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Optimizing the conditions for the production of extracellular amylases under solid state fermentation using groundnut shell as the substrate

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Amylases are a group of hydrolase enzymes, which hydrolyse starch molecules into simple sugars. Amylase can be extracted from molds, which are capable of producing high amounts of amylase. *Aspergillus niger* is used more frequently in the commercial production of α - Amylase. Groundnut shell is one main by-product of the groundnut processing factories. Solid state fermentation (SSF) is considered more useful in industries as the extraction procedures are cheaper. Optimization of various parameters and manipulation of media are one of the most important techniques used for the production of enzymes in large quantities to meet industrial demands. Specific objective of the research is to optimize the culture conditions for the *A. niger niger* under solid state fermentation using ground nut shell as the carbon source. Parameters used to optimize the Amylase production are the effect of mineral salt media, mixed culture inoculation of *A. niger* and *S. cerevisiae*, effect of surfactants Tween 80 and Tween 20, effect of different pH values ranging from pH 4.0 to 7.0 and effect of changing concentration of carbon source. From the results from samples with and without mineral salt media, clearly indicate that enzyme activity is high in the samples with mineral salt media 28.736 U/mL. The Amylase activity of the sample with mixed culture of *A. niger* and *S. cerevisiae* together, is 38.070 U/mL. The highest enzyme activity of 42.300 U/mL, was shown with Tween 80. Maximum Amylase activity 41.540 U/mL was found at pH 5.5. Carbon source concentration for SSF was measured as the mass per volume. Optimum carbon source for SSF for the maximum amylase activity 49.413 U/mL on 5th day was found to be 40% by mass per volume of mineral salt solution (8 g per 20 mL). Final analysis shows that the maximum activity of alpha amylase was recorded at day 4, pH 5.5, in the presence of Tween 80 and with the simultaneous inoculation of *A. niger* and *S. cerevisiae* for 2 g of carbon source. The net yield of optimized culture is 49.401 U/mL and non-optimized culture is 30.215 U/mL.

Keywords: Amylase, Enzymes, Fermentation, Parameters, Optimization