

Título: BIOPROCESS AS A TOOL FOR PROTEIN ENRICHMENT AND DEGRADATION OF TOXIC AND ANTINUTRITIONAL COMPOUNDS IN *Jatropha curcas* CAKE

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Resumo:

Jatropha curcas is a shrub that belongs to the *Euphorbiaceae* family. From the oil extraction, a co-product named *Jatropha curcas* cake is generated, which is rich in proteins, starch and aminoacids, but cannot be used as animal feed mainly due the presence of phorbol esters. Phorbol esters are tumor-promoting compounds and are considered the main responsible for the toxicity of *Jatropha curcas*. Other toxic compounds, as mycotoxins, or antinutritional factors, as phytic acid can also disallow the possible use of agro-industrial co-products in animal nutrition. Phytic acid has the capacity to form insoluble complexes with various cations and proteins, which are nutritionally essential, resulting in a decreased bioavailability of these nutrients in the animal feed. In order to reduce these undesirable compounds in *Jatropha curcas* cake, the process of solid-state fermentation (SSF) is one promising alternative. This bioprocess is based on the use of solid culture medium for microorganism growth and obtainment of bioproducts. So, the SSF was used to verify the *Penicillium simplicissimum* ability to eliminate the phorbol esters and other toxic/antinutritional compounds from *Jatropha curcas* cake and, simultaneously, to promote protein enrichment. The fermentations were carried out in tray bioreactors, using *Jatropha curcas* cake as culture medium, with 47% of initial moisture, at 30°C. The quantification of phorbol esters, aflatoxin, ochratoxin, phytic acid and crude protein were carried out in the samples of *in natura* and fermented cake. After 120h of fungal growth, there was an efficient reduction of 86% for phorbol esters. The phytic acid was reduced in 93%, reaching a concentration of 1,28g/100g. In relation to mycotoxin, ochratoxin A, aflatoxin B₁ and aflatoxin G₂ were reached in untreated *Jatropha curcas* cake, in the concentration of 0,15; 0,10 and 0,04 µg/Kg, respectively. After the SSF process, the fungus was able to eliminate the ochra- and aflatoxin B₁ and to reduce 75% of the aflatoxin G₂ content, reaching a legally allowed concentration for animal nutrition. Moreover, the protein content was 57% increased. Thus, using SSF it was possible to improve nutritionally the *Jatropha curcas* cake, by increasing the protein content and reducing the toxic and antinutritional compounds, making it safe for further applications, as animal feed for instance.

Keywords: *Jatropha curcas*, animal feed, detoxification, phorbol ester

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