

PHYTOCHEMICAL AND
BIOLOGICAL STUDY OF
LOBULARIA LIBYCA (VIV) C.F.W.
MEISSN. FAMILY BRASSICACEAE

A Thesis Submitted By

Khaled Ahmed Nematallah

Bachelor of Pharmaceutical Sciences,
Faculty of Pharmacy, Ain-Shams University

In partial fulfillment of the
requirements for the degree
Master in Pharmaceutical Sciences
(Pharmacognosy)

Department of Pharmacognosy
Faculty of Pharmacy
Ain Shams University
Abbasia, Cairo, Egypt

2014

Under the Supervision of

Prof. Dr. Nahla A. Ayoub

Professor of Pharmacognosy

Dept. of Pharmacognosy,

Faculty of Pharmacy

Ain Shams University

Ass. Prof. Dr. Soumaya Saad Zaghloul

Associate Professor of Pharmacognosy

Dept. of Pharmacognosy,

Faculty of Pharmacy

MSA University

Ass. Prof. Dr. Amal Amin Al-Gendy

Associate Professor of Pharmacognosy

Dept. of Pharmacognosy,

Faculty of Pharmacy

Zagazig University

APPROVAL SHEET

PHYTOCHEMICAL AND BIOLOGICAL STUDY OF *LOBULARIA LIBYCA* (VIV) C.F.W. MEISSN. FAMILY BRASSICACEAE

This thesis is approved by:

Prof. Dr. Abdel-Naser B. Singab -----

(Dean of the faculty of pharmacy – Ain Shams University)

Prof. Dr. Asem M. El-Shazly -----

(Vice-Dean of the faculty of pharmacy – Zagazig University)

Prof. Dr. Nahla A. Ayoub -----

(Professor of pharmacognosy – Ain Shams & BUE University)

Ass. Prof. Dr. Soumaya S. Zaghloul -----

(Associate Professor of pharmacognosy – MSA University)

Date:

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَمَا تَوْفِيقِي إِلَّا بِاللَّهِ عَلَيْهِ

تَوَكَّلْتُ وَإِلَيْهِ أُنِيبُ

صدق الله العظيم

(سورة هود آية 88)

DEDICATION

**TO THE SOUL OF
MY FATHER**

ACKNOWLEDGMENT

A word of thanks to God, the most gracious, merciful and the source of all knowledge by whose abundant grace this work has come to completion.

I feel like showing my greatest and deepest appreciation to the generous, kind and patient team I have got the honor to work with.

*My greatest appreciation, deepest thanks and sincere gratitude are owed to **Prof. Dr. Nahla A. Ayoub**, Professor of Pharmacognosy, Department of pharmacognosy, Ain-Shams University, (my professor and the main reason for me to be interested in natural products and pharmacognosy) for her Intellectual and academic support, her guidance, valuable discussions, variable knowledge, scientific advice and extensive efforts throughout this thesis.*

*I am profoundly grateful to **Ass. Prof. Dr. Soumaya Saad Zaghloul**, Department of pharmacognosy, MSA University, for her supervision, continuous encouragement, kind relation and help during this work, providing me the enough time and effort to finish this work,*

*Words can't express my deep and sincere gratitude to **Ass. Prof. Dr. Amal Amin Al-Gendy**, Department of pharmacognosy, Zagazig University for suggesting the topic of this thesis. Her knowledge and her logical way of thinking have been of great value for me. Her understanding, encouraging and personal guidance have provided a good basis for the present work, I would like to thank her for the effort that can't be described for supervising this work, and revising the thesis as well as the published articles. She could not even realize how much I have learnt from her. I am deeply indebted to her for offering me from her time and effort.*

I would like to thank all the members of pharmacology department, faculty of pharmacy, Ain-shams University for their great effort in carrying out the biological testings.

My deep appreciation to all colleagues in the pharmacognosy department, MSA University for their continuous encouragement and help.

*All my dear thanks and sincere gratitude are owed to MSA University represented personally by **Prof. Dr. Nawal El-Degwi** the head of board of trustees of MSA University, **Prof. Dr. Khayri Abdel-Hamid** the president of MSA University, **Prof. Dr. Sherif El-Degwi** the vice president of MSA University and **Prof. Dr. Mohamed Seif-Eldin Ashour** the dean of faculty of pharmacy, MSA University for providing the time, all lab facilities and equipment that are necessary for the work to be completed.*

*I would also like to thank **Manal Ali**, the technician responsible for the research lab in MSA University for her valuable help and support.*

*All my deep thanks and appreciation are extended to my wife, **Ayat Mohsen** who was keen on encouraging me and offering me all help, unconditional love, support and never ending tolerance and patience. She providing me the suitable atmosphere to work,*

*Special thanks are also owed to my **brothers** for offering me continuous help and support.*

*Finally my very special thanks, everlasting gratitude and sincere love are devoted to my beloved **mother** to whom words are not enough to describe her care, tenderness, encouragement, love, support and supplying me with adequate financial support. May God bless her and grant her all her wishes.*

Khaled Ahmed Nemataallah

Contents

Subject		Page
1.	INTRODUCTION	1
2.	REVIEW OF LITERATURE	3
3.	TAXONOMY	40
4.	MATERIAL, APPARATUS AND METHODS	43
5.	PART 1: BOTANICAL STUDY AND DNA FINGERPRINT OF <i>LOBULARIA LIBYCA</i> (VIV) C.F.W. MEISSN.	63
5.1	Chapter 1: Macromorphology of <i>Lobularia libyca</i> (Viv) C.F.W. Meissn.	63
5.1.1.	The root	63
5.1.2.	The young stem	63
5.1.3.	The old stem	63
5.1.4.	The leaf	64
5.1.5.	The flower	64
5.1.6.	The fruit	71
5.1.7.	The seed	71
5.2.	Chapter 2: Micromorphology of <i>Lobularia libyca</i> (Viv) C.F.W. Meissn.	76
5.2.1.	The old root	76
5.2.2.	The young stem	82
5.2.3.	The old stem	89
5.2.4.	The leaf	92
5.2.5.	The flower	99
5.2.6.	The fruit	102
5.2.7.	The seed	102
5.3.	Chapter 3: DNA fingerprint of <i>Lobularia libyca</i> (Viv) C.F.W. Meissn.	109
6.	PART 2: PHYTOCHEMICAL STUDY OF <i>LOBULARIA LIBYCA</i> (VIV) C.F.W. MEISSN.	115
6.1.	Chapter 1: Preliminary phytochemical screening	115
6.2.	Chapter 2: Quantitative estimation of total phenolics content of <i>Lobularia libyca</i> (Viv) C.F.W. Meissn.	116
6.3.	Chapter 3: Quantitative estimation of total flavonoids content of <i>Lobularia libyca</i> (Viv) C.F.W. Meissn.	120
6.4.	Chapter 4: HPLC analysis of phenolic compounds of <i>Lobularia libyca</i> (Viv) C.F.W. Meissn.	124
6.5.	Chapter 5: Isolation of compounds from the alcoholic extract of <i>Lobularia libyca</i> (Viv) C.F.W. Meissn.	127