

Mallappa Kumara Swamy *Editor*

Plant-derived Bioactives

Production, Properties and Therapeutic
Applications

 Springer

Editor
Mallappa Kumara Swamy
Department of Biotechnology
East West First Grade College
Bengaluru, Karnataka, India

ISBN 978-981-15-1760-0 ISBN 978-981-15-1761-7 (eBook)
<https://doi.org/10.1007/978-981-15-1761-7>

© Springer Nature Singapore Pte Ltd. 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Bioactive Compounds from Brazilian Lichens and Their Biotechnological Applications	209
Eugênia C. Pereira, Nicácio H. da Silva, Maria de Lourdes L. Buril, Mônica C. B. Martins, Hianna A. M. F. Silva, Emerson Peter S. Falcão, Helinando P. de Oliveira, Mateus MatiuZZi da Costa, Maria Estrella Legaz, Rocío Santiago, and Carlos Vicente	
Cardiovascular Benefits of Dietary Polyphenols	239
Boon Hee Goh and Joash Ban Lee Tan	
Antidiabetic Phytochemicals and Their Applications in Modern Medicine	259
Mahesh Sreekantan Krishna and Karthika Bahulayan Arun	
Phytochemicals as Antiviral Agents: Recent Updates	279
Ritu Ghildiyal, Vijeta Prakash, V. K. Chaudhary, Vandana Gupta, and Reema Gabrani	
Antimalarial Agents from Medicinal Plant and Fungal Sources	297
Grazia Luisi, Simone Carradori, Rossella Grande, Daniela Secci, and Paolo Guglielmi	
Bioactive Phytochemicals to Fight Against Antimicrobial Resistance	335
Gnanasekeran Karthikeyan, Mallappa Kumara Swamy, Madheshwar Rajha Viknesh, Rajendran Shurya, and Natesan Sudhakar	
Enzyme Inhibitory Potentials from Brazilian Flora	383
Luiz Everson da Silva, Camila Confortin, Michele Debiassi Alberton, Diogo Alexandre Siebert, and Camila Jeriane Paganelli	
Essential Oil-Bearing Plant Species of the Atlantic Rain Forest of Brazil: Chemical Composition and Biological Activities	395
Luiz Everson da Silva and Camila Confortin	
Essential Oils as Effective Agents Against Neurological Disorders	409
Sandeep Ramchandra Pai, Varsha Vasantrao Sonkamble, and Nilesh Shirish Wagh	
Traditional Plant Compounds for the Treatment of Neuropsychiatric Disorders	435
Inshah Din, Mumtaz Anwar, Sheikh Rayees, and Fayaz Malik	



Essential Oils as Effective Agents Against Neurological Disorders

Sandeep Ramchandra Pai, Varsha Vasanttrao Sonkamble,
and Nilesh Shirish Wagh

Abbreviations

ABTS	2,2'-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid)
AChE	Acetylcholinesterase
AD	Alzheimer's disorder
AKT	A serine/threonine protein kinase (also known as protein kinase B) encoded by an oncogene found in a retrovirus causing thymomas in a mouse AKR strain
BChE	Butyrylcholinesterase
C/EBP	CCAAT/enhancer-binding protein
CAT	Catalase
CNS	Central nervous system
DPPH	2,2-Diphenyl-1-picrylhydrazyl
EO	Essential oil
ER	Endoplasmic reticulum
GABA	Gamma-aminobutyric acid
GC-FID	Gas chromatography-flame ionization detector
GC-MS	Gas chromatography-mass spectrometry
GPX	Glutathione peroxidase
<i>IL-6</i>	Interleukin 6
LC3	Light chain 3
L-DOPA	L-3,4-Dihydroxyphenylalanine
MPTP	1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine
mRNA	Messenger ribonucleic acid
mTOR	Mammalian target of rapamycin

S. R. Pai · N. S. Wagh (✉)
Amity Institute of Biotechnology, Amity University Mumbai, Panvel, Mumbai, India

V. V. Sonkamble
Swami Ramanand Teerth Marathwada University, Nanded, India



Mallappa Kumara Swamy *Editor*

Plant-derived Bioactives

Chemistry and Mode of Action

 Springer

Plant-derived Bioactives pp 351–373 | [Cite as](#)[Home](#) > [Plant-derived Bioactives](#) > [Chapter](#)

Phytochemicals in the Prevention and Cure of Cancers

Nilesh Shirish Wagh, Sandeep Ramchandra Pai & Varsha Vasantrao Sonkamble

Chapter | [First Online: 28 June 2020](#)

Abstract

Most of the early medicines relied on the prescription of specific plants and herbs for medications. This practice is still supported by the present-day research, because of the bioactive phytochemicals present in them. Acting as a defense barrier against several plant pathogens, including bacteria, viruses, and fungi, phytochemicals are also associated with the diminution of lethal diseases in humans, such as hypertension, diabetes, heart disease, etc., and can also effectively diminish the risks of developing certain cancers. Cancer is considered

Access via your institution 

▼ Chapter EUR 29.95
Price includes VAT (India)

- DOI: 10.1007/978-981-15-2361-8_16
- Chapter length: 23 pages
- Instant PDF download
- Readable on all devices
- Own it forever
- Exclusive offer for individuals only
- Tax calculation will be finalised during checkout

[Buy Chapter](#)

> eBook EUR 192.59

> Softcover Book EUR 229.99

Copyright information

© 2020 Springer Nature Singapore Pte Ltd.

