Rapid assessment of tundra plant diversity using small bits of genetic code found in the soil

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Climate change and industrial activity are changing the Arctic tundra. Since tundra plants are small and hard to identify, it is often difficult to know which different kinds are found in an area of tundra. Not knowing which plants are present makes it difficult to support nature conservation efforts and measure changes in plants over time. The main objective of our study is to test a new protocol that could make finding the different kinds of plants in the tundra a lot easier.

The protocol uses small fragments of the plants' genetic code found in soil that can tell us which plants are found close by. To test the protocol, we will collect soil samples from three 300 m x 300 m tundra locations around Cambridge Bay and extract the plants' genetic code in the laboratory of the Canadian High Arctic Research Station. We will also survey the plants by eye and use drones to create maps of each location. The plant surveys will help us test the quality of the protocol and the maps will show us how the samples fit into the landscape.

The collected soil also holds information about nutrients and which microbes are present. In addition to testing the protocol, we will examine how soil nutrients and microbes influence the kinds of plant that can be found in an area of tundra.

We plan to complete the field research between July 1st and August 12th, 2023. The scientific analysis and evaluation of the protocol will be carried out at the University of Zurich in Switzerland. We aim to conclude the project by summer 2024.

All data and results will be made available to everyone through an online database and in a scientific publication. In addition, we will share all data and observations of interest to community members, local authorities, and researchers at Polar Knowledge Canada in advance. We will give a public talk to introduce the project during Polar Knowledge Canada's "Speaker Series" in Cambridge Bay this summer and hope to return later in 2023/24 to share the findings.

To make it easier to engage with our research, we will introduce our team on the appropriate Facebook groups prior to arrival in Cambridge Bay. We are also coordinating with Polar Knowledge Canada to plan a potential workshop for a school holiday club if this is of interest to the community.

The impact on the environment, wildlife, and people will be small. We will collect only small amounts of soil (estimated 162 samples of 50 ml each) and around five leaves for about 150 plants to create a library of the local plant's genetic code. We will prioritize respect for the community when we fly drones. As such, we will not fly within 150 m of people, camps, and houses. We will obtain all required permits.