Development of Fire Blight antagonists after application on apple flowers

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Fire Blight is a devastating bacterial disease which can cause great economic losses for fruit growers. Control mechanisms are limited to a few compounds with adequate efficiency, but the need for alternatives still remains.

Two main problems have to be considered in the development of control agents against the Fire Blight pathogen *Erwinia amylovora*: First, the ability of exponential growth leads to high cell densities in a short amount of time. Second, the most critical phase of Fire Blight infection occurs during blossoming, when the pathogen is transported to open flowers by various insects. To prevent infection, it is important to avoid invasion inside the plants tissue by interfering with growth of *E. amylovora* cells.

We are testing two different bacterial antagonists in their ability to inhibit the Fire Blight pathogen: The Gram negative bacterium *Erwinia tasmaniensis* and a Gram positive representative of *Bacillus amyloliquefaciens*.

E. tasmaniensis is closely related to the pathogen and is well adapted to the Fire Blight habitat. On the other hand, *Bacillus amyloliquefaciens* is commonly known as a classical soil habitant, its ability to adapt to the flower might be restricted.

Both antagonists are able to establish themselves in the field. However, efficiency against *E. amylora* differs between *E. tasmaniensis* and *B. amyloliquefaciens*.

Bacillus is fairly simple stored as spore formulations. Nevertheless, before growth of vegetative cells and inhibition against a pathogen can occur, spore germination has to take place. This might be a factor that can cause a delay in development on the flower.
Therefore, we investigated and compared the development of our antagonists after application onto apple flowers in a detached-flower assay in the lab to determine the growth rate and maximum cell densities.

Even though *E. tasmaniensis* as well as *B. amyloliquefaciens* start to grow 12 to 15 hours after application on the flower, the former reveals a steeper rise. Moreover, end cell densities differ and *B. amyloliquefaciens* reaches total cell numbers 10 to 100 fold below *E. tasmaniensis*.

A lower cell density might be a reason for a weaker efficiency in *E. amylovora* inhibition. To overcome this discrepancy an additional nutrient which is only favorable for the antagonist might be a useful additive to increase efficiency.