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Phenolics in Food and Nutraceuticals: Sorghum Phenolic Extracts

Phenolic compounds, one of the most widely distributed groups of secondary metabolites in plants, have received a lot of attention in the last few years since the consumption of vegetables and beverages with a high level of such compounds may reduce risks of the development of several diseases. This is partially due to their antioxidant power since other functions have been discovered. What's more, phenolic compounds are involved in many functions in plants, such as sensorial properties, structure, pollination, resistance to pests and predators, germination, processes of seed development, and reproduction. Phenolic compounds can be classified in different ways, ranging from simple molecules to highly polymerized compounds. Phenolic Compounds in Food: Characterization and Analysis deals with all aspects of phenolic compounds in food. In five sections, the 21st chapter of this book addresses the classification and occurrence of phenolic compounds in nature and foodstuffs; discusses all major aspects of analysis of phenolic compounds in foods, such as extraction, clean-up, separation, and detection; detail specific analysis methods of a number of classes of phenolic compounds, from simple molecules to complex compounds; describe the antioxidant power of phenolic compounds; and discuss specific analysis methods in different foodstuffs. For thousands of years mint has enjoyed an honored place in pharmacopoeias and kitchen cupboards in India, China, Europe, North America, and elsewhere. Today the amount of essential oils produced from the four major mint species (common, peppermint, Native spearmint, and Scotch spearmint) exceeds 23,000 metric tonnes annually with a market value. We are pleased to present this book, which is a reprint of articles from the Special Issue entitled "Extraction Strategies to Recover Bioactive Compounds, Incorporation into Food, and Health Benefits." Published online in the open access journal Foods (ISSN 2304-8158) from 2019 to 2020 (available at: https://www.mdpi.com/journal/foods/special_issues/extraction). Firstly, this book gathers studies addressing several strategies applied to obtain bioactive products and extracts, not from food matrices but also from agri-food byproducts, which can be used as natural additives, nutraceuticals, and functional ingredients for pharmaceutical, cosmetics, and food industries. In particular, tea and green and black tea beverages are explored in buckwheat, sesame, and olive leaf byproducts. Overall, these studies outline new valorization methods and offer new opportunities for alternative practices in the agro-industrial sector that help to migrate toward a circular bioeconomy model. This book also presents studies that predict bioactive components in fruits through mathematical tools and support the formulation of a novel beverage in resveratrol, a phenolic compound whose bioactivity is well recognized. Phenolic compounds comprise a broad class of natural products formed mainly by plants, but also microorganisms and marine organisms that have the capacity to form them. 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. Phenolic: Properties, Recovery, and Applications covers polyphenols, health effects, and new trends in recovery procedures and applications. Beginning with coverage of the metabolism and health effects of polyphenols, the book then addresses recovery, analysis, processing issues and industrial applications. The book not only connects the properties and health effects of polyphenols with recovery, processing, and encapsulation issues, but also explores industrial applications that are affected by these aspects, including both current applications and those under development. Covers the properties and health effects of polyphenols, along with trends in recovery procedures and applications. Addresses recovery, analysis and processing issues Concludes with coverage of the industrial applications of polyphenols.
presents the general mechanisms underlying the various assessments, the types of molecules detected, and the key advantages and disadvantages of each method. Both thermodynamic (i.e. efficiency of scavenging reactive species) and kinetic (i.e. rates of hydrogen atom or electron transfer reactions) aspects of available methods are discussed in detail. A thorough description of all available methods provides a basis and rationale for developing standardized antioxidant capacity/activity methods for food and nutraceutical sciences and industries. This text also contains data on new antioxidant measurement techniques including nanotechnological methods in spectroscopy and electrochemistry, as well as on innovative assays combining several principles. Therefore, the comparison of conventional methods versus