Edexcel B Biology A-Level

Core Practical 4

Investigate the effect of sucrose concentration on pollen tube growth

The pollen tube is a path digested through the stigma of a plant by **hydrolytic enzymes** so the pollen grain can travel down the stigma and through the micropyle to the embryo sac and eventually to the **ovum for fertilisation**. The production of these enzymes is catalysed by the **pollen tube nucleus** in the pollen grain.

Equipment

- 2M sucrose solution
- Mineral salt culture medium
- Optical microscope
- Filter paper
- Stage micrometer
- Flowering plants
- Petri dishes
- Distilled water
- Measuring cylinder
- Stop clock
- Balance
- Scissors
- Forceps
- Mounted needle
- Pipette

Method

1. **Dilute the stock sucrose solution** to several set concentrations (e.g. 0.1M, 0.3M, 0.5M, 0.7M, 0.9M).
2. Place a moist piece of filter paper into a petri dish to form a **humid chamber**.
3. Put a few drops of sucrose solution and an **equal volume** of mineral salt medium onto a clean microscope slide.
4. Use a mounted needle to rub the anther of the flowers so they shed some **pollen** onto the microscope slide. Don't add a coverslip to prevent the conditions becoming anoxic.
5. Place the slides into the petri dish until it is time to observe them.
6. Start the stop clock. Place the slides under the microscope and use a calibrated **eyepiece graticule to measure pollen tube growth**.

Risk Assessment

Hazard	Risk	Safety Precaution	In emergency	Risk Level
Biohazard	Allergies; soil bacteria; contamination	Wash hands after practical	Seek assistance	Low
Cuts from sharp object	Take care when handling glass objects; keep away from edge of desk	Elevate cuts; apply pressure; do not remove glass from wound; seek medical assistance	Cuts from sharp object	Low
Scalpel	Cuts from sharp object	Cut away from fingers;use forceps to hold sample whilst cutting	Elevate cuts; apply pressure; seek medical assistance	Low

Graph

- Plot a graph of the **sucrose concentration** against **pollen tube growth.**

Conclusion

- As **sucrose concentration increases, mean pollen tube growth** also **increases** up to an **optimum**. After this point, as **sucrose concentration increases, mean pollen tube growth decreases**.
- This is because of the **osmotic effects** of increasing concentrations of sucrose.