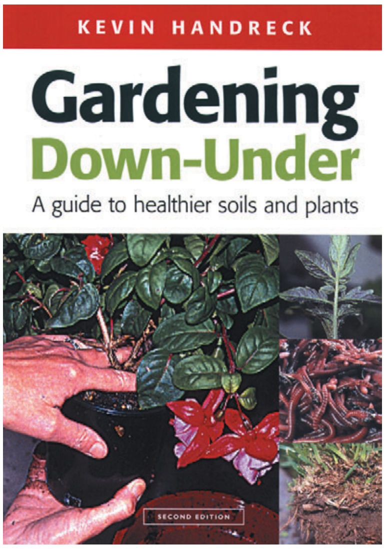


Gardening Down-Under

A Guide to Healthier Soils and Plants

2nd edition

Kevin Handreck

This book is available from CSIRO PUBLISHING through our secure online ordering facility at http://www.publish.csiro.au/ or from:

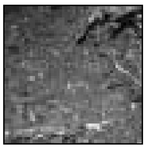
Customer Service
CSIRO PUBLISHING
PO Box 1139
Collingwood Victoria 3066
Australia

Telephone	+61 3 9662 7666
Freecall	1800 645 051 (Australia only)
Fax	+61 3 9662 7555
Email	publishing.sales@csiro.au

© CSIRO 2001

The sample pages following are provided solely for information purposes and may not be reproduced, stored or transmitted in any form or by any means without prior permission of the copyright owner. Contact CSIRO PUBLISHING for all permission requests.

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.



5 Organic matter

You have made a large pile of beautiful compost, your worms have made a small mountain of vermicompost and your poultry have reduced your kitchen scraps to deep litter. What do you do now? How much of these materials do you need to add to your soil, and how should they be added?

Here are a few guidelines. Information about the good things that organic materials do to soils is given on pp. 104–111.

USING COMPOSTS AND VERMICOMPOSTS

Thoroughly matured compost has an earthy smell, has few recognisable pieces of the original organic materials and is a fairly uniform dark brown or black colour. Rain can leach nutrients from finished compost, so cover matured heaps until they are used.

Stored, moist compost will continue to decompose and so will become a richer and richer source of most plant nutrients. Dried compost will change little during storage.

Compost from hot heaps may be used around mature plants as soon as the temperature of the heap has come down below 40°C, say three weeks after building the heap. Leaving it to cure for a few more weeks will improve it by increasing its fineness and reducing its C/N ratio, so making it into a better source of nitrogen for plants. (Soluble nitrogen is released from compost only after its C/N ratio falls below about 25.) It will usually take 6–12 months to get useable compost from unturned heaps and bins.

Your soil and plants will get the most benefit from the compost if it is used before it has become uniformly very fine. In fact, a greater improvement in

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

soil structure is achieved with relatively fresh compost than with thoroughly matured compost.

MULCH OR DIG IN?

Sieved compost may be used as a top dressing for lawns, but only if you are sure that all weed seeds in it have been killed. Otherwise it may be either dug into garden beds for vegetables or flowers, spread as a mulch around shrubs and trees or spread between rows of growing plants. Rain or sprinkler water will wash nutrients from compost mulches into the soil and plant roots will grow up into the lower part of the mulch.

You can dig compost into the soil of a vegetable patch or a bed for annual flowers, if you have not converted your garden to no-dig. But if you have changed to no-dig, you have no choice but to spread the compost on the surface.

Try the following guidelines:

- Reserve your most highly matured compost for digging into garden beds for annual vegetables and flowering plants or for sprinkling around the plants as an alternative to more soluble fertilisers. A 5 cm layer should be ample.
- Organic gardeners might also make a surface application of similar compost between rows of vegetables part-way through a growing season. Apply a 2–4 cm layer.
- You can use less mature compost as a mulch under shrubs and trees. One

Rich compost …

… by the barrow load …

… is excellent for gardens.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

application at establishment and one or two further applications in the first two years should bring the area up to self-maintenance through litter-fall. Each application could be of about 10 cm depth.

