

Objective 1

Documentation of the standards, regulations and legislation relevant to recycling, compost and manure preparation and application and a review of common UK practices relating to the preparation and application of uncomposted materials, manures, composts and compost extracts.

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Objective 1

Documentation of the standards, regulations and legislation relevant to recycling, compost and manure preparation and application and a review of common UK practices relating to the preparation and application of uncomposted materials, manures, composts and compost extracts.

1.1 Organic regulations relating to the preparation and use of uncomposted materials, manures, composts and compost extracts.

Organic farming is regulated through EU legislation (EU 2092/91). This law is implemented in all European member states where an ‘authoritative body’ takes responsibility for ensuring the legal standards are met. In the UK this role is fulfilled by UKROFS – the United Kingdom Register of Organic Food Standards. Within the UK there are currently twelve certification bodies which license organic producers and processors. These are listed in the following table (Table 1a).

Table 1a UK organic certification bodies

Certification body	Code
UKROFS	1
Organic Farmers and Growers Ltd.	2
Scottish Organic Producers Association (SOPA)	3
Organic Food Federation	4
Soil Association Certification Ltd.	5
Biodynamic Agricultural Association	6
Irish Organic Farmers and Growers Association (IOFGA)	7
Food Certification (Scotland) Ltd.	8
Organic Trust Ltd.	9
CMi Certification	10
International certification service (GB) trading as farm verified organic	11
Organic certification Ltd.	12

Each of the above organisations is free to develop and implement higher standards than the EU and UKROFS minimum, but no certification body is allowed to set lower standards than those set by UKROFS.

1.1.1 EU and UKROFS regulations

Both the EU and UKROFS standards emphasise that the maintenance of soil fertility and soil biological activity is a fundamental principle of organic farming. A number of treatments that help achieve that principle in practice are listed in the standards, for example: incorporation of organic material (in the form of farmyard manure, composts and slurries) and implementation of appropriate rotations. Organic matter from (non-intensive) non-organic farms, green composting facilities and *source separated* and composted household waste are acceptable within the EU organic standards although some prescriptions on use may be included depending on the material (reference EU 2092/91, appendix). However, UK waste legislation (ABPO) means that compost made from household waste is not currently allowed to be applied to organic land. This is set to be amended in 2003 (see below).

The total amount of manure (as defined in directive 91/676/EEC) applied on the holding may not exceed 170 kg N ha⁻¹yr⁻¹ under EC law, although the Biodynamic Agricultural Association (BDAA) stipulates that a maximum of 112 kg N ha⁻¹yr⁻¹ may be applied under their regulations. No guidance is given in the EU or UKROFS standards as to the relative merits of composts versus manures and no mention is made of compost extracts or teas.

Ten of the 12 UK organic certification bodies (including UKROFS) have similar standards for the preparation and use of composts and manures. The standards of the other two certification bodies (The Soil Association and The Biodynamic Agricultural Association) differ in that they provide greater guidance and in some cases set stricter standards to their licensees.

1.1.2 Soil Association and Demeter (BDAA) Regulations

The Soil Association standards go into considerably greater detail than the basic EU/UKROFS standards with regards to protection of the soil and preparation and management of manures and composts (Soil Association standards 2002). They recommend that all manure should be composted and slurries should be aerated. The composting process is defined and basic guidance is given as to how to prepare compost. Recommendations are included on the treatment and application of manures and composts in horticultural systems and there are new standards for substrate requirements for ornamentals and pot grown herbs.

The Demeter standards (produced by the BDAA) give more descriptive information than the basic UKROFS standards, but they don't differ greatly in terms of recommended practice. The importance of composts for market gardens and potting soils is emphasised in the standards, but limited guidance is given as to how to make or use composts. Neither Soil Association or Demeter standards mention compost extracts or teas.

1.2 Pesticide regulations relating to the use of compost teas/extracts

Some composts, manures and uncomposted plant residues have been shown to help prevent and control certain pests and diseases. These amendments are not currently covered in the UK by the Food and Environment Protection Act (1985) or Control of Pesticides Regulations (1986). In the UK, they are generally prepared on the farm where they are used or locally and are applied primarily for the purposes of crop nutrition or soil improvement. Any effect on pests or diseases is a secondary effect.

Compost extracts and teas are a different case. They are being prepared and used regularly in the United States specifically in an effort to prevent and control crop disease. Most compost extracts/teas are prepared and used on farm, but some are prepared and sold with the claim that they will help control disease. There is increasing interest in compost teas from UK organic farmers, therefore the authors of this report feel that it is important to clarify the legal situation regarding their use in the UK.

At present, the legal situation regarding the use of compost teas to control crop diseases in the UK is uncertain. The authors of this report have discussed with the Pesticide Safety Directorate (PSD) the background to compost extracts/teas, their use in the United States and the increasing interest from British growers in their use. However, PSD staff have requested further time for discussions and to gather information before they are prepared to clarify whether registration will be required for compost teas/extracts.

In the UK, any preparation which is sold by one company to another specifically for the purposes of controlling pests or diseases is classed as a pesticide. As such it must go through the lengthy and costly process of pesticide registration to prove both efficacy and safety to humans, animals, plants and the environment (Whitehead, 2003). Full registration would be very difficult to obtain for most compost teas, since most are currently made on-farm by individual farmers for their own use. The cost of registration for a product (which may differ slightly each time it was made) would be prohibitive. Proof of efficacy could prove a serious problem for potential commercial manufacturers of compost tea, since disease control with compost teas is reported to be very variable.

