

Microcosms platform data sheet

The Microcosms platform of the Montpellier European Ecotron is a 70 m² L2 laboratory which will house 12 identical and independent growth chambers. These customised growth chambers can be used as experimental units with artificial light and a single 1 m² layer of photosynthesising ecosystem. This layer can be composed of one or several growth units. If composed of several units, gas exchange of these units can be measured with a customised chamber connected to a LiCor 6400 gas analyser. Alternatively, the 12 growth chambers can be used as incubators for a large number of smaller non-photosynthesising microcosms. These smaller non-photosynthesising microcosms can be, on a turn, inserted in 6 gas exchange chambers located in an additional growth chamber and connected to gas analysers. Each growth chamber has a volume of 2 m³ and an external zenithal light compartment which can house various types of lamps (plasma lamps, modular spectrum LED lamps ...). The growth chamber prototype will be delivered in December 2013 and the 12 units in spring 2014.

Figure 1. Left: the Microcosms platform with temporary growth chambers. Right: the additional growth chamber hosting the gas exchange units for non-photosynthesising microcosms. Photos D. Landais.



Table 1. Major characteristics of the Microcosms platform at the Montpellier European Ecotron

Microcosms – Montpellier European Ecotron (see www.ecotron.cnrs for more details)	
General characteristics	
Design	Set of environmentally controlled growth chambers to be used as experimental units or as smaller microcosms' incubators. They are designed with an outside zenithal light compartment which can house various types of lamps (plasma lamps, modular spectrum LED lamps, ...)
Dimensions	1.5 x 1.45 x 2.16 (LxWxH) Cultivation area 0,95 m ² (square); height 1,5 m A lifting table will allow keeping the top of the canopy at a given distance from the lamps.
Replicates	12 independent experimental units
Confinement	Controlled air renewal (maximum 2 m ³ /h)
Environment control – continuous automated control	
Air temperature	+5 °C to +50 °C (± 0.5°C)
Air humidity	40 % to 90 % RH (± 3 %)
Soil moisture	Automated watering (drip irrigation)
Lighting	Plasma lamps with solar-like spectrum: 500 µmol/m ² /s at 40 cm LED lamps with modular light spectrum: 1000 µmol/m ² /s at 50 cm (Heliospectra)
Atmospheric chemistry control – continuous automated control	
CO ₂	Daytime: 380- 2000 ppm ± 10 ppm (lower level dependent upon photosynthesis) Night time: control only above 500 ppm
¹³ C	¹³ C enrichment with injection of ¹³ CO ₂
Environmental measurements	
Light	Quantum sensors
Temperature, RH	PT100, RH and T probes (Michell)
CO ₂	LiCor 7000
¹³ C	Picarro G2101 (if not used on the other platforms)
Mobile instrumentation	
Light	Spectrometer (Jaz Ocean Optics)
Wind	Hot wire anemometer (Ahlborn)
Canopy structure	SunScan (DeltaT)
Leaf gas exchange chlorophyll fluoresc.	Portable gas exchange system with leaf chambers and fluorescence system (LiCor 6400)
Water potential	Pressure chambers (2) (PMS Instrument)
Stomatal conductanc	Porometer (SC1 Decagon)
Leaf area	Bench belt leaf area meter (LI3100-C LiCor)
Study systems	
Reconstructed ecosystem	Ecosystems more or less complex
Non-photosynthetic microcosms	Soil ecosystems in smaller microcosms (up to 60 per chamber)
Populations	Population of small animals with or without plants can be raised in the chambers