



National 5 Biology

Unit 3 Life on Earth

3.5 Food production



Name _____

Class _____

Teacher _____

Food Production

The size of the human population places demand for resources on the planet. Increasing food supply requires the use of various different methods, including; fertilisers and pesticides, biological control and genetically modified (GM) crops.

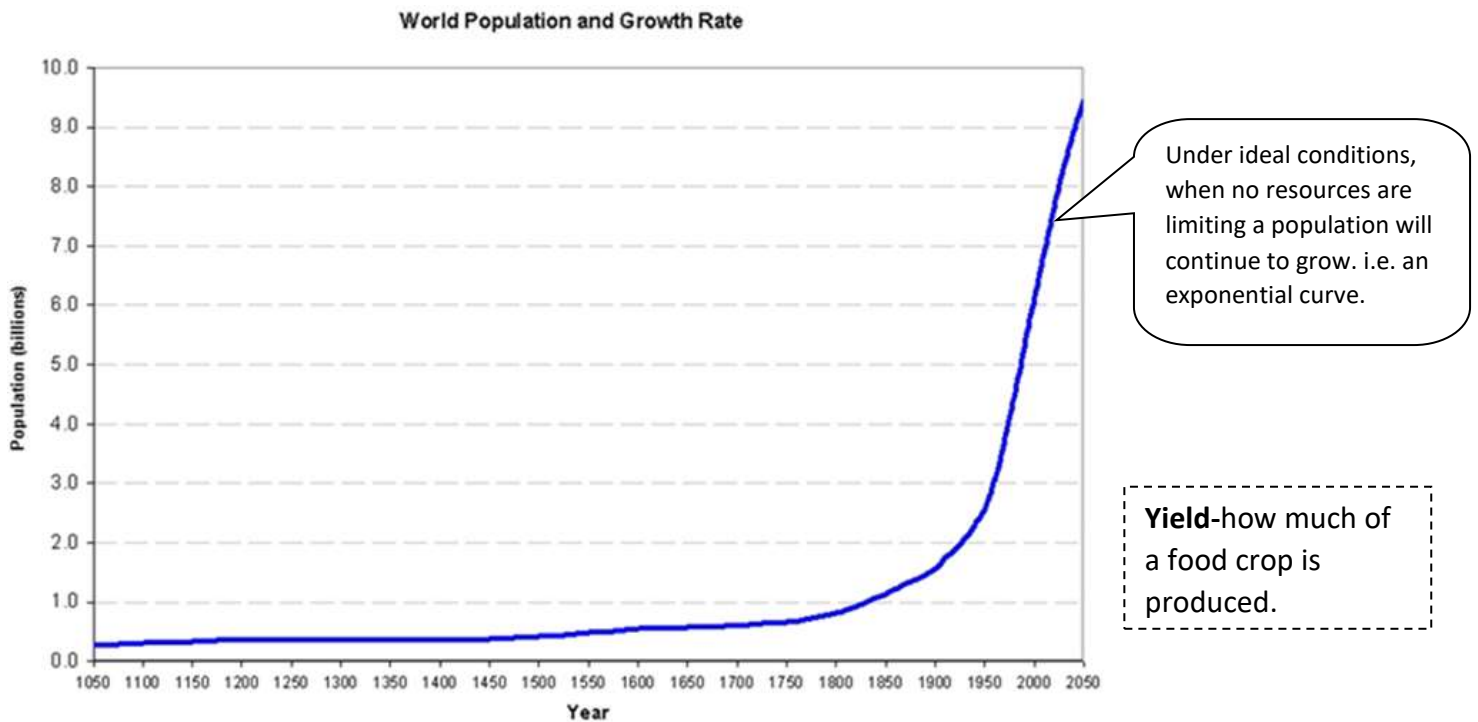
Learning intention

- To find out about the impact of the human population on food production.

Human population



The human population is continuing to _____ as shown by the graph below.



The increasing human population requires an _____ food yield.

To provide enough food to meet the needs of increasing population, methods of increasing food yield are needed. _____ is the main way in which humans guarantee food and much effort has gone into increasing crop yield.

Methods of increasing food yield include:

Intensive farming

This usually involves growing a single crop species like wheat in enormous fields. This allows efficient planting, crop treatments and harvesting.

Fertilisers and pesticides

Fertilisers provide _____ such as nitrates which increase crop yield. Plants and animals which _____ crop yield can be killed by pesticides.

Learning intention

- To find out about the importance of nitrates.

