

# Lemna Balloons project

**Question:** Is *Lemna minor* a good tool against eutrophication?

- ❑ **Scientific problem:** Studying the effect of nitrogen uptake efficiency on competitive outcome ~~between *Lemna minor* and *Chlamydomonas reinhardtii*~~
- ❑ **Variable:** Concentration of nitrate in freshwater
- ❑ **Constants:** Light, temperature, pH, amount of Lemna and algae, water
- ❑ **Objective:** Study the proportion of the algae individuals when they are in competition with Lemna for nitrates.

## MATERIAL:

- 30 x 50mL glass bottle
- Nitrogen NO<sub>3</sub> test JBL

*Chlamydomonas reinhardtii* cultures

*Lemna minor* 108

- Grid slide to count algae under microscope
- Scale with 1 µg precision
- Thermometers
- Luxmeter
- pH test
- Graduated cylinder
- Potassium/ Sodium nitrate
- Magnesium

## PROTOCOL

We chose to test 3 different concentrations of nitrates with 3 replicates, with 2 controls per concentration with 3 replicates for each.

Our controls would be:

*Chlamydomonas reinhardtii* /without /same concentration  
of nitrate

*Chlamydomonas reinhardtii* /with /same concentration  
of nitrate

In each beaker, for a determined concentration we will put 4 lentils with x concentration of algae. We will take the measure of nitrate before and after the experiment (or all along to observe the decrease).

Also, to pay attention about environment conditions we will measure continuously pH, *Chlamydomonas reinhardtii* concentration in the different beakers.

The goal of the experiment will be to compare the proportion of each individual in the environment when they are confronted to each other and when they will be alone in controls, defining a constant concentration of nitrates in the water.

We are planning to use 4 per beaker, which correspond to have 108 in total.

Wanted graphs: 1) Final concentration of algae in function of the concentration of nitrate 2) Final concentration of nitrates forecast the initial concentration of nitrates (both controls + experiment)

## **Ethical Concerns:**

- Lemna minor can suffer from too high concentration of nitrates. By varying initial concentration of nitrates, we may expose some of them to various ailment.
- If the hypothesis by which the algae are less efficient at uptaking nitrates, a lot of them will most likely die out of asphyxia.
- Nitrate in wastewater, if not treated, can have harmful consequences on the ecosystems in which they are dejected.

## **Measurements of parameters**

- ❖ Nitrate concentration:
  - At least 1 time per day - Nitrogen NO<sub>3</sub> Test
- ❖ Light:
  - 2 times per day - luxmeter
- ❖ Temperature:
  - 2 times per day - same thermometer
- ❖ pH:
  - 2 times per day - pH meter