In Vitro Antioxidant Activity And In Vivo Hepatoprotective

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Merr. (moraceae)

In Vitro Antioxidant and Antibacterial Activity of Twenty-one Northern Ontario Medicinal Plants

Protocols for in Vitro Analysis of Antioxidant Activity

Dietary Antioxidants and Prevention of Non-Communicable Diseases

Biochemistry of the SH Group

Reflectance of Botanical, Production and Geographical Origin on the Unique Compositionals Traits of Purple Grape Juices

Flavonoids Interactions with Iron and Iron Complexes

Bio-Farms for Nutraceuticals

Metabolic Conjugation and Metabolic Hydrolysis

Antioxidant Activity of Polyphenolic Plant Extracts

Phenolic Compounds

Handbook of Antioxidant Methodology

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Polyphenols

Antioxidant Activity and Capacity in In-Vitro Antioxidant Activity of Leaves Extract of Rumex Dentatus

Antioxidant Properties of the Leaves and Stems of Aristolochia Indica

Ethnobotany in the New Europen

In Vitro Antioxidant Activity of Thiaiolidine Derivatives

1, 3-thiazole and 1, 3, 4-thiapiazole

Phenolic Composition and In-Vitro Antioxidant Activity of Prunes and Prune Juice

Phytochemical Screening and In Vitro Antioxidant Activity

Characterization of in-Vitro Antioxidant Activity of Leaves

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and use as food additives. The polyphenols used in the present studies are derived from a great variety of plants, ranging from well-known species to rare ones that are found in specific regions. Moreover, some of the studies provide evidence that polyphenols may be used for the prevention and treatment of common diseases such as diabetes mellitus, Alzheimers' disease, cardiovascular and intestinal diseases. Importantly, in several of the studies green extraction methods for the isolation of polyphenols were developed using modern technologies, where few or no organic solvents were used, in order to minimize environmental and health impacts. Free Radicals in Biology and Medicine has become a classic text in the field of free radical biology. Now its fifth edition has been rewritten and updated whilst maintaining the clarity of its predecessors. Two new chapters discuss 'in vivo' and 'dietary' antioxidants, the first emphasising the role of peroxiredoxins and integrated defence mechanisms which allow useful roles for ROS, and the second containing new information on the role of fruits, vegetables, and vitamins in health and disease. This new edition also contains expanded coverage of the mechanisms of oxidative damage to lipids, DNA, and proteins (and the repair of such damage), and the roles played by reactive species in signal transduction, cell survival, death, human reproduction, defence mechanisms of animals and plants against pathogens, and other important biological events. The methodologies available to measure reactive species and oxidative damage (and their potential pitfalls) have been fully updated, as have the topics of phagocyte ROS production, NADPH oxidase enzymes, and toxicology. There is a detailed and critical evaluation of all of the free radical models of aging, cardiovascular disease, and cardiovascular diseases, especially atherosclerosis, cardioeic failure and neurodegenerative diseases. New aspects of ageing are discussed in the context of the free radical theory of ageing. This book is recommended as a comprehensive introduction to the field for students, educators, clinicians, and researchers. It will also be an invaluable companion to all those interested in the role of free radicals in the life and biomedical sciences. General Monographs, Alphabetically Arranged and Consisting of Methods for Quantitative Determination of the Substances, its Salts, and Preparations of Which it is a Principal Con-STITUENT.- Synthetic Organic Compounds, Methods for Determination of Substances not Included in the General Monographs.- Essential Oils.- Oils, Fats and Waxes.- Appendices.- I. Determination of Alcohol Content.- II. Complexometric Titrations.- III. Non-aqueous Titrations.- IV. The Oxygen-Flask Combustion Technique.- V. Determination of Water.- VI. Extraneous Matter in Food and Drugs.- VII. Microbiological Assays.- VIII. The aim of this is to standardise the plant Rumex dentatus by performing the phyto-chemical investigations & characterization of its major ingredients. In addition, a comprehensive study of the ethnobotanical resources in this region towards the study of antibacterial bioactivity and alleviation of oxidative stress. Oxidative stress plays a fundamental role in the pathogenesis of many major human illnesses, such as cancer, cardiovascular diseases, diabetes and Alzheimer’s syndrome. Also, infectious diseases are a major concern in our society due to the advent of multiple drug resistant strains of bacteria that cause millions of mortalities worldwide. From the accumulated list of 48 northern Ontario medicinal plants, I selected 21 plants based on their documented anticancer, antibacterial, antioxidant, antiinflammatory properties. These plants were separated into leaf, flower, stem and root tissues and extracted with ethanol. In total, 43 extracts were assayed for antioxidant and antibacterial activity in this study. The antioxidant activity was evaluated through the DPPH (2,2-diphenyl-1-picrylhydrazyl), ABTS (2,2’-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) diammonium salt), ORAC (Oxygen radical absorption capacity) and EC 50 (half maximal effective concentration) assays. The total phenolic content of medicinal plants was also determined. According to WHO, in 2012 there were approximately 347 million people globally who suffer from diabetes and it is predicted to become the seventh leading cause of death in 2030. Oxidative stress plays a major role in the pathogenesis of diabetes. This has impelled researchers to use antioxidants as a complementary therapy for diabetes. Hence, this study aimed to evaluate the hypoglycemic and in vitro antioxidant activity of the DCM fraction from the leaves of Ficus odorata. The methanolic crude extract was fractionated by liquid-liquid partitioning using organic solvents with increasing polarity. Four fractions were obtained such as, hexane, DCM, ethyl acetate and water. Of the four fractions tested, DCM fraction yielded the highest amount of flavonoid content at 335.63 mg CE/g sample. The same fraction was further subjected to Thin Layer Chromatography (TLC) and Reverse phase-HPLC analyses. TLC analysis revealed that the DCM fraction had a good bioactivity. One of the spots corresponded to quercetin (mean Rf value = 0.38± 0.02). On one hand, HPLC analyses revealed also the presence of quercetin. In acute oral toxicity test using OECD guidelines 425 main test, out of five rats, zero mortality was observed after 14 days of treatment. Gross necropsies of all rat organs were normal. Histopathological analyses of liver and kidneys were unremarkable. In hypoglycemic study, induction of diabetes was successfully completed in 28 days using single dose of streptozotocin (30 mg/Kg body weight) and high fat diet (Srinivasan et al., 2005). Daily oral administration of DCM fraction from the leaves of Ficus odorata at a dose of 50 mg/Kg (low dose) and 200 mg/Kg (high dose) body weight were given for 14 days. Results showed that at a dose of 50 mg/Kg (pPhytochemistry is the branch of science that deals with the study of plant-derived chemicals or compounds, which are also known as phytochemicals or plant-derived secondary metabolites. Plants are known to produce phytochemicals that are essential for their growth and reproduction, as they protect them from insects, pathogens, and herbivores. Some of the major groups of plant-derived secondary metabolites are phenolics, flavonoids, terpenoids, alkaloids, tannin etc. Plant-derived phytochemicals are pharmacologically active and have the potential to cure various human diseases and disorders. Natural plant products have been known for their medicinal properties for untold years, and form the basis of several medicinal systems such as Chinese, Unani, and Ayurvedic Medicine. This book offers an essential introduction to phytochemicals and their synthetic analogues. It discusses various in silico approaches used to identify pharmacologically active phytochemicals and their biological activities, as well as in vitro and in vivo models/assays that have been utilized for the pharmacological profiling of plant-derived products to combat cancer, diabetes, cardiovascular diseases and neurological disorders. The intended audience includes upper-level undergraduate and graduate students; researchers and scientists from the pharmaceutical/food chemistry/nutrition sciences/biochemistry, and clinical biochemistry fields; and medical students. Sharing the latest findings, the book will familiarize these readers with the concepts, chemistry, and tremendous potential of phytochemistry. Grains, leaves, shoots, glumes and stalks of sorghum varieties were analyzed for total phenols, condensed tannins, flavan-4-ols, anthocyanins and in vitro antioxidant activity. Black sorghum bran was used to evaluate the effectiveness of organic acids and enzymes on extractability of phenols. Flavonoid profiles of grains and non-grain tissues were determined and characterized using HPLC-PDA and HPLC-ESI-MSn. The presence of a pigmented testa and spreader genes (B1B2S) is a predictor for polymeric flavonoids (tannins) but not simple flavonoids such as flavan-4-ols, anthocyanins and in vitro antioxidant activity. Black sorghum bran was used to evaluate the effectiveness of organic acids and enzymes on extractability of phenols. Flavonoid profiles of grains and non-grain tissues were determined and characterized using HPLC-PDA and HPLC-ESI-MSn. The presence of a pigmented testa and spreader genes (B1B2S) is a predictor for polymeric flavonoids (tannins) but not simple flavonoids such as flavan-4-ols, 3-deoxyanthocyanins, flavones and flavanones. The leaves of biomass sorghum, Collier variety, had 3.4 times more 3-deoxyanthocyanins than the leaves of 4x430 Black x Sumac which had the highest levels (18107/g) of 3- deoxyanthocyanins among the leaves. The use of 1% HCl/ethanol provides a possible food grade substitute solvent for 1%HCl/methanol in the extraction of phenolic compounds from sorghum. All enzymes evaluated broke down bran particles forming a gel-like material which had increased phenols and antioxidant activities but not 3-