novel approaches is made possible. This important resource: Offers suggestions for assessing the antioxidant potential of foods and their components Includes strategies for the development of healthy functional food products Contains information for identifying antioxidant activity in the body Presents the pros and cons of the available antioxidant determination methods, and helps in the selection of the most appropriate method Written for researchers and professionals in the nutraceutical and functional food industries, academia and government laboratories, this text includes the most current knowledge in order to form a common language between research groups and to contribute to the solution of critical problems existing for all researchers working in this field.Antioxidants and their mechanisms of action; Food factors as antioxidants; Coronary heart disease; Malignant disease; Other diseases; Indicators of oxidative stress; Consumer issues. This book provides state-of-the-art discussion of natural antioxidants from dietary sources, their occurrence, health effects, chemistry, and methodologies. The book summarizes data on the occurrence of antioxidative compounds in cereals and legumes, oilsseeds, herbs and spices, vegetables, teas, muscle foods, and other commodities. The antioxidant vitamins and enzymes also are thoroughly discussed. The biological effects of various antioxidative compounds, the chemistry of antioxidants, their health effects, and their pharmacology have also been summarized. This comprehensive reference consolidates current information on the antioxidative properties of wheat, their beneficial effects, the mechanisms involved, factors affecting availability/bioavailability, and the methods used to measure them. It discusses antioxidative properties of wheat grains and fractions and their phytochemical compositions and covers the effects of genotype, growing conditions, post-harvest treatment, storage, and food formulation and processing on availability/bioavailability. Wheat Antioxidants will help cereal chemists, food technologists, food processors, nutritionists, and others maximize the health benefits of wheat-based foods.Wine has already been investigated for its potential nutritional quality, such as high amount of phenolic compounds. Phenolic compounds, well-known as natural antioxidants, are reported due their radical scavenging capacity. In the present work, the bioactive ingredients of nine Austrian wines (four red wines; Zweigelt, Blaufränkisch, Syrah and Cuvée; two white wines; Pinot Blanc and Chardonnay; one rosé Blaufränkisch; and two grape juice: red and white) have been quantified and the antioxidant activity has been evaluated. Among the bioactive compounds the total amount of polyphenols, flavonoids, catechins, and proanthocyanidins, were studied and analyzed by standardized photometric methods. The antioxidant activity was determined by the DPPH: radical scavenging method as well as by ABTS assays. The results of the antioxidant activity were expressed using the term EC50 and Trolox equivalents. As expected, red wines have higher phenolic content (Total polyphenols: 2211,76 mg gallic acid equivalents (GAE)/l, Flavonoids: 1418.39 mg catechin equivalents/l, Catechins: 635.36 mg catechin equivalents/l, B2,15 mg cyanidin equivalents/l) and antioxidant activity (DPPH: EC50 = 0.21 ml sample/mg DPPH and Trolox equivalents = 1,1 ml sample/mg Trolox; ABTS: EC50 = 2.50 ml sample/ABTS and Trolox equivalents = 0,7 ml sample/Trolox) than rosé Blaufränkisch (Total polyphenols: 315.44 mg GAE/l, Flavonoids: 76.78 mg catechin equivalents/l, Catechins: 9.05 mg catechin equivalents/l, Proanthocyanidins: 1.92 mg cyanidin equivalents/l; DPPH: EC50 = 2.52 ml sample/mg DPPH and Trolox equivalents = 13,2 ml sample/mg Trolox; ABTS: EC50 = 190,22 ml sample/ABTS and Trolox equivalents = 31,1 ml sample/mg Trolox), white wines (Total polyphenols: 333.76 mg GAE/l, Flavonoids: 74.02 mg catechin equivalents/l, Catechins: 14.27 mg catechin equivalents/l, Proanthocyanidins: 1.07 mg cyanidin equivalents/l; DPPH: EC50 = 2.74 ml sample/mg DPPH and Trolox equivalents = 14,3 ml sample/mg Trolox; ABTS: EC50 = 83.33 ml sample/ABTS and Trolox equivalents = 23,7 ml sample/Trolox; ABTS: EC50 = 14.34 ml sample/ABTS and Trolox equivalents = 31.54 and 15.02 ml sample/mg DPPH and Trolox equivalents = 7 and 79.7 ml sample/mg Trolox; ABTS: EC50 = 319.78 and 650 ml sample/ABTS and Trolox equivalents = 5.6 and 184.9 ml sample/mg Trolox for red and white, respectively). The relationship between the phenolic contents and the antioxidant activity in each sample was also checked. The results gave a slightly tendency (R > 0,8 for DPPH assay and R > 0,6 for ABTS assay). Finally, it was observed that Cuvée wine has the highest antioxidant activity for each method used and that the content of phenolic compounds in