平成 30 年度　環境科学院　修士論文内容の要旨

Detecting the effectiveness of *Sphagnum* transplantation for restoring wetland ecosystem after peat mining in Sarobetsu Mire, northern Japan

（サロベツ湿原泥炭採掘跡地における湿原生態系復元を目的としたミズゴケ移植有効性の検証）

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The re-establishment of *Sphagnum* mosses on the post-mined peat surface is a priority for the restoration of bogs. Transplantation of *Sphagnum* sometimes promotes vegetation recovery. The effects of transplantation differ between post-mined peatlands worldwide. In addition, transplantation is often conducted with pre-and post-treatments, such as litter mulch to increase the success of establishment. The present study was conducted in Sarobetsu mire, a post-mined peatland in northern Japan, to clarify the possibilities of restoration through moss transplantation. The successional sere after the peat mining is bare ground (BG) - *Rhynchospora alba* sedgeland (RA) - *Moliniopsis japonica* grassland (MJ) - peat moss carpet dominated by *Sphagnum papillosum* (ST). The transplantation of *S. papillosum* was conducted to these four habitats with and without litter mulch, consisting of *R. alba* or *M. japonica*.

The transplantation was conducted before snow accumulation in October 2017 and soon after snow-melting in April 2018 to detect the suitable transplantation timing. Litter mulch was performed to 1/2 of plots. In total, 320 plots were established based on the block design: 4 (vegetation) × 2 (timing) × 4 (mulch) × 10 (replication). Until late fall in 2018, the growth of *Sphagnum* was monitored by four parameters related to biomass or productivity, i.e., vertical growth, NDVI (normalized difference vegetation index), capitulum density and *Sphagnum* cover. The biomass was measured by harvesting during the final survey. Vegetation survey was conducted in September 2017 and July 2018. Water table, pH, light intensity and temperature were also monitored in 2018 to inspect the relationships between *Sphagnum* growth and environments.

Sphagnum showed higher vertical growth, biomass productivity and capitulum density in ST, higher vertical and horizontal growth with low capitulum density in MJ and high capitulum density in RA. *Sphagnum* were lost mostly from BG. The litter mulch promoted the vertical growth but did not change the biomass of moss, suggesting that shade induced spindly growth. *Sphagnum* tended to establish on the habitats showing high species richness of vascular plants, high pH, moderate light intensity and moderate temperature, as seen in MJ. Generalized linear regression showed that the biomass was predicted well by the four examined parameters. The biomass growth in un-harvested plots was estimated by the regression.

Even though the transplanted *Sphagnum* increased the cover, the total biomass growth was slower than *in-situ Sphagnum* (used as control) during the first year of transplantation. These results suggested that damages induced by the transplantation remained for one year or more. However, the transplanted moss survived mostly on the plots in MJ and RA and grew well on a few plots there. This study developed a precise and non-destructive method to estimate moss biomass and found out the techniques of moss transplantation to accelerate the succession.