25SCHOOLS
FREE LEARNING NOTES FOR ZAMBIA

FORM 2

Biology

Transport in plants and the role of heterotrophs

Lesson notes for learners · Competence-Based Curriculum

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Plants need water, minerals and food to grow, and they have a system that moves these materials to every part of the plant. Around us, animals, fungi and bacteria feed on other living things or on dead plants and animals. When you see leaves rotting on the ground or a cow grazing, you are watching these ideas at work.

AFTER THESE NOTES YOU SHOULD BE ABLE TO

- Explain why heterotrophic nutrition is important to organisms and the environment
- Name the tissues that carry materials in a plant and say what each one carries
- Describe transpiration and the factors that affect its rate
- Give plant adaptations that reduce water loss

KEY WORDS

heterotrophic nutrition	getting food and energy by feeding on plants, animals or other organic matter
xylem	the tissue that carries water and minerals from the roots to the leaves
phloem	the tissue that carries food made in the leaves to other parts of the plant
transpiration	the loss of water by evaporation from the leaves, which pulls more water up from the roots
cuticle	the waxy covering on a leaf that helps to reduce water loss

1 Why heterotrophic nutrition matters

Heterotrophic organisms get nutrients and energy by feeding on plants, animals or other organic matter. This supports their growth and survival.

Fungi and bacteria are heterotrophs that break down dead plants and animals. This stops dead matter from piling up and recycles nutrients back into the soil, where they support plant growth and keep the environment in balance. You can see this at home or in the community when leaves and food waste decompose, and when animals feed.

2 The transport system in plants

Transport in plants is the movement of water, minerals and manufactured food to all parts of the plant. In dicot and monocot plants this is done by two special tissues, the xylem and the phloem.

The xylem carries water and minerals from the roots to the leaves. The phloem carries the food made in the leaves to the other parts of the plant.

Tissue	What it carries	Direction
Xylem	Water and minerals	From the roots to the leaves
Phloem	Food made in the leaves	From the leaves to other parts of the plant

Figure 1. Xylem and phloem compared

3 Transpiration

Transpiration is the evaporation of water from the leaves. As water leaves, it pulls more water upward from the roots. This helps the movement of water and nutrients, cools the plant and keeps minerals flowing for growth.

The rate of transpiration is affected by temperature, wind, humidity and light. Plants have features that reduce water loss, such as a thick cuticle, small leaves and sunken stomata.

WORKED EXAMPLE

Why does a washed shirt dry faster on a hot, windy day, and how does this link to transpiration?

Water evaporates faster when it is hot and windy

Transpiration is evaporation of water from leaves

So temperature and wind both increase the rate of transpiration

TRY THIS

Look at plants and leaves around your school or home. Touch a thick leaf and a thin leaf and note which one looks built to lose less water. Also find a place where leaves are rotting and say which living things are breaking them down.

REMEMBER

- Heterotrophs feed on other organisms or organic matter for nutrients and energy
- Fungi and bacteria decompose dead matter and recycle nutrients into the soil
- Xylem carries water and minerals up from the roots; phloem carries food from the leaves
- Transpiration pulls water up the plant and cools it
- Temperature, wind, humidity and light affect transpiration
- Thick cuticles, small leaves and sunken stomata reduce water loss

? Check yourself

1. Name the tissue that carries water and minerals from the roots to the leaves.
2. What does the phloem carry?
3. What is transpiration?
4. List four factors that affect the rate of transpiration.
5. Give two plant features that reduce water loss.
6. A farmer near Feira notices that fallen maize leaves and old fruit in her field slowly disappear and the soil becomes richer. (a) Which living things cause this? (b) Explain why this is important for the plants she grows next season. (c) Say what happens to the nutrients in the dead matter.
7. Two bean plants are placed in the sun, one in a still, humid spot and one in a hot, windy spot. After a day the second plant has lost more water. (a) Which plant has the higher rate of transpiration? (b) Explain why using the factors that affect transpiration. (c) Name one feature that could help th

ANSWERS

1. Xylem.
2. Food made in the leaves, to other parts of the plant.
3. The evaporation of water from the leaves, which pulls more water up from the roots.
4. Temperature, wind, humidity and light.
5. Any two of a thick cuticle, small leaves, sunken stomata.
6. (a) Fungi and bacteria, which are heterotrophs. (b) They break down dead matter and return nutrients to the soil, which supports plant growth. (c) They are recycled back into the soil.
7. (a) The plant in the hot, windy spot. (b) Higher temperature and wind increase evaporation, while humid air slows it. (c) A thick cuticle, small leaves or sunken stomata.

Written by 25Schools to follow the Form 2 Biology syllabus of the Zambian competence-based curriculum. Free for learners to read, download and share. More notes and quizzes at 25schools.com.