

Biocontrol of Acid Phosphatase Secretion in *II⁵⁽¹⁾* y *Nocardiosis dassonvillei* cells exposed to Different Types of Detergents

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Novel and alternative approaches are needed to restrict the growth of harmful microbes in sites where traditional biocides or procedures are ineffective or impossible to implement. The application of more effective surface-active substances (SAS) could aid the destruction of the microbial biofilms that cause the harm, allowing the use of reduced concentrations of SAS. In order to control the destructive activity of these microorganisms, knowledge of the microbial metabolic pathways and factors influencing their activity is essential. However, the efficacy of the applied compound must be further evaluated on different materials supporting complex microbial communities, in field trials under various environmental conditions, and under laboratory conditions, to fully confirm their effectiveness. Phosphatase enzymes are widely distributed in all organisms, but only bacteria, fungi, and some algae are able to secrete them. As exoenzymes, they participate in the dissolution and mineralization of organic phosphate compounds in the environment.

Acid phosphatase activities and phospholipid composition of membrane lipid components have been studied in a culture of well established biodestructor *II⁵⁽¹⁾* y *Nocardiosis dassonvillei* cells grown on the non-ionic (Tween-80) and ionic (sodium dodecyl sulfate) surfactants containing medium.

The obtained data indicate a similar pattern of stimulation of enzymatic activity – almost identical for both detergents at high concentrations. However, dose-dependent activation of acid phosphatase at single-cell level was detected. In particular, the increase of secreted enzyme activity at single-cell level on the SDS-containing medium occur concomitantly with a marked decrease of viable cells, while an increase of acid phosphatase activity of cells grown on the Tween-80 containing medium is accompanied by a concomitant increase of viable cells. According to our experimental data, at the single-cell level complete positive correlations have been established between viable cell amounts and secreted acid phosphatase activity for microorganisms grown on the Tween -80 containing medium and also between peroxidation intensity and acid phosphatase activity for culture grown on the SDS containing medium.

It can be proposed that changes in the secretion of acid phosphatase by SDS and Tween-80 treated *II⁵⁽¹⁾* y *Nocardiosis dassonvillei* cells, may be the result of specific interactions of ionic and non-ionic detergents with the membrane lipid bilayer. Besides the detergents' injurious effects they also lead to complex changes in the membranes. The study of phospholipid composition of membrane lipid components gives possibility to propose the alternative pathways of acid phosphatase secretion for *II⁵⁽¹⁾* y *Nocardiosis dassonvillei* culture in the SDS and Tween-80 containing medium.