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Improving the antimicrobial activity of bagasse packaging paper using organophosphorus dimers

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Abstrak

The antimicrobial properties of bagasse paper sheets coated with
natural polymers (chitosan, different ratios of (gelatin/glycerol) + chitosan,
hemicellulose, hemicellulose + glycerol, hemicellulose+chitosan) or
synthetic organophosphorus dimer compounds were evaluated in this work.
Hemicelluloses showed moderate activity against Bacillus subtilis and Candida albicans, while chitosan showed weak
activity against B. subtilis. The condition that offered the highest inhibitory
activity of bagasse paper was the one
coated with 1,3-diaryl-2,2,2,4,4,4-hexachlorocyclodiphosph(V)azane
(where aryl is p-chloroaniline or p-anisidine). The developed bagasse papers
were evaluated against Gram-positive bacteria, Gram-negative bacteria, yeasts, and fungi. The highest inhibitory activity was obtained at a concentration of 200
mg/mL for p-chloroaniline with an inhibition zone that varied for different
microbes from 6.9 mm to 26 mm. The highest inhibitory activity was obtained at
300?250 mg/mL for p-anisidine against most of the pathogenic microorganisms
with an inhibition zone that varied for different microbes from 8 mm to 14.75
mm. The observed antimicrobial and antifungal activity properties for bagasse paper coated with 1,3-diaryl 2,2,2,4,4,4-hexachlorocyclodiphosph(V)azane could be attributed to the presence of Cl, P atoms, and the lone pair of
electrons on N atoms in the structure of the dimers.