

Detailed programme of the training at **the Laboratory of Biotechnology of Algae.**

Dpt. of Chemistry. Faculty of Experimental Sciences. University of Huelva.

Number of students	1
Duration in month	From 3 months to 1 year
Starting date	Whole year through (except august)
Closing date	Whole year through
Task Description:	<p>Our lab goal is to provide students a variety of techniques in the field of bioproduction of antioxidants from microalgae. The aim of our research is to define conditions which enhance biosynthesis, promote accumulation and address full biocompatible extraction of carotenoids antioxidants from different microalgae (<i>Chlamydomonas acidophila</i>, <i>Nannochloropsis gaditana</i>, <i>Dunaliella salina</i> among others).</p> <p>We always encourage students to get involved in our projects under supervision and then focus in on ones that are the most interest to them.</p> <p>Laboratory equipment and techniques used :</p> <p>Cell microalgae cultures: Growth chamber for photosynthetic microorganisms with controlled temperature and different type and quality of light. Optic microscopy to observe cellular growth. Hoods with laminar flux. Autoclave for sterilization processes.</p> <p>Protein purification: Refrigerated chamber (4°C). Purification systems (chromatographic columns, peristaltic pumps, collector of fractions). Chromatographic system for protein purification (FPLC).</p> <p>Separation and quantification of target compounds: Chromatography techniques (HPLC with fluorescence and UV-vis detector). UV-visible spectroscopy</p> <p>Continuous long-term cultures: 5-liters bioreactor with pH, T^a and oxygen probe. Software for an automatic continuous control of the reactor.</p> <p>Determination of cellular viability: Oxygen Clark electrode. PAM system for determination and quantification of chlorophyll.</p>
Other qualifications/comments	Not required
Computer skills	Not required
Language skills	Knowledge of spanish is not required. (we speak english and french)
Preferred field of training	Chemistry, Biology, Environmental Sciences, Food Sciences, Biochemistry
Contact person for this offer	
Title	PhD Associate professor
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Training of 3 months

Week 1 Bibliographical review

Week 2 Optimization of culture medium and growth of *Chlamydomonas acidophila*, *Nannochloropsis gaditana*, *Dunaliella salin* and determination of cellular viability with Oxygen Clark electrode and PAM system for determination and quantification of chlorophyll.

Week 3 HPLC techniques for lutein and β -carotene separation. UV-visible spectroscopy

Week 4-7 Culture and accumulation of lutein in *C. acidophila*/ *N. gaditana*/ *D. salina* under different nutritional stress conditions (nitrogen, sulfur, UV radiation, pH, heavy metals). Proposal of best conditions to produce highest amounts of lutein.

Week 8-10 Proposal of long-term processes with lab scale reactors for continuous production of lutein in bioreactors. 5-liters bioreactor with pH, T^a and oxygen probe. Software for an automatic continuous control of the reactor.

Week 11-12 Final analysis and discussion of results. Proposal and final report.

Training of 6 months

Week 1 Bibliographical review

Week 2-3 Optimization of culture medium and growth of *Chlamydomonas acidophila*, *Nannochloropsis gaditana*, *Dunaliella salin* and determination of cellular viability with Oxygen Clark electrode and PAM system for determination and quantification of chlorophyll.

Week 4-5 HPLC techniques for lutein and β -carotene separation. UV-visible spectroscopy

Week 6-9 Culture and accumulation of lutein in *C. acidophila*/ *N. gaditana*/ *D. salina* under different nutritional stress conditions (nitrogen, sulfur, UV radiation, pH, heavy metals). Proposal of best conditions to produce highest amounts of lutein.

Week 10-13 Proposal of long-term processes with lab scale reactors for continuous production of lutein in bioreactors. 5-liters bioreactor with pH, T^a and oxygen probe. Software for an automatic continuous control of the reactor.

Week 14-16 Electronic Microscopic studies of ultrastructural changes induces by oxidative stress in microalgae cells of *Chlamydomonas*, *Dunaliella* and *Nannochloropsis*.

Week 17-21 Microalgae cultures in *outdoor* reactors using best conditions obtained at lab scale reactors. Production of lutein/ β -carotene using optimal conditions obtained in weeks 6-9 and 10-13.

Week 22-24 Final analysis and discussion of results. Proposal and final report.

