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Quantitative phytochemical analysis of selected medicinal plant species by using various organic solvents

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Abstract

In the present study, 10 medicinally important plant species were screened for their phytochemicals (quantitatively) by using 4 different solvent (water [AQ], Acetone [AE], Petroleum Ether [PE] and chloroform [CF]) extracted from their selected parts (leaves, stem, pericarp of the fruit and seeds, cotyledons). All the plants which are selected for the study contains phytochemicals like alkaloids, flavonoids, steroids, phenols and saponins. The highest concentrations of alkaloids are observed in *Leucoside* leaf and *Ficus* stem extracts by using PE. The highest amounts of flavonoids are seen in AQ and PE extracts of *Ginseng*, *Dioscorea*, *S. japonica*. The moderate concentrations of phenols are reported in AQ and PE extracts of *Leucoside* and *S. japonica* plant species. The high concentrations of steroids are reported in *S. japonica* plant fruit pericarpic extract with PE. The concentration of phytochemicals varied, when different organic solvents are used for the extraction procedure.

Keywords: Phytochemicals, medicinal plants, bioactive compounds, flavonoids, saponins.

Introduction

Medicinal plants are plants containing built in active ingredients familiarized to cure disease and relieve from pain [1]. The use of traditional medicines and medicinal plants in mainly developing countries as remedial agents for the maintenance of health has been broadly observed [2]. Modern-day pharmacopoeia however contains at least 25% drugs derived from plants and many others, which are synthetic analogues, built on prototype chemical substances isolated from plants. Involvement in medicinal plants as a re-budding health assistance has been fuelled with the rising charges of prescription drugs in the safeguarding of personalized health and well being and the bio-prospecting of new plant derived drugs [3]. The ongoing development recognition regarding medicinal plants is due to various reasons; include increasing faith in herbal medicine [4]. On the top of that, an increasing dependence on the use of these medicinal plants in the industrialized organizations has been traced towards the extraction and development of drugs and chemotherapeutics from these plants as well as from conventionally used herbal remedies [5]. The therapeutic properties of plants could be based on their anti-oxidant, anti-microbial, anaptyretic effects of the phytochemicals constituents in them [6]. According to World Health Organization, medicinal plants would be the greatest source to obtain an army of drugs. Thus, such plants should be investigated to better understanding for their properties, safety practices in addition to usefulness [7].

In India, the ayurvedic system has features a numerous of such medicinal remedies on plants or plant products and the determination of their morphological, pharmacological or pharmacognostical characters can provide a better understanding of their active principle and mode of action. However a large number of tropical plants have not recently been studied in detail for their chemical constituents. So, in this regard we focused on phytochemical aspects in 10 selected indigenous plants of India: 1) *Ginseng* [GI] (leaves); 2) *Leucoside* [LC] (leaves); 3) *Nigella* [NS] (leaves); 4) *Leucoside* [LO] (leaves); 5) *Dioscorea* [DL] (leaves); 6) *Woodsfordia* [WF] (stem); 7) *Vaccinium* [VM] (leaves); 8) *Ficus* [FV] (stem); 9) *S. japonica* [SS] (pericarp); 10) *Amorpha* [AS] (seeds).

Materials and Methods

Collection of Plant material

The plants were collected from their natural habitat, from different parts of south and north India. The plant material was identified and authenticated in the Department of Botany, P.B.Siddhanta College, Vijayanada, A.P. India.

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Aoac Manual For Quantitative Phytochemical Analysis

**Sandra E. Shumway, JoAnn M.
Burkholder, Steven L. Morton**



Aoac Manual For Quantitative Phytochemical Analysis:

Phytochemistry, 3-Volume Set Chukwuebuka Egbuna, Jonathan Chinenye Ifemeje, Stanley Udedi Chidi, Shashank Kumar, Jaya Vikas Kurhekar, Nadia Sharif, 2022-05-29 The 3 volume set *Phytochemistry* covers a wide selection of topics in phytochemistry and provides a wealth of information on the fundamentals new applications methods and modern analytical techniques state of the art approaches and computational techniques With chapters from professional specialists in their fields from around the world the volumes deliver a comprehensive coverage of phytochemistry *Phytochemistry* is a multidisciplinary field so this book will appeal to students in both upper level students faculty researchers and industry professionals in a number of fields including biological science biochemistry pharmacy food and medicinal chemistry systematic botany and taxonomy ethnobotany conservation biology plant genetic and metabolomics evolutionary sciences and plant pathology

Phytochemistry Chukwuebuka Egbuna, Jonathan Chinenye Ifemeje, Stanley Chidi Udedi, Shashank Kumar, 2018-12-12 This first book in this three volume set provides comprehensive coverage of a wide range of topics in phytochemistry With chapters from professional specialists from key institutions around the world the volume starts with an introduction to phytochemistry and details the fundamentals Part II discusses the state of the art modern methods and techniques in phytochemical research while Part III provides an informative overview of computational phytochemistry and its applications Part IV presents novel research findings in the discovery of drugs that will be effective in the treatment of diseases The chapters are drawn carefully and integrated sequentially to aid flow consistency and continuity