At present, the main potential problem with compost teas appears to be the concern that fermenting compost could potentially support the growth of human pathogens. For example, Welke (1999) detected faecal coliform and salmonella populations in the source compost, in the nonaerated compost tea (NCT) and on samples of broccoli and leek growing in a field and sprayed with the NCT. Present evidence shows that pathogens can grow during the production of both aerated compost teas (ACTs) and NCT's. However, the indications are that pathogen growth is not supported when ACTs or NCTs are prepared without fermentation nutrients (Scheuerell and Mahaffee, 2002a). Further work is required to ensure that the production and use of compost teas and extracts can be guaranteed not to propagate and spread human pathogens onto food intended for human consumption.

The authors of this report have supplied information on the preparation and use of compost teas/extracts to PSD and await the outcome of their discussions with interest. The practical implications of their conclusions will be disseminated to interested parties in the proposed publications and seminar in 2003 (see form CSG15).

1.3 Current and future EU and UK government regulations relating to recycling, waste disposal, composting and compost use.

1.3.1 An overview of the key EU Directives and UK Acts and Regulations

The Framework Directive on Waste (75/442/EEC as amended by Directive 91/156/EEC) requires that member states of the EU produce a National Waste Strategy setting out their policies on the disposal and recovery of waste.

The 99/31/EC Landfill Directive aims at reducing the levels of biodegradable municipal waste going to landfill in order to cut the production of greenhouse gases. This Directive was implemented in England and Wales through the Landfill (England and Wales) Regulations which came into force in June 2002. Equivalent regulations are likely to be implemented in Scotland. The Directive requires member states to set up national strategies for implementing a reduction in the quantity of biodegradable waste going to landfills. The strategy must ensure that biodegradable waste going to landfill is reduced to the following (taking into account the derogation):

- 75% of the amount produced in 1995 by 2010
- 50% of the amount produced in 1995 by 2013
- 35% of the amount produced in 1995 by 2020

The main EU legislation relating to waste reduction, recycling, environmental protection and the preparation and use of composts and manures is listed in Table 1b.

1.3.2 The history of UK legislation and regulation

As a result of the industrial revolution, wastes became concentrated in the urban areas and were either dumped in open landfills or burnt. Following concerns over human health, acts were passed in the mid 19th century leading to the Public Health Acts of 1848, 1875 and 1936. Following the Second World War economics were against incineration, hence the domination of landfill in British waste disposal practice. However, the public were increasingly becoming aware of environmental issues and legislation and regulations on waste accelerated dramatically in the 1990s, following environmental incidents in the 1960s and 1970s. This will result in an increased amount of treated organic wastes being applied to agricultural land or used in horticulture and landscaping in the 21st century.

The Control of Pollution Act 1974 aimed for a much wider control of waste disposal and regulation of sites, and began a serious tightening up of waste disposal methods. The Government produced a White Paper on the Environment in 1990 "This Common Inheritance" which set out a waste strategy which regarded waste minimisation and recycling as priorities, with a target of 25% for the recycling of household waste by the year 2000.

The subsequent Environmental Protection Act 1990 separated waste regulation from operational work in local authorities and implemented more regulations and controls. It replaced the 1974 Act with a new licensing system covering all controlled wastes (certain household, commercial and industrial wastes) and required local authorities to consider recycling in their waste strategies. Responsibility for waste, Duty of Care, from generation to transfer and disposal was introduced in 1992. The Environment Act in 1995 established the Environment Agency, replacing the National Rivers Authority, Her Majesty's Inspectorate of Pollution, Waste Regulation Authorities and some parts of the Department of the Environment.

"Making Waste Work" was published by the Government in 1995 describing the waste strategy for England and Wales. This document set out plans for sustainable management of waste, and also confirmed the target of 25% of household waste to be recycled by the year 2000. The landfill tax was introduced in 1996, which levied £7 per tonne of waste going to landfill in order to encourage alternatives such as re-use and recycling, and promote waste minimisation. In the 1999 budget a "landfill escalator" of £1 per year until 2004 was introduced to increase landfill tax.

In 1999, the Government released "A Way with Waste", a draft waste strategy for England and Wales building on and rationalising "Making Waste Work". The national waste strategy for Scotland was also launched, with specific goals for reducing special and industrial waste arisings. In 2000 a finalised waste strategy for England and Wales - "Waste Strategy 2000" - was published, setting revised national targets for the recycling or composting of household waste: 25% by 2005, 30% by 2010, and 33% by 2015. The "Waste Management Strategy for Northern Ireland" was also launched, setting targets for household waste similar to "Waste Strategy 2000".

The Government's Strategy Unit on waste was tasked at the end of 2001 with carrying out a review of the Waste Strategy in England and the report 'Waste not, Want not' has been published (2002). The aims of the review were:

- to analyse the scale of the challenge posed by the growing quantities of municipal household waste;
- to assess the main causes and drivers behind this growth now and in the future; and
- to devise a strategy, with practical and cost-effective measures for addressing the challenge, which will put England on a sustainable path for managing future streams of household waste.

The main UK legislation relating to waste reduction, recycling, environmental protection and the preparation and use of composts and manures is listed in Table 1c.

