

## ATTRIBUTES OF NANOPARTICLES OBTAINED BY GREEN SYNTHESIS FOR APPLICATION IN ANTIFUNGAL COATINGS

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The green synthesis of nanoparticles based on the use of aqueous vegetable extracts is low cost, non-polluting and makes use of renewable reagents. These extracts contain metabolites that perform as reducing and stabilizing agents. In this regard, the use of tannins is promising due to their high polyphenol content. The present work proposes to synthesize and characterize nanoparticles obtained silver and copper salts with “tara” tannin (TT). TT is commercially available and proceeds aqueous extract of *Caesalpinia spinosa*. The nanoparticles were obtained starting an aqueous solution of  $\text{AgNO}_3$   $10^{-2}$  M and  $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$   $10^{-2}$  M to which the tannin solution was added in constant agitation. Three concentrations of TT were used: 500, 1000 and 2000 ppm. This process was done at  $60^\circ\text{C}$  and  $\text{pH} = 7$ . The stability over time of these nanoparticles was evaluated by UV-vis spectroscopy carried out at different times: 1, 30 and 60 days. To confirm the obtaining of the nanoparticles and observe their morphology, transmission electron microscopy (TEM) was applied. The synthesized nanoparticles were purified and Fourier transform infrared spectroscopy (FTIR) was performed. The antifungal activity was evaluated by the agar diffusion test (Kirby-Bauer) against the collection strains: *Cladosporium cladosporioides* (MG731215), *Alternaria tunuissima* (MG731240) and *Aspergillus versicolor* (MG725821). UV-vis spectra of silver nanoparticles obtained TT solutions of 500 (NpsAg500), 1000 (NpsAg1000) and 2000ppm (NpsAg2000) presented an absorption maximum around 400, 410 and 420 nm, respectively. These bands remained stable over time. In the case of copper salt the nanoparticles obtained with TT solution of 2000ppm (NpsCu2000) showed a band at 330 nm and with 1000 and 500ppm resulted unstable. TEM micrographs confirmed the presence of quasispherical nanoparticles predominantly smaller than 20 nm with higher frequency. FTIR spectra confirmed the strong interaction between of the nanoparticles and the tannin used in the synthesis. Related to the agar diffusion test, NpsCu2000 was not active against the fungal strains used while the silver nanoparticles showed to be active in all cases. In this sense, NpsAg500 presented the highest inhibition zone against *C. cladosporioides*. The next step will be to formulate coatings with these nanoparticles.

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