Phytochemicals for Health Marcello Locatelli, Michał Tomczyk, Laura Dugo, Marina Russo, 2025-03-28 *Phytochemicals for Health* presents the state of the art in the field of Phytochemicals It highlights how following the interactions of plants and the environment an analytical approach for standardization and quality control is of fundamental importance to product quality control Parts I and II cover the main problems related to natural products plants extraction quantitative analysis relationship with the surrounding environment Part III presents the main classes of organic compounds identified and reported and Part IV includes inorganic compounds It also includes a chapter covering all the natural compounds that have become Active Principle Ingredients API highlighting next challenges *Phytochemicals for Health* is a valuable tool for senior scientists working in natural products field interested in investigating the correlation between chemical profile and biological activity in order to obtain a product that is safe for human health Covers extraction purification and isolation methods of the active compounds in plants Highlights characterization and analysis of main organic and inorganic components Analyses the effect of the environment on the natural product Discusses standardization and quality control fundamental for the development of new products with beneficial activity on human health

Food Processing Romina Alina Marc, Antonio Valero Díaz, Guiomar Denisse Posada Izquierdo, 2020-05-06 In view of the continuous evolution that is taking place in the field of food processing this book aims to devise the most comprehensive presentation of up to date information in the specialized

literature to improve existing knowledge The chapters in this book have been divided into four sections Section 1 Food Technologies in Food Processing presents current technological processes used in food processing Section 2 Quality of Raw Materials in Food Processing presents the importance of the quality of raw materials used in food processing Section 3 Treatments Used in Food Processing presents the latest trends in treatments used in food processing Section 4 Factors That Influence Food Processing presents current information on the factors that influence food processing from the raw material to the packaging used

Harmful Algal Blooms Sandra E. Shumway, JoAnn M. Burkholder, Steven L. Morton, 2018-08-06

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Science and Technology for Shaping the Future of Mizoram Dr. K. Lalchhandama, 2017-05-26 This book is the direct outcome of the Mizoram Science Congress 2016 held on 13 and 14 November 2016

Current Trends in Food Processing and Nutrition to Mitigate Nutritional Health Issues Rana Muhammad Aadil, Muhammad Shahid Riaz Rajoka, Monica Trif, Seydi Yıkıms, 2023-10-11

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Phytochemical Analysis by Modern Techniques Deepak Kasote, Kishor Kumar Sadasivuni, Mohammed Alsafran, Zhentian Lei, 2025-11-17

Phytochemical Analysis by Modern Techniques Recent Trends and Future Perspectives offers cutting edge qualitative and quantitative methods Beginning with an overview of conventional and modern extraction strategies used in phytochemical analysis the book builds upon this knowledge by outlining state of the art modern techniques including vibrational spectroscopy and hyphenated HPLC MS The book emphasizes detailed reproducible methods and real world case studies making the techniques accessible to readers from neighboring scientific fields In addition to extraction strategies and modern techniques the book covers metabolomics and diverse analytical tools to enhance holistic understanding of phytochemical analysis It is an ideal resource for researchers students and professionals in analytical chemistry pharmacognosy phytochemistry natural product research ethnopharmacology and food chemistry Includes cutting edge qualitative and quantitative methods in phytochemical analysis offering readers across diverse fields the tools they need to

grasp and replicate these innovative approaches Provides modern techniques such as vibrational spectroscopy chemometrics hyperspectral imaging hyphenated HPLC MS and sensor based methods Covers the field of metabolomics with overviews and step by step workflows for MS and NMR based approaches Includes detailed methods and real world case studies thus ensuring that readers understand and can confidently apply and replicate the techniques

Official Methods of Analysis of Aoac International AOAC INTERNATIONAL,2022-06-27 AOAC INTERNATIONAL has been publishing a robust set of methods for analytical scientists since 1884 Scientists from around the globe contribute their expertise to ensure the content remains reliable in terms of standards development method development and the systematic evaluation and review of methods As a result the Official Methods of Analysis of AOAC INTERNATIONAL is the most comprehensive collection of chemical and microbiological methods available in the world Now in its twenty second edition this publication continues to be the most extensive and reliable collection of chemical and microbiological methods and consensus standards Many methods within the compendium have notation indicating their adoption as harmonized international reference methods by the International Organization for Standardization ISO the International Dairy Federation IDF the International Union of Pure and Applied Chemistry IUPAC and the Codex Alimentarius Commission This new edition includes new and updated methods approved since 2019

Official Methods of Analysis of AOAC International AOAC International,George W. Latimer,2010

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Official Methods of Analysis of AOAC International AOAC International,1995

Phytochemical Techniques (2nd Revised And Enlarged Edition) Prof. Dr. N. Raaman,2022-11-11

