Grassland systems impact swards and soils

Evidence from practice Practices and systems that might enhance soil biota in grassland

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Agricultural management practices impacting soil biota divided in terms of the scale of their impacts (Defra 2010)

i) systems-oriented approaches that provide energy-containing substrates and/or seek to optimise soil habitat

ii) those targeting specific often monotonic aspects of the soil biota or their environment (= point interventions)

Systems oriented approaches divided into those which seek to:

i) Manage the amount and quality of organic matter inputs;

ii) Modify tillage practices (usually reducing intensity);

iii) Diversify cropping systems.

Also iv) point interventions which deliver specific interventions often targeted at individual species or functional groups within the soil biota.

The long shortlist – practices known to be in use on-farm

- Use of green waste compost, paper waste, coffee grounds, treated sewage sludges – i.e. application of (local) waste organic matter
- Use of biochar
- Use of seaweed
- Changes in on-farm manure handling – reduced use of slurry
- On farm composting using a range of inoculants and advanced techniques to develop site specific composts
- Vermicomposting
- Use of compost teas
- Permaculture
- No dig and deep mulching for intensive horticulture
- Drilling directly into clover swards
- Minimum intensity tillage
- Non-inversion tillage
- Overwintered stubbles / late ploughing
- Controlled traffic
- Locally adapted rotations with grass/clover leys
- Introduction of deep rooting species and herbs into grassland
- Modification of grazing practices; use of some cutting and mulching within grazing systems
- Use of green manure crops incorporated to provide soil fumigation effects – e.g. mustard
- *Reduced use of pesticides – use of $CuSO_4$ is being phased out in organic systems*
- Targetting of inputs of fertiliser and pesticides through precision farming approaches
- Application of molasses based stimulants for microbial activity
- Inoculation of legumes through seed treatments
- Inoculation with mycorrhizal fungi

Advisory group experience suggested

- First step is explicit acknowledgement of soil biological fertility as a key part of the system.
- System-oriented practices which benefit biota may have been adopted for a range of other reasons including, but not only, fuel reduction, carbon sequestration and conservation of above-ground biodiversity.
- Farmers rarely simply adopt one practice which is thought to improve soil biota; they are adopted as part of an integrated policy of soil management

- 9 workshops
  (2 as part of existing event)
- 7th February – 3rd March 2011
- No restrictions on attendance except venue size
- 200 attendees overall
- 10-35 per venue
- Good mix of conventional/organic livestock, arable and growers

Why think about soil?

- “No response to some products when applied to crops. Crops suffering in extreme weather”
- “Seeing how the same soil is different under different management”
- “As an organic farm everything we produce comes from the soil; an understanding of the soil in each field is essential to produce high quality livestock / crops”
- “Adopting min till and beginning to see the long-term effects”
- “ ... began to realise that there was a huge untapped reservoir of potential benefits lurking in the soil which conventional farming wasn't taking advantage of”

Dairy
(3-15 practices)

>75%	Locally adapted rotations with grass/clover leys
>60%	Reduced use of slurry and increased use of solid manures / composting
> 60%	Minimum/ non-inversion tillage
c. 50%	Focus on on-farm composting e.g. through more regular turning, monitoring of temperature
c. 50%	Introduction of diverse seed mixes e.g. deep rooting species and herbs
c. 50%	Modified grazing practices

Grazing livestock
(2-11 practices)

>60%	Introduction of diverse seed mixes e.g. deep rooting species and herbs
>60%	Locally adapted rotations with grass/clover leys
> 50%	Over-seeding in grasslands
c. 50%	Focus on on-farm composting e.g. through more regular turning, monitoring of temperature

Point interventions directed at soil life such as use of compost tea or a microbial inoculant are used by small number of farmers

They are part of a set of changed practices which include a range of system-oriented changes to management of OM inputs and tillage.

The most appropriate practices that might be adopted on a farm depend on a range of other site factors; each combination of soil type and farming system calls for a different set of practices.

Hence there is a need for increased site-specific farmer understanding of the impacts of their farming practices on soil biota to enable choice amongst the increasing menu of available practices

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