Genetically Modified Organisms in Agriculture (19.3): Cambridge (CIE) A Level Biology 9700 Exam Questions by Top

22 questions · 59 marks · about 71 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · Paper 4 · February/March 2020 (42) · Q4(d) · 2 marks

(d) The Atlantic salmon, *Salmo salar*, can be genetically modified (GM).

GM Atlantic salmon are bred in commercial fish farms for food production. In 2017, GM Atlantic salmon bred in Canada became the first GM animal to enter the human food chain.

Explain how the genetic modification of the Atlantic salmon can be used to increase food production.

.....

.....

.....

.....

.....

Question 2 · information from earlier in the question

3 Salmon can be genetically modified (GM) to produce increased quantities of growth hormone, which is a protein. GM salmon modified in this way have a faster growth rate and reach their maximum body mass at a younger age than non-GM salmon.

Question 2 · Paper 4 · February/March 2023 (42) · Q3(b)(iii) · 1 mark

(iii) Suggest **one** advantage, **other** than cost, of farming GM salmon that produce increased quantities of growth hormone instead of farming non-GM salmon that are injected with recombinant growth hormone each week.

.....

.....

Question 3 · Paper 4 · October/November 2023 (42) · Q4(b) · 2 marks

(b) Give **two** advantages of genetically engineering herbicide resistance in crop plants such as soybean.

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

8 LibertyLink® soybean is a genetically modified crop. It was first grown in 1996 and used in food products from 1998. It has been grown in 6 countries and used in food products in 21 countries.

Table 8.1 summarises the modifications made to the soybean plant to produce LibertyLink® soybean.

Table 8.1

name of introduced gene	gene donor organism	gene product	function of gene product
pat	*Streptomyces viridochromogenes*	phosphinothricin *N*-acetyltransferase	stops action of glufosinate, a herbicide

(a) Explain how the modification made to produce LibertyLink® soybean may help to solve the global demand for food.

.....

.....

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 5 · Paper 4 · May/June 2019 (42) · Q3(a) · 4 marks

3 Soybean, *Glycine max*, is an important food crop for human consumption and for feeding to animals.

Two varieties of soybean are Vinton 81 and GTS 40-3-2.

Vinton 81 has been developed in the traditional way by selective breeding (artificial selection) and GTS 40-3-2 is an example of a genetically modified (GM) organism.

(a) GTS 40-3-2 is described as herbicide-resistant, as it can withstand the application of glyphosate herbicide. Glyphosate is sprayed on the crop to kill weeds.

Outline how genetic engineering gave GTS 40-3-2 the trait of herbicide resistance.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Question 6 · information from earlier in the question

4 In 1973, a technique for genetic engineering was used for the first time. Recombinant DNA was made using a plasmid and this was successfully transferred into an organism.

In 2012, a new technique for genetic engineering, called gene editing, was developed.

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

(b) Cassava plants, *Manihot esculenta*, produce roots that have a high starch content. These roots are an important food source in tropical regions. The growth of cassava plants is reduced by competition from weeds.

Scientists used gene editing to develop two types of cassava plant with different mutations (changes to the DNA). The gene edited cassava plants showed resistance to the herbicide glyphosate. In susceptible plants, glyphosate prevents synthesis of three amino acids from a precursor molecule called shikimate.

Fig. 4.1 shows the concentration of shikimate in the wild type (not gene edited) and the two types of gene edited cassava plant after they were exposed to three different concentrations of glyphosate.

