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Author: [ADVANCED](#) | Volume Page

Keyword: |



[TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

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[\[PDF \(579K\)\]](#) [\[References\]](#)

Functional Role of Mucilage - Border Cells: A Complex Facilitating Protozoan Effects on Plant Growth

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Abstract: In rhizosphere soil, mucilage and root border cells (RBCs) form a functional entity, the mucilage - border-cell complex (MB complex). Carbohydrates of the MB complex are utilized by rhizosphere bacteria, which are under strong grazing pressure of the soil food web, in particular protozoa. We investigated the role of the MB complex for protozoan effects on plant growth. First, the MB complex formed by 16 rice cultivars belonging to different ecotypes and subspecies were quantified. These cultivars were subsequently used to investigate protozoan effects on plant growth. The differences between the highest and lowest MB complex producers were 3.1 and 5.3 times for fully hydrated mucilage and RBCs, respectively. Mucilage production and RBCs showed a significant positive regression ($R^2=0.92$) in Japonica. Presence of protozoa generally enhanced shoot biomass, lateral root growth and plant nitrogen uptake. Further, upland cultivars showed significantly higher growth enhancement than lowland cultivars in presence of protozoa. A significant positive regression between MB complex and increased lateral root growth by amoeba revealed that the MB complex facilitated protozoan effects on plant growth, which is the first evidence for a new functional role of the MB complex.

Keywords: [Acanthameoba](#), [Amoeba](#), [Oryza sativa](#), [Protozoa](#), [Rhizosphere](#), [Rice](#), [Root exudation](#), [Root cap](#)



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