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Guide to Green Manures



Long Term Green Manures:

Nothing improves soil more than adding organic matter to it. Soils with enough organic matter are easier to work and grow better crops. This is well known and fast being recognised by all those involved in agriculture. Every year, due to cultivations, a crop uses between 2 5% of the soil's organic matter. Conventional farms apply inorganic fertilisers which provide major crop nutrients but no organic matter. Organic farms have the advantage of adding organic matter as a result of growing fertility-building crops known as green manures. Organic matter levels in most UK soils range between 1-6%. In England however, nearly half of soils measured by the National Soil Inventory were in the lowest category. The same applies across Europe, and there is concern at EU level regarding low levels of soil organic matter and the associated problems with soil erosion.

It is the stockless arable/horticultural units in the southern, midlands and eastern parts of England where the need to find sources of organic matter is greatest. Supplies of farmyard manure and the associated grass leys that the livestock enterprise provide are not commonly available. The reintroduction of livestock is unlikely as the necessary (and costly) infrastructure of suitable buildings and fencing or hedging are long gone. Therefore, growing green manures in rotation is the most significant way of providing soil organic matter and plant nutrients, especially nitrogen, and should be considered essential in stockless systems.

Profitable Organic Crops

The management of soil fertility is essential for profitable crop production. It is absolutely clear to any grower that crops thrive in well structured soil, especially where there is good soil fertility. When the soil itself is fed with organic matter, it will in turn feed the crops that grow in it. Adding organic materials such as green manures will, over time, build soil organic matter, improve the fertility of the soil and the health and yield of subsequent crops. Soil science is a difficult subject with many interrelated and complex issues which cause much confusion. Although we do not fully understand the interactions between soil and crop, we do know that there are real benefits to be obtained by gaining a sound understanding of the fundamentals of green manuring. Growing these cover crops, if carried out correctly, will improve the ability of the soil to provide plant nutrients and improved soil structure.

As in stockless organic systems green manures are the only alternative to the grazing leys used on mixed farms, their importance cannot be understated. Arguably, in terms of priority, they are in fact more significant than the cash crops themselves.

What is a Green Manure?

A green manure is a crop grown with the intention of benefiting the next crop. These are sown, grown and mowed and finally ploughed or cultivated back into the soil. Green manures have many

advantages but have two key roles: they add organic matter to soil, and make nitrogen and other nutrients available to the next crop. Some crops such as legumes fix N into the soil. Others mop up available nitrate from the soil and release it over many months after incorporation, especially good for wheat or brassica crops. Both N fixers and lifters add organic matter to the soil. Green manures fit between cash crops. They can be sown for a summer, over a winter or, to get the most effect, grow a grass/red clover mix for one or two years.

Adding Organic Matter is Key

When green plants are incorporated into the soil they break down to form soil organic matter. This is really important as green manures act as a store for nutrients which are released when they are returned back to the soil. The challenge for organic farmers is to time this release to coincide with the demands of the next crop. Of more importance is the carbon content of green manures which ultimately breaks down to form humus, which is the bit that is left when other forms of organic matter have broken down and gone. Humus is the ultimate soil improver as it acts like a glue, binding soil particles together to make soil structure. Getting the soil structure right leads to better root development, easier cultivations and greater water holding capacity.

By choosing green manures carefully we can select those that are better at supplying the soil with nitrogen, or those that are able to have a greater impact on soil structure. There is a compelling case for combining both nitrogen rich and carbon rich types to get the maximum benefit. In practise, most organic growers use a mixture of clover (nutrients) and grass (carbon). This type of green manure will be at the head of most crop rotations. Other green manures can follow, and will be of benefit, but without the grass/clover ley in the rotation most stockless organic farmers will see production fall.

Winter Green Manures

Quick to establish and frost tolerant

Winter green manures accumulate nitrogen and protect the soil from winter erosion. They also produce a large amount of biomass for soil improvement or even silage.

Overwinter Cover Crops

Any ground which is to be left fallow or without cover over the winter can be sown with a winter hardy green manure. These green manures normally precede a spring or summer sown cash crop. Winter green manures such as rye or westerwolds ryegrass (nitrogen lifters) scavenge excess nitrogen from previous crops. They are also an excellent tool to prevent nitrogen leaching which would otherwise occur with winter rainfall. Some can pick up to 90% of nitrate within the soil that would otherwise be leached. The nitrogen held within the green manure crop is released when it is incorporated. Some leguminous crops (nitrogen fixers) can be used for winter cover and, provided that these are sown by September, can fix up to 200kg/hectare of free nitrogen for use by the following cash crop.

These green manures also effectively protect the soil from erosion. They produce a canopy which stops rain pelting the soil and enables water to drain effectively into the soil. Winter green manures also suppress weeds and are particularly effective against those which germinate in low temperatures, such as chickweed and annual meadowgrass

Short Term Green Manures

These quick growing green manures are fast to establish. They are short term, lasting between two and six months. They can be sown on their own between cash crops or as an understory to a main crop. They are sown to add organic matter, fix nitrogen and suppress weeds.

Summer Green Manuring

There is often an opportunity during warm weather to grow a fast growing, fleshy annual green

manure. These crops add organic matter, mop up surplus soil nitrogen, suppress weeds and act as a break crop by interrupting pest and disease cycles. Summer green manures are planted from late spring onwards on bare ground, or immediately after cereal harvest, and are incorporated before the sowing of a winter cash crop. A good summer green manure will be ready for turning in after only 8-10 weeks.

These crops give good leaf canopy cover to block out light, suppressing weed growth. They are easy to establish with many species able to grow on the soil surface without the need for cultivation. The seed is cheap and the crops are usually very reliable. One further advantage of these fleshy annual plants is that incorporation is simple. Green crops should be worked into the the soil at least three weeks before sowing small seeded crops. All summer green manures must be destroyed before setting seed.

Two Crops Simultaneously

Inter cropping is the growing of a green manure at the same time as a cash crop. Seed is sown into a newly established cereal or brassica crop, usually in the spring, and left underneath until the main crop is harvested. After harvest the green manure grows strongly and establishes a full cover. This technique enables the use of small seeded, nitrogen fixing legumes. These legumes are slow to establish which means they shouldn't interfere with the harvest of the main crop. Once the main crop is harvested, they can be left as a summer or winter cover green manure. Incorporated in the autumn, they provide organic matter to improve soil tilth and N for the following cash crop.

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