Nitrates

Plants and animals cannot live without nitrogen. It is an important part of many cells and molecules such as nucleic acids, amino acids, and proteins.

Although almost 80% of the air is nitrogen gas (N_2) most organisms cannot use nitrogen in this form. Plants absorb their nitrogen as _____ dissolved in soil water. The nitrates are used to produce _____ which are synthesised into plant proteins.

Animals consume plants (or animals that have fed on plants) to obtain _____ for protein synthesis.

Fertilisers can be added to the soil to increase the nitrate concentration of the soil and to increase crop _____.

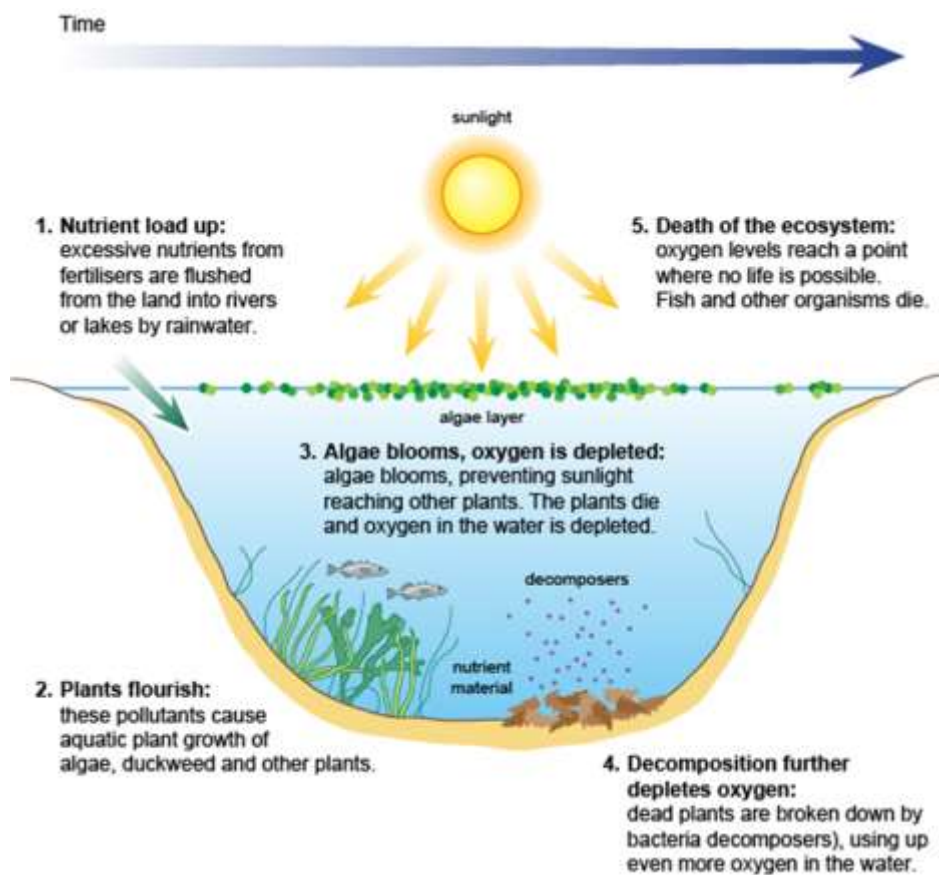
Learning intention

- To find out about the problems associated with the use of fertilisers.

Fertilisers

Fertilisers contain _____ that aid plant growth. Fertilisers are soluble, so dissolve in water. When fertilisers are used on crop plants are dissolved by rain water.

Following heavy rainfall fertiliser can leach away from fields into the fresh water of rivers, lochs and ponds. This adds extra, unwanted _____ to waterways.



The presence of nitrates in the water leads to an increase in the growth of algae (that already live in the water). This can then lead to an algal _____; an abundance of algal cells which form a thick _____ on the surface of the water. Algal blooms reduce light levels, killing aquatic plants.

When the nutrients run out and there is less light for _____ the algae begin to _____. Dead plants and dead algae become food for _____. The bacteria _____, so increase greatly in number and use up large quantities of oxygen. This _____ the oxygen available to other organisms and those that cannot survive in low oxygen concentrations will die, _____ the biodiversity. Genetically modified (GM) crops can be used to reduce the use of fertilisers.

