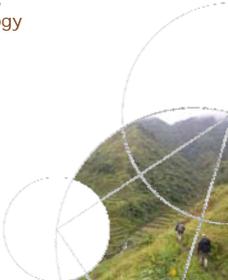


UNIVERSITY OF COPENHAGEN

Faculty of Life Sciences

Technology and Projects at the  
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Projects and Technology

1. Biological control of sheath blight in rice caused by *Rhizoctonia solani*
2. Biological control in potato in Greenland
3. Microbial community studies in and enzymes from ikaite columns
4. Microbial degradation of xenobiotics in soil



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Biological control of sheath blight in rice caused by *Rhizoctonia solani*

**Background:**  
Sheath blight is an upcoming problem under intensive rice production in the Mekong Delta in Vietnam. No effective way of controlling the disease.

**Aim:**  
To develop new eco- and user-friendly BCA technologies.  
To improve rice yield and quality.  
To understand the control mechanism of BCA's.

**Technologies:**  
AFLP analysis of *R. solani* isolates.  
Isolation of biocontrol bacteria, which control *R. solani*.  
Molecular characterization of the antagonistic mechanisms, e.g. transcriptomic analyses, *Tn5* mutagenesis.



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Biological control in potato in Greenland

**Background:**  
Potatoes are cultivated with limited crop rotation, without pesticides and in soil containing potential pathogens. Yet no severe potato diseases are found.

**Aim:**  
To analyze microbial community structure e.g. in relation to fertilization.  
To investigate if Greenlandic soils are suppressive.  
To isolate BCAs and understand their function.

**Technologies:**  
Metagenomic analyses to characterize microbial community structure.  
Isolation of biocontrol bacteria, which control pathogenic fungi.  
Molecular characterization of the antagonistic mechanisms, e.g. transcriptomic analyses.



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Microbial community studies in and enzymes from ikaite columns

**Background:**  
Ikaite columns in Greenland constitute the only place on Earth, which is low saline, alkaline (pH 10.4) and cold (2-6 °C). More than 1/3 of the bacteria in ikaite columns constitute new species and genera.

**Aim:**  
To analyze microbial community structure in ikaite columns.  
To sequence the genomes of a number of ikaite bacteria.  
To isolate enzymes and other bioactive molecules.

**Technologies:**  
Metagenomic analyses to characterize microbial community structure.  
Genome sequence analyses and enzyme gene isolation.  
Production and purification and characterization of recombinant enzymes.



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Microbial degradation of xenobiotics in soil

**Background:**  
Soil is a bioactive filter through which deposits must pass before reaching the ground water; this filter function is crucial for our drinking water quality. Xenobiotic degradation is dependent on the presence of degrader bacteria and on actual gene expression under the given *in situ* conditions.

**Aim:**  
To analyze the presence of xenobiotic degraders in contaminated soils.  
To investigate expression of genes involved in degradation of xenobiotics *in situ*.

**Technologies:**  
Detection and isolation of xenobiotic degraders using e.g. qPCR and DGGE.  
Transcriptomic analyses of gene expression *in situ*.



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**Techniques in use**

Analysis of whole microbial genome sequences.

Metagenomic analysis of microbial communities (16S rRNA, enzymes, etc.).

Transposon mutagenesis of microbes (Tn7, Tn5, Mariner; Gr. neg. & Gr. pos).

Simultaneous RNA/DNA extraction from soil

**Techniques to be implemented**

Transcriptomic analysis of microbial communities in response to e.g. xenobiotic contamination and fertilization

**Ongoing projects where these techniques are used**

Community analysis in ikaite columns, Ikka Fjord, Greenland.

Mining of genome sequences and screening for enzymes from ikaite columns.

Production and purification in small scale of recombinant enzymes.

Community analysis in potato soils in Greenland. Microbial structure as function of fertilization and other treatments.

Bacterial-fungal interactions. Genomics: Identification of biocontrol genes in genomic sequences, Transcriptomics: Transcription analysis of biocontrol genes, Metabolomics (light version): Analysis of biocontrol compounds (HPLC coupled with LCMS)

Mechanism studies of antagonistic behaviour of biocontrol agents against sheath blight in rice

Transcriptional analysis of specific genes in indigenous soil populations as influenced by substrate availability and soil parameters.