deoxygenanthocyanins as revealed by HPLC analysis. Microscopy examination showed the gel matrix rich in fiber and can possibly be used for nutraceutical applications. Careful understanding of enzyme activities is necessary for effective extraction of 3-deoxyanthocyanins from sorghum. Sorghum leaves, sheaths and glumes are excellent sources of bioactive compounds, up to 600 times more than the grains of some varieties. Sorghum with the "red turning to black genes" is a potential source of 3- deoxyanthocyanins and flavan-4-ols. With the trend towards sorghum as biofuels for ethanol production, plant breeders must select special traits aimed at developing enhanced desired functionality such as antioxidant properties and other health enhancing properties. The scientific world and modern society today is experiencing the dawnning of an era of herbal medicine. Extensive research has shown that aromatic plants are important anti-inflammatory, antioxidant, anti aging and immune boosting delectable foods, with the magic and miracle to boost our immune system providing us with extended and an improved quality of life. Apart from making bland recipes into welcoming or interesting victories, herbs and spices have stirred the minds of the research community to look deeper into its active components from a functional perspective. It is essential to present the scientific and medicinal aspect of herbs and spices together with the analysis of constituents, its medicinal application, toxicity and its physiological effects. Herbs and spices with high levels of antioxidants are in great demand as they tend to promote health and prevent diseases naturally assuring increased safety and reliability for consumers. Herbs and spices are more and more being used for their medicinal properties and consumed and consumed in new ways in addition to their traditional biological uses. Nowadays the interest in these compounds has increased mainly due to their diverse chemical structure and wide biological activity valuable in the prevention of some chronic or degenerative diseases. The functional foods are a rich source of these phytochemicals, and this is the starting point for this book, which shows the state of the art of the phenolic compounds and their biological activity. This book integrates eleven chapters that show the state of the art of diverse biological activity of the phenolic compounds, present in some crops or fruits A guide to the use of essential oils in food, including information on their composition, extraction methods and applications. Antioxidant and anti-microbial applications Guide that shows how essential oils can be used to extend the shelf life of food products whilst meeting consumer demand for "natural" products Review of the use of essential oils as natural flavour ingredients Summary of relevant food regulations pertaining to essential oils Academic researchers in food science, food technology, and educators and advanced students in food science and nutrition can tap into the most recent findings and basic understanding of the chemistry, application, and safety of essential oils in food processing. Free radicals are atoms or molecules containing unpaired electrons. Damage occurs when the free radical encounters another molecule and seeks to find another electron to pair its unpaired electron. Free radicals can cause mutation in different biological compounds such as protein, nucleic acids, and lipids, and the damage caused by the free radicals lead to various diseases (cancer, cardiovascular disease, aging, etc.). Antioxidants are helpful in reducing and preventing damage from free radicals because they have the ability to donate electrons, which neutralize the radical without forming another. Ascorbic acid, for example, can lose an electron to a free radical and remain stable itself by passing its unpaired electron around the antioxidant molecule. Unfortunately, new data indicate that the synthetic antioxidants used in the industry could have carcinogenic effects on human cells, thus fueling an intense search for new, natural, and efficient antioxidants. Therefore, the current book discusses the role and source of antioxidant compounds in nutrition and diet. Also, the current book includes nine chapters contributed by experts around the world, and the chapters are categorized into two sections: "Antioxidant Compounds and Biological Activities" and "Natural Antioxidants and Applications." Antioxidant properties of sorghum are related to sorghum type and method of processing into foods. Tannin and non-tannin sorghums and their products were evaluated for total phenols, tannins and antioxidant activity. Total phenols were determined using the Folin Ciocalteu method, and tannins were determined by the vanillin-HCl method. Antioxidant activity was evaluated using the ABTS (2,2’-azinobis(3-ethylbenzothiazoline-6-sulphonic acid) and DPPH (2,2’-diphenyl-1-picrylhydrazyl) assays. Tannin sorghums and their products had higher total phenols, tannins and antioxidant activity than non-tannin sorghum grain and products. Fermentation, extrusion cooking and porridge making reduced measurable phenols, tannins and in vitro antioxidant activity. Reduction was probably due to phenols binding to the food components, thus reducing their solubility in the extracting solvents; 1% HCl in methanol and 70% aqueous acetone. The procyandin profile obtained using normal phase HPLC and fluorescent detection showed that extrusion cooking and porridge making lowered extractability of polymers (DP>8), while that of oligomers (DP 2-8) and monomers in porridges was not significantly changed. This indicated increased interactions of procyandin polymers with the matrix food, especially with protein. Pepsin treatment of sorghum extrudates and porridges significantly improved the antioxidant