- Use relatively fresh compost for improving the structure of clay subsoils.
- Vermicompost and worm castings can be used at the same rate as 'ordinary' compost.

USING OTHER ORGANIC MATERIALS

Poultry manure is a very variable feast for your plants, as the nutrient content varies enormously between batches. The proportion of the nitrogen that is present in soluble form can range from zero to very high, depending on the age of the manure and processing. There is always some risk of burning plants through high salinity from poultry manure.

It is suggested that any one application of poultry manure should not be more than 300 g per square metre. You could repeat the application after a month or so, if your plants need more feeding.

Cow, sheep and zoo-animal manures can all be used at about the same rates as suggested for matured composts. Many bags of these manures and organic mulches carry no information about the nutrients in their contents. The high lime content of some will harm acid-loving plants. The sawdust and other low-nitrogen materials in some will not improve the growth of your plants. Labelling laws need to be extended to cover these materials.

Most products labelled as mushroom composts are the spent composts removed from mushroom farms after a mushroom crop has been harvested. The material contains both the compost and the 'casing' onto which the mushroom spore was sprinkled. Mushroom composts themselves are usually of neutral pH, but casings are usually very alkaline, so spent mushroom composts are generally alkaline. Their high soluble nutrient content often makes them very salty.

Do not use such composts if your soil is acid and you want to keep it that way.

Use them rather more sparingly than you would use 'ordinary' composts.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

SOME FACTS ABOUT SOIL ORGANIC MATTER AND HUMUS

DEFINITIONS

Soil Organic Matter: Soil organic matter is all the plant and animal residues at various stages of decomposition, cells and tissues of soil organisms and substances formed by soil fauna and microbes found in or on the surface of a soil.

It includes (in our garden soil) bits of plant roots that have died, recognisable bits of leaves and twigs from the compost and green manure crops we may have dug in, bits of sawdust and feathers from the poultry litter we may have added before the last crop, the bodies of beetles, earthworms, grubs and bugs, the remains of hordes of bacteria, fungi and actinomycetes, and their spores, living members of all of these groups, multitudes of chemicals such as enzymes, amino-acids, antibiotics and ethylene that are either beneficial or harmful to microbes and plants, and last but by no means least, the complex organic molecules that are collectively called humus.

Humus: The more-or-less stable part of soil organic matter remaining from the decomposition of plant and animal remains. Humus is really a waste product produced by micro-organisms. It is dark-coloured and consists of large organic molecules containing mainly carbon, hydrogen and oxygen. These molecules are stabilised by aluminium. They also contain considerable amounts of nitrogen and sulphur and smaller amounts of other elements. Most humus is probably formed from lignin – the material that gives plant stems and wood their rigidity.

HOW MUCH ORGANIC MATTER DO SOILS CONTAIN?

Many Australian soils contain less than 1% organic matter. Few contain more than a few per cent.

The amount of organic matter in a soil depends on the following.

- The amount added from the plants growing on the soil, both from roots and litter from the tops. The more fertile the soil, the greater the return of organic matter.
- The amount added as compost, animal manures and the like.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

- The clay content of the soil. With everything else being equal, a sandy soil will usually contain much less organic matter than a clay soil. In fact, it is difficult to maintain even a moderate amount of humus in a well-drained sandy soil. Humus forms very stable associations with clay particles. Much of it ends up sandwiched between clay particles, where it is protected from microbial attack. Increasing the clay content extends the protection to increasing amounts of organic matter, so adding both clay and organic matter to a very sandy soil will enable a much higher humus level to be maintained.
- Air supply, moisture and temperature. Soil microbes really zip along in a warm, moist, oxygen-rich soil that is also well stocked with their favourite foods. The irrigation water that you must use to keep your plants alive in hot weather also increases the rate of loss of the organic matter from the soil.
- How often you dig your soil. Digging speeds up the disappearance of soil organic matter. Digging always smashes some of the bonds holding organic matter and clay particles together. The organic matter is then exposed to attack by micro-organisms. So your soil loses some organic matter, but your plants gain from the nutrients released as the organic matter is decomposed.
- If you never add any organic matter to your soil, its content of organic matter could halve after about 25 years of annual digging.