1.3.3 Animal By-products Order

The Animal By-products Order 1999

(<http://www.legislation.hmsso.gov.uk/si/si1999/19990646.htm>) is partly as a consequence of the Animal Waste Directive 1990 and the Animal Health Act 1981. The Order is currently under review and amendments are likely to come into force in 2003. Changes to the order will restrict the disposal of animal by-products and will impose strict conditions on the use of treatment methods such as composting and anaerobic digestion. Where catering or household waste contains meat or other products derived from animals then, although it may be composted, it may not, currently (2002), be used on land. The Animal By-Products (Amendment) Order 2001 prohibited the use of this mixed compost on land where animals (including wild birds) may have access. However, this position is set to change. The EU Animal By-Products Regulation (EC 1774/2002) will allow the use of properly composted mixed waste on land. It is expected that this Regulation will come into force in April 2003.

DEFRA commissioned research to determine the level of risk to animal health from composting of catering wastes and the land spreading of the products. This research was reported in June 2002 (Gale 2002) <http://www.defra.gov.uk/animalh/by-prods/publicat/report5.pdf>

On 20th November 2002, DEFRA published a consultation document, the Animal By-Products (amendment)(England) Order 2002, on the proposed use of catering waste containing meat in composting and biogas treatment www.defra.gov.uk/corporate/consult/animalbyprod/letter.htm. The EU Regulation allows Member States to specify their own standards for the processing of catering wastes at national level, provided that these standards guarantee an equivalent level of pathogen removal. This proposed Amendment details those standards. The compost derived from catering waste may only be used on non-pasture land defined as land that is not grazed for at least two months after application of the compost.

1.3.4 Groundwater

Groundwater is an important resource. Its contamination is potentially dangerous to human health, can damage aquatic plant and animal life, and is difficult and expensive to remedy. For this reason there are European and national controls to protect groundwater, as well as guidance and codes to explain the controls to those affected by them.

The Groundwater Directive 80/68/EEC is the main European legislation. This is expected to be replaced over coming years by a new Groundwater Directive to be made pursuant to Article 17 of the Water Framework Directive 2000/60/EC. In the UK the main legislation implementing the Directive is the Water Resources Act 1991 and the Groundwater Regulations 1998 (www.defra.gov.uk/environment/water/ground/index.htm)

The Regulations came into force on 1 April 2000. They effectively extend existing controls, contained in the Water Resources Act 1991, over the discharge of polluting matter to controlled waters (including groundwater). They require that disposal, or tipping for the purposes of disposal, to land of certain listed substances may be carried out only if prior authorisation has been given by the Environment Agency. Under the Regulations the Environment Agency has powers to issue notices to control activities other than disposal,

where these are likely to result in an indirect discharge of a listed substance to groundwater. There is a prohibition on the entry of List I substances into groundwater.

1.3.5 Nitrate Vulnerable Zones

Nitrate from agricultural land is a source of nitrate in rivers and aquifers. High levels of nitrates in certain waters have given rise to environmental and health concerns and these have been reflected in the EC Nitrates Directive (91/676/EEC), which is aimed at reducing nitrate pollution from agriculture (www.defra.gov.uk/environment/water/quality/nitrate). 66 Nitrate Vulnerable Zones (NVZs) were designated in England in 1996 and the NVZ Action Programme came into force in those zones in December 1998. Following further consultation, additional NVZs have been designated in 2002 for England, coming into force in December 2002. Compliance with the rules of the Action Programme is a legal requirement. The rules detail the amounts of organic manures, through total nitrogen application, that may be applied to the land.

The rules include closed periods for both inorganic fertilizers on all soil types and organic manures with a high available nitrogen content on sandy and shallow soils. The nitrogen limits for organic manures are based on the whole farm at 210 kg total N/ha for arable (reducing to 170 kg/ha after 4 years) and 250 kg total N/ha for grassland, with individual field limits of 250 kg/ha as long as the available nitrogen does not exceed crop requirements.

In areas not within an NVZ, the Soil (MAFF 1998) and Water (MAFF 1998) Codes should be practiced (the codes are available from DEFRA). The application of liquid and solid wastes to land must provide agricultural benefit and be approved by the Environment Agency. Analysis of the materials must be provided to the farmer for total nitrogen, phosphate and potassium as major nutrients, and for potentially toxic elements. Soil sampling and analysis may be required to monitor soil levels for these latter elements.

The Water Code includes a maximum guide figure for the total nitrogen in manures of 250 kg/ha per year. The available nitrogen applied should not exceed the requirements of the next crop. Phosphorus and potassium should also be applied with regards to the crops needs through the rotation. Guidelines for application of slurries and manures are given in Fertilizer Recommendations (RB209) published by the Stationary Office (MAFF 2000).

Manures are commonly applied to arable stubbles in the autumn prior to drilling of winter cereals or oilseed rape. To optimise the use of the nutrients, especially nitrogen, in organic manures and to minimise leaching of nitrates, manures should be applied in the spring. Manure applications to spring sown crops should be made from January onwards to minimise leaching losses. Rapid soil incorporation will minimise ammonia losses and potential complaints of odour by neighbours.

Grassland fertilizers are normally applied between March and the end of July with no benefit in production from application from mid-August onwards.

Manures should not be applied when the soil is

- waterlogged,
- flooded,
- frozen hard or
- snow-covered.

