19.3 Genetically Modified Organisms in Agriculture

Question Paper

Course	CIE A Level Biology
Section	19. Genetic Technology
Topic	19.3 Genetically Modified Organisms in Agriculture
Difficulty	Hard

Time allowed: 10

Score: /8

Percentage: /100

Question 1a

Maize, *Zea mays*, is an important food crop for human consumption and for feeding to animals.

Two varieties of maize are MON810 and Justina. Justina has been developed in the traditional way by selective breeding (artificial selection) and MON810 is an example of a genetically modified (GM) organism.

MON810 produces a chemical that is toxic to insect pests. It is described as insect-resistant.

Outline how genetic engineering gave MON810 the trait of insect resistance.

[4 marks]

Question 1b

Countries vary in the extent to which they grow GM varieties such as MON810, instead of traditional varieties such as Justina.

- In the USA, 88 % of the total maize that is grown is GM.
- In most European countries, 0 % of the maize that is grown is GM.

Scientists used computer models to predict the effect of two different changes in agricultural practice on maize crop yields:

- a global ban that reduces the cultivation of GM maize to 0 % everywhere
- all countries increasing the cultivation of GM maize to the 88 % level of the USA.

Table 1 shows the results of this modelling for four countries.

Table 1

country	percentage change in yield of maize	
	decrease GM maize cultivation to 0 % of total	increase GM maize cultivation to 88 % of total
Argentina	−8.86	+2.90
Honduras	−1.26	+16.75
Spain	−3.82	+5.39
USA	−7.63	0.00

Explain what the data in Table 1 suggests about the social and ethical implications of growing GM maize.

[4 marks]