GREENHOUSE GAS BENEFITS OF *SPHAGNUM* FARMING (UK) USING MICROPROPAGATED MATERIAL

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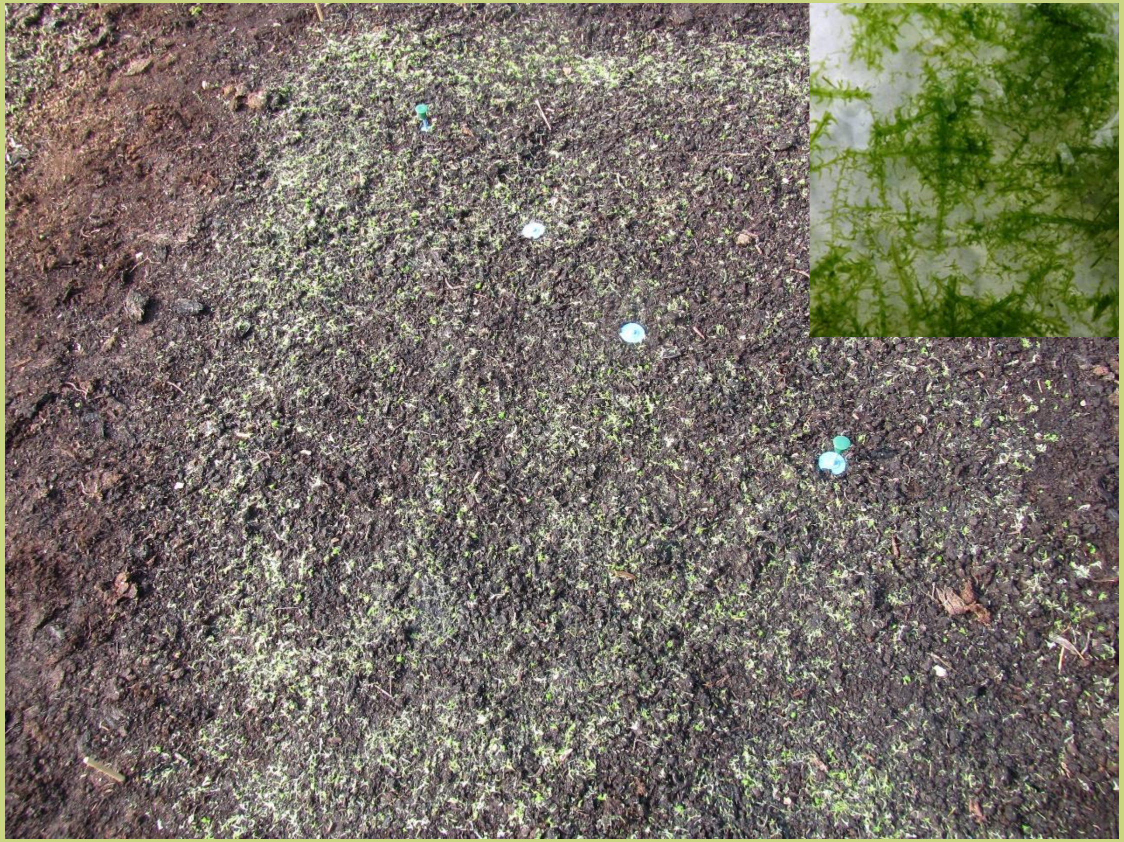
a – e: project partners; f: funders; g: landowner permissions

