

Instructions for measuring soil respiration in the lab (incubations)

Prep the soil

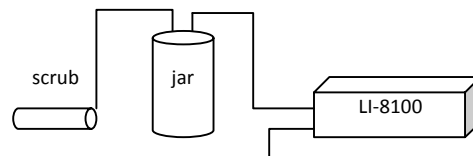
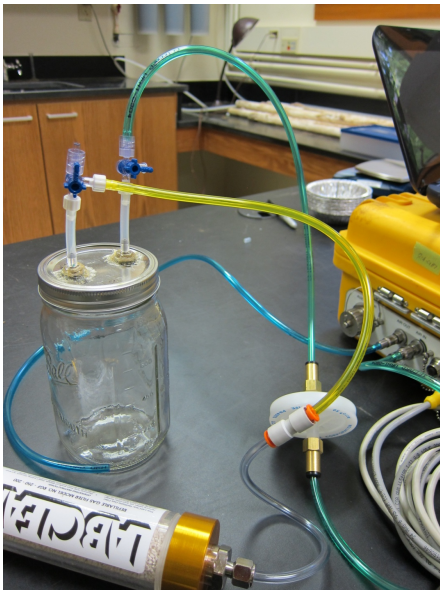
1. Record the weight of a 100mL glass beaker (I left out a field balance and some beakers in the lab),
2. Fill each beaker with field moist soil.
3. If you want to do any treatments (watering, adding sugar, or whatever), do it now.
4. Gently drop the beakers into the mason jars, and screw on the lids with valves. (At the end of the respiration measurements you can remove the beakers and dry the soils at 105C, in order to calculate the amount of respiration per gram dry soil.)

Prep the Licor-8100

1. Get a Licor battery off the charger in the lab. Power-up the LI-8100 and allow it to warm-up for about 15 minutes.
2. If the soil chamber is attached to the LI-8100, remove the 3 hoses and the chamber data cable. Attach the green hose with the filter to the air inlet, and the blue hose to the air outlet.
3. Establish communication with a laptop using the Licor data cable and the LI-8100 software.

Scrub out CO₂ from the jar headspace:

1. Attach the soda lime canister to one of the jar valves, as shown in the picture below, to flow air from the canister, through the jar, and to the Licor. The Licor outlet can remain unattached to vent to atmosphere. Note the position of the valves in the picture. It's worth studying the valves briefly to see how they work: 2 sides are always open while 1 side remains closed.

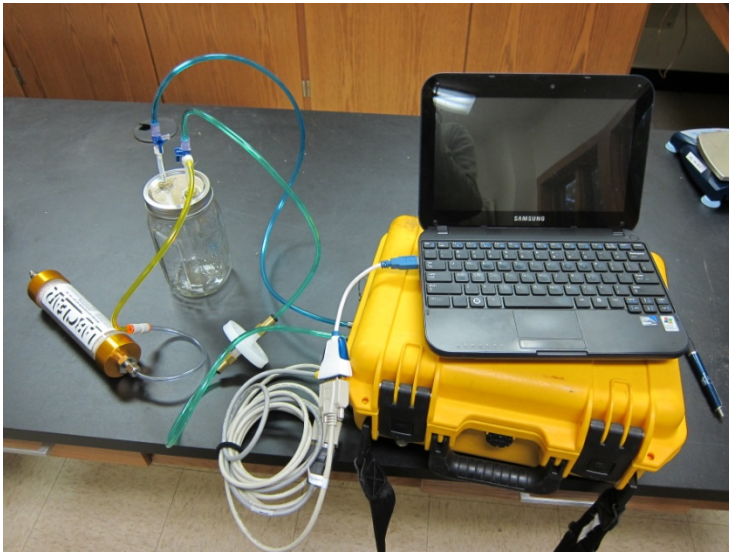


2. Monitor the CO₂ concentration of the Licor, and close off the jar valves when the CO₂ reaches zero or won't draw down any further. Close-off the jar by turning the long handle to the down position. (Note that the Licor pump will continue drawing atmospheric air through the open side of the valve. This is intentional: by using 3-way valves the pump should never have to draw against resistance.)
3. Record the starting time when the jars are closed. (Why? Because we want the *rate* of CO₂ evolution.)

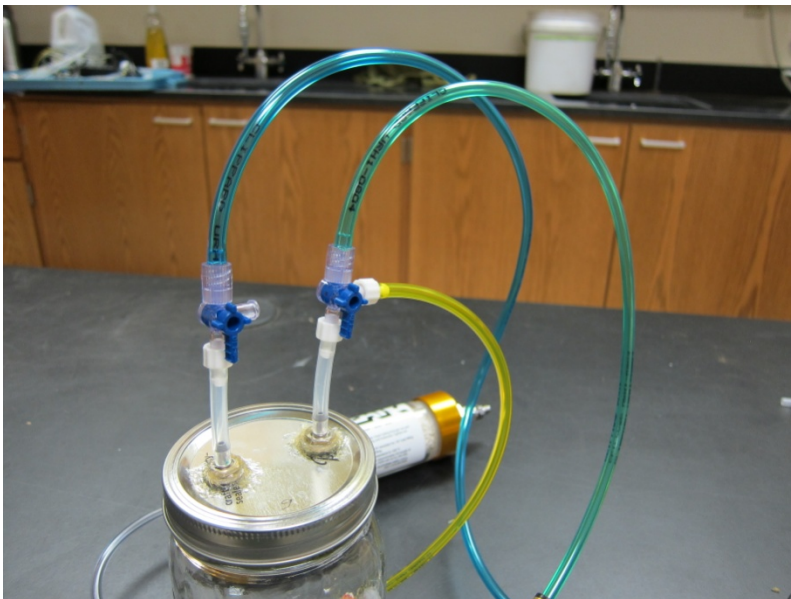
Wait for CO₂ to evolve...you can speed this up by setting the oven to 30C. Or by starting with more soil. Overnight is probably best.

Measuring headspace CO₂ concentration

1. Get the Licor up and running again.



2. Set up the tubing as shown below. This will draw air from the soda lime canister and flush the lines of any CO₂



3. When the lines are free of CO₂, switch the valves to circulate air between the jar and the Licor.



4. Record the measurement time.

Calculations

1. Determine the headspace volume (=jar volume-100mL-approx.30mL tubing&IRGA volume)
2. Determine the g of CO₂ present at each measurement by multiplying the concentration by the volume (ppm = ug/mL)
3. Calculate respiration rate as mg CO₂ produced per hr per g soil.