



Monitoring the Soil Water Availability of Young Urban Trees in Hamburg, Germany

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In large cities numerous trees have to be planted each year to replace died off or cut down trees or for greening of constructed roads and newly built quarters. The typical age of planted trees is between five and fifteen years. Often the planting takes place in special planting pits to stimulate the tree growth under the restricted urban conditions. Consequently, trees are surrounded by different soil substrates: the soil from the nursery in the root ball, the special planting pit substrate and the surrounding urban soil which is often anthropogenic influenced. Being relocated in the city, trees have to cope with the warmer urban climate, the soil sealing and compaction and the low water storage capacity of the substrate. All factors together increase the probability of dry phases for roadside trees.

The aim of this study is to monitor the soil water availability at sites of planted roadside trees during the first years after planting. Therefore, a measuring design was developed, which works automatically and takes the complex below ground structure of the soil into account. This approach consists of 13 soil water tension sensors inside and outside of each planting pit up to one meter depth connected to a data logger.

The monitoring devices will finally be installed at 20 roadside trees (amongst others *Quercus cerris*, *Quercus robur*, *Acer platanoides* 'Fairview') in Hamburg, Germany, to identify phases of drought stress. The young trees were mainly planted in spring 2016.

Data of the first year of measurements show, that the water tension varied between the different soil substrates and the depth. In the first year of tree growth in the city, soil in the tree root ball became significantly drier than the surrounding soil material. In late summer 2016 the water tension in the topsoil had the potential to cause drought stress below some trees.