

Exercises Plant Basics

1. Complete the two formulas and explain how they are connected:

- Photosynthesis: _____ + Water + _____ → Sugar + _____

- Respiration: Sugar + _____ → _____ + Water + Energy (ATP)

(Answer: Photosynthesis: Sunlight/light energy + Water + CO₂ → Sugar + O₂. Respiration: Sugar + O₂ → CO₂ + Water + Energy. They are opposite processes; photosynthesis produces the sugar and oxygen that respiration uses.)

2. Source to Sink

In early summer, sugar is produced in the leaves of a strawberry plant. Identify the SOURCE and the SINK for this sugar. Which tissue (xylem or phloem) transports it? Now, in late autumn, the root becomes a storage organ. Does it become a source or a sink?

(Answer: Early summer: Source = leaves, Sink = growing fruits/flowers. Transport via phloem. Late autumn: The root (now storing sugar for winter) is a sink.)

3. The Out-of-Order Code

The slides states: "The principal growth stages need not proceed in the strict sequence... but can occasionally also proceed in parallel." Can you think of an example?

(Example answer: On a cereal plant, the main shoot might be at the flowering stage (BBCH 60s) while new side shoots (tillers) are still in the leaf development stage (BBCH 10s). Stages 1 and 6 are happening in parallel on the same plant.

Potato: A potato plant doesn't complete one BBCH stage before starting the next. Multiple stages happen simultaneously on different parts of the plant.

- Above ground: Mature leaves are doing photosynthesis (Stage 1 function) while the plant is flowering (Stage 6).
- Below ground: At the same time, new tubers are actively swelling and growing (Stage 4 - yield formation).

So, one potato plant is in Stage 1 (leaf function), Stage 4 (tuber growth), and Stage 6 (flowering) all at once. The BBCH code describes each process separately, but in reality, the plant manages them in parallel.)

4. Decode the Stage

A wheat plant has emerged, and 5 leaves are fully unfolded on the main shoot. What is the principal growth stage (0-9)?

(Answer: Principal growth stage: 1 (Leaf development))

5. Logic Chain

Put the four main cultivation steps in the correct logical order

- Harvesting & Storage
- Sowing/Planting
- Plant Protection
- Fertilisation

(Answer: 1. Sowing/Planting (to establish the crop). 2. Fertilisation (to provide nutrients for growth). 3. Plant Protection (to safeguard the growing crop from threats). 4. Harvesting & Storage (to collect and preserve the yield at optimal maturity).)

6. The text mentions sensors for optimising fertilisation and plant protection. For one of these, propose:

- What could a sensor measure? (e.g., leaf colour, soil moisture)
- How would this data help the farmer make a better decision?

(Example answer for fertilisation: Sensor measures leaf colour/chlorophyll content (indicates nitrogen status). Data helps the farmer apply nitrogen fertilizer only when and where the crop actually needs it, saving costs and reducing environmental impact.)