



Physiological and biochemical characterization cellulolytic bacteria

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Abstract— Several efficient cellulase producing microorganisms were isolated. The purpose was to identify and characterize those isolates displaying the greatest cellulase activity for the possible use in the large scale biorefining. Cellulases are inducible enzymes that are synthesized by a large number of microorganisms during their growth on cellulosic materials. Cellulases have attracted much interest because of the diversity of their applications. Cellulases are used in the various industrial process, including textile and laundry, food, feed, leather, pulp and paper. The biochemical characterizations of the isolated Bacterial strains from termite gut. Isolated strains are efficient namely TG I and TG II. Indicate that they may play a role in cellulose digestion in termite gut.



Keywords— Bacteria, Cellulase, Termites, Biochemical study and Enzyme

I. INTRODUCTION

Bacteria has high growth rate as compared to fungi has good potential to be used in cellulose production. Some bacterial species viz., *Cellulomonas species*, *Pseudomonas species*, *Bacillus species* and *Micrococas* have cellulolytic property⁽¹⁵⁾. Large number of bacteria are capable of degrading cellulose, but only a few of them produce significant quantities of cell-free bioactive compounds capable of completely hydrolyzing crystalline cellulose in-vitro⁽¹⁶⁾. Cellulolytic bacteria have been isolated from diverse habitats like soil, compost, and water⁽⁸⁾. Common classification separates different pretreatments into physical, chemical, physicochemical, and biological treatments⁽¹⁸⁾. Enzymatic hydrolysis, pre-treatment of cellulosic material is utmost importance to obtain glucose which can be further converted into bioethanol by microbes^(2, 11, 17, and 22). Bacteria are now being widely explored for cellulase production because of their extremely high natural diversity and the capability to produce stable enzymes that can be applied in industries^(3, 9).

II. MATERIAL AND METHODS

A. Sample collection: Termite Sample was collected from sites which includes cellulose feeding organisms, such as termite residing on woody western ghat region Maharashtra state. Sample dissect in 0.9% saline solution under sterile condition. 1.0 gram of each sample is placed in 9 ml of 0.9% saline, mixed it rapidly and Serial dilution techniques was followed and the dilutions selected for further studies.

B. Isolation cellulolytic Bacteria`: The mixture was mixed by vortex for 2-3 mins for removal of microorganisms. One ml of this sample was plated by serial dilution (up to 10⁴- (technique amended with CMC agar and incubated at 37°C for 24 -48 hours. Bacterial cultures grown on CMC slants were cultured on basal mineral salt medium (BSM) as shown Fig 01.

C. Culture and Biochemical Characteristics

I. Morphology

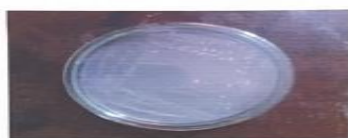
Sample	TG I	TG II
Test		
Shape	Cocci	Cocci
Gram stain	Positive	Positive
Motility	Motile	Motile

II. Colony Characteristics

Sample	TG I	TG II
Test		
Colour	Dirty white	Dirty white
Elevation	Convex	Convex
Density	Opaque	Opaque
Opti. Temp	30 ^o C	30 ^o C
Opti. pH	7	7

III. Biochemical Test

Sample	TG I	TG II
Test		
I) Starch hydrolysis	+	-
II) Carbohydrate fermentation		
Arabinose	+	-
Maltose	+	+
Lactose	+	-
Mannitol	-	+
Starch	+	-
Cellulose	+	+
Glucose	-	+
III) H ₂ S production	-	-
	(Alkaline)	(acidic)
IV) Simmon citrate	+	+
V) Caseic hydrolysis	+	-
VI) Catalase	+	+



1. Isolated colony



2. Gram staining



3. Zone of clearance

Fig.1 Isolated Bacteria.

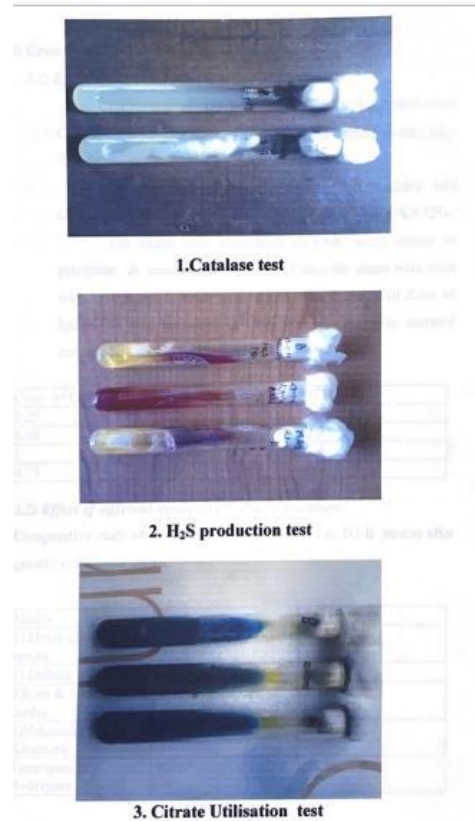


Fig.2 - Biochemical Test

III. RESULTS AND DISCUSSION

Gram stain was an empirical method of distinguishing bacterial species into two large groups (Gram-positive and Gram-negative) based on the presence of chemicals, primarily the presence of high levels of peptidoglycan and physical properties of their cell walls. A number of cellulolytic bacterial colonies were isolated from Termite gut. The colony morphology was studied in detail and the results are presented in Tabulation with heading also followed by biochemical tests performed for the isolated microorganisms.as shown fig 02. Clear zone producing bacterial isolates were then subjected to various biochemical test.

IV. CONCLUSIONS

With the help of biochemical tests) we could conclude that bacterial isolate belongs to genus Bacillus. A potential cellulose degrading enzyme from B. subtilis was characterized and studied for its possible hydrolyzing capability for disintegrating the cellulosic biomass residues.

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