

Managing waste and rubbish

This activity would follow on well from Disposable cups and the environment or making polylactic acid. If students have already done one or both of these other activities, they will have been introduced to the idea that landfill is a problem. They should also already be aware that waste does not rot in a landfill site so as long as we dump everything in a hole in the ground it does not matter much what the waste is made of, the effect remains the same.

Managing waste and rubbish introduces composting as a way of managing rubbish by turning it into a useful product – not just garden waste but the majority of biodegradable waste.

The activity focuses on two projects, one in Dorset in the UK and the other in the German town of Kassel.

Full details of the Kassel project can be found at

http://www.modellprojektkassel.de/eng/downloads/BUW_Kassel_Orbit_Text_2003.pdf

(accessed December 2005). More able students should be able to read and understand this report but it is a very long document (10 pages). If access to the internet or to computers for a whole class is difficult then the web pages mentioned in the student worksheet could be printed out and photocopied prior to the lesson. It is not necessary for students to do an internet search.

Answers to questions

1. Most rubbish in Britain ends up in landfill sites. There not much happens to it and it can remain unchanged for decades.
2. Answers could include the points listed in Table 1. There are other possible answers too – this list is not exhaustive.

Advantages	Disadvantages
Simple and quick. No sorting required as all waste goes in together.	Takes up a large amount of space and is ugly.
	The waste does not go away and does not decompose much – it just sits there using up space.
	It is wasteful – the Earth only has limited resources and they are all ending up buried in landfill sites.
	Toxins can leach out of the rubbish into water supplies.
	The government is taxing landfill now and fining local authorities who use it too much.
	Gases such as methane can build up in the rubbish.

Table 1 Advantages and disadvantages of landfill

3. Answers could include the points in Table 2.

Advantages	Disadvantages
Reduces the amount of waste going into landfill.	Not all waste can be composted.
You get a useful product out at the end.	If it is not done properly the compost heap can smell.
Can also reduce the amount of peat bought by people for their gardens. Peat is a limited natural resource.	Not all homes have a garden with enough space for a compost heap (this problem and the point above could be solved by having a municipal compost heap).

Table 2 Advantages and disadvantages of composting

4. This question asks for students' opinions so answers will vary. Few people compost their waste because:
- It takes effort and it is easier to throw things in the bin and forget about them.
 - People do not know about the advantages of composting or the disadvantages of landfill.
 - There are no (or limited) municipal composting facilities for domestic rubbish in the UK.
 - People still do not know which wastes are biodegradable.
5. Yes, you can use the compost to help plants grow.
6. The ordinary plastics in the compostable waste would not break down and would contaminate the final compost. The biodegradable plastics would mix in with the ordinary plastics being recycled without causing major problems. The task of matching the statements about the experiment is intended to make students think about how an experiment is carried out. They may initially think the Kassel project is not really like a science experiment because it is about people's behaviour and attitudes. This exercise should help them to realise that it is not so very different from an experiment conducted in the laboratory.

The scientists carried out their experiment only in the town of Kassel and not across the whole country.	Using a small sample gives you enough data to work with and is less expensive than trying to do the experiment on a very large scale.
They told people how to tell biodegradable and ordinary plastics apart.	This made it possible to collect biodegradable polymers with other biodegradable waste.
They tested the compost produced using the biodegradable polymers to see if plants would grow in it.	If plants were poisoned by the compost or could not grow in it then it would be useless and there would be little point in making it.
They analysed the waste people put into the different waste bins.	They wanted to see if the waste was being separated correctly.
They chose a town that already had a separate 'compostable waste' bin.	They were trying to find out if people could separate the plastics – not if they could separate all compostable waste.
They put a clear logo on the disposable plastics.	This made it easy to tell the plastics apart so people could do it even if they were in a hurry.

Table 3 Statements about the experiment aligned with the correct explanations

You may wish to discuss the questions in the To think about section with students before they write their report. The report could be set for homework or used as another follow-up activity. Students should focus on possible ways for the county council to reduce landfill but wherever possible should also highlight the difficulties that could arise.

