Statistical design of protease production from endophytic fungus isolated from Brazilian Cerrado

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Microbial proteases are very important for the industrial enzyme market worldwide, accounting for approximately 60% of total enzyme sale in the world. Extracellular protease production in microorganism was extremely influenced by medium composition, especially carbon and nitrogen sources. Response surface methodology (RSM) is one of the popularly used optimization procedures, mainly developed based on full factorial central composite design. RSM helps identify the effective factors, study interactions, select optimum conditions and quantify the relationships between one or more measured responses. These statistical techniques have been successfully applied in many for optimization culture medium for production of fungal proteases. The aim of this study was to apply a full factorial central composite design the RSM for the maximum production of an extracellular protease by an endophytic fungus isolated from a plant of Brazilian Cerrado. In this regard, a set of 11 experiments including 2^2 factorial experiments, three center points and four axial points (α = 1.414) were carried out with two variables (malt extract and ammonium sulfate). The ANOVA analysis of the optimization study indicated that the response data for malt extract and the interaction between the two variables were significant (p-value > F less than 0.05). The regression equation obtained from ANOVA analysis indicated that the multiple correlation coefficient R^2 is 0.89 (value greater than 0.75 indicates the aptness of the model) i.e. the model can explain 89% variation response. The results showed that the central point of the second 2^2 full factorial design was the best condition for the protease production (12.05 U/mL), with 2,3 % (w/v) malt extract and 0.2 % (w/v) ammonium sulfate. This study serves as example for application of the response surface methodology to biological systems and it introduces a new endophytic fungus strain as a potential candidate for the protease production that could have properties of industrial value.

Keywords: protease, endophytic fungi, Cerrado, statistical design.

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