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EVALUATION OF THE NUTRITIONAL QUALITY OF NONTOXIC KERNEL FLOUR FROM *JATROPHA CURCAS* L. IN RATS

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ABSTRACT

The origin of *Jatropha curcas* L. is in Central America, probably Mexico, although it is also distributed in South America, Africa and Asia. In Mexico, it grows as nontoxic and toxic *J. curcas* genotypes. In this work, the protein quality including protein efficiency ratio (PER), net protein ratio (NPR) and true digestibility (TD) of nontoxic genotype defatted flour was assessed using Wistar rats. The probed diets contained flour (3), flour-lysine, 1% (4), flour-phytase, 500 FTU (5) and two control diets: nitrogen-free (1) and casein (2). The rats were fed for 28 days. The PER (1.37, 1.77 and 1.61) and NPR (1.80, 2.29 and 2.12) obtained values for diets (3.4 and 5) were lower than those obtained for casein (2.07 and 2.46), respectively. No statistical differences were found in TD.

PRACTICAL APPLICATIONS

Jatropha curcas defatted flour may be used in the food industry for the development of diets for human and animal consumption. Besides achieving fortification of foods that are made from wheat, which has a low protein content, with the addition of *Jatropha* meal, these foods will improve the protein quality of many food products.

INTRODUCTION

In Mexico, *Jatropha curcas* L. grows wild in tropical and semi-tropical climates, at elevations of 0–1,650 m.a.s.l., in infertile and sandy soils. On spreading, the seeds germinate within 3–5 days. Interestingly, only Mexico has reported a nontoxic *J. curcas* genotype. The seeds of this nontoxic genotype are traditionally used in Veracruz, Puebla and Hidalgo States of Mexico to prepare a variety of traditional dishes (Makkar *et al*. 1997; Martínez-Herrera *et al*. 2006).

It is noteworthy that seeds of toxic and nontoxic genotypes cannot be differentiated morphologically so that special care must be exercised to differentiate these two types of seeds. The toxic seeds contain compounds known as phorbol esters that are highly toxic and when they are consumed can cause dizziness, vomiting, severe diarrhea and can even lead to death. Only through gas chromatography methods has it been possible to detect and quantify the phorbol esters (Goel *et al*. 2007). The seeds of *J. curcas* from Mexico have high protein (25–30%) and oil (55–62%) content, depending on the agro-climatic characteristics of the region. The oil seed can be converted into biodiesel. After oil extraction from dehulled kernels, the remaining meal contains 60% protein, and these proteins have a good amino acid balance. When it is compared with the Food and Agriculture Organization Reference Protein pattern for a growing child, the sulfur amino acid content is higher and lysine is the only limiting amino acid. The *in vitro* protein digestibility is above 80% (Martínez-Herrera *et al*. 2006). The seed contains some anti-nutritional compounds such as trypsin inhibitors, lectins and phytates. Trypsin inhibitors and lectins are inactivated by heat treatments, while phytate is heat stable (Makkar *et al*. 1997; Martínez-Herrera *et al*. 2006). A wealth of evidence exists showing the beneficial effect of several seeds: soybean