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Effect of Natural Products Against Growth of Three Allergenic and Toxigenic Molds

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Introduction

Dampness and fungal exposures in buildings are widespread, with estimates ranging from 18% to 50% of buildings being affected. Of the 21.8 million people reported to have asthma in the USA, approximately 4.6 million cases are attributable to dampness and mold exposure in the home.

Several fungal genera from damp environments were reported to be associated with allergy and/or asthma and some species can release mycotoxins in the environment.

Purpose

In this study, we have evaluated three plant based products - tea tree oil, grape fruit seed extracts, and natural vinegar - against growth of three specific allergenic and toxic mold species (Aspergillus versicolor, Penicillium brevicompactum, and Stachybotrys chartarum).

Methods

- Spore solutions (10^5–10^7 spores/mL) of these three mold species were prepared from pure cultures and 200 µL of solutions were spread over malt extract agar plates.
- Three 20 µL drops of different dilutions of three above-mentioned natural products were applied on agar plate surfaces immediately after spore solution inoculation.

Results

- Inhibition zones on agar plates were examined after the incubation of plates for 96 hours at 30±2°C.

We found that up to 10 times dilutions of grape fruit seed extracts developed 18-50 mm zones of inhibition for all mold species, up to two times dilutions of tea tree oil completely inhibited all three species but 5X dilution was effective for S. chartarum. Natural vinegar, on the other hand, inhibited S. chartarum and P. brevicompactum only and the inhibition zones for mold growth on agar surfaces were 18-28 mm.

Figure 1: The effect of grapefruit seed extract on S. chartarum.
Figure 2: The effect of tea tree oil on P. brevicompactum.
Figure 3: The effect of grapefruit seed extract on A. versicolor.

Figure 4: Box plot showing the effect of grapefruit seed extract on P. brevicompactum.
Figure 5: Box plot showing the effect of grapefruit seed extract on S. chartarum.
Figure 6: Box plot showing the effect of vinegar on P. brevicompactum.
Figure 7: Box plot showing the effect of vinegar on S. chartarum.

Conclusion

- Our study concluded that diluted tea tree oil and grape fruit seed extract and original vinegar can be used for inactivation of mold growth on surfaces.
- These inhibitory effects are species specific and further studies are required to understand the mechanisms.

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