Cover Crops

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Hot Topic

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- Regenerative (Carbon capture)
- Improve Soil Structure
- Nutrient retention
- Government Funding (Sustainable Farming Incentive)

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Carbon Capture

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- Organic Matter is formed from decaying organic material such as vegetation from crop residues and cover crops and animal deposition.
- The carbon is stored within the soil in long chains
- Thus sequestering carbon in the soil, reducing your carbon footprint

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Soil Structure

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Benefits of increasing Soil Organic Matter

- Improves soil structure and thus workability
- Increases water holding capacity (Drought tolerance), filtration and drainage
- Reduces the risk of capping, compaction, and erosion
- Adds to cation exchange capacity when well broken down (humus)
- Buffers pH during decomposition and stabilisation
- Provides a food source for soil organisms, including fungi which contribute to the soil biology and provide more pathways for nutrient management in the soil ecosystem.

Cover Crop Rooting

- Reduce Compaction
- Roots can provide food source for microorganisms

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ADAS trial with Affinity Water and Portsmouth Water

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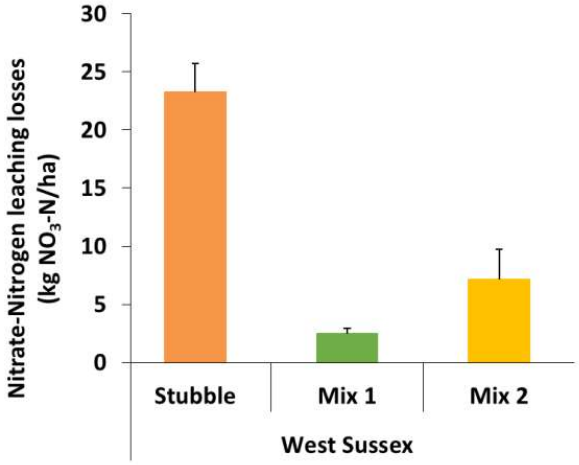
Mix 1: **Phacelia** (20%) **& Oil Radish** (80%) @ 15 kg/ha

Mix 2: **Japanese oats** (45%), **Buckwheat** (45%),
Phacelia (10%)@ 40kg/ha

Drilling dates: 6/09/2021
Destruction dates: 17/02/2022
Spring barley drilled: 19/03/2022
Soil texture: Silty clay loam, over chalk (down at 90cm)



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Spring Nitrogen Balance

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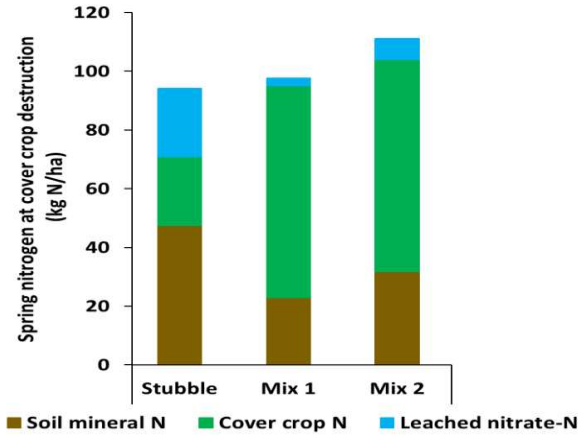

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Properties of Cover Crop Species

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Can be any species that provides cover to bare soil

Legumes, fix nitrogen for the following crop; Clover and Vetch

Pest Suppression, Biofumigation using glucosinolate producing plants that can suppress pests such as PCN; Mustard. Buckwheat can release antifeeding toxins to wireworm

Vigorous Rooting, improves soil structure; Forage Rye, black oats and Radishes can help remove compaction

Weed Suppression, vigerous above ground growth can out compete weeds; White Mustard, Forage Rye and Berseem Clover. Other species such as Black Oats also have allelopathic properties used to suppress weed growth

Phosphate scavenger, Buckwheats acidic root zone helps breakdown 'locked up' Phosphate

