

Antioxidant Activity And Physicochemical Properties Of

Polyphenols: Properties, Recovery, and Applications covers polyphenol properties, 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

Blackberry (*Rubus* sp.) fruit are a good source of phenolic compounds and anthocyanins, and are consumed in fresh and processed forms. Though organic products become more popular, limited information is available about how different organic production methods affect the post-harvest quality of blackberry fruit. The objective of this project was to investigate the effects of different organic production systems and harvest times on the physicochemical and nutraceutical properties of four cultivars of blackberry fruit during refrigerated and frozen storage. Trailing blackberry 'Obsidian' and semi-erect blackberry 'Triple Crown' were studied under refrigerated storage while two trailing blackberry 'Marion' and 'Black Diamond' were studied under frozen storage. 'Obsidian' and 'Triple Crown' were grown organically and treated with three different organic fertilizers: processed poultry litter, soy meal, and a blend of fish emulsion and hydrolysate. Each fertilizer was applied at the same rate of 56 kg nitrogen/ha in 2012 and 2013. Samples were hand-picked three times per season at 1 wk intervals, packed immediately into clamshell containers, and stored at 4.0 ± 0.2 °C and $90 \pm 5\%$ relative humidity for up to 12 d. Physicochemical properties, including decay, leakage, pH, titratable acidity (TA), weight loss, firmness, and moisture content, and antioxidant content and capacities, including total phenolic content (TPC), total monomeric anthocyanins (TMA), radical scavenging activity (RSA), oxygen radical absorbance capacity (ORAC), and ferric reducing ability of plasma (FRAP), were measured prior to and during refrigerated storage. Harvest date and storage time showed more effect on the physicochemical properties than that of fertilizer type. During storage, late-harvest fruit of both cultivars had the least decay in 2012 while early-harvest fruit exhibited the least decay in 2013. Fruit leakage in both cultivars increased during storage, reaching 54.3% and 62.5% in 'Obsidian' and 62.3% and 73.0% in 'Triple Crown' in 2012 and 2013, respectively. Fruit pH increased while titratable acidity decreased during storage in both cultivars. Firmness of 'Obsidian' fruit was significantly higher in 2012 than in 2013. Overall, fruit firmness decreased during storage. 'Obsidian' fruit had a

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2.52% weight loss while that of 'Triple Crown' fruit had a 3.15% weight loss after 10 d of storage. The type of fertilizer only affected fruit weight loss in 'Obsidian'. 'Obsidian' also had as much as 37% higher ORAC values than 'Triple Crown' at harvest. Late-harvest fruit from plants fertilized with fish emulsion showed 29% higher ORAC values than fruit harvested from plants in the other fertilizer treatments. Generally, 'Obsidian' blackberry showed greater variability in antioxidant properties than 'Triple Crown'. 'Marion' and 'Black Diamond' were also grown organically but, in this case with three different weed management strategies: non-weeding, hand weeding, and weed mat. Fruit were machine-harvested three times at 1 wk intervals in 2012, sorted by hand to exclude molded and damaged samples, frozen in a forced-air freezer at -25 °C, and stored at the freezer for up to 9 mo. Physicochemical properties, including pH, TA, and total soluble solids (TSS), and antioxidant content, including TPC and TMA were measured prior to and during frozen storage. Antioxidant capacities, including RSA, ORAC, and FRAP were also measured prior to frozen storage. Although weed management had no significant effect on the physicochemical properties of the fruit, it had numerous effects on TPC, TMA, RSA, ORAC and FRAP. Late-harvest 'Marion' fruit had the highest ORAC and FRAP values compared to 'Black Diamond' fruit and 'Marion' fruit from the earlier two harvests. Fruit from the hand-weeded treatments had up to 30% higher antioxidant content and capacity during the first second harvests than fruit from the non-weeded and weed mat treatments. This study provided important information about the effects of organic production systems on post-harvest quality of blackberry fruit during refrigerated and frozen storage. Such information will be helpful for providing guidelines to the organic berry industry (growers, packers and processors) for making decisions on the selection of organic fertilizers and weed management practices, the timing of fruit harvest, and the maximum amount of time in which the fruit should be refrigerated or frozen without a significant loss in quality.

