Bacterially mediated contact-independent antagonism of *Geomyces destructans*

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The recently identified causative agent of White Nose Syndrome (WNS), *Geomyces destructans*, has been responsible for the mortality of 5.7 million North American bats since its emergence in 2006. A primary focus of the National Response Plan established by the US Fish and Wildlife Service in 2011 was the identification of biological and chemical control agents. In an effort to identify potential biological and chemical control agents for WNS 6 previously described bacterially produced volatile organic compounds (VOCs) and multiply induced *Rhodococcus rhodochrous* DAP96253 were screened for anti-*Geomyces destructans* activity. *Geomyces destructans* spores and mycelial plugs were exposed to the VOCs and induced *Rhodococcus* in a closed air space at 15°C and 4°C and evaluated for inhibition of spore germination and radial growth. Subsequently, *in situ* application methods for induced *Rhodococcus* such as fixed cell catalyst and fermentation cell paste in non-growth conditions were screened with positive results. Additionally, *Rhodococcus* was assayed for *ex vivo* activity via exposure to bat tissue ex-plants inoculated with *G. destructans* spores. All VOCs inhibited radial growth of mycelial plugs and growth from spores at both temperatures at relative concentrations as low as 1ppm. The greatest observed inhibitory effect of the VOCs was at low temperature (4°C). Induced *Rhodococcus* completely inhibited growth from spores at 15°C and had a strong fungistatic effect at 4°C. Additionally, induced *Rhodococcus* inhibited *Geomyces destructans* growth from spores when cultured in a shared air space with bat tissue explants inoculated with *Geomyces destructans* spores at 7°C. The identification of bacterially produced VOCs and inducible biological agents with anti-*Geomyces destructans* activity expands the pool of potential biological and chemical control options for WNS and provides wildlife management personnel with tools to combat this devastating disease.