activity and recovery. The highest antioxidant activity was in the supernatants of pepsin hydrolysates. Amylase treatment alone did not significantly affect phenol content and antioxidants, except in bread containing non-tannin white sorghum bran, where there was a slight increase in phenols. The combination of pepsin followed by amylase treatment of porridges and extrudates had effects similar to those of pepsin alone. Improved extractability of antioxidants on pepsin treatment was due to either the release of phenolic antioxidants or protein hydrolysates high in aromatic amino acid residues such as tyrosine, also known for their antioxidant activity. In either situation the improved antioxidant activity could mean that once food is digested it can potentially protect the gastrointestinal tract against oxidative stress generated from the diet and that produced by food interactions during digestion. There is scope to explore other biological methods like use of other proteases to improve antioxidant recovery. Further work would thus determine contribution of phenolic compounds to improved antioxidant activity, and also identify the phenolics. The study of European Wild and medicinal plants and herbal medicines is an old discipline that has been invigorated by the character of recent research. The most exciting developments in recent years, the encapsulation of the traditional knowledge and its rediscovery, has been the rediscovery of Medieval European use of food plants and medicinal herbs. In spite of monumental changes introduced in the Age of Discovery and Mercantile Capitalism, some communities, often of immigrants in foreign lands, continue to hold on to old recipes and traditions, while others have adopted and encultivated exotic plants and remedies into their diets and pharmacopoeia in new and creative ways. Now in the 21st century, in the age of the European Union and Globalization, European folk botany is once again dynamically responding to challenging
cultural, economic, and political contexts. The authors and studies presented in this book reflect work being conducted across Europe's many regions. They tell the story of the on-going evolution of human-plant relations in one of the most bioculturally dynamic places on the planet, and explore new approaches that link the re-evaluation of plant-based cultural heritage with the conservation and use of biocultural diversity. Åristolačia indica is a traditionally used medicinal plant claimed to possess antioxidant, anti-diabetic and anti-inflammatory activity. The present study was conducted with the purpose to evaluate the in vitro antioxidant activity in leaves and stem of Aristolochia indica. The emphasis was put on the investigation of superoxide dismutase activity, glutathione peroxidase activity, s-transferase activity and non-enzymic antioxidants (ascorbic acid, polyphenols, carotenoids, -tocopherol, and flavonoids) were analysed. The free radical scavenging activity (inhibition of nitric acid, super oxide generation and in vitro lipid peroxidation and DPPH free radical scavenging and hydrogen peroxide radical scavenging activity) of different extracts of Aristolochia indica was also observed. The results obtained in the present study indicated that the Aristolochia indica might be a good source of natural antioxidant. This book is a printed edition of the Special Issue “Dietary Antioxidants and Prevention of Non-Communicable Diseases” that was published in Antioxidants & Medicinal plants are being used in traditional treatments to cure variety of diseases from thousands of years. Screening of antimicrobial and antioxidant activities performed on Esholtzia densa crude extracts which is traditionally used as herb shows that they are endowed with potentially utilisable antimicrobial and free radical scavenging activity. Accordingly, this implies the inhibition of microbial pathogenesis and cellular oxidation that is linked to pathological incidents such as heart disease, aging and cancer. It was seen that the ethylacetate extract showed the maximum inhibitory effects against both bacterial and fungal growth. This may be due to the presence of such ingredients in the said extracts like flavonoids, terpenes, tannins, polyphenolic compounds, alkaoids, etc. The crude extracts of the plant possess radical scavenging activity as estimated by in vitro antioxidant assays like DNA damage assay, lipid peroxidation assay, DPPH assay, FTC assay, etc. Hence, Esholtzia densa extracts could be used as an easy accessible source of natural antioxidants and antimicrobial agent. With food and nutraceutical producers increasingly demanding documented quantitative activities of natural materials that they purchase as ingredients, suppliers and analytical labs must develop expertise in the most-publicized assays. Recognizing the continuing confusion about antioxidant assays, Protocols for In Vitro Analysis of Antioxidant Activity provides the most up-to-date knowledge and standardized protocols for in vitro antioxidant assays. This valuable resource offers scientists, antioxidant researchers, and analytical chemists a base from which different materials and results from different labs can be compared reproducibly and legitimately. Teucrium species are an interesting object of research in the various aspects of science with multiple applications. With more than 300 species, Teucrium is one of the largest and well distributed genera