Tomato powder and soy fiber may provide health benefits by supplying dietary fiber and antioxidant compounds. The main objective of this study was to investigate the effects of dietary fiber additions (tomato powder 3%, tomato powder 5%, soy fiber 3% and soy fiber 5%) and fat content (10, 15 and 20%) on physical and chemical properties of beef hot dog. Tomato powder and soy fiber additions increased protein content and dietary fiber content in all cases ($P < 0.05$), and all dietary fiber additions provided a small degree of showed antioxidant activity in the order of ($P < 0.05$) 3% tomato powder 3% soy fiber 5% tomato powder= 5% soy fiber. Tomato powder content had no effect on cooking loss ($P > 0.05$) but decreased water holding capacity ($P < 0.05$), whereas soy fiber decreased cooking loss and increased water holding capacity ($P < 0.05$). Increasing fat content generally resulted in increased cooking loss and water holding capacity ($P < 0.05$). However, interaction effects on cooking loss due to fiber addition were found in 10 and 20% fat levels ($P < 0.05$). For the color analysis, Tomato fiber decreased L^* and a^* values and increased b^* value ($P < 0.05$), while

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soy fiber increased L^* and b^* value and decreased a^* value in beef hot dogs ($P < 0.05$). Increasing fat content increased L^* value and decreased a^* ($P < 0.05$) value but did not affect b^* value ($P > 0.05$). In regard to the texture profile, increasing fat content decreased hardness, gumminess and chewiness ($P < 0.05$).

Processing and Development of Polysaccharide-Based Biopolymers for Packaging Applications presents the latest cutting-edge research into the processing and utilization of bio-based polymers for packaging applications, covering materials derived from polysaccharides, polylactic acid (PLA), polyhydroxyalkanoates (PHAs), polybutylene and bio-polyethylene. The book also covers the principles of biopolymer plasticization, experimental and modeling techniques, the use of nanotechnology, and key advances relating to biopolymer-based packaging, including anti-microbials, anti-oxidative agents, and modified atmosphere packaging (MAP). Introduces the principles of biopolymer plasticization and summarizes experimental and modeling techniques Covers a range of important bio-based polymer resources, explaining resources, availability, characterization methods, and extraction and refining techniques Supports the processing and development of bio-based polymers with enhanced functionality for advanced packaging applications

This study aims to analyse physicochemical properties of whole potato (including skin) flours from four M?ori potato cultivars (Taewa). The properties of M?ori potato flour samples (Tutae, Kowi, Moe, and Hua) significantly differed from those of modern potato flour samples (Potato White Washed (PWW) and Potato Red Loose (PRL)), including in chemical composition, antioxidant activity, swelling power, water solubility index, and thermal, pasting and corresponding gel textural properties, as well as in vitro starch digestibility. The carbohydrate content, total dietary fibre, lipid content, minerals (P, Na, Ca, Fe, and Al), antioxidant activity and phenolic content were higher in M?ori potato flours, especially in flour derived from the Tutae cultivar, which has purple skin and flesh. Pearson correlations suggested that swelling, pasting, and textural properties were significantly associated with starch from potatoes. Principal component analysis was also performed from four different aspects, namely, chemical composition, mineral content, antioxidant activity, and functional activity, to evaluate the similarities and differences among the potato flours. Tutae and Kowi flour samples had similar functional properties. All M?ori potato flours were significantly different from modern potato samples. The results of this study highlight the unique characteristics of whole M?ori potato flours, which may be useful for further formulation in food product development. Keywords: M?ori potato, whole potato flours, chemical composition, antioxidant activity, thermal properties, rheological properties, in vitro starch digestibility.

Fruit ripening is an important aspect of fruit production. The timing of it affects supply chains and buying behaviour, and for consumers ripeness not only affects perceptions of health but has nutritional effects too. Ripeness is closely related to spoilage which has a major financial impact on agricultural industries. Currently

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there are fast moving developments in knowledge of the factors affecting fruit ripeness, and this up-to-date monograph seeks to draw together the disparate research in this area. The aim of the book is to produce a comprehensive account covering almost every area related to fruit ripening including the latest molecular mechanisms regulating fruit ripening, its impact on human nutrition and emerging research and technologies.

Chinese Dates: A Traditional Functional Food delivers unique information on Chinese dates (jujubes) as typical ethical foods and traditional health-promoting foods. It conveys a better understanding of Asian food cultures and provides historical information in regard to traditional functional foods and their dietary applications. It discusses the h

Food antioxidants are of primary importance for the preservation of food quality during processing and storage. However, the status of food depends on a balance of antioxidants and prooxidants occurring in food. Food Oxidants and Antioxidants: Chemical, Biological, and Functional Properties provides a single-volume reference on the effects of naturally occurring and process-generated prooxidants and antioxidants on various aspects of food quality. The book begins with a general introduction to oxidation in food and then characterizes the main oxidants present in food, including enzymatic oxidants. Chapters cover oxidation potential, mechanisms of oxidation of the main food components (proteins and lipids), addition of exogenous oxidants during food processing, and the effects of physical agents such as irradiation, freeze-thawing, and high hydrostatic pressure during processing. The book also discusses the effects of oxidation on sensory characteristics of food components and analyzes how oxidation and antioxidants affect the nutritive and health-promoting features of food components. The text examines natural antioxidants in food, including lesser-known ones such as amino acids and polysaccharides, antioxidants generated in food as a result of processing, mechanisms of antioxidant activity, and measurement of antioxidant activity of food components. It explores the bioavailability of curcuminoid and carotenoids antioxidants and presents case studies on natural food antioxidants, presenting novel extraction methods for preservation of antioxidant activity. The final chapters address functional antioxidant foods and beverages as well as general ideas on the effects of food on the redox homeostasis of the organism.