Manures should not be applied to steeply sloping fields or within 10 metres of surface water, including field ditches. There are closed periods for the application of slurries to land in NVZs on sandy or shallow soils in the autumn.

1.3.6 The IPPC Directive 96/61/EC

The EU has a set of common rules on permitting for industrial installations. These rules are set out in the IPPC Directive of 1996 (<http://europa.eu.int/comm/environment/ippc/>). This Directive (Integrated Pollution Prevention and Control) is about minimising pollution from various point sources throughout the EU. The purpose of the Directive is to achieve prevention and control of pollution arising from the range of activities listed in Annex 1. It lays down measures designed to prevent, or where that is not practicable, to reduce emissions to air, land and water from these activities, including measures concerning waste. This is being done in order to achieve a high level of protection of the environment taken as a whole.

All installations covered by Annex I of the Directive are required to obtain an authorisation (permit). The permits must be based on the concept of Best Available Techniques (BAT), which is defined in Article 2 of the Directive. Due to the effects of introducing the Directive, existing installations were granted an 11 year transition period.

Annex I includes:

6. Other activities
 - 6.1. Industrial plants for the production of:
 - (a) pulp from timber or other fibrous materials
 - (b) paper and board with a production capacity exceeding 20 tonnes per day
 - 6.2. Plants for the pre-treatment (operations such as washing, bleaching, mercerization) or dyeing of fibres or textiles where the treatment capacity exceeds 10 tonnes per day
 - 6.3. Plants for the tanning of hides and skins where the treatment capacity exceeds 12 tonnes of finished products per day
 - 6.4.
 - (a) Slaughterhouses with a carcase production capacity greater than 50 tonnes per day
 - (b) Treatment and processing intended for the production of food products from:
 - animal raw materials (other than milk) with a finished product production capacity greater than 75 tonnes per day
 - vegetable raw materials with a finished product production capacity greater than 300 tonnes per day (average value on a quarterly basis)
 - (c) Treatment and processing of milk, the quantity of milk received being greater than 200 tonnes per day (average value on an annual basis)
 - 6.5. Installations for the disposal or recycling of animal carcasses and animal waste with a treatment capacity exceeding 10 tonnes per day
 - 6.6. Installations for the intensive rearing of poultry or pigs with more than:
 - (a) 40 000 places for poultry
 - (b) 2 000 places for production pigs (over 30 kg), or
 - (c) 750 places for sows

A practical guide on IPPC is provided by DEFRA (<http://www.defra.gov.uk/environment/ppc/ippcguide/index.htm>). The IPPC Directive had to be implemented in all member states from the end of October 1999. This guide deals with the operation of IPPC under the Pollution Prevention and Control (England and Wales) Regulations 2000, SI 2000/1973 as amended ('the PPC Regulations') and the Landfill (England and Wales) Regulations 2002, SI 2002/1559 ('the Landfill Regulations'). These were made under the Pollution Prevention and Control Act 1999 and will eventually replace all of Part I and some of Part II of the EPA 1990. Separate systems will be introduced to

apply the IPPC Directive to Scotland www.sepa.org.uk/regulation/ppcregs/index.htm and Northern Ireland.

Assistance with the regulations is provided by the Environment Agency (<http://environment-agency.gov.uk/business/techguide/ippc/>). In order to simplify the application and permitting procedure for both the industry and the Agency, whilst still providing a high level of environmental protection, the Agency and DEFRA continue to work together with the pig and poultry industries to develop the Standard Farming Installation Rules for IPPC in agriculture. These Rules will reduce regulatory effort and have allowed lower application and subsistence fees for farming installations.

The Rules cover most aspects of farming activity regulated under IPPC, including raw materials and waste handling, intensive rearing of pigs, intensive rearing of poultry and the production of eggs, manure management planning, spreading of solid manure and slurry, energy, accident management and monitoring and reporting.

Version 3 of the Rules, dated June 2001, replaces the November 2000 version. The rules have been amended to take account of the useful comments made by the industry and others on the first versions of the rules.

The Rules will continue to be developed and amended as ongoing research, undertaken with the industry, gives clearer guidance as to what will be the Best Available Technology in UK.

'Ammonia in the UK' is a booklet published by Defra in October 2002 (DEFRA 2002) to help raise awareness of the effects of ammonia emissions and stimulate discussion on what can be done to reduce its environmental impact. More than 80 percent of ammonia pollution is produced by agriculture, mainly from livestock manure but also from nitrogen fertilizers. The booklet summarises the findings of years of research, covering sources of emissions, monitoring of ammonia to the atmosphere, impacts on the environment and potential techniques to reduce emissions. The UK is committed to reducing annual ammonia emissions to 297 kilotonnes by 2010 under the United Nations Economic Commission for the Europe Convention on Long Range Transboundary Air Pollution's Gothenburg Protocol and the EC National Emission Ceilings Directive. Defra has also produced a less technical, eight page summary of the booklet, 'Ammonia in the UK – Key Points'.

1.3.7 The definition of waste: manure and slurry

Agricultural waste is currently excluded from the waste management controls which apply to 'controlled waste' (section 75(7)(c) of the Environmental Protection Act 1990. This exclusion is inconsistent with the Waste Framework Directive and the Government has undertaken to consult on the regulations necessary to apply the Directive's controls to agricultural waste. The effect of the proposed regulations will be to extend to the farming industry the waste management controls which currently apply to other sectors of industry.