Sphagnum palustre

- Fast-growing
- Resilient
- Growing media choice

BeadaMoss® products used

BeadaGel™



BeadaHumok™

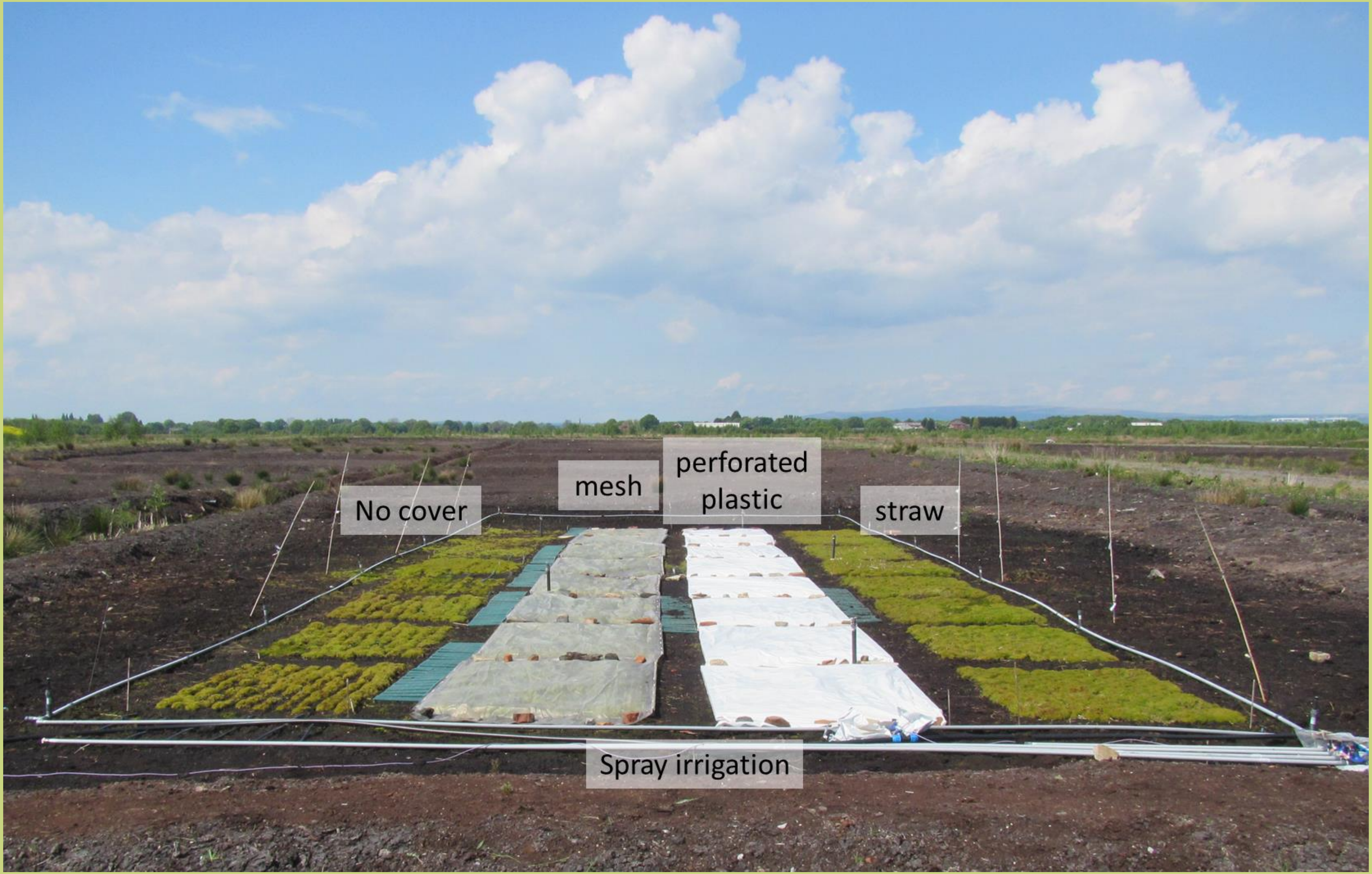
Little Woolden Moss planting: BeadaGel™ April 2019; BeadaHumok™ October 2018

