Involutin is a Fe3+ reductant Secreted by the Ectomycorrhizal Fungus *Paxillus involutus* during Fenton-based Decomposition of Organic Matter.

Shah F, Schwenk D, Nicolas C, Persson P, Hoffmeister D, Tunlid A (2016) Involutin is a Fe3+ reductant Secreted by the Ectomycorrhizal Fungus *Paxillus involutus* during Fenton-based Decomposition of Organic Matter. *Appl Environ Microbiol* 81, 8427-8433.

Abstract

Ectomycorrhizal fungi play a key role in mobilizing nutrients embedded in recalcitrant organic matter complexes, thereby increasing nutrient accessibility to the host plant. Recent study have shown that during assimilation of nutrients, the ectomycorrhizal fungus Paxillus involutus decomposes organic matter using an oxidative mechanism involving Fenton chemistry (Fe^{2+} + H_2O_2 + H^+ → Fe^{3+} + •OH + H_2O) similar to that of brown-rot wood-decaying fungi. In such fungi, secreted metabolites are one of the components that drive one-electron reductions of Fe^{3+} and O_2, generating Fenton chemistry reagents. Here, we investigated whether such a mechanism is also implemented by P. involutus during organic matter decomposition. Activity-guided purification was performed to isolate the Fe^{3+}-reducing principle secreted by P. involutus during growth on maize compost extract. The Fe^{3+}-reducing activity correlated with the presence of one compound. Mass spectrometry and NMR identified this compound as the diarylcyclopentenone involutin. A major part of the involutin produced by P. involutus during organic matter decomposition was secreted

into the medium and the metabolite was not detected when the fungus was grown on a mineral nutrient medium. We also demonstrated that in the presence of H_2O_2, involutin has the capacity to drive an in vitro Fenton reaction via Fe^{3+} reduction. Our results show that the mechanism for reducing Fe^{3+} and generating hydroxyl radicals via Fenton chemistry by ectomycorrhizal fungi during organic matter decomposition is similar to that expressed by the evolutionarily related brown-rot saprotrophs during wood decay.

Beteiligte Forschungseinheiten

Pharmazeutische Mikrobiologie Dirk Hoffmeister Mehr erfahren

Leibniz-HKI-Autor*innen

Dirk Hoffmeister

Details

Identifier

PMID: 26431968