

Abstract

Global climate change is a process that affects us all today and will continue to affect us with increasing intensity in the future. An important way to reduce the concentration of CO₂ in the atmosphere is the sequestration of carbon in pools other than the atmosphere, primarily in the soil pool. One way to achieve this is by increasing the carbon sequestration into the soil biomass using root exudates. Root exudates are released by plant roots into the soil to be beneficial to the plant and are also a good source of carbon for the rhizosphere (the soil in the immediate vicinity of the root system affected by its exudates). The rhizosphere is thus a suitable environment for microorganisms that play a major role in the soil carbon sequestration. In this thesis, I describe the composition and the role of root exudates for the plant, the importance of root border cells and border-like cells, the importance of exuded carbon compounds for microorganisms in the soil and their importance for carbon sequestration and CO₂ mineralization in the soil. The role of root exudates and microorganisms in the soil carbon cycle is discussed with an emphasis on mineral-associated soil organic carbon and soil aggregates. This thesis also discusses the role of exudates for the rhizosphere priming effect and its mechanisms. This topic needs to be studied further with an interdisciplinary approach due to its importance in the carbon cycle.

Key words

Border cells, carbon sequestration, plant root exudates, rhizodeposition, rhizosphere, rhizosphere priming effect, soil aggregates, soil carbon cycle, soil carbon pool, soil microorganisms.