INTERACTIONS BETWEEN TREES, CROPS AND PEDOSPHERE: EXPERIENCES IN IRRIGATED BIOENERGY - AGROFORESTRY SYSTEM IN HUNGARY

Beatrix Bakti[1], Ágnes Kun[2], Ildikó Kolozsvári[2], Mihály Jancsó[2], Árpád Székely[2], Zsolt Keserű[1], Csaba Bozán[2], Csaba Gyuricza[3]

[1]Department of Plantation Forestry, Forest Research Institute, University of Sopron, H-4150 Püspökladány, Farkasszíget 3., Hungary; E-Mail: Bakti.Beatrix@uni-sopron.hu

[2]Research Center of Irrigation and Water Management, Institute of Environmental Sciences, Hungarian University of Agriculture and Life Sciences, H-5540 Szarvas, Anna-liget u. 35.; E-Mail: Kun.Agnes@uni-mate.hu

[3]Institute of Agronomy, Hungarian University of Agriculture and Life Sciences, H-2100 Gödöllő, Páter Károly u. 1., Hungary

Aim of our study was to evaluate a complex agroforestry system with the intercropping of aerobic rice and the utilization of reclaimed water for sustainability and climate change adaptation. The foreseeable positive outcomes of the intercropping system could be higher yields for the arable crops, additional woody product and indirectly favourable microclimate, water conservation, increased biodiversity and wind damage reduction.

In our small scale (0.3 ha) experiment aerobic rice production took place between poplar and willow rows in 2019. Hungarian rice cultivar ‘M488’ was irrigated with River Water and Effluent Water from an intensive catfish farm (micro sprinkler irrigation). The effect of different irrigation doses on the tree species via measurement of phenology parameters and root growth was analysed. Beside the rice and woody plant biomass production, the changes of soil parameters and mineral composition of rice were evaluated as well due to the properties of the effluent water (high nitrogen, sodium (313 mg/dm^3) and bicarbonate (951 mg/dm^3) content of the water). According to our hypothesis the inorganic nitrogen content of the effluent water contributes to meeting plant nutrient requirements, however the soil salinization should be avoided. In addition, the effects of soil improvements (limestone grit; 2.5 t calcium-carbonate per ha) and mulch (winter wheat straw, 2.5 t/ha) on soil processes were also explored. The effect of irrigation and organic mulching on earthworm abundance, biomass and species composition was also investigated. Soil mulching significantly increased earthworm abundance and biomass in summer, while irrigation quality and doses significantly decreased it.