

Unit 3 Sustainability & Interdependence

Key Area 3 Crop Protection

1. Crop pests can be controlled in various ways. Which control methods are involved in integrated pest management?

A biological and chemical
B biological and systemic
C chemical and selective
D selective and systemic

2. The list below shows some adaptations of weed plants.

1 high seed output
2 possession of storage organs
3 vegetative reproduction
4 long term seed viability

Which of these are competitive adaptations of **perennial** weeds?

A 1 and 2 only
B 1 and 4 only
C 2 and 3 only
D 2 and 4 only

3. Which of the following are adaptations of **perennial** weeds?

A short life cycle and storage organs
B storage organs and vegetative reproduction
C high seed output and short life cycle
D vegetative reproduction and short life cycle

4. Dandelions are weeds which often grow in grass lawns.

Which of the following could be sprayed onto a lawn to remove the dandelions?

A non-selective herbicide
B non-selective fungicide
C selective herbicide
D selective fungicide

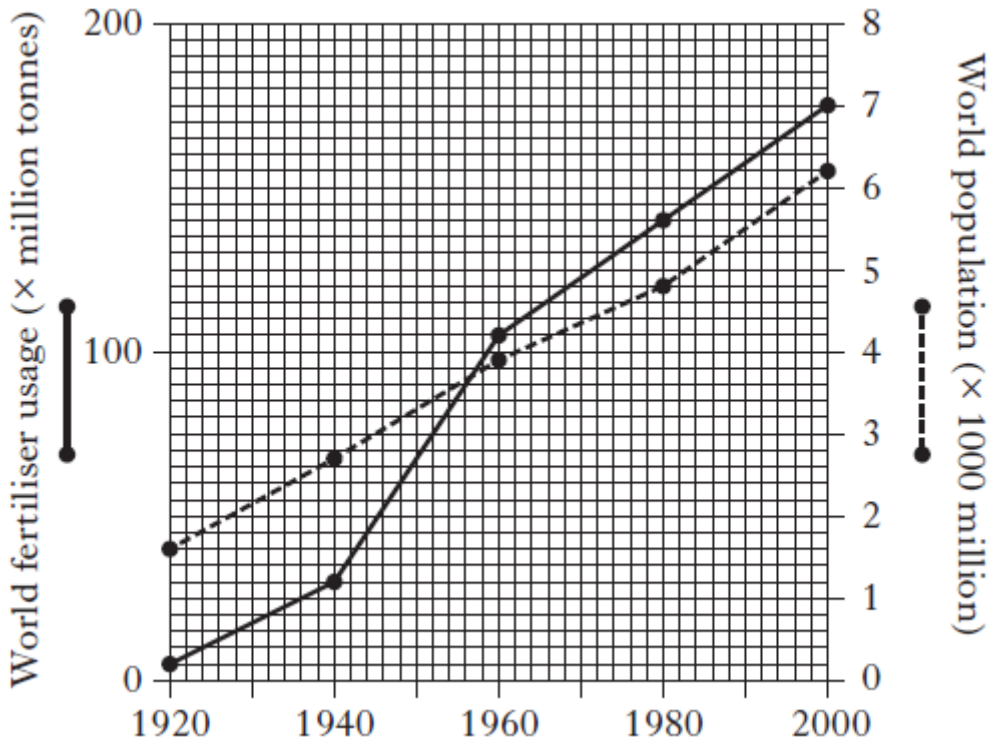
5.

A cabbage crop was sprayed with pesticide to treat an infestation of caterpillars. The concentration of pesticide was measured in the tissues of the caterpillars and of birds which ate them.

Which line in the table below shows the animal with the highest pesticide concentration in its tissues and identifies the reason for this?

	<i>Animal with highest pesticide concentration</i>	<i>Reason</i>
A	caterpillars	pesticide is systemic
B	caterpillars	accumulation has occurred
C	birds	pesticide is systemic
D	birds	accumulation has occurred

