Phytochemicals are the individual chemicals from which the plants are made and plants are the key sources of raw material 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 are involved in the isolation of compounds from plants, some of the essential phytochemical techniques are included in this book. The theoretical principles of various instruments, handling of samples and interpretation of spectra are given in detail. Adequate chemical formulas are included to support and explain various structures of compounds and techniques. The book will prove useful to students, researchers, professionals in the field of Plant Physiology and Pathology, Pharmaceutical and Chemical Engineering, Biotechnology, Medicinal and Aromatic Plants and Horticulture.

"The present reference book entitled "Medicinal plants: properties, uses and production" is based on the recent developments in the medicinal and aromatic plants sector. The contents provided in the present title are written by field..."
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North American ginseng is a unique medicinal plant which is believed to show several biological activities including: anti-stress, anti-angiogenic, immunosuppressive, and anti-oxidant activity. Components previously isolated from North American ginseng include ginsenosides, polysaccharides, peptides, polyacetylenic alcohols, and fatty acids. The biological and pharmacological effects of ginseng are mainly related to the ginsenoside components, making their extraction and characterization of interest in order to identify them, and study their biological activities. This thesis focused on the extraction of ginsenosides from North American ginseng by an ultrasonication method with methanol and DMSO as solvents and their aqueous mixtures. Quantitative analysis of individual ginsenosides from the extracts was measured by HPLC, which demonstrated that ultrasonication significantly enhanced the extraction efficiency, with the best efficiency found using 80% solvent (methanol, and DMSO) and 20% water. Immunosuppressive activity of these ginseng extracts was tested in LPS-induced macrophage cells showing that the 80% DMSO and 80% methanol extracts gave significant potency toward immunosuppressive activity in a dose-dependent manner. Moreover, significant quantities of 6-O-acetylginsenoside Rb1 were obtained using DMSO as the extraction solvent during ultrasonication, and identified using MS, FTIR, and 1D (1H and 13C) and 2D (gCOSY, gHSQC, and gHMBC) NMR. Also, subsequent bioassay experiments confirmed that acetyl ginsenoside Rb1 demonstrated additional immunosuppressive activity towards inhibiting the production of nitric oxide (NO) and tumor necrosis factor (TNF)- in LPS-induced macrophage cells using murine macrophages. In addition, acetyl ginsenoside Rb1 gave significant anti-angiogenic activity and exhibited enhanced potency towards inhibiting tube-like structure formation of endothelial cells. Supercritical fluid chromatography (SFC) using supercritical carbon dioxide which is considered as a green separation method and believed as a promising technique for separation, isolation, and identification of herbal and medicinal plants, was used to separate and isolate ginseng extracts obtained by supercritical
CO2 extraction (SFE). The effect of temperature and pressure on the separation of ginsenosides was studied with methanol being added to the CO2 mobile phase. Acidic, basic, and ionic additives were introduced to the mobile phase, respectively, to study their effect on the separation of ginsenosides. The best separation condition was obtained by adding 0.05% v/v trifluoroacetic acid in methanol. A high-concentration component in the extracts from the supercritical fluid extraction of North American ginseng was isolated by SFC and identified as sucrose using NMR, HPLC, and ESI-MS. Because of its unique biological activities, development of a suitable delivery system for acetyl ginsenoside Rb1 (ac-Rb1) was investigated for the first time in this research. PLGA microspheres were used to encapsulate ac-Rb1, examining both a double emulsion and a microfluidic technique. The size and morphology of the ac-Rb1 loaded PLGA microspheres were characterized by SEM and ZEISS light microscopy, showing unimodal 50-65 µm size diameters, respectively, using the microfluidic technique. Also, another delivery system of PLGA in gelatin hydrogel was prepared in order to achieve a localized delivery method, overcoming drawbacks such as PLGA removal by macrophages and a high initial burst effect from gelatin hydrogel that can damage tissues around the injection site. The ac-Rb1 loaded microspheres were incorporated into the gelatin hydrogels to form a new delivery system examining glutaraldehyde cross-linking concentrations from 10-100 µl. FTIR, DSC and TGA confirmed the formation and chemical stability of the gelatin encapsulated composites. Release profiles were studied and quantified by UV-Vis spectrophotometry with the results showing that the release of ac-Rb1 from the unimodal microspheres prepared by the microfluidic technique showed a lower initial burst effect than those from the double emulsion method. The burst effect was followed by a slow release profile which can be used for long term drug delivery applications to maintain the ginsenoside concentration for an extended time period. It should be mentioned that although the large burst effect could release a therapeutic agent relatively fast, it can also damage tissues around the treatment site. Hence, a combination delivery system was developed using cross-linked gelatin. The release of ac-Rb1 from the cross-linked gelatin encapsulated microspheres was effected by the pH of the releasing medium as well as the crosslinker concentration. Then, the in vitro cumulative release data of the core and core-composite systems was analyzed using empirical equations in Matlab. The results showed that the in vitro release kinetics data followed Fickian diffusion with the best fit observed using the Weibull model, for all investigated cases. Moreover, the released ac-Rb1 from delivery systems showed a significant immunosuppressive effect on LPS-induced macrophages indicating the novel delivery systems for ac-Rb1 have potential for next-generation biomedical agents in drug-release devices.

