

# Genetically modified organisms in agriculture

## Question Paper 2

<b>Level</b>	International A Level
<b>Subject</b>	Biology
<b>Exam Board</b>	CIE
<b>Topic</b>	Genetic Technology
<b>Sub Topic</b>	Genetically modified organisms in agriculture
<b>Booklet</b>	Theory
<b>Paper Type</b>	Question Paper 2

**Time Allowed :** 41 minutes

**Score :** / 34

**Percentage :** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

- 1 Maize was developed from a wild plant called teosinte, which grows from Mexico south to Argentina. It is thought that cultivated maize was derived from teosinte only once.

Maize has been found at archaeological sites dated to 5500 years ago.

- (a) Fig. 5.1 shows the genetic diversity at ten gene loci in teosinte and in cultivated maize. This was determined by sequencing the DNA base pairs at each locus, and calculating how much each of these base sequences varied. The gene loci are numbered in order of the degree of diversity in teosinte.

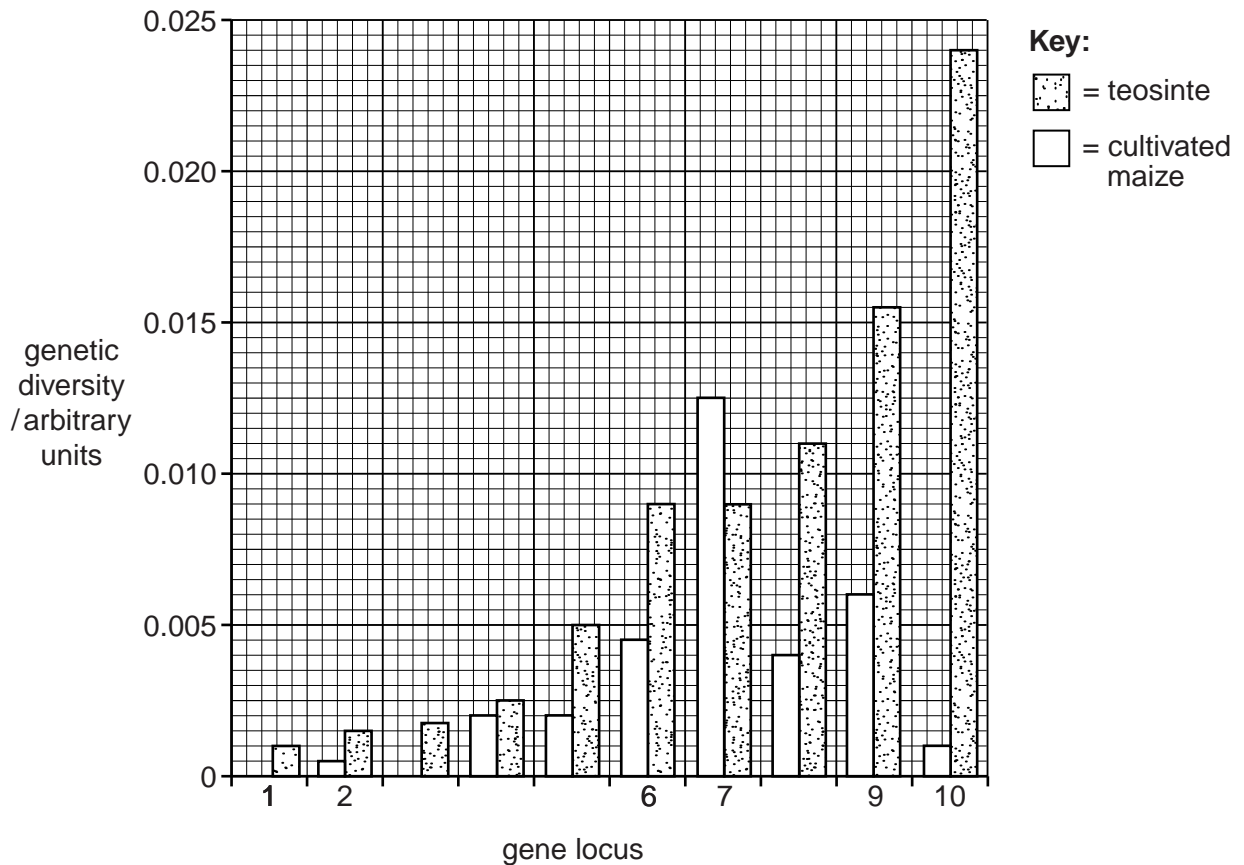


Fig. 5.1

- (i) Compare the genetic diversity of teosinte with that of cultivated maize.

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- (ii) Suggest reasons for the differences in genetic diversity between teosinte and cultivated maize.