Austrian wines is very similar to Chinese wines and lower than those in the Italian wines. This book is mainly based on the latest research results and applications of phenolic and polyphenolic compounds. Phenolic compounds, ubiquitous in plants, are an essential part of the human diet and are of considerable interest due to their antioxidant properties and potential beneficial health effects. These compounds range structurally from a simple molecule to complex high-molecular-weight polymers. There is increasing evidence that consumption of a variety of phenolic compounds present in foods may lower the risk of health disorders because of their antioxidant activity. When added to foods, antioxidants control rancidity development, retard the formation of toxic oxidation products, maintain nutritional quality and extend the shelf-life of products. Due to safety concerns and limitation on the use of synthetic antioxidants, natural phenolics antioxidants obtained from edible materials, edible-by-products and residual sources have been increasing in interest. This contribution summarizes both the synthetic and the natural antioxidative phenolics, emphasizing their mode of action, health effects, degradation products and toxicity. In addition, sources of phenolic antioxidants are discussed in detail. Coffee contains many antioxidants including purpurogallin, which is a hydrophilic phenolic antioxidant that is difficult to measure with reported methods. A method combining solid-phase extraction and liquid chromatography-mass spectrometry was developed to detect and quantify purpurogallin in brewed beverages, including coffee. For beverage preparation, water extraction was adopted for improved correlation with moka pot brewing. Purpurogallin was detected in all commercial coffee samples and its content is high enough in the roasting degree to reduce the oxidative stress at different levels, as well as treatment with chlorogenic acid to revert and diminish the damage. Oxidative Stress and Chronic Degenerative Diseases - A Role for Antioxidants is written for health professionals, food chemists, food technologists, food processors, nutritionists, and others. Wheat Antioxidants will help cereal chemists, food technologists, food processors, nutritionists, and others maximize the health benefits of wheat-based foods.
and antioxidant activity than Shabalala both in the whole grain and the bran, probably due to the presence of condensed tannins in Phatafal sorghum, which were not detected in Shabalala sorghum. For both sorghum varieties, the bran contained higher levels of total phenols and antioxidant activity than the whole grain, confirming that phenolic compounds in sorghum are largely concentrated in the bran. Antioxidant activities of the sorghum varieties varied greatly with their total phenol and condensed tannin contents, suggesting that the phenolic compounds were largely responsible for the antioxidant activities of the sorghum grains. Bubbling of oxygen into the liquid crude phenolic extract did not have any significant effect on the parameters tested. Similarly, vacuum-packed samples did not differ significantly in the parameters tested from the samples that were not vacuum-packed. CPE samples stored at 20°C had significantly higher levels of total phenols, condensed tannins and antioxidant activity than those stored at 25°C during some days of storage. Storage time was however the major factor influencing the levels of total phenols, condensed tannins and antioxidant activity of the CPE from Phatafal sorghum sorghum bran might need to be used shortly after extraction to ensure optimum antioxidant activity. There was an insignificant correlation between the antioxidant activities of the CPE and their phenolic contents during storage, which could have been due to the formation of new compounds with a lower antioxidant capacity. The CPE inhibited oxidation of sunflower oil as shown by lower peroxide values and anisidine values compared to control samples. The CPE was however less effective in reducing peroxide values compared to TBHQ, but was similar to TBHQ in reducing anisidine values. In the presence of ferric ions, the CPE appeared to be less effective in reducing peroxide values compared to TBHQ, but appeared to be more effective than TBHQ in reducing anisidine values. The results showed that the tannin sorghum bran CPE appeared to act as both lipid radical scavengers and metal (Fe+++ ) chelators. The results indicated that the sorghum bran CPE may be suitable for black soybean flour and corn grits, as well as for black soybean flour and other legume varieties and possess higher antioxidant activity. In this study, the three legume varieties were subjected to broad range of processing conditions, and the effects on phenolic contents, antioxidant capacity and individual phenolic acid were investigated. The