April 16-17, 2018 Amsterdam, Netherlands Key Topics: Natural Products Of Medicinal Interest, Traditional Medicine, Pharmacognosy, Analytical Methods For Natural Products, Toxicological Studies Of Plant Products, Phytomedicine, Phytochemistry, Plant Biotechnology And Tissue Culture, Innovative Plant Extraction Methods, Applied Plant Sciences, Complementary And Alternative Medicine, Applications Of Natural Products, Natural Products In Medicines, Analytical Techniques In Phytochemistry, Standardization Of Herbal Drugs, Formulation And Manufacture Of Plant Medicines, Clinical Pharmacognosy And Aromatic Medicinal Plants, Natural Products In Cancer Prevention And Therapy, Marine Drugs, EthnoPharmacology, Medicinal Plant Chemistry,
Essential oils are often used in aromatherapy, a form of alternative medicine that employs plant extracts to support health and well-being. The essential guide for beginners to the use of essential oils. In our book, we have a chapter that guides us to steam distillation and production of essential oils at home and in the company. Steam current distillation is a technique that allows the extraction of essential oils and aromatic waters from aromatic herbs and medicinal plants; in other words, with steam current distillation, we obtain aromatic waters from which the essential oil is extracted. This book puts the power of natural healing in your hands. This simple guide distills the knowledge needed to unlock the potential of commonly available essential oils. Start making nutritious, all-natural, affordable remedies to treat a variety of conditions, for your skincare and home cleaning products.

Research Paper (postgraduate) from the year 2018 in the subject Biology - Botany, grade: A, course: Biotechnology, language: English, abstract: Gallic acid is showed best results from fermentation process than extraction process due to biotransformation. In this research, the highest concentration of gallic acid was observed to be 8.7 to 9.0 microgram/ml from the soxhlet extraction and column chromatography process, and the concentration was increased to 9.7 microgram/ml from the fermentation process by Bacillus cereus species. The fermented extracts are showed with the maximum specific growth rate and the maximum yield factor (Yx/s) of Bacillus cereus are 0.3541 hr-1 and 0.234 microgram/ml. The non fermented extracts are showed the modelling equation for the quercetin yield extract was Es = 0.0721(1 - e-0.2867t). The model allowed good accordance with the experimental data by producing average absolute relative deviation from about 9.78 percent. Keywords: Terminalia species, Gallic acid, Fermentation, Extraction, Bacillus cereus