THE GOOD THINGS ABOUT ORGANIC MATTER

Have you noticed that the large amounts of compost or animal manures that you add to your soil seem to disappear to almost nothing within a few months? Maybe you have wondered whether all the effort is really worth it. Why not just throw on some fertiliser from a bag? You can certainly supply nutrients that way, but you cannot buy good soil structure in a bag of chemical fertiliser.

Stick with your hard work. Your efforts to increase the humus content of your soil will be rewarded by better plant growth, better soil structure and therefore easier digging, or a decreased need to dig.

Here is a list of the good things that the organic matter in your soil does for your plants. But note that organic matter does not have ‘magical’ properties.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

Plants and their products are no less healthy when grown in properly balanced hydroponic systems than in organic-rich soils.

Organic matter:

- Improves soil structure;
- Is a source of essential plant nutrients;
- Helps control plant diseases.

ORGANIC MATTER IMPROVES SOIL STRUCTURE

When we apply compost, poultry litter or a green manure crop to a soil there is a massive explosion in the population of microbes in it. These microbes (bacteria, fungi, etc.) produce sticky secretions and humus which bridge the gaps between mineral particles or groups of mineral particles and so bind them together into crumbs or aggregates.

This binding is at first rather flimsy and can be easily broken by cultivating the soil (p. 71). A year or two of leaving the soil undisturbed – as under a mulch – is necessary for loosely formed aggregates to be stabilised.

Typically, no more than 30% of organic materials added to a soil remains after a year. The rest has been used as food by countless hordes of micro-organisms and has ended up as carbon dioxide, water and nutrient elements that have been released into the soil.

It might take another year for soil microbes to eat half of the remaining organic matter. It is during this first couple of years that your plants will receive the most direct benefit from the added organic matter, mainly from the nutrients released into the soil around their roots.

As the years roll by, less and less of the remaining organic matter is able to be used by micro-organisms. Some of it is protected through being sandwiched between day particles. Much of it is humus which, as it is a waste product of micro-organisms, is really not very good food for them.

But this long-lived humus is vital for the well-being of your soil and to future generations of plants that will grow in it. Humus is essential to good soil structure and the ability of your soil to provide air and water to the roots of your plants. The real value of humus is in its resistance to attack by microbes, rather than in its ability to release nutrient elements during attack.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

Radiocarbon dating has shown that much of the humus of soils is very old. For example, one study showed an average age of 2560 years.

Because humus tends to remain in soil for as long as thousands of years, the plant nutrients in humus are only slowly made available to plants.

Some are released each year as microbes break down a small proportion of the humus: if the humus content of the soil is high, the decomposition of this small proportion can provide enough nutrients for good plant growth.

In other words, if your soil has a high humus content, you may be able to get good plant growth by using this 'capital'. But unless you return nutrients in recycled organic matter, your capital will eventually be reduced to such a low level that it will no longer be enough for good plant growth.

You will then be forced to rely on 'chemical' fertilisers for adequate nutrition. But without the return of organic matter, the structure of your soil will gradually deteriorate. Eventually the soil will be difficult to dig and your plants will grow poorly.

Humus is the vital ingredient that binds soil mineral particles into aggregates. If your soil has no humus, it will have no aggregates and therefore very poor structure. Poor soil structure means poor plant growth; it's as simple as that.

