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**Intra and inter-kingdom signalling mediated by fungal volatile organic compounds**

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**Key Words** Trichoderma, Volatile Organic compounds, Signalling, Reactive oxygen species

*Trichoderma* species are soil-borne filamentous fungi widely utilized for their many plant health benefits. *Trichoderma* spp. establish associations with plants, nematodes and other microbes. Microbial volatile organic compounds (mVOCs) have an important role during inter- and intra- kingdom communication. *Trichoderma* spp. produce different blends of mVOCs, and these differ within species. These differences are most likely associated with the capacity to respond to the environment. Here, we present the role of different signalling components from T. atroviride in mVOCs production, and describe how these molecules affect plants and plant -pathogen interactions. By using gene deletion mutants in *T. atroviride*, we show that NADPH oxidases (Nox1, Nox2 and NoxR) and the response regulators (Ssk1, Skn7 and Rim15) are involved in quantitative differences in the emission of diverse mVOCs. Increases in root and shoot biomass and plant pathogen inhibition induced by *T. atroviride* mVOCs differed significantly depending on the signalling component deleted. We discuss these findings and describe how specific mVOCs have a major role in these interkingdom communications between plants, *Trichoderma* and fungal pathogens.

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