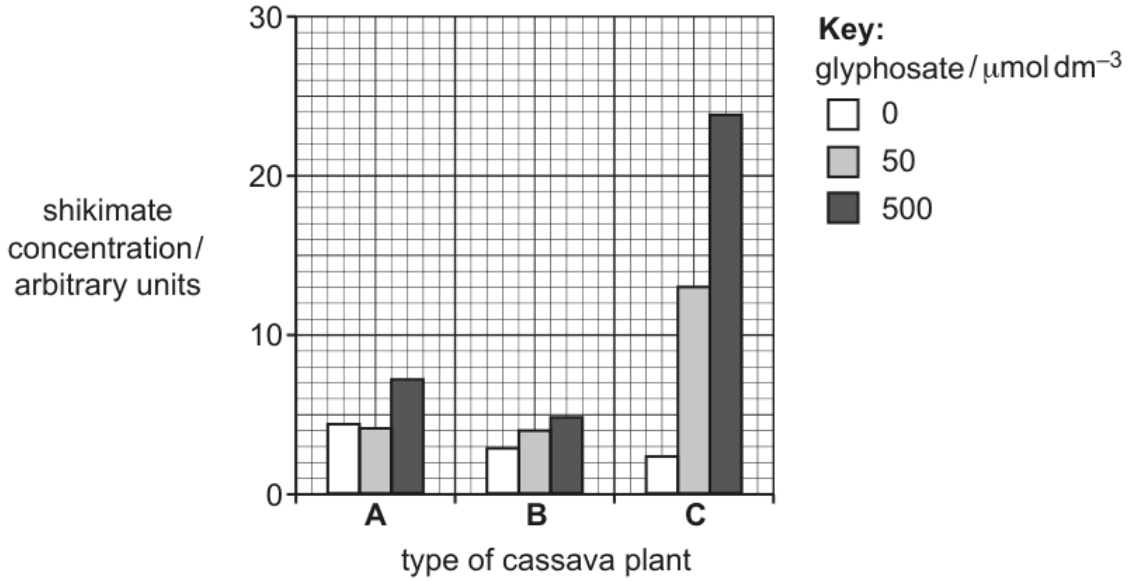


Fig. 4.1

Question 6 · Paper 4 · May/June 2022 (42) · Q4(b)(ii) · 3 marks

(ii) Explain the social benefit of this example of gene editing.

.....

.....

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 7 · Paper 4 · February/March 2019 (42) · Q5(b)(i) · 2 marks

(b) (i) Genetic modifications in crops can provide resistance to insect pests. Bt maize is one type of GM crop that has been produced to be resistant to insect pests.

State **two** benefits to farmers of insect resistance in crops.

.....

.....

.....

Question 8 · Paper 4 · February/March 2019 (42) · Q5(b)(ii) · 2 marks

(ii) Describe the difference between Bt maize and non-GM maize that explains why Bt maize is resistant to insects.

.....

.....

.....

Question 9 · information from earlier in the question

(b) An analysis in 2019 concluded that twice as many insect species have populations that are decreasing in size compared with chordate species. This analysis focused on developed countries that have large human populations.

Question 9 · Paper 4 · May/June 2021 (42) · Q3(b)(ii) · 2 marks

(ii) Explain how the introduction of crops that are genetically modified to express the Bt toxin can benefit biodiversity.

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 10 · information from earlier in the question

4 The potato plant, *Solanum tuberosum*, is an important food crop. Crop yield is reduced if the leaves of the plant are eaten by the larvae (immature stages) of the Colorado beetle, *Leptinotarsa decemlineata*.

Crop scientists used recombinant DNA technology to create two genetically modified (GM) varieties of potato plant. These plants produce proteins that are poisonous to insects.

- GM potato variety **A** contains two new genes, *SN* and *Bt*.
- GM potato variety **B** contains two new genes, *SN* and *OCII*.

The new varieties were tested by having a constant number of Colorado beetle larvae introduced to the plants at time 0 hours. The number of larvae that were alive after 24, 48 and 72 hours was recorded. The percentage of the larvae that had died in each time interval was calculated. This was repeated for potato plants that had not been genetically modified (non-GM).

Table 4.1 shows the percentage of Colorado beetle larvae that had died on the GM potato plant varieties and on non-GM potato plants.

Table 4.1

type of potato plant	percentage of Colorado beetle larvae that had died		
	24 h	48 h	72 h
GM potato variety **A**	50	93	100
GM potato variety **B**	37	70	93
non-GM potato	0	0	0

Question 10 · Paper 4 · October/November 2023 (41) · Q4(b) · 3 marks

(b) Discuss how the results in Table 4.1 provide information that could help to solve the global demand for food.

.....

.....

.....

.....

.....

.....

.....

Question 11 · information from earlier in the question

4 In 1973, a technique for genetic engineering was used for the first time. Recombinant DNA was made using a plasmid and this was successfully transferred into an organism.

In 2012, a new technique for genetic engineering, called gene editing, was developed.

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

(b) *Camelina sativa* is a fast-growing plant with oil-rich seeds.