ORGANIC MATTER SUPPLIES NUTRIENTS

Composts, vermicomposts and animal manures contain plant nutrients in both readily soluble and slow-release forms. The soluble nutrients are quickly available to plant roots, while some of the others are slowly released as the organic matter is further broken down by soil animals and microbes.

The fertiliser value of a compost is directly related to the quality of the organic materials used to make the compost. Materials of low nutrient content give compost of low fertiliser value. Typical contents of dried compost are 1.4–3.5% nitrogen, 0.3–1.0% phosphorus and 0.4–2.0% potassium, with smaller amounts of other nutrients. Some composts are therefore relatively low in plant nutrients and good growth can only be achieved by supplementing them with manufactured fertilisers or organic fertilisers of higher nutrient content.

Nitrogen from organic matter

In most topsoils, about 95% of the nitrogen is present in the organic matter. Plants cannot get at it until it has been converted by micro-organisms to

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

ammonium or nitrate ions, that is, to an inorganic form. Microbial decomposition of organic materials therefore provides plants with a constant trickle of available nitrogen. Whether this trickle is enough for excellent plant growth depends on the amount of organic matter in the soil, its nitrogen content, and its rate of decomposition.

Most of the nitrate released by micro-organisms comes from organic materials added to, or formed in, the soil during the previous 1 to 5 years; only a small amount comes from (humus) materials that have been in the soil for more than 25 years. So the nitrogen in the very old humus fractions cannot be used by plants. (Cultivation increases the rate of release of nitrogen from these fractions but of course this cannot go on indefinitely.)

Compost is a mixture of humus, microbes and partly decomposed plant materials.

Repeated applications of organic matter with an adequate nitrogen level are therefore needed for good plant growth if we do not add nitrogenous fertilisers (which supply ammonium and/or nitrate). The annual amount of organic matter needed for a vegetable garden or bed for annual flowers is about a 5–10 cm layer of compost or about 300 g of poultry litter per square metre.

Nitrate is not held firmly in soils; it can easily be washed out by rain or sprinkler water. Organic matter, by providing a constant trickle of nitrate, reduces losses of nitrate compared with losses from similar amounts of nitrogen applied in a completely soluble fertiliser.

All of the nitrogen and sulphur in plant materials is lost to the air when they are burnt.

Over half of the nitrogen in organic residues that have been left on the surface of a soil may be lost to the atmosphere. This causes a dilemma for gardeners. Should the nitrogen be conserved by digging the residues into the soil, or should soil structure be conserved by scattering the compost on the surface? There is no right answer. Most gardeners will choose the easiest way of dealing with residues – minimal digging combined with mulching.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

Phosphorus from organic matter

Soil organic matter may contain from 15–85% of the total soil phosphorus, yet in many soils plants have access to only a small proportion of this phosphorus. Plants take up phosphorus almost exclusively in the form of inorganic phosphate ions.

Most Australian soils are naturally deficient in phosphorus. Unless we correct this underlying deficiency with a concentrated source of phosphorus such as superphosphate, reactive rock phosphate or poultry manure, it is difficult to supply enough phosphorus to vegetable crops from composts only.

So, in new gardens, when digging-in organic materials or when making a compost heap, it is usually advisable to include a sprinkling of a concentrated phosphatic material such as superphosphate. But please note the caution on pp. 143 and 153 about adding too much phosphorus.

Potassium, calcium and magnesium from organic matter

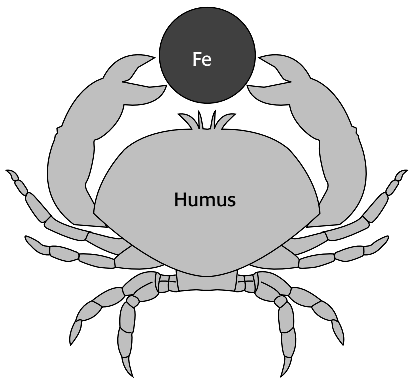
Decomposing plant residues are excellent sources of potassium, calcium and magnesium in forms that are readily available to plants.

