

14.5 Tropic responses

Name: _____ Class: _____ Date: _____

Total: 19 marks

KEY WORDS shoot 嫩枝 • auxin 生长素 • tropism 向性 • phototropism 向光性
• gravitropism 向地性

Objective

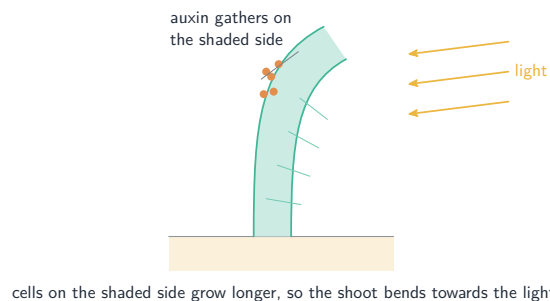
Build the skills to answer exam questions on **tropic responses** 向性反应 — **phototropism** 向光性 and **gravitropism** 向地性, and the role of **auxin** 生长素.

You must be able to:

- define phototropism and gravitropism
- describe how auxin controls a shoot's response to light
- predict the direction of growth

1 Worked examples

■ Phototropism and auxin



Auxin from the tip gathers on the shaded side; those cells grow longer, so the shoot bends to the light

- **phototropism:** growth towards light (shoots positive). **gravitropism:** roots down, shoots up.
- auxin made in the shoot tip; it makes cells elongate.

2 Practice

2.1 Define phototropism. [1]

2.2 State the direction a root grows in response to gravity. [1]

3 Exam-style questions

3.1 A shoot lit from one side bends towards the light because auxin: [1]

- **A** is destroyed by light
- **B** gathers on the shaded side and makes those cells grow longer
- **C** stops the shoot growing
- **D** gathers on the lit side

3.2 Auxin controls phototropism.

(a) State where auxin is made. [1]

(b) Explain how unequal auxin makes a shoot bend towards the light. [3]

3.3 A seedling was left in a box with a hole in one side, so light reached it from one direction only. After three days the shoot had bent towards the light and the root had grown straight down.

(a) Name the response shown by the shoot and the response shown by the root, and state whether each is positive or negative. [4]

(b) Explain, using auxin, why the shoot bends towards the light. [4]

(c) Explain how each response helps the seedling survive. [2]

(d) The tip of a second shoot was cut off before the experiment. Predict what happened to that shoot, and explain why. [2]

Solutions

2.1 a plant's growth response towards (or away from) the direction of light.

2.2 downwards (towards gravity).

3.1 B. Auxin gathers on the shaded side and makes those cells grow longer.

3.2 (a) in the shoot tip.

(b) light makes auxin spread to the shaded side; auxin makes those cells elongate (grow longer); so the shaded side grows faster and the shoot bends towards the light.

3.3 (a) The shoot shows **positive phototropism** — growth towards light; the root shows **positive gravitropism** — growth towards gravity. (Accept “negative phototropism” for the root only if the answer makes clear it is growing away from light.)

(b) Auxin is made in the shoot tip; it moves to the **shaded** side of the shoot, so more auxin collects there; auxin makes cells **elongate**, so the cells on the shaded side grow longer than those on the lit side; the uneven growth makes the shoot bend towards the light.

(c) Growing towards light means the leaves get more light for photosynthesis; growing downwards anchors the plant and reaches water and minerals in the soil.

(d) It grew straight up without bending; the tip is where auxin is made, so with the tip removed there is no auxin to build up on one side and no uneven growth.