BeadaMoss® company: http://www.beadamoss.co.uk/

Project sites

Little Woolden Moss (LWM), Lancashire
Ex-milled peatland site

Whitwick, Leicestershire
Organo-mineral site



No cover
mesh
perforated plastic
straw
Spray irrigation

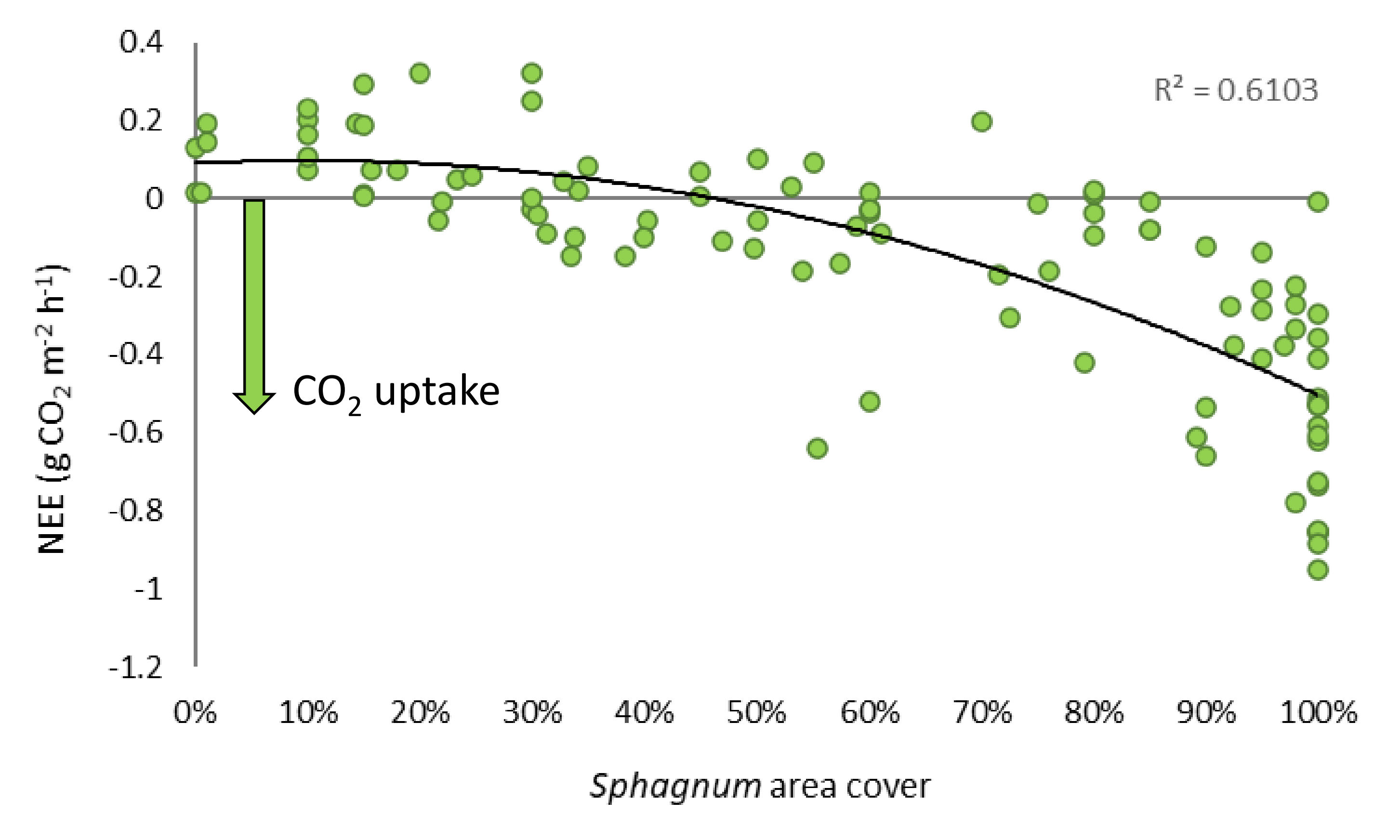
Carbon GHG measurements

- Los Gatos UGGA and closed chamber system
- CO_2 and CH_4
- Net Ecosystem Respiration (NER) (dark) x 2 minutes
- Net Ecosystem Exchange (NEE) (light) x 2 minutes
- Monthly visits
- All treatments, covers removed
- Environmental variables (peat temperature and PAR)
- *Sphagnum* cover measurement

$$Flux = \frac{\Delta CO2}{t} * \frac{PV}{RT} * \frac{1}{As} * \left(\frac{44*60*60}{1000}\right) \text{ g } CO_2 \text{ m}^{-2} \text{ s}^{-1}$$