Milk processing is one of the most ancient food technologies, dating back to around 6000 B.C. A huge number of milk products have been developed worldwide, representing a spectacular example of biodiversity and a priceless cultural heritage. After millennia of unanimous appreciation as a pillar of human nutrition, a series of questions about the desirability of their wide consumption have been raised. In the light of the growing threat deriving mostly from the spread of veganism and health consciousness, improving milk processing safety and dairy nutritional characteristics, as well as deepening their functional characteristics, are of a primary exigency. This Special Issue contains several articles focusing on this hot topic, all of which add

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knowledge to the field and supply interesting ideas for developing new products and processes.

A comprehensive reference for assessing the antioxidant potential of foods and essential techniques for developing healthy food products *Measurement of Antioxidant Activity and Capacity* offers a much-needed resource for assessing the antioxidant potential of food and includes proven approaches for creating healthy food products. With contributions from world-class experts in the field, the text 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.

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 labeling 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 agriculturalists.

The discovery of resistant starch is considered one of the major developments in our understanding of the importance of carbohydrates for health in the past twenty years. Resistant starch, which is resistant to digestion and absorption in the human small intestine with complete or partial fermentation in the large intestine, is naturally present in foods. *Resistant Starch: Sources, Applications and Health Benefits* covers the intrinsic and extrinsic sources of resistant starch in foods, and compares different methods of measuring resistant starch and their strengths and limitations. Applications in different food categories are fully covered, with descriptions of how resistant starch performs in bakery, dairy, snack, breakfast cereals, pasta, noodles, confectionery, meat, processed food and beverage products.

This book reviews recent research and applications of chitin and chitosan, as natural alternatives of fossil fuel products, in medicine and pharmacy, agriculture, food science

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and water treatment. Chitin and chitosan products are polysaccharides derived from food waste of crustaceans and fungi, and thus are cheap, abundant, sustainable, non-toxic, recyclable and biocompatible. Remarkable applications include food additives and preservation, packaging materials, biopesticides and fertilisers, drug delivery, tissue engineering, bioflocculation and dye removal.

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.

This book provides a broad-based foundation of knowledge about brown rice, including the latest information on health benefits and disease prevention resulting from consumption of brown rice, and information on consumer knowledge, attitudes, and behaviors towards brown rice. It is the first book of its kind to provide a comprehensive review of current brown rice science and technology, regulatory/policy issues, dietary intake, consumer interest and health promotion. The edited volume focuses on the latest developments in breeding varieties for high quality brown rice, varietal variations, defects, milling, cooking quality, eating quality, post-harvest management and methods to improve shelf life. Contributing authors address the physical, chemical, engineering, nutritional and glycemic qualities of brown rice in different chapters. Authors also discuss the physiological functions of brown rice in vivo and radical scavenging activity, emphasizing their importance to growers, technologists and consumers, and providing insight into future advances. This comprehensive collection benefits scientists, nutritionists, dieticians, diabetic educators, and professionals in the food industry. The information covered is valuable for food scientists and technologists working to develop new brown rice products and enhancing the taste, quality, and health profile of brown rice.

"Astaxanthin is an active antioxidant and has beneficial effect on human health. However, its hydrophobic nature and susceptibility to light, heat and oxygen limit its application in most food systems. This study aimed to encapsulate astaxanthin using milk proteins and carbohydrate, in order to improve its stability and application in food systems. Whey protein isolate (WPI) and sodium caseinate (SC) are well known encapsulants and possess antioxidant properties. Soluble corn fibre 70 (SCF70) with DE 20 is believed to exhibit antioxidant activity and to improve encapsulating capacity of protein-based wall systems. They were therefore selected as the wall materials for encapsulation of astaxanthin. The wall solution was prepared from dissolving the emulsifier and carbohydrate containing a total of 20-24 wt% solids in water. The astaxanthin emulsions were prepared by two-stage homogeniser at 80 + 800 bars after passing through the homogeniser 4 times. The emulsion were then converted into powders with 0.33 wt% astaxanthin by spray drying at 160°C inlet air temperature and 70°C outlet air temperature. The properties of the emulsions were evaluated including droplet size, size distribution, zeta potential, and viscosity. The powder produced from

