Wheat
Wheat is the 2nd largest crop grown in the world; 730 million tonnes are grown world wide. It is the largest crop grown in the UK.

Oil seed rape
2.3 million tonnes of oil seed rape are grown in the UK each year. The flowers are popular with bees; it produces a pale set honey.

Bread, pasta, cakes...
Wheat products, along with potatoes, are a staple food in the UK. This means that they make up a large part of the diet of many people.

Vegetable oil
Oil is used as an ingredient in a wide range of foods such as cakes, biscuits and dressings. It is also used for cooking foods.

Straw
The UK produces an estimated 6 million tonnes of wheat straw a year. This has many uses but is an underused resource.

Rape straw
The straw has many uses including for animal bedding. However, there is potential to obtain more profit from this resource.

Bio-board
Bio-board is strong and versatile building product which is more sustainable than chopping down trees. It also has no harmful chemicals which are found in other boards.

Energy
Straw can be burned in specially designed power stations to produce a renewable source of energy. This means that less fossil fuels need to be used.
In Brazil the price of oranges has fallen dramatically (60% between the years 2007 and 2013). This makes it difficult for orange farmers to stay in business.

Over 5 million tonnes of potatoes were grown in the UK in 2013. 52% of these in the East of England and Yorkshire.

Brazil is the largest exporter of orange juice in the world. In 2013 they produced 1.12 million tonnes of orange juice.

Brazil produces over 7 million tonnes of orange peel a year. This is expensive to dispose of.

Limonene is a chemical with many uses. It can be used to flavour food and add scent to cleaning products. It can be used instead of chemicals made from oil.

In the UK we eat an average of 100kg of potatoes per person per year!

In the UK 359,000 tonnes of potato is wasted every year. This includes potato peel left over from making chips. All of this waste could be used.

‘Bio plastic’ takes less energy and fossil fuel to make than traditional plastic. The process also produces less greenhouse gasses.
Maize
Maize is increasingly grown in the UK. It grows very tall and is used to make temporary ‘maize mazes’.

Cocoa beans
Cocoa beans grow in hot humid conditions and most cocoa is grown near the equator. It takes a whole year’s crop from one tree to make half a kilo of chocolate.

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Chocolate
The UK is one of the world’s largest consumers of chocolate. We consume an average of 11kg of chocolate per person per year in the UK.

Cocoa bean husk
The beans are contained within a thick husk, or shell, which is not used in the production of chocolate.

Packaging
Coco shells can be ground into a powder and become one of the ingredients of packaging. Researchers are also investigating ways to use them as a source of food.
1. **Coffee beans**
   - **Coffee beans**
   - Coffee is grown in countries near to the equator. The coffee berries have to be picked by hand and the beans roasted before they are ready to use.

2. **Coffee beans**
   - **Coffee**
   - Coffee is one of the most popular drinks in the world. The flavour of the drink can be affected by the variety of bean used and for how long it has been roasted.

3. **Coffee beans**
   - **Coffee grounds**
   - The UK produces 500,000 tonnes of coffee grounds per year. If alternative uses are not found for them this would lead to a lot of waste in landfill sites.

4. **Coffee beans**
   - **Oils**
   - The oils made from spent coffee ground can be used to make fuels and soap. This is an important alternative to palm oil and so can help protect the rain forest.

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1. **Food crops**
   - **Food crops**
   - We use a wide range of crops in this country both grown and raised in this country and imported from around the world.

2. **Food crops**
   - **Food**
   - We eat both unprocessed materials (such as apples) and foods that have been made following a range of processes such as cooking or fermentation.

3. **Food crops**
   - **Food waste**
   - In Britain the average family throws out the equivalent of 24 meals a month. 4.2 million tonnes of food is wasted in this country every year. This includes food that is mouldy and vegetable peel.

4. **Food crops**
   - **Fuels and fertiliser**
   - Some companies specialise in recovering as much of this waste as possible. Some of it is used to enrich the soil and the rest is burned to create energy.
Peas

Pea plants
Peas grow in pods on climbing plants which can grow to over a meter in height. The UK are the largest producer of peas for freezing.

Peas
Peas are used in both animal and human feed and are a good source of protein. They can be served as a side vegetable, in stews or as mushy peas.

Pea vines
Peas are an annual plant, so once the peas have been harvested the vine on which they have been growing dies. The vine represents nearly half of the total weight of the crop.

Thickening agent
The pea vines can be processed to extract a substance which adds valuable nutrition to food as well as thickening sauces and soups to make them more appetising.

Fossil fuel

Fossil fuel

Fossil fuel

Fossil fuel

Unlike the other raw materials described here fossil fuels such as coal and oil, cannot be replaced. Whatever scientists do their production inevitably leads to pollution.
### Activity Sheet 12: Science Solutions Overview

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Product</th>
<th>Waste</th>
<th>Green Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>orange</td>
<td>orange juice</td>
<td>orange peel</td>
<td>limonene</td>
</tr>
<tr>
<td>potato</td>
<td>chips, roasted, mash</td>
<td>potato peel</td>
<td>plastic</td>
</tr>
<tr>
<td>wheat</td>
<td>bread, cakes, pasta</td>
<td>straw</td>
<td>bio board</td>
</tr>
<tr>
<td>oil seed rape</td>
<td>vegetable oil</td>
<td>rape straw</td>
<td>energy</td>
</tr>
<tr>
<td>maize</td>
<td>corn oil, sweetcorn, pop corn</td>
<td>maize straw</td>
<td>eco wax</td>
</tr>
<tr>
<td>cocoa beans</td>
<td>chocolate</td>
<td>cocoa bean husk</td>
<td>packaging</td>
</tr>
<tr>
<td>coffee beans</td>
<td>coffee</td>
<td>coffee grounds</td>
<td>oils (used in fuels and soap)</td>
</tr>
<tr>
<td>food crops</td>
<td>food</td>
<td>food waste</td>
<td>fuels and fertiliser</td>
</tr>
<tr>
<td>pea plants</td>
<td>peas</td>
<td>vines</td>
<td>thickening agent</td>
</tr>
</tbody>
</table>