Photosynthetic characteristics of *Bistorta vivipara* in Ny-Ålesund, Svalbard

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The Arctic is warming two to four times faster than the global average. It has been suggested that plants are affected by current and future warming. The change may have key implications for various feedback mechanisms throughout the changes of carbon, nitrogen, water cycles, albedo, etc. To clarify how plants respond to changes in the temperature environment in the Arctic, we plan to compare the ecophysiological characteristics and traits of individual plants in the Norwegian high Arctic. We selected alpine bistort (*Bistorta vivipara*), widely distributed in the Svalbard archipelago, and investigated its photosynthetic characteristics.

The study site was Ny-Ålesund, Spitsbergen, Norway. In July 2023, we collected three flowering *B. vivipara* and brought them to the NIPR station in Ny-Ålesund. The relationships between temperature, light–net photosynthesis and temperature–dark respiration were measured using a portable photosynthesis measurement device (Li-Cor, LI-6400).

The light-photosynthesis curve had a light saturation point of about 500 mmol photons m^{-2} s^{-1}, and the photosynthetic rate tended to increase up to 1500 mmol photons m^{-2} s^{-1}. There was no significant difference in temperature-photosynthesis in the 9-27 ºC range, but there was a tendency for the higher photosynthetic rate at 13 ºC. On the other hand, the dark respiration rate increased exponentially with increasing temperature.

When the obtained photosynthetic characteristics were compared with *Salix polaris,* which was investigated at the same study site (Muraoka et al., 2002), the responses of the photosynthetic rate of *B. vivipara* to light and temperature were similar to *S. polaris*. On the other hand, the net photosynthesis of more than 1000 mmol photons m^{-2} s^{-1} PPFD tended to be higher in *B. vivipara* than *S. polaris*. The dark respiration rate of *B. vivipara* also tended to be higher than that of S. *polaris*. When we constructed a production model based on the photosynthesis characteristics and estimated the net production over a 10-day summer period at the individual leaf level for *S. polaris* and *B. vivipara*, the net production would be higher for *B. vivipara* than for *S. polaris*. Now that we have a prospect of constructing a photosynthetic production model for *B. vivipara*, we plan to investigate the photosynthetic activity of *B. vivipara* that grows in other regions of Svalbard and compare their net production in addition to ecophysiological characteristics.