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spray drying were characterised by chemical and physical tests including water activity, microencapsulation efficiency, surface properties and oxidative stability. The interaction between wall materials was studied using Fourier Transform Infrared Spectroscopy (FTIR) while the bioaccessibility was investigated in an in vitro digestion study. Results show that droplet size of the astaxanthin emulsions was below 200 nm and size distribution appeared to be narrowly distributed. Therefore, particle size would have little effect on the physicochemical properties of spray dried powders. The low viscosity of the parent emulsions probably exhibited little effect on the spray drying process. It was found that the reconstituted emulsion and parent emulsion both had droplet size below 200 nm. This indicates that the astaxanthin emulsions could be stable during spray drying. Scanning electron microscopy reveals that formation of surface dents on some samples caused by particle shrinkage during early drying process. Particle with WPI based wall systems had smoother outer surface than those formulated with SC based wall matrices, suggesting that WPI could be a suitable encapsulating agent in combination with soluble corn fibre 70. Microencapsulation efficiency of the microencapsulated astaxanthin was above 88%, indicating the wall matrices were effective in preventing penetration of the organic solvent into the microcapsule. Storage test was conducted at 45°C and 33% relative humidity, under air and nitrogen environment. The oxidative stability of the astaxanthin microcapsules was determined by measuring peroxide value and p-anisidine value. Results show that surface oil might not be related to the oxidative stability of the microcapsules and other factors might adversely affect the oxidative stability. Changes in the physical state of the amorphous powders due to the difference in water activity between the powders and storage environment might influence the oxidative stability and the astaxanthin content in the microcapsules. Results indicate that wall composition may have little effect on the oxidative stability of the microencapsulated astaxanthin. Astaxanthin content in microcapsules with high oil content decreased slightly faster than in those containing less oil content. Oxidative stability of the microcapsules could be related to the antioxidant activity of raw materials. The FTIR results indicated the possibility of Maillard reaction products formation, which may also influence the oxidative stability of the microcapsules. The in vitro digestion results suggested that the digestivity of the WPI based wall systems might be better than that of the SC based wall systems, as the bioaccessibility of the microcapsule were higher. The presence of dietary fibre (i.e., SCF70) and wall thickness might affect the in vitro digestivity of the microcapsules. Overall, the best formulation showing the best bioaccessibility (71.67%) is the WPI/SCF 70 ratio of 1/0.5 and the wall/core ratio of 2. In summary, this research has shown that microencapsulation of astaxanthin by spray drying technique is capable of producing a more stable microcapsule that has potential application in food system"--Abstract.

Spray drying is a mechanical process by which materials in liquid form can be converted into solid form such as powders. It is a rapid, continuous, cost-effective, reproducible and scalable process for producing dry powders from a fluid material by atomization through an atomizer into a hot drying gas medium, usually air. The Handbook on Spray Drying Applications for Food Industries deals with recent techniques adopted in spray drying systems for drying a vast array of food products, novel and emerging tools used for spray drying of antioxidant rich

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products, optimized conditions used for extraction and production of herbal powders by using spray drying techniques, and problems encountered during spray drying of acid and sugar rich foods and also various herbal powders. The book discusses the encapsulation of flavors by using the spray drying process providing a comparison with other encapsulation techniques. It reviews the retention of bioactive compounds and the effect of different parameters on bioactive compounds during spray drying of juice. Moreover, the book explains the effect of novel approaches of spray drying on nutrients. The book addresses strategies adopted for retention of nutrients and survival of probiotic bacteria during spray drying processing. It also identifies packaging material needed for enhanced product stability. The safety and quality aspects of manufacturing spray dried food products are discussed. Key Features: Describes the design of high performance spray drying systems Highlights the strategy adopted for maximizing the yield potential of various spray dried food products Discusses strategies adopted for retention of nutrients and survival of probiotic bacteria during spray drying process Contains charts, procedure flow sheets, tables, figures, photos, and a list of spray drying equipment suppliers This book will benefit entrepreneurs, food scientists, academicians and students by providing in-depth knowledge about spray drying of foods for quality retention and also for efficient consumer acceptability of finished products.

Glucosidases—Advances in Research and Application: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Glucosidases. The editors have built Glucosidases—Advances in Research and Application: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Glucosidases in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Glucosidases—Advances in Research and Application: 2012 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

"Overwhelmed by all the disconnected literature on antioxidant technology and methodology? One book, one resource to fulfill your antioxidant needs. A complete description (including figures) of the skin's endogenous (innate) antioxidant system A chapter on the production of free radicals in skin due to UV irradiation A comprehensive description of testing methodologies for lipid peroxidation and free radical scavenging capacity (antioxidant assays) A comprehensive examination of the use of antioxidants in skin care products Timely and pertinent reference information, structures, and physical/chemical properties of antioxidants used to treat the skin A survey of antioxidant products

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in skin care formulas covering various product categories For researchers in the field of personal care, information on formulating for antioxidant claims is both overwhelming and so widespread as to seem incomplete. While much of the literature out there addresses free radical damages, little goes further to address the cellular level of human skin. Antioxidants and the Skin is the first text to offer a comprehensive account of antioxidants in personal care. Never before has this vast field been drawn together in a single text. You benefit from Roger L. McMullen's years of experience and research on topics ranging from the fundamental aspects of skin biochemistry and how free radical species damage biological systems, to concepts of lipid peroxidation and the effects on skin, to antioxidant treatment efficacy and detailed outlines of the physicochemical properties of key antioxidants. This book is an essential reference text and an up-to-date treatise on the crucial fields of dermatology and cosmetic skin science. Whether you are beginning a journey in the realm of antioxidants, or are a seasoned antioxidant veteran in need of a valuable resource tool, you need look no further!"--Dawsonera website.

