The Content And Antioxidant Activity Of Phenolic Compounds

effect of different solvent type on total phenolic content and antioxidant activity of agarwood leaves
determination of antioxidant activity, total phenolic and flavonoid content of hornstedtia spp. (zingiberaceae)
phenolic content and antioxidant activity of selected spices

Total flavonoids, phenolic content and antioxidant activity of various crude extract of fibraurea chloroleuca
phenolic content and antioxidant activity of fresh and fried local fruits

Effect of cooking on total phenolic content and antioxidant activity in selected foods

Oxidative damage to plants

The effect of different infusion conditions on total phenolic content and antioxidant activity of lemongrass
(Cymbopogon citratus)

Total phenolic content and antioxidant activity of some malaysian herbs

Antioxidant methodology

Handbook of antioxidant methodology

functional food cereal grain by-products as natural antioxidants

Polyphenol content and antioxidant activity in dehydrated berries and apple juice

A comprehensive study of phenolics and peptides from three legume varieties

Phenolic antioxidants and health benefits

Total flavonoid content, total phenolic content and antioxidant activity of various of extract of etlinger elatior

Total phenolic content and antioxidant activity of pulp and peel extracts of benincasa hispida

Evaluation of total phenolic content and antioxidant activity of canola grown in the north central region of north america

Grape antioxidants - influence of processing parameters on their content and activity

Antioxidant activity, total phenolic and flavonoid content of leaf, stem and...
Antioxidant Activity of Polyphenolic Plant Extracts
Effect of Extraction Parameters on Total Phenolic Content and Antioxidant Activity of Kesum Leaves
Effect of Varietal Differences in Antioxidant Activity and Phenolic Composition of Asparagus
Thermal Processing Effects on Total Phenolic Content, Antioxidant Activity, Trypsin Inhibitor Activity and In-vitro Protein Digestibility of Lentils
Bioactive Ingredients and Antioxidant Activity of Austrian Wine and Grape Juice
Measurement of Antioxidant Activity and Capacity
Total Polyphenol, Flavonoids Content and Antioxidant Activity of Sargassum Sp
Total Polyphenol, Flavonoid Content and Antioxidant Activity Towards Bark of Moringa Oleifera
Effect of Heat Treatment on [alpha]-Tocopherol Content and Antioxidant Activity of Vegetable Oils
Total Polyphenol and Flavonoid Content and Antioxidant Activity of Cycas Revoluta Leaves
Oxidative Stress and Chronic Degenerative Diseases
Misai Kucing Phenolic Content and Antioxidant Activity of South African Sorghums and of Flours and Cookies Made from Them
Phenolic Compounds
Determination of Total Phenolic Content and Antioxidant Activity of Water and Methanol Extracts of Rhaphidophora Decursiva (Roxb.) Schott Leaves
Effect of Ultrasound Extraction on Anthocyanin Content and Antioxidant Activity in Red Raspberries
Quantification of Total Phenolic Content and Antioxidant Activity of Oat Cultivars Grown in South Dakota

“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, Alzheimer's disease, cardiovascular and intestinal diseases. Importantly, in several of the studies “green extraction methods” for the isolation of polyphenols were developed using modern technologies, where few or no organic solvents were used, in order to minimize environmental and health impacts.

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 capacity were expressed using the term EC50 and Trolox equivalents. As expected, red wines have higher phenolic content (Total polyphenols: 2211.76 mg gallic
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acid equivalents (GAE)/l, Flavonoids: 1418,39 mg catechin equivalents/l, Catechins: 635,36 mg catechin equivalents/l, 82,15 mg cyanidin equivalents/l for Cuvée) 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/l ABTS and Trolox equivalents = 0,7 ml sample/mg 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: 1,69 mg cyanidin equivalents/l; DPPH: EC50 = 2,52 ml sample/mg DPPH and Trolox equivalents = 13,2 ml sample/mg Trolox; ABTS: EC50 = 109,22 ml sample/l 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, Proanthocyanidin: 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/l ABTS and Trolox equivalents = 23,7 ml sample/mg Trolox for Chardonnay) and grape juice (Total polyphenols: 710,35 and 110,22 mg GAE/l, Flavonoids: 313,56 and 8,28 mg catechin equivalents/l, Catechins: 133,64 and 1,06 mg catechin equivalents/l, Proanthocyanidin: 11,63 and 6,93 mg cyanidin equivalents/l; DPPH: EC50 = 1,34 and 15,02 ml sample/mg DPPH and Trolox equivalents = 7 and 78,7 ml sample/mg Trolox; ABTS: EC50 = 319,77 and 650 ml sample/l ABTS and Trolox equivalents = 5,6 and 184,9 ml sample/mg Trolox for red and white, respectably). 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 capacity 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 work responds to the need to find, in a sole document, the affect of oxidative stress at different levels, as well as treatment with antioxidants to revert and diminish the damage. Oxidative Stress and Chronic Degenerative Diseases - a Role for Antioxidants is written for health professionals by researchers at diverse educative institutions (Mexico, Brazil, USA, Spain, Australia, and Slovenia). I would like to underscore that of the 19 chapters, 14 are by Mexican researchers, which demonstrates the commitment of Mexican institutions to academic life and to the prevention and treatment of chronic degenerative diseases.