The present reference book entitled "Medicinal plants: properties, uses and production" is based on the recent developments in the medicinal and aromatic plants sector. The contents provided in the present title are written by field experts from different regions. All the chapters were reviewed by the external reviewers and based on their opinions, necessary modifications have been made. The present book contains eight well-descriptive manuscripts with comprehensive information about the topics. The first chapter describes the medicinal uses, bioactive constituents and biological activities of the genus Limoniastrum. The chapter also deals with the ethnomedical properties and
traditional uses of these plants. Phytochemical analysis of these plants revealed the presence of gallic acid, catechin, and epigallocatechin as major compounds whereas the pharmacological studies showed antioxidant, anti-inflammatory and antitumoral activities in different experimental models. The second chapter covers the therapeutical potential, phytochemicals and natural status of endangered medicinal plants of the Ashtavarga group. These plants are used in the Ayurvedic system of medicine and popularly known as Kakoli, Kshirakakoli, Jeevak, Rishbhak, Meda, Mahameda, Riddhi and Vriddhi. These plants are grown in high-altitude regions and currently facing a problem of extinction in their natural habitat and hence considered as rare. Presently, efforts are being continued to cultivate them for their survival as well as to use them in medicine. The present chapter comprises the medicinal and chemical profile of ashtavarga plants together with their proper identification and traditional uses. The third chapter describes the nutritional products derived from coneflower for athletes. This chapter covers the application of coneflower nutritional products for sportspersons published in the period 2000-2020. It has been noticed that the use of Echinacea supplements is most popular in United States, Canada and the United Kingdom. The use of these supplements is common among professional sportsmen, varsity athletes, as well as children practising different sport disciplines. The fourth chapter is based on the phytochemical, pharmacological, toxicological and commercial aspects of the henna plant which is the most popular religious plant in Asian countries. The dye of this plant is extensively used for the decoration of skin in the form of temporary tattooing, and also used as hair dye. A chemical compound called lawsone is the major constituent of this plant which is responsible for the dyeing properties. However, the chemicals added with henna to impart its colour and improve other dyeing properties are dangerous to use and causing contact dermatitis. Although it is a reputed medicine and cosmetic, there is a problem of adulteration in its products available in the market. Many products selling in the market in the name of henna are free from the plant extract and only contain synthetic paraphenylenediamine which causing the allergy. The fifth chapter deals with selected anticancer molecules found in traditional medicinal plants. Since the current treatments available for cancer are either chemotherapy or radiotherapy that causes serious side effects, thus plant-derived products can be used as an effective and safe treatment for cancers. Various constituents like Vinca alkaloids, podophyllotoxin derivatives, taxanes, camptothecin derivatives and homoharringtoninone were found effective against cancers. The sixth chapter describes molecular aspects of herbal medicine toxicity. Several studies have shown that certain medicinal herbs can be poisonous and may produce a variety of undesirable or adverse reactions that are life-threatening and even deadly. In industrialized countries, the craze for products of natural origin is a relatively recent phenomenon, developed, in particular, in favour of aggressive marketing campaigns inducing in the public mind notions as false as they are dangerous such as the assertion "what is natural is harmless". Several intoxications, often deadly, after herbal treatments have been reported which draws attention to the dangers of excessive use and the no control on this therapeutic model. The seventh chapter covers the role of novel drug delivery systems in improving the bioavailability of herbal medicines. The herbal world is the soul of the health care system since ancient times because every disease has been curing or managing by herbal medication from that time to today. However, the herbal system of medication suffered from a lack of the required developments, which were necessary demands of time. Today, people are very much conscious about their health and again starting to shift towards herbal
medication due to the serious adverse effects of synthetic drugs. Researchers are trying to develop herbal medicines in the form of a novel drug delivery system to improve drug pharmacokinetics and pharmacodynamics along with stability as well as formulation related issues. The eighth chapter is based on the mathematical modelling and optimization in solid-liquid extractions of bioactive constituents of medicinal plants. In herbal medicine, the most important step in the extraction process that ensures the maximum bioactive potential of a medicinal plant. The efficiency of the extraction process mainly relies upon the extraction conditions and therefore it is crucial to describe the optimal conditions for the selected extraction method. Mathematical modelling and optimisation techniques are extensively used for planning and optimisation of solid-liquid extraction processes of bioactives from medicinal plants. Mathematical models provide valuable insight into mechanisms of solid-liquid extraction of bioactives being the main objective optimisation of the extraction process parameters. Overall, the book is a collection of different research areas of medicinal plants. It covers general applications of a particular medicinal plant like henna, a compilation of pharmaceutical properties of a genus like Limoniastrum, a traditional combination like Ashtavarga, nutritional importance of a plant like coneflower, description of bioactive compounds like Vinca alkaloids, the toxicity associated with the herbal treatment, the use of novel drug delivery in improving the pharmacokinetics of a herbal drug and mathematical modelling of bioactives isolated via different extraction techniques. This book will be useful for academicians and researchers working in the areas of herbal medicine, traditional medicine and natural products. The book is also useful for Master and PhD students of various universities.


"Divided into two sections, the volume first examines health claims of food-based bioactive compounds, which are extranutritional constituents that typically occur in small quantities in foods. This section lays out the concepts of extraction of food-based bioactive molecules, along with both conventional and modernized extraction techniques, as well as the available sources, biochemistry, structural composition, and potential biological activities of bioactive compounds. The book goes to present new research on health claims of bioactive compounds from medicinal plants, their importance, and health perspectives. Both sections cover the various pharmacological and therapeutic aspects of bioactive compounds, along with their methods of extraction, their phytochemistry, their pharmacological and biological activities, their medicinal properties, and their applications for disease management and prevention. Among the specific foods and plants included are soybean, durum wheat, avocado, watermelon, blueberries, macro and micro algae, bitter cucumber (or Citrullus colocynthis), black..."
myrobalan, clove, flaxseed, and even industrial waste from cereal bran. This book volume sheds new light on the potential of natural and plant-based foods for human health from different technological aspects, contributing to the ocean of knowledge on food science and technology. This compendium will be useful for students, researchers, and industry professionals in the study of functional foods."

The book entitled Medicinal Plants and Natural Product Research describes various aspects of ethnopharmacological uses of medicinal plants; extraction, isolation, and identification of bioactive compounds from medicinal plants; various aspects of biological activity such as antioxidant, antimicrobial, anticancer, immunomodulatory activity, etc., as well as characterization of plant secondary metabolites as active substances from medicinal plants.

Essentials of Botanical Extraction: Principles and Applications provides a unique, single source of valuable information on the various botanical extraction methods available, from conventional to the use of green and modern extraction technologies including ultrasounds, microwaves, pressurized liquids, and supercritical fluids. Most extracts obtained from botanicals are often poorly characterized with unidentified active or inactive constituents. A wise selection of an extraction strategy is vital to drug discovery from medicinal plants as extraction forms the basic first step in medicinal plant research. This book also explores the mathematical hypotheses and innovations in botanical extractions and analyzes different post extraction operations so that dependency on serendipity is reduced and the same be converted into programmed drug discovery. Reviews the history and current state of natural product drug discovery and development, highlighting successes and current issues Explains the application of chemometric tools in extraction process design and method development Introduces process intensification as applied to the processing of medicinal plant extracts for rapid and cost-effective extraction

A unique, unified and a single source laboratory handbook; providing handy analytical procedures on the gamut of important, diagnostic medicinal and economic plant chemicals. More than 300 experiments on about 70 groups of phytochemicals in about 100 important plants are explained in an understandable way. A brief review on the chemistry, various types of extraction, solvents used and important analytical instruments are specified in the beginning of the book. The experiments range from simple paper and TLC chromatographic procedures to advanced GC and HPLC methods, therefore, the experiments can be easily selected depending on the availability of instruments with oneself. This book will be a valuable handbook for all the ayurvedic and herbal manufacturers throughout the world for their quality control procedures; and for courses on biochemistry, botany, pharmacy, biotechnology and organic chemistry. This can also serve as a reference book for phytochemistry, economic botany, medicinal plants and researchers.

