Increasingly warm winters may reduce the survival of forest tree seedlings

March 21 2019

The future climate is expected to be warmer and rainfall is expected to be higher than at present, particularly during the winter. This will increase warm periods and rainfall during the winter, which may lead to a thinner snow cover, local flooding and the formation of ice layers on ground surface and inside the snow cover.

According to laboratory tests, small pine and downy birch seedlings seem to react differently to different snow conditions. Only those pine seedlings that were fully covered by snow started to grow normally. Those seedlings that were partly covered by snow or not covered by snow at all suffered from serious damage that took place during the winter or at the beginning of the growing season.

Instead, the snow cover or the lack of it did not have any impact on the survival of downy birch seedlings.

"However, those birch seedlings that were covered by snow or ice accumulated more leaf and root biomass during the next growing season", says Timo Domisch, research scientist at Luke.

These results indicate that the snow cover is important for young tree seedlings to protect them from the cold and dry winter air.

More information needed about the impact of the changing climate on tree roots

During the winter, trees have to endure many different stress factors. These include a low air temperature and changes in it, a low ground temperature and frost heaving, as well as changes in soil moisture and strong solar radiation in the spring. How trees are able to withstand these factors depends on the tree species and its origin. Trees weakened by various stress factors are more susceptible to, for example, catching fungal diseases, and their ability resistsing pests is decreased

Environmental conditions and the thickness of the snow cover show significant variation from one year to the next. Because snow acts as an excellent insulation material, the ground temperature may vary substantially between different years and locations. Due to precipitation and repeated thawing and freezing cycles, there can also be variation in soil moisture and surface conditions (snow, ice).

Climate change is expected to change winter conditions on northern latitudes, particularly the thickness of the snow cover, resulting in changes in temperature and moisture conditions. The impact of winter conditions on tree roots, and particularly on fine roots and mycorrhiza that are important considering the nutrient and water uptake, is not known as well as the impact on aboveground tree parts.

More information: Timo Domisch et al. Let it snow! Winter conditions affect growth of birch seedlings during the following growing season, *Tree Physiology* (2018). DOI: 10.1093/treephys/tpy128

Provided by Natural Resources Institute Finland