Thermal germination characteristics of High Arctic plants: implications for their responses to climate warming

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Recent climate warming is likely to affect the reproduction of Arctic plants, but little is known about its impacts on the timing of germination and recruitments of them. In this study, we conducted a laboratory experiment to study the thermal germination characteristics of some High Arctic plants and their relations to temperature conditions in the field.

We collected seeds of three plant species, *Dryas octopetala, Eriophorum scheuchzeri*, and *Oxyria digyna* in Ny-Ålsund, Svalbard (August 2019). They were transported to Japan in a dried condition and stored in a refrigerator at 3 ℃ until the experiment.

The thermal germination characteristics were examined by the GT method (Gradually increasing and decreasing Temperature method) proposed by Washitani (1987). In this method, the seeds were subjected to two temperature regimes; a gradually increasing temperature regime (IT system) and a gradually decreasing temperature regime (DT system) in the range of 4−15 ℃, and the time course of germination was monitored.

Oxyria began to germinate at 8 ℃ in the IT system with the final germination of 56%. The final germination in the DT system (30%) was lower than in the IT system suggesting that cold treatment stimulated the germination. Germination percentages of *Dryas* and *Eriophorum* were low (≦ 10%) in both systems.

We estimated the impact of climate warming (+ 2 ℃ and + 4 ℃) on the germination of *Oxyria* using soil temperature data recorded in Ny-Ålsund. The results suggested that the warming extends the period available for the germination by 2−6 weeks.

References:

Washitani I (1987) A convenient screening test system and model for thermal germination responses of wild plant seeds: behavior of model and real seeds in the system. Plant Cell Environ 10:587−598