

# Soil and Nutrient Network



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Helping farmers improve soil and nutrient management

## Information Note Choosing a Cover Crop

Cover crops are primarily grown to provide ground protection and soil enrichment. With an increase in extreme weather events predicted due to climate change, cover crops can help protect and improve farm soils. The crops can be kept in the ground for a period of a few months, or several years, and can be either annuals or perennials, grown as single species or as part of a mixture.

When deciding upon the use of a cover crop there are several considerations to be given thought. Cover crop duration within a rotation; climatic and soil conditions e.g. typical weather conditions and soil pH; benefit required e.g. nitrogen retention will need a fast growing leafy crop, whereas soil structural benefits will be best achieved with a plant that grows a deep tap root. Often a mixture of species with different characteristics will be sown which will provide multiple benefits.

### Crimson Clover

Crimson clover is a legume. It is a short term annual, grown to produce a rapid boost to soil fertility

Typical sowing rate is 12.5 - 15 kg/ha. It is a small seed which should be broadcast or drilled to a shallow depth, not more than 10mm. Sowing too deep will reduce the germination. Roll after sowing to increase soil contact with the seed. It will not germinate if it does not have sufficient moisture. Once established, it rapidly produces a canopy and does not need weed control. The plant will die away once flowering is finished. The crop should produce approx. 3 – 4 tonnes of biomass (less than red clover). Being a legume, it will fix nitrogen – best estimates are between 100 and 150 kg N/ha annually. The crop is very attractive to insects and is good at suppressing weeds. Crimson clover can grow to a height of 70 cm.

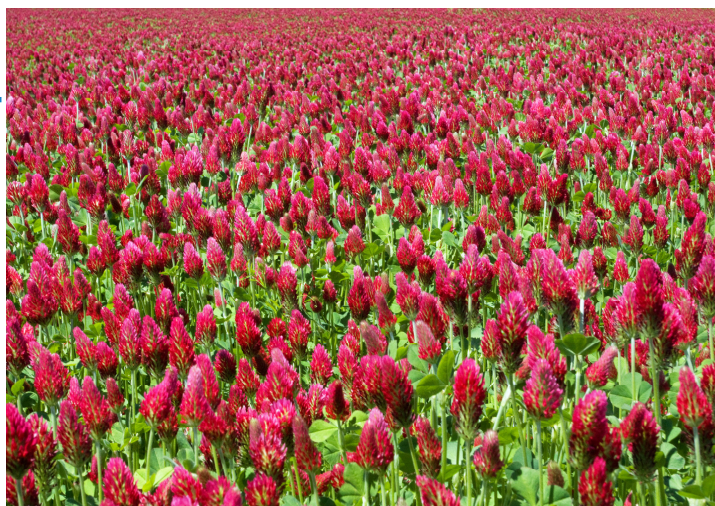


Photo: Ian Sane, flickr cc

For more information on the Soil and Nutrient Network see [www.fass.scot](http://www.fass.scot). For dates of SNN events, find us on Facebook or follow us on Twitter @FASScot



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The European Agricultural Fund  
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## Red Clover

Red clover is a legume and will fix nitrogen. It is a tried and tested green manure. Once established it will grow rapidly and may persist up to three years.

Typical sowing rate is 12.5 - 15 kg/ha. It is a small seed, should be broadcast or drilled to a shallow depth, not more than 10mm. Ensure a fine, firm seed bed. Sowing too deep will reduce the germination. Roll after sowing to increase soil contact with the seed. The plant will over winter unless there are severe frosts – the leaves dies back and the plant over winters as crowns. Crops should persist for two years, with some varieties potentially three. If looking for the crop to persist, it is important that the crowns do not get damaged. It will normally compete well against weeds and can produce a large amount of biomass – up to 10 t/ha of dry matter. It is good at improving and aerating soil structure and also a useful weed suppressor. Estimated levels of nitrogen fixed vary considerably from 150 – 450 kg N/ha. The plant does not release its nitrogen until it is ploughed in. Red clover can grow to a height of 60 cm.



## Vetch

Vetch is also a legume and will fix nitrogen.

Typical sowing rates would be approximately 60 - 90 kg/ha. The seed is fairly large and the sowing depth should be 1 – 2 cm. The ideal sowing time would be from March to May, but it will need moisture to germinate. Ensure a fine, firm seedbed. Roll after sowing. The plant will not thrive in wet or waterlogged conditions, preferring loam and clay soils. The crop is competitive so weeds are seldom a problem. It will produce a large quantity of biomass, while the estimated nitrogen fixation varies between 100 and 250 kg N/ha. Vetch can grow to a height of 50cm or higher if grown in a mix with other crops



Photo: Dr Mary Gillham Archive Project, flickr cc,

## White Clover

White clover is a legume which will fix nitrogen. It is a tried and tested plant throughout the UK. For a single stand, a sowing rate of 5 – 7.5 kg/ha would be typical, but almost always sown as part of a mix. The seed should be broadcast or sown to only a shallow depth. Deep sowing will reduce the germination. Ideal sowing is between March and May, but avoid late frosts. It will grow in a wide variety of different soils and is tolerant to dry conditions. The plant is persistent. The leaves die back over the winter and the plant survives as underground stolons. Smaller leaved varieties tend to be more persistent than larger leaved varieties. The crop can be slow to establish so weeds can be a problem. The crop is recorded as producing up to 7 tonnes of dry matter per hectare and can fix anywhere between 50 – 450 kg N/ha.