results showed all processing methods could decrease the total phenolic content, and steaming processing could measure more phenolics and antioxidant activity than boiling processing. Phenolic acids mainly existed in non-free form and the content of individual free phenolic acids was dependent on the thermal process applied. When in vitro gastrointestinal simulation digestion was applied to the thermally processed beans, it was found that the properties of hydrolysates including total phenolic content, antioxidant activity, degree of hydrolysis, and ACE (angiotensin converting enzyme) inhibitory activity were all affected by thermal conditions employed. There was a weak correlation between the degree of hydrolysis and ACE inhibition. In the current study, for each legume variety, cooking conditions which yielded the highest phenolic content and antioxidant activity were selected. Phenolics of the raw and cooked seeds from each legume variety were extracted, semi-purified (XAD-7) and further fractionated (Sephadex LH-20). The results showed cooking had great effects on yield, phenolic content, antioxidant capacity, and individual phenolic compounds. The phenolic content and antioxidant activity could be enriched tremendously in the semi-purified extracts and some fractions. Some phenolic compounds which were absent in raw meal could be found after cooking in the fractions and some phenolic compounds which were present in raw material disappeared after cooking. Among crude phenolic extracts, semi-purified extracts and fractions, only crude extracts showed ACE inhibition. In addition, protein isolates from the legumes varieties were treated with in vitro GI (gastrointestinal) digestion and then separated by ultrafiltration, DEAE anion exchange chromatography and gel permeation chromatography. After ultrafiltration, the lowest molecular weight fraction (Phenolic compounds as a large class of metabolites found in plants have attracted attention since long time ago due to their properties and the hope that they will show beneficial health effects when taken as dietary supplements. This book presents the state of the art of some of the natural sources of phenolic compounds, for example, medicinal plants, grapes or blue maize, as well as the modern methods of extraction, quantification, and identification, and there is a special section discussing the treatment, removal, and degradation of phenols, an important issue in those phosphenolic derived from the pharmaceutical or petrochemical industries. This book covers the physiological processes relevant to inflammation. It centers on the recruitment of leukocytes to sites of injury and infection, their function in the tissue and the eventual resolution of inflammation. The content of the book is organized into three main sections: the biology of inflammation and chemotaxis, the role of mediators of inflammation, and the clinical implications of inflammation. In this chapter, we discuss the influence of the processing methods on the content of phenolic compounds in fruits and vegetables. The intake of fruits and vegetables based-foods is associated with delayed aging and a decreased risk of chronic disease development. Fruits and vegetables can be consumed in natura, but the highest amounts are ingested after some processing methods, such as cooking procedures or sanitizing methods. These methods are directly related to alteration on the phenolic content. In addition, the postharvest conditions may modify several phytochemical substances. Phenolic compounds are referred to as phytochemicals found in a large number of foods and beverages. The relative high diversity of these molecules produced by plants must be taken into account when methods of preparation are employed to obtain industrial or homemade products. Phenolic compounds comprise one (phenolic acids) or more (polyphenols) aromatic rings with attached hydroxyl groups in their structures. Their antioxidant capacities are related to these hydroxyl groups and phenolic rings. As the antioxidant activity, they have many other beneficial effects on human health. However, before attributing health benefits to these compounds, absorption, distribution, and metabolism of each phenolic compound in the body are important points that should be considered. 