

Food security and farming methods

Q1. (2018)

0 5

Read the following.

In the 1950s farmers in India could not grow enough rice to feed the rapidly increasing population.

At the International Rice Research Institute (IRRI) scientists began a selective breeding programme with 10 000 different varieties of rice plants.

In 1966 the IRRI produced a new variety called IR8 which gave a yield of up to ten times the traditional varieties. IR8 has short stems and large rice grains.

IR8 was grown by farmers all over India so people had enough to eat.

A)

0 5 . 1

The IR8 variety of rice was produced by selective breeding.

Describe the steps the scientists would have taken to produce IR8

[4 marks]

B)

0 5 . 2

The IRRI has now developed several new varieties of genetically modified (GM) rice plants.

Some people in India agree and some people disagree with GM varieties of rice being grown.

Explain why.

[4 marks]

Q2. (2018)

Biologists have discovered a way to produce oysters that have three sets of chromosomes (triploid) instead of the usual two sets (diploid).

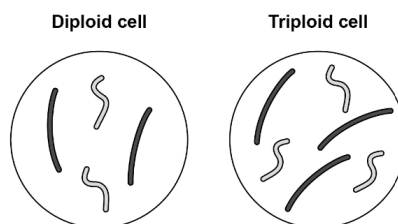
The triploid oysters cannot reproduce and so they grow more quickly.

Diploid oysters do not taste good in the reproductive season. Triploid oysters taste good all year.

Figure 5 shows the chromosomes in a diploid cell and in a triploid cell.

Only two sets of chromosomes are shown.

Figure 5



0 7 . 4

Explain why the triploid oysters grow more quickly than the diploid oysters.

[2 marks]

Q3. (2020)

0 3 . 4

Intensive farming, where a single crop is grown on a large area of land year after year, is more cost effective for farmers.

It is efficient to use fertilisers and to burn the waste so the land is ready to use the next year.

Planting a single crop reduces biodiversity.

Suggest **two** ways that this type of farming can damage the environment.

Do **not** refer to biodiversity in your answer.

[2 marks]

1 _____

2 _____

Q4. (2020)

0 3 . 5

Most of the world's production of antibiotics is used in farming.

Antibiotics are given to animals to prevent the spread of disease.

Explain how the widespread use of antibiotics in farming is a threat to human life.

[4 marks]

Q5. (2022)

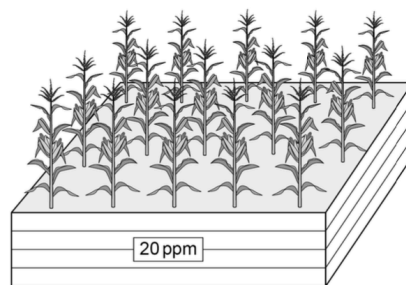
0 4

Scientists investigated the effect of soil nitrate ion concentration on the yield of corn.

This is the method used.

1. Corn plants were grown in a large box of soil.
2. The soil nitrate ion concentration in the box was kept at 0 parts per million (ppm).
3. All the corn from each plant in the box was removed and weighed.
4. The mean mass of corn per plant was calculated.
5. Steps 1 to 4 were repeated for boxes containing soil with different concentrations of nitrate ions.

Figure 2 shows the corn plants in the box with a 20 ppm soil nitrate ion concentration.

Figure 2

A)

0 4 . 1

Give **two** variables the scientists should have controlled in this investigation.

[2 marks]

1 _____

2 _____

B)

The scientists carried out a valid investigation.

Table 1 shows the scientists' results.

Table 1

Soil nitrate ion concentration in ppm	Mean mass of corn per plant in grams
0	122
10	190
20	256
30	268
40	240
50	184

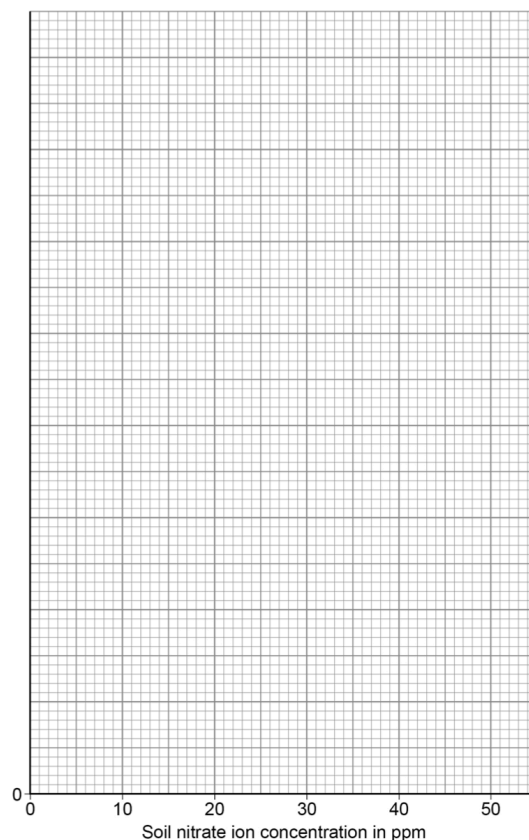
0 4 . 2 Complete **Figure 3**.

You should:

- label the y-axis
- use a suitable scale for the y-axis
- plot the data from **Table 1**
- draw a line of best fit.

[4 marks]

Figure 3



C)

0 4 . 3 Describe the relationship between soil nitrate ion concentration and the mean mass of corn per plant.

Use data from **Table 1** in your answer.

[2 marks]

Biotechnology in food production (fermenters, GM crops, mycoprotein basics)

Q1. (2024)

0 2 . 5

Scientists have collected and stored seeds from species in the same genus as potatoes.

In the future, these seeds may be used for genetic modification of potato plants.

Genetically modified potato plants could help supply food to the human population as the climate changes.

Explain why genetic modification of crop plants may be important for the human population to survive climate change.

[6 marks]