



Fertilizers and Manures

SUMMARY The RHS advocates the thoughtful use of fertilizers and manures in gardening. This can make a positive contribution to conservation and the environment, with benefits to soil fertility and plant growth, and through the avoidance of excessive or improper application. Opportunities for recycling organic matter are an important benefit. Cost saving from discerning use is a reward to be added to the satisfaction in helping to preserve the natural order. Leaflets relating to specific aspects of fertilizer and manure usage in gardening are available free of charge to RHS Members.



Photo: SITA©

Composting green waste reduces the need for landfill sites

RHS policy statements

- 1 The Royal Horticultural Society advocates good fertilizer and manure application practice based on soil analysis, accurate application (both timing and quantity) and never applying extra 'to be on the safe side'.
- 2 The Royal Horticultural Society advocates the use of bulky organic manure as an essential aspect of good horticultural practice in maintaining soil fertility and soil structure. The Society encourages the use of animal manures and composted plant remains for this purpose, and promotes advice on methods of making garden compost.
- 3 Bulky organic manure is an inadequate source of nutrients for sustaining healthy growth in many garden plants, particularly fruit and vegetables. Wherever necessary the Society recommends the additional use of base dressing and supplementary feeding with fertilizers supplying nutrients in concentrated form.
- 4 The Society encourages the use of fertilizers of organic origin, in preference to inorganic manufactured fertilizers which have greater potential for leaching and contaminating waterways and ground water.
- 5 The Society is aware that there may be some health hazards in using organic materials derived from animal sources. The Society contributes actively to United Kingdom consultation papers on these matters and endeavours to keep up to date with all relevant information.

Fertilizers and manures

The words 'fertilizer' and 'manure' are used interchangeably in the context of gardening, both referring to substances added to soil for the establishment, improvement and maintenance of fertility.

By convention 'fertilizer' refers to a substance applied in small amounts which contains a relatively high percentage of plant nutrients. Fertilizers may be of organic or inorganic origin, used either in their naturally occurring state or more often after some form of processing. Organic fertilizers include substances such as dried blood and seaweed derivatives, which are of animal and plant origins respectively. Inorganic fertilizers are usually wholly manufactured, as in the case of sulphate of ammonia; or they may be processed from a mined or quarried mineral, as in the case of ground limestone. Fertilizers may be described as 'straight' where the product contains predominantly nitrogen, phosphate or potash, and 'compound' where there is a mix of nutrients.

The word 'manure' is generally used to describe bulky waste substances high in fibre and water content with relatively low levels of nutrients. Such bulky organics are most commonly represented by the mixture of farm animal dung and bedding known as farmyard manure. Composted plant remains, farm slurry and sewage sludge are other examples of bulky organic manure. Thoughtful use of fertilizers and manures can contribute beneficially to various aspects of the natural environment.

Soil nutrients

The maintenance of adequate levels of nutrients in soil is essential for

healthy plant growth. In turn this provides sustenance and shelter for insects, birds and mammals. There are some plants, particularly wildflowers, which benefit from nutrient deficient soils and should not be dressed with fertilizers.

Applying fertilizers, including lime, is an important means of optimising concentrations of nitrogen, phosphorus, potassium, calcium and other major nutrients, as well as trace elements which are essential to plant growth in small quantities. Bulky organic manure is a major source of humus which is vital in the development of soil structure and in nutrient retention. It supports a great many soil-inhabiting organisms which are prominent in the wildlife food chain, for example earthworms which are foraged by birds. Good fertility is fundamental to successful plant growth, and the application of fertilizers and manures is an essential gardening activity which warrants thoughtful attention by gardeners in general.

Good fertilizer application practice

In order to apply fertilizers or manures in an environmentally and financially responsible manner the following points should be considered:

- Soil analysis can help prevent over application by establishing existing soil nutrient concentrations. Where nutrient hungry crops are regularly grown, or a new area is being developed, or after a long period without cultivation, soil analysis is recommended. The RHS offers a soil analysis service which determines soil texture, organic

matter content, pH, available phosphorus, potassium and magnesium. For further details of the fee and how to take soil samples, please send an SAE to the Wisley Advisory Service at the address given at the end of this leaflet.



Magnesium deficiency in tomato

- Timing of application is important; most plant types benefit from application in spring whilst an application in autumn or winter is usually unnecessary (nutrients can be leached away as most plants are dormant during this period). Autumn / winter applications can also be damaging to the plant by encouraging untimely young growth which can be harmed by the winter weather. Any application of a fertilizer in preparation for a plant or crop should be undertaken as close to the planting date as possible. Liming the soil to raise the soil pH is best done in the previous autumn.
- Accurately apply the correct fertilizer rate for particular plant

species. A good horticultural text book will usually recommend application rates for different plant types. The needs of individual plants differ greatly.

