



A whirlwind tour of issues relating to household waste and composting

The figures

In the UK about 29.3 million tonnes of domestic rubbish is produced each year.

Over 60% of this is biodegradable, with an average of 38% made up of food waste (such as vegetable peelings, tea bags and food scraps) and other organic materials (such as paper and cardboard).



In 2001-2002, 78% of the UK's domestic waste ended up in landfill sites.

Between 50kg and 125kg of biodegradable garden waste is generated per person each year in the UK.

The issues

Compost forms as a result of the natural breakdown of organic material derived from living animals and plants.

Composting is an aerobic process (i.e. it uses oxygen) performed by the bacteria, fungi, insects and animals which inhabit soil.

Micro-organisms convert the material into carbon dioxide, water vapour and a stable residue, compost.

Composting is nature's own and oldest method of waste disposal and soil fertilisation. However, when organic materials are buried in landfill sites they are deprived of oxygen and they decompose anaerobically, generating methane and a potentially hazardous liquid called leachate. The organic materials within a landfill are the main source of methane, a greenhouse gas which causes 20 times as much global warming as CFCs.

Compost is valuable as

- soil fertiliser
- mulch
- soil conditioner, improving soil structure in both clay and sandy soils
- it reduces soil erosion and stops desertification
- It can also be used in 'bioremediation' to restore contaminated soils

The politics

An EC directive, known as the Landfill Directive (1999/31/EC) aims to reduce methane emissions from landfill by phasing out the landfilling of biodegradable waste. A draft UK strategy aims to reduce biodegradable waste entering landfill to 75% of 1995 levels by 2010.

Concerns following disease outbreaks such as Foot and Mouth have led to the introduction of tighter controls on commercial composting operations.

The solutions

Compost your organic waste, either at home in your garden, or centrally through kerbside collection schemes or a civic amenity site.



For those without the space for a compost heap, a worm composting bin is an alternative for recycling your kitchen waste. Worm compost is five times richer than most fertile soil, and a worm bin can even be kept indoors.

Take action

Set up your own compost heap and see how quickly your micro-army make it their home and get to work turning your waste into compost. You will need to get the right balance between the nitrogen-rich food based materials, and the high carbon materials such as straw and leaves. Add all your organic waste to your compost system. Remember, that items such as cardboard and paper can be added to the composting mix, and they will provide much needed carbon to nitrogen rich kitchen waste

Use compost in your gardening wherever possible. However, if you do buy soil improver rather than making your own, ensure that you avoid peat based composts, as the peat is often taken from fragile wetland ecosystems. Alternatively, ask your local civic amenity site for a source of recycled compost or soil conditioner.

For more information on how to make compost visit the Henry Doubleday Research Association www.hdra.org.uk and the Composting Association www.compost.org.uk



Compost time line

Composting is an excellent way to recycle your old fruit and vegetable waste. Did you know there are all sorts of other materials that can be composted too? And, that different materials take different amounts of time to break down?

In teams, have a go at putting the cards printed below into a compost timeline which shows how long it takes for different materials to decay in your compost bin. Use the phrases on the bottom of the cards to help you line them up in the correct order.

Put the fastest material to decay at one end and the slowest at the other! If you like you can make a giant cardboard worm to put the cards on. Divide the worm into ten segments and at the head write "fastest to decay", and at the tail write "slowest to decay".

You will need

- a set of compost timeline cards for each group
- samples of each material to accompany the timeline cards (optional)
- giant cardboard worm for each group (optional)

ANSWERS

(Fastest) grass > young weeds > potato peelings > tea bags > nettles > thistles > autumn leaves > hedge clippings > tree branches > cardboard (slowest).

tree branches

tree branches are faster than cardboard, but slower than autumn leaves

cardboard

cardboard is the slowest

grass

grass is faster than potato peelings

potato peelings

potato peelings are slower than young weeds but faster than nettles

thistles

thistles are slower than both nettles and tea bags

teabags

tea bags are slower than potato peelings but faster than both nettles and thistles

nettles

nettles are faster than both thistles and autumn leaves, but not as fast as potato peelings

