



# Newly identified helper bacteria stimulate ectomycorrhizal formation in *Populus*

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## Background

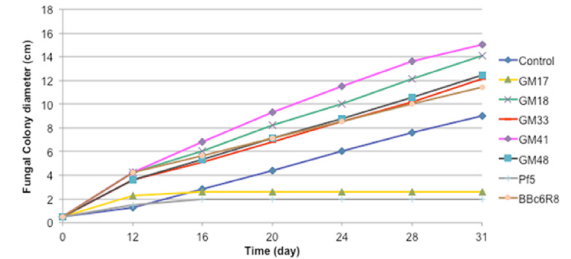
- Mycorrhiza helper bacteria (MHB) are known to increase host root colonization by mycorrhizal fungi but the molecular mechanisms and potential tripartite interactions are poorly understood. Through an effort to study *Populus* microbiome, we isolated 21 *Pseudomonas* strains from native *Populus deltoides* roots. These bacterial isolates were characterized and screened for MHB effectiveness on the *Populus-Laccaria* system.

## Science

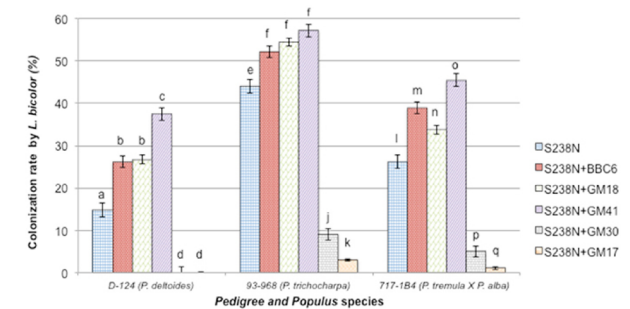
- Nineteen of the 21 *Pseudomonas* strains tested had positive effects on *L. bicolor* S238N growth, as well as on mycelial architecture, with strains GM41 and GM18 having the most significant effect.
- Four of seven *L. bicolor* reporter genes, *Tra1*, *Tectonin2*, *Gcn5*, and *Cipc1*, thought to be regulated during the interaction with MHB strain BBc6R8, were induced or repressed, while interacting with *Pseudomonas* strains GM17, GM33, GM41, GM48, Pf-5, and BBc6R8. Strain GM41 promoted the highest roots colonization across three *Populus* species but most notably in *P. deltoides*, which is otherwise poorly colonized by *L. bicolor*.

## Significance

- This study reports novel MHB strains isolated from native *Populus* that improve *L. bicolor* root colonization on *Populus*. This tripartite relationship could be exploited for *Populus* species/genotypes nursery production as a means of improving establishment and survival in marginal lands.



Effect of seven *Pseudomonas* strains on radial growth of *Laccaria bicolor* S238N. Control: bacterial suspension was substituted by sterile deionized water. Each data point represents the mean ( $\pm$ SE) of seven replicates.



Percentage of roots from three *Populus* genotypes colonized by *Laccaria bicolor* S238N in co-culture with *Pseudomonas fluorescens* strains BBc6R8, GM18, GM41, GM30, and GM17. Bars with the same letters are not significantly different according to Tukey's HSD test.