About this chapter



Check for updates

Cite this chapter

Wagh, N.S., Pai, S.R., Sonkamble, V.V. (2020). Phytochemicals in the Prevention and Cure of Cancers. In: Swamy, M. (eds) Plant-derived Bioactives. Springer, Singapore.
https://doi.org/10.1007/978-981-15-2361-8_16

Download citation

[.RIS](#) [.ENW](#) [.BIB](#)

DOI

https://doi.org/10.1007/978-981-15-2361-8_16

Published	Publisher Name	Print ISBN
28 June 2020	Springer, Singapore	978-981-15-2360-1

Online ISBN	eBook Packages
978-981-15-2361-8	Biomedical and Life Sciences Biomedical and Life Sciences (R0)

▼ Chapter EUR 29.95
Price includes VAT (India)

- DOI: 10.1007/978-981-15-2361-8_16
- Chapter length: 23 pages
- Instant PDF download
- Readable on all devices
- Own it forever
- Exclusive offer for individuals only
- Tax calculation will be finalised during checkout

[Buy Chapter](#)

> eBook EUR 192.59

> Softcover Book EUR 229.99

> Hardcover Book EUR 229.99

[Learn about institutional subscriptions](#)**Sections** [Figures](#) [References](#)[Author information](#)[Editor information](#)[Rights and permissions](#)[Copyright information](#)[About this chapter](#)



Phytochemicals in the Prevention and Cure of Cancers

16

Nilesh Shirish Wagh, Sandeep Ramchandra Pai,
and Varsha Vasantrao Sonkamble

Contents

16.1	Introduction to Cancers.....	354
16.1.1	Definition and General Types of Cancer.....	354
16.1.2	Risk Factors of Cancer.....	354
16.1.3	Treatments of Cancer.....	354
16.1.4	Side Effects of Anticancer Drugs (Synthetic Drugs).....	356
16.2	Phytochemicals: Introduction and Different Mechanisms of Cancer Prevention by Phytochemicals.....	356
16.2.1	Through Antioxidant Activity.....	357
16.2.2	Inhibition of Cellular Mechanisms.....	357
16.2.2.1	Cell Proliferation.....	357
16.2.2.2	Cell Adhesion and Invasion.....	359
16.2.2.3	Signal Transduction Pathways.....	360
16.2.2.4	Oncogene Expression.....	361
16.2.3	Induction of Cellular Activities.....	362
16.2.3.1	Cell Differentiation.....	362
16.2.3.2	Cell Apoptosis.....	363
16.2.3.3	Tumor Suppressor Gene Expression.....	364
16.2.3.4	Cell Cycle Arrest.....	364
16.2.4	Other Mechanisms.....	365
16.2.4.1	Enzyme Induction and Enhancing Detoxification.....	365
16.2.4.2	Enzyme Inhibition.....	366
16.2.4.3	Enhancement of Immune Function and Surveillance.....	367
16.2.4.4	Anti-Angiogenesis.....	368
16.3	Conclusions and Future Prospects.....	369
	References.....	369

N. S. Wagh · S. R. Pai
Amity Institute of Biotechnology, Amity University, Mumbai, Maharashtra, India

V. V. Sonkamble (✉)
School of Life Sciences, Swami Ramanand Teerth Marathwada University,
Nanded, Maharashtra, India

Tarun Belwal
Milen I. Georgiev
Jameel M Al-Khayri *Editors*


Nutraceuticals Production from Plant Cell Factory

 Springer

Editors

Tann Belwal
Biosystems Engineering and Food
Science
Zhejiang University
Hangzhou, China

Milen I. Georgiev
Institute of Microbiology
Bulgarian Academy of Sciences
Plovdiv, Bulgaria

Jameel M Al-Khayri 
Agricultural Biotechnology
King Faisal University
Al-Hassa, Saudi Arabia

ISBN 978-981-16-8857-7 ISBN 978-981-16-8858-4 (eBook)
<https://doi.org/10.1007/978-981-16-8858-4>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2022

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore



In Vitro Production of Terpenoids

8

Sandeep Ramchandra Pai

Abstract

Plants produce diverse groups of secondary metabolites (SMs); terpenoids are one such large group of SMs. Terpenoids are found commonly in related and unrelated plant taxa; however, some specific terpenoids are also reported in lower and higher taxa. The pharmacological importance and commercial utilization of terpenoids are on the top among the plant SMs. A number of reviews on biosynthesis of terpenoids have been published suggesting 2-C-methyl-D-erythritol-4-phosphate (MEP) and the mevalonate (MVA) as common pathways. Today, researchers are working on target-specific production of terpenoids by altering metabolic pathways and expressing genes in microsystems. Recent high-throughput analytical techniques coupled to functional genomics approach has geared up biosynthesis and overproduction of terpenoids. In this chapter, terpenoids have been reviewed in detail for their sources, biosynthetic pathways, in vitro production technologies, scale-up techniques, and biological activities. The ecological and environmental perspectives for function of terpenoids have also been discussed. Considering commercial implications of terpenoids in therapeutic, perfumery, food, flavor, and fuel industries, a comprehensive account on their prospective future has been concentrated upon. Extraction and detection methodologies for terpenoids have been focused. Attention has also been drawn toward the need for designing possible roadmap for its sustainable utilization.

Keywords

Terpenoids · Medicinal plants · Extraction · Scale-up · Activities · Utilization

S. R. Pai (✉)

Department of Botany, Rayat Shikshan Shanstha's Dada Patil Mahavidyalaya, Karjat, Maharashtra, India

© The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2022

185

T. Belwal et al. (eds.), *Nutraceuticals Production from Plant Cell Factory*, https://doi.org/10.1007/978-981-16-8858-4_8