

Algal Blooms

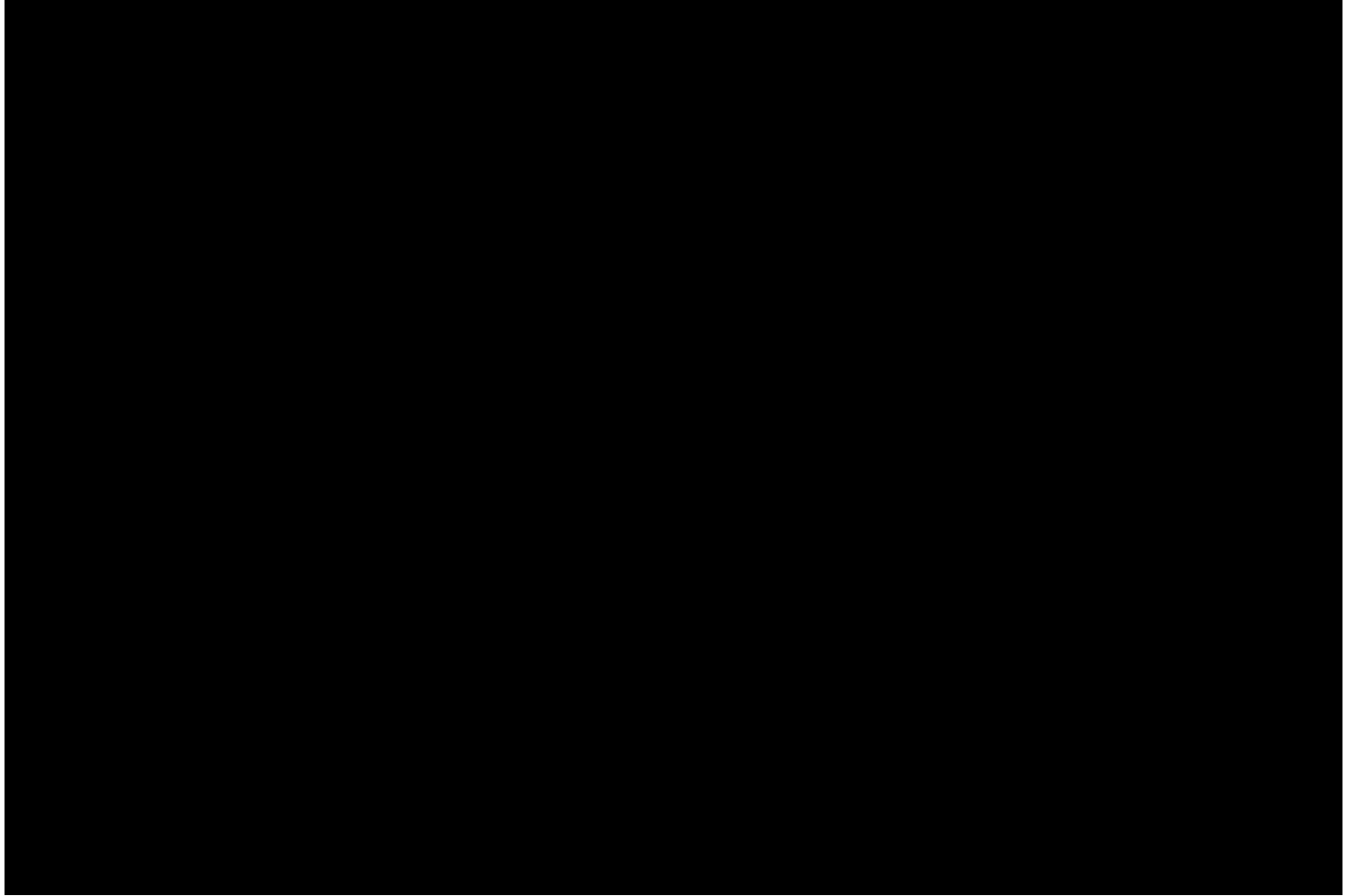


Algal Blooms

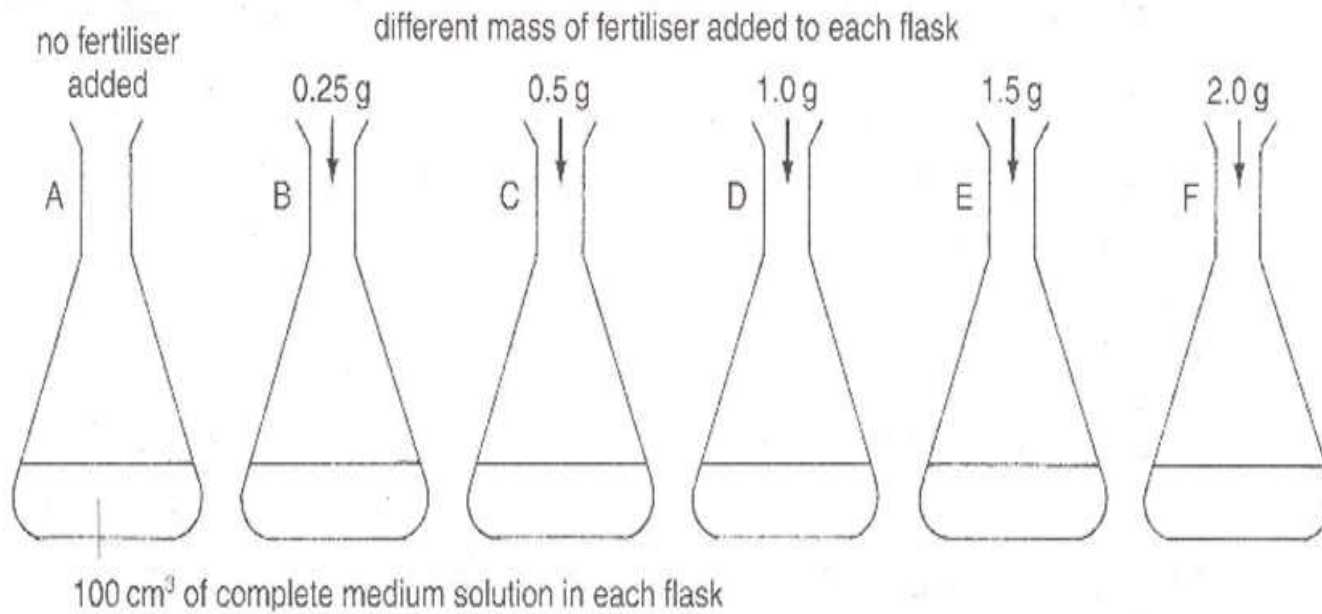
Learning Outcomes

- To describe the effects leaking of fertilisers can have in fresh water
- To explain the importance of minerals for plant growth

Algal Blooms



Effect of Nitrate on Plant Growth



Method

- 1. Add 100cm³ of complete medium solution to 6 individual flasks.
- 2. Add the different masses of nitrate fertiliser to each flask (see diagram of experiment).
- 3. Using a syringe add 3cm³ of algal suspension to each flask
- 4. Leave flasks in a warm environment under constant illumination (4 weeks).
- 5. Add distilled water as required (as water evaporates from flask).
- 6. Note appearance of plant population.
- 7. Filter contents.
- 8. Dry filter paper in oven till constant mass.
- 9. Record mass of algae.

