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The behaviour of pectin-degrading enzymes in dense media



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Effect of solid loading on the behaviour of pectin-degrading enzymes

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Context

Pectin impacts plant biomass recalcitrance by affecting the ability of other cell wall components to access enzyme degradation. Their removal thus has a positive effect on the saccharification of pectin-rich biomass. Furthermore, the development of environmentally-friendly processes involves reducing water consumption and using high-solids loadings. The aim of this research is to thus study the behaviour of different pectin-degrading enzymes in the presence of a low (5 %) to high (35 %) solid citrus-peel loading. Two enzyme conditions were studied, with a pectin lyase being compared with a mixture of endopolygalacturonase and pectin methylesterase.

water mobility and that these changes in mobility vary according to the enzyme used. Pectin lyase caused less significant changes than the mixture of endopolygalacturonase and pectin methylesterase.

At similar concentrations of pectin, pectin solutions inhibit the diffusion of polygalacturonase more than the solid substrate. This could be attributed to the high viscosity of highly concentrated pectin solutions, while the pores present in the solid substrate provide continuous diffusion pathways.

Future outlook

Although pectin structure varies according to the plant source, the results obtained here can be extrapolated to other co-products, as the pectin motifs recognised by the enzymes are always present. This new information is useful in the biorefinery of pectin-rich plant materials when enzymes are used in the treatment.

Results

A high solid citrus-peel loading affects the solubilisation of pectin differently, depending on the enzyme used. The pectin lyase causes increased breakdown of the solid substrate and is less sensitive to a reduction in water content than the mixture of endopolygalacturonase and pectin methylesterase, with or without a processive mode of action. In conjunction with enzyme degradation, low-field NMR experiments showed that the solid loading clearly affects

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PROBE