Dissertation

On

"Newer Technological Intervention For Simultaneous Extraction of Essential Oil and Phenolic Principles From Vitex negundo."

Submitted for Partial fulltime of the requirement for the award of degree of

Master of Pharmacy [Pharmacognosy]



Session 2020-2022

SUPERVISED BY
Dr. Vivekananda Mandal
(M.Pharm., Ph.D.)
Assistant Professor

SUBMITED BY Kajal Lal

M. Pharm. IV semester Enroll No.: GGV/20/06317 Roll No.: 20706006

DEPARTMENT OF PHARMACY,
GURU GHASIDAS VISHWAVIDYALAYA BILASPUR (C.G.)

(A Central University established by the Central Universities Act 2009 No. 25 of 2009)

A

Dissertation

on

"Newer Technological Intervention For Simultaneous Extraction of Essential Oil and Phenolic Principles From *Vitex negundo*."

Submitted for Partial fulltime of the requirement for the award of degree of

Master of Pharmacy
[Pharmacognosy]



Session 2020-2022

SUPERVISED BY

Dr. Vivekananda Mandal (M.Pharm., Ph.D.) Assistant Professor

SUBMITED BY

Kajal Lal

M. Pharm. IV semester Enroll No.: GGV/20/06317 Roll No.: 20706006

DEPARTMENT OF PHARMACY, GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act-2009 No. 25 of 2009)



DEPARTMENT OF PHARMACY, GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act-2009 No. 25 of 2009)

Tel. No. 07752-260027; Fax No. 07752-260148

FORWARDING CERTIFICATE

This is to certify that Ms. Kajal Lal D/o Mr. Shashikant Lal is a student of M.Pharm. IV semester in Department of Pharmacy (GGV) has submitted her project report entitled "Newer Technological Intervention For Simultaneous Extraction of Essential Oil and Phenolic Principles From Vitex negundo" for the partial fulfilment of the requirement for the Degree of Master of Pharmacy (Pharmacognosy) at Department of Pharmacy, GGV Bilaspur (C.G.). She has completed her project work under the supervision of Dr. Vivekananda Mandal (Assistant professor)

I hereby forward her project report in M. Pharm. (Pharmacognosy) during the academic session 2020-2022.

Date: 14/11/2022

Place: GGVi Bilaspur

Dr. Bharti Ahirwar

Associate Professor and HOD Department of Pharmacy, G.G.V. Bilaspur (C.G.)

Head

Department of Pharmacy
Guru Ghasidas Vishwavidyalaya
(A Central University)
Bilaspur (C.G.)



DEPARTMENT OF PHARMACY, GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act-2009 No. 25 of 2009)

Tel. No. 07752-260027; Fax No. 07752-260148

CERTIFICATE

This is to certify that Ms. Kajal Lal D/o Mr. Shashikant Lal student of M. Pharm. IV semester, Department of Pharmacy, (GGV) has submitted her project report entitled "Newer Technological Intervention For Simultaneous Extraction of Essential Oil and Phenolic Principles From Vitex negundo" for the partial fulfillment of the requirement for the Degree of Master of Pharmacy (Pharmacognosy) at Department of Pharmacy, GGV Bilaspur (C.G.). She has completed her project report under my supervision.

I hereby forwarding her project report for the award of degree of M. Pharm. (Pharmacognosy) during the academic session 2020-2022.

I wish her every success in future life.

Date: 14/11/2022

Place: 990. Bllospun

Supervised By

Dr. Vivekananda Mandal Assistant Professor Department of Pharmacy, G.G.V, Bilaspur (C.G.)

Dr. Vivetananda Mandal
Asst. Professor, institute of Pharmacy
Guru Ghasidas Central University

Bilaspur (C.G.) 495009



DEPARTMENT OF PHARMACY,

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act-2009 No. 25 of 2009)

Tel. No. 07752-260027; Fax No. 07752-260148

DECLARATION

I hereby declare that the project report entitled "Newer Technological Intervention For Simultaneous Extraction of Essential Oil and Phenolic Principles From Vitex negundo" was done by me. The entire work was done with the guidance and suggestion received from my supervisor Dr. Vivekananda Mandal (Assistant Professor) at Department of Pharmacy, GGV, Bilaspur (C.G.). The same is submitted to Guru Ghasidas Vishwavidyalaya Bilaspur for the partial fulfillment of the requirement for the degree of Master of Pharmacy (Pharmacognosy).

Date: 14/11/2022

Place: GGV Bllospur

Kajal Lal

M.Pharm. IV Semester Roll No. 20706006 Enrollment No. GGV/20/06317

Department of Pharmacy, GGV, Bilaspur, (C.G.)

