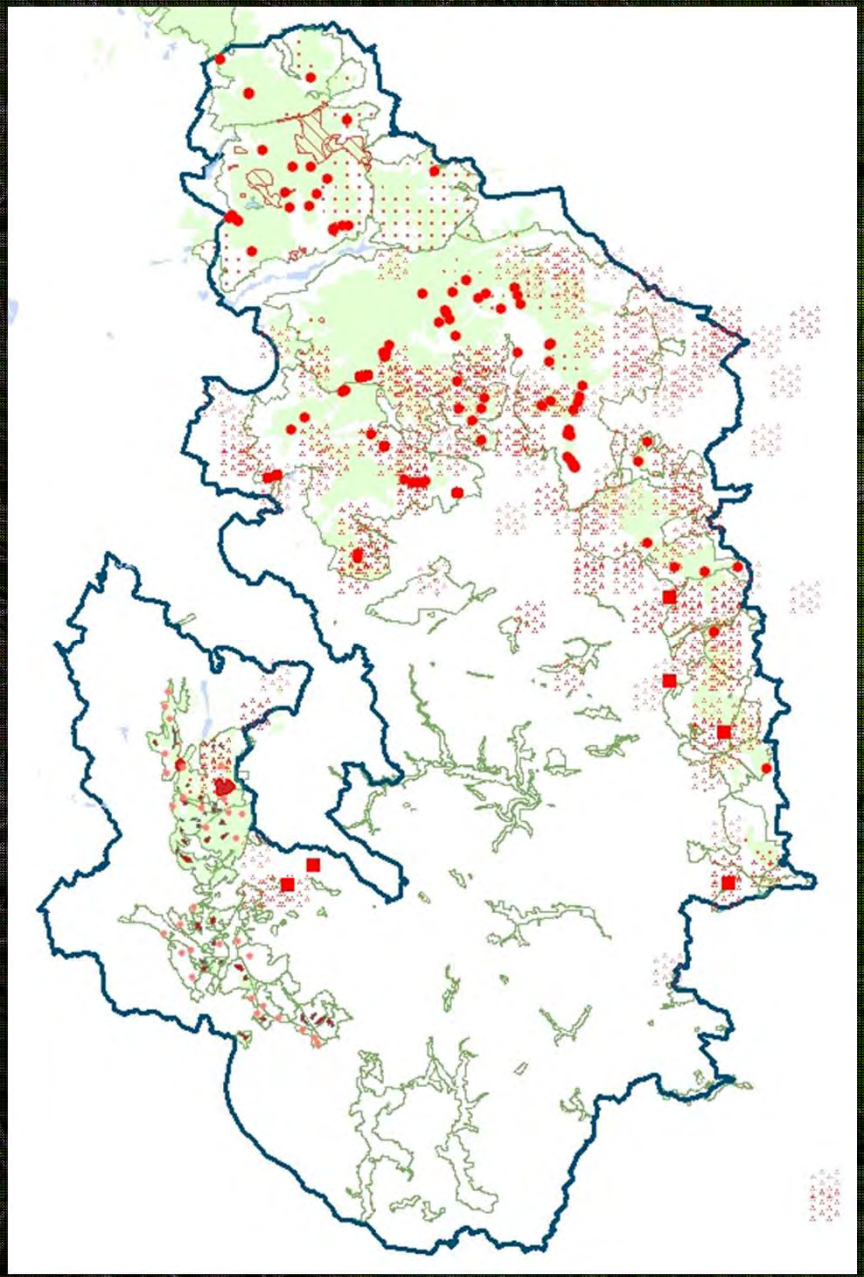
- Large, bare peat areas
- Lack of suitable propagules
- Harsh environmental conditions
- Legacy of industrial pollution

However…

- Not all bad news
- Natural recovery



Caporn *et al.*, 2006



SSSI Unit

Blanket Bog (National Inventory v1-1)

Sphagnum Records (1989 - 2007)

(Sphagnum somewhere within this area)

Penny Anderson Associates, Moors for the Future, Natural England, Manchester Metropolitan University

How to improve?

- Limiting factor - *Sphagnum* propagules
- Introduce more!
  - Brash
  - *Sphagnum* mulch
  - BeadaMoss
  - Each method has its pros and cons

Where, when & how?

