GUIDE TO ORGANIC FERTILISERS & SOIL CONDITIONERS

The following list of soil conditioners and fertilisers describes materials that feed the soil as much as the plants, creating and maintaining **humus-rich soils** full of beneficial bacteria, micro- & macro-organisms, a balanced pH-level, and the essential physical characteristics of good water retention and drainage, aeration and **friability.**

Chemical fertilisers provide the basic nutrients for a plant to grow, but contribute nothing to the quality and condition of the soil. Indeed, some chemical fertilisers create the unintended effects of killing off worm populations and **acidifying** the soil. As consumers, we often find the resultant crop tasteless, or worse, unpleasant, especially in the case of tomatoes or potatoes, for example. The condition and **vitality** of the soil is all important to the health of plants; a poor soil laced with chemical fertilisers will grow a crop which has unbalanced growth, rendering that crop open to damage from **environmental stress** resulting in disease and pest attack.

The following materials are all commonly used in organic growing systems, and all can be obtained commercially or made domestically to current organic standards. Most can be obtained from unarguably **sustainable** sources, and many are acceptable to vegetarian and vegan gardeners.

The more diverse a range of materials going into the compost heap and onto the soil, the more one can expect healthy and flavoursome foods.

SEAWEED MEAL :

Sustainably harvested from north Atlantic Ocean. The best all-round organic fertiliser and compost heap activator. Contains good amounts of nitrogen, phosphorus and potassium (~ 2.8/0.2/2.3) plus the other macro-nutrients, such as calcium, magnesium and sulphur. Also a vast array of the micro-nutrients so essential to optimum plant health, such as iron, copper, zinc, sodium and boron.

Seaweed meal also consists largely in **alginates**, substances famously used in laboratories for growing bacterial cultures in petri-dishes. This ability of alginates to encourage and accelerate the growth of bacteria makes seaweed an excellent compost activator, improving the quality and reducing the time to maturity of the compost. When applied to the soil, the alginates feed soil bacteria and micro-organisms, helping to bind the soil into stable **humus compounds.**
There is strong anecdotal and mounting scientific evidence that use of seaweed can have a tonic effect, helping plants overcome environmental stress and attack from pests and diseases; food crops develop optimum flavour and stay fresh in storage for longer.

Application: As a **compost activator,** apply between 0.5 to 1kg per cubic metre of material. As a **soil conditioner** and **crop fertiliser** fork in to top 20 cm up to 250g per square metre. To use as a **liquid feed,** ferment for 6-8 weeks, 1kg in 25 litres of rainwater, apply diluted 1:20. As a **foliar spray,** ferment 1kg in 5 litres of water and apply at 1:10 dilution. Add to **potting compost** mixes at 1kg per 50 litres.

VOLCANIC ROCK DUST :

Especially useful material if one is attempting to revitalise tired or abused soils, as it will be slowly broken down by the available soil bacteria, releasing a vast array of trace elements. A soil that has become thin and lifeless as a result of heavy chemical liming, combined with constant use of chemical fertilisers, is often lacking in a number of trace, but nonetheless vital, elements. A combination of **double-digging** and the addition of plenty of compost can resurrect a soil in a couple of years; the use of rock dusts greatly helps this. For quicker breakdown and optimum use of small quantities, add volcanic rock dust to the compost heap.

Application: 500g per sq. metre, lightly forked in, but more if can spare it. In the compost heap, a heavy dusting every 20 cm of material is a generous measure.

CALCIFIED SEAWEED (Marl) :

This is ground up coral collected from the coasts of France and Britain. As it consists almost 50% **calcium** it has a similar sweetening effect on acid soils as lime, but unlike chemical, hydrated lime, it is unlikely to 'burn' plants, or lock-up essential nutrients, and cannot raise the pH much above pH 6.5, thereby avoiding the danger of overdosing. It also contains up to 10% magnesium carbonate, **magnesium** being an essential macro-nutrient in chlorophyll development and enzyme activation. Calcium is also highly biochemically reactive, 'feeding' the soil bacteria, and promoting the activity of nitrogen-fixing bacteria in legume crops.