C. sativa grows in dry and poor soils and so it may be important as a food crop in the future. The oil from its seeds has a high content of polyunsaturated fatty acids. This shortens the time that the oil can be stored for, which is a disadvantage.

Scientists used gene editing to develop two types of *C. sativa* with different genetic changes. The gene edited *C. sativa* seeds produced oil with longer storage times.

Fig. 4.1 shows the percentage composition of fatty acids in the oil extracted from seeds of gene edited and wild type (not gene edited) *C. sativa*.

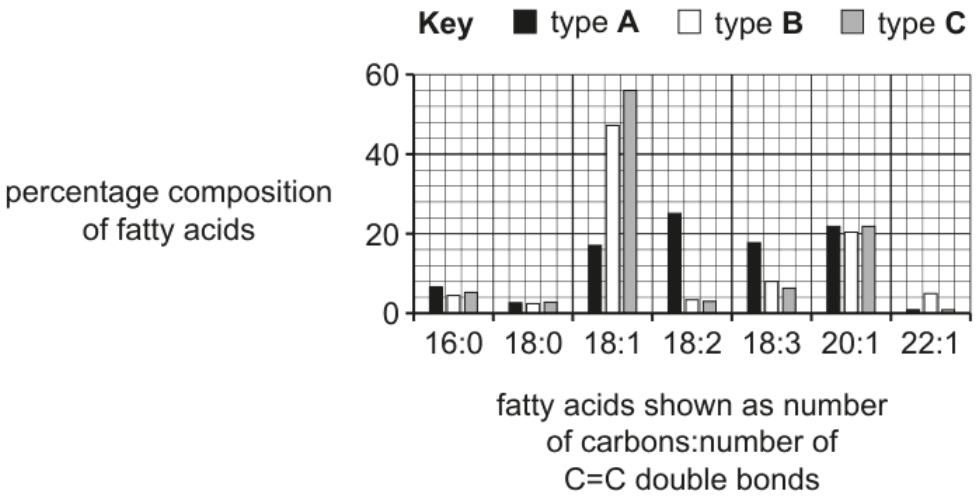


Fig. 4.1

Question 11 · Paper 4 · May/June 2022 (43) · Q4(b)(ii) · 3 marks

(ii) With reference to Fig. 4.1, discuss the social benefits of this example of gene editing.

.....

.....

.....

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 12 · Paper 4 · February/March 2019 (42) · Q5(a)(i) · 2 marks

5 Fig. 5.1 shows the area of land that was used to grow genetically modified (GM) crops in the USA, Brazil, India and China from 2004 to 2015.

