Ecological roles of endophytic fungi with plant growth and function

Contact: Christopher Schadt (schadtcw@ornl.gov); 865.576.3982)
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Background

- *Populus* species associate with a high diversity of root endophytes, which play key roles in rhizosphere function and plant fitness, but the mechanisms involved remain unknown.
- Phylogenetically distinct endophytic fungi elicit differential expression in core genes in their *Populus* host culminating in differences between plant growth and defense.

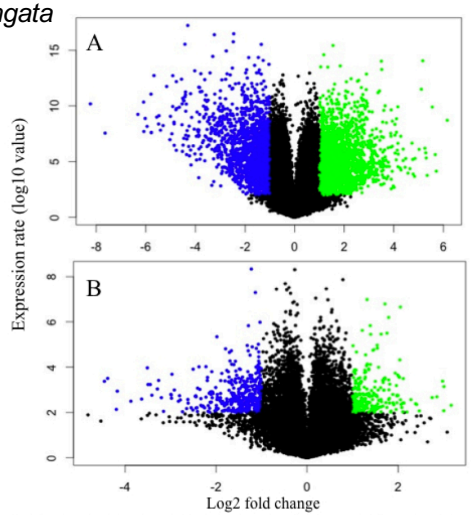
Science

- Bioassay experiments with *P. trichocarpa* inoculated with *M. elongata* and *I. europaea,* two highly phylogenetically diverse endophytic fungi, revealed that *M. elongata* promoted plant growth, while *I. europaea* did not.
- *M. elongata* and *I. erupaea* affected root and soil-associated microbes by enriching other fungal endophytes and fungal pathogens, respectively.
- Transcriptomic studies revealed that of 85 plant genes involved in extracellular activities, 15 genes were predicted to be small secreted proteins (SSPs). *Populus* SSPs associated with plant defense responses were down-regulated in response to *M. elongata*.

Significance

- Several mechanisms of communication between plant and endophytic fungi exist that affect plant growth and fitness.

Growth enhancement of Populus trichocarpa BESC86 in response to inoculation without (Left) and with (Right) *Mortierella elongata*



Volcano plots demonstrating the counts and expression rate of *P. trichocarpa* genes up- (green) and down- (blue) regulated in response to *M. elongata* (A) and *I. europaea* (B). Black dots represent no significant difference.

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Liao, H-L, et al. (2019). Fungal endophytes of Populus trichocarpa alter host phenotype, gene expression and rhizobiome compositon. MPMI, doi: 10.1094/MPMI-05-18-0133-R.