Calcified seaweed also contains a broad spectrum of trace elements, revivifying overworked, abused soils. Its sweetening effect can be put to good purpose in the compost heap; a light dusting every 20 cm if many of the materials are acidic (i.e. lots of rotting fruit & veg.); also a light dusting in worm bins every 20 cm keeps conditions sweet; the calcium is required by worms to aid reproduction/egg-laying.

Application: As a soil conditioner; i.e. to encourage soil bacteria, raise pH, break open heavy clay soils and build humus, it can be applied up to 500g per square metre (though 250g per sq m usual) and forked into top 20 cm, or just left to rain to wash it in on bare soil over winter/spring.

MAGNESIAN LIME:

Powdered rock often available as Dolomite Lime, as much of it is quarried from the same-named mountainous region. It usually contains 60% calcium carbonate and 40% magnesium carbonate. Again, like calcified seaweed, it has a number of beneficial effects on the soil, especially acidic, heavy clay soils typical of our region;

- Raises pH to a level (~6.5) that makes nutrients available to the majority of our food plants. As mentioned above, it does this without the danger of overdosing, unlike common, hydrated or 'garden' lime, which, if over-applied, has the chemical effect of 'locking-up' a number of vital macro-nutrients. This unfortunate effect is most likely on a poor soil.
- Feeds the bacteria that creates humus, which in turn creates a physically improved soil (water retention and drainage; friability), and a soil capable of holding onto plant nutrients over a long period.
-Supplies magnesium, which is involved in production of chlorophyll, part of the process of photosynthesis.

Application: Same uses and application rates as calcified seaweed.

PLASTER (Calcium Sulphate)

Can be distributed as a long-term improver for heavy clay soils. Crops should not come into contact for at least six months, while plaster is chemically reacting in the soil.

Application: 50 Kg per 100 m^2

DRIED BLOOD:

By-product of slaughter houses. Will not 'burn' foliage like chemically-synthesized equivalents. Dried blood consists mainly of protein, and as such provides **nitrogen**; for many of the more demanding crops, and crops that have to be grown quickly (salads), its use can make a big difference in yield and quality.

Note that dried blood ought to be used during the main growing season only (March/April til end August). Either side of this period will result in **unbalanced growth**, encouraging pests and diseases, or waste, as the plants are insufficiently active to take up the product. The season is extended somewhat within the environment of a warm greenhouse or polytunnel, and this can be taken into consideration.

Application: Usually available combined with other products, so follow instructions accordingly. Note that products on the market described as 'blood, fish and bonemeal' may have chemical fertilisers added.

For potting mixes, use combined, balanced products, such as **'Growsafe'**, at the rate of up to 500g per 50 litres volume, or for established plants to grow in containers, up to 1 Kg per50 l.

BONEMEAL:

This is also a slaughter house by-product. Horticultural grades are steam-sterilised, and most is imported from abroad (especially since BSE). Bonemeal is a good supplier of **phosphorus**, plus some nitrogen. Phosphorus is essential in plant sugar metabolism, and therefore in the development of flower, fruit and seed. Crops such as tomatoes, strawberries and sweetcorn all appreciate a dressing of bonemeal at the time of bed preparation.

When planting fruit trees, dig in up to ½ kilo in the planting hole. That the tree will appreciate this is recorded in the story of the apple tree in a Rhode Island cemetary, which, during an attempt to disinter a body to be moved to a new mauseleum, was found to have two main roots; one followed the line of the spine to the hips, at which point it split into two, following the legs as far as the toes, the whole having a striking resemblance to the human form!

Application: 125-250g per sq. metre, lightly forked in before planting the crop.

HOOF & HORN :

Slaughter house by-product. Horse hoof chips could be acquired from a friendly shoe-smith. Like dried blood, contains nitrogen, but as a hard protein, broken down slowly in the soil by bacteria, and is released over a long period of time. Also contains a small amount of phosphorus. Hoof & horn is an excellent fertiliser to add to planting holes for fruit trees and bushes; it promotes early vigour, helping the plant adapt to its new conditions, and to grow a strong framework of branches that will support heavy, healthy crops in the future.

