

Optimization and Purification of Amylase Production from *Bacillus velezensis* and Recovering of Its Derived Value-added Products

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BACKGROUND/OBJECTIVES: *Bacillus velezensis* can produce numerous metabolites for various promising industrial and medical applications and bioremediation. However, even though there are lots of studies investigating the metabolites produced by *B. velezensis*, no multiple metabolites production and recovering process have been reported yet. In this study, we optimized the amylase production of *B. velezensis* Ph1 which is newly isolated from phenolic waste, and investigated the purification and application of several useful metabolites such as antioxidant and biosurfactant.

METHOD: The enzymatic activity was measured based on the amount of reducing sugar released from the starch by the hydrolysis of amylase. The reducing sugar was measured by the 3, 5-dinitrosalicylic acid method. The factors were optimized by the single factors experiments and response surface methodology. The purification of the enzyme and other metabolites was based on precipitation and solvent extraction.

RESULTS: Among all of these metabolites, amylase was chosen for the optimizing object since it would be the most easily deactivated product. The activity of the amylase was optimized by single factors experiments and response surface methodology (RSM) and the results suggested that it would have the highest activity at 34.578 U/mL under the fermentation conditions: temperature 39.6 °C, pH 7.9, fermentation time 73.2 hours. The yellow substance recovered from the precipitate shown antioxidant activity. The biosurfactant was also tested for removing engine oil from the soil.

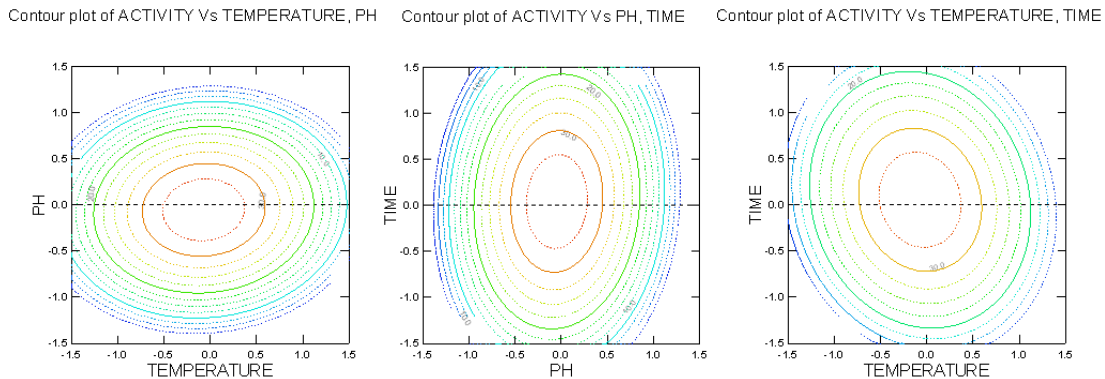


Figure 1. The counterplot of the established RSM model.

$$y = -10.240X_1^2 - 17.871X_2^2 - 7.595X_3^2 + 1.389X_1X_2 + 1.422X_2X_3 - 1.893X_1X_3 - 1.401X_1 - 1.796X_2 + 0.711X_3 + 34.460$$

Equation 1. The estimated RSM equation. X_1 is temperature, X_2 is pH, and X_3 is fermentation time.

CONCLUSION/IMPLICATION: In this study, the potential of a newly isolated *B. velezensis* in producing value-added products and the method for recovering several useful metabolites have been investigated. This bacterium has high potentials in various industrial applications. Further genetic modification could be promising to significantly enhance its usage in various fields.