Biodegradable, bioactive-based polymers have been successfully employed as sustained bioactive delivery systems. This dissertation describes bioactives that have been chemically incorporated into novel, biodegradable polymers via covalent bonds for controlled, sustained, and tunable release properties. Bioactives are released from polymers via hydrolytic degradation. The polymers described herein utilize alternative synthetic methods and a wide array of bioactives, including antibiotics, antioxidants, antimicrobials, and anti-inflammatory drugs. One goal is to focus on naturally-occurring bioactives that are generally regarded as safe (GRAS) by the FDA. First, poly(anhydride-amides) comprised of ampicillin were synthesized and formulated as coatings. Polymer adhesion onto medical-grade stainless steel surfaces was assessed and in vitro release characterized. Cytocompatibility and antibacterial activity elucidated polymer safety and efficacy for potential in vivo use. These localized delivery systems could mediate the issues caused by implant surgery. Second, poly(anhydride-esters) comprised solely of naturally-occurring phenols and EDTA were synthesized and physicochemical properties determined. Bioactive release was ascertained, in addition to antioxidant activity and activity against Gram-positive and Gram-negative bacteria. These polymers can act as potential preservatives, increasing cosmetic and food product shelf life through antioxidant and antimicrobial pathways. Third, through environmentally sustainable (i.e., green) methods, polyesters with pendant anti-inflammatory groups and a sugar-based backbone were prepared with minimal solvent use, enzymatic catalysis, and biorenewable reactants and reagents. Three comonomers of varying hydrophobicity were tested to elucidate changes in polymer thermal properties and bioactive release rate. Fourth, poly(anhydride-esters) with a mannitol backbone and multiple bioactive groups per repeat unit were developed as the first linear, biodegradable polymers with high bioactive loading (~70%) using a

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polyol. In vitro ibuprofen release was quantified and an anti-inflammatory assay determined that bioactive retained activity upon polymer degradation. Alteration of polyol, bioactive class, and other facets leads to highly tunable polymer properties. Last, to combat bacterial spoilage and oxidation, poly(anhydride-esters) containing natural antimicrobials were designed for food applications. Bioactive released from polymer exhibited radical scavenging ability and antibacterial activity. Furthermore, polymers were blended with current food packaging materials (e.g., polyethylene) and molded into films for active food packaging that contains a higher percentage of biodegradable content.

Barley: Properties, Functionality and Applications provides a systematic introduction and a comprehensive examination of barley science. Recent research has raised the importance of barley finding that barley is a rich source of phenolic compounds, dietary fiber, vitamins, and minerals. Studying the properties of barley provides a basis for better utilizing it, in addition to further development of barley as a sustainable crop. This book will explore knowledge about barley production, grain structure, chemistry and nutritional aspects, primary processing technologies, product formulations and the future prospects of barley. The book also discusses how the limitations of using barley in food products may be overcome by processing of barley grains. Thermal and food preparation methods applied to cereals improves their texture, palatability and nutritive value by gelatinization of starch, denaturation of proteins, increased nutrient availability, inactivation of heat labile toxic compounds and other enzyme inhibitors

Key Features: Contains information on the physical, functional and antioxidant properties in barley flour Deals with the latest development in physical, chemical and enzymatic modification of native barley starch Explores the utilization of malt and malt products in brewing and additionally in distilling, vinegar production and commercially as a food ingredients Provides information in enhancing shelf life and its utilization in phytochemical rich product development. With comprehensive knowledge on nutritional and non-nutritional aspects of barley, this book provides the latest information for grain science professionals and food technologists alike. It will be a useful supplementary text for classes teaching cereal technology, cereal science, cereal chemistry, food science, food chemistry, and nutritional properties of cereals.