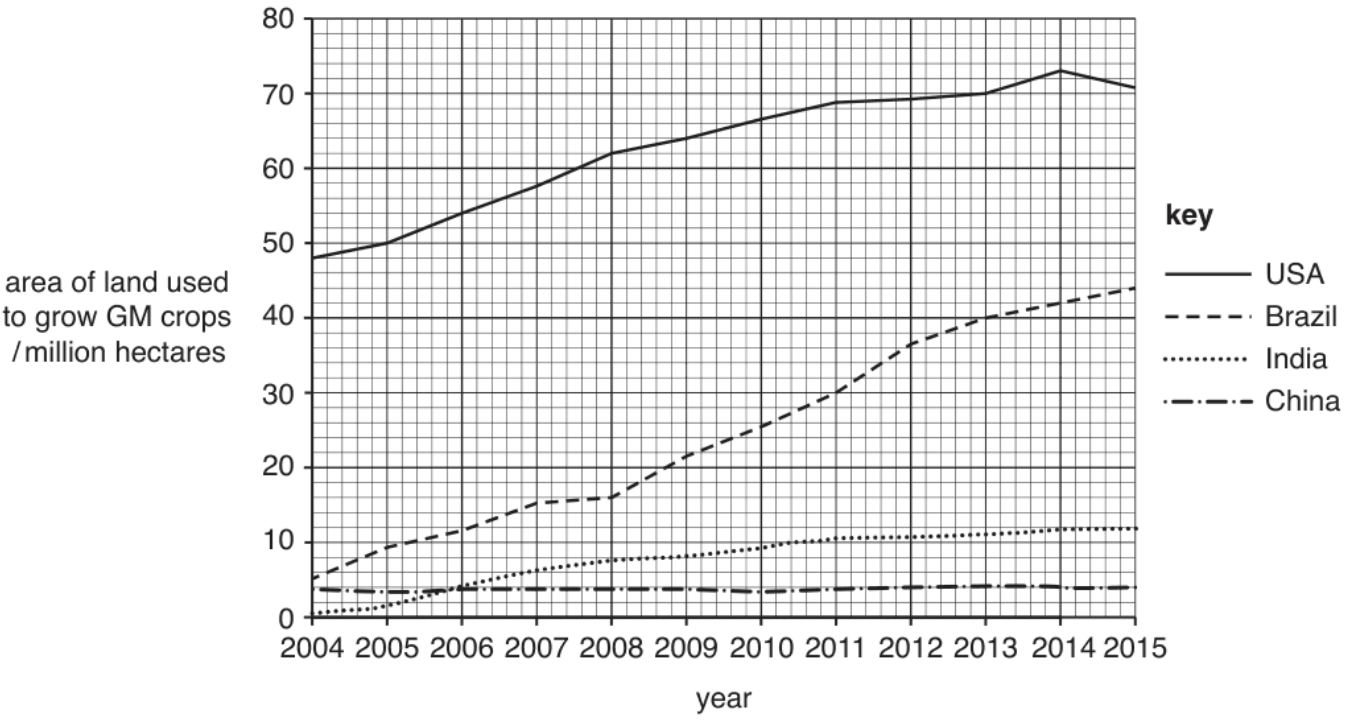


Fig. 5.1

(a) (i) Suggest reasons why the area of land used to grow GM crops in the USA is greater than the area of land used to grow GM crops in Brazil.

.....

.....

.....

Question 13 · Paper 4 · February/March 2019 (42) · Q5(c)(i) · 2 marks

(c) (i) State **two** reasons why people may have objections to the growth of insect-resistant GM crops.

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 14 · Paper 4 · February/March 2019 (42) · Q5(c)(ii) · 1 mark

(ii) In 2015, the percentage of the USA population that objected to the use of GM crops was lower than in 2005.

Suggest why a smaller percentage of the USA population objected to the use of GM crops in 2015.

.....

Question 15 · information from earlier in the question

3 Soybean, *Glycine max*, is an important food crop for human consumption and for feeding to animals.

Two varieties of soybean are Vinton 81 and GTS 40-3-2.

Vinton 81 has been developed in the traditional way by selective breeding (artificial selection) and GTS 40-3-2 is an example of a genetically modified (GM) organism.

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

(b) Countries vary in the extent to which they grow GM varieties, such as GTS 40-3-2, instead of traditional varieties such as Vinton 81.

- In the USA, 94% of soybeans grown are GM.
- In Europe, 0% of soybeans grown are GM.

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

- a global ban that reduces the cultivation of GM soybeans to 0% everywhere
- all countries increasing the cultivation of GM soybeans to the 94% level of the USA.

Table 3.1 shows the results of this modelling for four countries.

Table 3.1

country	percentage change in yield of soybeans	
	decrease GM soybean cultivation to 0% of total	increase GM soybean cultivation to 94% of total
Argentina	0.00	+6.23
Bolivia	–10.82	0.00
Brazil	0.00	+6.23
USA	–5.87	0.00

Explain what the data in Table 3.1 suggests about the social and ethical implications of growing GM soybeans.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 16 · information from earlier in the question

8 LibertyLink® soybean is a genetically modified crop. It was first grown in 1996 and used in food products from 1998. It has been grown in 6 countries and used in food products in 21 countries.

Table 8.1 summarises the modifications made to the soybean plant to produce LibertyLink® soybean.

Table 8.1

name of introduced gene	gene donor organism	gene product	function of gene product
pat	*Streptomyces viridochromogenes*	phosphinothricin *N*-acetyltransferase	stops action of glufosinate, a herbicide

Question 16 · Paper 4 · October/November 2025 (41) · Q8(c) · 3 marks

(c) Suggest reasons why LibertyLink® soybean is used in food products in 21 countries but only grown in 6 countries.

.....

.....

.....

.....

Question 17 · Paper 4 · October/November 2025 (44) · Q3(c) · 4 marks

(c) Discuss the social implications of growing GM crops.

.....

.....

.....

.....

.....

