WJEC Wales Biology A Level

SP 2.1: Investigation into biodiversity in a habitat

Practical notes

Introduction

Biodiversity is the variety of life. It refers to the number of species in a habitat (**species richness**) and the relative abundance of individuals within each species (**species evenness**).

Simpson's diversity index can be used as a measure of biodiversity:

$$D = 1 - \frac{\sum n(n - 1)}{N(N - 1)}$$

where…

n = the number of individuals of a certain species
N = the total number of organisms

Equipment

- Quadrat
- 2× 20 m tape measure
- Dichotomous key
- Random number generator
- Flat edged net
- White tray

Risk assessment

Hazard	Risk	Precaution	Emergency
Plants (thorns, sting, poisonous)	Adverse skin reaction	Keep skin covered at all times	Carry out appropriate procedure e.g. take an antihistamine for stings; seek medical assistance
Insect bites and stings	Adverse skin reaction	Keep skin covered at all times; wear insect repellent	Take an antihistamine; seek further medical assistance
Weather	Hypothermia; hyperthermia; sunburn	Wear appropriate clothing; bring suitable kit e.g. suncream, sunglasses, gloves	Seek medical assistance

Terrain	Slipping, tripping	Wear appropriate footwear; take care when walking; don't run	Seek medical assistance

Method

Measuring the biodiversity of ground flora

1. Choose a sample area (e.g. field).
2. Position two 20 m **tape measures** at **right angles** along the border of the sample area.
3. Use a **random number generator** to randomly select **two** numbers which serve as the **x-coordinate** and **y-coordinate** with the tape measures as the **axis.**
4. At each location, place the lower **left** hand corner of the quadrat at the **coordinate point.**
5. Identify the species present in each quadrat using a **dichotomous key.**
6. Record the **numbers** of each species present.
7. Repeat this for a total of **10** randomly-generated coordinates.
8. Calculate a value for the **Simpson's index of diversity.**

Measuring the biodiversity of invertebrates

1. Choose a sample area (e.g. stream).
2. Use a **quadrat** to mark the sample area.
3. Just downstream from the quadrat, hold a **flat edged net** against the river bed.
4. Disturb the marked area with a stick or tool for **two minutes.**
5. Fill a white tray to a **2 cm** depth with water from the stream. Remove the net and tip the 'catch' onto the tray.
6. Identify the species present using a **dichotomous key.**
7. Record the **numbers** of each species present.
8. Return the organisms 1 m upstream from the sample area.
9. Repeat this for a total of **10** randomly-generated coordinates.
10. Calculate a value for the **Simpson's index of diversity.**

Worked example

Sample results

Organism	Number of individuals
Stonefly nymph	4
Mayfly nymph	4
Freshwater shrimp	11
Caddis fly larva	3
Dobsonfly larva	1
Blood worm	2
Rat tailed maggot	1

Calculating Simpson's diversity index

Organism	n	n(n-1)
Stonefly nymph	4	12
Mayfly nymph	3	6
Freshwater shrimp	11	110
Caddis fly larva	4	12
Dobsonfly larva	1	0
Blood worm	2	2
Rat tailed maggot	1	0
∑	26	142

N = 26
N(N-1) = 650

$$D = 1 - \frac{\sum n(n-1)}{N(N-1)}$$

$$= 1 - \frac{142}{650}$$

$$= \mathbf{0.782}$$

The Simpson's diversity index can take any value between 0 and 1.
The **higher** the value, the **greater** the **biodiversity**.