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- (iii) Explain how these data support the idea that wild relatives of crop plants, such as maize, should be conserved.

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- (b) Most farmers today grow maize from seeds that have been produced by crossing two different homozygous parents.

Explain why this is done.

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[Total: 10]

2 Flowers are the organs of sexual reproduction in plants. Before fertilisation and seed development can take place, pollination must occur. This can be either self-pollination or cross-pollination, and can be carried out by insects or by wind.

(a) Explain the meaning of the term *self-pollination*.

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(b) Explain why cross-pollination may be more beneficial to a species than self-pollination.

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(c) In maize, wind pollination occurs. An investigation was carried out to find out how the length of time that maize pollen is in the air affects its ability to bring about fertilisation in a female flower.

- Pollen grains were removed from maize flowers and left exposed to the air for varying times.
- The pollen grains were then placed onto groups of female flowers.
- The groups of fertilised flowers developed into ‘ears’, each containing many seeds. The number of seeds per ear was counted.

The results are shown in Fig. 5.1.

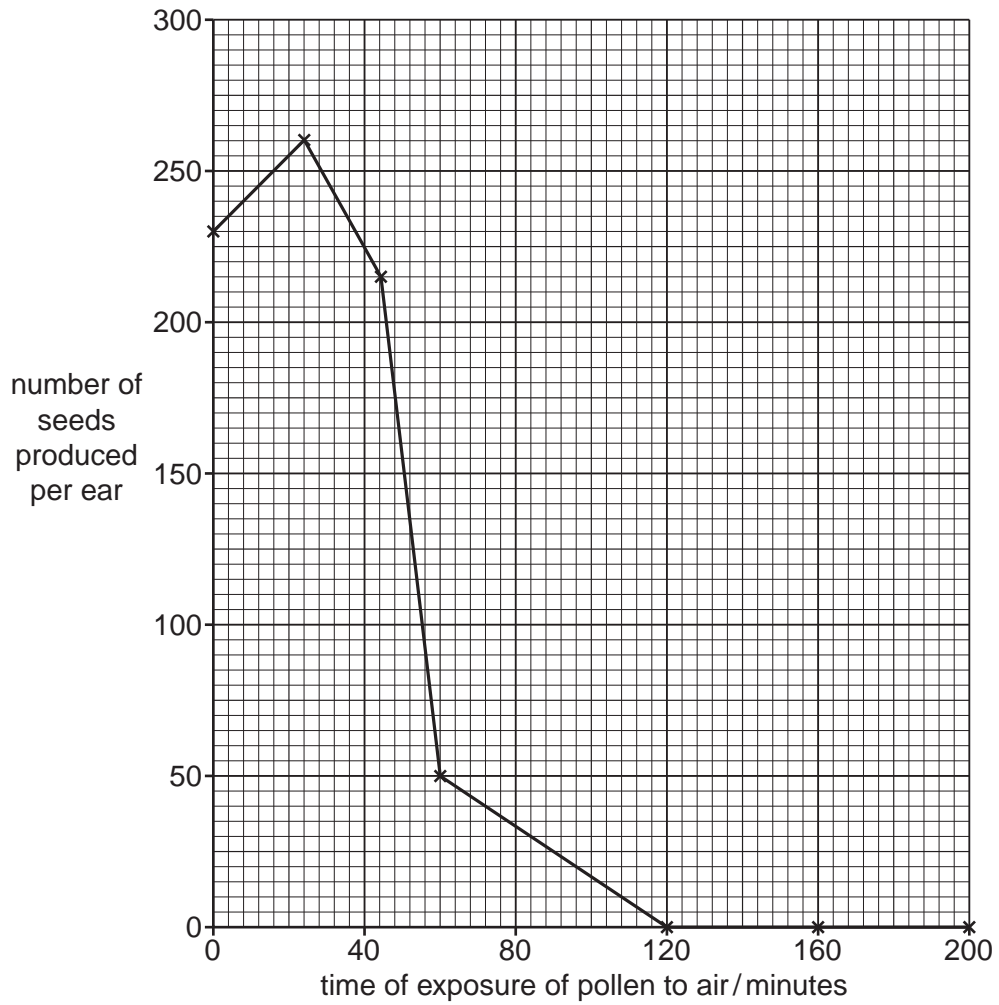


Fig. 5.1

(i) Describe the effect of exposure to the air on maize pollen.

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- (ii) A wild relative of maize, called teosinte, grows in Mexico. There are concerns that pollen from genetically-modified maize could pollinate wild teosinte and transfer new genes to it.

Suggest how the results shown in Fig. 5.1 could be used to devise strategies that would reduce the possibility of this happening.

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[Total: 9]



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