

LOW-TEMPERATURE CLARIFICATIONS, MACERATIONS AT SYNERGISTIC INTERACTIONS OF DIFFERENT ENZYMES

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ABSTRACT

Achieving low temperature clarification, maceration with good yields from fruit juices and fruit pulps, having pectincellulosic substrate, when using low enzyme loadings continues to be a challenge for biochemically processes. This review examines the enzymes required to degrade pectin, hemicellulases, cellulosic components of pulp, juices and the impact of treatments on these components. Many factors affect the enzymes and the optimisation of the depolymerization, hydrolysis process, such as enzyme ratios, substrate loadings, enzyme loadings, inhibitors. The mixed culture fermentations may have a synergistic effect, increasing the concentration of galacturonic acid/ di-galacturonic acid compounds produced in fermentations than conducted in monoculture. The synergy effects are difficult to study because these effects depend on the combination of factors with time-varying characteristics. The mechanisms by which different types of these enzymes enhance each other's activities are complex and not completely understood, and the published data is often inconsistent. These synergistic interactions between different enzymes have been investigated in order to design optimal combinations and ratios of enzymes for different pectin, hemicellulose, cellulosic substrates that have been subjected to different treatments. Consideration was also given to the calculation of degrees of synergy and yield. The galacturonic acid/ di-galacturonic acid compounds were identified by their higher concentration in 200-216nm produced in mixed culture than in monoculture. The differences in UV profile principally rely on the proportions in galacturonic acid/ oligo-galacturonic acid compounds and not on the number of polymer compounds. The multivariate analysis, principal component analysis, and factorial discriminant analysis permit to demonstrate the synergism between the strains during fermentation process. A model is proposed for the optimisation of enzyme combinations based on a selection of individual or commercial enzyme mixtures. Enzymes acting on pectincellulosic substrate in synergistic mixtures have higher combined activities than the sum of their individual activities at low temperature of pretreatments and of treatments. The fermentation of lemon, persimmon, peach juice with mixed enzymes been produced at industrial scale. It has also been found, that the sugars released during the cleavage can inhibit the above enzymatic processes. Achieving low temperature maceration from fruit pulps are difficult (even impossible). But it is absolutely compulsory to study the low temperature maceration from fruit pulps with the mixed culture fermentation may have a synergistic effect. Our analysis demonstrated that when using the selected enzymes at low temperature for 48 hours, maceration occurs, but on a small extent (by 5.7%).

Keywords: Bioconversion; Low temperature clarification; Low temperature maceration Hydrolysis; Synergy