Almost any dead plant material will provide some potassium, calcium and magnesium, but legumes (as for example in clover and lucerne hays) and poultry manure are particularly rich sources. The potassium of organic materials is easily dissolved in water, so such materials as cow manure, compost and seagrasses that have been sitting out in the rain for more than a month contain little potassium.

Trace elements from organic matter

Another way in which soil organic matter regulates and improves nutrient supply to plants is through its ability to 'chelate' some trace elements.

'Chelation' (pronounced kee-lation) refers to the ability of some organic molecules to hold atoms of such metals as iron, copper, manganese and zinc in a claw-like grip. (Chelate comes from the Greek word chele = claw.) Chelates of metals are readily available to plants. Chelation protects these metals from ending up in the soil in forms that are very insoluble and so of low availability to plant roots.



'Chelation' of trace elements.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

Organic matter usually improves the supply of iron to plants but there is one situation in which this may not be so. Large quantities of carbon dioxide are produced in soils after green manure crops have been dug in. In alkaline (calcareous) soils some of this carbon dioxide is converted to bicarbonate. Bicarbonate interferes with the availability of iron to some plants, so green manuring of alkaline soils can produce iron chlorosis (yellowing of young leaves) in plants that are particularly susceptible. Allowing a few weeks between digging in a cover crop and planting the next crop should prevent this problem.

HUMUS REGULATES THE SUPPLY OF NUTRIENTS

As well as releasing nutrients to plants as it is decomposed by microbes, humus also regulates their supply. The surface of humus is like a sponge: it holds nutrients so that water does not as readily wash them out of the reach of plant roots; it holds the nutrients until plant roots are able to help themselves to them as they are needed. More detail on this is given on p. 63.

DISEASE CONTROL WITH ORGANIC MATTER

There is a general belief among organic gardeners that many diseases of plants can be prevented or eliminated through the addition of organic matter to soils. There is much truth in this but it is by no means universally true. Sometimes organic matter reduces the severity of or prevents the establishment of a disease; sometimes, in seemingly similar situations, organic matter has little effect on a disease or can occasionally make it worse.

To get some understanding of these variable effects of organic matter, we need to know something about the complexities of life amongst the micro-organisms and small animals in soils, because it is micro-organisms and small animals that produce many of the changes in plant growth that we call disease.

Fungi, actinomycetes, bacteria, viruses and small animals such as nematodes are the organisms we need to know about. In any soil there are usually many thousands of different species of these organisms present. They interact with one another, with soil components and with plants in complex ways.

It is important to realise that most soil organisms are not harmful to plants. Most are either neutral or beneficial to plants. Many soil organisms live only on dead organic matter. They decompose the remains of plants and animals in soils and so recycle to plants the nutrient elements in that organic matter. Some soil organisms live only on other organisms while others can live on

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

both dead materials and living organisms. These kinds of organisms therefore can be very useful to plants if they suppress populations of organisms that are able to attack plants.

Soil organisms that are able to attack plants are called pathogens (from the Greek: path = disease or suffering; gene = start or beginning).

Even though a soil may contain many pathogens, it does not necessarily follow that plants will be attacked or that an attack will seriously damage or destroy the plants. The ability of a pathogen to infect a plant depends on the numbers of infectious organisms present, their vigour, environmental conditions (including the numbers and types of other organisms present) and the susceptibility of the plant (that is, on its ability to defend itself).

Adding organic matter to a soil adds food for microbes in that soil as well as the extra microbes present in the organic matter. If the organic matter contains a balanced supply of nutrient elements – and especially if there is an ample supply of nitrogen and phosphorus – there is a population explosion in the soil as the microbes feast on the new food supply. This explosion is mainly amongst those microbes that can easily feed on dead organic matter and on other microbes. Pathogenic microbes – those that need a living plant as food – miss out. They are therefore surrounded by increasing numbers of other microbes, some of which are able to attack them.