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 the importance of understanding the controversies on antioxidant activity and describes methods that are most appropriate for different situations, how the results can be interpreted and what information may be inferred from the data. There are 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 understanding 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. The methods used to determine antioxidant activity are described, ranging from simple techniques of colorimetry in drinking fluids to highly sophisticated methods that are used in the treatment, removal and 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. Amongst cereals, sorghum is one of the major sources of phenolic compounds. South African cultivars have not been probed for their phenolic content and antioxidant activity to highlight their potential benefits. The South African sorghum cultivars representing different sorghum types were evaluated for total phenolic content, condensed tannin content and antioxidant activity and the effect of cultivar on their antioxidant activity. The presence of phenolic antioxidants in the different sorghum cultivars, created an opportunity to develop a sorghum product as a vector of the antioxidants. Cookies were a product of choice due to their shelf stability and high nutrient density. Sorghum cookies were produced from 70%, 90% and 100% extraction rate factors. The effects of flour extraction rate and cultivar on the total phenolic content, condensed tannin content and antioxidant activity of the cookies were determined. Consumer sensory evaluation was used to evaluate the consumer acceptance of the cookies. The results showed a significant difference in the total phenol content of the cultivars, determined by the Folin-Ciocalteu method was 0.20 to 1.42 g catechin equivalents (CE)/100 g. The total phenol content of the cookies was 3 to 7 times higher in condensed tannin cultivars than in tannin-free cultivars. Using the modified Vanillin-HCl method, condensed tannins were only measurable in the condensed tannin cultivars. They ranged between 5.16 and 8.39 g CE/100 g.
had 2 to 3 times higher total phenolics compared to those of 70% extraction rate flours, while antioxidant activity was 2 to 10 times higher. Cooked samples of the condensed tannin sorghum had 2 to 5 times more phenolics compared to those of condensed tannin-free sorghum. Antioxidant activity was 145 to 2277 Mol Trolox equivalents (TE)/g in cookies of condensed tannin sorghum compared to 10 to 1027 Mol TE/g in those of condensed tannin-free sorghum. Processing sorghum flours to cookies seemed to reduce phenolic and antioxidant activity, but considering the flour component in the formula, cookie antioxidant activity was slightly higher than that of flours. The texture of all sorghum cookies was less acceptable compared to that of wheat cookies. The consumers showed a slight overall liking of the condensed tannin-free sorghum and wheat flour cookies. The cookies from condensed tannin flours were neither liked nor disliked. Since generally wheat flour is used for making cookies, the similarities in the overall liking of the condensed tannin-free sorghum and wheat flour cookies indicate strong potential of sorghum flour for cookie making. Therefore, sorghum cookies have a potential as a functional ready-to-eat snack, with target consumers such as school children in feeding schemes to improve their health and nutrition status. Abstract: Mauby bark is commonly used to make a beverage believed to possess medicinal properties in the Caribbean. However, limited studies have substantiated this claim. Therefore, the objectives of this research were to determine the polyphenolic content and antioxidant activity of Mauby bark extracts boiled at 30, 45, and 60 minutes. The Total Flavonoid Content (TFC) ranged from 1.93 ± 0.17 mg CE/mL to 3.17 ± 0.11 mg CE/mL and the Total Phenolic Content (TPC) ranged from 2.10 mg ± 0.11 GAE/mL to 2.36 mg ± 0.07 GAE/mL. The 2,2-Diphenyl-1-Picyrylhydrazyl (DPPH) scavenging activity ranged from 75 ± 4.02% to 83 ± 0.68% and the Ferric Reducing Antioxidant Power (FRAP) values ranged from 6.29 ± 0.64 to 6.90 ± 1.54 mM FeSO4 equivalents/0.2 mL. Although polyphenolic content increased with boiling time for the first 30 minutes, later boiling times showed decreased content (Polyphenol) composition. It also aids in selecting sources and regulating environmental conditions affecting yield for more consistent and functional dietary supplements. Polyphenols play key roles in the growth, regulation and structure of plants and vary widely within different plants. Stress, growth conditions and plant species modify polyphenol structure and content. This book describes techniques to identify, isolate and characterize polyphenols, taking mammalian toxicity into account as well. Defines conditions of growth affecting the polyphenol levels Describes assay and instrumentation techniques critical to identifying and defining polyphenols, critical to researchers and business development documents how some polyphenols are dangerous to consume, important to dietary supplement industry, government regulators and lay public usersPhenolics in Food and Nutraceuticals is the first single-source compendium of essential information concerning food phenolics. This unique book reports the classification and nomenclature of phenolics, their