Adapted from Dossa *et al.*, 2015

NEE (Net CO_2 uptake) increases with *Sphagnum* cover

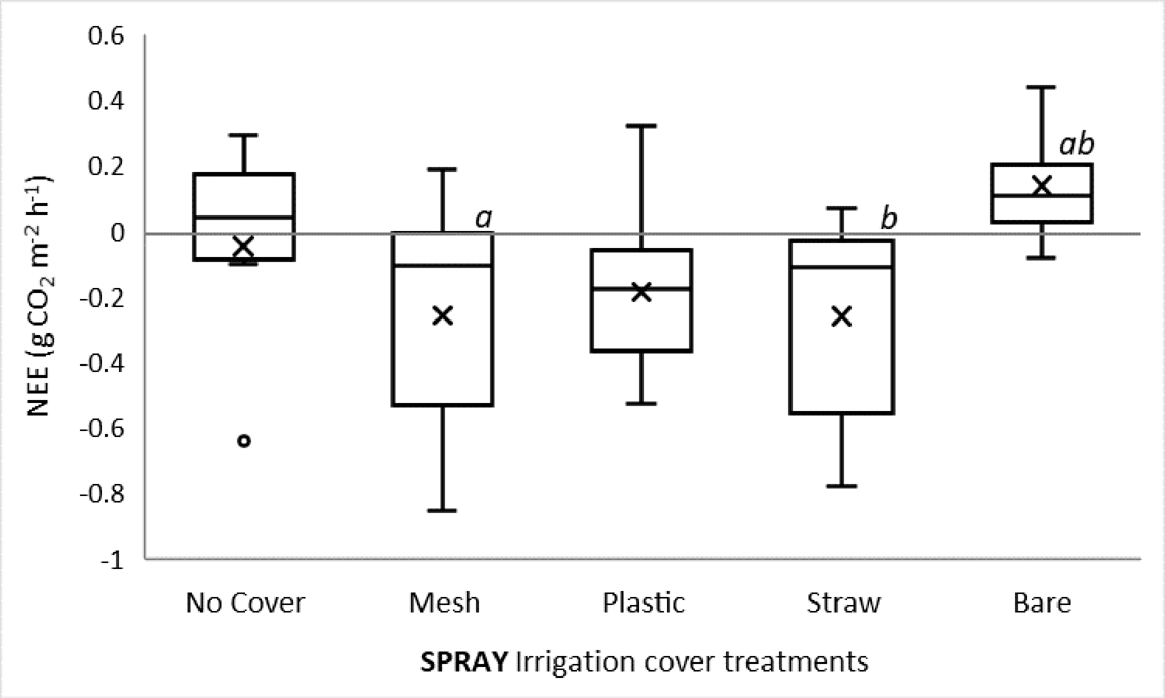


- Little Woolden Moss site only
- May to September 2019 data
- Middle of day measurements

Mean PAR: 1365 ± 463 µmol m^{-2} s^{-1}
Mean Peat Temp at 5cm depth: 16.8 ± 2.5 °C

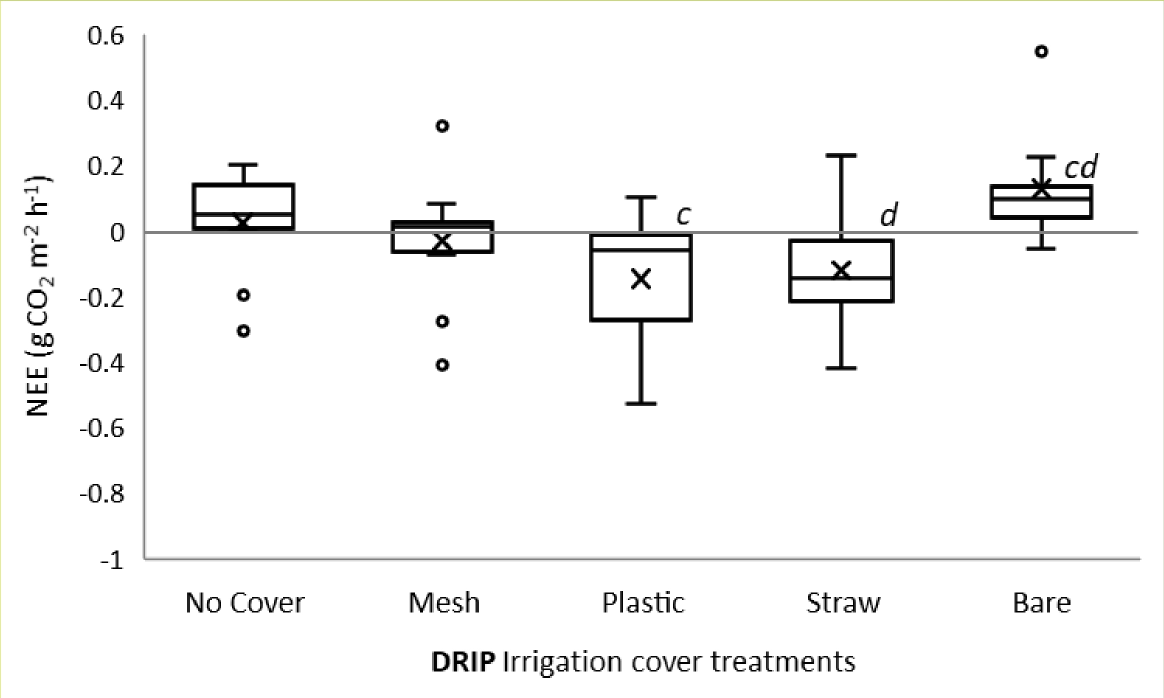
NEE across cover treatments and irrigation regimes

