

Title: ANALYSIS OF THE AMINOACID PROFILE OF THE CASTOR BEAN CAKE AFTER FERMENTATION PROCESS

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Abstract:

The castor bean cake, produced from the extraction of oil from the *Ricinus communis* seeds, is a co-product rich in nutrients, but has toxic compounds such as ricin. The detoxification may be reached by a biological process called solid-state fermentation (SSF), based on the growth of microorganisms on solid substrates, which are used as a source of nutrients for the production of microbial biomass (*single cell protein*), enzymes and others. Filamentous fungi are considered as the most promising in the production of biomass, such as *Penicillium simplicissimum*. Once detoxified, the castor bean cake can be valued through protein enrichment. For this, the composition of protein and amino acid profile after the SSF by *P. simplicissimum* were analyzed. The fermentation process was carried out with 20 g of castor bean cake (45% w/w) without supplementation or with feather meal. The medium was inoculated with 10⁷ spores/gram of dry solid and incubated in a chamber with conditions set to 30 °C and 90% water saturation. After different times of fermentation, the total nitrogen content of the samples was determined by the Kjeldahl method, using concentrated sulfuric acid. For the quantification of amino acids in the samples, a hydrolysis with hydrochloric acid for 90 minutes at 150 °C was carried out, followed by reversed-phase chromatography in HPLC system. The total protein content found for *in natura* and fermented samples were approximately 45.5% and in the samples supplemented with feather meal, it was observed about 57.8% of protein. The total amino acids content for *in natura* castor bean cake was 15.2% and after 48 hours of fermentation, there was an increase to 21.3%. In the fermentations supplemented with feather meal, there was a significant increase of 22.86% to 34.4% after 48h of fungal growth. Some amino acids are considered essential such as valine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine and tryptophan. An increase of 4.95% to 6% of phenylalanine content in non-fermented samples was observed after 48h of SSF. Regarding the supplemented samples, an increase of 7.38% to 22.8% was observed to leucine content at 72h. These results show an increase of amino acids from the fungal metabolism. The development of a biotechnological process for the use of castor bean cake provides the value-addition of this agro-industrial co-product for future applications in animal feed industry.

Keywords: solid-state fermentation, fungal biomass, amino acids, agro-industrial by-products

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