occurrence in food and nutraceuticals, chemistry and applications, and nutritional and health effects. In addition, it describes antioxidant aHerbs have drawn much attention of people worldwide, not only because of their economic value as food products, but also for their antioxidant properties. Thus, we investigated to determine the total phenolic content and antioxidant activities on three Malaysian herbs by using Soxhlet extraction method. The herbs were Eugenia polyantha (Seral kayu), Euoda reddeyi (Tenggek barung) and Limnocharis flavala (Sudu ilik). The total phenolic content and antioxidant compounds were extracted using distilled water at three different extraction time (4, 8 and 12 hour). The extracts were then evaluated using Folin-Ciocalteau reagent for their total phenolic content and 2,2-Diphenyl-1-picyrylhydrazyl (DPPH) assay for their antioxidant compounds. Further analysis was done using High Performance Liquid Chromatography (HPLC) to further verifying the ascorbic acid existence in the extracts. It was found L. flavala showed the highest content of total phenolic compounds (15.01 mg galic acid equivalent [GAE] per g of sample) with the antioxidant capacity standing at 20.42 mg ascorbic acid equivalent (AAE) per 1 g of sample after 8 hour extraction. While, E. polyantha and L. flavala after 8 hour extraction contained 0.7625 and 0.9745 mg GAE/g of ascorbic acid respectively. Phenolic compounds are considered secondary metabolites within the physiology of a plant. They have different functions, such as pollination systems, sun protection, protection against pathogens and diseases. Research on these compounds has increased due to the number of molecules they can include and the different biological activities they demonstrate. It is important to know the methods of extracting molecules, the biosynthesis routes, and their relationship with activities that can benefit from their consumption. Therefore, the book includes chapters that provide information on extraction and optimization techniques, biosynthetic pathways, and the identification and characterization of miRNAs involved in their regulation of biosynthesis. The combination of herbs has drawn much attention of people worldwide, not only because of their economic value as food products, but also for their antioxidant properties. Orthosiphon stamineus and Eugenia polyantha are examples of herbs with antioxidant properties by their own, but that can be improved when mixed. In the present work, the antioxidant activity and phenolic compounds were from the individual herbs, and from mixtures of these herbs in different extraction method. The total phenolic content and antioxidant compounds were extracted using distilled water at 100 oC for deocction method and by using ethanol for soxhlet method. The extracts were then evaluated using Folin-Ciocalteau reagent for their total phenolic content and 2,2-Diphenyl-1-picyrylhydrazyl (DPPH) assay for their antioxidant compounds. Further analysis was done using High Performance Liquid Chromatography (HPLC) to verify the gallic acid existence in the extracts. Mixture herbs > Eugenia polyantha > Orthosiphon stamineus was the order observed for antioxidant capacity, which can be related to their different distribution in phenolic compounds. It was found mixture herbs showed the highest content of total phenolic compounds (2.11 ± 0.09 and 1.88 ± 0.03 mg galic acid equivalent [GAE] per 20 g of sample) with the antioxidant capacity 0.617 and 0.517 mg ascorbic acid equivalent (AAE) per 20 g of sample for decoction and soxhlet extraction method respectively. This study shows that it is possible to commercialize the study and process the herbs combined in decoction extracts of mixture Orthosiphon stamineus and Eugenia polyantha. Master's Thesis from the year 2013 in the subject Agrarian Studies, grade: Master's Thesis. Language: English; abstract: This study was carried out to investigate the changes in chemical composition, total phenolic compounds content, phyate free and free radical scavenging abilities against DPPH assay during soaking and germination of three cereal grains; wheat (Sids 1), corn (H310 White) and sorghum (Giza 15). On the other hand, the present work is also aimed to use the fractions of those grains to improve the quality of some meat products as chicken and meat burger by using it as ingredient with concentration 5% of burger formula. These formulas were refrigerated 52°C in a home refrigerator up to 15 days. Soaking and germination processes showed significant decrease in total phenolic compounds and antioxidant activity. Using of cereal grains fractions led to improve meat products (beef and chicken burger) by increasing oxidative stability and decreased values of TBA and PV during refrigerated up to 15 days in a home refrigerator. The text was written by a non-native English