



SWES Colloquium Series 2013-2014

Department of Soil, Water and Environmental Science

The host microbiome in health and disease: Insights from aquaculture and agriculture

Abstract. The advent of the -omics era has enhanced our understanding of multicellular eukaryotic organisms as “superorganisms” consisting of the organism itself along with all of its associated microorganisms. This conceptual shift has impacted the field of disease ecology where “host-pathogen” interactions have become “host-host microbiome-pathogen” interactions. The role of the host microbiome in preventing disease caused by fungal and oomycete pathogens will be explored in two food production systems: salmon aquaculture (pathogen: *Saprolegnia parasitica*) and sugar beet production (pathogen: *Rhizoctonia solani*), based on recent and ongoing studies in the Microbial Ecology Department of the Dutch Institute of Ecology (NIOO-KNAW) in Wageningen, The Netherlands.

Salmon: Healthy and diseased salmon eggs from a commercial aquaculture facility were subjected to meta-taxonomic analyses revealing diverse communities of bacteria, fungi and oomycetes on the egg surface. While virulent *Saprolegnia* isolates were found on both diseased and healthy eggs, those eggs with a high abundance of commensal Actinobacteria were more likely to be healthy. Bacterial isolates were tested for their ability to prevent infection by *Saprolegnia parasitica* in bioassays using live salmon eggs and a promising strain was identified that is being further explored as a potential biocontrol agent.

Sugar beet: Natural control of soil-borne plant pathogens in disease suppressive soils containing high population levels of virulent pathogens has been documented for decades in various agricultural systems, however the understanding of the microbial mechanisms remains limited. Rhizosphere metagenomes were compared between sugar beet seedlings grown in disease suppressive vs. disease conducive soils to identify functional genes and taxonomic groups associated with plant health. Ongoing analyses of sequencing data will be presented.

Results of both studies will be explored in the context of both understanding the ecology of host-associated microorganisms and harnessing this knowledge to develop sustainable biologically-based disease control strategies.

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Monday, April 21, 2014 -- 3:00pm

Marley 230

Refreshments at 2:45