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Groundwater uptake by forest and herbaceous vegetation in the context of salt accumulation in the Hungarian Great Plain

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In Hungarian Great Plain forested areas has significantly increased during the last century. Hydrological effects of trees differ from that of crops or grasses in that, due to their deep roots, they extract water from much deeper soil layers. It has been demonstrated that forest cover causes water table depression and subsurface salt accumulation above shallow saline water table in areas with a negative water balance.

The above mentioned situation caused by the afforestation in the Hungarian Great Plain is examined in the frame of a systematic study, which analyzed all affecting factors, like climatic water balance, water table depth and salinity, three species, subsoil layering and stand age. At the regional scale altogether 108 forested and neighbouring non forested plots are sampled. At the stand scale 18 representative forested and accompanying non forested plots (from the 108) are monitored intensively. In this paper dataset of two neighbouring plots (common oak forest and herbaceous vegetation) was compared (as first results of this complex investigation). On the basis of the analysis it could be summarized that under forest the water table was lower, and the amplitude of diel fluctuation of water table was significantly larger as under the herbaceous vegetation. Both results demonstrate greater groundwater use of forest vegetation. Groundwater uptake of the forest (which was calculated by diel based method) was almost same as potential reference evapotranspiration (calculated by Penman-Monteith equation with locally measured meteorological dataset) along the very dry summer of 2012.

Larger amount of forest groundwater use is not parallel with salt uptake, therefore salt accumulates in soil and also in groundwater as can be measured of the representative monitoring sites as well. In the long run this process can result in the decline of biological production or even the dry out of some part of the forest. Greater groundwater uptake and salt accumulation effect can be especially true under the more significant drought conditions of global climate change.

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