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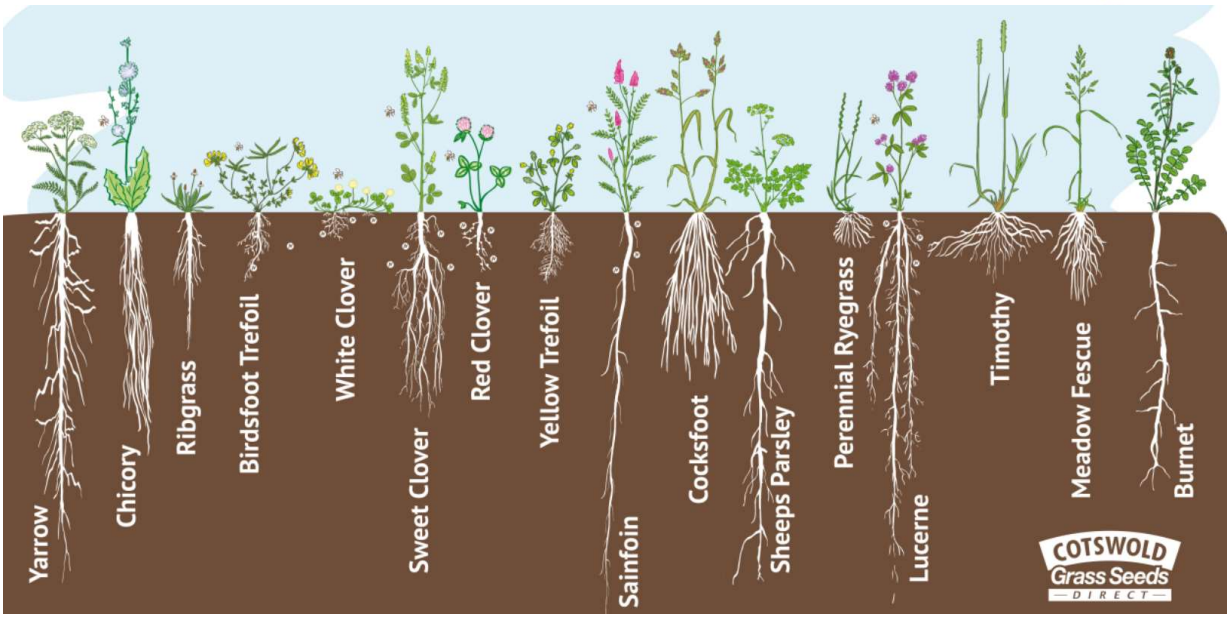

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Considerations

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- Consider your rotation when selecting cover crop species to avoid disease, pest and weed issues
- Ensure cover crop destruction of species with high carbon: Nitrogen ratio are terminated early
- Be aware of possible herbicide residues
- Must be cost effective
- Grazing can cause some compaction depending on the condition and potential for leaching

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Grazing Cover Crops Increased Nitrogen Leaching

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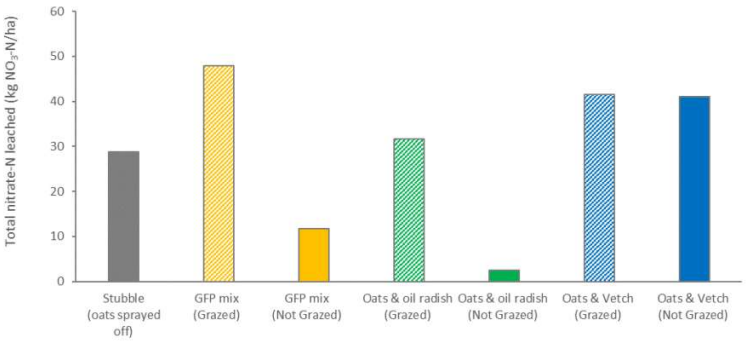
Trial conducted by ADAS, Anglian Water and Dyson Farming showed increased nitrate leaching when grazing cover crop with sheep.

GFP mix (12 kg/ha) phacelia (4%), vetch (33%), linseed (17%), berseem clover (12%), oil radish (17%), turnip rape (17%)

Oats (80%) & **Oil radish** (20%) (5 kg/ha)

Oats (80%) **& Vetch** (20%) (5 kg/ha)



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Destruction

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Chemical Vs Mechanical

Mix 1: Phacelia (20%) & Oil Radish (80%) @ 15 kg/ha

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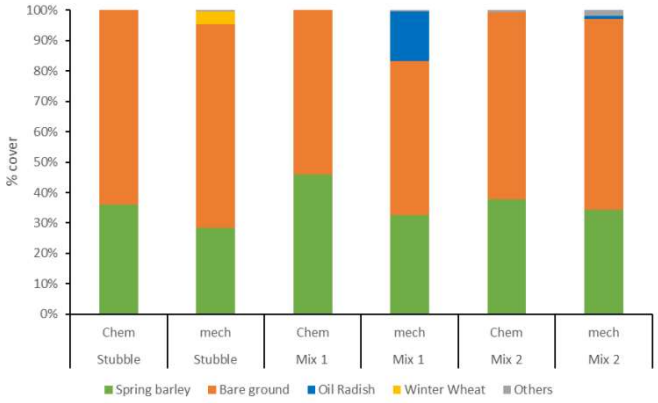

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Yield impacts

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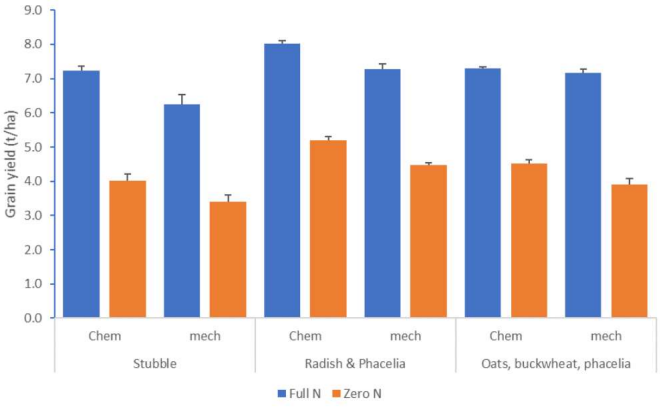
-0.6-0.7 t/ha yield reduction where CC mechanically destroyed (1 t/ha on stubble+N)

