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P1 – Spatial and temporal variation of plant water status and growth of black locust (*Robinia pseudoacacia* L.) in agroforestry systems

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Short-rotation forestry and agroforestry systems have the potential to become an ecologically valuable and economically profitable land use alternative on marginal lands. Therefore, our project focuses on determining the water demand for biomass production of black locust in the Lusatia region (Eastern Germany). The area is characterized by relative low annual rainfall (560-600 mm/yr) and drought periods during spring and summer. Black locust (*Robinia pseudoacacia* L.) is planted in short rotation plantations as well as in agroforestry systems at reclaimed post-mining sites of the opencast mining area “Welzow Süd” and on a conventionally managed field near the town Forst (both study sites are located about 120 km to the south of Berlin). Due to mining activities the ground water table in “Welzow-Süd” is below 100 m, while on the field site in Forst the ground water table is about 2 m below the soil surface. Because of the water accessibility directly affecting the yield, it is crucial to identify the spatial variation of the soil water availability and its influence on black locust growth. The main question of this study is how the drought periods affect black locust’s growth and recovery and about the drought mitigation effect obtainable by an accessible water table. The growth rate is estimate monthly by measuring the maximum high and the trunk diameter at 10 and 130 cm. Furthermore, several trees are equipped with dendrometers to record their diameter increment in daily intervals. The pre-dawn water potential for selected trees is evaluated periodically and used for quantifying the plant water stress and related to the growth pattern. Water availability and microclimatic condition are monitored continuously. Information gathered from the field data at the end of the vegetation period will be used to develop a growth model to link the soil water availability and plant water status with the growth rate of the trees.

P2 – Impact of drought stress on photosynthesis, transpiration and growth of black locust (*Robinia pseudoacacia* L.)

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Nowadays, there is an increasing interest in black locust (*Robinia pseudoacacia*) for the production of biomass for bioenergy in short-rotation plantations. As a pioneer tree species black locust grows under a wide range of site conditions and is known to be relatively drought tolerant compared to other temperate, deciduous tree species. In Central and Eastern Europe *Robinia* is cultivated in a continental climate with an annual precipitation often below 600 mm. However, the native range of black locust in Northern America is classified by a humid to sub-humid climate with a mean annual precipitation of 1020 to 1830 mm. In order to evaluate its growth and ecophysiological performance to drought stress, we conducted an drought experiment. Two sets each with 13 seven year old cuttings of black locust were cultivated in 65 liters plastic pots at the von-Thünen-Institute in Hamburg-Lohbrügge. The drought