

## Recipe for Lemna Lab

### Materials

The materials needed for this experiment will be determined by individual experimental designs.

### Procedure

Design an experiment to test the effect that varying the amount of one particular resource has on the population growth of Lemna. You can manipulate specific nutrients, such as phosphate, light levels, or surface area of the culture. For each set up, start with 15 plants and count the number of thalli on Day 7 and Day 14. Ideally, each experimental condition should be replicated at least 4 times, if space permits. Will you need a control? Use Table II to record your data.

**Nutrients:** Steinberg (1946, as cited by Clatworthy and Harper, 1962) studied the nutrient requirements of Lemna and developed an ideal culture solution:

$\text{KH}_2\text{PO}_4$	100 mg/l	$\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$	0.18 mg/l
$\text{KNO}_3$	350 mg/l	$\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$	0.18 mg/l
$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	100 mg/l	$\text{HBO}_3$	0.12 mg/l
$\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$	295 mg/l	$(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$	0.037mg/l
$\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$	0.76 mg/l		

The pH of the culture solution is adjusted to 5.2-5.3 by the addition of dilute HCl or KOH.

Any one of these nutrients could be manipulated by adding various serial dilutions of a stock solution of the nutrient to artificial pond water. The maximum concentration of any nutrient should not exceed 10X that recommended by Steinberg.

**Light:** Depending on your situation you could vary light levels by growing the Lemna cultures closer to a light source (a difference of six inches from a light source can be significant for Lemna growth), adding lights, changing photoperiod, or shading cultures with translucent material (e.g., plastic screening used in cross-stitch comes with various size holes at craft stores). You can use a light meter (hand-held or on a camera) to estimate actual or relative light levels.