

## BASIC EQUIPMENT

### BIO-OPTIC

- Eldonet radiometers (4) included in the European (ELDONET) and Andalusian UVR-PAR (UVIFAN) network <http://uvifan.scai.uma.es>.
- Multifilter PAR/UV Radiometers PUV 500/510 y NILU UV-6 (5).
- Multidiode Spectroradiometers Sphere Optics-SMS 500 (1) and Ramses- TRIOS UV and Trios-VIS (6).
- Radiometer Macam (3) with broadband UVA, UVB and UVC sensors.
- Oriel Solar simulator (2).
- Calibrator of PAR and UVR radiometers and spectroradiometers (Licor Li-1800/02).
- UV Radiation lamps: Philips TL12 and Q-Panel 340.
- PAR Radiation lamps : TrueLite, High pressure lamps.

### BIOTECHNOLOGY

- In vivo chlorophyll a fluorescence PAM fluorometers (PAM 2000, Diving-PAM (9), Water-PAM, Junior-PAM/B and JuniorPAM/WL).
- High-performance liquid chromatography HPLC Water-600 (7).
- Gas Chromatography LINDE- GC FOCUS Series (8).
- Ionic Chromatography Metrohm 883 Basic IC Plus (10).
- OBD equipos WTW- Oxitop IS6.
- Cultivation Chamber CANDY CCV 150 EU WM1-15.

## PHOTOBIOLOGY SERVICE

•Scientific Responsible: Professor Dr. Félix López Figueroa. Coordinator of the Research Group RNM-295. Department of Ecology and Geology. Faculty of Sciences. Málaga University  
Email: [felix\\_lopez@uma.es](mailto:felix_lopez@uma.es)

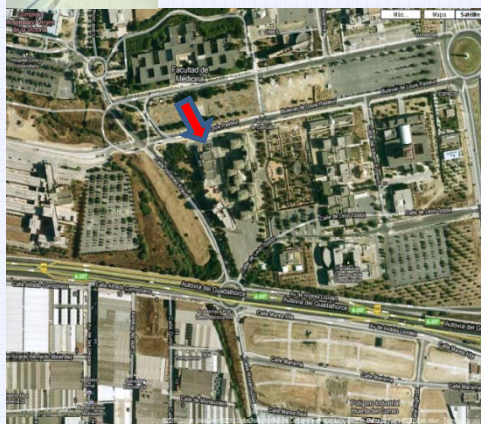
•Technician Responsible: Dr. Francisca de la Coba Luque. Email: [pdlacoba@uma.es](mailto:pdlacoba@uma.es)

•Technician of Aquaculture Production: David López Paniagua.

Central Research Services (SCAI).  
Boulevard Louis Pasteur, 33. Campus of Teatinos.  
University of Málaga  
29071 Málaga  
Tfno. **952133337**  
**952131672**  
Fax: 952132376



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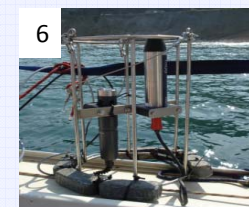
## Laboratory of Photobiology Scientific and Technological Services

### Photobiology and Biotechnology of Algae



## Bio-optic and radiometry

- **Calibration of radiation instruments.** Licor 1800 Optical Calibrator (periodic lamp revisions in the INTA, Mazagón, Spain).
- **Quality control of artificial UV radiation lamps** in tanning sunbeds.
- **Daily data of photosynthetic solar radiation** (PAR,  $\lambda=400-700$  nm) , UV-A ( $\lambda=315-400$  nm) and UV-B ( $\lambda=280-315$  nm).
- **Effective radiation and UV Index** (erythemal radiation).
- **Spectral characterization of artificial lamps and cut- off filters.** Advice about illumination systems applied to aquaculture (algal biomass) and recreational aquaria.



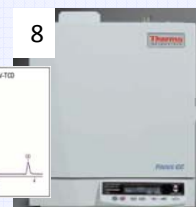
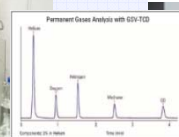
## Alga and bioactive substance characterization

### ALGAL SAMPLES:

- **Evaluation and quantification of pigments and sunscreen molecules by HPLC:** chlorophylls, phycobiliproteins, phenols, carotenoids and mycosporine-like amino acids (MAAs).
- **Determination of fatty acids by Gas chromatography.**
- **Extraction and purification of acid and neutral polysaccharides.**
- **Antioxidant enzyme activities:** Superoxide dismutase (SOD), catalase (CAT), glutathione reductase (GR), glutathione peroxidase (GPx), ascorbate peroxidase (APx).

### BIOACTIVE SUBSTANCES:

- **Photoprotection capability:** *in vitro* determination (Diffey Assay).
- **Global antioxidant activity** : scavenging of hydro and organic soluble radicals (DPPH and ABTS /H<sub>2</sub>O<sub>2</sub>/ HRP and ABTS/S<sub>2</sub>O<sub>8</sub>K<sub>2</sub>) and inhibition of lipid peroxidation.
- **Protein damage**
- **Immunomodulation assays:** evaluation of the expression of TNF- $\alpha$ , IL-6, IL-10 cytokines among others in mouse macrophages by using ELISA.
- **Evaluation of antitumor activity** of different natural extracts (algae) and new design molecules, according to the National Institute of the Cancer (INC) of USA normative.



## Biofiltration of effluents by using algae

- **Physical-chemical characterization of effluents:** anions (F<sup>-</sup>, Cl<sup>-</sup>, NO<sub>2</sub><sup>-</sup>, Br<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, PO<sub>4</sub><sup>3-</sup>, SO<sub>3</sub><sup>2-</sup>) and cations (Na<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, K<sup>+</sup>, Mg<sup>2+</sup>, Ca<sup>2+</sup>) by **ionic chromatography (10)**, OBD, total solids, solids in suspension, pH and oxygen.
- **Isolation and selective growth of different biofilter alga strains** adapted to different conditions. Creation and maintenance of collection of biofilters.
- Evaluation of the **physiological status** of the biofilter algae based on *In vivo* Chl a fluorescence associated to Photosystem II (PAM fluorescence) (9).
- **Production and maintenance of algal biomass** algal using outdoor tanks and flat photobioreactors.
- **Biotechnological evaluation of seaweed biomass** as source of substances with cosmeceutical (photoprotectors and antioxidants), aquacultural (immunostimulants and functional food) and energetic (biodiesel) application.

