

10 SCIENCE BIOLOGY ASSIGNMENT

GENETICALLY MODIFIED FOOD

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Name: ANSWER
Form: KEY



Teacher: ANSWER
Due date: KEY

Aim: This assignment will allow you to research information about genetically modified food.

IMPORTANT INFORMATION

Plagiarism

- This assignment is to be done individually, not with a partner.
- You must write in your own words not copy sentences word for word from another student or another source.
- Plagiarising = instant zero on assignment and you will have to re-do it.

Referencing

- You must reference your information.
- Include a minimum of 2 references.
- Use the referencing style below.

How to reference a web site:

Rice, C. (2013). Cute cats could be key to learning new languages. Retrieved February 8, 2014 from www.bbc.co.uk/news/technology-25103362

Author's last name, first letter of first name. (Year of publication). Title of website. Date you retrieved the information, website

Assessment policy

Have sick note/legitimate reason from parent = new negotiated due date.
Assignment not submitted on due date and no sick note from parents = -20% mark
Assignment not submitted on new negotiated due date = -40% mark

+ Letter home to parents

+ Must attend academic completion to complete assignment

OR

Submit assignment to student services before academic completion date and academic completion not necessary.

Academic completion not attended = zero on assignment + Saturday detention

If you know that you cannot submit your assignment on the due date, let your teacher know BEFORE the due date (email them if you are not in school) or just email them your assignment the night before.

Genetically modified food

The Green Revolution of the 1950's increased food production by using new and improved chemicals to control weeds, insect pests and diseases. New varieties of crops and fertilisers also helped to increase food production.

The Gene Revolution of the 21st century uses genetic modification to grow crops that could produce more food with a higher nutritional value than traditional crops. The Gene Revolution also uses fewer chemicals. Scientists believe that by using gene technology they can improve a variety of crops including corn, wheat, rice, canola, chicory, squash, potato, soybean, alfalfa, cotton, banana and tomato.

Below are some of the arguments for and against the use of genetically modified (GM) food.

Arguments for the use of genetically modified crops

- GM crops are potentially more resistant to disease, can grow in less space, can provide greater yield (amount produced) and need less pesticide.
- Current agricultural methods will not be able to grow enough food to feed the 9 billion people predicted to populate the world by 2050. Genetic modification can improve crops more quickly than normal selective breeding processes.
- By adding 'toughness genes', scientists can make plants more tolerant of frost, drought and salinity (salt level). These genes can be turned 'off' and 'on' in different parts of the plant. Genetic modification is one tool that farmers can use to maintain or increase crop yields as the climate changes.
- GM foods can improve a poor diet by improving nutritionally improved foods. This should have health benefits in both developing countries and developed nations. GM plants can also deliver medicines. For example, golden rice increases the intake of vitamin A, and bananas can carry a vaccine (cure) for the disease hepatitis D.
- Genetic modification may be able to remove allergens (something that causes an allergy) from nuts. Eleven different proteins called allergens in peanuts are known to cause allergic reactions. Scientists are developing genetically modified peanuts in which the two strongest allergens are removed.
- GM organisms and food products are studied and tested more than normal foods. There is no strong evidence to suggest that approved GM foods are more dangerous than normal foods. Because of the amount of testing they undergo, they may actually be safer!
- In Australia, GM foods are regulated (controlled), ensuring that only assessed and approved GM foods enter the food supply.

Arguments against genetically modified crops

- Some people say that GM crops are not safe to eat. They feel that there has not been enough evaluation of the potential risks that could come from changing the genetic make-up of an organism. They are concerned that new allergens could be created.
- Herbicides are chemicals that are used to control weeds. Some people think that the genes for herbicide resistant could be transferred from the GM crop to weeds in the environment. This would make it more difficult to control weeds.
- Some people think that antibiotic resistance may develop in humans and farm animals that eat GM foods. This could make antibiotics less effective in treating disease.
- Some food labelling may not be good enough to alert people to GM ingredients in food.

Social and ethical concerns

- Large companies that own the patent (copyright) for the GM plants may be able to dominate (to have complete control over) the world food market by controlling the distribution of the genetically modified seeds.
- Using genes from animals in food plants may create ethical or religious problems. For example, eating genetic materials from pork in a vegetable or fruit could be a problem for some religious groups or vegetarians.
- Some people believe that genetically modifying plants and animals is 'playing God' and is unnatural. They say that genes from unrelated species should not be mixed.

Answer the questions based on the information above.

1. Compare the Green Revolution and the Gene Revolution. (2 marks)
(How were they similar to each other, how were they different to each other?)

