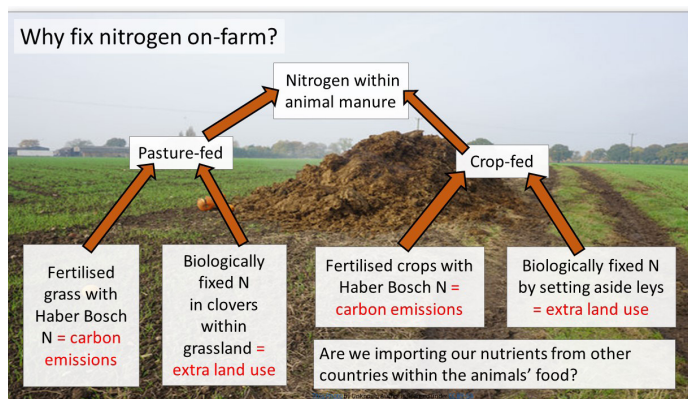


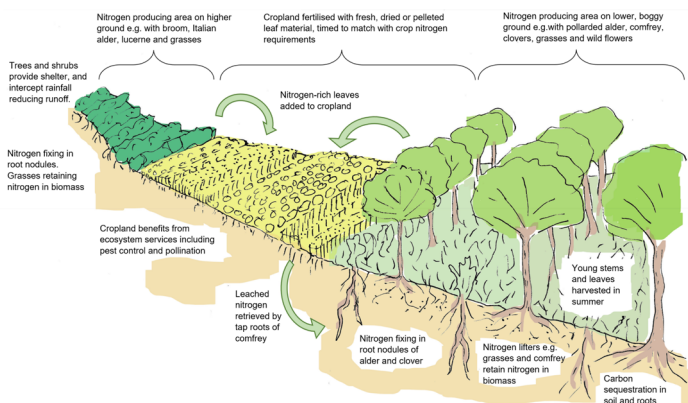
# Perennial green manures – an Innovative Farmers webinar

Perennial green manures are trees, shrubs and perennial plants grown in permanent areas to provide nitrogen-rich leaves to fertilise horticultural and arable land. It's an experimental technique being trialled on a small scale by a grower group in mid-Wales. Clo Ward introduced the topic to readers of The OG in Autumn 2022 (OG60) and at Organic Matters 2022 (OG61). This Innovative Farmers webinar provided an update on trials in 2023 and opportunities to get involved in a field lab on the topic.



Clo Ward, researcher for the Perennial Green Manures project, run by Ecodyfi, introduced the project, which follows on from research that Clo carried out as part of a PhD at Bangor University, which began in 2016. The concept evolved to solve 'the nitrogen problem,' the environmental impact of nitrogen fertilisers and animal manures versus taking land out of production to grow clover leys with losses of nitrogen after incorporation of the ley (tillage). Could there be an alternative approach of growing trees and shrubs in permanent 'Bio-service' areas and harvesting the leaves to fertilise the crops? The bio-service area, which could be on marginal land, can be multi-functional as windbreak, shelterbelt or buffer strip, and provide biodiversity benefits. The Bangor research looked at Alder, Gunnera and Gorse. It concluded that perennial green manures:

- provide a slower, but effective supply of nitrogen, which becomes more effective in the second year of additions in the field.
- resulted in lower nitrogen in soil solution
- can produce lower N<sub>2</sub>O emissions than either ammonium nitrate fertiliser or incorporated clover leys.



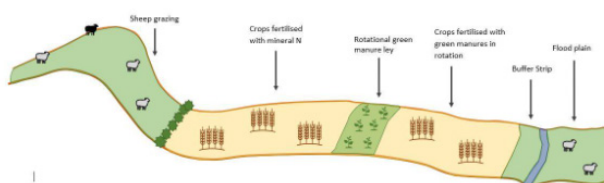
Fertilising crops using perennial green manures

## Perennial Green Manures project

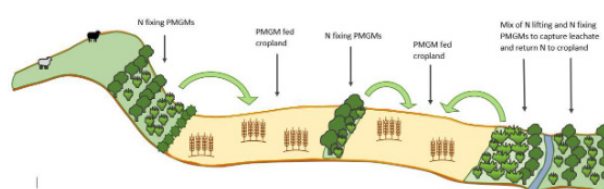
The Ecodyfi-run project "is a much less scientific project, but much more about practicalities and the experience for the growers" Clo said. "We collected leaves of the perennial green manures, and we're trialling them on six farms, and we're going to write up the results in a report that we will release in the spring."

