# Climatic and biotic controls of shrub expansion, Southwest Yukon

*Interim Report - April 2017*

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## *Objectives of project*

Climate warming is occurring rapidly in northern ecosystems and allows plants to grow faster, causing a "greening" of the tundra. As higher latitudes and elevations warm, plants may also expand their range, such as the treeline moving into previously treeless areas. The shrubline seems to be advancing in areas of the Yukon, but in a variable way and not closely tracking changes in climate.

The expansion of tall shrubs in the tundra could be limited by interactions with the other plants already present in the community. The general aim of this PhD project is to determine whether plant-plant interactions alter the climate sensitivity and the expansion potential of shrub communities in the Kluane region.

The aim of the 2016 field season was to determine whether the availability of suitable seedbeds and the production of toxic compounds by other plants interfered with the recruitment of shrubs.

## *Progress and current findings*

In the summer 2016, we conducted two types of germination experiments, using seeds of willow shrubs collected in Pika Valley (61.1°, -138.7°) and on Qikiqtaruk Herschel-Island (under permit 16-48S&E). The experiments were designed to answer the following questions:

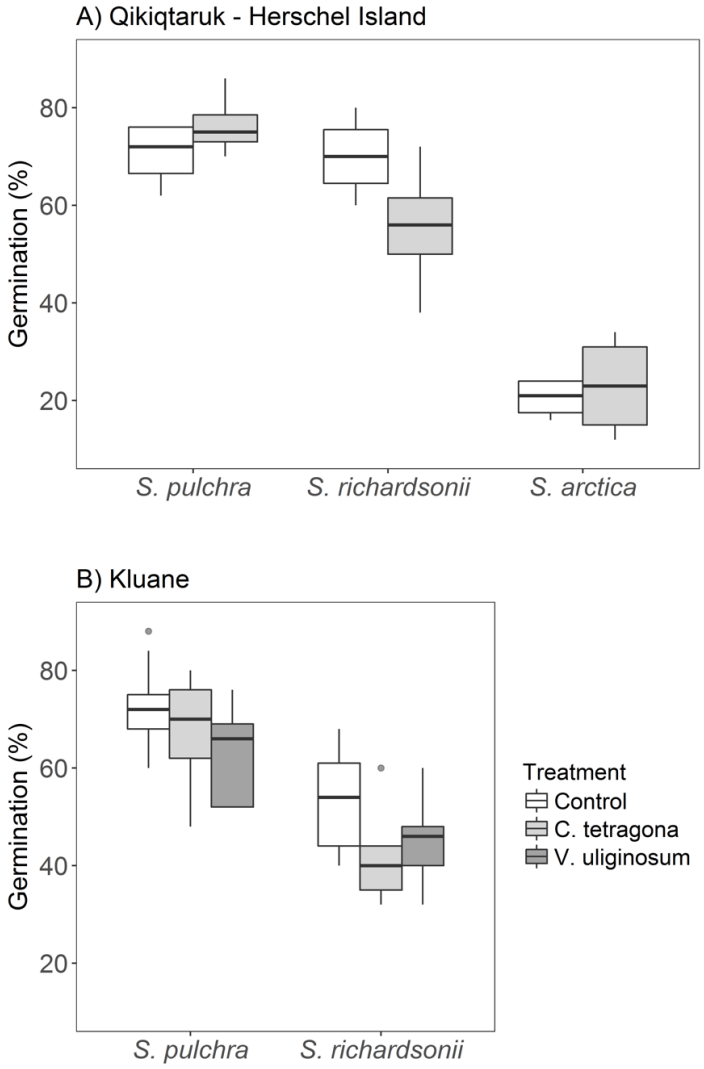
1) Does seedbed type affect germination success of willow seeds?

We collected soil disks with four different ground vegetation types: herbs, graminoids, moss, and scarified (all vegetation removed). We found that germination was higher on bare ground, suggesting that the advance of the shrubline could be slowed down by surrounding vegetation or enhanced by disturbances that expose bare ground.


**Willows germinate more frequently on bare ground than on undisturbed vegetation.**

2) Are chemicals produced by dwarf shrubs limiting the germination of willow seeds?

We prepared leaf extracts from common dwarf shrubs *Vaccinium uliginosum* (blueberry), *Cassiope tetragona* (Arctic bell-heather) to test whether the chemicals contained in the leaves were harmful to shrub seeds as they have been shown to be with some tree species. For most combinations of treatments and willow species, we did not find evidence for chemical interference, but one willow species (*Salix richardsonii*) had lower germination success when exposed to *C. tetragona*.




**Willows are not vulnerable to chemicals produced by blueberry plants, but the germination of the Richardson's willow is negatively affected by the Arctic bell-heather.**

These results have been presented at the ArcticNet Annual Scientific Meeting in Winnipeg in December 2016 (http://www.arcticnetmeetings.ca/asm2016/), and a manuscript is in preparation.

*Additional information:*

Team Shrub at the University of Edinburgh https://teamshrub.wordpress.com/