

15.2 Control and coordination in plants

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

KEY WORDS gibberellin 赤霉素 • venus fly trap 捕蝇草 • auxin 生长素 • proton 质子
• germination 萌发

Objective

Build the skills to answer exam questions on **control and coordination in plants** — the **Venus fly trap** 捕蝇草, **auxin** 生长素 in elongation growth, and **gibberellin** 赤霉素 in germination.

You must be able to:

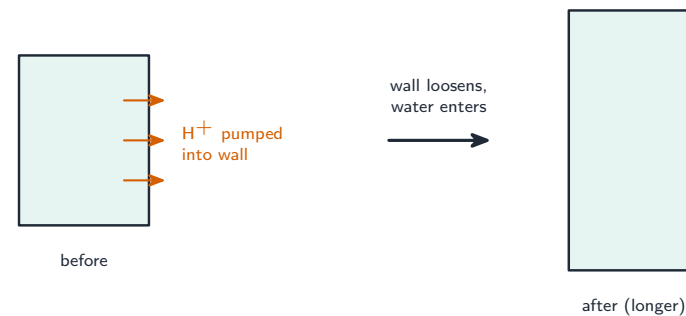
- describe the rapid response of the Venus fly trap and how the trap closes
- explain how auxin causes elongation growth by acidifying the cell wall
- describe the role of gibberellin in the germination of barley

1 Worked examples

■ The Venus fly trap

Touching the trigger hairs starts a fast electrical signal; cells rapidly lose water and change shape, so the trap snaps shut to catch the insect.

■ Auxin and elongation growth



Auxin's "acid growth": H^+ pumped into the wall loosens it, so the cell stretches as water enters

Auxin makes the cell pump **protons** 质子 (H^+) into the **cell wall** 细胞壁; this **acidifies** 酸化 and loosens the wall, so the cell can stretch as water enters — **elongation** 伸长 growth.

■ Gibberellin and germination

In germinating **barley** 大麦, gibberellin switches on the genes that make **amylase** 淀粉酶, which breaks down stored starch into sugars to feed the growing seedling.

2 Practice

2.1 Name the plant hormone responsible for elongation growth. [1]

2.2 State what gibberellin causes to be made during the germination of barley. [1]

3 Exam-style questions

3.1 How does auxin loosen a plant cell wall? [1]

- A by pumping protons (H^+) into the wall, acidifying it
- B by removing water from the cell
- C by adding cellulose to the wall
- D by closing the stomata

3.2 In germinating barley, gibberellin switches on the gene for: [1]

- A amylase
- B auxin
- C chlorophyll
- D rubisco

3.3 Explain how auxin causes a plant cell to grow longer. [3]

3.4 A seedling is given gibberellin and grows much taller than an untreated one.

(a) Suggest why the untreated seedling grew less. [2]

(b) Suggest **one** control the experimenter should include. [1]

Solutions

2.1 auxin.

2.2 amylase.

3.1 A. Auxin pumps H^+ into the wall, acidifying and loosening it.

3.2 A. Gibberellin switches on the amylase gene.

3.3 auxin makes the cell pump protons (H^+) into the cell wall; the acidified wall is loosened; so the cell stretches/elongates as water enters by osmosis.

3.4 (a) the untreated seedling may make less gibberellin itself, so less starch is broken down / less elongation occurs.
(b) e.g. treat with water only / same conditions otherwise.