

Evaluation of rhizobia immobilized in silicate matrices as an alternative inoculant formulation.

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Symbiotic nitrogen fixation results from the interaction of a legume host with rhizobia, leading to root nodulation of the host plant. One of the main problems of the inoculation industry is to keep rhizobial cells viable in large numbers in the inoculants. Furthermore, soil is a heterogeneous, unpredictable environment, where the inoculated bacteria find it often difficult to survive among the competitors, resulting in a progressive decline in the bacterial density. Immobilization of microbial cells into polymer matrices has proved to be advantageous over direct soil inoculation. A new inoculant formulation consisting of *Mesorhizobium loti* immobilized in a highly porous silicate matrix is proposed. Bacteria were immobilized using sodium silicate as the sol precursor and citric acid as the polymerization catalyst. The results obtained demonstrate the long time preservation of entrapped cells, at room temperature, for periods exceeding 10 months and the ability of rhizobia to effectively nodulate roots once they are freed from the polymer, confirming their presence in the nodules by means of PCR. Their viability at different pHs, from 3 to 7, and their survival in sterile soil were also evaluated showing better results than liquid inoculants. Further studies are being performed to use rhizobia immobilized in silicate gels as alternative inoculant formulations in real field conditions.