Greenhouse - CEREEP-Ecotron IleDeFrance

Technical specifications of the experimental greenhouse

The experimental greenhouse is composed of a technical hall (123m² ground) and two work spaces, research and production areas (204.8 m² each).

The research area is divided in 2 compartments of 48m² separated by the hallway. Each compartment can be subdivided in 3 cells (4 m L × 4 m l × 3 m H) made of insect proof nets (stitch 0.9mm, light transmission 85 to 90%). There are 3 removable culture boards (1.10 x 3.30 m) in each cell. Each compartment has a heating/cooling system obtained by heat pump, a humidity control by fog, a sprinkler system and photosynthetic lighting in each cell. A sheath in each cell allows heating or cooling by air blowing. Watering is done by drip or sub-irrigation with tap water. The lighting in the cells is ensured by classic sodium lamps on top of the cultures. The light period can't be shorter than daylight but can be longer with the lamps. Light usable for plants can't be less than sunlight but can be more with lamp.

The production area is composed of 8 culture boards in half of space, the other half is open to different types of experimentation. Watering in culture boards is done by drip.

Watering can be completed by manual spray as well as fertilization if necessary, in both areas.

The technical hall shelters the supervision system of the greenhouse and has room to work and for storage. A nursery and a heating culture table are available to prepare and germinate plants.

Figure 1. Photographs of existing facilities at CEREEP. Top, aerial view of the platform. Bottom, inside views of, left, production area and, right, research area. © CNRS UMS 3194.

Specification table of Greenhouse (CEREEP)

	Research area **CEREEP**
General characteristics	
Dimensions	204.8 m²
Confinement	2 insect proof nest (stitch 0.9mm, light transmission 85 to 90%) compartments divided in 3 cells each (4 m L × 4 m l × 3 m H)
Weather control	
Temperature	Colling system in the Summer and heating in the Winter Summer: around 25 to 30°C Winter: 5 to 15° C
Humidity	Humidity controlled by fog
Irrigation	Drip or Sub-irrigation
Light	Photosynthetic light with classic sodium lamps
Instrumentation	
Weather conditions	Temperature, humidity and light are measured with sensors included in each compartment
Study systems	
Plants	Any plant can be grown if it supports cool weather in winter and hot in the summer
Animals	Pollinators can be studied thanks to the insect proof nets of each cell
	Production area **CEREEP**
General characteristics	
Dimensions	204.8 m²
Confinement	No confinement other than the greenhouse itself. No insect proof nest in the lateral windows
Weather and habitat control	
Temperature	Only heating system in the Winter, no cooling other than the air through the openings in the Summer Winter: 5 to 15° C
Humidity	No humidity control
Irrigation	Drip irrigation
Light	No photosynthetic light
Instrumentation	
Weather conditions	Temperature, humidity and light are measured with sensors included in each compartment
Study systems	
Plants	Any plant can be grown if it supports cool weather in winter and hot in the summer and no photosynthetic light
Animals	Fish or other small animals that can be kept in small aquaria or enclosures/boxes/cages
	Technical hall **CEREEP**
General characteristics	
Dimensions	123m²
Material	
Culture board	2 culture boards are available for seedling
Germination board	A heating germination board is available
Germination room	A temperature controlled room is available for germination and algae culture

Weather conditions	Temperature, humidity and light are measured with sensors included in each compartment

References and key publications

1. Flacher, F., **Hansart, A.**, Motard, E., Fofana, A. M., Vincent, O., Geslin, B., Dajoz, I. and X. Raynaud (2017) Does competition with wind-pollinated species alter Echium plantagineum's attractiveness to a common pollinator *Bombus terrestris*?. Ecological Entomology **42**(5): 617-628.

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4. Sotton, B., Paris, A., Le Manach, S., Blond, A., **Lacroix, G., Millot, A.,** Duval, C., Qiao, Q., Catherine, A. and B. Marie (2017). Global metabolome changes induced by cyanobacterial blooms in three representative fish species. Science of the total environment **590-591**: 333-342.

5. Sotton, B., Pari,s A., Le Manach, S., Blond, A., **Lacroix, G., Millot, A.,** Duval, C., Huet, H., Qiao, Q., Labrut, S., Chiappetta, G., Vinh, J., Catherine A. and B. Marie (2017) Metabolic changes in Medaka fish induced by cyanobacterial exposures in mesocosms: an integrative approach combining proteomic and metabolomic analyses. Scientific Reports **7**: 4051.