The Kassel project

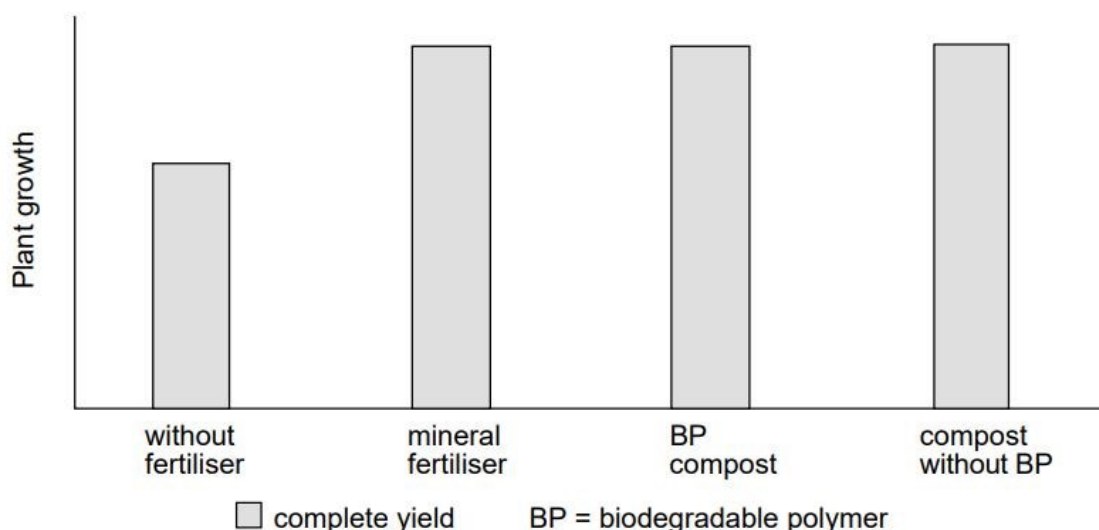
Some scientists from the Department of Waste Management at Weimar University in Germany did some experiments to see if consumers would be able to separate compostable plastics from ordinary plastics. They decided to do their experiment in the town of Kassel.

People in Kassel already had separate bins for recycling and for compostable waste. The scientists got shops in Kassel to use carrier bags and packaging made of biodegradable plastics. These items were labelled with a clear logo. An advertising campaign was run to ask people to put these plastics into a separate bin for compostable waste. The scientists analysed waste bins from different areas and looked to see:

- If people put ordinary plastic into the bin for compostable waste
- If people put the biodegradable plastic into the general recycling or waste bin.

They found that people did put some biodegradable plastic into general recycling bins, but not enough to be a problem. They did not find much ordinary plastic in the bins for compostable waste but suggested that someone at the recycling plant should check to make sure no ordinary plastic went into the composters.

The scientists also tested the compost they made with the biodegradable plastics to see if plants could grow in it.



4. Look at the chart. Can you use the compost to help plants grow?

5. Why is it more of a problem if you have ordinary plastics mixed in with biodegradable waste than if biodegradable plastics get mixed in with ordinary waste?

Why did the scientists conduct their experiment in the way they did? Are their results helpful?

Match the statements below about what the scientists did and what they observed with the correct explanations.

What they did

The scientists carried out their experiment only in the town of Kassel and not across the whole country.

They analysed the waste people put into the different waste bins.

They told people how to tell biodegradable and ordinary plastics apart. This made it easy to tell the plastics apart so people could do it even if they were in a hurry.

They tested the compost produced using the biodegradable polymers to see if plants would grow in it.

They chose a town that already had a separate 'compostable waste' bin.

They put a clear logo on the disposable plastics.

Explanation

They were trying to find out if people could separate the plastics – not if they could separate all compostable waste.

If plants were poisoned by the compost or could not grow in it then it would be useless and there would be little point in making it.

Using a small sample gives you enough data to work with and is less expensive than trying to do the experiment on a very large scale.

They wanted to see if the waste was being separated correctly.

This made it possible to collect biodegradable polymers with other biodegradable waste.

This made it easy to tell the plastics apart so people could do it even if they were in a hurry.

To think about

Could a system like the one trialled in Kassel be used in the UK? What would be the advantages, disadvantages and problems with such a system? Should we try it? What additional problems might we have in the UK that they did not have in Germany? Would it be worth it? If you had to separate your waste at home into four different easily manageable types, what would they be and why?

Imagine that you are a scientist who specialises in waste management. The county council has asked you to help them reduce the amount of waste going into landfill. If they do not cut back the government will fine them. Write a short report for them describing some ways they could achieve their goals.