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EFFECTS OF *SINORHIZOBIUM MELILOTI* VOLATILES ON ARABIDOPSIS

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Volatile compounds produced by plant-growth promoting rhizobacteria are known to act as infochemicals that play an important role in plant-microbe interactions. The most recognized effects of bacterial volatiles are the ability to promote plant growth and enhance plant resistance to biotic and abiotic stresses. These properties could be harnessed to improve crop yield replacing chemical pesticides and fertilizers.
The soil alpha-proteobacterium *Sinorhizobium* (*Ensifer*) *meliloti* is well known for its ability to establish nitrogen-fixing root nodule symbiosis with legumes. Recent studies have shown that *S. meliloti* produces volatile compounds, which exhibit interesting effects on non-legume plants (Hernández-Calderón et al., 2018; López-Lara et al., 2018). We previously reported that application of 2-tridecanone, a volatile methylketone emitted by *S. meliloti*, can protect tomato plants from the development of bacterial speck disease (López-Lara et al. 2018). In this study, we show that the volatile blend produced by *S. meliloti* GR4 induces significant increases in shoot and root biomass and promotes formation of lateral roots in Arabidopsis, especially when grown under short-day conditions. Rhizobial volatiles cause Arabidopsis rhizosphere acidification, a transient up-regulation of genes coding for the Fe^{3+}-chelate reductase FRO2 and the Fe^{2+} transporter IRT1, and an increase in root ferric reductase activity. These data indicate that the *S. meliloti* volatilome activates the iron acquisition machinery in Arabidopsis. The role of volatile methylketones produced by *S. meliloti* in plant growth promotion has been investigated in bioassays with single synthetic compounds. Preliminary data revealed dose-dependent effects on the plant growth response.

Hernández-Calderón et al. (2018). Volatile compounds from beneficial or pathogenic bacteria differentially regulate root exudation, transcription of iron transporters, and defense signaling pathways in Sorghum bicolor. Plant Mol Biol 96: 291-304.

López-Lara et al. (2018). 2-Tridecanone impacts surface-associated bacterial behaviours and hinders plant-bacteria interactions. Environ Microbiol 20: 2049-2065.

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