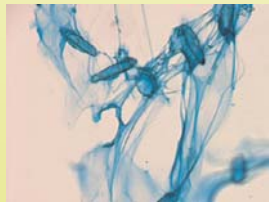


# Root border cells in the rhizosphere

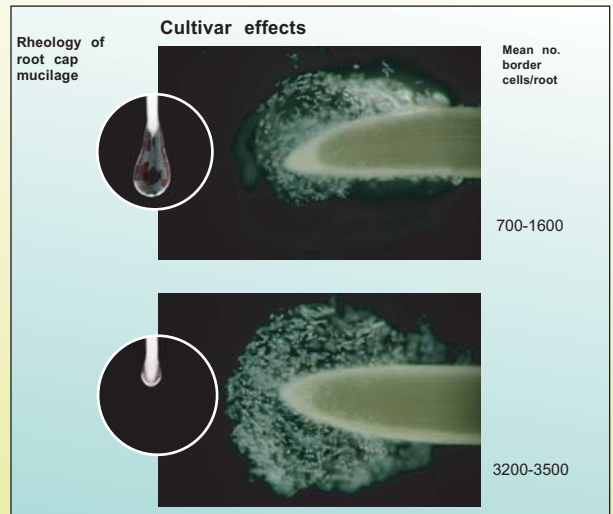
A.G. Bengough, D. Cooke, B.S. Griffiths, S. Humphris, K. Killham<sup>1</sup>, O.G.G. Knox<sup>1</sup>, D.B. Standing<sup>1</sup>, S. Rodger<sup>2</sup>, V.E.C. Stubbs, T.Valentine, I.M. Young<sup>2</sup>  
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## Border cell release into the rhizosphere

- Root caps of most plant species are tipped with a fringe of border cells that can remain viable in the rhizosphere for several days
- There was an eight-fold variation in the rate of border cell release between maize cultivars. Rheological properties of the mucilage of the different cultivars affected border cell release.
- Decapping decreased border cell numbers by an order of magnitude for 2-3 days until the cap regenerated. We tested the hypothesis that the rate of border cell release influences rhizosphere colonisation.

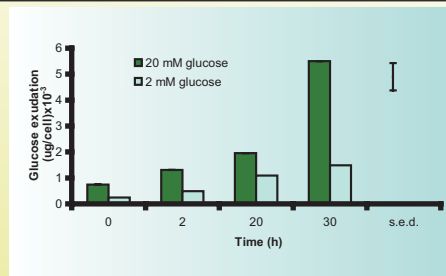


Border cells within mucilage network



## Border cells and rhizosphere carbon flow

- Border cells actively take-up and release small quantities of glucose-C.
- Root exudate contains much more bacteria-utilisable carbon than is released from border cells after they detach.

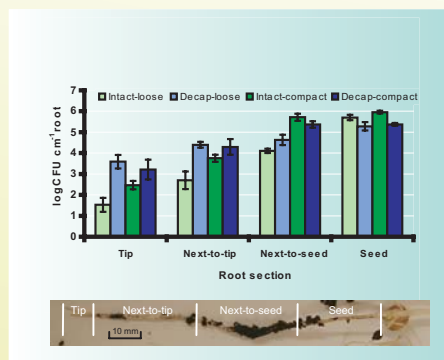


Border cell and associated mucilage

## Border cells influence colonization of the rhizosphere by (micro-) organisms

### Soil bacteria

- Colonization of the root tip by *Pseudomonas fluorescens* (GFP-labelled) was increased in decapped roots
- Concept that border cells and their associated mucilage act as a disposable sleeve around the root.
- The border cell sleeve decreases root-soil friction and decreases root colonisation by biocontrol bacteria - with implications for biocontrol strategies in the field.

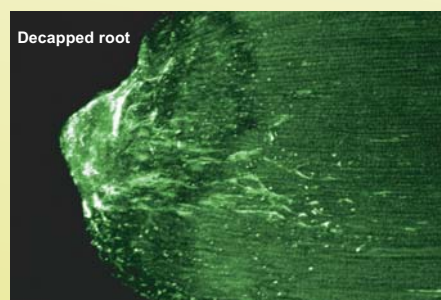


### Nematodes

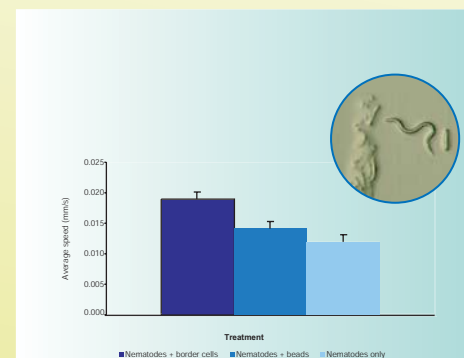
- Weak long-range attraction to border cells.
- Large and significant effects on movement at the local scale. Signal molecules involved?



Intact root cap



Decapped root



## Acknowledgements

This work was funded by the BBSRC. SCRI receives grant-in-aid from SEERAD.