Plants are important source of lead molecules for drug discovery. These lead molecules serve as starting materials for laboratory synthesis of drug as well a model for production of biologically active compounds. Phytochemical processing of
raw plant materials is essentially required to optimize the concentration of known constituents and also to maintain their activities. Extraction techniques and analytical techniques have played critical roles in phytochemical processing of raw materials. Extraction technologies from conventional extraction to green extraction as well as analytical techniques from single technique to hyphenated/coupled techniques most frequently used in phytochemistry laboratories are covered in the book.

Aromatic plants have essential or aromatic oils naturally occurring in them. They help heal mental ailments and other diseases. India is endowed with a rich wealth of medicinal plants. Aromatic (Aroma Producing) plants are those plants which produce a certain type of aroma. Their aroma is due to the presence of some kind of essential oil with chemical constituents that contain at least one benzene ring in the their chemical configuration. The chemical nature of these aromatic substances may be due to a variety of complex chemical compounds. These plants have made a good contribution to the development of ancient Indian material medica. In recent years, there has been a tremendous growth of interest in plant based drugs, pharmaceuticals, perfumery products, cosmetics and aroma compounds used in food flavors and fragrances and natural colors in the world. There is a definite trend to adopt plant based products due to the cumulative derogatory effects resulting from the use of antibiotic and synthetics and except for a few cultivated crops, the availability of plant based material is mainly from the natural sources like forests and wastelands. There is a need to introduce these crops into the cropping system of the county, which, besides meeting the demands of the industry, will also help to maintain the standards on quality, potency and chemical composition. During the past decade, demand for aromatic plants and its products has attracted the worldwide interest, India being the treasure house of biodiversity, accounts for thousands of species which are used in herbal drugs. 90% of herbal industry requirement of raw material is taken out from the forests. Some fundamentals of this book are botanical description of the plant, genetic improvement, harvesting, intercropping, transplantation, irrigation and weeding, vanilla cultivation in India, commercial cultivation of vanilla, distillation of herbage for essential oil, effect of growth hormones, jasmine crop improvement & agrotechniques, efforts for new variety of jasminum auriculatum, essential oils of agarwood, cinnamomum tamala leaves, eucalyptus citriodora and caultheria pragrantissima, past and future of sandal wood oil industry, by product development from turmeric and ginger rhizomes, isolation of essential oils and its flavour profile etc. This book contains most of the important aspects related to aromatic plants. It is being published for those who are interested in growing, processing and trading of aromatic plants.

The latest research on the health benefits and optimal processing technologies of herbs and spices. This book provides a comprehensive overview of the health benefits, analytical techniques used, and effects of processing upon the physicochemical properties of herbs and spices. Presented in three parts, it opens with a section on the technological and health benefits of herbs and spices. The second part reviews the effect of classical and novel processing techniques on the properties of herbs/spices. The third section examines extraction techniques and analytical methodologies used for herbs and spices. Filled with contributions from experts in academia and industry, Herbs, Spices and Medicinal Plants: Processing,
Health Benefits and Safety offers chapters covering thermal and non-thermal processing of herbs and spices, recent developments in high-quality drying of herbs and spices, conventional and novel techniques for extracting bioactive compounds from herbs and spices, and approaches to analytical techniques. It also examines purification and isolation techniques for enriching bioactive phytochemicals, medicinal properties of herbs and spices, synergy in whole-plant medicine, potential applications of polyphenols from herbs and spices in dairy products, biotic and abiotic safety concerns, and adverse human health effects and regulation of metal contaminants in terrestrial plant-derived food and phytopharmaceuticals. Covers the emerging health benefits of herbs and spices, including their use as anti-diabetics, anti-inflammatories, and anti-oxidants. Reviews the effect of classical and novel processing techniques on the properties of herbs and spices. Features informed perspectives from noted academics and professionals in the industry. Part of Wiley's new IFST Advances in Food Science series. Herbs, Spices and Medicinal Plants is an important book for companies, research institutions, and universities active in the areas of food processing and the agri-food environment. It will appeal to food scientists and engineers, environmentalists, and food regulatory agencies.