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

(b) A new application of recombinant DNA technology uses the genetic modification of a plant to prevent disease. It aims to prevent the most common source of food-borne disease, which is caused by eating food contaminated with pathogenic *Escherichia coli* bacteria.

Scientists genetically modified edible spinach plants to produce colicins. Colicins are antimicrobial proteins that can kill pathogenic *E.coli*. Colicins are normally made by other bacteria.

An experiment was carried out to test this application by spraying an extract of genetically modified (GM) spinach in buffer solution onto raw meat contaminated with pathogenic *E.coli*. The meat was stored at 10 °C for varying lengths of time before the numbers of viable (living) pathogenic *E.coli* bacteria were counted. Fig. 4.1 shows the results.

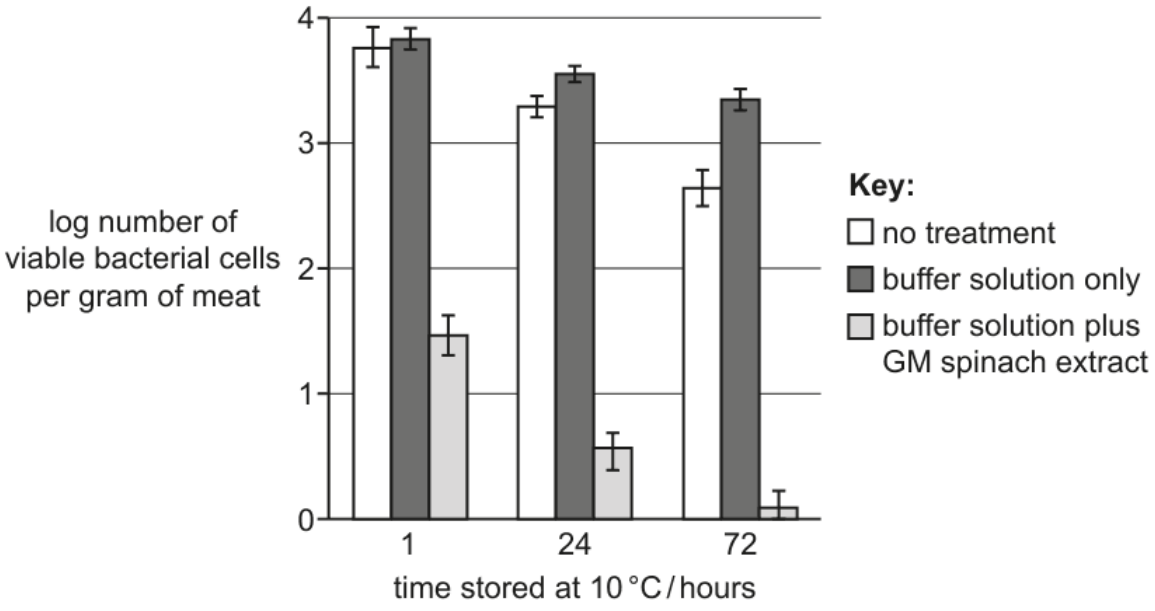


Fig. 4.1

(i) With reference to Fig. 4.1, evaluate the effectiveness of using GM spinach spray on raw meat to prevent food-borne disease.

.....

.....

.....

.....

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 19 · Paper 4 · May/June 2021 (42) · Q4(b)(ii) · 3 marks

(ii) Regulatory authorities may not approve the use of GM spinach spray on raw meat to protect consumers.

Discuss the concerns that may stop regulatory authorities approving this application of recombinant DNA technology.

.....

.....

.....

.....

.....

.....

.....

Question 20 · information from earlier in the question

3 Vitamin A deficiency is a widespread public health problem.

One source of vitamin A is carotene in the diet. Carotene can be converted to vitamin A in the body.

White rice grains are not a dietary source of vitamin A because they do not contain carotene.

Scientists have genetically modified a variety of rice to improve the diet of people who are vitamin A deficient. The grains of this genetically modified rice contain carotene.

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 20 · Paper 4 · February/March 2021 (42) · Q3(b) · 4 marks

In a 2018 report, the United Nations Children's Fund (UNICEF) estimated that:

- more than 140 million children are at high risk of vitamin A deficiency
- 1.15 million child deaths are caused by vitamin A deficiency each year.

