

**ISOLATION AND SCREENING OF CELLULOLYTIC BACTERIA FROM COW
DUNG IN KUALA PILAH**

NAIMAH BINTI HAMZAH

**Written Thesis Submitted in
Fulfillment of the Requirements for the
Degree of Bachelor of Science (Hons) Biology
In the Faculty of Applied Sciences
Mara University of Technology**

JANUARY 2016

The Final Year Project entitled “**Isolation and Screening of Cellulolytic Bacteria from Cow Dung in Kuala Pilah**” was submitted by Naimah binti Hamzah, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Biology, in the Faculty of Applied Science, and was approved by



Nurul Hidayah binti Adenan
Supervisor
Faculty of Applied Sciences
Universiti Teknologi Mara
Pekan Parit Tinggi
72 000 Kuala Pilah
Negeri Sembilan



Iwana Izni binti Zainudin
Co-Supervisor
Faculty of Applied Sciences
Universiti Teknologi Mara
Pekan Parit Tinggi
72 000 Kuala Pilah
Negeri Sembilan



Ilyanie binti Hj. Yaacob
Project Coordinator
Faculty of Applied Science
Universiti Teknologi MARA
72 000 Kuala Pilah
Negeri Sembilan



Dr. Noor' Aisyah binti Abu Shah
Head of School of Biology
Faculty of Applied Science
Universiti Teknologi MARA
72 000 Kuala Pilah
Negeri Sembilan

TABLE OF CONTENTS

CONTENTS	PAGE
FRONT PAGE	i
DECLARATION OF SUBMISSION	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1: INTRODUCTION	
1.1 Background study	1
1.2 Problem Statement	5
1.3 Significance of the Study	6
1.4 Objectives of the Study	7
CHAPTER 2: LITERATURE REVIEW	
2.1 Introduction	8
2.2 Cellulose and Cellulase	10
2.3 Cellulase Producing Bacteria	11
2.4 Cellulase Degradation by Microorganisms in the Rumen	13
2.5 Cellulase Synthesis	13
2.6 Application of Cellulases	14
2.6.1 Cellulases in Food Applications	15
2.6.2 Cellulases in Pharmaceutical and Medical Applications	15
2.6.3 Cellulases in Textile Industry	16
2.6.4 Cellulases in Other Applications	17

CHAPTER 3:	METHODOLOGY	
3.1	Materials	
3.1.1	Raw materials	19
3.1.2	Chemicals	19
3.1.2	Apparatus	20
3.2	Methods	
3.2.1	Isolation of Cellulase Producing Bacteria from Cow Dung	21
3.2.2	Purification of Bacteria	21
3.2.3	Preparation of Bacterial Broth	22
3.2.4	Preparation of Glycerol Stock	23
3.2.5	Identification of Bacteria by Gram-Staining Technique	23
3.2.6	Screening of Cellulase Producing Bacteria using Congo Red Dye	24
CHAPTER 4:	RESULTS AND DISCUSSIONS	
4.1	Introduction	25
4.2	Isolation of Cellulase Producing Bacteria from Cow Dung	25
4.3	Morphological Characteristics of Colonies Formed on CMC Agar	26
4.4	Gram staining	28
4.5	Screening of Cellulase Producing Bacteria Using Congo Red Dye	29
CHAPTER 5:	CONCLUSION AND RECOMMENDATION	33
	CITED REFERENCES	34
	APPENDICES	45
	CURRICULUM VITAE	51

ABSTRACT

ISOLATION AND SCREENING OF CELLULOLYTIC BACTERIA FROM COW DUNG IN KUALA PILAH

Cellulases are produced by microorganisms such as bacteria, fungi or actinomycetes during their growth on cellulosic materials. Various group of microbes live within digestive systems of ruminants, whereby these ruminants such as cow, goat, sheep and deer degrade plant material in their rumen. These microorganisms help animals to breakdown complex plant materials such as cellulose into simpler products by their own metabolism. The main objective of this research was to isolate cellulase producing bacteria from cow dung. Potential isolates were obtained from the village area in Kuala Pilah. A total of fifteen isolates were obtained by the primary screening technique on Nutrient Agar (NA), which only eight isolates were found to be cellulase producer since they grew well on Carboxymethylcellulose (CMC) agar. The isolates were further characterized on the basis of staining and biochemical activities. Macroscopic and microscopic observation was made including characterization based on colonies morphology and Gram staining method. Six of them, sample CD 1, CD 2, CD 3, CD 4, CD 5 and CD 7 were found to be Gram positive bacteria, while sample CD 6 and CD 8 were characterized as Gram negative bacteria. The potential isolates were then further tested for secondary screening by using Congo red dye. Only three isolates show positive inhibition zone, which is sample CD 1, CD 2 and CD 3. Sample CD 3 was found to be the most efficient cellulase producing bacteria since it shows the largest inhibition zone among the three isolates.