Production and Characterization of Lipase enzyme from Lipolytic *Bacillus* sp.

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ABSTRACT

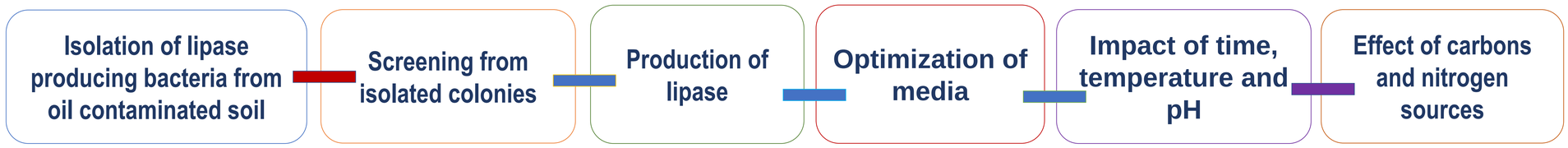
Due to many beneficial characteristics' lipases have become a major constituent of several commercial applications. Currently, because of the increasing capabilities in the field of biotechnology, these lipolytic enzymes are fascinating an immense concentration. For the current study lipase producing strain of *Bacillus* sp. was isolated from oil-polluted soil and its fermentation conditions were optimized for the maximum output of lipase. The titrimetric method were used to calculate the activity of lipase in the current study. A strain of bacteria was segregated through edible effluent lubricant infected ground in Karachi. It was recognized as a class of *Bacillus.* The process of fermenting took place at 37°C for 48 hours. Peak production of lipase producing strain at pH 9.0 and temperature of 37°C was observed at 48 hrs. As a source of carbon 1 percent mustard oil was used, while as nitrogen source 1 percent ammonium sulphate was utilized.

INTRODUCTION

Lipases are very important enzymes having major uses in various industries like food, detergent and cosmetic productions. They are categorized as a set of hydrolytic enzymes. They are mainly associated with the decomposition of fats into fatty acids and glycerol. They are efficient workers in a medium with and without water to break fats into fatty acids and glycerol. Lipases are crucial enzymes in detergent production, replacing harsh chemicals in soaps with immobilized, color beads for better cleaning. Enzymes from animal sources are costly, but microorganisms offer cost-effective and cheap alternatives. All organisms produce all enzymes, with some producing lipase, protease, and amylase. Exploring bacterial resources for better yields and quality enzymes is essential.

Use of microorganisms for enzyme production is feasible. Just like animals, where every individual specie is different from other microorganisms also categorize in different species and having different traits. Now all organisms produce all enzymes. Instead, some are lipase producing and some are protease (acts on proteins) and some are amylase (acts on carbohydrate). Within the same enzyme producing bacteria not all strains have same yield. Lipase are commercially very important, their major use in detergent industry because of their extremophilic nature against pH, organic solvents and temperature.

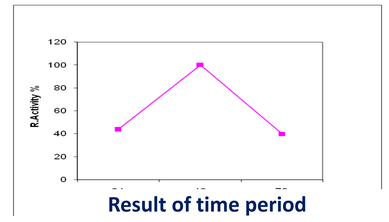
METHODOLOGY



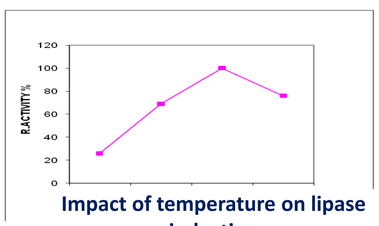
RESULTS

Table: Cellular, Colonial and Taxonomical Characteristics of Bacillus subtilis

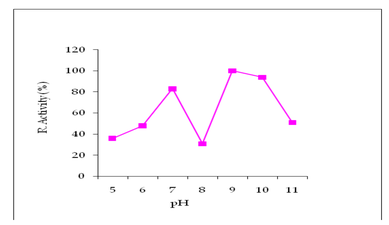
Cellular Characteristics	
Gram's Staining	Positive
Morphology	Rods with rounded ends
Motility	Motile
Spore	Central to para central, ellipsoidal to cylindrical in shape
Colonial Morphology	
Nutrient Agar	**Finely wrinkled, dull,opaque, adherent colonies**
Growth Factor	
Oxygen	**Strict aerobe**
Temperature optimum	**37°C**
Range	**35-60°C**
pH optimum	**7.0**
Range	**5.0-9.0**
Biochemical Reactions	
Indole	Positive
Methyl Red	Negative
Vogues Prosker	Positive
Citrate	Utilized
Starch hydrolysis	Positive
Nitrite	Formed from nitrate
Fermentation Reaction	
Glucose	Acid
Fructose	Acid
Galactose	Acid
Mannose	Acid
Lactose	Acid
Sucrose	Acid



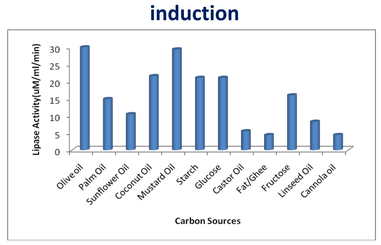
Result of time period



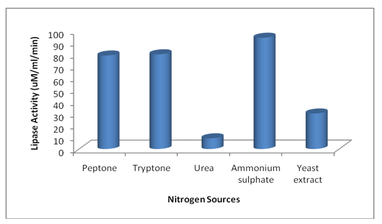
Impact of temperature on lipase induction



Impact of pH



Impact of carbon sources on lipase induction



Chief nitrogen sources for lipase induction

CONCLUSION

The result of this research will create a unique, efficient lipase biocatalyst from Bacillus spp., addressing the shortage of standardized, high-performance lipases for industrial applications. The refined fermentation process produces a pure, stable, and versatile biocatalyst with high lipase activity and productivity.

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