Vitamin A deficiency is also a leading cause of childhood blindness.

The recommended dietary allowance (RDA) of vitamin A for a 5-year-old child is 400 μg per day.

Genetically modified (GM) rice contains 12 μg of carotene per gram of rice. In 2018, four countries approved GM rice as safe to eat.

The development of GM rice has been partly paid for by governments. It has been agreed that seeds of GM rice will be made available to farmers in countries with high levels of poverty at the same cost as seeds of normal rice.

Some international organisations, such as Greenpeace, campaign against all GM crops.

More than 100 respected scientists have asked Greenpeace to stop campaigning against GM rice.

(b) Discuss social and ethical arguments that support the position of the scientists.

.....

.....

.....

.....

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 21 · Paper 4 · October/November 2020 (42) · Q2(d) · 2 marks

(d) Children in developing countries may drink unpasteurised goats' milk. Some may develop diarrhoea caused by live bacteria ingested in the milk.

Scientists have used genetic engineering to develop goats that produce human lysozyme in their milk. Lysozyme is an enzyme that kills bacteria and so reduces the number of bacteria in the milk.

State a social advantage **and** a social disadvantage of making these GM goats available in developing countries.

advantage .....

.....

disadvantage .....

.....

[2]

Question 22 · Paper 4 · October/November 2018 (42) · Q3(c)(i) · 1 mark

(c) Horns on agricultural animals such as goats and cattle can be dangerous to the farmer and to other animals. Horns are often prevented from growing in 5-day-old animals by a stressful procedure called disbudding.

Genetic modification can cause a deletion in the allele **h** coding for horns in cattle embryos, so that the allele no longer codes for a functional protein and the embryos grow into cattle that are hornless.

(i) State an **ethical** advantage of this example of genetic modification.

.....

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Mark schemes

Question 1 · Paper 4 · February/March 2020 (42) · Q4(d) · 2 marks

4(d)	*any **two** from:* 1 gene / allele, for, faster growth rate / growth hormone / larger sized salmon, (inserted) ; 2 ref. to promoter from another species (also inserted) ; 3 growth occurs, all year round / not just in spring and summer ; 4 GM salmon, grow faster / grow larger / reproduce more ;	**2**

Question 2 · Paper 4 · February/March 2023 (42) · Q3(b)(iii) · 1 mark

3(b)(iii)	*any **one** from:* 1 *idea of* less labour intensive ; e.g. no need for weekly injections / GM only needs to be done once 2 *idea of* less stressful on GM salmon ; 3 risk of infection with injections ; 4 *idea that* growth hormone is continuously produced ; 5 GM salmon may grow faster ;	**1**

Question 3 · Paper 4 · October/November 2023 (42) · Q4(b) · 2 marks

4(b)	*any **two** from:* 1 high / increase in, yield / productivity / quality **or** more food ; 2 increased income / reduce costs ; 3 can use herbicides / AW ; 4 less / no, competition ; 5 no need to plough / less labour intensive ;	**2**

Question 4 · Paper 4 · October/November 2025 (41) · Q8(a) · 4 marks

8(a)	*any **four** from:* **1** (Liberty Link soybean / it, is) not harmed by / not killed by / resistant to, herbicide / glufosinate ; **2** herbicide / glufosinate, kills, weeds / unwanted plants ; **3** reduces / removes / less / no, competition (with, weeds / unwanted plants) ; **4** *ref. to* (sun)light / water / (named) soil minerals ; **5** higher yield **or** more crop, harvested / produced ; **6** AVP ;	**4**

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 5 · Paper 4 · May/June 2019 (42) · Q3(a) · 4 marks

3(a)	*any **four** from:*	**4**
	1 gene (for herbicide resistance) from, another species / variety / (soil) bacterium ; **A** allele	
	2 *ref. to* restriction enzyme ;	
	3 *ref. to* (Ti) plasmid / vector / *Agrobacterium* / gene gun ;	
	4 (DNA) ligase ;	
	5 *ref. to* recombinant, DNA / plasmid ;	
	6 introduced into soybean, cells / genome / DNA ; **I** embryos	
	7 (new) gene, expressed / transcribed ;	
	8 (to produce) protein / enzyme, resistant to, glyphosate / herbicide ;	
	9 AVP ; e.g. *ref. to* tissue culture / produce callus / detail such as grow cells on growth medium / marker genes / insert promoter	