To achieve sustainable waste management in the UK agricultural sector it was announced that an Agricultural Waste Stakeholders' Forum would be set up and the Forum's membership was announced on 14 August 2002.

www.defra.gov.uk/environment/waste/agforum/index.htm

The definition of manure and slurry in the context of waste is discussed in a letter from DEFRA to the Environment Agency on 27 June 2002. The Department's views on the three sets of circumstances are set out covering:

- a) a farmer using slurry or manure on the farm on which it was produced as a fertilizer or soil conditioner to meet the requirements of agricultural land (i.e. the use is beneficial to the land)
- b) a farmer using slurry or manure on the farm on which it was produced in quantities which exceed the requirements of agricultural land (i.e. the use is not beneficial to the land)
- c) Slurry or manure is transferred from the farm on which it was produced for use by someone else.

The Department's views are that a) is not waste, b) is waste and for c) that it depends. Criteria to determine when 'benefit to agriculture or ecological improvement' is achieved are being drawn up by the Department in consultation with the Environment Agency's Exemptions Working Group.

1.3.8 Quantities of composts and manures in UK

1.3.8.1 Quantities of compost from household waste

Today in the UK, it is estimated that each household will throw away over a tonne of waste every year, totalling approximately 26 million tonnes. Approximately 50% of household waste is potentially recyclable, and a further 20% is kitchen waste, consisting of organic matter which could be composted. Nevertheless, although surveys suggest that over 90% of the general public perceive recycling as a worthwhile activity, it is estimated that only 5% of dustbin contents are recycled or composed in the UK. As such, we could recycle or compost fourteen times as much as we do now. By contrast, around 85% of household waste in the UK is landfilled. In comparison, Switzerland only landfills 11%, Denmark 20%, Japan 21%, the Netherlands 30% and Sweden 34%.

Composting of biodegradable municipal household waste (BMSW) is on the increase. In a survey of 1998 by the Composting Association (J Gilbert 1999) 0.9 million tonnes of organic waste was found to be composted. This report estimated that alternatives to landfilling of 4.9 million tonnes of BMSW would be required by 2010, including composting, in order to meet Landfill Directive targets. There is also an estimated 100 million tonnes of commercial and industrial biodegradable waste that could potentially be diverted from landfill.

1.3.8.2 sludge

Sewage sludge disposal is controlled by the Sludge (Use in Agriculture) Regulations 1989 (amended 1990) transposing Directive 86/278/EEC. The 2001 UK Sewage Sludge Survey showed that on average 1,072,000 tonnes of dry solids a year was produced in the years 1998 to 2000. Sewage sludge dumping to sea was banned in 1998. In 2000, approximately 55% of sludge was applied to agricultural land, 22% was incinerated and 11% landfilled. Agreement was reached in 1998 between Water UK and the British Retail Consortium to the 'Safe Sludge Matrix' (www.adas.co.uk/matrix) which set out improved treatment processes and post-application harvesting and grazing restrictions. Government supports the agricultural recycling of sludge to land as the Best Practicable Environmental Option in most circumstances.

The Government and Welsh Assembly Government issued a consultation document (www.defra.gov.uk/environment/conindex.htm) in October 2002 on proposals to amend the statutory controls for the agricultural use of sludge, the associated non-statutory code of practice and the draft for the Regulatory Impact Assessment which will accompany the regulations. The revisions proposed by the Government will give statutory force to the voluntary codes of practice including a ban on the application of untreated sludge (including

septic tank sludge) to land to be used for food crops, the tightening of sludge treatment processes and changes to the post application harvesting requirements. New record keeping and control procedures are also proposed.

The EC has also signalled that it plans to revise the existing 1986 Sludge Directive.

1.3.8.3 Animal manures

Cattle manures were surveyed (K.A.Smith 2001) for management practices. Manures from dairy and beef farming comprise 73 million tonnes out of the 90 million tonnes produced in the UK. An estimated 4.4 million tonnes of poultry manure are produced in the UK with 10.4 m tonnes arising from pigs and 2.6 m tonnes from sheep. Management practices with regard to poultry manures were also surveyed in England and Wales in 1996 (K. A. Smith 2001).

Organic manures supply both nutrients and organic matter when applied to land. Depending on the timing of application, their form and the amounts applied, manures may also be a source of pollution to water. A review of fertilizer practice in Great Britain (Chambers 2001) showed that between 1983 and 1997 manures were, on average, applied to 16% of tilled land whereas for grassland the proportion increased slightly from 40% to 44% over the period. Much of the manure and slurry was applied during the period August to October when the risk of subsequent leaching is greatest.

1.3.9 Composting

1.3.9.1 Technical guidance on composting operations

In October 2001, the Environment Agency issued a consultation document 'Technical Guidance on Composting Operations'. <http://www.environment-agency.gov.uk/commondata/105385/compostin.pdf> The objective of the guidance is to promote best practice in the operation and regulation of composting facilities, with particular reference to:

- composting techniques currently available;
- regulatory requirements for composting facilities;
- potential environmental impacts of composting; and
- operational requirements

1.3.9.2 The Composting Association

The Composting Association (www.compost.org.uk) drafted standards for the preparation of composts in 2000, which have formed the basis of PAS 100 launched by the BSI in November 2002 funded by the Waste and Resources Action Programme (WRAP www.wrap.org.uk). This Publicly Available Specification sets out a voluntary standard for the process of composting source separated wastes and for the end product quality in terms of the content of potentially toxic elements, contaminants, human pathogens and weed seeds, and also labelling.