speaker. Please excuse any errors or inconsistencies.Buckwheat belongs to the group of raw materials with high nutritional value. Its grains are a good source of valuable ingredients, among which phenolic compounds are of particular importance exhibiting strong antioxidant effect. Among them rutin and phenolics dominate in buckwheat grains. In many European Countries the most popular are roasted and dehulled buckwheat grains called u00a0u0103kaashi u0103e1u0103lí, which is cooked and served like rice. Most research on the way in which buckwheat grains change during the process of roasting the grains is done by conducting this process into one a laboratory scale, therefore the aim of the study was to determine how its course in industrial conditions affects the antioxidant properties. The results showed that bioactivity of extracts were measured by the DPPH scavenging activity. The antioxidant activity of phenolic compounds (their total amount and the content of rutin and phenolic acids: coumaric, ferulic, syringic and vanillic) and as the ability to neutralize the DPPH (2,2-diphenyl-1-picyrylhydrazyl) radical. Total phenolics were determined spectrophotometrically using Folin-Ciocalteau reagent. Phenolic acids and rutin were analyzed using HPLC method.Under the influence of dehulling process the rutin content decreased in the range from 31 to 55%, depending on the origin of the samples, and the amount of coumaric, syringic and vanillic acid increased respectively in the following ranges: 33-42%, 37-44% and 16-26%. Antioxidant activity measured as the ability to neutralize the DPPH radical changed to a small extent. In turn, determining the effect of hydrothermal treatment used in individual plants, it should be stated that in all of them it caused a reduction in the total content of phenolic compounds (in the case of samples coming from one mill almost fourfold), coumaric and acid rutin. Considering the treatment methods used in individual plants, it seems that the content of phenolic compounds was more dependent on the roasting temperature, than on the process was carried out (pressure boilers and drum roaster). In order to obtain the best health value of following buckwheat groats, the roasting process should be carried out at a temperature close to 100u00b0C for a time that will ensure good sensory characteristics, even if it is for several hours.Conflict of interest: There is no conflict of interest.Plant foods are an... of our daily diet and constitute one of the highest contributors to the world economy. These foods are rich in phenolic compounds and antioxidant activity. Using of cereal grains fractions led to improve meat products (beef and chicken burger) by increasing oxidative stability and decreased values of TBA and PV during refrigerated up to 15 days in a home refrigerator. This textbook presents a comprehensive overview of the chemistry, biochemistry and analysis of phenolic compounds present in a variety of foods. The text can be used as a source of knowledge for plant food science and technology, covering all of the important chemical, biochemical and analytical aspects needed for a thorough understanding of phenolic antioxidants in foods. Phenolic Antioxidants In Foods: Chemistry, Biochemistry, and Analysis is comprised of three sections. The first section covers the basic concepts of antioxidants, their chemistry and their chemical composition in foods, providing a detailed introduction to the concept. The second section covers the biochemical aspects of phenolic antioxidants, including their biosynthetic pathways, biological effects and the molecular mechanism of antioxidant effects in the biological system. This section promotes an
understanding of the fundamental biochemical reactions that take place in foods and after digestion and absorption. The third section covers the analytical chemistry used in the analysis of phenolic antioxidants in foods, including the basic analytical procedures, methods for analysis and chromatographic and spectroscopic analyses. This section is significant for aspiring food chemists and manufacturers to evaluate the nature and chemistry of phenolic antioxidants in foods. Featuring helpful quizzes, section summaries, and key chapter points, this textbook is the perfect learning tool for advanced chemistry undergraduates and post-graduates looking to gain a fundamental understanding of phenolic antioxidants in food products. Free radicals and other reactive oxygen species are constantly formed in the human body and have been implicated in human diseases such as cancer, atherosclerosis, rheumatoid arthritis, Parkinson's disease, and malaria. This observation has raised the possibility that antioxidants could act as prophylactic agents. However, it remains to be fully established whether oxidative stress makes a significant contribution to the pathology