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## Yellow Trefoil / Black Medick

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This is a nitrogen fixing plant. It is a short lived (annual or biennial) plant with a low growth habit.

Commonly sown at approximately 10 kg per hectare, the seed is quite small and should be broadcast or drilled to only a shallow depth. Sowing is typically between March and May. The plant should be capable of surviving through the winter if sown later in the year. If sown in the spring, the plants will die off after flowering. It can set a lot of seed very quickly, and these can come back as weeds in the following year. They should be relatively easy to control. The plant is not that competitive against weeds, but its low growth habit is quite good at smothering other plants. Biomass production tends to be slightly less than red clover, but there is little information on the levels of nitrogen that it will fix. Yellow trefoil can grow to a height of 25 cm.



Photo: Annie Roonie, flickr cc,

## Buckwheat

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Buckwheat is a rapid growing annual crop. It is good at scavenging phosphate from the soil which it then makes available to subsequent crops when incorporated.

Typically the sowing rate would be 50 – 70 kg/ha. Seed can be expensive. Sowing time is typically April and May, but avoid late frosts. The crop has very little tolerance of frost. Buckwheat has large leaves which are good at suppressing weeds. It also makes the crop good at producing biomass. While the crop does not fix nitrogen, it is useful in preventing the leaching of nitrogen. The crop dislikes wet, heavy or compacted soil. Buckwheat can reach a height of 90 cm.



Photo: Karelj, Wikimedia commons:

## Chicory

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This is a deep rooting, pan busting herb, with roots capable of penetrating to a great depth. The main root looks like a long, thin carrot, and there are many pencil like projections from it. These roots will often break through plough pans and leave soil aerated, aiding drainage and crop root development. A sowing rate of approximately 15 kg/ha would be normal. Chicory is a small seed and should not be sown too deep. The crop likes to be sown into a warm seedbed, and the crop can be slow to establish in cold conditions. However, the crop is tolerant to frost, and is capable of persisting for many years. Biomass production is estimated at 11 – 13 tonnes of dry matter per hectare. The crop does not fix nitrogen. After leaf development at around 50 cm, the plant can bolt to produce a flowering head at 100 – 150 cm.



Photo: Blonder1984, Wikimedia commons,

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## Forage Rye

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This crop does not fix nitrogen for the next crop, but it is one of the most effective at preventing nitrogen leaching.

A sowing rate of approximately 125 - 185 kg/ha would be recommended, with the seed sown at 2 – 3 cm. The high seed rate makes this a more expensive crop to establish. The crop is tolerant to frost and can rapidly produce a large amount of biomass. The crop has an extensive and fibrous root system, and grows well on light, sandy, free draining soils. This crop can reach heights of at least 100 cm.



Photo: tslane888, flickr cc,

## Italian Ryegrass

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This is one of the most rapidly growing grasses. The standard sowing rate would be around 30 - 35 kg/ha, sown at a depth of 1 – 2 cm.

When sown as a green manure or a grass stand, it can be sown in late spring. Often sown as a catch crop for autumn grazing. Not very winter hardy, but may survive through the winter for a time and can persist for 2 years.

The crop grows very quickly, therefore weeds are seldom an issue. Biomass yields can be as high as 15 tonnes of dry matter per hectare. The crop does not fix nitrogen, but is effective at helping to prevent nitrogen leaching. The plant has an extensive and fibrous root system, which is good for improving soil structure. It can potentially reach heights of up to 1 metre.



Matt Lavin 2009  
[http://www.flickr.com/photos/plant\\_diversity/3932191267/sizes/o/](http://www.flickr.com/photos/plant_diversity/3932191267/sizes/o/)

## Mustard

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This is a short term nitrogen holder that can quickly produce a lot of biomass. The plant does not fix nitrogen, but grows rapidly and is good at suppressing weeds.

A sowing rate of around 12 - 17 kg per hectare would be normal for a single stand of white mustard, which again is sown when conditions warm up in the spring. The plant needs a good seedbed. The crop is not tolerant to frost. Leaves break down very quickly when exposed to frost. The crop has a very short persistence and can start to flower after only 4 – 6 weeks. There is a concern that the plant will produce seed which will go on to be a weed problem in the future. The crop has a fibrous root system and will grow on most soil types. The crop has bio-fumigation properties, but not to the same extent as brown mustard. These crops will typically reach heights of 50 – 70 cm.



