ComBAStrep

Combination of bio-analytical approaches for necrotic activity assessment of a Streptomyces metabolite

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Summary

Context —
In a project to decipher the molecular dialogues between forest soil bacteria and to understand their influence on tree root development, we identified a *Streptomyces* strain (Bs9) that inhibited root development and caused root necrosis. The anthocyanin content of the roots and leaves also increased significantly, indicating severe stress in the plant. Interestingly, the necrotic effect disappeared when *Streptomyces* Bs9 was co-cultured with two bacterial partners, a *Bacillus* strain and a *Pseudomonas* strain.

Objectives —
We have recently highlighted by MSI (Mass Spectrometry Imaging) technology a metabolite produced by *Streptomyces* Bs9 that could be responsible for necrotic activity.
The objectives of the project are:

- to confirm that the molecule highlighted by MSI is responsible for inhibiting root development in poplar (and other plants)
- to understand at the molecular level how the bacterial partners prevent this effect, probably by preventing the production of the antagonistic metabolite
- to understand by which mechanism the necrosis-inducing metabolite acts on plants.

Approaches —
To achieve these objectives, we will develop

- an analytical approach to purify and structurally characterize the metabolite responsible for this necrotic effect
- a mutagenesis approach of the candidate biosynthetic pathway of this metabolite to confirm its involvement in the necrotic activity prevalence among forest soil *Streptomyces*
- MSI and molecular approaches to get insights on the bacterial communication within the consortium that explain the loss of this necrotic activity.

Expected results and impacts —
This project will give new knowledge on an original phenomenon of negative interaction between a forest soil Streptomyces strain and a model and economically important tree (poplar). It will also provide new insights into the interactions within soil microbial communities and how microorganisms within a community modulate the activities of their partners.