- *Sphagnum* species trial
  - *S.cuspidatum*
  - *S.fallax*
  - *S.fimbriatum*
  - *S.palustre*
  - *S.papillosum*
- Different substrates
  - Bare
  - Treated
  - Intact
- Seasonality
  - Sowing
  - November ‘09
  - April ‘10
  - August ‘10
  - September ‘10
- Indoor experiment
  - Holme Moss peat
  - Commercial peat
  - Climate eliminated

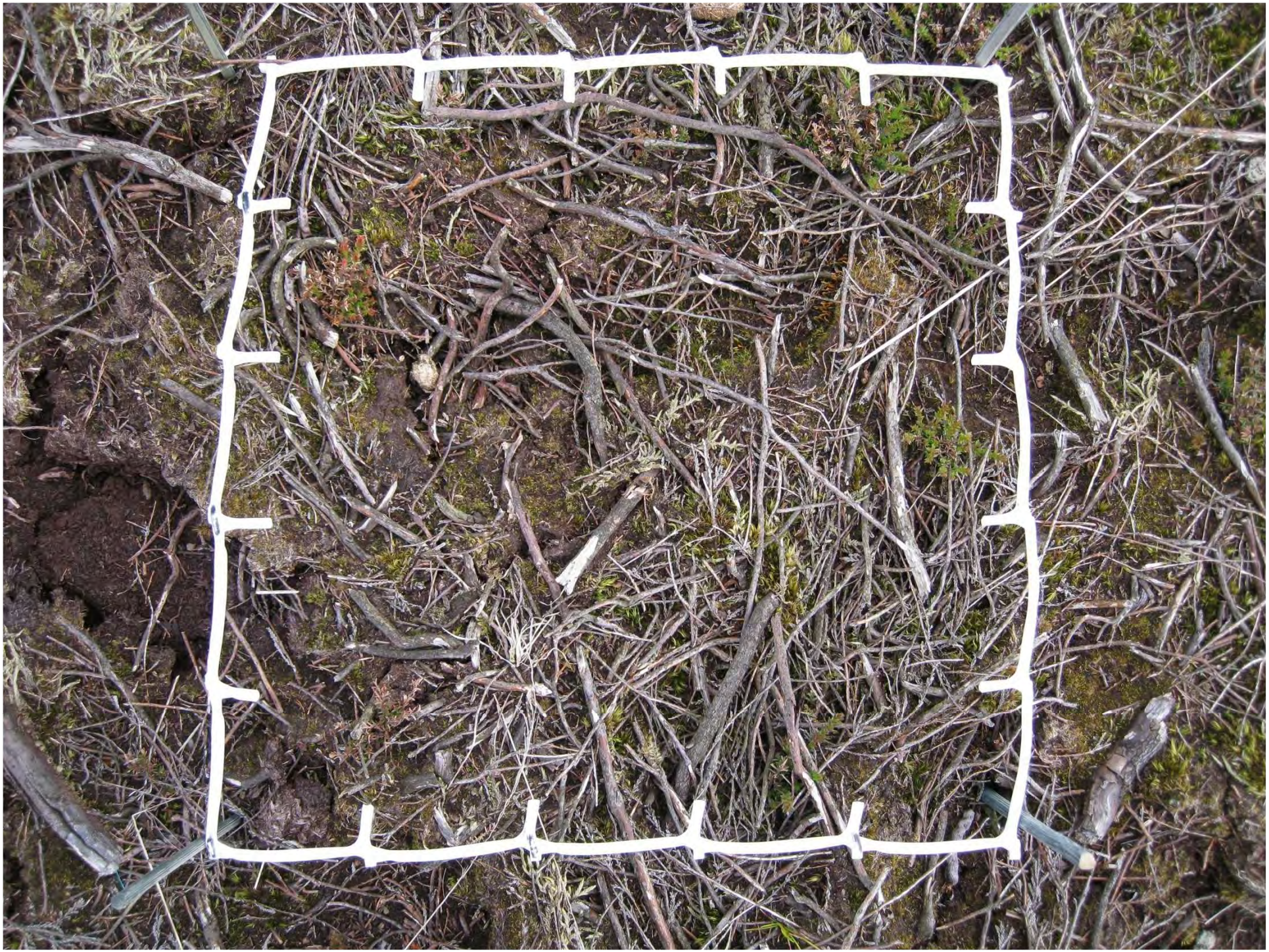
Sphagnum propagule source

- Heather brash
- *Sphagnum* mulch / Harvested *Sphagnum*
- BeadaMoss
  - Heather brash, *Sphagnum* mulch + heather brash, BeadaMoss (*S.fallax* + *S.palustre*) + heather brash
  - Bare and treated surfaces
  - Indoor experiment on Holme Moss and commercial peat