6. The graph below shows how world population and fertiliser usage changed between 1920 and 2000.

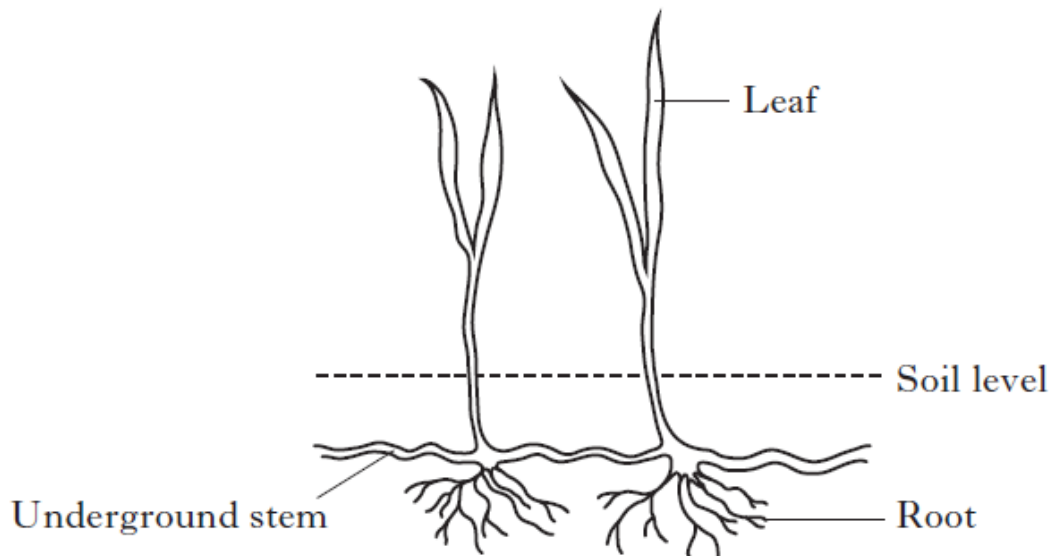


Which of the following conclusions can be drawn from these results?

- A World fertiliser usage was 55 million tonnes in 1930.
- B World population increased steadily between 1960 and 2000.
- C World fertiliser usage was 140 million tonnes in 1980.
- D World fertiliser usage first increased more rapidly than the population growth in 1956.

7.

African couch grass is a perennial weed of crops which spreads rapidly from branching underground stems as shown in the diagram below. If the plant's leaves are damaged, new leaves can grow from the underground stems.



(a) Explain why herbicide used in the control of this weed should be systemic.

1

(b) (i) Introducing non-native insects which eat African couch grass has been suggested as a biological control.

Suggest a possible risk associated with using a biological control method such as this.

1

(ii) Describe what is meant by the term integrated pest management (IPM).

1

8.

The table below shows the number of beet armyworm larvae found in plots of cotton plants. Some plots were treated with insecticide on 27 June and 1 August and other plots left untreated.

		<i>Number of beet armyworm larvae</i>	
		Treated plots	Untreated plots
July	8	3	3
	15	33	2
	22	22	17
	29	42	10
August	5	120	8
	12	160	10

Which of the following is the most likely explanation for the differences between the treated and untreated plots?

- A The insecticide kills a predator of the larvae
- B The larvae are resistant to the insecticide
- C The beet armyworm breeds in July
- D The larvae have a short lifecycle

9.

Harlequin ladybirds, *Harmonia axyridis*, were introduced to the UK from their native habitat in Eastern Asia in order to reduce the population of aphids, which feed on crop plants.

Since their introduction, harlequin ladybirds have spread rapidly and their population has dramatically increased. As a result the populations of some ladybird species have dramatically decreased, although the population of native seven-spot ladybirds has remained relatively stable.

(a) Name this control method used to manage the population of aphids.

1

(b) Suggest one reason why the population size of the seven-spot ladybird has remained relatively stable.

1

(c) Give a reason why the population of harlequin ladybirds has increased more quickly in the UK than in their native habitat.

1

10.

Potato plants are attacked by leaf eating caterpillars. *Bacillus thuringiensis* is a bacterium which can be used to control these pests. The bacteria produce a protein (Bt toxin) which kills these caterpillars.

(a) (i) Explain how an attack by leaf eating caterpillars causes a reduction in crop yield.

2

(ii) State an advantage of using this type of biological control rather than using chemicals.

1

(b) Bt toxin does not kill all caterpillars.

A study was carried out to investigate the effectiveness of the Bt toxin compared with a modified Bt toxin by exposing different groups of caterpillars to them.

The results are shown in the table.

<i>Toxin tested</i>	<i>Number of caterpillars tested</i>	<i>Number of caterpillars surviving</i>	<i>Caterpillars killed (%)</i>
Bt toxin alone	240	204	
Modified Bt toxin alone	300	105	65
Bt toxin and modified Bt toxin used together	210	42	80

(i) Complete the table to show the percentage of caterpillars killed by the Bt toxin alone.

1

Space for calculation

(ii) The Bt toxin and modified Bt toxin work by different mechanisms. Use information from the table to justify this statement.

1