"We got the growers to choose what crop they wanted to experiment on, and we chose perennial green manures that we thought would supply nutrients well into that crop. We usually used a mix; one slow release like alder and one faster release like clover or comfrey but adding just a little bit when the crops need it so that you can fertilise the crops and you don't build up the nitrogen in the soil too much. We then compare it with their own additions."

One surprise was the quantities of nitrogen that some growers were putting on in manures and composts – up to 800kg N/ha! Preliminary results have been interesting - willow is looking surprisingly effective on beetroot crops, but it could be a chance result. Alder/clover additions at 180 kg/N/ha produced good yields of potatoes in a trial, but not as high as the manure treatment of 800 kg/ha!



Typical present day agricultural landscape



Perennial green manures integrated into the landscape



Perennial green manure trials

Photos and graphics: Perennial Green Manures project

The key issues behind the technique are:

- You're adding the nitrogen bit by bit within the leaves of the perennial green manures, as and when needed by the crop. "If we can build up information on other nutrient content like phosphorus and potassium, then we could also perhaps address other soil issues by carefully adding the right species."
- The land use issue. Is it a more environmentally beneficial way to fix nitrogen? It provides more carbon sequestration and biodiversity benefits than grass/clover fertility-building leys. Conventional farmers may argue that the use of manufactured nitrogen spares land. But for organic farmers the clover ley part of the rotation perform useful functions, building soil health and providing a break for reducing weeds, pests and diseases.

## Emma Maxwell's trial

Emma runs Ash and Elm, a market garden in mid-Wales and had previously carried out trials as part of a field lab on 'Alternatives to plastic mulches.' As part of this she had used grass mulches as a weed suppressant, but had been amazed at the yield boost it had given when used to mulch kale. So, for the perennial green manure trial Emma was keen to include a grass/clover mulch as a treatment, choosing potatoes as the crop this time. One issue was that at the time of the trial Emma had no irrigation and many of the additions were not activated until there was rain. Despite that, the alder/clover and grass treatments worked well, but were more variable than the plots with manure.

Grass mulches work for Emma as "we've got grass paths, so it's really easy to gather and spread the grass. For next year I want to look at another crop that I could easily mow, such as comfrey."

"The tree leaf mulches I think are great, but it's how to easily gather them in and process them for use. But what really impressed me (Aberystwyth University processed the green manures into pellets) is that these pellets look just the same as a fertiliser you could buy such as chicken manure pellets."

## Challenges to master

What system would work best with perennial green manures? It could be an alley cropping agroforestry system where you use the leaves directly, or separate bioservice areas, and drying the leaves for use elsewhere?

Other problems to solve include:

- Knowing the non-nitrogen nutrient values of a wide range of perennial green manures.
- Effects on soil chemistry and biology, including long-term.
- Soil carbon sequestration levels and carbon losses.
- Risk of spreading tree diseases and mitigation strategies
- Methods of harvesting to minimise disturbance to wildlife.
- Policy issues. E.g., tenancy rules preventing tree planting, NVZ rules on nitrogen application rates, even with slow-release materials.

## Topics for a field lab

What quantity of perennial green manures and nutrients can be produced per unit area? What are the most effective and low carbon methods to add the material to crop land?

How effective can perennial green manures be at fertilising crops on a field scale?

Growers in the field lab could have a bio-service area which includes trees and shrubs, but a lot of the PGMs used on the cropland could be herbaceous, ground covering leafy stuff, such as comfrey.



## Discussion

Conventional grower Chris Molyneux mentioned that he had good results with harvesting grass/clover with a forage harvester and spreading on the land for a kale crop (one to one in terms of area harvested and an equivalent area of crop), using strip-till to plant the kale into it. He was applying the equivalent of 100 kg N/ha and it helps reduce his fertiliser bills.

### Phil Sumption

<https://youtu.be/6xNe8g-fAxY?si=OzwFVUJj5c6KWGmB>

[www.innovativefarmers.org/news/pgm-webinar/](http://www.innovativefarmers.org/news/pgm-webinar/)

More links and resources: [www.dyfibiophere.wales/perennial-green-manures](http://www.dyfibiophere.wales/perennial-green-manures)



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