AGES 14–18 · TEACHER PAGE

Design an investigation

Students design, carry out and evaluate their own investigation into a factor affecting plant growth.



3 sessions of 55 min, 4 weeks of growing | MAVA : HYDRO SLIM

KEY QUESTION **Which factor limits the growth of our lettuces?**

OBJECTIVES

1. Formulate a research question and a hypothesis.
2. Identify the independent, dependent and controlled variables.
3. Process and evaluate data: means, graphs, uncertainty.

MATERIALS

- The MAVA and lettuce or rocket plants of the same age
- To test the solution or pH: 1 L jars, net cups, nutrient solution
- pH meter or strips, scales to 0.1 g, ruler
- The pupil sheet

CURRICULUM LINKS

NATIONAL CURRICULUM	**KS4 · Photosynthesis**: factors affecting the rate of photosynthesis.
NGSS	**HS-LS1-5**: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
IB	MYP Sciences: criteria **B** (Inquiring and designing) and **C**; useful preparation for the DP scientific investigation

LESSON STEPS

1 **Observe** 20 min	On the tower, the plants are not all the same size. Students list possible factors: light, nutrients, pH, temperature.
2 **Design** 55 min	In teams: question, hypothesis, variables, at least 3 plants per condition, method. Ideas: top, middle or bottom of the tower (light); ½, 1 or 1.5 doses of solution (jars); pH 5.5, 6.5 or 7.5 (jars).
3 **Measure** 10 min / wk	Height and leaf count every week; fresh mass at the end of the experiment.
4 **Analyse** 55 min	Means, range, graph with error bars. Conclusion, limitations and improvements, presented on a poster.

ASSESS

A repeatable method, controlled variables identified, a conclusion based on the data, limitations discussed.

VOCABULARY

limiting factor, variable, control, replicate, mean, uncertainty

EXTENSION

Pool the teams' results in a class table.

⚠ **Safety :** Wear gloves when handling nutrient solutions; never mix solutions A and B undiluted.

AGES 14–18 · PUPIL SHEET

Design an investigation

NAME _____ CLASS _____ DATE _____

1 Research question

2 Hypothesis, with a reason

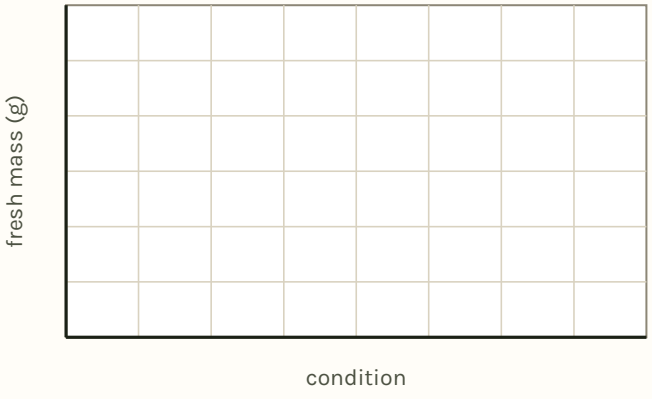
3 Variables

Independent variable	Dependent variable	Controlled variables

4 Method (summary)

5 Results: final fresh mass (g)

Condition	Plant 1	Plant 2	Plant 3	Mean	Range



6 Conclusion

7 Limitations and improvements