

**A Level Biology B**

**H422/01** Fundamentals of biology

**Question Set 5**

- 1 (a) (i) *Miscanthus* and reed canary grass are crops that are reported to promote species diversity.

A field trial was carried out to determine which crop promotes the greater diversity of bird species:

- two fields (**M** and **R**) were sampled
- *Miscanthus* was grown in field **M**
- reed canary grass was grown in field **R**
- the number of each bird species (*n*) was recorded for both fields
- the Simpson's Index of Diversity was calculated for both fields.

Explain what is meant by the term species diversity.

[2]

- (a) (ii) State **two** variables that should have been controlled to ensure a **valid** comparison between fields **M** and **R**.

[2]

**(b) (i)** The incomplete results for field **M** are shown in Table 35.

Bird species	$n$	$n/N$	$(n/N)^2$
Dunnoek	3	0.03	0.0009
Song thrush	40	0.40	0.1600
Reed bunting	23	0.23	0.0529
Meadow pipit	12		
Willow warbler	4		
Common redstart	18		
	$N =$		$\Sigma(n/N)^2 =$
			$1 - (\Sigma(n/N)^2) =$

**Table 35**

Complete Table 35 and use the formula below to calculate the Simpson's Index of Diversity ( $D$ ) for field **M**.

$$D = 1 - (\Sigma(n/N)^2)$$

Where:

$n$  = number of individuals of each species

$N$  = total number of individuals in all species

**[3]**

**(b) (ii)** The Simpson's Index of Diversity for field **R** is 0.54.

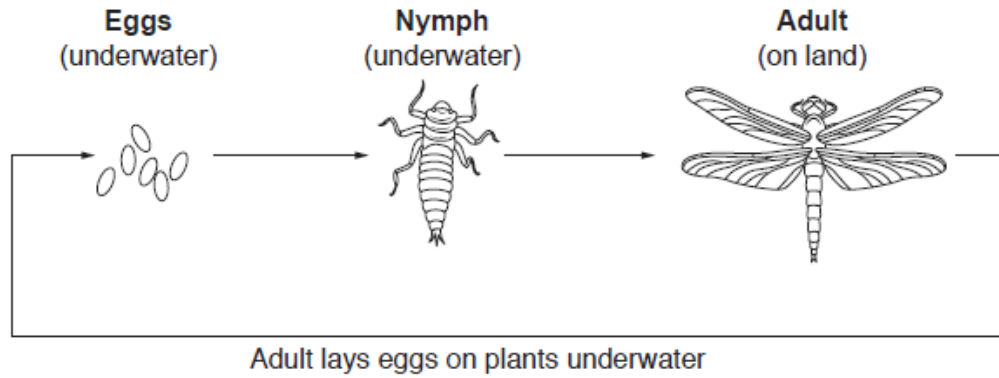
Using this information and your answer to **(b)(i)**, conclude which crop promotes the greater diversity of bird species. Justify your conclusion.

**[1]**

- (c) Modern agricultural methods involve the use of chemical fertilisers added to the soil to increase crop yield.

However, the use of chemical fertilisers can have an impact on organisms within aquatic ecosystems such as ponds and streams.

The lifecycle of a dragonfly is shown in Fig. 35.



**Fig. 35**

Explain how the use of chemical fertilisers on agricultural land may threaten the survival of dragonflies.

**[3]**

**Total Marks for Question Set 5: 11**

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