

AQA Biology A-level

5.3 - Energy and ecosystems

Flashcards

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How do plants use the sugars from photosynthesis?



How do plants use the sugars from photosynthesis?

- primarily as respiratory substrates
- to synthesise other biological molecules e.g. cellulose



What is biomass?



What is biomass?

Total dry mass of tissue or mass of carbon measured over a given time in a specific area.



Suggest the units for biomass.



Suggest the units for biomass.

- when an area is being sampled: gm^{-2}
- when a volume (e.g. a pond) is being sampled: gm^{-3}



How can the chemical energy store in dry mass be estimated?



How can the chemical energy store in dry biomass be estimated?

Using calorimetry.

Energy released = specific heat capacity of water \times volume of water (cm^3) \times temperature increase of water.



Why is bomb calorimetry preferable to simple calorimetry?



Why is bomb calorimetry preferable to simple calorimetry?

Reduces heat loss to surroundings.



How could a student ensure that all water had been removed from a sample before weighing?



How could a student ensure that all water had been removed from a sample before weighing?

Heat the sample and reweigh it until the mass reading is constant.



Define gross primary production (GPP).



Define gross primary production (GPP).

Total chemical energy in plant biomass within a given volume or area.



Define net primary productivity (NPP).



Define net primary productivity (NPP).

Total **chemical energy** available for plant **growth**, plant **reproduction** and energy transfer to **other trophic levels** after **respiratory losses**.



Give the mathematical relationship
between GPP and NPP.



Give the mathematical relationship between GPP and NPP.

$$NPP = GPP - R$$

where R represents respiratory losses



Why is most of the Sun's energy not converted to organic matter?



Why is most of the Sun's energy not converted to organic matter?

- Most solar energy is absorbed by atmosphere or reflected by clouds.
- Photosynthetic pigments cannot absorb some wavelengths of light.
- Not all light falls directly on a chlorophyll molecule.
- Energy lost as heat during respiration/

photosynthesis.



How can the net production of consumers be calculated?



How can the net production of consumers be calculated?

$$N = I - (F + R)$$

I: chemical energy from ingested food

F: energy lost as faeces and urine

R: respiratory losses



Why does biomass decrease along a food chain?



Why does biomass decrease along a food chain?

- Energy lost in nitrogenous waste (urine) & faeces.
- Some of the organism is not consumed.
- Energy lost to surroundings as heat.



Define primary and secondary productivity.



Define primary and secondary productivity.

- rate of primary or secondary production
- biomass in a specific area over a given time period e.g. $\text{kJ ha}^{-1} \text{ year}^{-1}$



Outline some common farming practices used to increase the efficiency of energy transfer.



Outline some common farming practices used to increase the efficiency of energy transfer.

- Exclusion of predators: no energy lost to other organisms in food web.
- Artificial heating: reduce energy lost to maintain constant body temperature.
- Restriction of movement.
- Feeding is controlled at the optimum.



Give a general equation for % efficiency.



Give a general equation for % efficiency.

$$\frac{\text{energy converted to a useful form (J)} \times 100}{\text{total energy supplied (J)}}$$



Explain why the length of food chains is limited.



Explain why the length of food chains is limited.

Energy is lost at each trophic level

So there is insufficient energy to support a higher trophic level



What is a pyramid of biomass?



What is a pyramid of biomass?

Diagram that shows the biomass at each trophic level.



Why is a pyramid of biomass preferable to a pyramid of numbers?



Why is a pyramid of biomass preferable to a pyramid of numbers?

Shape of pyramid of numbers may be skewed since a small number of producers can support many consumers.