This book covers the nutritional and nutraceutical profiles of a wide range of popularly consumed vegetables and nuts. The first half of the book focuses on popular vegetables, and describes how higher vegetable consumption reduces the risk of diseases ranging from diabetes to osteoporosis, diseases of the gastrointestinal tract, cardiovascular diseases, autoimmune diseases and cancer. The book also includes an interesting section on the antioxidant potential of mushrooms. In turn, the second half discusses the nutritional value of various nuts. Nuts are nutrient-dense foods with complex matrices rich in unsaturated fats, high-quality protein, fiber, minerals, tocopherols, phytosterols and phenolics. The respective chapters illustrate how the consumption of nuts could ward off

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chronic diseases like hypertension, cancer, inflammation, oxidative stress, high blood pressure, coronary heart disease etc. In order to effectively promote vegetable and nut consumption, it is necessary to know and understand the nutritional and nutraceutical profiles of vegetables & nuts. Given its scope, the book will be of interest to students, researchers, food scientists, olericulturists, dietitians and agricultural scientists alike. Those working in the vegetable and nut processing industries, horticultural departments and other agricultural departments will also find the comprehensive information relevant to their work. *Future Foods: Global Trends, Opportunities, and Sustainability Challenges* highlights trends and sustainability challenges along the entire agri-food supply chain. Using an interdisciplinary approach, this book addresses innovations, technological developments, state-of-the-art based research, value chain analysis, and a summary of future sustainability challenges. The book is written for food scientists, researchers, engineers, producers, and policy makers and will be a welcomed reference. Provides practical solutions for overcoming recurring sustainability challenges along the entire agri-food supply chain Highlights potential industrial opportunities and supports circular economy concepts Proposes novel concepts to address various sustainability challenges that can affect and have an impact on the future generations

This book gathers the proceedings of the 30th Scientific-Experts Conference of Agriculture and Food Industry, held on September 26-27, 2019, in Sarajevo, Bosnia and Herzegovina. It reports on the application of innovative technologies in food sciences and agriculture, and covers research in plant and animal production, agricultural economics and food production. Further, the book discusses key social and environmental issues, and proposes answers to current challenges. The conference was jointly organized by the Faculty of Agriculture and Food Sciences of the University of Sarajevo, Bosnia and Herzegovina, the Faculty of Agriculture of Ege University, Turkey, the Bosnia and Herzegovina Medical and Biological Engineering Society, and the Faculty of Agriculture of the University of Belgrade, Serbia. The proceedings offer a timely snapshot of cutting-edge, multidisciplinary research and developments in modern agriculture. As such, they address the needs of researchers and professionals, agricultural companies, food producers, and regulatory and food safety agencies.

“Antioxidant Activity of Polyphenolic Plant Extracts” is a collection of scientific articles regarding polyphenols, that is, substances occurring naturally in plants and exhibiting many beneficial effects on human health. Among polyphenols’ interesting biological properties, their antioxidant activity is considered the most important. This book brings together experts from different research fields on topics related to polyphenols, such as their isolation and purification, assessment of their antioxidant activity, prevention from oxidative stress-induced diseases 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 only 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,

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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.

Mathematical and Statistical Approaches in Food Science and Technology offers an accessible guide to applying statistical and mathematical technologies in the food science field whilst also addressing the theoretical foundations. Using clear examples and case-studies by way of practical illustration, the book is more than just a theoretical guide for non-statisticians, and may therefore be used by scientists, students and food industry professionals at different levels and with varying degrees of statistical skill.

Processing and Impact on Antioxidants in Beverages presents information key to understanding how antioxidants change during production of beverages, how production options can be used to enhance antioxidant benefit, and how to determine the production process that will result in the optimum antioxidant benefit while retaining consumer acceptability. In the food industry, antioxidants are added to preserve the shelf life of foods and to prevent off-flavors from developing. These production-added components also contribute to the overall availability of essential nutrients for intake. Moreover, some production processes reduce the amount of naturally occurring antioxidants. Thus, in terms of food science, it is important to understand not only the physiological importance of antioxidants, but what they are, how much are in the different food ingredients, and how they are damaged or enhanced through the processing and packaging phases. This book specifically addresses the composition and characterization of antioxidants in coffee, green tea, soft drinks, beer, and wine. Processing techniques considered here include fermentation and aging, high-pressure homogenization, enzymatic debittering, and more. Lastly, the book considers several selective antioxidant assays, such as Oxygen Radical Absorbance Capacity (ORAC) and Trolox Equivalent Antioxidant Capacity (TEAC) assays. Provides insights into processing options for enhanced antioxidant bioavailability Presents correlation potentials for increased total antioxidant capacity Includes methods for the in situ or in-line monitoring of antioxidants to reduce industrial loss of antioxidants in beverages Proposes processing of concentrated fractions of antioxidants that can be added to foods

This work adopts a holistic approach to studies on landscape, agriculture, forests and natural sciences. As such, it represents a good starting point for anyone looking to learn more about these topics. The book includes research and studies from 50 contributors who are experts in their respective fields.