of the Lamiaceae family. Known medicinal Teucrium species have a long traditional use as well as different potential applications in pharmacy, food and beverage industry. Teucrium species are very rich in a variety of secondary metabolites with significant biological activities. Based on that, the book contains 15 chapters which discusses recent advances in exploring the unique features of Teucrium species including morphology, systematics, taxonony, biogeography, ethnobotany, phytochemistry, biological activity such as genotoxic, antioxidant, antibacterial, antifungal, antiviral, anticancer, anticholinesterase, anti-diabetic and anti-inflammatory activity of secondary metabolites as well as applications including current challenges and further perspectives. Some medicinal Teucrium species in excessive use can cause certain consequences. This phenomenon and precaution is also described. Whilst this book is primarily aimed at scientists, researchers, beginners in the investigations of Teucrium species, graduate and post-graduate students in biology, botany, biotechnology, agriculture, and pharmacy, as well as science enthusiasts and practitioners involved in medicinal plants applications. Book provides complete Teucrium species list, color photographs of selected Teucrium species on natural habitats, as well as up-to-date bibliography related to Teucrium genus. The present book is a collection of ten original research articles and reports, associated with selected topics in agricultural chemistry. The discussed issues are organized in four sections: Classification and labelling of active substances in plant protection products, Environmental and stress plant physiology and behavior, Antimicrobial and antioxidant potential of plant extracts, and Pollutants analysis and effects. The information provided in this book should be of interest for academic researchers and for agriculturists. The field of antioxidant research has grown rapidly over the last 30 years and shows no sign of slowing down. In order to understand how antioxidants work, it is essential to understand how their activity is measured. However, antioxidant activity measurements are controversial and their value has been challenged. This book addresses a number of the controversies on antioxidant testing methods. Specifically, the book highlights the importance of context, helping the reader to decide what methods are most appropriate for different situations, how the results can be interpreted and what information may be inferred from the data. There is a multiplicity of methods for measuring activity, with no standardized method approved for in vitro or in vivo testing. In order to select an appropriate method, a thorough knowledge of the processes associated with reduction-oxidation is essential, leading to an improved understanding and use of activity measurements and the associated data. The book presents background information, in a unique style, which is designed to assist readers to grasp the fundamentals of redox processes, as well as thermodynamics and kinetics, which are essential to later chapters. Recovery and extraction of antioxidants from diverse matrices are presented in a clear and logical fashion along with methods used to determine antioxidant activity from a mechanistic perspective. Other chapters present current methodologies used for activity testing in different sample types ranging from foods and plants, to body fluids and even to packaging, but always with a strong emphasis on the nature of the sample and the underlying chemistry of the method. A number of emerging techniques for assessing antioxidant behaviour, namely, electrochemical methods, chip technology exploiting microfluidic devices, metabolomics plus studies of gene and protein expression, are examined. Ultimately, these techniques will be involved in generation of “big data” for which an understanding of chemometrics will be essential in drawing valid conclusions. The book is written to appeal to a wide audience, but will be particularly helpful for any researchers who are attempting to make sense of the vast literature and often conflicting messages on antioxidant activity. Chelating Agents and Metal Chelates focus on the structure and properties of metal chelates, as well as bond types, stereochemistry, and optical phenomena. The selection first offers information on historical background and fundamental concepts and the nature of metal-ligand bond. Discussions focus on the structure and stability of metal chelates, bond types and characteristic properties, classes of acceptor metal atoms, and metal-metal bonds in complex compounds. The text also touches on bidentate chelates, design and stereochemistry of multidentate chelating agents, and optical phenomena in metal chelates. The publication ponders on oxidation-reduction potentials as functions of donor atom and ligand and metal chelates of ethylenediaminetetraacetic acid and related substances. Topics include liquid junction potentials, reversibility, measurement of redox potentials, ethylenediaminetetraacetic acid chelate couples, and metal chelates of ethylenediaminetetraacetic acid. The text also takes a look at metal chelates in biological systems and physical and coordination chemistry of tetrapyrrole pigments. This monograph is a vital reference for senior students, researchers, biologists, and medical scientists interested in the chemistry of metal chelates.