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Dynamics of Root Border Cells in Rhizosphere Soil of *Zea mays* L.: Crushed Cells during Root Penetration, Survival in Soil, and Long Term Soil Compaction Effect

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Abstract: Plant roots release mucilage and root border cells (RBCs) into rhizosphere, which function as a complex at the root-soil interface. The dynamics of RBCs in rhizosphere soil, however, remains unknown. In this study, the ratio of crushed root cap cells during root penetration into soil and survival of the RBCs after the release from the root cap were estimated in maize seminal root. In addition, the effects of long term soil compaction on RBCs release were investigated. During the root penetration into rhizosphere soil, 78, 56, and 45% of sloughed root cap cells were estimated to be crushed at the first, second, and third day after planting, respectively. The number of surviving RBCs decreased with time, but 6% of the RBCs in the rhizosphere still retained their cell walls at one month after planting. These cells were estimated to remain in the soil for at least 10 d after the release from lateral roots. Furthermore, RBCs release from newly emerged nodal root increased with aging of plants, and the cell release was significantly increased by soil compaction only at the seedling stage. In conclusion, significant number of RBCs were crushed during root penetration into soil, however many RBCs remained in the rhizosphere soil for a relatively longer period. Soil compaction significantly increased cell release only at the seedling stage.

Keywords: [Detached cells](#), [Maize](#), [Rhizosphere](#), [Root cap](#), [Sloughed root cap cells](#), [Soil compaction](#), [Soil mechanical impedance](#)



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