How do hedgerows influence soil organic carbon (SOC) in livestock grazed grasslands?

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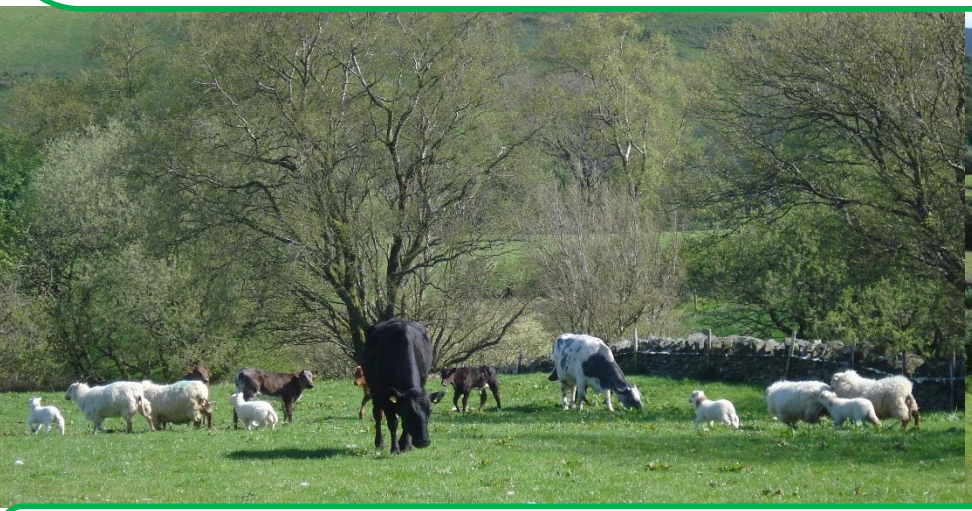
Multi-Land

Enhancing Agricultural Productivity and Ecosystem Service Resilience in Multifunctional Landscapes



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- Hedgerows have potential to enhance regulating services (Welsh government, 2017)
  - Shelter
  - Water quality
  - Soil erosion prevention
  - Carbon storage
- But often ignored when quantifying ES at the landscape scale (Scholefield et al., 2016)

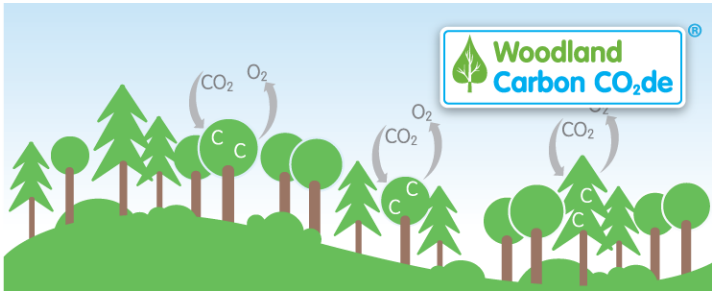
Current mapping of C stock in agricultural grasslands

Cranfield Natmap soil map (i.e. freely draining acid loam)
LCM2007 Land cover map (i.e. improved or rough grassland)

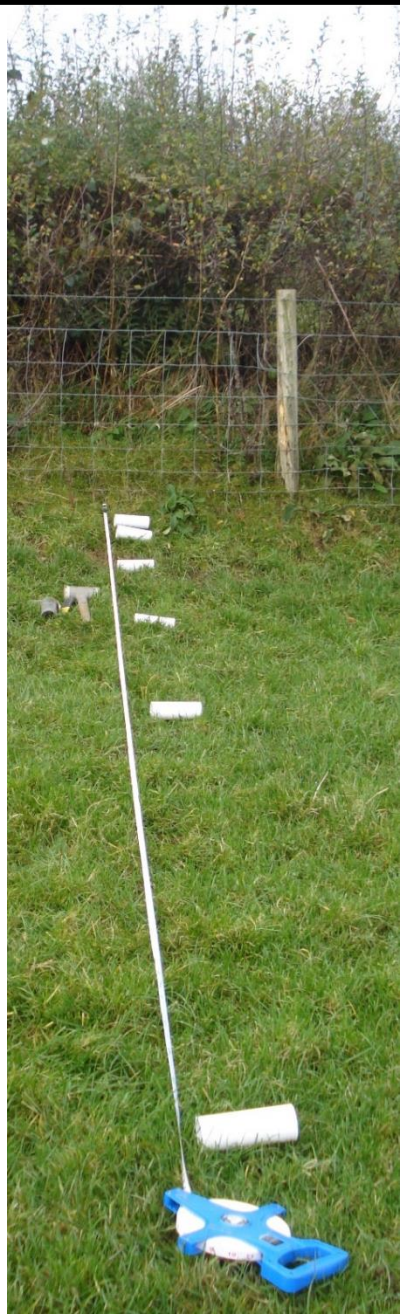
↓

Used to calculated C stock

BUT Hedgerows not mapped or included in calculations



- 9 upland farms Conwy catchment
- 38 hedgerows & 16 stone wall / fence
- Samples (0.15, 0.3, 0.6, 1.2, 2.4, 4.8m)