The first book to extensively cover nanoparticles, this addresses some of the key issues in nanocomposites. Polymer nanocomposites (polymers reinforced with nanoparticles), are of great interest due to their remarkable mechanical, thermal, chemical properties as well as optical, electronic, and magnetic applications Potential applications include automobile body parts, high-barrier packaging materials, flame-retardants, scratch-resistant composites, and biodegradable nanocomposites Combines basic theory as well as advanced and in-depth knowledge of these properties Broad audience includes researchers in Materials Science, Physics, Polymer Chemistry, and Engineering, and those in industry

Sulfenic acids figure prominently in biological and natural products chemistry as

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important intermediates. For example, cysteine derived sulfenic acids are key intermediates in cell signaling and play both catalytic and structural roles in enzymes. Due to the ubiquitous nature of protein sulfenic acids in cells, methods have been developed to detect and quantitate them. Although they can be detected, the mechanisms by which they form and react remain unclear. In addition, sulfenic acids are important enzymatic intermediates in *Allium* chemistry. Garlic, a member of the *Allium* genus, is known to have powerful antioxidant activity and this has recently been attributed to allyl sulfenic acid. Allicin, the thiosulfinate that gives garlic its characteristic odor and flavor, decomposes to yield allyl sulfenic acid, which is believed to trap chain-carrying peroxy radicals by readily donating a hydrogen atom, thus inhibiting autoxidations of hydrocarbons. Despite their important biological roles, little is known of the physicochemical properties of sulfenic acids. This is primarily due to their instability in air and high reactivity as both electrophiles and nucleophiles, giving them the tendency to self-condense and form thiosulfonates. Few persistent sulfenic acids, stabilized by alkyl steric protecting groups surrounding the sulfenic acid functional group, have been reported in the literature. Herein we report our synthetic efforts toward two such sulfenic acids, 9-triptycene sulfenic acid, and trans-9-decalinsulfenic acid, which were expected to be appropriate models for cysteine-derived and allyl sulfenic acids. Using 9-triptycene sulfenic acid, we were able to provide insight into the thermodynamics (O-H BDE) and kinetics (k_{inh}) of the reactions of sulfenic acids with peroxy radicals, which provide a clear connection between the antioxidant activity in garlic and sulfenic acids. We also preliminarily characterized the electrochemical behaviour of this compound, as well as determined its pKa.

The Study of Physicochemical Properties of Mori Potato (Taewa) Flours

Towards more sustainable packaging with biodegradable materials! The combination of the continuously increasing food packaging waste with the non-biodegradable nature of the plastic materials that have a big slice of the packaging market makes it necessary to move towards sustainable packaging for the benefit of the environment and human health. Sustainable packaging is the type of packaging that can provide to food the necessary protection conditions, but at the same time is biodegradable and can be disposed as organic waste to the landfills in order to biodegrade through a natural procedure. In this way, sustainable packaging becomes part of the circular economy. *Sustainable Food Packaging Technology* deals with packaging solutions that use engineered biopolymers or biocomposites that have suitable physicochemical properties for food contact and protection and originate both from renewable or non-renewable resources, but in both cases are compostable or edible. Modified paper and cardboard with increased protective properties towards food while keeping their compostability are presented as well. The book also covers natural components that can make the packaging functional, e.g., by providing active protection to the food indicating food spoilage. * Addresses urgent problems: food packaging creates a lot of hard-to-recycle waste - this book puts forward more sustainable solutions using biodegradable materials * State-of-the-art: *Sustainable Food Packaging Technology* provides knowledge on new developments in functional packaging * From lab to large-scale applications: expert authors report on the technology aspects of sustainable packaging

The latest research on the health benefits and optimal processing technologies of herbs

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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.

Nutritional Composition and Antioxidant Properties of Fruits and Vegetables provides an overview of the nutritional and anti-nutritional composition, antioxidant potential, and health benefits of a wide range of commonly consumed fruits and vegetables. The book presents a comprehensive overview on a variety of topics, including inflorescence, flowers and flower buds (broccoli, cauliflower, cabbage), bulb, stem and stalk (onion, celery, asparagus, celery), leaves (watercress, lettuce, spinach), fruit and seed (peppers, squash, tomato, eggplant, green beans), roots and tubers (red beet, carrots, radish), and fruits, such as citrus (orange, lemon, grapefruit), berries (blackberry, strawberry, lingonberry, bayberry, blueberry), melons (pumpkin, watermelon), and more. Each chapter, contributed by an international expert in the field, also discusses the factors influencing antioxidant content, such as genotype, environmental variation and agronomic conditions. Contains detailed information on nutritional and anti-nutritional composition for commonly consumed fruits and vegetables Presents recent epidemiological information on the health benefits of fresh produce Provides in-depth information about the antioxidant properties of a range of fruits and vegetables This book is a printed edition of the Special Issue "Antioxidants in Health and Disease" that was published in *Nutrients*

Bioactive Polysaccharides offers a comprehensive review of the structures and bioactivities of bioactive polysaccharides isolated from traditional herbs, fungi, and seaweeds. It describes and discusses specific topics based on the authors' rich experience, including extraction technologies, practical techniques required for

