OCR (B) Biology GCSE

Topic B3: How are organisms in an ecosystem interdependent?

Flashcards

Explain the importance of small molecules such as sugars, amino acids, fatty acids and glycerol in the body

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They are used to synthesise large organic molecules:

- Amino acids join to form proteins
- Simple sugars join to form larger, more complex sugars
- Fatty acids and glycerol combine to form lipids

Describe how producers gain biomass

Describe how producers gain biomass

- Take in carbon and nitrogen-containing compounds from the environment
- During photosynthesis, carbon is combined with oxygen and hydrogen to form glucose
- Glucose is converted into small molecules: others sugars, fatty acids, glycerol and amino acids
- Larger organic molecules are synthesised from small molecules and are used by the plant to build new structures e.g. cell membranes, organelles

Give some examples of long-chain carbohydrates and their functions in organisms

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- Cellulose - component of cell walls in plants
- Starch - energy storage in plants
- Glycogen - energy storage in animals

Describe the functions of lipids in organisms

Describe the functions of lipids in organisms

- Energy storage
- Component of cell membranes

How are amino acids formed from glucose?

How are amino acids formed from glucose?

Glucose reacts with nitrate ions from the soil to form amino acids

Describe how consumers gain biomass

Describe how consumers gain biomass

- Ingest large organic molecules from producers or other consumers
- Large organic molecules broken down into smaller, simpler molecules during digestion
- Small molecules absorbed across the surface of the gut wall
- They are transported to the required cells where large molecules are resynthesised and used to build biomass in the consumer

Outline the levels of organisation in an ecosystem

Outline the levels of organisation in an ecosystem

- Individual
- Population
- Community
- Ecosystem

Define population

Define population

All organisms of the same species living with one another in a habitat

Define community

Define community

All of the populations of different species living together in a habitat

Define ecosystem

Define ecosystem

The community of organisms and non-living components of an area and their interactions

Organisms within a community are described as being ‘interdependent’. What does this mean?

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Organisms are dependent upon each other.

e.g. if the population of producers in a food chain decreases, there will be an accompanying decline in the population of primary consumers, secondary consumers and so on down the food chain.

Give some examples of interdependence in a community

Give some examples of interdependence in a community

- Plants depend on pollinators e.g. bees
- Herbivores are dependent on plants
- Animals are dependent on mates

Why is competition important in a community?

Why is competition important in a community?

Competition limits population sizes as organisms must compete for resources. This can stimulate evolutionary change.

What does a food chain show?

(biology only)

What does a food chain show? (biology only)

A food chain describes the feeding relationships between organisms and the resultant stages of biomass transfer.

Define biomass (biology only)

Define biomass (biology only)

The total mass of living material

What are trophic levels? (biology only)

What are trophic levels? (biology only)

The stages in a food chain

What do arrows in a food chain represent? (biology only)

What do arrows in a food chain represent? (biology only)

The direction of biomass transfer

Describe a simple food chain

(biology only)

Describe a simple food chain (biology only)

producer → primary consumer → secondary consumer → tertiary consumer

Why are producers the first trophic level? (biology only)

Why are producers the first trophic level? (biology only)

- Producers provide all biomass for the food chain (via photosynthesis)
- The rest of the food chain involves the transfer of this biomass.

What does a food web show?
(biology only)

What does a food web show? (biology only)

It shows how different food chains are interlinked and how members of an ecosystem are interdependent.

What does a pyramid of biomass represent? (biology only)

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It represents the dry mass of living material at each trophic level of a food chain.