Species and seasonality trials

- Proven success in preliminary trials
- Hard winter
- Tough summer
- Beads still present in the field

Photos by S.Hinde



Sphagnum propagule source trial

- Applied thickly
- Mobile peat surface
- Grass barrier

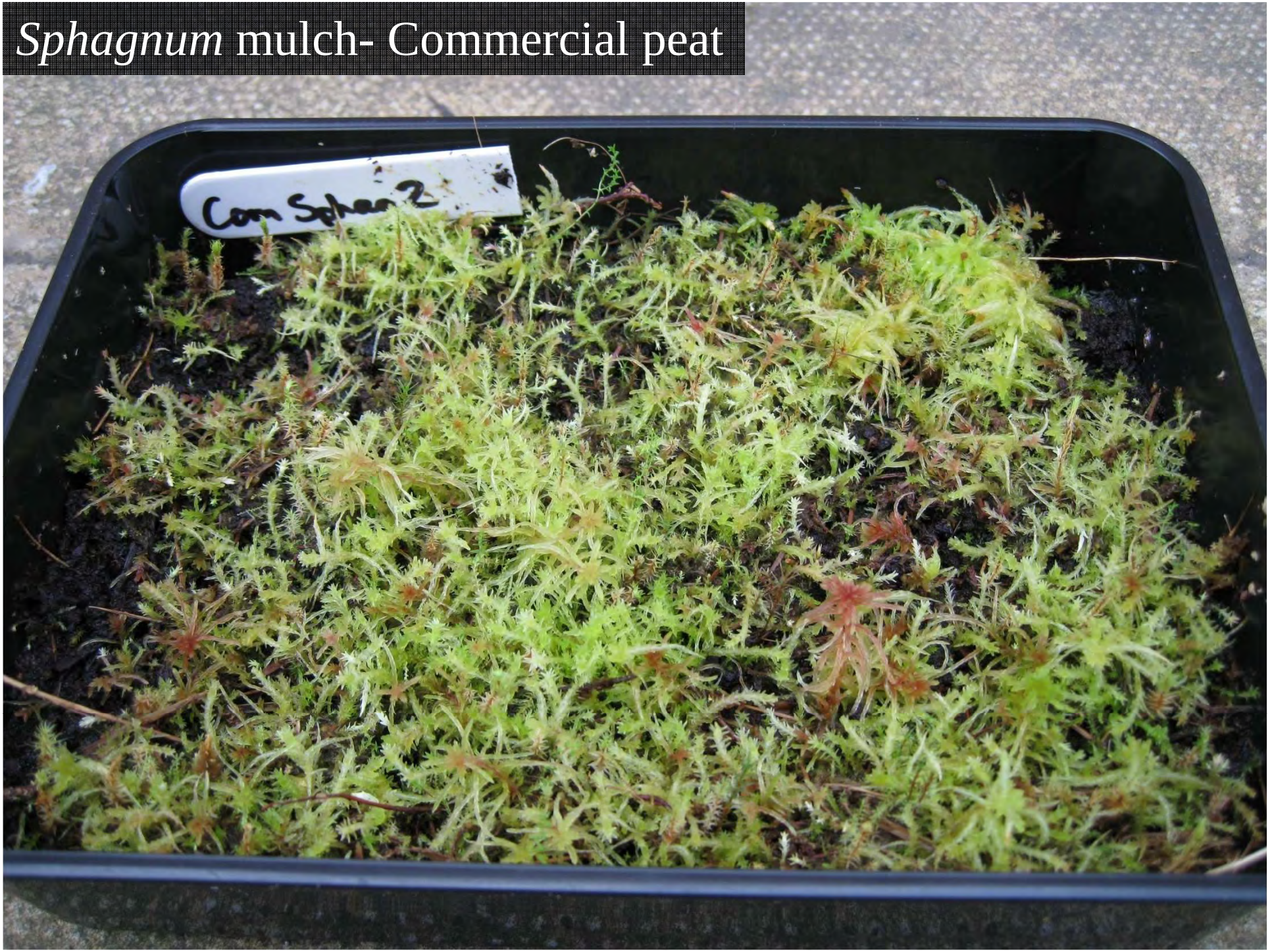
Indoor trials

- Answer specific questions
- Still poorer performance

Commercial peat

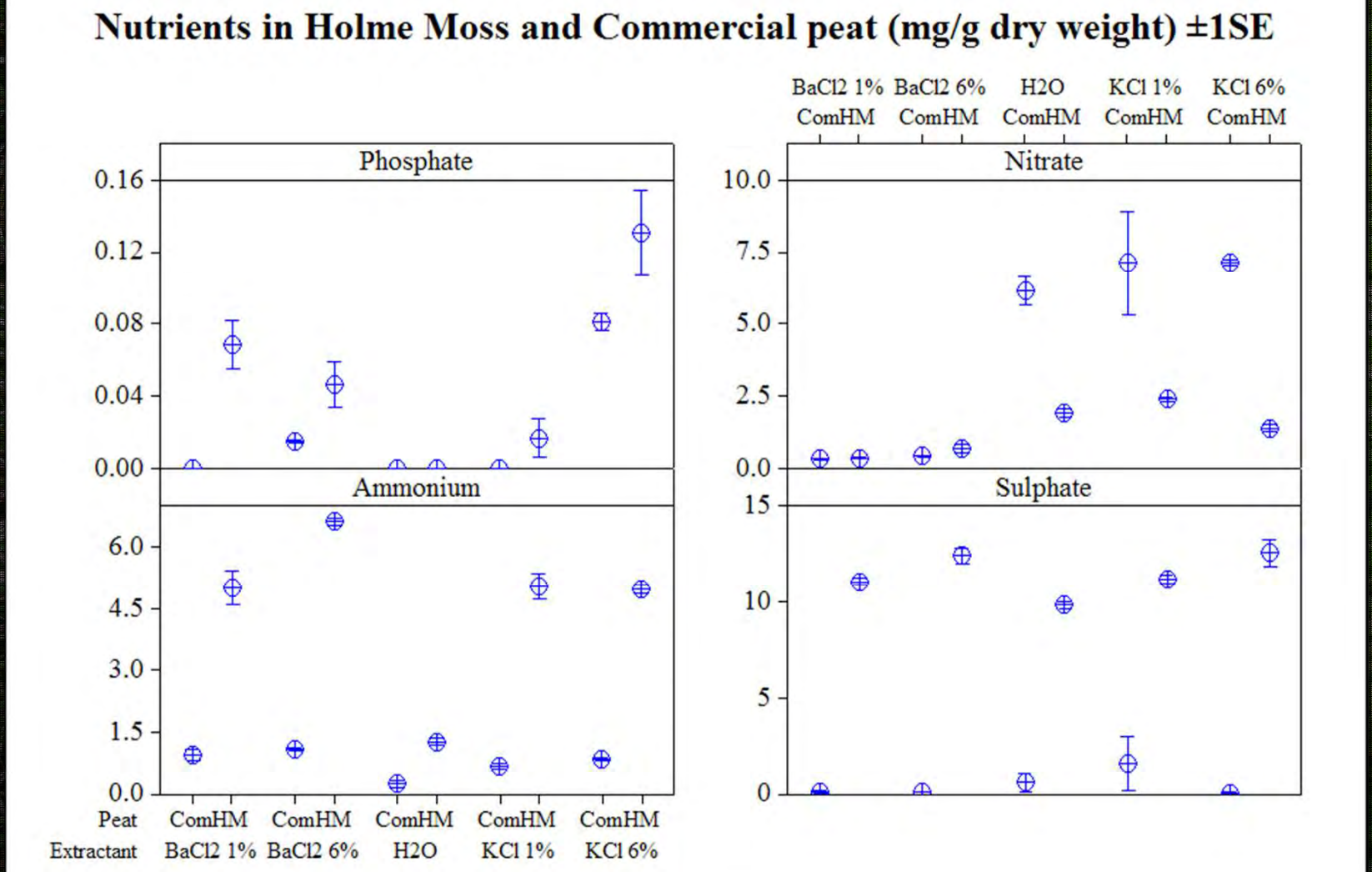
Holme Moss peat

Sphagnum mulch- Commercial peat



