MICROBIAL AND ENZYMATIC HYDROLYSIS OF TANNIC ACID: INFLUENCE OF SUBSTRATE QUALITY

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Introduction. Tannic acid (TA) is commonly employed as the main component in culture media for the selection of tannase-producing strains (1). In biotechnological processes it is the favorite substrate used to induce the tannase enzyme for microbial and/or enzymatic production of gallic acid(2). However, low reproducibility, disperse activity titles, and different product yield values are usually found in literature. For this reason it is important to conduct a study focused on the analysis of substrates used in the production of tannase.

The present work, for the first time, reveals the importance of differences in the quality and chemical profile of TA from different suppliers and their influence on the fungal and enzymatic hydrolytic pattern obtained when it is used as a substrate.

Methods. The chemical profiles of each commercial TA were obtained by FT-IR and HPLC. We quantified the amount of gallic acid present in the TA to determine the degree of initial hydrolysis and then an enzymatic hydrolysis with a commercial tannase to determine the efficiency of the degradation of tannin. We also carried out microbial growth kinetics of *Aspergillus niger* on four different substrates of TA to four different concentrations 0, 40, 80 and 120 g/ L. Culture conditions were: 30 °C during 72 h, sampling every 12 h. Biomass content was evaluated through dried weight, the results were modeled with the equations of Monod and Logistics.

Results.

Differences in chemical composition or purity can lead to significant differences in chemical and functional properties; thus, different results on the kinetics of microbial growth and microbial or enzymatic hydrolysis of TA from different suppliers can be obtained (Fig 1 and Table 1).

Table 1. Comparition of gallic acid content before and after enzymatic hydrolysis of different commercial TAs.

Tannic acid	Initial concentration of gallic acid (g/L)	Conversion (%)	Gallic acid yield (g/L)	Yield *
Jalmek	0.187	100	0.33	0.66
Riedel de Haen	0.17	100	0.32	0.56
Faga Lab	0.25	100	0.26	0.52
Division Food	0.16	64.7	0.22	0.44

**Yield means the relation between the amount of product formed per unit of substrate.*

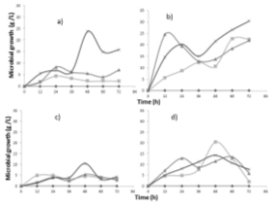
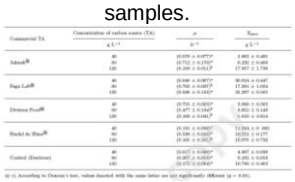


Fig.1 Growth profile of *Aspergillus niger* GH1 strain on different TA samples (a) Jalmek®, (b) Fagalab®, (c) Division food®, (d) Riedel de Haen® at different content of TA: • 0 g/L, ▪ 40 g/L, Δ 80 g/L, x 120 g/L.

Table 2. Effect of substrate concentration on the growth of *Aspergillus niger* GH1 using different commercial TA samples.



Conclusions. Significant differences in the microbial and enzymatic hydrolysis of TA influenced by the chemical quality were clearly evidenced. This study shows the importance of the selection of TA for any particular application. It is important to consider differences in the raw materials to avoid inconsistencies in bioprocesses when TA from different sources is used.

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References. 1. Aguilar, C., Gutiérrez-Sánchez,G.(2001). Food Sci. Technol. Int. (7) 373-382. 2. Bath, T., Singh, B., Sharma, O.(1998). Biodegradation. (9) 343-357.