

Maturity of ascostroma and spore dispersal of tar spot pathogen on *Salix polaris* in Ny-Ålesund

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In Ny-Ålesund, Spitsbergen Island, high Arctic Norway, tar spot disease caused by *Rhytisma* sp. occurs widely on *Salix polaris*. Plant pathogens can affect individual growth and community structure in many wild plants (Gilbert 2002). Although the disease has long been recorded in Spitsbergen Is. (Lind 1928, Hagen 1941), the ecological characteristics of the pathogen have not been determined. To clarify the aspects of early stage in the life cycle of *Rhytisma* sp., we investigated the ascostroma maturity levels and spore dispersal of the pathogen in both field and laboratory experiments. In field experiments, the pathogen developments were investigated in ascostromata and spores at the study site from snowmelt to late summer. The spore dispersal was periodically estimated using a trapping method using a slide glass with a layer of soft wax. In laboratory experiments, spore developments in ascostromata were compared among three different moisture conditions including natural drying, high humidity (99.9 %) and saturated conditions. The laboratory experiments were conducted at 15°C under light. The field experiments showed that the ascostroma was formed on the host leaves during the previous summer and on the fallen leaves over the winter. The ascostromata were immature just after snowmelt but matured in two weeks. The spores were dispersed by precipitation at the experiment site (Figure 1). A strong correlation ($p < 0.05$, $R^2=0.91$) was found between the spore dispersion and precipitation. In laboratory experiments, ascostromata matured and released spores only under saturated condition (Figure 2). The laboratory experiments also showed that the minimum period for maturation of the ascostromata was five days at 15°C. These results demonstrated that saturation is necessary to release spores of the pathogen, at least for primary production of the spores from ascostroma. This suggests that the amount and frequency of rainfall highly influence spore release from matured ascostroma under field conditions at Ny-Ålesund where is little precipitation in summer (34 mm / monthly mean precipitation of July).

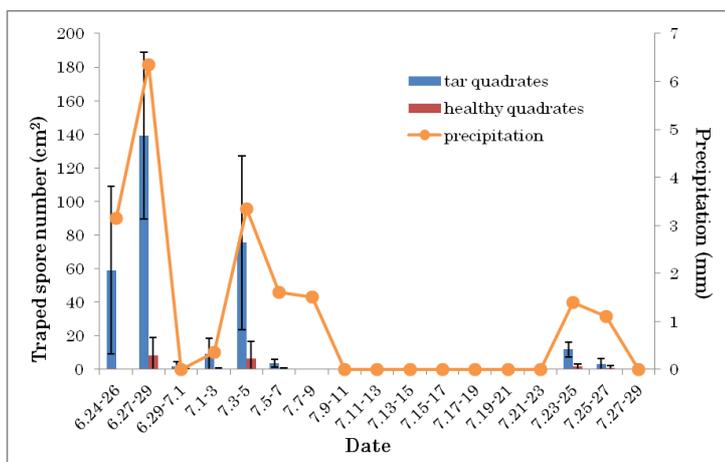


Figure 1. Relationships between the spore dispersal of *Rhytisma* sp. and precipitation at the experiment site in Ny-Ålesund.

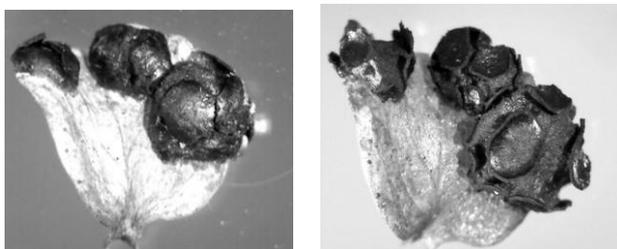


Figure 2. Matured ascostroma of *Rhytisma* sp. from Ny-Ålesund under dry conditions (left) and saturated conditions (right).

References

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