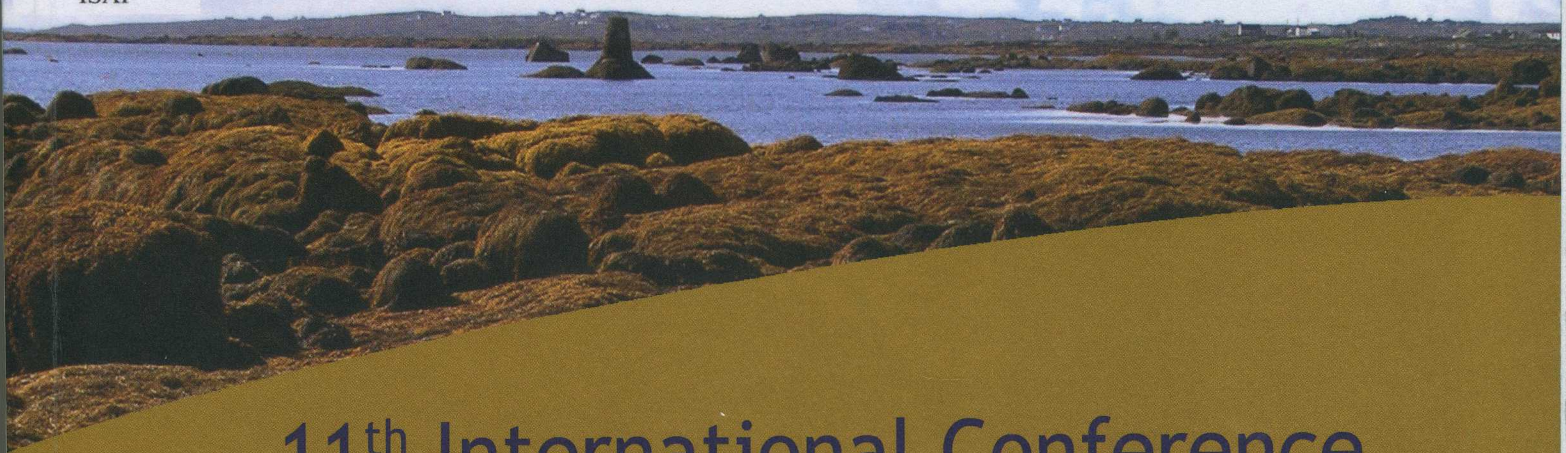
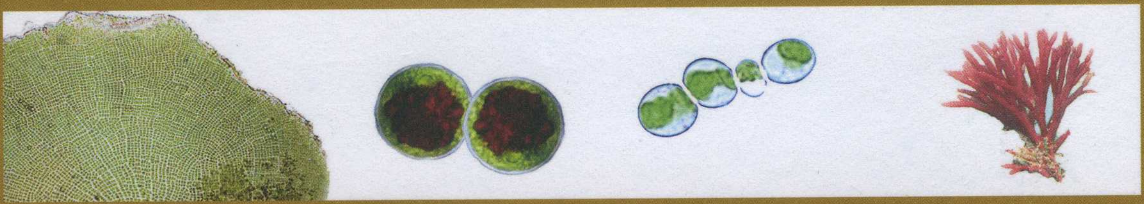


11th International Conference on Applied Phycology,

Galway, Ireland, June 21-27, 2008

Applied phycology in the 21st century; novel opportunities in a changing world

Program & Abstracts



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algal N and P contents increased up to maximums of 7% N and 1% P. Although variable, algal N and P accounted for roughly 70-90% of input N and P at loading rates below 1 g TN, 0.15 g TP m^{-2} d^{-1}. N and P recovery rates decreased to 50-80 % at higher loading rates. There were no differences in algal productivity or N and P recovery values from raceways with carbon dioxide supplementation compared to values from raceways without added carbon dioxide.

119. INTERACTING ENVIRONMENTAL FACTORS DETERMINE BIOREMEDIATION EFFICIENCY OF TROPICL GREEN MACROALGAE.

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Nutrient discharge is an important limitation to aquaculture production but seaweed bioremediation has the ability to resolve this waste issue. We investigated the bioremediation efficiency of six *Caulerpa* species from tropical Australia by examining the interactive effects of environment on their growth and nutrient uptake. Preliminary experiments determined interactive effects between species and nutrient load (1.5 vs 5 mgN L^{-1}) but not nutrient type (NO_3^- vs NH_4^+). Growth rates generally increased with nutrient load for all species except *C. lentillifera*. However, two species (*C. serrulata* and *C. sertularioides*) were eliminated from further trials due to poor survival. When cultured in salinities from 15 to 45‰, survival was high for *C. taxifolia*, *C. cupressoides* and *C. racemosa* between 20 and 45‰ and limited to 20 to 35‰ for *C. lentillifera*. In a comprehensive three-factor design testing the interactive effects of temperature, salinity and light it was clear that *Caulerpa* species responded uniquely to various combinations of environmental factors. This impacted on their growth, and importantly on their internal nitrogen content. Significant interactions existed between salinity (25‰ vs 35‰) and temperature (24°C vs 30°C) for *C. lentillifera* and *C. racemosa,* and between salinity and light for *C. lentillifera*. Overall, salinity had the greatest effect on growth, with optimal performance for all species at 35‰. Under optimal conditions the growth rate of *C. racemosa* was twice that of other species. However, the four fold increase in nitrogen content in *C. cupressoides*, combined with its wide salinity tolerance, makes it the most promising species of *Caulerpa* for bioremediation.