- Never apply extra fertilizer 'to be on the safe side'.

A potential source of pollution

Careless use or storage of fertilisers or manures can lead to pollution of both water and air. Dressing garden soils with fertilizers and manures presents a small but important pollution risk and the potential for damage to the natural environment must be borne in mind. The proximity of the garden to watercourses is of particular importance as misapplied fertilizer or manure can quickly enter surface waters and may cause pollution.

DEFRA (Department for Environment, Food and Rural Affairs) has identified two areas of concern with regards to nitrate and phosphorus pollution, these being public health and environmental harm. DEFRA describes how high nitrate levels in drinking water can cause a serious blood condition in young babies known as methaemoglobinaemia ('blue baby syndrome'). Whilst this is extremely rare, health concerns surround the amount of nitrate in the diet and the European Union has introduced a limit for nitrate concentration in public water supplies.

Excessive nitrate or phosphorus can cause environmental damage in the form of eutrophication of surface waters, leading to algal blooms. The addition of either nutrient upsets both the balance of organisms in the water as well as its quality.

Recycling of plant residues through composting largely eliminates the

need for burning as a means of disposal and thus reduces the contribution to atmospheric pollution made by bonfire smoke. It should be remembered that in some areas bonfires are actually illegal. Gardeners should also be aware of best storage practice for manures. Heaps of animal manure stacked for weathering prior to digging in should be thoughtfully sited and managed to minimise the risk of atmospheric pollution, which includes offensive odour and the attraction of flies. It should also be stacked under a waterproof cover to avoid the loss by leaching of nitrates and potassium. Not only will such steps prevent ground water pollution, they will also reduce the likelihood of accumulated nitrates in vegetables which may be potentially harmful in the food chain.

Home composting

The practice of home composting plant residues serves not only to harness the benefits of recycling for the maintenance of garden soil fertility but is also a significant environmentally friendly practice. EU and UK legislation encourages local councils to reduce green waste being

sent to landfill. Home composting can have a significant impact on this volume of material. Landfill sites are considered by many to be unsightly as well as a potential source of pollution. Further information on composting is given in the Conservation and Environment Guideline on 'Recycling'

Cost saving through recycling

The recycling of municipal organic refuse and sewage sludge as soil improvers offers potential saving of Local Authority expenditure incurred in transport and landfill site management, and additional income from retailing the products. Both materials require a guaranteed assurance of freedom from contamination by heavy metals which can permanently cause plant toxicity on treated land. There are some useful products available based on segregated municipal green waste, consisting of plant or other suitable refuse composted with organic matter such as bark. Sewage sludge has potential, but has to overcome perception problems. A popular soil conditioner in agriculture, its potential value to amateur gardeners is yet to be realised.

Energy saving

Fast-acting inorganic nitrogenous fertilizers are commonly used where gardeners wish to stimulate plant growth. Energy is consumed in the manufacture of inorganic fertilizers; moderation in their use will save energy resources.

Health and safety considerations

Inorganic fertilizers should always be applied following the manufacturer's instructions. Where gloves, masks etc are recommended it is imperative that this advice is followed.

Photo: RHS Garden Wisley: Andrew Halstead



Most kitchen and garden waste makes good compost

Organic fertilizers derived from animal sources may pose a health hazard if all human pathogens have not been destroyed in processing. Inhalation or ingestion of fine particles of fertilizers is potentially harmful and it is sensible to wear gloves and a dust-excluding mask when handling these materials. Secure storage should be provided as fertilizers based on animal remains may attract flies and rodents. Similarly, bulky organic manures should also be handled thoughtfully to avoid personal contamination.

Publicity linking BSE (Bovine Spongiform Encephalopathy) with animal derived manures and fertilisers has led to clarification from DEFRA. There is no scientific evidence to suggest manure transmits BSE. With regards to meat and bone meal based fertilisers, amateur gardeners can carry on using this material as it has been processed in an appropriate manner. Contaminated material is prevented from entering the finished product because of two checks in the system. Firstly, material which is 'suspect' has to be destroyed and thus is not allowed to enter the processing system. The second check is the fact that the material which is allowed into the process is rendered to the EU pressure-cooking standard which is known to reduce significantly BSE infectivity.



November 2002

Source: The Science Departments, The Royal Horticultural Society's Garden, Wisley, Woking, Surrey GU23 6QB

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