Spray



Mean WTD -15.9 ± 10.8 cm

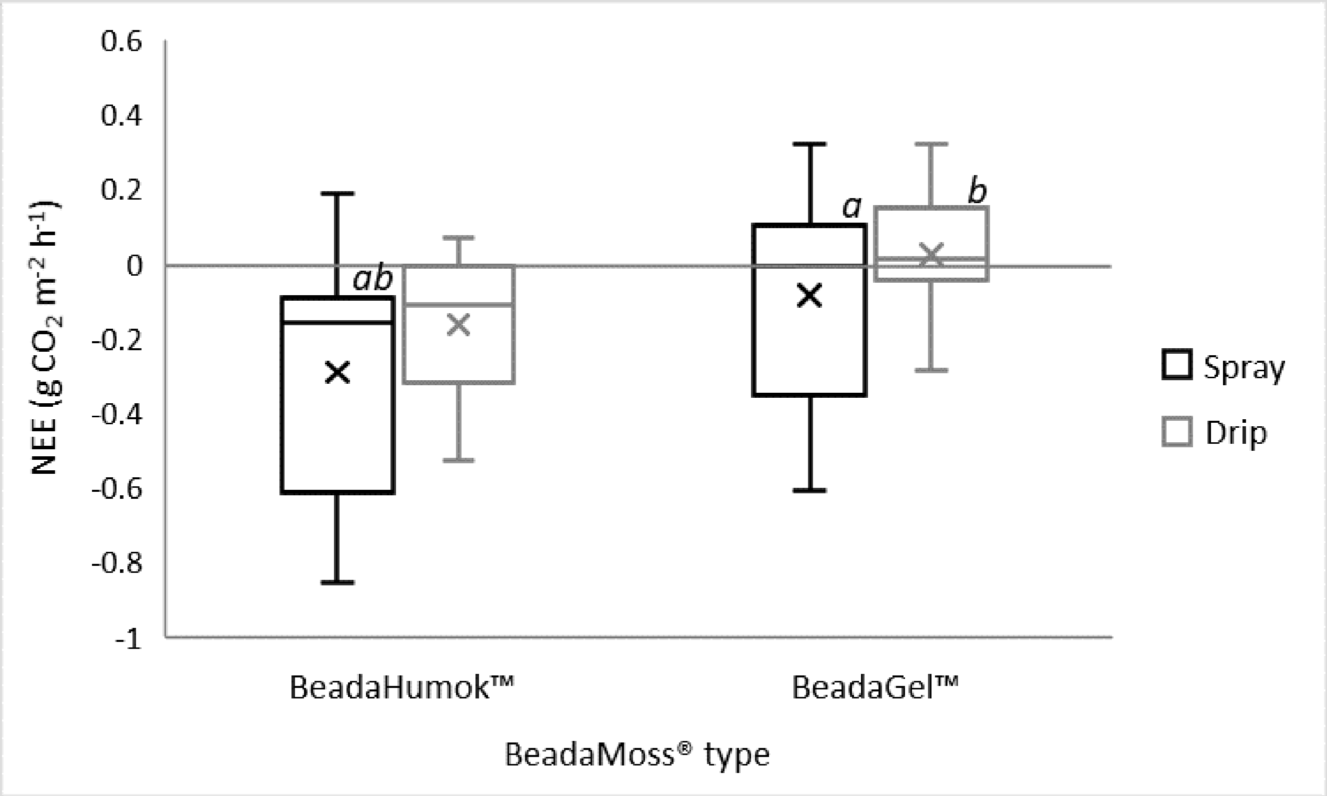
Drip



Mean WTD -18.3 ± 9.8 cm

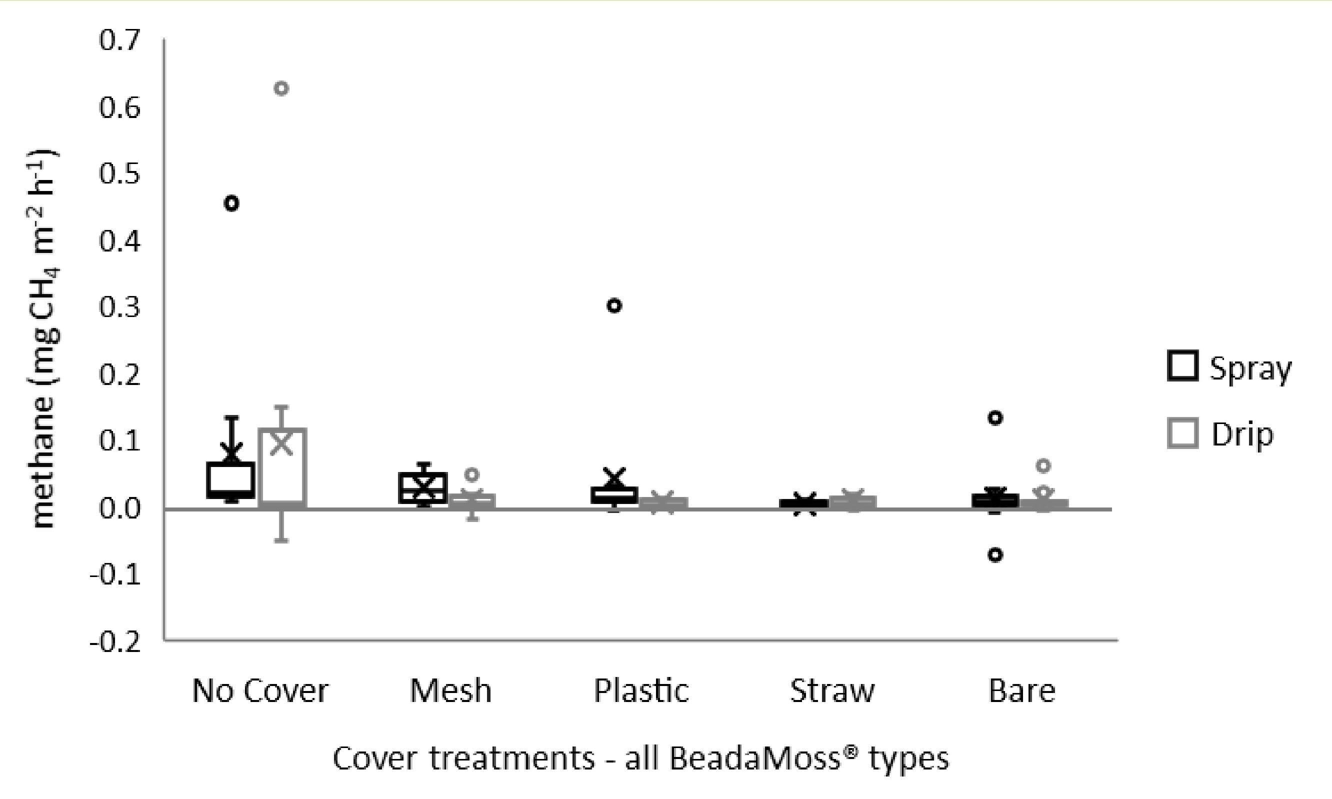
Little Woolden Moss site only, combined BeadaHumok™ and BeadaGel™ data, May to September 2019, n = 10 throughout
In box plots, crosses indicate the mean value, lines indicate the median, and interquartile median range is inclusive
Shared letters indicate statistically significant differences on post-hoc Tukey HSD tests where $p < 0.05$