The Composting Association has published various documents useful to practical composting such as 'A guide to in-vessel composting' and 'Large scale composting – a practical manual for the UK'.

1.3.9.3 EU Draft Biological Treatment of Biowaste

The EU is working towards a Composting Directive in 2004. This will be based on the 2nd draft of a working document 'Biological Treatment of Biowaste' published in 2001. This covers the collection and treatment of biowastes as listed, as well as the production, trade and shipment of treated biowaste.

1.4 Soil Protection

1.4.1 EU Soil protection

The Sixth European Environmental Action Plan 'Our Future, Our Choice' (2001) includes an objective to protect soils from pollution and erosion and proposes a soil protection strategy. The Sustainable Development Strategy (2002) noted that soil loss and declining fertility are eroding the viability of agricultural land. In 'Towards a Thematic Strategy for Soil Protection' (2002), the Commission stated that it intends to develop a thematic strategy. The Commission will propose a series of environmental measures designed to prevent soil contamination, including legislation relating to mining waste, sewage sludge and compost, and, in addition, will pursue integration of soil protection concerns in major EU policies. A progress report will be prepared in mid 2004.

1.4.2 Soil strategy, England and Wales

The Royal Commission on Environmental Pollution (1996) published their 19th report 'Sustainable Use of Soil' making various recommendations on soil sustainability.

In March 2001, the DETR launched a consultation paper presenting a draft for an overall soil strategy for England (2001). The paper discusses the role of soil in the context of sustainable development. It sets out proposals for a strategic approach and, in particular, the development of a new set of key soil indicators and targets. The paper also addresses soil-related elements of land-use planning.

This paper summaries that:

- soil fulfils a wide range of environmental, economic and social functions;
- the sustainable use of soil is an important step towards a wider objective of sustainable development. The Government aims to ensure that we use and protect our soil in a way that is not only sustainable in its own right, but also contributes to a wider aim of sustainable development.

Within this aim, are the following objectives:

- to manage the extent of our soil resource in ways which ensure we can meet our present and future land use needs;
- to manage diversity of soils concentrating particularly on our most valued soils, so that the right balance of soil types is available to meet current and future needs of soil to support our ecosystems, landscapes, agriculture and cultural functions;
- to maintain and improve the quality of our soils in ways which ensure we can meet our current and future social, environmental and economic needs.

1.5 The preparation and use of uncomposted materials, manures, composts and compost extracts on UK organic farms

A range of organic farmers, growers, certification officers and inspectors from the UK were interviewed. This was essential in order to determine current practice with regard to the preparation and use of plant residues, manures, composts and compost extracts.

Interviewees included: 10 farmers registered with the Soil Association, 15 farmers registered with the BDAA, 10 farmers registered with certification bodies with standards approximately

equivalent to those of UKROFS (i.e. not the Soil Association or BDAA), 2 organic inspectors and 3 organic certification officers.

1.5.1 Preparation

All farmers, inspectors and certification officers interviewed agreed that manures and/or composts were an important component of the organic farming system and that their careful preparation and management was key to the optimisation of nutrient cycling on organic farms. Although many of the farmers interviewed said that they prepared and applied composts, by the definitions used in the glossary from this report (Appendix 1), they were actually talking about stacked manures. Most UK organic farmers stack their animal manures for between 6 months and a year prior to application. Some farmers turn the manure at least once during stacking, but few farmers cover their manure stacks and acknowledge that nutrient loss through leaching and volatilisation is probably a problem, particularly during wet periods. According to those interviewed, most UK organic farmers stack strawy cattle manure, although manure from other animals such as goats, pigs and poultry is sometimes stacked in combination with bedding such as straw or wood shavings. The farmers interviewed who stacked their manures were generally happy with their manure management strategy because it was cheap and appeared to be an effective way of optimising nutrient cycling around the farm.

A small minority of UK organic farmers are making true composts. Several of the biodynamic farmers interviewed have been making composts for a many years, mostly on a small scale to provide nutrition for horticultural crops on farms of between 0.5 and 10 acres. They are using compost bins or covered/ uncovered compost piles and are turning the material by hand or with a tractor and bucket. Their composting process often takes a year or longer. The biodynamic farmers interviewed were composting a wide range of feedstocks including manures, vegetable wastes, shavings, paper and straw. and for up to a year or sometimes longer in order to get a satisfactory product. The composting process used on biodynamic farms is generally not monitored or controlled, but the farmers were happy with the product that they were creating and were convinced of the merits of composts over stacked manures.

It is estimated that less than ten non-biodynamic organic farmers are preparing true composts in the UK. According to those interviewed, all of those farmers are using a single, patented composting process known as the Controlled Microbial Composting® (or CMC®) process. This patented method was developed by the Luebke family in Austria and involves the production of compost in covered windrows (1.2 x 1.8 m approx. x any length) over a 6-8 week period. The feedstocks are carefully chosen to include a balance of well structured materials and should have a carbon to nitrogen (C:N) ratio of around 30:1. They are mixed, water is added if necessary and covered with a waterproof, breathable membrane. The windrows are monitored daily for CO₂, moisture levels and temperature and the windrows are turned with a purpose-built compost turner every time the temperature exceeds 60°C. This often means that the windrows are turned daily at the start of the process. Compost maturity is estimated by measuring temperature and CO₂ emission from the windrows. The growers who are now making compost by the CMC method are generally happy with it and the quality of the compost which is produced. They acknowledge that this true compost is very different from stacked manure and claim that it is more suitable for their enterprise.