young weeds

young weeds are slower than grass, but faster than tea bags

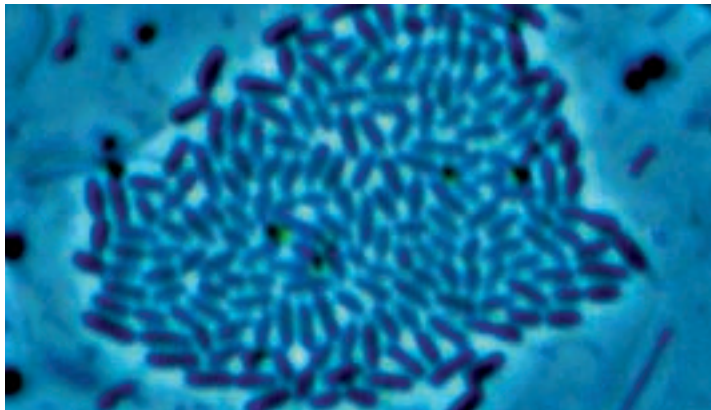
autumn leaves

autumn leaves are found fourth from bottom and are slower than thistles

hedge clippings

hedge clippings are not as fast as autumn leaves but faster than tree branches

Know your compost



How nitrifying bacteria, one of the organisms that plays an important role in composting, looks under the microscope

Compost is organic material that has been biologically broken down (or **biodegraded**) by micro organisms such as bacteria and fungi. Without bacteria, food and green waste would take much longer to breakdown into compost. Eventually, healthy bacteria will change the organic material into something that looks and smells like soil but is actually called **humus**. The humus adds vital nutrients to the soil and helps plants to grow. To keep bacteria growing happily and staying healthy, they need the right conditions.

- Shredding the organic material that is being composted increases the **surface area** that is exposed to the bacteria. This means the bacteria have more to feed on and work quicker.
- The bacteria in compost require **aerobic** conditions. In other words, they need oxygen to thrive. That's why it's important to keep a compost heap loosely packed so air can circulate. It's also important to introduce more oxygen into the compost heap by turning all the food and green waste. At home, compost heaps should be turned every 6 months, but large industrial compost heaps are turned every 12 to 14 weeks.
- **Carbon dioxide** is produced as a by-product of the composting process. Turning the compost also helps to let carbon dioxide out which otherwise would start to poison the bacteria.
- The other essential ingredient for compost bacteria is water. Ideally, the organic material will be slightly moist. However, should the compost become waterlogged the bacteria will not be able to obtain the necessary oxygen.

- Compost bacteria are **thermophilic** which means they need warm conditions to live. As bacteria get busy eating the food and green waste they also create lots of heat of their own. It can reach 75 C inside a compost heap and you may see steam rising as water evaporates. These high temperatures are also essential to kill harmful bacteria which may be present in the compost, such as Salmonella which causes food poisoning.



- Bacteria need a healthy balanced diet just like us. They need chemicals from food to use for growth, movement, making energy and reproduction. Bacteria need **carbon** from woody things like twigs and paper, and **nitrogen** from green things like sprouts and dead flowers.

During the winter, a young fox warms itself on a commercial compost heap in Essex

Commercial composting



Commercial composting uses special machines to turn the compost, allowing oxygen in, and carbon dioxide out.

Industrial scale production of compost, often called **commercial composting**, uses garden and kitchen waste from kerbside recycling schemes or civic amenity sites. This organic material is often referred to as the **feedstock**. The most common industrial composting system is a large scale version of a garden compost heap. The compost is often arranged in long triangular shaped piles called **windrows**. The compost is turned by specially designed machines, or has air blown in through pipes laid underneath the compost. Other compost systems used closed vessels to contain the compost which allow the temperature and moisture levels to be controlled precisely. Industrially produced humus is often bagged and sold in garden centres as peat replacement. This reduces the **environmental impact** of removing peat from fragile swamp and bog ecosystems.

Lifecycle of a worm - nature's great recyclers

Worms are one of the most important creatures that help in the decomposition of organic matter in the soil. An earthworm eats dead leaves and other organic matter. The remains of an earthworm's food passes along its body and are pushed out to form a worm cast or worm poo! Worm casts are full of nutrients which enrich the soil. Their burrows also help to aerate the soil and let water drain away.

The earthworm is one of the most common worms. It has a moist, brown skin and can be up to 30 centimetres long. Its body has many sections called segments. These segments have tiny hairs called bristles that help the worm to grip the ground. It does not have any legs but moves through the soil by stretching the front half of the body forward and then pulling the tail end up towards the front.

Worms are hermaphrodites. This means that each worm has both male and female reproductive organs. However, two worms are still needed in order for them to reproduce as they cannot self-fertilise.

