Effect of tar spot on photosynthetic activity of polar willow in Ny-Ålesund, Svalbard

Shota Masumoto[1], Masaki Uchida[1, 2], Motoaki Tojo[3] and Satoshi Imura[1, 2]
[1]*The Graduate University for Advanced Studies*
[2]*National Institute of Polar Research*
[3]*Graduate School of Life and Environmental Sciences, Osaka Prefecture University*

Tar spot disease is one of the plant diseases that occur on willows and caused by the genus *Rhytisma*. Their appearance closely resembles droplets of tar on leaf. The diseases have possibilities to regulate photosynthesis of host plant because the symptom covers host leaf and/or the infection itself affects plant activity. However, little is known about the effect of tar spot disease on the activity. In this study, we aimed to clarify the effect of tar spot disease on photosynthetic activity of polar willow (*Salix polaris*) in Norwegian High Arctic.

In polar semi desert of Ny-Ålesund, Spitsbergen Island, Norway (79˚N, 12˚E), *Salix polaris* achieves high coverage and net primary production. We measured photosynthetic activity of *S. polaris* with a pulse-amplitude modulation chlorophyll fluorometer (PAM2100, Walz, Germany). We also investigated growth rate of tar spot area and phenology of *Salix*. These investigations were conducted during July 12 to August 30, 2010.

Tar spot symptom area had no photosynthetic activity (Fig.). In contrast, photosynthetic activity of green part of infected leaf was similar level with the activity of uninfected leaf (Fig.). There was no difference of timing of autumn leaves and leaf drop between infected plant and uninfected plant. Tar spot grew within one month and the area eventually covered over 20 percect of whole leaf. Those results suggest that tar spot infection rate, the covered period and the covered area are important factors to regulate primary production of *S. polaris*.

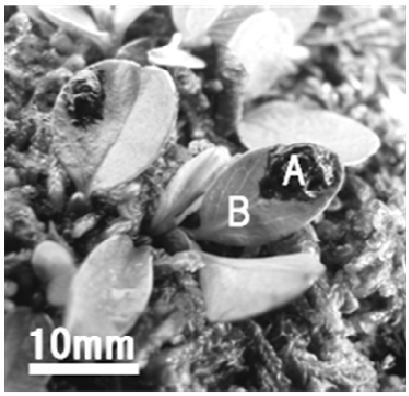

Fig. Tar spot disease infecting on *S. polaris*
A: Symptom area
B: Green part of infected leaf