Photo: tata\_aka\_T, flickr cc,

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## Phacelia

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This is a quick growing plant which establishes rapidly and is good at suppressing weeds. The crop does not fix nitrogen, but is useful at storing it and preventing leaching. A sowing rate of between 7.5 and 10 kg per hectare would be normal, with the plant being sown in late spring. Phacelia will grow on most soil types and will tolerate dry conditions. It produces blue flowers which are loved by bees and butterflies. It has a fairly shallow root system. The crop must be incorporated before it sets seed otherwise there is a risk that it may appear as a weed in future crops. The plant is said to release many different minerals as it decomposes – P, Ca and Mg.



## Fodder Radish

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This plant produces a large amount of biomass and has a large tap root. It will grow in most soil types and tends to be sown at between 10 – 20 kg per hectare.

The plant does not fix nitrogen, but is useful at preventing leaching. The plant grows vigorously and gives good early cover, suppressing weeds.



## Black Oats

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This is a cereal crop which is quick to establish and grows well under a variety of conditions. It has a fibrous root system and is good at scavenging and storing nitrogen and nutrients from the soil, making these available to the next crop. It tends to be sown at 50 – 75 kg per hectare and is capable of producing a lot of biomass. It is capable of growing on most soil types and conditions.

The crop is not winter hardy, and should be destroyed before flowering to prevent self seeding.

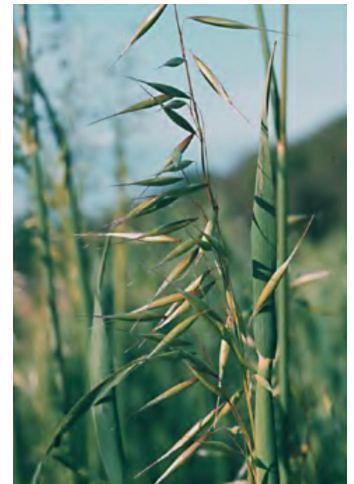


Photo: Miquel Pujol Wikimedia commons

## Westerwolds

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This is a very fast growing annual ryegrass which will produce large quantities of biomass in a very short time. Because of this, it is very good at scavenging and storing nitrogen. It is also good at competing with weeds. Typical sowing rates are 35 kg per hectare, sown at a depth of approximately 1 cm. Because it grows so quickly, sowing date can be from spring right through to autumn.

Westerwolds ryegrass rapidly produces large amounts of biomass. Depending on the time of sowing, dry matter yields of up to 15 tonnes per hectare could be achieved. Crops can grow to a height of 80 cm.



Photo: Rasback Wikimedia commons

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## Yellow Blossom Clover

This is a biennial plant which can survive for a number of years. The plant will survive over the winter as a tap root. It is a legume which fixes nitrogen, aiding fertility. It also has a long tap root which helps to improve soil structure. Typical sowing rates are 12.5 – 15 kg per hectare, with the plant preferring poor, dry soils. Being a small seed, it should only be sown to a very shallow depth, otherwise germination may well be affected. The plant does not grow well in wet or waterlogged conditions.



Photo: Pethan Utrecht, Wikimedia commons

The plant is nectar rich, which attracts pollinators. It has quite an open growth habit and therefore does not compete well with weeds. If well established, the crop can fix large amounts of nitrogen – up to 150 kg N per hectare, and will grow to over 1 metre in height. The plant can set seed and come back in future crops. There are reports of rejections with malting barley crops due to contamination.

## Ecological Focus Area Green Cover (EFAGC)

Sowing an area of green cover is one option for farmers to meet their requirement to have an ecological focus area as part of the “greening” requirements in Scotland. Green Cover is an autumn sown crop which will have a number of benefits, including the prevention of soil erosion, improvements to soil structure and enhancement of biodiversity. Farmers choosing this option for their EFA must establish a green cover consisting of two or more of only the following crops: alfalfa, barley, red clover, white clover, mustard, oats, phacelia, radish, rye, triticale and vetch. Green Cover has a weighting factor of 0.3 when calculating your EFA requirement.

Full details of the EFA guidelines and the rules regarding Green Cover can be found at [www.ruralpayments.org/](http://www.ruralpayments.org/)

### Key Points

- Soil erosion over winter is a huge cost to any farm business and this is where cover crops can be an important management tool.
- Cover crops have many benefits but in a commercial system these could outweigh the financial costs associated with establishment.
- The many plant species that can be considered as a cover crop will each have different benefits e.g. nitrogen fixing, improving soil structure or the abundance of above ground biomass that can be incorporated to improve soil organic matter.
- The biodiversity benefits from cover crops can be seen both above and below ground. Many species have abundant flowers that attract beneficial insects that can help with crop management, whilst others will provide extensive root systems that can improve soil structure and soil health.