This book on 'Aromatic Plants' contains seven chapters. Introductory chapter on 'History, importance and scope of aromatic plants' deals with the importance of aromatic crops and their close association with human health and beauty care from time immemorial. History of development of cultivation and aroma based industries in different regions of the world is described to emphasize their significance, scope and role in increasing the quality of human life. Classification of aromatic plants based on their climatic requirement, growth habit and floral morphology elaborated in succeeding chapter will be of great interest to students, researchers and farmers. Chapter on 'Extraction of aroma principles' describes traditional as well as modern techniques employed for efficient extraction of volatile oils and oleo-resins from different plants materials and equipments employed for the purpose. Quality of oil is found to vary significantly with ecotypes, season, time of collection, crop maturity and weather conditions prevailing during the growth period, extraction method and duration of extraction process. Conditions and duration of storage also have a bearing on quality of essential oil. This necessitates development and imposition of appropriate quality standards in trade. These aspects are covered in fourth chapter on 'Quality assurance of essential oils'. Aromatic oils & their derivatives and combinations occupy a covetable position in holistic medicines such as aromatherapy. Chapter on 'Aromatherapy' details the use of essential oils in human health care, techniques employed, aromatherapy message, aromatic bath, facial care, hair care etc. Information on aromatic oil's wide spread application to relieve stress and rejuvenate body are also included. Sixth and seventh chapters deal with major and other sources of aromatic oils. Under major sources, 17 aromatic crops and under other sources, 25 crops and discussed in detail. These chapters include the common name, botanical name and synonyms if any and family, vernacular names, importance and uses, habitat and distribution, agro technology, soil, climate, season, land preparation, planting, seed rate and spacing, manurial and fertilizer recommendation, irrigation, weed control, pest control, harvest, propagation techniques, herbal yield, extraction and utilization, oil recovery, oil composition, properties of oil, storage requirements etc.
The vast and exciting Brazilian flora biodiversity is still underexplored. Several research groups are devoted to the study of the chemical structure richness found in the different Biomes. This volume presents a comprehensive account of the research collated on natural products produced from Brazilian medicinal plants and focuses on various aspects of the field. The authors describe the key natural products and their extracts with emphasis upon sources, an appreciation of these complex molecules and applications in science. Many of the extracts are today associated with important drugs, nutrition products, beverages, perfumes, cosmetics and pigments, and these are highlighted. Key Features: Presents Brazilian biodiversity: its flora, its people, and its research Describes the emergence of natural products research in Brazil Emphasizes the increasing global interests in botanical drugs Aids the international natural product communities to better understand the herbal resources in Brazil Discusses Brazilian legislation to work with native plants

In this era of climate change and food/water/natural resource crises, it is important that current advancements in technology are made taking into consideration the impact on humanity and the environment. This new volume, Food Technology: Applied Research and Production Techniques, in the Innovations in Agricultural and Biological Engineering book series, looks at recent developments and innovations in food technology and sustainable technologies. Advanced topics in the volume include food processing, preservation, nutritional analysis, quality control and maintenance as well as good manufacturing practices in the food industries. The chapters are highly focused reports to help direct the development of current food- and agriculture-based knowledge into promising technologies. Features: provides information on relevant technology makes suggestions for equipment and devices looks at standardization in food technology explores new and innovative packaging technology studies antimicrobial activities in food considers active constituents of foods and provides information about isolation, validation and characterization of major bioactive constituents discusses the effect of laws and regulatory guidelines on infrastructure to transform technology into highly value-added products Food Technology: Applied Research and Production Techniques will be a very useful reference book for food technologists, practicing food engineers, researchers, professors, students of these fields and professionals working in food technology, food science, food processing, and nutrition.

Document from the year 2017 in the subject Chemistry - Bio-chemistry, Mansoura University, language: English, abstract: Forty-two medicinal plants were collected depending on their availability on Egypt. These plant were extracted and screened for their activity towards green synthesis of AgNPs. A new modified method was used in order to screen large number of extracts in short time (high throughput screening). In this method, the synthesized nanoparticles were evaluated in using 96-well plate which is transparent to facilitate the color monitoring and easy to be read spectrophotometrically using microplate reader. The green synthesis activity by the different plant extracts was monitored and evaluated by color change and UV-Vis absorption at time intervals. Out of these 42 plants, only 3 plants viz., Pylanthusemblicafruits, Psidium guajava leaves and Lawsoniainermisleaves, showed high AgNPs synthetic activity. The most active plant extracts were further partitioned with ethyl acetate. The results showed that the EtOAc fraction of the three active plants showed superior
AgNPs green synthesis over their remaining aqueous. Thus, chromatographic columns were used to isolate the active compounds from the EtOAc fraction of each plant. Metal nanoparticles synthesis is a leading topic of research in modern material science owing to their distinctive potential applications in the field of electronic, optoelectronic, information storage and Health care. Among the all noble metal nanoparticles, silver nanoparticles are one the main products in the field of nanotechnology which has acquired limitless attention due to their unique properties such as chemical stability, good conductivity, catalytic and most important antibacterial, antiviral and antifungal activities. Nevertheless, there is still need for economic commercially viable as well as environmentally clean synthesis route to synthesize the silver nanoparticles.