Question 6 · Paper 4 · May/June 2022 (42) · Q4(b)(ii) · 3 marks

4(b)(ii)	*any **three** from:*	**3**
	1 increased / high, (crop) yield ;	
	2 *idea of* less food shortages / more food production / helps solve global demand for food ;	
	3 less need to remove weeds (by hand) ;	
	4 more income for, growers / farmers **or** *ref. to* economic benefit for, country / region ;	
	5 cheaper / lower cost, to buy ;	
	6 AVP ; e.g. less need for deforestation of other land	

Question 7 · Paper 4 · February/March 2019 (42) · Q5(b)(i) · 2 marks

5(b)(i)	*any **two** from:* 1 increase yield ; 2 increase quality ; 3 less / no, pesticide / insecticide, needs to be used ; 4 (so) less / no, money spent on, pesticides / insecticides ; **A** cheaper	**2**

Question 8 · Paper 4 · February/March 2019 (42) · Q5(b)(ii) · 2 marks

5(b)(ii)	1 contains gene from, *Bacillus thuringiensis* / bacterium ; 2 produces, (Bt) toxin / compound, harmful to insects ;	**2**

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 9 · Paper 4 · May/June 2021 (42) · Q3(b)(ii) · 2 marks

3(b)(ii)	*any **two** from:* **1** Bt toxin (only) kills, specific insects / insects that feed on the crops ; **2** reduces use of, insecticides / pesticides ; **3** *idea that* insects survive to pollinate plants ;	**2**

Question 10 · Paper 4 · October/November 2023 (41) · Q4(b) · 3 marks

4(b)	1 **A** and **B** kill larvae ; 2 GM increases, yield of / food from (potatoes) ; 3 **A**, is best / kills most / works faster / should be grown / will provide most food ;	**3**

Question 11 · Paper 4 · May/June 2022 (43) · Q4(b)(ii) · 3 marks

4(b)(ii)	*any **three** from:* 1 less food waste ; **A** increases quality of food 2 *idea of* less food shortages / more food production / helps solve global demand for food ; 3 more income for, growers / farmers **or** ref. economic benefit for, country / region ; 4 crop can be grown, when there is a water shortage / in poor quality soil / in harsh environment ;	**3**

Question 12 · Paper 4 · February/March 2019 (42) · Q5(a)(i) · 2 marks

5(a)(i)	*in USA unless otherwise stated* *any **two** from:* 1 can afford GM crops ; 2 (technology) developed in USA ; 3 more land available (to grow crops) ; 4 fewer laws restricting GM crops / more widespread (public) approval ; 5 climate conditions more suitable for GM crops ;	**2**

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 13 · Paper 4 · February/March 2019 (42) · Q5(c)(i) · 2 marks

5(c)(i)	*any **two** from:*	**2**
	1 resistance (to insects) may be transferred to wild plants ;	
	2 contamination of food marketed as organic ;	
	3 may kill, useful insects / pollinators ;	
	4 decrease in biodiversity ;	
	5 potential health risks of humans (eating GM crops) ;	
	6 insects may become resistant (to toxin) ;	

Question 14 · Paper 4 · February/March 2019 (42) · Q5(c)(ii) · 1 mark

5(c)(ii)	*any **one** from:*	**1**
	1 education / awareness ;	
	2 reasons for objections have not been proven ;	
	3 consumption of GM foods shows no ill effects ;	
	4 entire generation grown up in GM era ;	

Question 15 · Paper 4 · May/June 2019 (42) · Q3(b) · 5 marks

3(b)	1 decrease / ban / 0%, GM soybean (cultivation), decreases yield ;	**5**
	2 use GM soybean, more / 94%, increases yield ;	
	*use GM crops – accept **ora** throughout if GM crops banned*	
	3 increase food supply / decrease food cost ;	
	4 relieve, hunger / starvation ;	
	5 less / more, herbicides used ; *correct context needed*	
	6 less / more, money spent on herbicides ; *correct context needed*	
	7 increase profits / improve economy ;	
	8 unknown health consequences ; (can be positive or negative)	
	9 high cost of GM seed ;	
	10 *idea of* decrease in, genetic variation / biodiversity ;	

