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Preparation and characterization of cashew gum nanoparticles loaded with natural larvicide from *Moringa Oleifera* seeds

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Abstract – High incidence rate of the dengue epidemics around the world reinforces the need to improve the methods and the formulations for larval control. The aqueous extract from the seed of *Moringa oleifera* contains an active substance with an effective larvicide effect, however, the low stability of the substance limits its use for larval control. In this work it is studied the encapsulation of *Moringa oleifera* extract by cashew gum, aiming to extend the kinetics release and the activity of the plant active ingredient.

The partial efficiency of traditional larvicide methods for *Aedes aegypti* control allied to the high toxicity of the synthetic products motivate the development of more viable socioeconomic and environmental systems [1]. Gums from Brazilian northeast are hydrophilic, exhibiting properties which make them good candidate for use as drug carriers. The aqueous extract from *M. Oleifera* (MO) seeds was found to present larvicide properties [2], and when the aqueous extract is loaded in a chitosan polymeric matrix [3] the system has presented improved kinetics release. In this work, it is proposed a new matrix for protection and slow release of the larvicide from MO using cashew gum (CG), a polysaccharide exudated from *Anacardium occidentale L*. The CG/MO particles were prepared by mixing a 2% CG solution and a MO extract in different MO/CG weight ratio (Table 1). The solution was processed in a spray dryer (Büchi B-190). The particles were characterized by FTIR, loading efficiency and thermal analysis. The efficacy of the system was evaluated by *in vivo* bioassays using larvae of *St. Aegypti* . Results showed that M.O was incorporated in the CG particles and sample with MO/GC =1:1ratio presented the maximum loading efficiency. A unimodal particle size was obtained, with particle size in the range from 12 to 800 nm, the smallest particle being obtained for MO/GC =1:2 ratio. Thermal stability of the particles showed similar behavior for all samples up to 300ºC, the sample A showing greater stability at higher temperatures. FTIR analysis showed that sample C presented peaks at 1060 cm^{-1} and 1652 cm^{-1} due to the hydroxyl and carboxyl groups of GC, and signals at 1238 cm^{-1} and 1563 cm^{-1} , due to the S-H, C-S and C-N groups, attributed to MO. Tests *in vivo* showed that sample C presented greater larval mortality (80%) after 48 h, due to the higher loading of M.O. Further bioassays performed after 30 days showed significant levels of mortality, which is an indication of a prolonged and sustainable effect.

Table 1: MO/CG weight ratio and loading efficiency for GC nanoparticles

Sample	M.O./GC ratio	Loading (%)
A	1:2	2.6
B	1:3	3.4
C	1:1	4.7

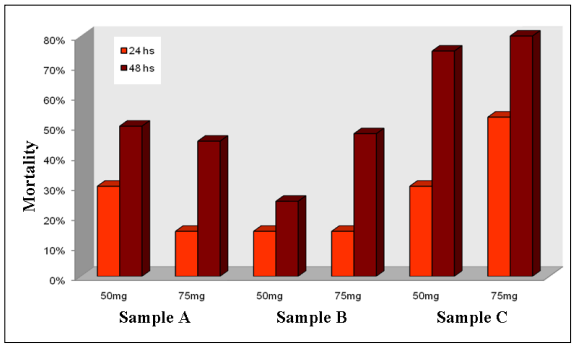

Figure 1: Mortality kinetics of larvae of *St. Aegypti* after 24 h (red) and 48 h (gray)

References

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