Investigation of Amino acids profile in Desmodesmus sp.

Jair G. Marques Jr.¹ (PG), Engy S. Shokry¹ (PG), ´Nelson R. Antoniosi¹ (PQ).

¹Universidade Federal de Goiás (UFG), Campus II, Samambaia. Instituto de Química (IQ) - Laboratório de Métodos de Extração e Separação (LAMES) - CEP: 74001-970 Goiânia – GO, Brasil.

Key words: Microalgae, amino acid, HPLC-MS/MS

**Abstract**

To determine the composition of free amino acids in Desmodesmus sp., microalgae extract was analyzed using HPLC-MS/MS.

**Introdução**

Microalgae are unicellular organisms, found in either colonies or individual cells, that can produce many compounds as pigments and fatty acids by photosynthesis. Among these compounds are the proteins with structural and metabolic functions. Proteins play an important role as a commodity for animal food and the amino acids (AAs) composition is a critical factor, as a number of AAs are dietary essentials for mammals and they are unable to synthesize them1. Many studies have been published showing microalgae as an alternative fatty raw material for biodiesel production2,3. However, producing microalgae only for fuel production is not economically plausible, and other products must be added to the production chain to make the process profitable1.

Aiming to determine the AAs profile in Desmodesmus sp. microalgae a HPLC-MS/MS system was used to analyze them and a factorial planning 2³ was performed to set the best conditions to extract these AAs.

**Resultados e Discussão**

An LC-MS/MS method was develop and validated according to ICH guide lines for the quantitative estimation of the AAs, and found to be fast (20 min run), accurate, precise and robust. The extraction was fulfilled in a ultrasound bath at room temperature varying the length of stay in the bath, the pH of the extractor solvent and the ratio solvent / biomass as demonstrated in Table 1.

**Table 1.** Factors and levels of the experimental design.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (min)</td>
<td>20, 60</td>
</tr>
<tr>
<td>pH</td>
<td>2, 3</td>
</tr>
<tr>
<td>Solvent / Biomass (mL/100 mg)</td>
<td>0.03, 0.06</td>
</tr>
</tbody>
</table>

For the extractor solvent, pH 2 using the ratio solvent / biomass of 0.05 showed the best condition. The extraction time is at the discretion of the analyst. The increase in extraction time of 30 to 60 minutes did not show pronounced effect as compared with the other factors. AAs composition and relative concentrations for Desmodesmus sp. microalgae are shown in Graphic 1.

**Graphic 1. AA content.**

Regarding the composition, Desmodesmus sp. presents essential AAs (6 AAs) in addition to non essential AAs (11 AAs).

**Conclusões**

This work represents an initial study of the AA profile for microalgae and will be subject to further investigation to evaluate the nutritional value of this specie and others related.

**Agradecimentos**

The authors would like to thank the FAPEG, Ministry of Science, Technology and Innovation (MCTI) for financial support provided by FINEP (Process No. 01.10.0457.00) and CNPq (Process No. 407556/2013-3) CAPES and CNPq for a research productivity grant to Nelson R. Antoniosi Filho (Process No. 312019/2013-0) and FUNAPE for management of financial resources.