**2013 The rhizosphere revisited: root microbiomics**

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**Frontiers in Plant Science 4:1-7**

--Rhizosphere microbes assist plant in acquiring nutrients and protecting from pathogen attack

--Understanding the processes that drive the selection and function of the rhizosphere community will lead to increased plant health and yield

--Rhizodeposition = organic carbon as root border cell, mucilage, soluble exudates, VOCs, carbon flow to symbionts, and death and lysis of plant cells

--Different plants select different rhizosphere communities

Wheat, maize, rape, clover, etc.

--Field grown potato rhizosphere affected by plant growth stage

--Plant genotype affects rhizosphere community composition

Recruitment of the rhizosphere microbiome:

1. Recruited from the reservoir of organisms inhabiting the soil

2. Plant genotype drives selection

3. When attacked, plants actively select specific elements of the community, and

Under conditions that that favor a specific pathogen, antagonists that are most effective against the pathogen are selected for by the plant

e.g. suppressive soils

--TAD. Under irrigation, wheat selected DAPG producers, under dryland, plants selected PZ producers. Ggt more an issue when wet, R. solani more an issue when dry

--Fusarium wilt suppressive soils. Selects production of PZs and competition for carbon by a nonpathogenic Fusarium oxysporum

--Potato common scab, black root rot

--Foliar aphid feeding stimulated populations of Bacillus subtilis that reduced X axonopodis pv. vesicatoria on roots

--Whitefly feeding on pepper resulted in reduced feeding due to changes in the rhizosphere community, possibly by attracting bacteria that produced insecticidal toxins

--Arabidopsis infected by P. syringae pv tomato secreted elevated levels of malic acid from roots, resulting in attraction by B. subtilis FB17 that caused ISR

--P. putida KT2440 caused ISR in response to root exudates modulated by the bacterium

4. Abiotic stresses

Drought sensitive pepper plants grown under desert farming conditions selected for a root microbiome that increased photosynthesis and plant biomass under drought

Soil nitrogen availability influenced community of Medicago truncatulata only when the plant present

Release of DIMBOA (2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one) increased populations of P. putida with beneficial characteristics

Phenolic compounds act as substrates and signals

Plant age affects community composition

5. Plants mediate fine-tuning of bacterial gene expression

Wheat root infection by Ggt changed gene expression of P. fluorescens Pf29Arp

Strawberry infected with V. dahlia increased HCN production in Pseud sp. LBUM300

Using a split root system with barley, infection of one side by P. ultimum increased phlA expression in P. fluorescens CHA0 on the other side’s roots

P. ultimum infection increased root release of fumaric acid, p-coumaric acid and vanillic acid. These increased phlA expression in CHA0