The weapons used in the attack include the same antibiotics that we use to control infectious diseases, enzymes that dissolve holes in the outer walls of the cells of the attacked, suffocation as the attacking microbes use the oxygen around them, and starvation as they use all the available food. Organic matter can therefore reduce the incidence of disease in plants through its effects of soil microbes. All this activity also rapidly decomposes pesticide residues.

Organic matter may also reduce plant disease by other means. Well-fed plants have all their internal mechanisms for resisting disease working at full efficiency; starved plants, like starved human beings, are more susceptible to attack. Organic matter supplies plants with an abundant and well-balanced supply of nutrients, so it promotes plant vigour and hence their ability to resist pathogens. The better physical properties of a soil that usually result from the addition of organic matter will also promote better root growth and hence greater plant vigour.

Yet another way that some of the micro-organisms present in actively decomposing organic matter can help plants is through their production of various chemicals such as salicylic acid (as in aspirin). These chemicals are

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

able to strengthen plants' immune systems so that they are better able to resist attack by pathogens.

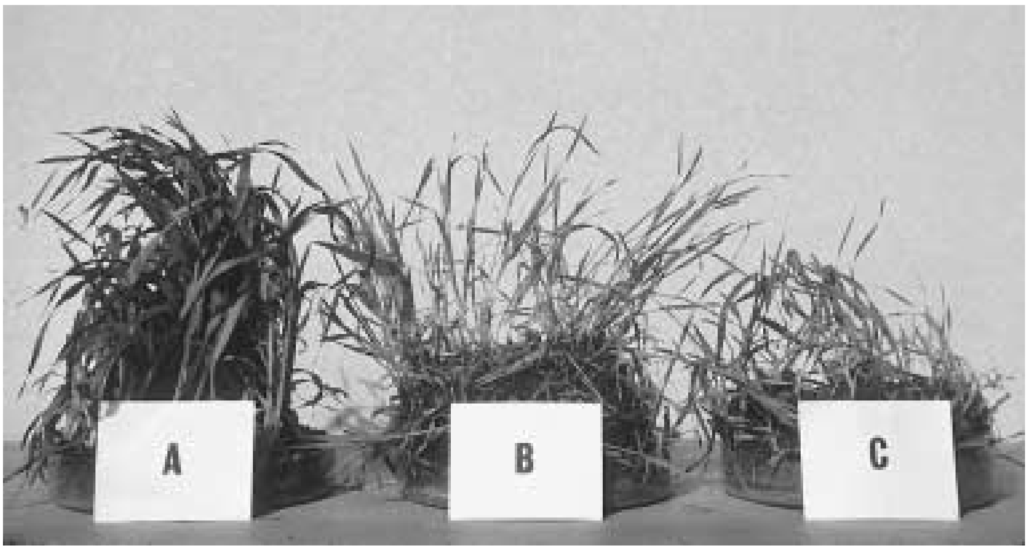
Organic matter does not always decrease disease in plants. Sometimes it has no effect; sometimes it increases disease. The reasons for this are sometimes obvious but often not. If we introduce pathogens along with the organic matter we add to our soil, we hardly give our plants a chance. For example, digging in dead tomato plants into soil intended for more tomatoes is especially likely to lead to disease problems.

POSSIBLE PROBLEMS WITH ORGANIC MATTER

While organic matter is almost always beneficial to soils and plants, there are a few situations in which it can cause problems.

Plants can have problems with organic matter if it:

- Contains toxins;
- Contains pathogens;
- Robs the plants of soluble nitrogen;
- Prevents the soil from rewetting after drying.



Ron Kimber

Reduced wheat growth (B and C) caused by residues of the previous crop decomposing in the soil.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

TOXINS FROM ORGANIC MATTER

Some soil organic matter is able to injure plants, or even kill them. These are lumped together under the term phytotoxins, which literally means plant poisons. Phytotoxins are organic chemicals that come partly from plant residues newly dug into the sod and partly from microbes as they decompose residues.

