

ABSTRACT

ASSESSMENT OF RISK AND EVALUATION OF THE PERSISTENCE OF TOXICITY OF *JATROPHA CURCAS* LINN. PRESSED CAKE

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The continuous utilization of *J. curcas* as a source of renewable energy raised the concern on the increasing amount of its by-products. The meal, left-over after mechanical and solvent-aided oil extraction, contains high levels of toxic materials and anti-nutritional compounds. This study aimed to assess the risk associated with the effective toxicity of the whole meal against vulnerable organisms and to determine whether the toxicity persists, by means of ecotoxicological bioassays. *Eudrilus eugeniae*, *Oryza sativa*, *Danio rerio*, and *Pomacea canaliculata* were used as representative test organisms for worm survival assay, plant growth assay, fish survival, and snail assay, respectively. Biotoxic assays were conducted using pressed cake samples collected immediately after oil extraction, after 6 months and after 12 month in meal piles exposed to the natural environment. Risk assessment was conducted by the construction of Species Sensitivity Distribution and the estimation of the hazard concentration protecting 95% of all the organisms in the ecosystem, HC5. The relative sensitivity of tested organisms is as follows: plant > snail > fish > worm, with EC50 values from the point estimate of the most sensitive test at 1.89%, 2.45%, 4.56%, and 4.58% meal, respectively. The effective toxicity of *J. curcas* pressed cake persisted within, at least, six months and served as a natural molluscicide, affected plant growth, fish mortality, and worm survival. The toxicity towards vulnerable organisms was not observed after a year of exposure of the pressed cake in the natural environment, suggesting the occurrence of an effective biodegradation process within a year. SSD analysis estimated HC5 at 0.801921%, a value that is 18.35% more protective than the usual two-fold safety margins applied in some established criteria. While this study was able to determine some important toxicological information on *J. curcas* that can be used as a guide in the formulation of quality criteria, it is recognized that there is a need to further develop a more robust technique that would incorporate ecological interactions among organisms in a target compartment. Nevertheless, this study established the ecological risks associated with the presence of large amounts of waste product that is linked in the search for renewable source of energy.