Effect of Nitrate on Plant Growth

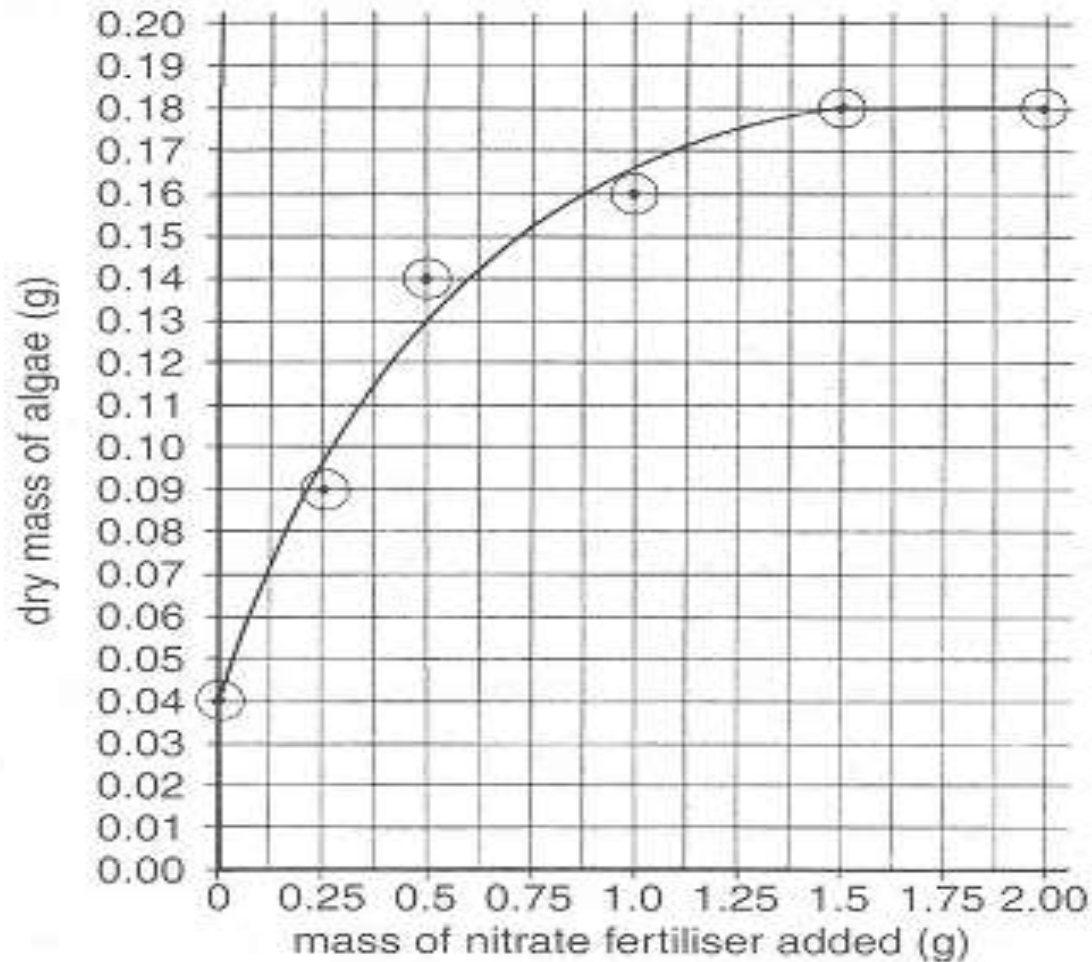
Results

Flask	Mass of nitrate fertiliser added (g)	Colour of solution in flask		Dry mass of algae (g)
		at start	after 4 weeks	
A	0.0	faint green	Yellow-green	0.04
B	0.25	faint green	dark green	0.09
C	0.5	faint green	dark green	0.14
D	1.0	faint green	very dark green	0.16
E	1.5	faint green	very dark green	0.18
F	2.0	faint green	very dark green	0.18

Conclusion

- As mass of nitrate **INCREASES** dry mass of algae **INCREASES** up to 1.5g. Beyond 1.5g of nitrate there is no further increase in the dry mass of algae.
- As mass of nitrate added increase the algae becomes **MORE GREEN** in colour

Graph of Algal Growth Results



Evaluation

Design Feature	Reason
use of complete medium solution	to supply plants with all the nutrients needed for growth
use of control flask	to check that the one variable factor under investigation is responsible for results
shake each sample vigorously	to disperse algae evenly
light intensity, temperature and volume of liquid kept equal for all flasks	to ensure that only one variable factor was being investigated
experiment repeated	to obtain more reliable results

Causes of Algal Blooms

Such blooms are a rapid increase in the population of algae. Generally, they are caused by **eutrophication** (an increase in nutrients in the water e.g. nitrogen and phosphorous) in rivers and lakes. **Human activities** are mostly responsible for the raising of nutrient levels in bodies of water. Lawn **fertilisers**, agricultural **manure**, **sewage** output and storm water are potential sources of additional nutrients.

When algal levels are raised there is potential harm for many other organisms. As the algae population increases they cover the surface of the water and block out light to organisms underneath. Much of the oxygen available to organisms is used up as the algae grow, utilising the extra nutrients available to them.

Causes of Algal Blooms

Sometimes they will produce toxic materials causing fish kills, human illness through shellfish poisoning, and death of marine mammals and shore birds. This population explosion is unsustainable, and eventually dies off, as they block out the light and use up all the oxygen. The algae sink to the bottom, and bacterial decomposition uses the remaining oxygen from the water.



Answers to Exercise

- Eutrophication is an increase in the nutrient levels in a water source.
- Nitrogen and phosphorous are the additional nutrients that can cause algal blooms.
- Lawn fertilisers, agricultural manure and sewage output are the causes of these levels rising.
- Algal blooms and bacterial decomposition are lowering oxygen levels.