Ecolab datasheet - CEREEP-Ecotron IleDeFrance

Summary and figures

The Ecolab is a modular structure coupling together three environmental chambers and one laboratory room (see Figure 1 below). Each environmental chamber (13 m^3 and 5 m^2) can be independently controlled accurately for realistic climate and atmospheric conditions (air temperature and humidity, air CO_2, O_3 and O_2 content, plasma and LED lighting). A mesocosm (1 m^3) with temperature-control on three independent levels makes it possible to incubate natural or artificial ecosystems. This mesocosm can host both terrestrial and aquatic organisms and ecosystems (see specification table below for more technical details). A set of 5 Ecolabs are available on site, which makes up a total of 18 fully independent, environmental chambers for replicated experiments.

Figure 1. Photographs of existing facilities at Ecotron IleDeFrance. Top, aerial view of Ecolab currently installed on the new platform – closed environmental chambers are isolated from the outside and can be fully controlled independently from each other. Left, internal view of one environmental chamber where a mesocosm with 4 soil lysimeters is installed. Right, a powerful light source in function above several plants. All photographs © CNRS UMS 3194.

Specification table of Ecolab (Ecotron IleDeFrance)

	Ecolab **Ecotron IleDeFrance**
General characteristics	
Design	Three independent climate chambers around a laboratory room
Dimensions	Climate chamber: 13 m^3, 5 m^2 and 2.2 m height Mesocosm: 1m^3 and 1,3 m^2
Replicates	15 climate chambers
Confinement	Closed and controlled environment facility Stainless steel mesocosm for aquatic and terrestrial communities, including small vascular plants and small top predators
Climate control - continuous time control	
Temperatures	-13°C to +47°C (± 0.2 °C) – continuous time control Independent temperature control of the mesocosm at 3 depths
Humidity	0.8 g water per kg air (-8°C) to 113 $g.kg^{-1}$ (50°C) equivalent to a range of relative humidity of 7-100%
Rainfall	Control of rainfall quantity, water temperature and quality, droplet size
Lighting	Modular LED-lighting including 7 individually powered controlled waverlenghts (max.: 400 $\mu mol.m^{-2}.s^{-1}$ at 60 cm). Plasma lighting with full solar spectrum (max.: 500 $\mu mol.m^{-2}.s^{-1}$ at 80 cm), can control power from 60 to 100 % without changing spectrum. Other classical technologies (LED bulbs, neons, sodium lamps) available on demand.
Pressure	Uncontrolled (± 1000 Pa) or strictly controlled (under test)
Atmospheric control - continuous time control	
CO_2	50-20,000 ppm ± 3 ppm (injection and absorption controlled by mass flow meters)
O_3	0-2000 ppb range (installed in 3 climate chambers)
O_2	4000 -21,000 ppm ±100 ppm (downward control, substitution with nitrogen)
Instrumentation	
Mesocosm	SCAIME sensors for continuous measurement of weight. Collection of leachates.
Atmosphere	Climate and gaseous measures : Pt100 for temperature ; Rotronic HF53/46 HC for hygrometry ; LICOR LI820 for CO2 ; CTX 300 for O2 ; Chromato Micro GC CP4900 for N2, O2, C02, CH4 analysis ; Jumo 40 for pressure ; 2BTech Model 306 for O3 monitor
Light	Pyranometer Apogee SP214, Mightex and JAZ spectrophotometers.
Rainfall	Laser disdrometer.
Soil	Decagon MAS1 for soil moisture, Pt100 for temperature, Prenart Super Quartz for water solutes sampling, porous tubes and manifold for gas sampling and analysis (currently equipped with Vaisala sensors GMM220 for CO2).
Study systems	
Plants	Up to small vascular plants as high as 40-100 cm above ground
Animals	Up to small animal predators including insects or fishes
Communities	Aquatic and terrestrial communities including soil-plant compartments, freshwater ecosystems or marine ecosystems

References

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