Sphagnum mulch- Holme Moss peat

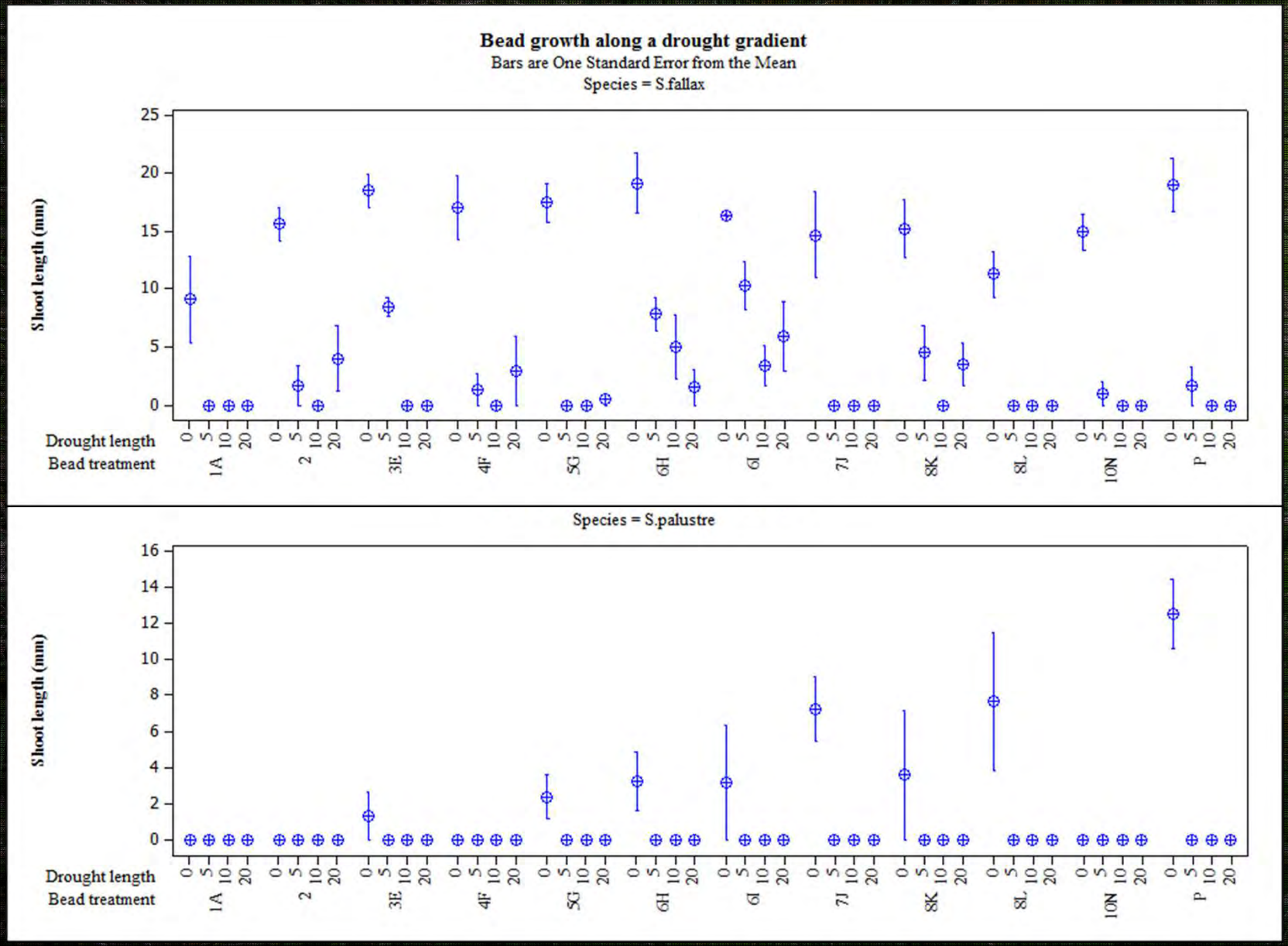
Peat chemistry



Drought experiment

- Desiccation is problem
- Series of bead treatments, *S.fallax* and *S.palustre*
- Improve drought resistance
- Growth cabinet- highly controlled environmental conditions

Drought experiment



What next?

- Micro-climate importance & provision
- Facilitation experiment

- Alternative degraded bog sites
  - *Molinia*
  - Peat pans
  - Diversification
  - Lowland raised bog (cutting, forestry, etc.)

- All related to environmental variables; physical, chemical, meteorological, etc.

- Complete just in time to provide guidance to MoorLIFE

Acknowledgements

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MOORS FOR THE FUTURE PARTNERSHIP

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Manchester Metropolitan University

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