Herbs have drawn much attention of people worldwide, not only because of their economic value as food products, but also for their antioxidant compounds. Thus, this study was conducted to investigate the total phenolic content and antioxidant activities on three Malaysian herbs by using Soxhlet extraction method. The herbs were Eugenia polyantha (Serai kayu), Euodia redlevi (Tenggek burung) and Limnocharis flava (Sudu itik). 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-Ciocalteu reagent for their total phenolic content and 2, 2-Diphenyl-1-picrylhydrazyl hydrate (DPPH) assay for their antioxidant compounds. Further analyzed was done using HighPerformance Liquid Chromatography (HPLC) to further verifying the ascorbic acid existence in the extracts. It was found L. flava showed the highest content of total phenolic compounds (15.01 mg gallic acid equivalent (GAE) per 1 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 showed the highest value of antioxidant capacity (21.19 mg AAE/g) with total phenolic content of 9.99 mgGAE/g. In HPLC analysis, it was found that E. polyantha and L. flava after 8 hour
Master's Thesis from the year 2013 in the subject Agrarian Studies, grade: Master, language: English, abstract: This study was carried out to investigate the changes in chemical composition, total phenolic compounds content, phytate content 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 5±2°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. It could be concluded that addition of wheat fine bran with 5% concentration was the best treatment to improve beef and chicken burger oxidative stability. This text was written by a non-native English speaker. Please excuse any errors or inconsistencies.

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.

Amongst cereals, sorghum is one of the major sources of phenolic compounds. South African cultivars have not been profiled for their phenolic content and antioxidant activity to highlight their potential benefits. Thus, 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 flours. The effects of flour extraction rates 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 sorghum cookie acceptability against a wheat flour cookie. Total phenolic content of the cultivars, determined by the Folin-Ciocalteu method.
was 0.20 to 1.42 g catechin equivalents (CE)/100 g. The total phenolic content 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. Subsequently, the antioxidant activity of the condensed tannin cultivars measured by the ABTS radical scavenging assay was up to 4 times higher than in the tannin-free cultivars. The high phenolic content and antioxidant activity of condensed tannin cultivars was attributed to the contribution of condensed tannins. Therefore, condensed tannin cultivars are a major source of antioxidants compared to tannin-free cultivars. For each sorghum cultivar, cookies of 100% extraction rate flours 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. Cookies 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 227? Mol Trolox equivalents (TE)/g in cookies of condensed tannin sorghum compared to 10 to 102? 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 cookies and the 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.
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 phenolic 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 antioxidants obtained from edible materials, edible by-products and residual sources have been of increasing interest. This contribution summarizes both the synthetic and natural phenolic antioxidants, emphasizing their mode of action, health effects, degradation products and toxicology. In addition, sources of phenolic antioxidants are discussed in detail.

The field of antioxidant research has grown rapidly over the last 30 years and shows no sign of slowing down. In order to understand how antioxidants work, it is essential to understand how their activity is measured. However, antioxidant activity measurements are controversial and their value has been challenged. This book addresses a number of the controversies on antioxidant testing methods. Specifically, the book highlights the importance of context, helping the reader to decide what methods are most appropriate for different situations, how the results can be interpreted and what information
may be inferred from the data. There 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 knowledge of the processes associated with reduction-oxidation is essential, leading to an improved understanding and use of activity measurements and the associated data. The book presents background information, in a unique style, which is designed to assist readers to grasp the fundamentals of redox processes, as well as thermodynamics and kinetics, which are essential to later chapters. Recovery and extraction of antioxidants from diverse matrices are presented in a clear and logical fashion along with methods used to determine antioxidant activity from a mechanistic perspective. Other chapters present current methodologies used for activity testing in different sample types ranging from foods and plants, to body fluids and even to packaging, but always with a strong emphasis on the nature of the sample and the underlying chemistry of the method. A number of emerging techniques for assessing antioxidant behaviour, namely, electrochemical methods, chip technology exploiting microfluidic devices, metabolomics plus studies of gene and protein expression, are examined. Ultimately, these techniques will be involved in generation of "big data" for which an understanding of chemometrics will be essential in drawing valid conclusions. The book is written to appeal to a wide audience, but will be particularly helpful for any researchers who are attempting to make sense of the vast literature and often conflicting messages on antioxidant activity.

