

# Soil and Nutrient Network



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Helping farmers improve soil and nutrient management

## Case study - Redwell Farm, Angus

Redwell Farm is farmed by Roy Callander who purchased the farm 11 years ago. More recently Roy purchased a second block of land taking the total area to 154ha (380.53ac). Redwell lies between the town of Kirriemuir and the village of Glamis.

Like many farmers in Angus, Roy lets out ground for high-value crops including potatoes, carrots and vining peas. The rotation also includes spring barley and winter wheat, which was sown for the first time this year. Following carrots, stubble turnips are planted and grazed through the winter to introduce manure to help with the breakdown of the straw residue.

The soil at Redwell is mainly fluvioglacial sand and gravels which are derived from old red sandstone. The land has gentle to steep slopes and is classified as grade 3.2. The soil is made up of 60% sand, 30% silt and 10% clay. The sandy loam soil is forgiving and is well suited to spring cropping. On the other hand, the low clay content means that the soil is prone to leaching meaning nutrient management is a major challenge. Furthermore, the high sand content in the soil means this land can be prone to drought, which was a clear issue in 2018. However, these challenges are minimised by the above average organic matter content. To continue building the organic matter, Roy is considering a 'straw for dung' deal as well as including cover crops into the rotation to protect the soil throughout the winter months.



### Soil Sampling—A Baseline

At Redwell soil sampling is carried out on a semi regular basis. As part of this project 8 fields in the arable and grassland rotation were sampled in the conventional 'W-Pattern' sampling method.

In order to get a starting point for where levels of nutrients, pH and organic matter are sitting, soil sampling was carried out in September 2019, the results of this are shown in table 1.

The pH values ranged from 6.0 to 6.6 with an average of 6.4, indicating that the soil does not require an application of lime. Phosphate and potash levels were fairly consistent within the target value with the exception of one field (CW 3). The Organic Matter (OM) results show that Redwell farm has a relatively high OM content for this soil type with an average of 5.61%.

Table 1: Soil analysis results from Redwell Farm

Field	pH	P	K	Mg	OM (%)
RW 7	6.5	M-	M+	H	5.27
RW 11	6.4	M+	M+	M	3.23
RW 18	6.6	M-	M+	H	
RW 24	6.3	M-	M-	M	
RW 34	6.2	M-	M-	H	8.33
CW 1	6.5	M-	M+	M	
CW 3	6.6	VL	L	H	
CW 7	6.0	M-	M+	M	

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## Crop Rotation to Improve Soil Health

Soil fertility should be preserved through the balancing of growth and regeneration. In all agricultural systems nutrients are removed when crops are harvested and sold off the farm. This removal needs to be carefully balanced through good management to make certain that the fertility of the soil is not depleted.

Recycling of organic matter through manure, plant wastes, leguminous crops to fix nitrogen from the atmosphere as well as a balanced rotation should be the centre of a soil management plan. Organic matter provides essential food source for soil life in conjunction with helping to improve soil structure which, in turn, will reduce soil erosion, run-off and compaction. Organic matter is most often returned to the soil through ploughing grass leys and crop residues or direct application of manures.

One of the main challenges facing Redwell farm is the very high sand content within the soil which can lead to problems such as nutrient leaching and drought. One way in which Roy is thinking to combat this is with the use of cover crops and short term grass. However, with no livestock to utilise these, they are expensive options to justify.

Introducing grass and clover leys into an arable rotation can bring many advantages, particularly to manage weed problems or to build up soil fertility by extending the rotation and bringing in a wider variety of crops with different rooting depths to ensure the whole soil profile is utilised. Having a cover crop planted over the winter months will help reduce nutrient losses that occur when soils are left bare in-between crops. Introducing a clover mix can fix between 100-250kg/N/ha per year and in the long term will reduce conventional fertiliser and herbicide costs.

## Cost of Establishment

The method of establishment used for sowing grass has a significant impact on the cost. For a farm such as Redwell, it is important to evaluate the price of grass establishment, fertiliser and lime requirements, and fencing in order to evaluate if letting grassland is a viable option to increase soil health.

The cost of grass establishment should be split over the number of years the ley is in the ground. For Redwell, a 2 year ley fits within the rotation, however this makes grass an expensive crop to grow, although, there is potential to offset this income against grazing.

In comparison, cover crops can be established relatively cheaply, especially if the seed is broadcast. Cover crop biomass is dependant on sowing date and some cover crop mixes can be grazed if established early enough, which makes their place in the rotation important. Redwell is considering establishing cover crops after carrots are lifted in May to aid break down of straw and provide this early sowing date.

**Table 2: Comparison of costs of establishment for grass and cover crops**

	Grass		Cover Crop	
	Plough	Direct Drill	Direct Drill	Broad-cast
Seed	£ 150.00	£ 150.00	£ 40.00	£ 40.00
Fertiliser	£ 80.00	£ 80.00		
Sprays	£ 8.00	£ 8.00		
	£ 238.00	£ 238.00	£ 40.00	£ 40.00
Establishment	£ 252.00	£ 117.00	£ 91.00	£ 11.00
Total Costs	£ 490.00	£ 355.00	£ 131.00	£ 51.00
No. of Years	2	2	1	1
Annual Cost	£ 245.00	£ 177.50	£ 131.00	£ 51.00

### Key Findings

- Cover crops and grass leys can build fertility in arable systems
- Soil organic matter is crucial for maintaining soil health
- There is significant variation in the price of establishment for grass and cover crops