Healthy Greenlandic potatoes!

-Charlotte Jensen, PhD student from the Faculty of Life Sciences, University of Copenhagen

Charlotte Jensen standing at the research station in Upernaviarsuk, South Greenland. The picture is from May 2009 during the first expedition to Greenland.

The inner fjords around Qaqortoq in South Greenland have a luxuriant vegetation. Thus, in these areas the growing of potatoes is normal among the settled sheep farmers. Due to global warming and the continual increase in temperature in the Arctic, the farm land for growing potatoes in Greenland may be expanded significantly and in the long run Greenland potentially can be self-sufficient with potatoes.

Previous studies of the potato fields in South Greenland have shown that potato pathogens causing severe soil borne plant diseases, such as late-blight, which is known to provide major problems for the potato farmers in Denmark, are present in the Greenlandic potato soils. However, despite the limited use of crop rotation and no use of pesticides, potato diseases are not yet a major threat for the potato farmers in Greenland.

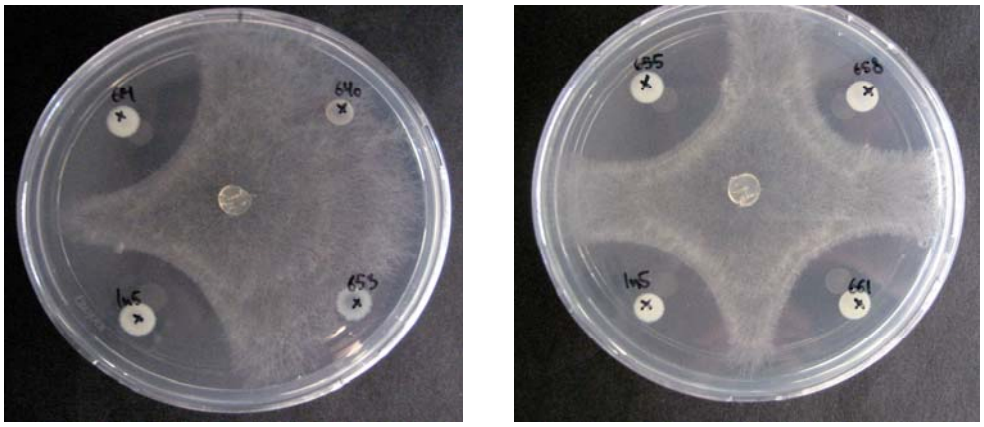
Growth inhibition of the plant pathogens due to the cold winters in Greenland could be one explanation why the Greenlandic potato farmers not yet have experienced severe soil borne plant diseases in their crops. However, the potato soils could also contain several beneficial and fungal-inhibiting microorganisms, which can suppress the growth of the plant pathogens.

In November 2008 I, Charlotte Jensen, Microbiologist from the University of Copenhagen, received a PhD grant from the Danish Agency for Science, Technology and Innovation. The project is financed by the Greenland Home Rule and provides a collaboration between the Chief counsellor Kenneth Høegh from the research station in Upernaviarsuk, the potato farmers in South Greenland and the Section for Genetics and Microbiology, Faculty of Life Sciences, University of Copenhagen.

During the project, I will be studying the microbial diversity in the potato fields in South Greenland with special focus on beneficial, fungal-inhibiting bacterial. Additionally, I will investigate whether the Greenlandic potato soils are suppressive against plant diseases, i.e. if the soils contain large amounts of beneficial microorganisms, which can inhibit the growth and/or disease mechanisms of

the plant pathogens. The cold tolerance of Greenlandic plant pathogens will also be studied during this project.

Finally, I will study how different management strategies of the potato production in Greenland, i.e. the use of different manure, weed removal methods, watering, plastic covering and so forth, can affect the temperature- and moisture in the soils together with the effect on the microbial communities.



Inhibition assay against the plant pathogen *Rhizoctonia solani* Ag3 with bacteria isolated from the potato fields in South Greenland. Some of the bacteria inhibit the growth of the fungus, whereas others do not.

My results so far have indicated that beneficial and fungal-inhibiting bacteria do exist in the Greenlandic potato soils, in that I have isolated and analyzed a handful of bacteria from these soils, which have fungal-inhibiting activities. Thus, currently I am trying to develop a multiple screening method to detect fungal-inhibiting activities from several bacteria at one time.

During my PhD project I will go to South Greenland two times a year during the growing season (e.g. from the 20th of May to the 20th of September) to collect soil samples from selected potato fields at the research station in Upernaviarsuk and at Ferdinand Egede in Eqaluit Ilua. My first expedition to Greenland was in May 2009, which is the period where the potatoes are put in the soil. Soil samples were collected from the selected potato fields and some data loggers, which have the abilities to measure the temperature, light intensity and moisture in the soils, were placed in the different fields to follow the variations in the soils during the entire growing season. My next expedition to Greenland will be in August 2009, which is the period where the new potatoes are taken up from the soils. At this time, new soil samples will be collected from the selected potato fields and the data from the data collectors will be uploaded for analysis. The data loggers will be placed back into the soils to follow the variations during the rest of the year until the following expedition in May 2010.

During the project period Kenneth Høegh, his co-workers and the Greenlandic potato farmers will be regularly updated with results from my study.