

Photosynthesis in Ponds

Plants in water need to photosynthesise just like those on land. Rates of photosynthesis can be slower in water, however, as the levels carbon dioxide dissolved in the water can be variable.

This traditional experiment on the rates of photosynthesis in aquatic plants compares three common species. Although tricky to get right, when it works well, this experiment shows how effective plants can be at photosynthesis.

Resources

- Powerpoint presentation (see end of pdf)
- Teachers' notes to support the presentation (see end of pdf)



Pond plant race – Light levels and Photosynthesis

- Ponds are often surrounded by plant life and have green algae, lilies, and pondweed growing in them.
- Scientists who study the relationship between living things (Ecologists) often need to know why one type of plant lives in one place and another in a different place.
- Plants need light and the levels of light under water will vary depending on the time of day and time of year, clouds, the depth and how clear the water is (turbidity).



Click [here](#) to watch a short film introduction to ponds



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Starter: Which of the following do plants need and where do they get them?

Go to the next slide once you have answered the questions



Is it needed by plants?

YES

NO

YES	NO

Where does the plant get them from?

--

the right temperature

carbon dioxide

minerals

sunlight

water





Starter: Which of the following do plants need and where do they get them?



the right temperature

carbon dioxide

minerals

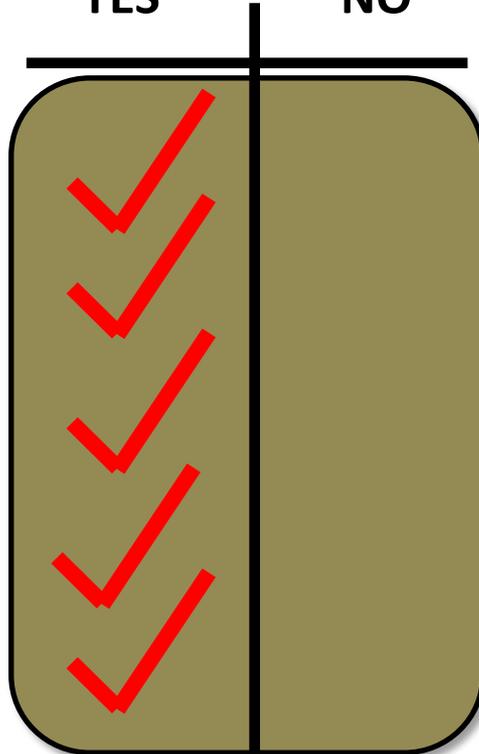
sunlight

water

Is it needed by plants?

YES

NO



Where does the plant get them from?

Atmosphere/water

From air into leaf through stomata

From the soil/water

From the sun

From the pond/soil





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Need to know beforehand:

When plant leaves absorb carbon dioxide from the air they combine it with water from the roots to make sugars for food but they usually have some left over oxygen so this is released out of the leaf. We can collect this oxygen to measure photosynthesis.

Challenge:

You are going to carry out an investigation to check which plants (e.g. pondweed or green algae or duckweed) can photosynthesise the fastest.



Equipment needed:

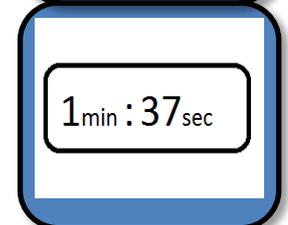
2 x Up-turned measuring cylinder or beaker with volume marks



2 x plastic or glass tub filled with water and 50g of pondweed or green algae



A stop watch with minutes and seconds to time the race.



Plastic gloves





Method:

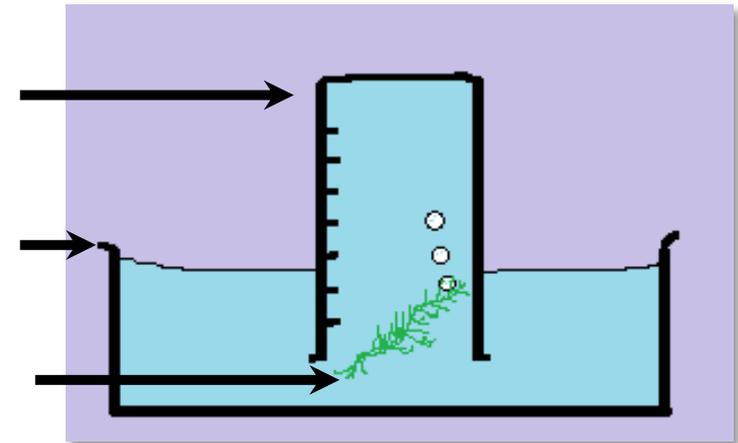
- 1) Gloves on to protect you while collecting plants/algae.
- 2) Half fill your plastic white tray/dish/tub with water.
- 3) Submerge your upturned measuring cylinder filling it with water while placing the pond plant/algae inside, then place the measuring cylinder upside down in the tub
- 4) Place all the plants in the same amount of sunlight
- 5) Start the stopwatch
- 6) Record how long it takes for the pond plant or algae to release 5ml of oxygen.
- 7) Repeat with the second type of pond plant or algae.



