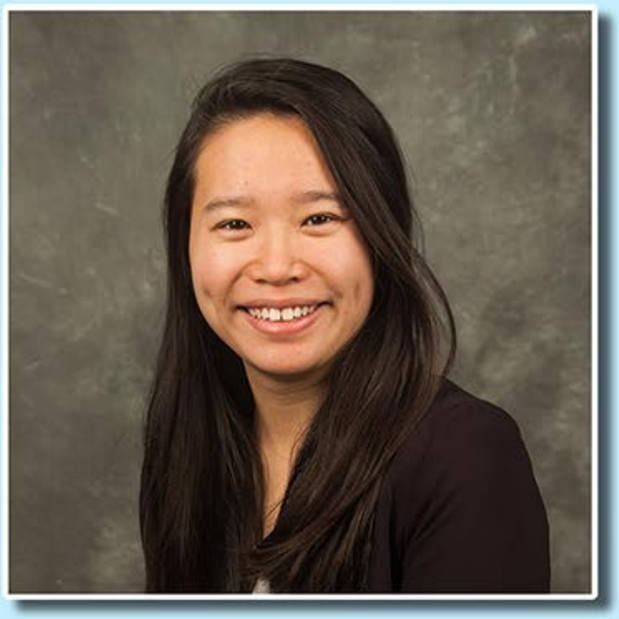

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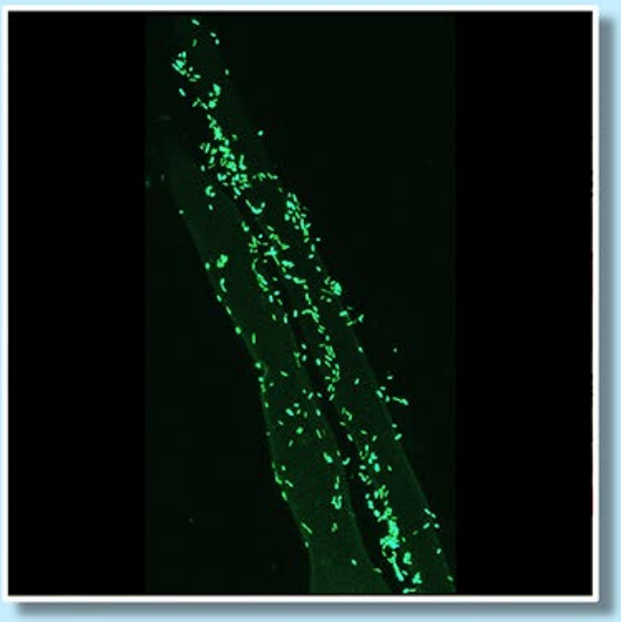

Microbes Interacting With Plant Roots
(Image credit: http://www.ias.csic.es/pilar-prieto-lab/gallery/roothairsf7surf/)

Repression of Microbially-induced Phosphate Starvation Response in *Arabidopsis thaliana* is Systemic

Plant cells respond to limiting concentrations of inorganic phosphate (Pi) in the environment or intracellularly, via a phosphate starvation response (PSR). The PSR encompasses a complex network of morphological, developmental, physiological and transcriptional responses. The PSR was originally described in sterile conditions, but the relevance of these findings to physiological conditions is unknown because plant roots associate with microbial communities that can vary with the nutrient content of the surrounding soil. Specifically, it was unknown how the presence of bacteria in the environment affects the PSR. In order to study the interplay between induction of PSR and plant-microbe competition for phosphate, we used a 'split-root' assay in which *Arabidopsis thaliana* roots were divided across two sides of an agar plate with media with variable phosphate concentrations and the presence or absence of a 35-member synthetic bacterial community (SynCom). The induction of PSR was measured using a reporter system that expresses β-glucuronidase (GUS) under the control of the IPS1 promoter, which is strongly induced at low Pi. We found that high Pi in one compartment repressed bacterially-induced PSR in the adjacent low Pi compartment, indicating that regulation of signaling in bacterially-triggered PSR is systemic. In addition, plants grown with SynCom increased Pi uptake in Pi-replete media compared to plants grown in sterile conditions. Surprisingly, in roots that were split between sterile and colonized conditions, the SynCom-induced PSR was mainly apparent in the sterile part of the root system regardless of the Pi concentration in the media. Thus, PSR triggered by SynCom has common regulatory and signaling elements with the canonical PSR that occurs in sterile conditions, and thus could serve as a model for the studying the mechanisms of PSR induction in nature.