

# Sesquiterpene aryl ester natural products in North American *Armillaria* species

Misieck M, Hoffmeister D (2012) Sesquiterpene aryl ester natural products in North American *Armillaria* species *Mycol Progress* 11, 7-15.

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## Abstract

In the first comprehensive study on the secondary metabolism of all ten North American *Armillaria* species, we analyzed their capacity to produce sesquiterpene aryl ester natural products. All species were identified as producers. Species-specific trends were observed for some species, e.g., for *Armillaria ostoyae* and *A. gemina* (low diversity of aryl esters) or *A. tabescens* (very low number of chlorinated aryl esters). The crude extracts were assayed for antibiotic activity against wood-rotting basidiomycetes and ubiquitous soil fungi. Inhibitory effects were strongly dependent on the target organism, with basidiomycetes being more susceptible than other fungi. *Tapinella panuoides* and *Omphalotus illudens* were inhibited by extracts of all *Armillaria* species whereas the same extracts were completely inactive against *Trichoderma harzianum*, widely inactive against *Mucor racemosus*, and only moderately active against *Aspergillus flavus* and *Penicillium oxalicum*. Activity tests with seven purified aryl esters suggest that lipophilicity and the position of the double bond in the tricyclic sesquiterpene moiety impact upon bioactivity while the substitution pattern of the aromatic ring does not. Arnamiol was the most active compound and showed a minimum inhibitory concentration of