

Characterization of willow pathogens, *Melampsora epitea* and *Rhytisma salicinum*, from Spitsbergen, Svalbard archipelago, Norway, on species identity and epidemiology

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Rust and tar-spot are the most frequently found leaf diseases on polar willow (*Salix polaris*) in the high arctic regions (Elvebakk and Prestrud 1996, Smith et al. 2004). However, neither detailed taxonomic information nor epidemiological aspects of the pathogens have been available. This study characterized the pathogens from Ny-Ålesund, Svalbard, Norway on species identity and epidemiology. Pathogens of rust and tar-spot diseases from Ny-Ålesund were identified as *Melampsora epitea* and *Rhytisma salicinum* based on morphology, and sequences of the rDNA-ITS regions. Occurrences of rust and tar spot diseases were investigated on same colonies of polar willow in Ny-Ålesund in August 2008 and 2010. Fifteen plots, each consisting of 15 x 15 cm square and had 89-159 shoots of the polar willow, were examined on number of the polar willow shoot which had the diseased leaves. Percentages of ground area covered by moss colony which consisted mainly with *Sanionia uncinata* and *Orthothecium* spp. were also investigated for the each plot. The number of the diseased plants was increased with increasing mosses-covering area in tar spot in 2008 and 2010. There was no relationship between the diseased plants and mosses-covering area in rust. There were no significant difference between the observations in 2008 and 2010 on total number of shoots, total number of shoots which had tar spot diseased leaves, and total number of shoots which had rust diseased leaves in the fifteen plots. These results indicated that disease occurrences were related with moss covering area of ground in tar spot but not in rust on polar willow in Ny-Ålesund. Humid conditions are required for spore transmission of tar spot (Minter 1997), but not for rust. Moss covering of the ground increased the moisture around polar willow leaves and might enhance infection of the tar spot. The results also indicated that the both diseases had no effects on survival of the plants during the two year period.