Root Distribution of Four Tropical Useful Plants in the Early State of Plantation on Degraded Sites in Amazonia

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For adapting field management processes on useful plants information about the genetically and environmentally influenced root formation pattern especially in the installation phase of a plantation is of great importance. The characteristics of each plant species concerning root growth, spread and distribution, its strategy of nutrient uptake as well as its velocity of mycorrhiza formation can decide on the ability of the plant to establish itself at degraded sites. Further these qualities are of interest for the species' usefulness to cover previously burned and cleared soils, to avoid erosion and minimise nutrient losses in the soil horizons.

Perennial plants commonly are precultivated in nurseries for six to eight weeks. The environmental factors of nursery pots or plastic bags are characterised by low volume, adequate substrate, and equilibrated regimes of fertilisation and irrigation. Additionally the plants in the pots can be inoculated with high contents of effective arbuscular mycorrhiza fungi (AMF) of commonly exogenic genotypes. In the field the plants are set into holes, fertilised in graduated levels, and then surrounded by organic material and disturbed soil of the B-horizon, both containing few infection units of native AMF. There, in the early stages of development the plant material has to overcome drastic environmentally changes as soon as the roots are growing into the adjacent soil. This relatively undisturbed field soil is characterised by chemical and physical degradation, e.g. low nutrient availability, low pH and often compactness. Here the roots meet the first time larger quantities of native AMF which potentially will form now the larger part of the symbioses of the roots with AMF.

How do such changes of the environment affect the root distribution of crop species under the practised mycorrhiza management and fertilisation regime? In order to put forward that question we selected four species which were presumed to form different types of root systems: *Bixa orellana* L., Bixaceae; *Bertholletia excelsa* HUMB. ET BONPL., Lecythidaceae, *Theobroma grandiflorum* (WILLD. EX SPRENG) SCHUM. Sterculiaceae, and *Hevea brasiliensis* MUELL. ARG., Euphorbiaceae. Before and six months after planting in the experimental field near Manaus, Amazonia, their root system and root distribution throughout the soil horizons were described. The fine roots were characterised by morphological parameters to enable detection and classifying under field conditions. Fertiliser induced differences in root distribution were described for *Bixa orellana*. The nutrient status of the field soil was analysed. The inoculum potential of mycorrhiza as well as the degree of colonisation were investigated in the nursery, the substrate of the plant hole and the adjacent field soil, respectively.

Conclusions are made with regard to the species' traits, the spatial and temporal coincidence of the mycorrhizal symbionts in the field and the common management practice. Necessary further quantitative and qualitative examinations to prove the preliminary conclusions are put forward.

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