Several other nutrient amendments are added to soils in organic systems, including green manures, non-harvested plant parts and aerated slurries from housed animal production systems. Their application assists with nutrient cycling around the farm, but they do not tend to form the major part of fertilisation strategies on farms where cropping provides the main source of income.

There is no evidence that UK organic farmers are preparing compost extracts or teas for routine use on their farms, although there is great interest in the subject following reports of their use in the United States.

1.5.2 Use

All of those interviewed had a good understanding of environmentally sound manure management practices and applied stacked manures at times when they would be of most use to key crops and least likely to lose nutrients through leaching. Stacked manures are generally applied at the point in the rotation when they will be of greatest use, for example, just prior to the final cropping year in an arable rotation, or before nutrient demanding crops such as potatoes. Stacked manures are used on all types of UK organic farms including livestock, mixed, stockless farms and horticultural units.

All of the UK organic growers who are making compost by the CMC method are involved in the production of high value horticultural crops, on at least part of their enterprise. Most have fairly recently undergone conversion to organic production and most are running holdings larger than 5 hectares. They feel that the cost of producing true compost is justified by the quality of the compost and the benefits which it brings to their cropping system. The compost producers interviewed acknowledge that there is limited scientific proof for some of the claims which are made for the effects of true composts on crops and soils. However, they feel that true composts are superior to simple stacked manures because nutrient release from composts is more closely matched to crop demand and because they believe that composts provides a better quality of organic matter to enhance the soil.

1.6 Composting operations outside organic farms

The increased costs of landfill are encouraging waste management companies and manufacturers to re-use, recover and re-cycle wastes. A growing number of UK companies are interested in producing composts suitable for use in organic production systems. Some are already doing so and others are developing technologies, feedstock sources and markets in order to do so. The current situation is summarised below.

Several companies (mainly based in England) have recognised the market for composts as soil conditioners and as growing media for plant propagation in organic farming. Some companies aim primarily to process locally produced industrial waste for other companies and the production of a quality, saleable product, although important, is a secondary consideration. Others aim to optimise the feedstocks and process in order to produce a premium compost product for high value markets including organic horticulture and the consumer garden retail market. An increasing number of companies fall into this category. The majority produce composts for use as soil conditioners. Only a very few companies produce a product of suitably high and consistent quality for use as constituents of propagation media for organic transplants. Most companies which currently produce composts for the organic market have applied for, or intend to apply for approval and registration through the Soil Association Certified Inputs Scheme.

The majority of composts which are produced by commercial composting companies for organic farmers are made from some or all of the following: local authority green waste, organic and non-organic vegetable processing and pack house wastes, domestic green waste from kerbside collections. A few companies use in-vessel systems for rapid composting, followed by maturation in windrows. Another company uses an in-vessel system followed by a vermicomposting system. However, most companies produce compost in uncovered, turned windrows due to the simplicity and low cost of the system.

1.7 References

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Table 1b EU Legislation, regulations and policy

Date	Organisation	Item	Location
1999	EU	Landfill Directive	http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=31999L0031&model=guichett
2000	EU	Working document on sludge	http://europa.eu.int/comm/environment/sludge/sludge_en.pdf
2000	EU	Success stories on composting and separate collection	http://europa.eu.int/comm/environment/waste/compost/compost_en.pdf
2001	EU	Biological treatment of biowaste, 2nd draft (“Composting Directive”)	http://europa.eu.int/comm/environment/waste/biodegradable2_en.pdf
19 June 2001	EU	Questions and answers on animal by-products	http://www.europa.eu.int/comm/dgs/health_consumer/library/press/press152_en.pdf
20 November 2001	EU	Common services paper on the processing, disposal and uses of animal by-products in Member States	http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=MEMO/01/378 0 RAPID&lg=EN
21 November 2001	EU	Common position on animal by-products regulation agreed	http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/01/1616 0 RAPID&lg=EN
April 2002	EU	"The biological treatment of biodegradable waste - Technical aspects" , Conference Brussels 8-10 April 2002	http://europa.eu.int/comm/environment/waste/compost/conference_programme.htm
2002	EU	Animal By-products Regulation: Common Position	http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/ce045/ce04520020219en00700169.pdf
2002	EU	Towards a Thematic Strategy for Soil Protection	http://europa.eu.int/comm/environment/agriculture/soil_protection.htm

