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Effect of membrane permeability of *Agrobacterium tumifaciens* on curdlan biosynthesis and optimization of process parameters by response surface methodology

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Statement of the Problem: Curdlan, is a linear water insoluble biopolymer with ß(1-3) glycosidic linkages produced by *Alcaligens faecalis* and *Agrobacterium* species. Due to their rheological properties and ability to form thermo-irreversible gels, they find commercial application as bio thickeners in the food industry and in the pharmaceutical industry. Curdlan is used as the thickening and gelling agent in confectionaries, noodles and functional foods. In the pharmaceutical industry, curdlan finds application as drug delivery vehicle for the delivery of biological macromolecules and in the encapsulation of tablets for controlled release formulations. The huge demand for curdlan in commercial sectors, emphasizes the need for maximizing the curdlan production and its recovery from fermentation media by process optimization and metabolic engineering approaches. Most of the studies were focused on maximizing substrate utilization with maltose, glucose, fructose, sucrose as carbon sources to achieve maximum yield of biopolymers. Curdlan is a membrane-bound polymer, thus altering the membrane permeability without affecting the cell viability also serves as one of the key components to facilitating the recovery of the biopolymer, thus maximizing the yield

Methodology and Theoretical Orientation: Response surface methodology using Box – Belhen Design was used to optimize curdlan production by using three variables lithium (0.5 – 2.5mg/l), agitation speed (90 - 130 rpm) and sucrose concentration (50 – 130 g/l). Statistical analysis was used to study the individual and interaction effects of variables on biomass yield and curdlan production.

Findings: The highest curdlan production of 2.40 g/l was obtained at an optimum sucrose concentration of 131.82g/l and lithium concentration of 1.44 mg/l and agitation speed of 112 rpm. The sucrose concentration and interaction effects of sucrose and lithium chloride had significant effects on biomass yield and curdlan production. The SEM analysis, XRD and DSC analysis of the curdlan with the control clearly depicts the effect of lithium chloride on membrane architecture and curdlan secretion compared to the control samples.

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