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 16 · Paper 4 · October/November 2025 (41) · Q8(c) · 3 marks

8(c)	*any **three** from:* *some / other / 21, countries:* **1** may, have, unsuitable / described problem in, climate / weather / soil ; **2** no regulatory approval / may have banned (GM / Liberty Link) ; **3** may have, (activist) groups / people, opposed to GM crops ; **4** may not have land space available ; **5** may have banned, herbicide / glufosinate ; **6** AVP ;	**3**

Question 17 · Paper 4 · October/November 2025 (44) · Q3(c) · 4 marks

3(c)	*any **four** from:* *positive implications:* **1** more food / higher yield (per hectare) ; **2** (farmers) use less, insecticide / pesticide ; **3** cheaper food prices for consumers ; **4** less land needed to grow food leaves more for, biodiversity / conservation ; **5** improved food nutritional value ; *negative implications:* **6** food allergies ; **7** greater quantity of herbicide residue on food ; **8** (evolution of) resistance in, insects / weeds / fungi / pests ; **9** pollen drift to / cross-breeding with, organic / non-GM / conventional, crops ; **10** GM crops may become invasive weeds ; **11** consumer mistrust / GM food must be clearly labelled ;	**4**

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 18 · Paper 4 · May/June 2021 (42) · Q4(b)(i) · 4 marks

4(b)(i) — **4**

*any **four** from:*

valid

1 GM spinach decreases number of, bacteria / *E.coli*
or
GM spinach has lowest number of, bacteria / *E.coli* **;**

2 at all times (meat is stored)
or
the longer the time stored the more effective it is
or
most effective after 72 hours **;**

3 data quote comparing no treatment or buffer alone with GM spinach extract at stated time **;**

time / hrs	no treatment	buffer alone	buffer plus GM spinach
1	3.7–3.8	3.8–3.9	1.4–1.5
24	3.2–3.3	3.5–3.6	0.5–0.6
72	2.6–2.7	3.3–3.4	0.1–0.2

not valid

4 no treatment / buffer alone, (also) decrease number of, bacteria / *E.coli*
or
GM spinach does not kill **all**, bacteria / *E.coli* **;**

5 meat should not normally be left at 10°C
or
people unlikely to eat meat left at, 10°C / for 72 hours **;**

6 does not test effect on people / AW **;**

Question 19 · Paper 4 · May/June 2021 (42) · Q4(b)(ii) · 3 marks

4(b)(ii) — **3**

*any **three** from:*

1 may alter, taste / texture / quality, of meat **;**

2 may be unsafe for humans / allergies / side effects **;**

3 may harm, gut / beneficial, bacteria
or
may increase growth of, non-colicin sensitive / other, bacteria **;**

4 contaminate food labelled as organic / AW **;**

5 *E.coli* / bacteria, may develop resistance to, (spray / colicins) **;**
R GM spray / colicins, cause mutation

6 AVP **;** e.g. may decrease food hygiene practices in, meat factories / abattoirs / restaurants / food outlets **;**

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.

Question 20 · Paper 4 · February/March 2021 (42) · Q3(b) · 4 marks

3(b)	*any **four** from:* 1 33–34 grams of genetically modified rice needed (to meet the RDA of a child) ; 2 would help to prevent (childhood) blindness ; 3 would help to prevent death (of children) ; 4 (seeds) affordable / AW ; 5 (seeds) scientifically proven to be safe ; 6 (continuing to campaign would cause) waste of government money ; 7 AVP ; e.g. benefits outweigh concerns plant-based GM (no GM animal welfare concerns) would reduce the need for supplementing diets	**4**

Question 21 · Paper 4 · October/November 2020 (42) · Q2(d) · 2 marks

2(d)	*any **one** advantage:* **1** stops / reduces, diarrhoea (in children) ; **2** improves children's, nutrition / growth / development ; *any **one** disadvantage:* **3** safety risks unknown / potential allergen / side effects ; **4** may disrupt ('good') bacteria / AW ; **5** expensive ; **6** not willing to drink GM milk ;	**2**

Question 22 · Paper 4 · October/November 2018 (42) · Q3(c)(i) · 1 mark

3(c)(i)	less, painful / stressful / harmful, for animal ;	**1**

Questions, mark schemes and examiners' report extracts © Cambridge University Press & Assessment.