Food security and the medicinal needs of billions of people around the world are pressing global issues, and the biodiversity and sustainable utilization of plants is of great significance in this context. Further, ethnobotanical studies are vital in the discovery of new drugs from indigenous medicinal plants, and plants with industrially important metabolites need to be cultivated to meet the growing market demand. In addition, the production of plant metabolites under in vitro conditions also has tremendous possibilities. The totipotency of plant cells plays a valuable role in the sustainable utilization of plant resources through cell, tissue and organ culture. At the same time, production can be enhanced using productive cell lines, treatment with elicitors, changing nutritional parameters and metabolic engineering. This book provides state-of-the-art information on biodiversity, conservation, ethnobotany, various aspects of in vitro secondary metabolite production, bioprospecting from various plant groups and drug discovery. It also discusses methods of extracting and characterizing drug leads from plant sources.

Malaria is a potentially life-threatening disease that affects millions worldwide, especially in Sub-Saharan Africa. The recent emergence and spread of multidrug resistance in parts of Southeast Asia prompts the urgent need for novel and effective therapy against the disease. Medicinal Plants and Malaria: Applications, Trends, and Prospects highlig

Due to the increase in the consumption of herbal medicine, there is a need to know which scientifically based methods are appropriate for assessing the quality of herbal medicines. Fingerprinting has emerged as a suitable technique for quality estimation. Chemical markers are used for evaluation of herbal medicines. Identification and quantification of these chemical markers are crucial for quality control of herbal medicines. This book provides updated knowledge on methodology, quality assessment, toxicity analysis and medicinal values of natural compounds.

A comprehensive practical account detailing botanical cultivation and chemical processing of plants for the extraction of pharmacologically active drugs or drug mixtures. Includes species containing aromatic and flavoring substances and essential oils used in the kitchen, perfumery and cosmetics, in modern therapy and traditional herbal remedies. The controlling possibilities of biological, economical and technical parameters influencing efficient cultivation are discussed as
well as special biological requirements and equipment.

"This book discusses current concepts and practice on analytical approaches for characterization of medicinal plants and plant-based products. It reviews all aspects of extraction, spectroscopic analysis, isolation, chemometrics, DNA bar-coding, in-line processing, and bioassays."--Provided by publisher.


Water Extraction of Bioactive Compounds: From Plants to Drug Development draws together the expert knowledge of researchers from around the world to outline the essential knowledge and techniques required to successfully extract bioactive compounds for further study. The book is a practical tool for medicinal chemists, biochemists, pharmaceutical scientists and academics working in the discovery and development of drugs from natural sources. The discovery and extraction of bioactive plant compounds from natural sources is of growing interest to drug developers, adding greater fuel to a simultaneous search for efficient, green technologies to support this. Particularly promising are aqueous based methods, as water is a cheap, safe and abundant solvent. The book is a detailed guide to the fundamental concepts and necessary equipment needed to successfully undertake such processes, supported by application examples and highlighting the most influential variables. Part 1 begins with a thorough introduction to plants as sources of drugs, highlighting strategies for the discovery of novel bioactive constituents of botanicals, the need for standardization and a move toward more rational and greener techniques in the field, the development of plant-based extraction processes and pretreatments for the efficient extraction. Part 2 then reviews a broad range of available techniques, including sections on conventional hot water extraction and pressurized hot water extraction in a range of settings. Intensified processes are then discussed in detail, including sections on microwave-assisted processes, ultrasound-assisted processes and enzyme assisted extraction. Covers the theoretical background and range of techniques available to researchers, helping them to select the most appropriate extraction method for their needs Presents up-to-date and cutting edge applications by international experts Highlights current use and future potential for industrial scale applications Offers a thorough introduction to plants as sources of drugs, highlighting strategies for the discovery of novel bioactive constituents of botanicals
Nature has always been, and still is, a source of food and ingredients that are beneficial to human health. Nowadays, plant extracts are increasingly becoming important additives in the food industry due to their antimicrobial and antioxidant activities that delay the development of off-flavors and improve the shelf life and color stability of food products. Due to their natural origin, they are excellent candidates to replace synthetic compounds, which are generally considered to have toxicological and carcinogenic effects. The efficient extraction of these compounds from their natural sources and the determination of their activity in commercialized products have been great challenges for researchers and food chain contributors to develop products with positive effects on human health. The objective of this Special Issue is to highlight the existing evidence regarding the various potential benefits of the consumption of plant extracts and plant-extract-based products, with emphasis on in vivo works and epidemiological studies, the application of plant extracts to improving shelf life, the nutritional and health-related properties of foods, and the extraction techniques that can be used to obtain bioactive compounds from plant extracts.