Learning intention

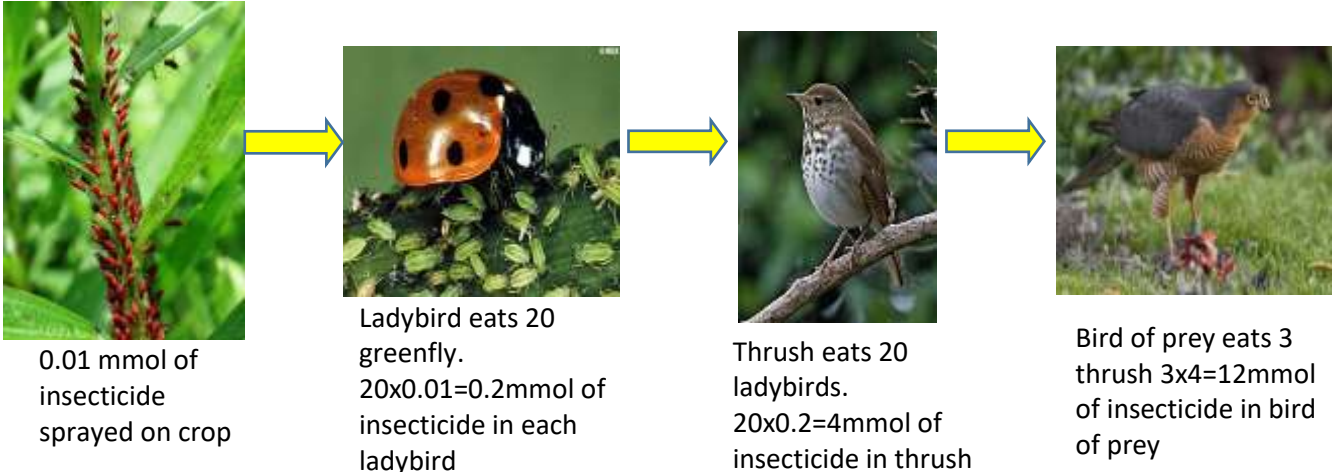
- To find out about the problems associated with the use of pesticides.



Pesticides

Pesticides are chemicals that are used to kill pests that feed on crop plants. They are usually applied to crops by spraying. Preventing damage to crops ensures a good crop yield.

However, pesticides sprayed onto crops can _____ in the bodies of organisms over time. As they are passed along food chains toxicity _____ and can reach lethal levels killing top predators. This is called _____.



Learning intention

- To find out about the alternatives to fertilisers and pesticides.



Biological control- An alternative to pesticides

To avoid the effects of bioaccumulation farmers can use biological control.

This involves using organisms such as natural _____ or parasites to control pest numbers. This can work well in enclosed situations such as glasshouses but is more difficult in open _____. Biological pest control works particularly well when the pest has been



introduced to the ecosystem and has _____ natural predators. For example ladybirds can be introduced to feed on _____ (greenfly) that are a pest to crop plants.



GM crops- An alternative to fertilisers

Genetically modified or genetically engineered refers to organisms whose

_____ information has been altered, usually by the addition of a useful _____ from another _____.

Common GM foods include tomatoes, maize, rice, cabbage, potato and soy bean. Crop plants can have genes added that will make them grow _____, produce more food and or



have insect resistance. This allows an increase in crop yield without the need for chemicals.



Test your knowledge

1. Explain why, unlike other animals, the human population continues to increase rapidly (2)

2. Name TWO ways in which attempts are being made to increase food yield (2)

3. Explain why fertilisers need to be added to land where crop is repeatedly grown, harvested and removed (2)

4. What events lead to the formation of an algal bloom and why does this lead to a reduction in oxygen content of the water (4)

I can:	
State that the increasing human population requires an increased food yield.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that increasing the food yield involves the use of fertilisers and pesticides.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that fertilisers provide chemicals such as nitrates which increase crop yield.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that plants and animals which reduce crop yield can be killed by pesticides.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that nitrates dissolved in soil water are absorbed into plants.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that nitrates are used to produce amino acids which are synthesised into plant proteins.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that animals consume plants or other animals to obtain amino acids for protein synthesis.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that fertilisers can be added to soil to increase the nitrate content of the soil.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that fertilisers can leach into fresh water adding excess, unwanted nitrates.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the effect of adding excess, unwanted nitrates into fresh water.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the effects of algal blooms on fresh water habitats.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Explain how bacteria affect oxygen levels in fresh water habitats.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that GM crops can be used to reduce the use of fertilisers.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that pesticides sprayed onto crops can accumulate in the bodies of organisms over time.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe how pesticides are passed along food chains causing toxicity to increase and reach lethal levels.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the use of biological control and genetically (GM) modified crops as an alternative to the use of pesticides.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>