Worms mate when the weather is warm and damp. The two worms lie next to one another and wrap themselves together with slime. They may stay close like this for several hours.

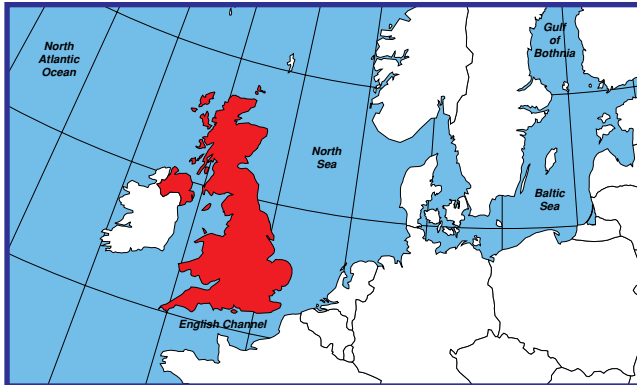
After mating, the saddle in the middle of each worm makes a sticky belt of mucus. Worms lay about 20 eggs inside this sticky belt. When ready to let the eggs hatch, the worm wriggles out of the saddle and leaves it in the soil. The saddle then seals up and makes a hard cocoon. The worms' eggs take several weeks or even months to hatch from the cocoon.



The young earthworms are about as long as a thumbnail, are whiter than the adults and have no saddles. It takes about 18 months for a young worm to grow up and lay eggs of its own. Amazingly, earthworms can live for up to 10 years or more.



Focus on the United Kingdom



Location Northern Europe
Population 59 200 000 approx (2002)
Capital London

Staple diet: Britain no longer has a staple diet. The wide availability of dishes from every corner of the globe has introduced such a variety of foods that the average consumer has considerable choice. According to the British Nutrition Foundation, the food available to us provides us with more than all the necessary nutrients for our needs.

Malnutrition: For all the volume of food consumed, statistics show malnutrition to be widespread. For example, children eat less than half of the recommended five portions of fruit and vegetables a day. In an average week, one in five 4-18 year olds eat no fruit at all. In contrast, intakes of fatty and sugary foods are significantly above recommended guidelines.

Poverty: According to the National Food Alliance, 13 million people in the UK are living in food poverty i.e. they are unable to afford to eat a balanced diet

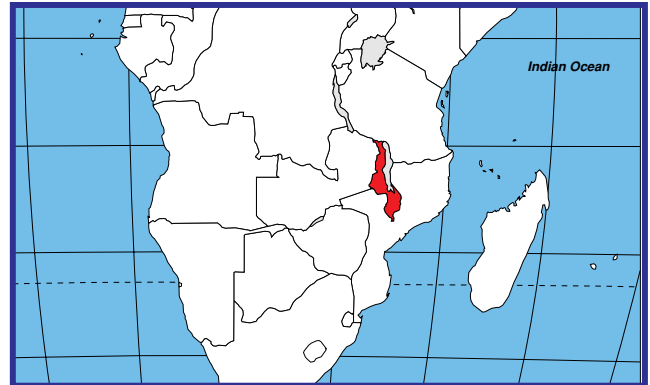
Where do the leftovers go? With this abundance of food on the shelves, what happens to the food we don't buy? Britain throws away up to 500,000 tonnes of food each year worth an estimated £400m. It costs a further £50m to dispose of and this cost will rise because of landfill tax increases. 3000 tonnes of food is given to charities or local authorities to redistribute. It is estimated that 20% of food in the commercial sector (shops, restaurants etc) is thrown away.

Of the 20% of fresh fruit and vegetable waste Britain's houses could compost, only 2.6% is composted.



Source: British Nutrition Foundation; National Food Alliance; Sustainweb Food Poverty Project.

Focus on Malawi



Location Southeast Africa
Population 9 900 000 approx (1998)
Capital Lilongwe

Staple diet: Malawi's staple diet is Nsima – white maize meal mixed with water and butter or margarine. This is usually served with vegetables or occasionally, fish or meat. Other foods include Mbatata biscuits made from sweet potato, banana bread, banana fritters and peanut cookies.

Malnutrition: According to studies malnutrition rates are not high in those areas where there is enough food. However, a recent survey showed that 27% of children under 5 are underweight.

Poverty: Malawi was hit by a devastating drought in 2002. The famine affected 3 million people. The situation was worsened by the loss of national grain reserves and other political factors. Many families have lost their key breadwinner and skilled farm labourers due to illness and deaths from the AIDS epidemic. More than one in seven of the population of Malawi have HIV.