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purification and fractionation, strategies and skills for elucidating the fine structures, in-vitro and in-vivo protocols, and methodologies for evaluating the specific bioactivities, including immune-modulating activities, anti-cancer activities, anti-oxidant activities, and others. This unique book also discusses partial structure-functionality (bioactivities) relationships based on conformational studies. This comprehensive work can be used as a handbook to explore potential applications in foods, pharmaceuticals, and nutraceutical areas for commercial interests. Serves as a comprehensive review on extraction technologies, and as a practical guide for the purification and fractionation of bioactive polysaccharides Brings step-by-step strategies for elucidating the fine structures and molecular characterizations of bioactive polysaccharides Includes detailed experimental design and methodologies for investigation bioactivities using both in-vitro and in-vivo protocols Clarifies how to extract, purify, and fractionate bioactive polysaccharides, also exploring health benefits Useful as a guide to explore the commercial potentials of bioactive polysaccharides as pharmaceuticals, medicine, and functional foods

Flavonoids are abundant secondary metabolites found in plants and fungi that have various roles in these organisms, including pigmentation, cell signalling, plant defence and inter-organism communication. Due to their abundance in nature, flavonoids are also important components of the human diet, and the last four decades have seen an intense study focused on the structure characterization of flavonoids and on their roles in mammal metabolism. This book reviews most of the well-established activities of flavonoids, and we also present more recent research studies on the area of flavonoids, including the chemical aspects of structure characterization of flavonoids, the biosynthesis of flavonoids in model plants as well as their role in abiotic stress situations and in agriculture, the role of flavonoids in metabolism and health and their importance in foods, from consumption to their use as bioactive components. Cancer is a global risk for human wellness and health. Dietary habits could profoundly affect the risk of certain cancer, such as colorectal cancer (CRC) (Platz, 2000). CRC has listed the third leading cancer among male and female in the United States (Stewart, 2014). Surprisingly, the consumption of dietary fiber has an inverse correlation with the mortality of CRC (Song, 2018). However, most Americans do not consume enough dietary fiber to meet the recommended level of dietary fiber intake (Clemens, 2012; Lee-Kwan, 2017). Hence, it is reasonable to increase the nutrient density, i.e., dietary fiber, of current food model. Xylo-oligosaccharides (XOS), an emerging prebiotics, showed multiple advantages over fructo-oligosaccharides (FOS) and inulin. For example, Hsu et al. (2004) reported XOS are more effective than FOS on increasing *Bifidobacterium* level in rat cecum (Hsu, 2004). It is also suggested that dietary fiber and phenolic compounds have synergistic effect on promoting gut health (Uehara, 2001; Matsukawa, 2009). Therefore, the application of XOS into a polyphenol-dense food vehicle (strawberry puree) could be a viable way to promote gastrointestinal health and help reduce CRC risk. First, the effect of xylo-oligosaccharides (XOS) incorporation on the quality attributes of strawberry puree was investigated. Rheological properties, color and physicochemical characteristics and composition such as water activity, pH, and total soluble solids, were investigated to determine the maximum XOS content that can be incorporated into the strawberry puree without significantly altering the original properties of samples. Based on the collected data, adding xylo-

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oligosaccharides greater than 7.5% w/w will significantly change the quality attributes of the strawberry puree including its rheological characteristics, color profile, water activity, and total soluble solids. The addition of XOS at 2.5% and 5% w/w did not significantly alter overall quality attributes of strawberry puree. Second, the effects of heat treatment (HTST, 75°C, 15s and UHT, 121°C, 2s) and storage condition (storage time: 1, 15, and 36 days; storage temperature: 4°C and 55°C) on the quality attributes of xylo-oligosaccharides enhanced strawberry puree was studied (texture, color water activity, total soluble solids, and pH). In addition, the physicochemical (total phenolic, tannin, flavonoids contents, and antioxidant activity) evolution was studied. A 9-point Hedonic test was conducted to evaluate the sensory properties (overall, texture, color, appearance, sweetness, aroma, flavor) of purees (with and without XOS, 5%w/w) under different thermal treatments. Briefly, all nutritional attributes were retained better under cold storage (4 °C) as compared to high-temperature storage (55 °C). The result revealed that thermal treatment and high storage temperature showed an inverse correlation with puree consistency. As for chemical analysis, intense thermal treatment (UHT) caused the most degradation in TPC, TFC and tannin level. However, such treatments (UHT) helped significantly increase the measurable antioxidant level. For other physicochemical properties, processing methods (HTST / UHT) and high storage temperature exhibited more significance in changing the color profiles of the specimen than XOS incorporation. Overall, the addition of XOS up to 5% w/w could increase nutritional value of strawberry puree as well as consumer preference without significantly compromising quality attributes. Based on instrumental and sensory analysis, HTST treated strawberry puree with XOS incorporation (5% w/w) meet the standard of sensorial attributes of fresh puree with improved shelf-life stability and fiber concentration.

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