Measuring cylinder

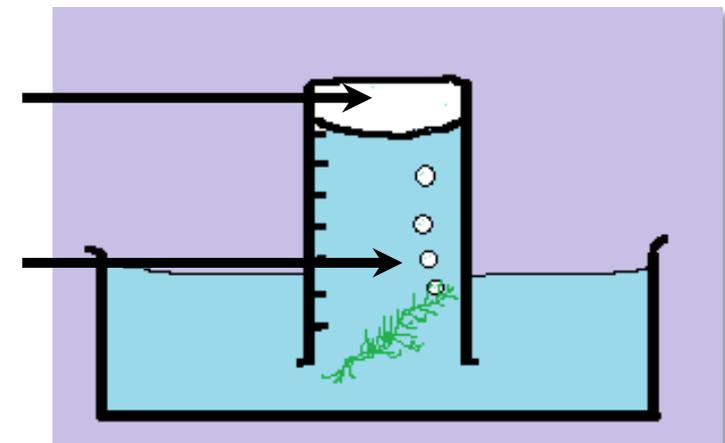
Deep plastic tub or tray

Pond plant/algae



Oxygen collects at the top of the measuring cylinder

Oxygen bubbles (a waste product of photosynthesis)





Results:

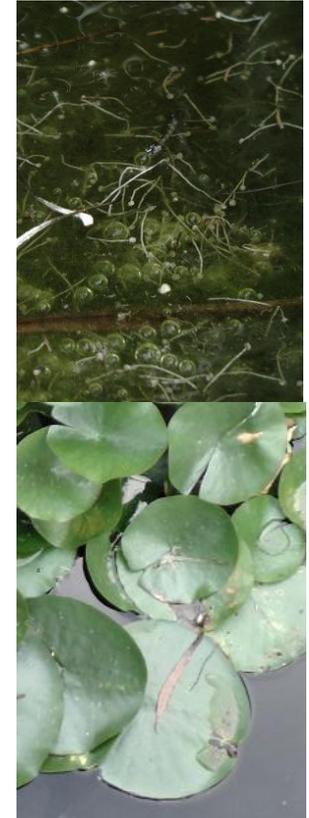
Record your results in table like the one below:

Type of plant	Time (Seconds)	Oxygen collected (ml)
Pondweed		5ml
Green Algae		5ml
Duckweed		5ml

Other variables to be kept the same: sunlight level.....

Conclusions

1. Do plants/algae photosynthesize at different speeds?
2. Why might this be?
3. What factors affect photosynthesis?
4. What factors (variables) should be kept the same when carrying out the experiment to keep it a valid test?





Pond Plant Race – Light Levels and Photosynthesis

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Age group: 12-16 years (the resource is adaptable for different levels as required by the facilitator)

Curriculum links and keywords: Plants, photosynthesis, aquatic life, adaptations

Group size: up to 30 students

Locations: anywhere with a pond or static water that is safe to access and a classroom

Time needed: 1 hour

Learning outcomes: For students to recognise that a variety of factors can affect photosynthesis.

Note: No specialist knowledge is required but students will need to have prior knowledge of how plants gain energy from sunlight.

Preparation: 2 x Up-turned measuring cylinder or beaker with volume marks

2 x plastic or glass tub, stop watch, plastic gloves, notebooks, pencils.

Activity

1) Open the PowerPoint included in this download

Basic info:

- Ponds are often surrounded by plant life and have green algae, lilies, and pondweed growing in them.
- Scientists who study the relationship between living things (Ecologists) often need to know why one type of plant lives in one place and another in a different place.
- Plants need light and the levels of light under water will vary depending on the time of day and time of year, clouds, the depth and how clear the water is (turbidity).

Slide 1: The PowerPoint begins with an introductory video clip to ponds (click on the link in the PowerPoint to open the video which is already loaded onto YouTube). To preview the clip see: http://www.youtube.com/watch?v=STaskXuUiQ&feature=channel_video_title

Slides 2, 3: Starter activity on limiting factors in plant/algal growth

Slide 4: Introduces the challenge activity where students carry out an investigation to check which plants (e.g. pondweed or green algae or duckweed) can photosynthesise the fastest. It includes a “need to know section” on basics of photosynthesis.

Slide 5: Challenge instructions and method.

Slide 6: Results section including conclusion questions.

Questions for students to consider:

1. Do plants/algae photosynthesize at different speeds?
2. Why might this be?
3. What factors affect photosynthesis?
4. What factors (variables) should be kept the same when carrying out the experiment to keep it a fair test?