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 objective of this research was to investigate the effect of heating on [alpha] Tocopherol content and antioxidant activity of different vegetable oils (EVOO, canola and palm oil). The highest [alpha]-Tocopherol content was found in EVOO followed by canola oil and palm oil (323 ±5, 271 ±2 and 174 ±2 ug/ml) respectively. The effect of heat was done at 70, 100 and 130 C, for time intervals of 0.5, 1, 1.5 and 2 h. Thermal degradation of [alpha]-Tocopherol in the oils was minimal at 70 C and
increased at 100 °C and 130 °C. Heating at 130 °C for 2 h resulted in 100, 24 and 44 % degradation of [alpha]-Tocopherol in EVOO, canola oil and palm oil respectively; EVOO was completely degraded after 1.5 h heating at 130 °C. Use of 2 cooking methods, pan-frying (250 °C, 5 min) and oven cooking (130 °C, 30 min) resulted in the degradation of [alpha]-Tocopherol in the oils. In the pan-frying method, both EVOO and palm oil were completely degraded and canola oil showed 42 % degradation. With the oven cooking method the degradation for EVOO, canola oil and palm oil were 18, 13 and 10 %, respectively. The antioxidant activity was highest with canola oil followed by palm oil and EVOO (59 ±1.72, 51 ±0.84 and 46 ±0.91 %), respectively. At 70 °C there was no significant decrease in the antioxidant activity of the heated oils. At 100 °C, EVOO showed highest reduction in antioxidant activity followed by canola oil and palm oil. At 130 °C, the antioxidant activity decreased gradually in the oil samples. The highest decrease was observed with EVOO followed by canola oil and palm oil. The decrease of antioxidant activity in oil samples was also observed with both pan-frying and oven cooking methods, with greater reduction in antioxidant activity using the pan-frying method. " --

Grapes and wine production residuals, containing grape skins, seeds and stems, represent important sources of phenolic compounds. Red wines are rich in phenolic antioxidants while white wines generally show lower (poly)phenolic content and antioxidant activity. The main difference in the production of white and red wines is the fermentation step. The fermentation of red grapes includes maceration, i.e. it takes place in both liquid and solid parts of the grape. In the case of white wines, the must is clarified before the fermentation starts, cultured yeasts are added to convert the must to wine and antioxidant sulfur dioxide is inserted to protect the wine. The objective of the PhD research was to study antioxidant
potential of white grape phenolics both in raw material and fermentation products. First, the standards of phenolic compounds commonly found in white grapes and wines were tested for their antioxidant and antiradical activity. All tested compounds except apigenin showed strong antioxidant and antiradical properties. Afterwards, conventional solid-liquid extraction (CE) and pressurized liquid extraction (PLE) of phenolic compounds from grape seeds were performed. The optimal extraction conditions were investigated and extracts were analyzed in order to determine their total phenolic content, individual phenolic compounds and antiradical potential. Two different drying methods (hot air and freeze drying) were applied to the seeds. Solvent efficiencies of water, ethanol and water-ethanol mixtures were compared at different temperatures. In addition, supercritical fluid extraction (SFE) with CO2 was investigated as the technique for the recovery of phenolic compounds and for the pretreatment of white grape seed samples. Both CE and PLE gave extracts rich in phenolic compounds with good antiradical properties and, generally, the best results were obtained with PLE at 130°C. At the end, the influence of maceration process on the content and the activity of grape phenolic antioxidants in white wines was studied. For such a purpose, six commercially available macerated white wines from Italy and Croatia were analyzed. In addition, eight non-macerated wines from the same region and variety were studied and compared to macerated wines. The experiments have shown that the maceration process increases the total phenolic content and antiradical activity of the wine. It enables the production of white wines rich in phenolic compounds and with strong antiradical properties in completely natural way using only the grapes and without addition of any chemical agents.

