Study reveals antiviral properties of solid wood surfaces

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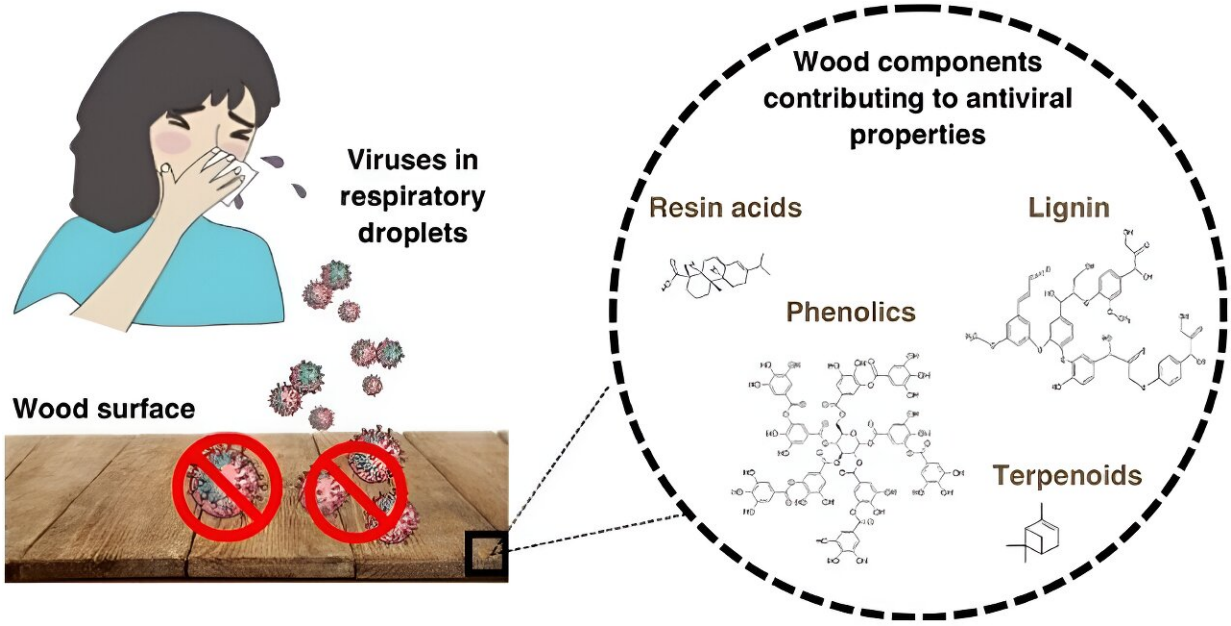

Graphical abstract. Credit: *ACS Applied Materials & Interfaces* (2024). DOI: 10.1021/acsami.4c02156

Researchers from the University of Eastern Finland (UEF) and the University of Jyväskylä (JYU) have collaborated to publish research on the antiviral capabilities of solid wood surfaces.

The study, led by the research groups of Varpu Marjomäki at JYU and Antti Haapala at UEF, investigated the antiviral potential of different wood species against enveloped coronaviruses and non-enveloped enteroviruses. The work has been published in *ACS Applied Materials & Interfaces*.

The COVID-19 pandemic and recurrent viral outbreaks have underscored the urgent need for innovative strategies to reduce virus transmission.

While wood has been a fundamental material in human environments for centuries, its antiviral properties have not been extensively explored—until now. This research is the first to systematically evaluate the inherent antiviral efficacy of the sawn wood material from various tree species, including both coniferous and deciduous trees, under different environmental conditions.

Key findings

- Pine and Spruce: These coniferous species demonstrated excellent antiviral activity against enveloped coronaviruses, significantly reducing viral infectivity within just 10 to 15 minutes. However, their efficacy against non-enveloped enteroviruses was less pronounced.
- Oak: This hardwood species was notably effective against non-enveloped enteroviruses, showcasing its potential for broader antiviral applications.
- Chemical Composition: Analysis at UEF revealed that the antiviral properties are primarily governed by the chemical composition of the wood, including the presence of resin acids, terpenes, and phenolic compounds. These chemicals vary

significantly between species and are influenced by environmental factors such as temperature and humidity.
- Porosity and Absorption: While the porosity of wood and the absorption characteristics of viruses play a role, the study highlights that the chemical makeup of the wood is the key determinant in its antiviral functionality.

The research also found that thermal treatments and the addition of plastics to wood, such as in wood-plastic composites, can compromise the antiviral properties of the material. This insight opens new avenues for utilizing untreated or minimally processed wood surfaces in public health applications.

Future directions

The research teams from UEF and JYU will continue their investigation into the most effective antiviral components of wood and their mechanisms of action as part of the ongoing European Doctorate Program DESTINY. This future research aims to identify specific bioactive compounds that can be harnessed to develop sustainable and effective antiviral materials and coatings.

"This study marks a significant step forward in understanding how natural materials can be leveraged to enhance public health," said Varpu Marjomäki, lead virologist at JYU.

"Our findings suggest that wood, a sustainable and widely available material, could play a crucial role in reducing viral transmission in various settings," added Antti Haapala, lead material engineer at UEF.

"The synergistic roles between the different chemicals present are a continuing theme of investigation," states Professor Haapala from Department of Chemistry.

More information: Sailee Shroff et al, Tree Species-Dependent Inactivation of Coronaviruses and Enteroviruses on Solid Wood Surfaces, *ACS Applied Materials & Interfaces* (2024). DOI: 10.1021/acsami.4c02156

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