For example, considerable amounts of toxins can be produced if fresh plant residues are dug into the soil. Roots of seedlings planted into this soil can be damaged if they come into contact with these toxins. At best, their growth can be reduced for a while; at worst, they are killed.

Such damage is prevented if the toxin-producing phase of decomposition is allowed to take place in a compost heap. All of the toxins will have been destroyed by the time the compost is ready for use.

If you do want to dig plant residues (including hay and straw) into soil, you should wait for about 5 weeks before planting. The wait can be reduced to about 3 weeks when green manure crops are dug in.

INTRODUCTION OF PATHOGENS

You are asking for trouble if you add severely diseased plant materials to your soil. It is better that you lose the organic matter by dumping the materials into the garbage bin rather than run the risk of a massive infection next season. The only safe way of using diseased materials is by running them through a compost

Poor growth (right) caused by the incorporation of sawdust into the soil.

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

heap that remains at above 55°C for 3 days. The pathogens are unlikely to be killed in a compost bin or in a heap that does not heat much above 40°C.

NITROGEN DEFICIENCY

Plants can suffer from nitrogen deficiency if you dig into the soil under them any organic matter such as sawdust that has a high C/N ratio, that is, too little nitrogen in it in relation to its carbon content. Soil microbes use most of the soluble nitrogen in the soil as they decompose the sawdust, leaving little for plants growing there. If you do want to use sawdust as a source of soil organic matter, you should first add to it some urea (about 2 kg/m^3) or poultry manure (about 30 kg/m^3) and then either compost it or age it for a year or so.

NON-WETTING SOILS

Many very sandy soils are naturally water-repellent (p. 72). Other sandy soils can become water repellent following the addition to them of large amounts of organic matter. Water can sit for hours in pools on the surface of the dry soil.

Difficulty in wetting is caused by the presence of waxy materials on the surfaces of sand particles. These waxy materials are produced mainly by fungi as they decompose organic matter.

IMPROVING WETTABILITY

One way of improving the wettability of a non-wetting soil is for you to stand out in the rain or under the sprinkler and 'thump' the soil so that you force water into close contact with soil particles. Once wet, the soil will be easy to rewet as long as it does not dry out completely. But thumping will again be necessary if it dries out. Better ways of improving wettability include:

- Adding clay: Non-wetting of sandy soils can usually be permanently cured by increasing their clay content to above about 10%. That means adding 10–15 kg of clay per square metre and mixing it with the top 10 cm of sand.
- Using wetting agents: The simplest way of ensuring quick rewetting of dry sandy soils is through the use of wetting agents.

A wetting agent is really just a special type of detergent that is only slowly biodegraded and that is not toxic to plants at the recommended rate of use. The wetting agent allows water to spread more easily across the surfaces of

© CSIRO 2001
http://www.publish.csiro.au/

Gardening Down-Under: A Guide to Healthier Soils and Plants,
2nd edition, by Kevin Handreck, 2001, Landlinks, 304 pp.

particles in a soil or potting mix, in much the same way that dishwashing detergent allows water to spread over and stick to a greasy plate.

Despite what advertisements state, wetting agents are usually needed only on sandy soils. They are unlikely to improve wetting or water use efficiency on heavier soils.

APPLYING WETTING AGENTS TO SANDY SOILS

1. Use a fork to make small holes in the soil.
2. Apply wetting agent as recommended, typically at 5 mL per square metre. You must dilute the concentrated wetting agent so that the 5 mL is carried in about 2 litres of water. Thus, 25 mL of wetting agent in 10 litres of water will treat 5 square metres of soil.
3. Encourage penetration of the solution by further forking, if necessary.
4. Irrigate at a low rate (5–10 mm per hour) so that water can penetrate deeply into the soil.

© CSIRO 2001
http://www.publish.csiro.au/