Where do the leftovers go? Malawi does not have a significant amount of commercial food waste. In rural areas, the only organic waste is vegetable peelings. This is buried and left to decompose, then dug up and used as compost. A recent delegation of Malawian visitors to a composting facility in Norfolk commented that the masses of wood being chipped for composting would have been very efficiently reused for furniture in Malawi, with smaller pieces being used for firewood for cooking.



Source: The National Statistical Office of Malawi; The Lonely Planet Guide to Malawi; The Africa Guide; Malawi Here (www.malawihere.com); Nutrition of Young Children and Mothers in Malawi (www.nso.malawi.net/data_on_line/demography/dhs/nutrition_chart-book.pdf)



Waste Online

This informative website provides information on all waste issues, including composting. The Waste Online information sheets provides a comprehensive view of composting in the UK, from where to buy a worm bin, to EU legislation affecting composting targets. The online database also includes many other documents on organic waste.

www.wasteonline.org.uk



The Wildlife Trusts

The UK's leading conservation charity exclusively dedicated to wildlife, including the conservation of peat bogs. Just enter 'peat' into the site search engine to find out about some of the stunning wildlife under threat by those lazy gardeners who insist on buying peat based soil improvers rather than good old compost.

www.wildlifetrusts.org

Get Composting

For everything you needed to know about home composting.

www.getcomposting.com

Wildlife Watch

Compost heaps should be teeming with life - especially minibeasts and fungi that are so important in the composting process. This website looks at composting in detail and celebrates the biodiversity of the compost heap.

www.wildlifewatch.org.uk/helpingwildlife/composting.php



WORMERY SPECIFIC WEB SITES

Wiggly Wigglers

Wiggly Wigglers are suppliers of compost bins, wormeries, worms and books. They offer friendly help and advice on all aspects of natural gardening, conservation and recycling.

www.wigglywigglers.co.uk



Ollie Recycles

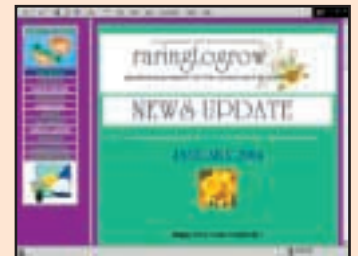
A pupil friendly web site with information on wormeries, compost and the 3Rs.

www.ollierecycles.com/uk/html/reuse.html

Raring to Grow

Gardening projects for schools including worms, wormeries and composting. This jolly and clearly laid out website will push your compost enthusiasm levels sky high!

www.raringtogrow.com/worms.htm



COMPOSTING SPECIFIC WEB SITES

The Composting Association

The Composting Association is one of the leading organisations promoting good practice in composting and the use of composted materials. Their website has information on all aspects of composting and about its environmental and economic benefits. There is also information on commercial composting schemes.

www.compost.org.uk

Henry Doubleday Research Association (HDRA)

This website is guaranteed to get you gardening! HDRA is an environmental organisation which focuses on organic horticulture and related topics such as composting and organic waste recycling. The Schools Organic Network is an excellent part of the website with resources for teachers and children, including advice, facts and figures, activities, National Curriculum links and teaching advice. There are even lovely pictures of the HDRA gardens to keep you happy on a rainy day.

www.hdra.org.uk



Wild Kids

This website includes teachers' notes on composting and other inspiring ideas for turning your garden into a sanctuary for wildlife.

www.wildkids.org.uk/teachers/notes1.htm

Cornell Composting

A very detailed American website to help schools with composting. There are sections including ideas for projects, a compost quiz, and weird and unusual composting stories.

www.compost.css.cornell.edu/Composting_homepage.html

Its out there on the internet - composting birds!

The amazing Brush Turkey that lives in Australia makes a compost heap to keep its eggs in. The heaps are made from vegetable matter that the male turkey scrapes into a pile using its powerful feet. The heat generated by decomposition within the compost heap keeps the Brush Turkey's eggs nice and warm while they are incubating.

Amazingly, the Brush Turkey tests the temperature of the nest using its tongue and will add or remove material depending on whether the nest is too hot or too cold. The nest also provides ammunition for the turkey against predators. Rangers have spotted the Brush Turkey kicking twigs from the nest into the faces of predatory monitor lizards looking to steal eggs.

For more details visit www.scz.org/animals/t/bturkey.html

