

## **Development of a semi-defined growth medium for *Pedobacter Cryoconitis* BG5 using statistical experimental design**

### **Abstract**

*Pedobacter cryoconitis* BG5 are psychrophiles isolated from the cold environment and capable of proliferating and growing well at low temperature regime. Their cellular products have found a broad spectrum of applications, including in food, medicine, and bioremediation. Therefore, it is imperative to develop a high-cell density cultivation strategy coupled with optimized growth medium for *P. cryoconitis* BG5. To date, there has been no published report on the design and optimization of growth medium for *P. cryoconitis*, hence the objective of this research project. A preliminary screening of four commercially available media, namely tryptic soy broth, R2A, Luria Bertani broth, and nutrient broth, was conducted to formulate the basal medium. Based on the preliminary screening, tryptone, glucose, NaCl, and K<sub>2</sub>HPO<sub>4</sub> along with three additional nutrients (yeast extract, MgSO<sub>4</sub>, and NH<sub>4</sub>Cl) were identified to form the basal medium which was further analyzed by Plackett–Burman experimental design. Central composite experimental design using response surface methodology was adopted to optimize tryptone, yeast extract, and NH<sub>4</sub>Cl concentrations in the formulated growth medium. Statistical data analysis showed a high regression factor of 0.84 with a predicted optimum optical (600 nm) cell density of 7.5 using 23.7 g/L of tryptone, 8.8 g/L of yeast extract, and 0.7 g/L of NH<sub>4</sub>Cl. The optimized medium for *P. cryoconitis* BG5 was tested, and the observed optical density was 7.8. The cost-effectiveness of the optimized medium was determined as 6.25 unit prices per gram of cell produced in a 250-ml Erlenmeyer flask.