Why is a pyramid of biomass almost always pyramid-shaped? (biology only)

Why is a pyramid of biomass almost always pyramid-shaped? (biology only)

- Producers (at the bottom of the pyramid) have the greatest biomass so have the longest bar
- As you move along the food chain (and up the pyramid) biomass is lost so the bars decrease in length

Why is biomass lost between each trophic level in a food chain? (biology only)

Why is biomass lost between each trophic level in a food chain? (biology only)

- Glucose is immediately used for respiration in plants
- Respiration to generate heat energy, energy for movement etc.
- Some parts of organisms are indigestible
- Egestion, excretion

Why are there rarely more than four or five trophic levels in a food chain? (biology only)

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Above this, there is insufficient energy to support another breeding population

What is the equation for calculating the efficiency of biomass transfer between trophic levels? (biology only)

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(biology only)

$$\text{Efficiency} = \frac{\text{Biomass available after transfer}}{\text{Biomass available before transfer}} \times 100$$

What does a pyramid of numbers represent? (biology only)

What does a pyramid of numbers represent?
(biology only)

It represents the number of organisms at each trophic level of a food chain.

Why are the carbon and water cycles important?

Why are the carbon and the water cycles important?

- Carbon and water are essential to life
- There is a fixed amount of both carbon and water on Earth which must be constantly recycled

Describe the stages of the water cycle

Describe the stages of the water cycle

1. Energy from the sun evaporates water from bodies of water such as lakes and oceans.
2. Transpiration also releases water vapour
3. Water vapour rises, cools and condenses forming clouds
4. Precipitation occurs
5. Water is absorbed by the soil and taken up by roots. Some is used in photosynthesis or becomes part of the plant, entering the food chain.
6. Excretion returns water to the soil
7. Surface runoff returns to streams, rivers and eventually the sea

Describe the stages of the carbon cycle

Describe the stages of the carbon cycle

1. Photosynthesising plants remove CO_2 from the atmosphere
2. Eating passes carbon compounds along a food chain
3. Respiration in plants and animals returns CO_2 to the atmosphere
4. Organisms die and decompose. Decomposers (bacteria and fungi) break down dead material and release CO_2 via respiration
5. Combustion of materials (e.g. wood, fossil fuels) releases CO_2

What is meant by decomposition?

What is meant by decomposition?

The breakdown of dead materials into simpler organic matter

How do decomposers break down dead matter?

How do decomposers break down dead matter?

Decomposers release enzymes which catalyse the breakdown of dead material into smaller molecules.

What factors affect the rate of decomposition?

(biology only)

What factors affect the rate of decomposition? (biology only)

- Oxygen availability
- Temperature
- Water content

Why is oxygen required for decomposition?

(biology only)

Why is oxygen required for decomposition? (biology only)

Most decomposers require oxygen for aerobic respiration

How does the availability of oxygen affect the rate of decomposition? (biology only)

How does the availability of oxygen affect the rate of decomposition? (biology only)

- As oxygen levels increase, the rate of decomposition increases
- As oxygen levels decrease, the rate of decomposition decreases

Why can decomposition still occur in the absence of oxygen?

(biology only)

Why can decomposition still occur in the absence of oxygen? (biology only)

Some decomposers respire anaerobically

*However, the rate of decomposition is slower as anaerobic respiration produces less energy

How does temperature affect the rate of decomposition?

(biology only)

How does temperature affect the rate of decomposition? (biology only)

Decomposers release enzymes:

- Rate highest at 50°C (optimum temperature for enzymes)
- Lower temperatures, enzymes work too slowly, rate decreases
- High temperatures, enzymes denature, decomposition stops

How does soil water content affect the rate of decomposition?

(biology only)

How does soil water content affect the rate of decomposition? (biology only)

Decomposers require water to survive:

- In moist conditions the rate of decomposition is high
- In waterlogged soils there is little oxygen for respiration so the rate of decomposition decreases

Why does decomposition require water?
(biology only)

Why does decomposition require water? (biology only)

Water is required for the secretion of enzymes and absorption of dissolved molecules.

How do decomposers in landfill sites contribute to global warming? (biology only)

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- Landfill sites tend to be oxygen deficient
- Decomposers respire anaerobically, producing methane
- Methane is a greenhouse gas which traps energy in the atmosphere, raising global temperatures