



SWES Colloquium Series 2013-2014

Department of Soil, Water and Environmental Science

New insight into plant immune responses: Impact of border cell extracellular traps in defense of roots and establishment of microbial populations at the root-soil interface

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Microbial growth in the rhizosphere (Hiltner 1904) is stimulated by carbon-rich material released from roots, and up to 98% of the weight of these exudates is derived from the root apex. Yet the root apex generally remains free of infection and colonization. Recent insight into the function of mammalian neutrophils and root 'border' cells (Fig. 1), a specialized population programmed to detach from the root cap into the soil environment, may shed light on this conundrum. Neutrophils now are known to respond to invasion by export of a 'trap' consisting of histone-linked extracellular DNA (exDNA) and antimicrobial proteins (Science 303:1532). This 'extracellular trap' chemotactically attracts and immobilizes pathogens to prevent infection. Border cells also produce exDNA-based traps which attract and immobilize pathogens (Fig. 1, inset) and thereby prevent infection of the root tip as it moves through the soil. How exDNA and other reactive components of the leftover traps affect the chemistry of the soil, water, nutrients, composts, toxins, metals, and microbes at the 'critical zone' of the root-soil interface remains to be determined.

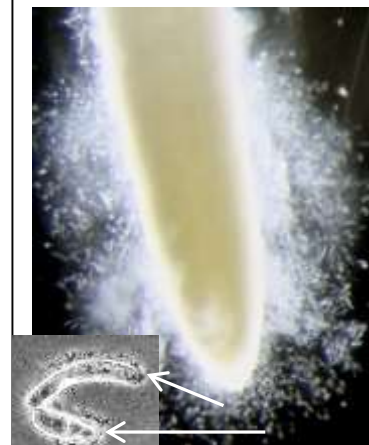


Fig. 1. Legume roots (above) produce >4000 border cells daily. Each cell (arrows) traps dozens of bacteria in minutes. AZ cotton cvs produce 30,000 cells/tip.

Monday, April 14, 2014 – 3:00pm

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Refreshments at 2:45