

**EVALUATION OF SOLID STATE FERMENTATION IN THE
DETOXIFICATION OF *Jatropha curcas* SEED PRESS CAKE**

by

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ABSTRACT

Jatropha curcas (Jatropha) produces seeds with high oil and protein content. The seed meal could be suitable for animal feed. However, Jatropha seeds are highly toxic and the seeds cannot be fed to animals. The toxicity is mainly due to phorbol esters and lectins (agglutinins) found in the seeds. An agglutinin that is an 11.5 kDa subunit protein and a toxin of 28 kDa were isolated from Jatropha seeds using a combination of gel filtration chromatography and ion exchange chromatography on Biogel P-100 column and Q-Sepharose column respectively. The agglutinin was not inhibited by common sugars. The 28 kDa protein was identified using LC-MS and MALDI-TOF MS as curcin, a ribosome inactivating protein, known to be toxic. Curcin is glycosylated, whereas the 11.5 kDa agglutinin is not glycosylated. Solid state fermentation using *Aspergillus niger* and *Mucor plumbeus* was used as a detoxifying agent on Jatropha seed press cake. Western blotting using rabbit anti-curcin antibodies showed that curcin was completely degraded after 8 days of fermentation using *A. niger*. Phorbol esters were assayed in fermented seed press cake, unfermented seed press cake and Jatropha seeds using PepTag assay for non-radioactive detection of protein kinase C. The assay showed presence of phorbol esters in Jatropha seeds and undetectable levels of phorbol esters in both fermented and unfermented seed press cake. Lipase activity on fermented seed press cake was analysed using TLC, which showed triacylglycerols in the fermented seed press cake had been hydrolysed to free fatty acids. Confirmation of detoxification was carried out by feeding male rats with fermented Jatropha seed press cake based formulation. In comparison, consumption of fermented seed press cake based formulation was higher than consumption of unfermented seed press cake based formulation. Average daily food intake of fermented seed press cake based formulation was lower compared to the consumption of normal feed. Also the rats fed with both fermented and unfermented seed press cake based formulations lost weight whereas the rats fed with normal feed gained weight. Over a period of 14 days, the rats fed with fermented seed press cake lost an average weight of 60 grams while rats fed with unfermented seed press cake lost an average weight of 100 grams. Observations from this study showed that solid state fermentation destroyed curcin and improved palatability of Jatropha seed press cake in rats.