

Assembly and structure of root-associated microbiomes involved in strawberry health and nutrition



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Background

Manipulation of root-associated microorganisms is a promising alternative to reduce agrochemical inputs and the environmental impacts associated to the management of crop biotic and abiotic stressors. For this, understanding the factors that drive the assembly of beneficial microbiomes is essential. Plants recruit microorganisms from the soil environment to the soil immediately around the roots (rhizosphere) which then may colonize the roots (endosphere) providing the last barrier of plant defense against pathogens. Strawberry cropping systems rely heavily on soil fumigants for the reduction of potentially devastating soil-borne pathogens. Restrictions in pesticide use have fostered robust breeding efforts aimed at improving strawberry cultivar tolerance to soil-borne fungal pathogens. Several cultivars exist that are tolerant to some of the major diseases, yet the resistance mechanisms are still unknown.

Objective

Here we assessed how strawberry cultivars showing different vigor and resistance against pathogens, recruit microorganisms from the soil environment.

We hypothesized that the endosphere and rhizosphere have distinct microbial communities which are shaped over time due to the influence of the surrounding soil after the plants are transplanted. This process is altered in the presence of soil borne pathogens to trigger resistance mechanisms.



Isolated rhizosphere soil through dry sieving of roots
Cleaning of roots with 10% bleach solution and autoclaved water to isolate endosphere microorganisms

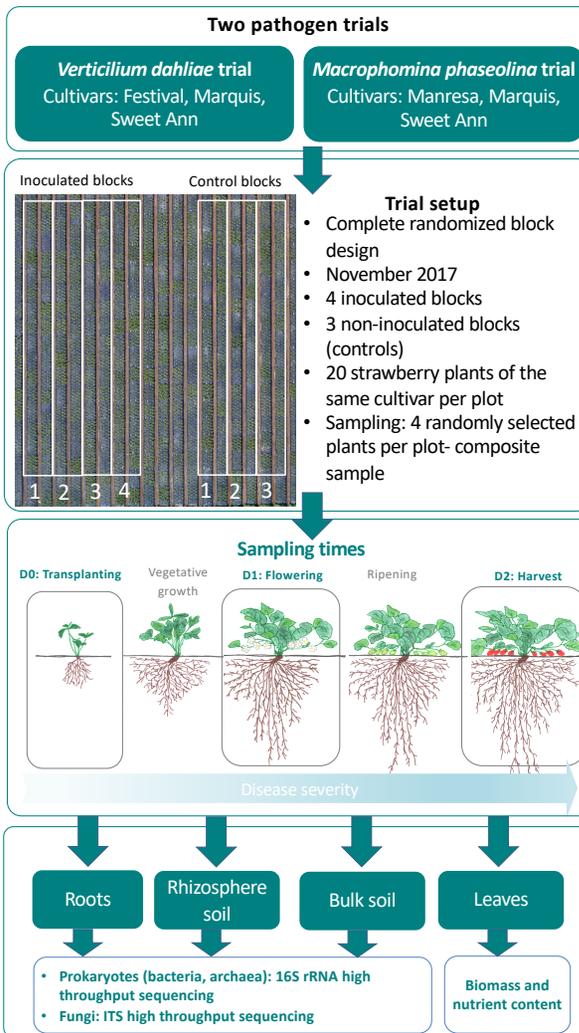


- Lyophilization
- Grinding
- DNA isolation in roots, rhizosphere and bulk soil using Qiagen Powerizer
- PowerSoil kit



- Illumina MiSeq Sequencing of targeted V4 region of the 16S rRNA
- Reads summarized to Amplicon Sequence Variants (ASVs), filtered for chimeric sequences using DADA2
- SILVA database used for taxonomy identification

Experimental design



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Strawberry drawings by Daniel J. Geisseler <http://geisseler.ucdavis.edu/Guidelines/Home.html>

