Effect of Additives to Enhance Blood Shelf Life

A Major Project dissertation submitted

in partial fulfilment of the requirement for the degree of

Master of Technology

In

Biomedical Engineering

Submitted by

Bhagyeshwari Chouhan

(DTU/13/M. Tech/386) Delhi Technological University, Delhi, India

Under the supervision of

Dr. Vimal Kishor Singh



Department of Biotechnology Delhi Technological University (Formerly Delhi College of Engineering) Shahbad Daulatpur, Main Bawana Road, Delhi-110042, INDIA



CERTIFICATE

This is to certify that the M. Tech. Major dissertation entitled "Effect of Additives to Enhance Blood Shelf Life", submitted by Bhagyeshwari Chouhan (DTU/13/M.Tech/386) in partial fulfilment of the requirement for the award of the degree of Master of Technology, Delhi Technological University (Formerly Delhi College of Engineering, University of Delhi), is an authentic record of the candidate's own work carried out by her under my guidance.

The information and data enclosed in this dissertation is original and has not been submitted elsewhere for honouring of any other degree.

Date: 15th July, 2015

Dr. Vimal Kishor Singh

Department of Bio-Technology Delhi Technological University Delhi Professor D. Kumar

Head of department
Department of biotechnology
Delhi Technological University
Delhi

DECLARATION

I, Bhagyeshwari Chouhan (DTU/13/MTECH/386) declare that M. Tech. dissertation entitled "Effect of Additives to Enhance Blood Shelf Life", submitted in partial fulfilment of the requirement for the award of the degree of Master of Technology, Delhi Technological University (Formerly Delhi College of Engineering, University of Delhi), is an authentic record of my own work carried out under the guidance of **Dr. Vimal Kishor Singh**.

The information and data enclosed in this dissertation is original and has not been submitted elsewhere for honouring of any other degree

Date: July 15, 2015 Signature:

Place: Delhi Bhagyeshwari Chouhan

MAJOR PROJECT

ACKNOWLEDGEMENT

I owe a great many thanks to a great many people who helped and supported me

during the working on this project.

I express my deepest thanks to Professor and HOD Dr. D. Kumar, the Guide of

the project Dr. Vimal Kishor Singh, Dr. B. D. Malhotra and all faculty members

for guiding and correcting various documents of mine with attention and care.

They have taken pain to go through the project and make necessary correction

as and when needed. I would like to thank my seniors Mr. Abhishek Saini, Miss

Manisha Kalsan and Mr. Neeraj Kumar for their help and support during my

project work. I would also like to thank Mr. Sunil Tirkey from Environmental

engineering lab, DTU for helping me in my project work.

I would also thank to my Institution, Mr. Chail bihari and Mr. jitendra singh and

all non-teaching staff without whom this project would have been a distant

reality.

BHAGYESHWARI CHOUHAN

2K13/BME/02

CONTENTS

S No.	TOPIC	PAGE NO
	List of abbreviations	1
	Abstract	2
1	Introduction	3
2	Review of literature	4
	2.1 Distribution, taxonomy and other properties of papaya plant	4
	2.2 Carica papaya properties	4
	2.3 use of papaya in dengue fever	5
	2.4 Properties and extraction of papaya leaf	5
	2.5 GC-MS analysis of papaya leaf extract	6
	2.6 Extraction, isolation and characterization of plant extracts	6
	2.7 Measurement of stored Red blood Cells quality	8
	2.8 Aging of erythrocytes	8
	2.9 Programmed cell death of RBC	10
3	Objective and methodology	12
4	Result	17
5	Discussion and future prospective	41
6	Conclusion	42
7	References	43

LIST OF TABLES

S No.	Tables	Page No.
1	Composition of alkaline hematin detergent	12
2	Rf values of TLC 1	17
3	Rf values of TLC 2	17
4	Rf values of TLC 3	18
5	Phytochemical screening of papaya leaf extract	18
6	Phytoconstituents identified from the acetone extract of Carica papaya leaves by GC-MS analysis	19
7	Phytoconstituents identified from Hexane extract of Carica papaya leaf by GC-MS	22
8	Phytochemicals identified in 60% ethanol extract of Carica papaya leaf by GC-MS analysis	24
9	Phytochemicals identified from 40% ethanolic extract of Carica papaya leaf by GC- MS analysis	25
10	Phytochemicals identified from water extract of Carica papaya leaf by GC-MS analysis	26
11	Phytoconstituents and their medicinal uses obtained from Carica papaya leaf extract (Hexane)	27
12	Phytoconstituents and their medicinal uses obtained from Carica papaya leaf extract (Acetone)	28
13	Phytoconstituents and their medicinal uses obtained from 60%, 40% ethanol and water extract of papaya leaf	30
14	Standard of AHD	31
15	Absorbance of different blood sample by AHD	31
16	pH of blood sample up to 7 th week	33
17	Red Blood Cell count by haematology analyzer (Sysmex KX-21N)	40

MAJOR PROJECT

LIST OF FIGURE

S. No.	Figure Name	Page No.
1	Brief summary of the general approaches in extraction, isolation and characterization of bio-active compound from plant extract	7
2	An overview of biochemical changes of RBCs in in- vitro condition in blood bank	9
3	Flow chart of soxhlet extraction procedure	13
4	Soxhlet Extraction of papaya leaf	14
5	Gas chromatography-Mass spectrometer	15
6	Papaya leaf extract in PBS	16
7	TLC 1 of papaya extract	17
8	TLC 2 of papaya extract	17
9	TLC 3 of papaya extract	18
10	Chromatogram of Carica papaya leaf extract in acetone	19
11	Chromatogram of Carica papaya leaf extract in Hexane	22
12	Chromatogram of Carica papaya leaf extract in 60% ethanol	24
13	Chromatogram Carica papaya leaf extract in 40% ethanol	25
14	Chromatogram of Carica papaya leaf extract in water	26
15	AHD absorbance of blood sample	33
16	pH of different extract containing blood sample during storage period	34
17	Morphology of fresh blood sample (40X)	34
18	Morphology of erythrocyte after 2 week of storage	35
19	Morphology of erythrocyte after 4weeks of storage	36
20	Morphology of erythrocytes after 5 weeks of storage	37
21	Study of RBC morphological changes from 1 st week to 5 th week during storage by scanning electron microscopy	38
22	Cell count after 5 weeks of storage in different extract	40
23	Comparison of RBC count in different extract	40