of a given disease or whether it is an epiphenomenon. Indeed, development of specific assays applicable to humans would greatly contribute to our understanding of the role played by free radicals and their modulation by antioxidants in normal physiology and in human diseases. This book addresses the key methodological questions. This Special Issue comprises articles related to the effects of genotype and processing conditions on the phenolic compound profile and antioxidant activity of cocoa-derived products, isolation and characterization of antioxidant compounds such as polyphenols and melanoids from cocoa beans, and assessment of the antioxidant, antioxidative stress and anti-inflammatory effects of cocoa beans and cocoa-derived products. The results of these studies show that it is possible to maintain or increase the biological activity of cocoa beans and their derived products (cocoa powder and chocolate) by choosing appropriate processing conditions and cocoa genotype and origin. The papers published in this Special Issue confirm that cocoa beans and cocoa by-products can be considered as an attractive source material for manufacturing of functional foods and nutraceuticals. This is because they contain many bioactive compounds, mainly polyphenols, including flavonoids (proanthocyanidins, monomeric flavan-3-ols, and anthocyanins) and phenolic acids, as well as melanoids. Finally, the in vitro and in vivo studies demonstrate the importance of cocoa antioxidants for the prevention of oxidative stress and inflammation. These are just a few examples that illustrate the chemical diversity and use of phenolic compounds, the topic of ‘Phenolic Compound Biochemistry’. This book is written for researchers, instructors, advanced undergraduate students and beginning graduate students in the life sciences who wish to become more familiar with these and many other intriguing aspects of phenolic compounds. Topics covered include nomenclature, chemical properties, biosynthesis, including an up-to-date overview of the genetics controlling phenolic metabolism; isolation and characterization of phenolic compounds, phenolics used in plant defense, and the impact of phenolics on human health. The book is written in an accessible style, and assumes only basic knowledge of organic chemistry, biochemistry and cell physiology. More than 300 chemical structures and reaction schemes illustrate the text. Wilfred Vermerris is Associate Professor of Agronomy at the University of Florida Genetics Institute in Gainesville, FL. His research focuses on the genetic control of phenolic compounds that impact agro-industrial processing of crop plants. Ralph Nicholson is Professor of Botany and Plant Pathology at Purdue University in West Lafayette, IN. He is an expert on phenolic compounds involved in the plant’s defense against pathogenic fungi and bacteria. The peanut seeds represent less than 40 % of the total biomass of the peanut plant. Currently, peanut plants are left in the field after harvest or baled for animal feed. The research presented here was the second step in identifying bioactive compounds from peanut plants that may be the source for value added products for the peanut industry. The objective of this work was to determine the antioxidant capacity and total phenolic content for peanut leaves and roots, and to identify and quantify specific phenolic compounds contributing to the total antioxidant activity. Peanut leaves and roots were collected from a North Carolina (NC) research farm. Additional roots were collected from a Texas (TX) farm. Plant parts were freeze dried and extracted with methanol and aqueous methanol. Antioxidant activity of the extracts was tested using ORAC and DPPH assays. Total phenolics were measured using the Folin-Ciocalteau method. Chlorophyll was tested with the ORAC assay to dispel concern for potential chlorophyll antioxidant activity. Thin Layer Chromatography (TLC) and High Performance Liquid Chromatography (HPLC) were used for separation and preliminary identification of compounds contributing to the total antioxidant capacity of the peanut leaves and roots. HPLC coupled with Mass Spectrometry (MS) was utilized for identification and quantification of individual phenolic compounds in the peanut plant parts. The identified phenolic compounds were assayed individually and as a quantitative mixture with both antioxidant assays to determine the contribution of the individual compounds to the total antioxidant activity previously determined for peanut plant extracts. NC leaves had the highest antioxidant capacity and total phenolic content, followed by NC roots and TX roots. Aqueous methanol extracted more antioxidant compounds from peanut plants than methanol, which was displayed by significantly higher antioxidant capacities and total phenolic content. The total phenolic content...