The Anadenathera macrocarpa, Schinus molle, Hymenaea courbaril, Cariniana legalis, Solidago microglossa and Stryphnodendron barbatiman, were collected "in natura" samples (leaves, flowers, barks and seeds) from different commercial suppliers. The pharmaco-active compounds in ethanolic extracts had been made by the Mato Grosso Federal University (UFMT). The energy-dispersive x-ray fluorescence (ED-XRF) spectrometry was used for the elemental analysis in different parts of the plants and respective ethanolic extracts. The Ca, Cl, Cu, Fe, K, Mg, Mn, Na, Ni, P, Rb, S, Sr and Zn concentrations were determined by the fundamental parameters method. Some specimens showed a similar inorganic profile for "in natura" and ethanolic extract samples and some ones showed a distinct inorganic profile. For example, the Anadenathera macrocarpa showed a similar concentration in Mg, P, Cu, Zn and Rb elements in "in natura" and ethanolic extract samples; however very different concentration in Na, S, Cl, K, Ca, Mn, Fe and Sr was observed in distinctive samples. The Solidago microglossa showed the K, Ca, Cl, S, Mg, P and Fe elements as major constituents in both samples, suggesting that the extraction process did not affect in a considerable way the "in natura" inorganic composition. The elemental composition of the different parts of the plants (leaves, flowers, barks and seeds) has been also determined. For example, the Schinus molle specimen showed P, K, Cl and Ca elements as major constituents in the seeds, Mg, K and Sr in the barks and Mg, S, Cl and Mn in the leaves, demonstrating a differentiated elementary distribution. These inorganic profiles will contribute to evaluate the quality control of the Brazilian herbaceous trade and also will assist to identify which parts of the medicinal plants has greater therapeutic effect.

This book summarizes experimentally-supported research on the therapeutic efficacy of plant extracts and their constituents on a range of respiratory diseases including infections. It discusses the pharmacological, cellular and molecular factors involved in the pathogenicity of respiratory diseases and their modulation by plant-derived compounds. Additionally, it underlines the growing relevance of medicinal plant-based advanced drug delivery systems for treating lung diseases providing maximal therapeutic efficacy with better patient compliance. Overall, this comprehensive book is a blend of...
translational, biological, chemical and drug delivery aspects of medicinal plants employed in targeting respiratory diseases and attracts a range of audiences including physiochemist, translational and clinical researchers working in the field of respiratory diseases.

Aloe Vera is a semi tropical plant. It is one of the oldest known medicinal plants gifted by nature, Aloe Vera often called Miracle plant known by many names. It contains more than two hundred tonic ingredients including essential amino acids, enzymes, glucose and more. Also contains the most essential components required by the human body. It is grown wild in hedge rows in dry soil conditions and almost all parts of India. It can be grown even under constant drought conditions. Commercial cultivation and utilization of this plant with the application of technology can be of great value. There are various benefits of this plant; it is used to support the natural healing of skin that has been damaged. A common usage is to soothe sunburned skin. Aloe Vera can also be made into juices, gels, powders and is often added to products. For example it can be found in cosmetics, shampoos, lotions and many other common household Aloe Vera products. The many benefits of Aloe Vera are not fully researched as of yet. Processing of Aloe Vera gel derived from the leaf pulp of the plant, has become a big industry worldwide due to the application in the food industry. It has been utilized as a resource of functional food, especially for the preparation of health drinks which contain Aloe Vera gel and which have no laxative effects. Given the exponentially growing demand for it in the international market, it presents the finest commercial opportunity among the various medicinal plants. Also, India is among the few countries gifted with the unique geographical features essential for cultivation of Aloe Vera and other high potential medicinal plants. Some fundamentals of this book are chemical investigations of different parts of the leaf, agro technique: Aloe Vera, economics of cultivation per hector, aloe (Aloe Vera) investment opportunity, specialty raw material market for cosmetics/toiletries, strategy for capacity creation and marketing, influence of Aloe Vera on the glycol amino glycans in the matrix of healing dermal wounds in rats, effects of low molecular constituents from Aloe Vera gel on oxidative metabolism and bactericidal activities of human neutrophils, Aloe Vera & aids research, anti diabetic activity of aloes: preliminary, aloe reduction in ulcers, erosions & hemorrhages, extraction process, processing steps, extraction process of aloe gel and powder etc. This book highlights such technical details to guide and encourage new entrepreneurs. It is very useful book for consultants, farmers, students of Agricultural universities, libraries etc.

Medicinal plants are globally valuable sources of herbal products. Plant-based remedies have been used for centuries and have had no alternative in the western medicine repertoire, while others and their bioactive derivatives are in high demand and have been the central focus of biomedical research. As Medicinal plants move from fringe to mainstream with a greater number of individuals seeking treatments free of side effects, considerable attention has been paid to utilize plant-based products for the prevention and cure of human diseases. An unintended consequence of this increased demand, however, is that the existence of many medicinal plants is now threatened, due to their small population size, narrow distribution area, habitat specificity, and destructive mode of harvesting. In addition, climate change, habitat loss and genetic drift have
further endangered these unique species. Although extensive research has been carried out on medicinal and aromatic plants, there is relatively little information available on their global distribution patterns, conservation and the associated laws prevailing. This book reviews the current status of threatened medicinal plants in light of increased surge in the demand for herbal medicine. It brings together chapters on both wild (non-cultivated) and domestic (cultivated) species having therapeutic values. Thematically, conventional and contemporary approaches to conservation of such threatened medicinal plants with commercial feasibility are presented. The topics of interest include, but not limited to, biotechnology, sustainable development, in situ and ex situ conservation, and even the relevance of IPR on threatened medicinal plants. We believe this book is useful to horticulturists, botanists, policy makers, conservationists, NGOs and researchers in the academia and the industry sectors.