Phytochemicals are the individual chemicals from which the plants are made and plants are the key sources of raw materials for both pharmaceutical and aromatic industries The improved methods for higher yield of active compounds will be the major incentive in these industries To help those who involved in the isolation of compounds from plants some of the essential phytochemical techniques are included in this book It contains 10 chapters A brief introduction is given in Chapter 1 Chapter 2 deals with the production processes for herbals and botanicals Selection of plant and plant parts for phytochemical analysis are included in Chapter 3 Different methods of extraction are given in Chapter 4 Qualitative phytochemical screening is presented in Chapter 5 Various methods for separation of phytochemicals which include paper and thin layer chromatography and column chromatography are given in Chapter 6 Qualitative and quantitative estimation of phytochemicals using gas chromatography high performance liquid chromatography and high performance thin layer chromatography are described in Chapter 7 The various methods of identification including the physical characteristics and spectroscopy are included in Chapter 8 The ultraviolet spectroscopy infrared spectroscopy near infrared spectroscopy mass spectroscopy nuclear magnetic resonance spectroscopy and crystallography are included in this chapter The categories of phytochemicals are given in Chapter 9 A case study of isolation and identification of compounds in the laboratory of the author of this book is included in Chapter 10 Isolation of alkaloids is

given in Chapter 11 Extraction and isolation of phenolic compounds is described in Chapter 12 Isolation of anthocyanin compounds is included in Chapter 13 Extraction and analysis of essential oils are described in Chapter 14 The theoretical principles involved in the instruments handling of samples and interpretation of spectra are given in detail More than 160 figures 27 in colour are included to illustrate the various techniques and the structures of compounds Apart from the references indexes of common and scientific names of plants and chemical names and subject index are included

Phytochemical Methods A Guide to Modern Techniques of Plant Analysis A.J. Harborne, 1998-04-30 This long awaited third edition of *Phytochemical Methods* is as its predecessors a key tool for undergraduates research workers in plant biochemistry plant taxonomists and any researchers in related areas where the analysis of organic plant components is key to their investigations *Phytochemistry* is a rapidly expanding area with new techniques being developed and existing ones perfected and made easier to incorporate as standard methods in the laboratory This latest edition includes descriptions of the most up to date methods such as HPLC and the increasingly sophisticated NMR and related spectral techniques Other methods described are the use of NMR to locate substances within the plant cell and the chiral separation of essential oils After an introductory chapter on methods of plant analysis individual chapters describe methods of identifying the different type of plant molecules phenolic compounds terpenoids organic acids lipids and related compounds nitrogen compounds sugar and derivatives and macromolecules Different methods are discussed and recommended and guidance provided for the analysis of compounds of special physiological relevance such as endogenous growth regulators substances of pharmacological interest and screening methods for the detection of substances for taxonomic purposes It also includes an important bibliographic guide to specialized texts This comprehensive book constitutes a unique and indispensable practical guide for any phytochemistry or related laboratory and provides hands on description of experimental techniques so that students and researchers can become familiar with these invaluable methods **Organic Analysis** Albert Benjamin

Prescott, 1887 **Handbook of Plant Food Phytochemicals** Brijesh K. Tiwari, Nigel P. Brunton, Charles Brennan, 2013-04-01 *Phytochemicals* are plant derived chemicals which may bestow health benefits when consumed whether medicinally or as part of a balanced diet Given that plant foods are a major component of most diets worldwide it is unsurprising that these foods represent the greatest source of phytochemicals for most people Yet it is only relatively recently that due recognition has been given to the importance of phytochemicals in maintaining our health New evidence for the role of specific plant food phytochemicals in protecting against the onset of diseases such as cancers and heart disease is continually being put forward The increasing awareness of consumers of the link between diet and health has exponentially increased the number of scientific studies into the biological effects of these substances The *Handbook of Plant Food Phytochemicals* provides a comprehensive overview of the occurrence significance and factors effecting phytochemicals in plant foods A key objective of the book is to critically evaluate these aspects Evaluation of the evidence for and against the

quantifiable health benefits being imparted as expressed in terms of the reduction in the risk of disease conferred through the consumption of foods that are rich in phytochemicals With world leading editors and contributors the Handbook of Plant Food Phytochemicals is an invaluable cutting edge resource for food scientists nutritionists and plant biochemists It covers the processing techniques aimed at the production of phytochemical rich foods which can have a role in disease prevention making it ideal for both the food industry and those who are researching the health benefits of particular foods Lecturers and advanced students will find it a helpful and readable guide to a constantly expanding subject area **Phytochemical**

Analysis ,1990 **A Student's Manual of Organic Chemical Analysis, Qualitative and Quantitative** Jocelyn Field
Thorpe,Martha Annie Whiteley,Henri ter Meulen,1923 *Phytochemical Methods* J. B. Harborne,2012-12-06

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