Table 1c - UK Legislation , regulations and policy

Date	Organisation	Item	Location
1990	UK Government	Environment Protection Act 1990	http://www.legislation.hmso.gov.uk/acts/acts1990/Ukpga_1990043_en_1.htm
1998	DEFRA	Less Waste. More Value. Consultation Paper on the Waste Strategy for England and Wales	http://www.defra.gov.uk/environment/consult/waste/index.htm
1999	DEFRA	A summary of responses to Less Waste More Value.	http://www.defra.gov.uk/environment/waste/strategy/summary/index.htm
1999	DEFRA	Animal By-products Order 1999	http://www.legislation.hmso.gov.uk/si/si1999/19990646.htm
1999	DEFRA	Limiting Landfill: A Consultation paper on limiting landfill to meet the EC Landfill Directive's targets for the landfill of biodegradable municipal waste	http://www.defra.gov.uk/environment/waste/strategy/landfill/index.htm
2000	DEFRA	Waste Management Paper No.4 Licencing of Waste Management Facilities	http://www.defra.gov.uk/environment/waste/management/paper04a/index.htm
		Waste Management Paper No.4a Licensing of Metal Recycling Sites	
2000	DEFRA	Applying for a Waste Management License	http://www.defra.gov.uk/environment/waste/management/licence/index.htm

Table 1c - UK Legislation , regulations and policy

Date	Organisation	Item	Location
2000	DEFRA	The Implementation of Council Directive 1999/31/EC on the Landfill of Waste	http://www.defra.gov.uk/environment/consult/landfill/index.htm
2000	DEFRA	A Way With Waste	http://www.defra.gov.uk/environment/waste/strategy/part1/index.htm and http://www.defra.gov.uk/environment/waste/strategy/part2/index2.htm
2000	DEFRA	Waste Strategy Guidance: Best Value and Waste Management	http://www.defra.gov.uk/environment/waste/strategy/guidance/bestvalue/index.htm
2000	DEFRA	Waste Strategy 2000 for England and Wales	http://www.defra.gov.uk/environment/waste/strategy/cm4693/index.htm
15 August 2001	DEFRA	Consultation letter: Implementation of the EU Animal By-products Regulation	http://www.defra.gov.uk/animalh/by-prods/publicat/bp-regs4.pdf
2001	DEFRA	Guidance note on the disposal of animal by-products and catering waste	http://www.defra.gov.uk/animalh/by-prods/publicat/dispguide.pdf
2001	DEFRA	Waste Summit: report on meeting	http://www.defra.gov.uk/environment/waste/review/summary.htm
2001	DEFRA	Guidance on Municipal Waste Management Strategies	http://www.defra.gov.uk/environment/waste/management/guidance/mwms/index.htm
2001	EA	Composting & Landspreading and the Implications of the Animal By-Products Amendment Order	http://www.environment-agency.gov.uk/commondata/105385/compol.pdf
2001	EA	Agency position on composting and health effects	http://www.environment-agency.gov.uk/commondata/105385/compost.pdf

Table 1c - UK Legislation , regulations and policy

Date	Organisation	Item	Location
2001	EA	Technical Guidance on Composting Operations	http://www.environment-agency.gov.uk/commondata/105385/compostin.pdf
2002	DEFRA	Briefing note on composting	http://www.defra.gov.uk/animalh/by-prods/cater/compost.htm
17 April 2002	DEFRA	Animal By-products Regulation. Letter: 17 April 2002 on EU position	http://www.defra.gov.uk/animalh/by-prods/publicat/letter2.pdf
2002	EA	Waste Management Licensing Process Handbook	http://www.environment-agency.gov.uk/commondata/103706/wmlhand.pdf
3 July 2002	DEFRA	Animal By-products Regulation. Letter: 3 July 2002 on EU position	http://www.defra.gov.uk/animalh/by-prods/publicat/bp-regs6.pdf
2002	Performance and Innovation Unit	The Waste Project: Update	http://www.cabinet-office.gov.uk/innovation/2001/Waste/summ.shtml
2002	DEFRA	Risk Assessment: Use of composting to dispose of catering waste and animal by-products	http://www.defra.gov.uk/animalh/by-prods/cater/comprisk.htm
2002	DEFRA	Project Profile	
2002	DEFRA	Risk Assessment: Use of composting and biogas treatment to dispose of catering waste containing meat	http://www.defra.gov.uk/animalh/by-prods/publicat/report5.pdf
2002	DEFRA	Executive summary to risk assessment	http://www.defra.gov.uk/animalh/by-prods/publicat/execsum.pdf
2002	DEFRA	Report on meeting of experts panel to discuss risk assessment	http://www.defra.gov.uk/animalh/by-prods/publicat/exppan.pdf
2002	DEFRA	Municipal Waste Management Statistics 2000/01	http://www.defra.gov.uk/environment/statistics/des/waste/bulletin/index.htm
2002	EA	Application for a Waste Management (site) Licence	http://www.environment-agency.gov.uk/commondata/105385/wml1v011.pdf?lang=_e

Table 1c - UK Legislation , regulations and policy

Date	Organisation	Item	Location
2002	EA	Waste Management Licenses: Library of License Conditions	http://www.environment-agency.gov.uk/commondata/105385/130224
2002	EA	Waste Management Licences: Working Plan Guidance and Specification	http://www.environment-agency.gov.uk/commondata/105385/130229
2002	EA	Guidance to Agency officers on the provision of technically competent management (multiple sites) at licensed waste management facilities	http://www.environment-agency.gov.uk/commondata/105385/techcom
May 2002	EA	Consultation response to 'Technical guidance on composting operations'	http://www.environment-agency.gov.uk/commondata/105385/commentsweb.pdf
7 June	EA	EA position regarding composting (home composting licensing scare)	http://www.environment-agency.gov.uk/aboutus/275292/234805/237584/focus/300604?lang=e&region=&projectstatus=&theme=&subject=&searchfor=composting&topic=&area=&month=
