# Transnational Access Report

## 1. General Information

| | |
|---|---|
| Project Acronym (ID): | WaxSpruceRoot |
| Project Title | Do heat injuries, heat stress or reduced photosynthate production affect root architecture and growth rate after wax covering of Norway spruce seedling shoot parts? |
| Name of Group Leader | Aud B. Eriksen |
| Name of organization | Department of Biosciences, University of Oslo |

## 2. Duration of access

| Begin of the project | End of the project |
|---|---|
| 17 November 2014 | 22 January 2015 |

## 3. Project summary (max. 250 words)

Norway spruce (*Picea abietis*) saplings are protected against pine weevils (*Hylobius abietis*) feeding on the bark of the stem by a layer of wax on the lower parts of the stem. The wax is applied hot, which may inflict heat stress or heat injuries to the phloem and cambium of the plants. In addition, the needles on the lower parts of the stem and branches are killed. Root growth may be affected by reduced transport of photosynthate through the phloem or by reduced photosynthate production in the lower parts of the shoot. To separate the effects on root growth of heat on the stem and loss of photosynthetically active parts, the effects of normal wax application, of heating the lower parts of the shoot with hot water and of removing needles and branches on the lower parts of the shoot were compared. Micro CT scannings were performed to visualize the 3D root architecture within the soil cores and to quantify several measures of root growth and root architecture. The VG Studio Max software was used to separate the root voxels from the soil voxels. The RooTrak software was used to quantify the root volume and soil volume occupied. Further studies of the CT scannings are to be done to complete the work.

## 4. Main achievements (max. 250 words)

The 3D root architecture within the soil cores of 30 spruce saplings has been studied. Although Norway spruce is an economically important species, the CT method has not previously been used to study the undisturbed 3D root architecture of this species, to our knowledge. Growth rates during the first five weeks after planting can be calculated for all 30 plants. Further, growth rates during the fifth week can be calculated for six plants, comparing controls with wax treated plants. The 3D architecture of 14 weeks old root systems of controls, wax treated plants and plants with needles and branches on the lower shoot removed, will also be studied. These root systems are expected to contain more newly developed roots that are longer and more branched than the five week old root systems.
The vitally growing roots after five weeks of growth often initiated from much thinner roots developed the previous growth season. Such thin roots are more prone to breaking than the ones developed from thicker roots. The root branching site may be of importance to the successful establishment of a spruce sapling in a field, and should therefore be studied further. We will start by extracting information from the present experiment. **(201 words)**

## 5. Publications related to the access granted, acknowledging the support by EC.

In Preperation