AS Level Biology B

H022/02 Biology in depth

Question Set 17

1 In 2004 a new species known as the harlequin ladybird, *Harmonia axyridis*, arrived in the south east of the UK and, since then, it has spread across the country.

Harlequin ladybirds are able to eat a wider range of food than native ladybirds and also predate on the eggs of other ladybirds.

(a) Explain how the introduction of a new species would affect biodiversity. **[3]**

(b) **(i)** A national survey was carried out in the UK to track the spread of the harlequin ladybird.

A class of students decided to take part in the survey by studying the ladybird species in a local meadow. During a morning lesson, the class counted the number of different ladybird species and the number of ladybirds in each species found in the meadow.

Outline the procedure the students should have followed to obtain valid results. **[3]**

(ii) A national ladybird survey published the data for 2014.

The teacher asked the class to use the data to calculate the Simpson's Diversity Index (D) for ladybirds in this survey.

The formula they used was:

$$D = 1 - \left(\sum\left(\frac{n}{N}\right)^2\right)$$

where n = number of individuals of a species
N = total number of individuals of all species

Some of the data is shown in the table below.

Species	n	n/N	$(n/N)^2$
Harlequin	1824		0.06004
2 spot	931	0.1251	0.01564
10 spot	1702	0.2286	0.05228
Cream spot	249	0.0334	0.00112
7 spot	1557	0.2092	0.04375
Pine	753	0.1012	0.01023
14 spot	428	0.0575	0.00331
		Sum ($\sum$)	
		D	

Complete the table with the three missing values. Record your answers in the table. **[2]**

(iii) In 2004, the Simpson's Diversity Index for ladybirds in the UK was approximately 0.8.

Using the Simpson's Diversity Index (D) calculated in (b)(ii), suggest what impact the introduction of the harlequin ladybird has had on native ladybird species between 2004 and 2014. Give a reason for your answer.

[2]

Total Marks for Question Set 17: 10