- Both attempt to increase food production. (1)
- Green Revolution: used chemicals to control weeds, pests, and diseases.

(1) Gene Revolution: uses genetic modification to grow more productive crops using fewer chemicals.

2. A fish gene could be inserted into a tomato plant to change the plant's genes. If a vegetarian eats a tomato from that plant, are they eating fish? Discuss. (2 marks)

- DNA in your cells is manufactured from the DNA consumed in your food. A gene derived from fish DNA inserted into a tomato becomes a tomato gene. Many organisms share a substantial number of genes.

OR SIMILAR

3. Identify what you think is the strongest argument for GM foods. (1 mark)

Individual student response

4. Identify what you think is the strongest argument against GM foods. (1 mark)

Individual student response

5. Decide whether you support the continued use of GM foods in Australia and justify your decision (explain why). (3 marks)

supported or not supported (1)

Discussion (2)

You will now need to use the internet in order to research GM foods and answer the following questions.

1. In your own words, describe what genetic modification is. (1) (2 marks)

The use of modern biotechnology techniques to change the genes of an organism using genes from one organism and inserting them into another. (1)

2. List two other terms that also mean genetic modification (GM). (2 marks)

Gene manipulation, genetic engineering (1) (1)

3. What are two types of genetically modified crops grown in Australia? (2 marks)

GE Canola, Bt cotton (1) (1)

others have been trialled but not commercially grown
- GE wheat, sugarcane, grapes
pineapple, papaya, bananas

4. Currently, genetic engineering is mainly used to produce two types of crops:

Bt crops: these are genetically engineered to produce their own pesticide to kill certain insect pests.

Herbicide-tolerant crops: these are genetically engineered to resist herbicide that farmers spray on the crop to kill weeds.

Fill in the table below: choose two Bt crops and list two countries where each is grown.

(4 marks)

Name of Bt crop	Two countries where it is grown
Bt Corn/maize ①	Argentina, Bulgaria, Canada, Columbia, Germany, Spain, United States, Philippines
Bt Potato ①	Canada, United States

Bt Cotton Australia, Argentina, China, India, Indonesia

Fill in the table below: choose two herbicide tolerant crops and list two countries where each is grown.

(4 marks)

Name of herbicide-tolerant crop	Two countries where it is grown
Roundup Ready corn/optimum GAT corn ①	United States
Roundup Ready soybean/libertyLink soybeans ①	United States

Roundup alfalfa, cotton, sugarbeets, winter canola

5. Bt crops use a gene taken from a bacteria. What is the name of the bacteria?

(1 mark)

Bacillus thuringiensis

6. Bt crops produce their own pesticide to kill certain insect pests, what is the main type of pest that it kills? (1 mark)

cotton bollworm (or pink bollworm, tobacco budworm, southwestern corn borer, Colorado potato beetle)

Choose a GM crop from the following list then answer the questions.

- Corn
- Wheat
- Rice
- Canola
- Chicory
- Squash
- Potato
- Soybean
- Cotton
- Banana

1. Name of your GM crop: _____

(1 mark)

2. Find out when genetic modification of your chosen crop began.

(1 mark)

3. Describe two advantages of genetically modifying your chosen crop.

(2 marks)

1 mark for each disadvantage

4. Describe two disadvantages of genetically modifying your chosen crop.

(2 marks)

1 mark for each
disadvantage

5. List three countries where your chosen GM crop is grown.

(3 marks)

1 mark for each correct
country

6. Look at the following groups in Australia and state whether they are for growing GM crops in Australia or against growing GM crops in Australia. For each group, record a piece of evidence you found on the website that supports your answer.

(14 marks)

Group	Pro-GM or anti-GM	Evidence to support your answer
Crop Life Australia www.croplifeaustralia.org.au/	Pro-GM (1)	GM crops have helped to improve farming techniques & crop production around the world by increasing plants' resistance to diseases and pests. (1)
Biotechnology Industry Organization http://www.bio.org/	Pro-GM (1)	'quote that gives evidence' (1)
Producers Forum www.producersforum.net.au/index.htm	Pro-GM (1)	'We are driven by frustration at the attitude towards GM crops of some of the major commodity companies'. (1)
Ag Bio World http://www.agbioworld.org/	Pro-GM (1)	'quote that gives evidence' (1)
True Food Network www.truefood.org.au/index.php	Anti-GM (1)	quote that gives evidence
Golden Rice http://www.goldenrice.org/	Pro-GM (1)	quote that gives evidence (1)

(1) mark for 2 references
(0.5) each

(1) mark for referencing
correctly