In recent years, the concern of society about how food influences the health status of people has
increased. Consumers are increasingly aware that food can prevent the development of certain diseases, so in recent years, the food industry is developing new, healthier products taking into account aspects such as trans fats, lower caloric intake, less salt, etc. However, there are bioactive compounds that can improve the beneficial effect of these foods and go beyond the nutritional value. This book provides information on impact of bioactive ingredients (vitamins, antioxidants, compounds of the pulses, etc.) on nutrition through food, how functional foods can prevent disease, and tools to evaluate the effects of bioactive ingredients, functional foods, and diet.

With contributions that review research on this topic throughout the world, Oxidative Damage to Plants covers key areas of discovery, from the generation of reactive oxygen species (ROSs), their mechanisms, quenching of these ROSs through enzymatic and non-enzymatic antioxidants, and detailed aspects of such antioxidants as SOD and CAT. Environmental stress is responsible for the generation of oxidative stress, which causes oxidative damage to biomolecules and hence reduces crop yield. To cope up with these problems, scientists have to fully understand the generation of reactive oxygen species, its impact on plants and how plants will be able to withstand these stresses. Provides invaluable information about the role of antioxidants in alleviating oxidative stress Examines both the negative effects (senescence, impaired photosynthesis and necrosis) and positive effects (crucial role that superoxide plays against invading microbes) of ROS on plants Features contributors from a variety of regions globally

Benincasa hispida (B. hispida) also known as kundur, a member of cucurbitaceae (cucurbit) family that
gain highly attention as their biological function such as antioxidant, antimitagenic activities and high in polyphenol content. The foods that we eat contain high chemical composition especially ready to eat food thus, it is important to know the basic nutrition content from the food. With increasing the variety of food production, the increasing in antioxidant activity needed in order to prevent serious health's problem. Natural antioxidant usually comes from plant and from variety part of plants, it also contains its antioxidant value and phenolic content. The objective of this study is to evaluate how drying process of peel and pulp of B. hispida also by using different solvent can affect the antioxidant activity and total phenolic content (TPC) of the peel and pulp extracts. The effects of different drying proces (microwave dried and oven dried) and different solvent systems (ethanol, methanol, ethanol-water 80:20 and methanol-water 80:20) were assessed on the antioxidant activity and total phenolic contents of B. hispida peel and pulp. Antioxidant activities of the sample were determined through DPPH radical scavenging activity, while the TPC was determined spectrophotometrically using Folin-Ciocalteae assay. There was a difference in the extracting ability of each of the solvents. The aqueous solvents were superior in their ability to extract the antioxidants and aqueous methanol was significantly more efficient than aqueous ethanol as shown by the TPC results. As for DPPH, oven-dried pulp samples extracted by methanol solvent showed the highest scavenging activity at 96.55%. The pulp samples showed the highest radical scavenging activity of 81.98% (microwave-dried) and 97.80% (oven-dried) when extracted using 100% ethanol. Meanwhile the peel samples demonstrated highest radical scavenging activities at 68.35% (microwave-dried) and 81.84% (oven-dried) when extracted by aqueous methanol. The findings of this study revealed that 80% methanol and 100% ethanol are the best two extraction solvents used for obtaining the highest antioxidant activities Also, the peel and pulp samples drying process prior to extraction, also influenced the extraction yield. Oven dried peel samples had the
highest yield while oven dried pulp had the lowest. From the result it shows that oven-dried has the best drying method by using aqueous methanol for antioxidant activity. While, for total phenolic content aqueous methanol show the best extraction solvent with microwave-dried. The result obtained demonstrated the potential of the peel and pulp of B. hispida as an alternative source of antioxidant agents.

Heat pre-treatment of nutrient-rich lentil seeds prior to their processing into flour may enhance its use by reducing processing and preparation times in value added products. In this study, changes in trypsin inhibitor content, total phenolic content, antioxidant activity, and in-vitro protein digestibility of flours prepared from hulled red lentils and unhulled green lentils were determined subsequent to various processing methods such as oven roasting (OR), boiling and microwave heating (MH). The increasing interest in the phenolic content of plant based food-stuffs made us to assess two different lentil cultivars processed under fixed temperature and time combination. Total phenolic content and antioxidant activity (TAC) of 70% acetone lentil extracts were assayed spectrophotometrically at 760nm using Folin-Ciocalteu and DPPH (1,1-diphenyl-2-picrylhydrazyl) radical scavenging activity methods, respectively. Significant differences in phenolic content and

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.

Lentil, black soybean and black turtle have been proved to be phenolic-rich 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 preserve 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 material 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 (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.

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