Photosynthesis measurements of plants in the school garden

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Aim:

To offer a deeper knowledge about photosynthesis by measuring it with the instruments provided by the research institute.

Introduction

Evergreen trees or shrubs in school gardens fit very well with this project allowing students to carry out measurements during their school year and to observe the assimilation rate changing over seasons, winter included.

The scientist or his technician or assistant has to be present during data recording for any needs that may arise.

A fortnightly frequency would be great, but this can be difficult to do as the students need to be very available (but they could form groups and then spread the recording of the data between groups) and due to local meteorological conditions (measurements have to be taken in full sun, so southern countries where a high probability of good days exist fit pretty well with this kind of experiment).

Prior knowledge

A frontal lesson on photosynthesis process and instrument functioning is recommended before starting the experiment.

Materials

- Gas Analyser (we have CIRAS-1) to measure :
    - assimilation rate (μmol m^{-2} sec^{-1}),
    - cuvette humidity (%HR)
    - stomatal conductance (μmol m^{-2} sec^{-1})
    - leaf temperature (°C)
- Evergreen trees or shrubs (leaves must be easy to reach)
- PC for data recording and manipulation

Procedure

1. Select the species and which kind of leaves to be studied

2. Formulate a hypothesis on the behaviour expected (what should I see over seasons? how much is the photosynthesis rate during winter? is the leaf age an influencing factor on photosynthesis rate? is leaf position in the canopy relevant on leaf behaviour?).

3. Establish the frequency of the measurements and organise the surveys.

Measurements take ~30-60 minutes, depending on the number of replicates.

We suggest five measurements on leaves of different ages and different positions in the canopy (for example new leaves and 1 year old leaves in spring; sun leaves and shade leaves).

4. Using the CIRAS-1, record and save the data.

Downloading is done by the scientist. Data are then given to the students for the analysis.

5. Analyse the results and decide if your hypothesis was correct.

If the school is provided with a meteorological station, work with meteorological data and photosynthesis values.