-0.5-0.9 t/ha yield increase due to CC (+N plots); highest with radish/phacelia mix



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Termination Summary

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- Rolling cover crops on a frost can help to weaken the plants, making desiccation easier and can stimulate more root growth
- No benefit of leaving the cover into spring as the cover will have done its job
- Spray off 6-8weeks prior to drilling Spring Crop with glyphosate to avoid N lock up

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Glyphosate

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History

-Developed **1970**

-360g glyphosate, affects the amino acid builders

-180g Ethoxylated Tallow Alkylamines (ETA), surfactant

-1985, released roundup 480. Target weeds with dose, removed ETA so the correct volume could be added for water volume

-Cost of Glyphosate < Cost of Surfactant

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Importance of minimising glyphosate rates

- Cost £50 ⟶ £150
- Risk of withdrawal and resistance if over used
- Potential impact on soil organisms, can reduce the spore viability and root colonisation of Arbuscular mycorrhizal fungi

Nb. Some studies show that the soil fauna is more affected by mechanical weed control

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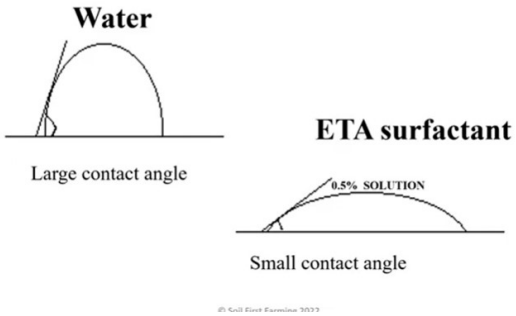
Surfactant

- Conditions the surface tension of the water
- 0.5% of the water volume needed
- 100L/ha, 0.5L of Surfactant
- 200L/ha, 1L of Surfactant



(Steve Townsend, 2022)

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Surfactant concentration in the water 0.5% of Water volume

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		Spray Volume				
		50 L/ha	75 L/ha	100 L/ha	150 L/ha	200L/ha
800g/L Surfactant	0.5L/ha	0.8	0.5	0.4	0.3	0.2
	1L/ha	1.6	1.1	0.8	0.5	0.4
	2L/ha	3.2	2.1	1.6	1.1	0.8

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Water Conditioners

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- Glyphosate is highly soluble and an excellent chelating agent,
  - When added to hard water, the chelates in glyphosate bind with the cations to become locked up which makes them unavailable
  - Cation-complexing agent; also reduces the pH, contains an anti-foamer and a humectant. Eg; X-Change
  - Ammonium sulphate; outcompetes the glyphosate in the water and binds with the cations, also promotes photosynthesis which speeds up the herbicide activity
  - Citric Acid; Reduces pH and binds with cations in the hard water

MUST BE ADDED TO THE TANK FIRST

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Glyphosate Rates

Correct dose and timing for the weeds' growth stage

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Target	Minimum Rate (@360g/L)
Small grass Seedlings	360g (1L)
Volunteer Cereals/OSR	720g (2L)
Weeds with Rhizomes	1440g (4L)
Desiccation Cereals	360g (1L)
Desiccation OSR, Legumes	1440g (4L)
Cover Crop	1440g (4L)
Pre-emergence	540g (1.5L)
Thistles, Volunteer Potatoes	1440g (4L)

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A few questions about effective glyphosate application onto large targets

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Best Water Volume for Glyphosate application?

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100L/ha

Out performs 200L/ha, glyphosate works better with higher concentration droplets and reduces how much surfactant is required

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Ideal Spray pressure?

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1.5-2 Bar Pressure (20-30psi)

Lowers the potential to drift and reduces energy on the droplet

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Best Spray Quality for developed target plants?

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Medium- Coarse

Glyphosate is a Graminicide, therefore you don't need fine, complete coverage.
You need good sized droplets which fit well with lower pressures
Smaller droplets required to hit small grass seedlings

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Best time of the day to spray?

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The Morning

Longer time to dry before the dew at night.

Wet or frosty leaf is good so long as temp goes above 5 degrees

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Golden Rules

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1. Correct dose and timing, weed growth stage
2. Surfactant concentration in the water **0.5%** of Water volume
3. Water Volume **100L**
4. Spray pressure **1.5-2 Bar**
5. Spray quality **Medium to coarse** ideal
6. **Water conditioning**, important in hard water and low doses

(Water conditioner added to the tank first)

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Thank you

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