Natural Alternative to Synthetic Drugs: Juglone-Sodium Alginate Binary Systems

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The overuse of substances with antibacterial and antifungal properties cause drugs to lose efficiency because of the resistance that microorganisms started to develop over time. We came up with the idea of using pure Juglone in concoction with Sodium Alginate. Firstly, we created 3 concoctions with different ratios (1:1, 1:2, 2:1). We also used pure Juglone in order to compare the results and did Infrared Analysis to prove that within the concoction no new bonds or compounds are formed and it works as a system. Next step was UV Analysis in which we proved the solubility increase of Juglone within Sodium Alginate, the most efficient ratio turned was 1 Juglone/2 Sodium Alginate which increased Juglone's solubility more than twice in 40 minutes. Lastly we applied the 3 concoctions and pure Juglone on Escherichia coli, Staphylococcus aureus and Candida albicans and calculated their minimum inhibitory and bactericidal concentration. The most efficient antibacterial concoction was the ratio 2 Juglone/1 Sodium Alginate, with the smallest concentration of 0,015625 mg/ml in bacteria and 0,0625 mg/ml in fungus. Within the complexation with Sodium Alginate toxic effects of Juglone were inhibited. Due to its 100% natural composition and high antibacterial efficiency it can replace synthetic drugs; increased solubility will allow using less medicine and get the same effect. Moreover, cheap and available raw materials provide a more affordable price than that of antibiotics. Being content with the results, we expect to conduct further investigations on a higher level, especially work in vivo.

Awards Won:
Fourth Award of $500