ACKNOWLEDGEMENT

I humbly and whole heartedly bow my head before Lord Almighty for blessing me all his grace to successfully complete my studies and research endeavor at Guru Ghasidas University.

It is a great pleasure to acknowledge my deepest thanks and gratitude to everyone who supported me throughout the course of thesis work. I wish to extend my sincere and heartfelt obligation to work all the personages who have helped me in this endeavour. Without their active guidance, help, cooperation, and encouragement, I would not have made any progress in my project.

By the grace of Almighty, I take this opportunity to express my deep sense of gratitude to my supervisor Dr. Vivekananda Mandal, Assistant Professor, Department of Pharmacognosy, Department of Pharmacy, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) for providing me excellent guidance, motivation, encouragement, and care throughout my research work. I am highly thankful to him for critical inputs, thought provoking suggestions during the progress of the work and writing of dissertation.

I am also thankful to Prof. Bharti Ahirwar Head of Department of Pharmacy Guru Ghasidas Vishwavidyalaya, Bilaspar (CG) for providing me the required facilities and their timely words of advice, despite of their busy schedule.

I am thankful to, Dr. Arjun Patra, Dr. Bharti Ahirwar, Dr. Vinod D. Rangari and Dr.

Neelirose beck for their constant efforts and support throughout my project work and

post-graduation as well.

I would like to thanks all the non-teaching staff of the department for their contribution

and assistance.

I would like to thanks and express my gratitude to my seniors and friends, Mr. Kavi

Bhushan Chouhan, Mr. Souvik Mukherjee, Pragya Gupta, Monika Chandrakar and Sunil

Sahu who contributed in some or other way for the success of this research work.

Now, Last but not the least; my unbound gratitude and affection drive to my beloved

parents Mr. Shashikant Lal and Mrs. Snidgha Lal for bringing me up in the best of ways,

for rendering me the best of education, for nurturing in me the best of ideals.

Sincerely thanks to all.

Date: 14/11/2022

Place: Gqu, Bilaspun

Kajal Lal

S.NO.	TITLE	PAGE NO.
1.	INTRODUCTION	1
2.	AIMS & OBJECTIVES	7
3.	LITERATURE REVIEW	8
3.1	Essential Oil	8
3.2	Phenolics & Flavonoids	11
3.3	Solvent Free Microwave Assisted Extraction (SFME)	14
3.3.1	Types of SFME	15
3.4	Antioxidant	16
3.5	International and National Status	18
3.6	Plant Profile	22
3.6.1	A summary of the Genus vitex	22
3.6.2	A summary of Family Lamiaceae	24
3.6.3	Common Names	25
3.6.4	Scientific Classification	26
3.6.5	Distribution	26
3.6.6	Geographical Distribution	27
3.6.7	Plant Characteristics	28
3.6.8	Cultivation	28
3.6.9	Microscopy	28
3.6.10	Chemical constituents	19
3.6.11	Pharmacological activity of Vitex negundo	32
4.	MATERIAL AND METHODS	39
4.1	Sample Collection and Authentication	39
4.2	Chemicals	41
4.3	Moisture Content	41
4.4	Extraction Method	42
4.4.1	Solvent Free Microwave Assisted extraction (SFME)	42
4.4.2	Conventional Hydro Distillation (HD)	46
4.4.3	Re-Extraction of the Biomass	50
4.5	Total Phenolic Content (TPC)	52

4.6 4.7 4.8 4.9	Determination of Carbohydrate Content Antioxidant	55
4.8		
4.9		57
	Chemo Microscopy	58
	Chromatographic analysis	
4.9.1	GC-FID Analysis	59
4.9.2		59
4.10	Field Emission Scanning Electron Microscopy	60
5	Statistical Analysis	60
	RESULTS AND DISCUSSION	61
5.1	Moisture Content	61
5.2	Yield of Oil from HD	61
5.3	SFME	62
5.4	Extraction Protocol	63
5.5	Temperature Profile	65
5.6	Effect of Microwave Power on Appearance of 1st Drop	68
5.7	Effect of Microwave power on Yield	69
5.8	Effect of Microwave power on Extraction Time	72
5.9	Determination of Oil Quality	73
5.9.1	Total Phenolic Content (TPC)	73
5.9.2	GC-FID Analysis	75
5.9.3	Dot blot Analysis	83
5.10	Assessment of Biomass Integrity After Extraction of Oil	84
5.10.1	TPC of Biomass	85
5.10.2	Carbohydrate Test	86
5.10.3	Antioxidant Activity of Extract	87
5.10.4	Chemo microscopy	89
5.10.5	SEM Analysis	91
6	CONCLUSION	94
7	REFERENCES	96