120. FATTY ACIDS OF SELECTED AZOREAN SEAWEEDS

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This work aimed at providing additional information on the total lipids (TL) and fatty acids (FA) contents of locally consumed species, to promote a regional product that potentially can be profitable from the biotechnology and commercial perspective, and also bring benefits to Public Health in general.

TL content and FA profile of eight seaweeds was determined. Seaweeds belonging to Phaeophyta (*Cystoseira abies-marina* and *Fucus spiralis*), Chlorophyta (*Chaetomorpha pachynema* and *Codium elisabethae*) and Rhodophyta (*Porphyra* sp., *Osmundea pinnatifida*, *Pterocladiella capillacea* and *Sphaeroccoccus coronopifolius*) were collected during January and February 2007, from the littoral of the Azores archipelago. The TL content ranged between 0,06 and 3,54 (g/100g). The most abundant saturated acids were palmitic (C16:0) and myristic (C14:0), whilst oleic (C18:1n-9) was the dominant monounsaturated acid. All seaweeds had the polyunsaturated fatty acid linoleic (C18:2n-6). α-linolenic acid (C18:3n3) and eicosapentanoic (20:5n-3) were present in *Porphyra* sp. (3,34%±0,13) and *C. pachynema* (0,47%±0,12),

respectively. The n-6/n-3 and h/H ratios were low, suggesting a high nutritional value. No patterns of FA per group were identified although statistical analysis showed differences among taxonomic groups and the species within.

121. MOLECULAR AND CHEMICAL ANALYSIS OF DIFFERENT COMMERCIAL *CHLORELLA*-PRODUCTS

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The coccoid green alga *Chlorella vulgaris* is one of the best-studied phototrophic eukaryotes with manifold applications in microalgal biotechnology since its first isolation in the late 19th century. From the 1950s on, this and some other algal species were cultivated in huge amounts to meet the growing demand for alternative protein sources. After drying, it can be merchandised as tablets, capsules, extract or powder. These nutraceuticals are advertised by typical (biochemical) qualities and its consumption shall support a holistic nourishment and health.

However, the products' quality, e.g. the content and quality of pigments or the microbiological contamination, varies enormously due to culture conditions. Furthermore, as a result of the diversity within the genus *Chlorella* and its difficult taxonomy, many products declared to contain *C. vulgaris* are presumably made from other *Chlorella*-like species. In this study, ten *Chlorella* products and ten unprocessed *Chlorella* powders were analysed and compared to a culture of *C. vulgaris* (SAG 211-11b).

The content of pigments varied greately between the samples and neither of them reached a naturally occurring pigment content. Furthermore, many of the samples contained microorganisms, like fungi or bacteria, in critical concentrations. The molecular analysis of the 18S rRNA confirmed either the existence of 1-3 species per product or found other green algal species at all in about half of the samples.

122. MICROALGAE BIOAPPLICATIONS RESEARCH AT CSIRO, AUSTRALIA

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The CSIRO Collection of Living Microalgae (http://www.cmar.csiro.au/microalgae/) is a living bank of microalgae isolated from Australian waters from the tropics to Antarctica. Microalgal biodiversity is displayed in a range of bioactive compounds that have medical, human health, aquafeed, and energy applications. In the CSIRO Wealth from Oceans National Research Flagship exopolysaccharides (EPS) from microorganisms are being investigated for new bioinspired adhesives, with microalgae from the Collection being screened for their EPS production, along with development of known targets of EPS-producing bacteria from the extreme Antarctic environment. Gene discovery in microalgae for biosynthesis of omega-3 long chain polyunsaturated fatty acids (LC-PUFA) that have an impressive range of human health benefits is one focus of the CSIRO Food Futures National Research Flagship. The goal is to introduce the microalgal omega-3 pathway into genetically engineered crop plants, thus ensuring a sustainable source of omega-3 LC-PUFA for the future. Some microalgae are characterised by high oil content. The CSIRO Energy Transformed National Research Flagship is investigating the potential for biodiesel from algae. High biomass cultivation of microalgae has the potential to not only produce oil and/or biomass for biofuels but also to mitigate CO_2 and other green house gases as part of photosynthesis and growth.