NEE between *Sphagnum* types and irrigation regimes



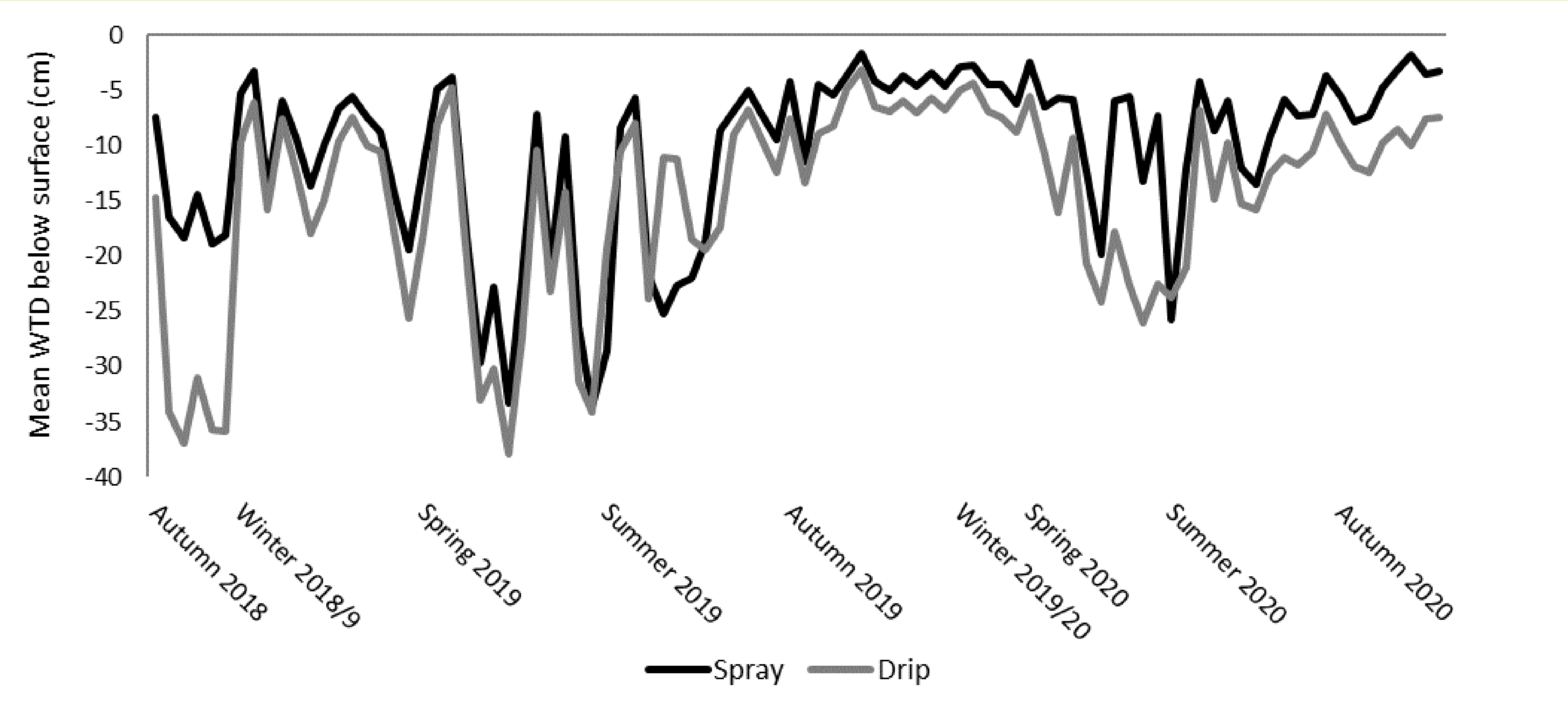
Little Woolden Moss site only, May to September 2019 data, n = 20 throughout
In box plots, crosses indicate the mean value, lines indicate the median, and interquartile median range is inclusive
Shared letters indicate statistically significant differences on post-hoc Tukey HSD tests where $p < 0.05$

Methane fluxes negligible



Little Woolden Moss site only, measured in the dark, May to September 2019 data, *n* = 10 throughout
In box plots, crosses indicate the mean value, lines indicate the median, and interquartile median range is inclusive

Site water table stabilising



Summary Observations and Questions

Summary:

- Net CO_2 uptake improves with greater *Sphagnum* area cover
- Spray irrigation more successful than Drip irrigation (growth-related)
- *Sphagnum* protective covers improve net CO_2 uptake (growth-related)
- Net CO_2 uptake better with *Sphagnum* than not
- These methods do not facilitate methane emission

Questions:

- CGHG flux under covers (light reduction: mesh 20.0 ± 2.3 %, plastic 63.1 ± 2.3 %)
- N_2O contribution (agri-soils particularly) and DOC: not known
- CGHG budget – more data/reduced treatments needed for modelling

Outcomes

- Beneficial *Sphagnum* farming methods identified: BeadaMoss®, irrigation regime, cover material
- Field–scale trials in progress
- Potential for both economic returns and Carbon GHG benefits

Thank you!

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