Hoof and horn is also useful for the more demanding vegetable crops that require heavy feeding, especially if grown in containers. For vegetables, apply only at the beginning and height of the growing season; overly lush,'**soft' growth** on over wintering varieties makes them prone to frost damage.

Application: 125g per sq. metre for vegetables. Up to a kilo per planting hole for the larger fruit trees.

ROCK PHOSPHATE :

A non-slaughterhouse derived form of phosphorus. Often combined with calcified seaweed, since the availability of phosphorus decreases in soils with a pH under 6.5. It is released more slowly than bonemeal as it takes a longer time to break down in the soil.

Application : Dig in up to 500g per sq. metre, especially before planting up a perennial crop.

LEAFMOULD : Most useful as key ingredient of seed sowing and potting composts, or growing mediums. But since at leaf-fall it is so freely available, and not valued by many gardeners {who remain addicted to peat - an inferior material for most purposes), it is possible to collect enough to use as a soil improver and conditioner.

After a year's storage, the leaves have broken down sufficiently to be dug into the soil. Trees whose leaves are high in tannins, such as beech and oak, are the best to use, because the tannins break down to release some nitrogen. A related virtue is that such tannin-rich leafmoulds have a longer lasting conditioning effect on the soil generally. All broadleaved deciduous trees can be employed. As a bulky material, leafmould has a **mechanical** effect on the soil, as well as a **biological** effect. On a sticky, clay soil, leafmould can help to open it up, making the soil more workable; on light, thin soils, it will add body, helping the soil to retain water. The biological effect on both soils is that soil fungi and bacteria, as well as a host of small organisms and insects, feed on the leafmould (or prey on the feeders!), which in turn creates humus.

MANURES : The manure of any herbivore (even human!) can be used, but unlike most of the above-mentioned materials, it is far from a standard product, and is available in many forms and conditions: E.g; Cow manure may have been well stacked, and occasionally turned, and been obtained from a conscientious farmer with healthy stock. Conversely the manure may have been frequently rain-drenched, compacted, and have come from unhealthy stock reliant on doses of antibiotics etc...

Different species yield manures with widely differing proportions of nutrients; the general rule being that the part of the plant upon which an animal characteristically feeds is best fertilised by that species of animal: Pig manure for root crops; sheep and goat manure for herbs and bush fruits; chicken manure for seed and flower crops.

Application: Bulky manures, such as from cows, horses and pigs, are primary sources of humus, with all the concomitant benefits this material brings, and can be applied directly onto the soi as **mulch**, or dug in. Depending on the soil condition, time of year and crop to be grown, up to a barrow load per square metre. Combined with dressings of seaweed meal and sowings of **green manures,** most soils can be brought round in a couple of years to become water retentive and friable.

The more concentrated manures, such as chicken, pigeon and sheep, are best used as liquid feeds; E.g. Half a hessian sackful suspended in a barrel of rainwater and fermented for several weeks, and applied at a dilution of about 20:1. It is especially good for crop quality to liquid feed with manure appropriate to the growing stage of the crop.

To fix the most humus from manure, and to make good garden compost, it is best to put as much manure through the compost heap as possible. The bulky manures mix well with crop wastes and kitchen scraps to make a well-ventilated, moist heap, that keeps the **thermophilic bacteria** active over a long time, helping optimum fermentation. The more concentrated, nitrogen-rich manures act purely as **compost activators**, feeding the bacteria.

On scientific analysis, most manures seem to contain only low levels of nutrients, but on closer inspection, manure is a complex material that has subtle but important qualities with the ability to heal soils and grow healthy plants: Mature, humus-rich manures contain **auxins** (plant growth hormones); micronutrients that stimulate sugar production, and increase the content of vitamins, gluten and carotene in food crops; their ability to correct soil pH balance; aid seed germination and warm the soil in spring; maintain high levels of beneficial bacteria in the soil, warding off disease; improving soil water retention... the list could go on!

In conclusion, it is this symbiotic and cyclical relationship between plant and animal that is considered the key to organic horticulture, the proof of which, fortunately for us, is in the eating!