A.J. developed the theoretical formalism of the study. V.L. carried out the experiment with support from A.B. and J.B-M. V.L. performed the data analysis and wrote the manuscript with support from A.J. The final version of the manuscript received input from K.K., who along with A.J., supervised the project.

200 word summary

It is well-established that microorganisms play an essential role in facilitating nutrient uptake, host defence, and abiotic stress resistance in the vicinity of plant roots (1, 2). Plant exudates (organic and amino acids, sugars, secondary metabolites) modulate interspecies interactions (3-7). Root cell transcription thus influences the niches available for colonization. Distinguishing beneficial symbionts from opportunists or pathogens is difficult due to high genotype and phenotype plasticity in bacteria (8, 9). Furthermore, the extent that rhizosphere niches provided by the plant are open to colonization by foreign microorganisms remains controversial.

Our results from a series of experiments over three years in an aquaponics system supports prior evidence that rhizosphere communities will consolidate towards a singular distribution despite external manipulation of microbial abundance and diversity. For instance, we show that organisms responsible for nitrogen metabolism in upstream nitrifying environments cannot supplant nitrifiers in the roots. Although this has observed in other environments, this phenomenon has not yet been described in hydroponics (10-15), or in aquaponics systems where there has been a longstanding belief that the microbial composition of the hydroponics component is somehow enhanced by the microbial diversity in the aquaculture effluent. These findings expose an inadequacy in our understanding of rhizosphere colonization, hitherto overlooking the selection pressure exerted by plant exudates in securing the rhizosphere against colonisation. ~~For a niche in the rhizosphere to be occupied by a microorganism, it must fulfill the need of the plant and additionally must thrive in the root environment.~~

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