Herbal Biomolecules in Healthcare Applications presents extensive detailed information on all the vital principles, basics and fundamental aspects of multiple herbal biomolecules in the healthcare industry. This book examines important herbal biomolecules including alkaloids, glycosides, flavonoids, anthraquinones, steroids, polysaccharides, tannins and polyphenolic compounds, terpenes, fats and waxes, proteins and peptides, and vitamins. These herbal macromolecules are responsible for different bioactivities as well as pharmacological potentials. A systematic understanding of the extraction, purification, characterization, applications and their derivatives in healthcare fields is developed in this comprehensive book. Chapters explore the key topics along with an emphasis on recent research and developments in healthcare fields by leading experts. They include updated literature review of the relevant key topics, good quality illustrations, chemical structures, flow charts, well-organized tables and case studies. Herbal Biomolecules in Healthcare Applications will be useful for researchers working on natural products and biomolecules with bioactivity and nutraceutical properties. Professionals specializing in scientific areas such as biochemistry, pharmacology, analytical chemistry, organic chemistry, clinics, or engineering focused on bioactive natural products will find this book useful. Provides a study of different type of biomolecules from herbal extracts and their bioactivities as well as their application in the healthcare industry Contributions by global leaders and experts from academia, industry and regulatory agencies, who have been considered as pioneers in the application of herbal biomolecules in the diverse healthcare fields Includes updated literature review along with practical examples and research case studies

Plant extracts are widely used for therapeutic purposes. The vegetal origin of these products satisfies people’s desire to cure themselves with natural drugs; this aspect, together with effectiveness and regulatory opportunities, is the base of the broad modern use of medicinal plants. Traditional uses and novel biological effects allow the availability of an extraordinarily high number of different compounds with formidable therapeutic potential. Nevertheless, pitfalls are hidden behind poor pharmacological and toxicological knowledge of plant extracts, nonstandardized methods of extraction, and undefined and nonrepeatable qualitative and quantitative composition. In this context, novel experimental studies on plant products and appreciated and are necessary to reinforce the scientific soundness of phytotherapy. This book aims to
respond to this medical need comprehensively highlighting the newest discoveries in vegetal resources with an emphasis on pharmacological activity.

The latest research on the health benefits and optimal processing technologies of herbs and spices This book provides a comprehensive overview of the health benefits, analytical techniques used, and effects of processing upon the physicochemical properties of herbs and spices. Presented in three parts, it opens with a section on the technological and health benefits of herbs and spices. The second part reviews the effect of classical and novel processing techniques on the properties of herbs/spices. The third section examines extraction techniques and analytical methodologies used for herbs and spices. Filled with contributions from experts in academia and industry, Herbs, Spices and Medicinal Plants: Processing, Health Benefits and Safety offers chapters covering thermal and non-thermal processing of herbs and spices, recent developments in high-quality drying of herbs and spices, conventional and novel techniques for extracting bioactive compounds from herbs and spices, and approaches to analytical techniques. It also examines purification and isolation techniques for enriching bioactive phytochemicals, medicinal properties of herbs and spices, synergy in whole-plant medicine, potential applications of polyphenols from herbs and spices in dairy products, biotic and abiotic safety concerns, and adverse human health effects and regulation of metal contaminants in terrestrial plant-derived food and phytopharmaceuticals. Covers the emerging health benefits of herbs and spices, including their use as anti-diabetics, anti-inflammatories, and anti-oxidants Reviews the effect of classical and novel processing techniques on the properties of herbs and spices Features informed perspectives from noted academics and professionals in the industry Part of Wiley's new IFST Advances in Food Science series Herbs, Spices and Medicinal Plants is an important book for companies, research institutions, and universities active in the areas of food processing and the agri-food environment. It will appeal to food scientists and engineers, environmentalists, and food regulatory agencies.

The aim of this book to describe the extraction of phenolic compounds from different extracts of medicinal plants by using different extraction techniques and quantification methods. The phenolic compounds are well known phytochemicals found in all plants and these are responsible for antioxidant activity. Phenolic compounds are classified as simple phenols or poly phenols based on the number of phenol units in the molecule. Bio Chemical methods are used to detect the presences of phenol while different techniques like soxhlet extraction, micro wave-assisted extraction, and ultra sound-assisted extraction and quantification methods like spectrophotometric, high pressure liquid chromatography, gas chromatography methodologies are utilized in plant based products.

Novel extraction methods including Microwave Assisted Extraction (MAE), super-critical fluid extraction (SCFE), Accelerated Solvent Extraction (ASE) and ultrasound extraction (USE) have drawn significant research attention in the last decade. If these techniques are explored scientifically, they can provide an efficient extraction technology for ensuring the quality of herbal medicines worldwide. This work aimed at introducing, optimizing and disseminating these new technologies to Egypt.
We succeeded in introducing new technologies for an important sector in Egypt which may have a good effect on improving the quality and quantity of the products.

"This book is an attempt to provide complete information on the 25 selected medicinal herbs in Volume I, starting from the botanical name to quantitative testing of active ingredients"—P. xvii.

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