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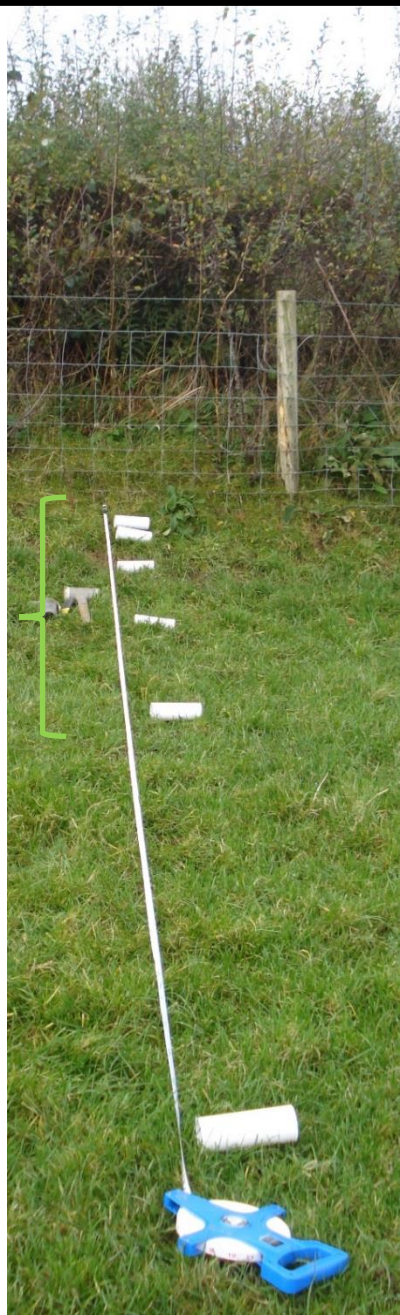
Next to hedgerow

↑ SOC due to tree root exudates, fine root turnover, leaf litter

↑ BD (compaction) by livestock?

Or ↓ BD due to aeration of soil by tree roots?



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- Soil parameters
  - Soil moisture
  - pH
  - Bulk density (BD)
  - Soil organic matter (SOM)
  - SOC

15 cm core comparable to GMEP / Countryside survey

- 9 upland farms Conwy catchment
- 38 hedgerows & 16 stone wall / fence
- Samples (0.15, 0.3, 0.6, 1.2, 2.4, 4.8m)

- Hedgerow parameters
  - Age (since planting)
  - Dominant tree species
  - Management
  - Presence of standards

Standards (↑ SOC?)

Trimmed (last year) (↑ or ↓ SOC?)

Hazel, blackthorn & hawthorn (↑ SOC blackthorn due to root network)

- 74% of variation in SOC content adjacent to hedgerows explained by 4 parameters
- No relationship between SOC stock and hedgerow parameters
- If only SOC stock is mapped zone next to hedgerow does not show any differences as enhanced SOM is offset by decreased BD

- Work with Amy Thomas (SIP project) to develop joint Bangor University / CEH GIS layer incorporating impact of hedgerows on SOC within the Conwy catchment
- Will allows us to model future scenarios with enhanced hedgerow cover for ↑ SOC

Under hedge (high SOC)

~2m from hedge boundary (medium SOC)

Pasture (low SOC)

- Seasonal soil respiration measured from hedgerows and adjacent livestock grazed pasture in free-draining and waterlogged soils

- Planting hedgerows on free-draining soils on upland farms could improve the carbon balance of livestock grazed pastures

Other interesting work Hedgerows & shelter

Ysgoloriaethau Sgiliau Economi Gwybodaeth
Knowledge Economy Skills Scholarships

Improving the efficiency of sheep production through environmental management

Prysor Williams, Andy Smith, Peers Davies, Fiona Lovatt, Hilary Ford, Diego Moya

- How does the provision of on-farm shelter impact livestock production efficiency?
- Can on-farm shelter improve lamb mortality and welfare?
- Randomised control trial of the impact of different levels of shelter on ewe and lamb outcomes.
- Develop a decision support tool for modelling the impact of alternative shelter enhancements in commercial flocks.

Flock Health Ltd

PhD studentship Hedgerows & shelter

Ysgoloriaethau Sgiliau Economi Gwybodaeth
Knowledge Economy Skills Scholarships

Modelling the impact of shelterbelts on livestock productivity and welfare

Andy Smith, Mark Rayment

Please circulate to anyone you think would be interested:

http://kess2.ac.uk/buk211/

https://www.findaphd.com/search/ProjectDetails.aspx?PJID=99079

*Closing date **31st July 2018***

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Thanks for listening – any questions?