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I am very aware of the responsibilities that the editor's role entails, and I approach my new role with so excitement. I would like to point out that the policy of top priority of **FHTS** is especially to put forward and to reveal the innovations and inspiring outputs for food health and technological sciences. **FHTS** offers an exceptionally fast publication schedule including prompt peer-review by the experts in the field and immediate publication upon acceptance.

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Lastly I should thank all our submitting authors, who have toiled in the production of their work, and have chosen **Food Health and Technological Sciences** as the journal they would like to publish in. Have a great Publishing with **FHTS** …

Ozlem Tokusoglu
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Novel Applications in Nutrition and Food Science: Fortificated Vitamins and Polyphenols of Innovative Industrial Foods and Nutraceuticals

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Abstract

The necessity of fortificated bioactive vitamins carotenoids, and polyphenolic compounds (flavonoids etc.) has been accelerated the development of innovations in the food industry, generating the so-called "*functional foods*" and "*nutraceuticals*"; these are primary importance for human nutrition. Novel processing applications may influence the quality and effectiveness of mentioned nutrients including most fortificated vitamins (Vitamin C,A), carotenoids and phenolic bioactives. In this review content, Pulsed Electrical Field (PEF) processing effects on mentioned nutraceuticals including vitamin C, Vitamin A, carotenoids and phenolics has been detailed approached.

Keywords: Bioactive Vitamins, Polyphenols, Pulsed Electrical Field (PEF), Nutraceutical

Introduction

Nutraceutical vitamins are micronutrients from food by-products that play an essential role in nutrition, food science and technology. It has been determined that nutraceutical food powders as a sources of anticarcinogenic vitamins and carotenoids in medical genomics approach. Most fortificated vitamin C, Vitamin A and also precursor carotenoids as antioxidative defence system components and that of with gene regulation functions have been considered.

Vitamins are micronutrients of foods and beverages that play an essential role in human nutrition. The occurrence of the vitamins in the various groups of food is related to their water or fat-solubility. They comprise a diverse group of organic compounds that are nutritionally essential minor components.

Novel non-thermal technologies (e.g. ultrasounds, high-hydrostatic pressure-HHP, pulsed electric field-PEF) promise to treat foods without decomposing the nutritional constituents and sensorial properties that are normally affected during heat treatment. The implementation of novel technologies together with other trends and practices of the food industry (containing microencapsulation, food waste recovery, food by product based powders) have been brought new developments and state of the art in the industrial foods field.

Vitamins and Phenolics as Fortifiers

Vitamin function *in vivo* in several ways, including (a) as coenzymes or their precursors (niacin, thiamin, riboflavin, vitamin B_6, vitamin B_{12}, biotin, pantothenic acid, and folate; (b) as components of the antioxidative defense system (ascorbic acid, certain carotenoids and vitamin E); (c) as factors involved in genetic regulation (vitamin A and vitamin D, vitamin B_6, folate) is precious for human health and nutrition (Traber,2007; Gregory,1996; de Man,1999) (Figure 1.).

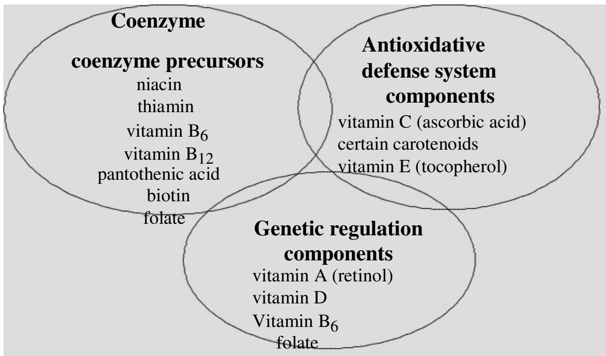

FIGURE 1. Vitamin function *in vivo*

Food is a very complex matrix made up of lots of many individual components including fat and water soluble vitamins that a group of essential organic molecules. Fat soluble (A,D,E,K) and water soluble vitamins (B group, C, biotin, pantothenic acid) in foods have been categorized as above-mentioned three groups from a biochemical standpoint (Figure 1.).

With developing of functional foods, nutraceuticals and dietary patterns, "dietary nutriome" (nutrient profile and composition) and genome health maintenance has been improved. Nutrigenomics based on genome healths is an emerging and recent important field of food nutritional science due to it is increasingly evident that optimal concentration of micronutrients for the prevention of genome damage is dependent upon genetic polymorphisms that alter the gene function involved directly or indirectly in DNA repair and metabolism. It has shown that above-average intake of certain micronutrients (i.e. vitamin E, retinol, folate, vitamin B_6) is associated with a reduced genome damage rate measured using the micronucleus assay (Fenech,2007).

Antioxidants quench free radicals via donating the phenolic H and an electron. They exhibit variable degrees of efficiency for protection of human cells. Especially vitamin C (ascorbic acid) and certain carotenoids (-carotene), when not esterified, have the ability to act as antioxidants (Gregory,1996). Recently, a great interest has been focused on antioxidant vitamins in foods, particularly owing to their likely role in the prevention of coronary heart diseases and cancer (Simon,1992; Gester,1991; German,1990)

It is determined that the physicological action of retinoids is expressed through nuclear receptors which can bind retinoids and regulate the expression of various genes. All *trans*-retinoic acid and 9-cis retinoic acid which are active metabolites of vitamin A are utilized as ligands for nuclear receptors (RAR, RXR), that results in regulation of the expression of various genes at the transcription level (Takase et.al, 1998, 2000).

Novel Processing Effects on Nutraceuticals

Consumers around the world are better educated and more demanding in their identification and purchase of quality health-promoting foods. The food industry and regulatory agencies are searching for innovative technologies to provide safe and stable foods for their clientele. Thermal pasteurization and commercial sterilization of foods provide safe and nutritious foods that, unfortunately, are often heated beyond a safety factor that results in unacceptable quality and nutrient retention. Nonthermal processing technologies offer unprecedented opportunities and challenges for the food industry to market safe, high-quality health-promoting foods. The development of nonthermal processing technologies for food processing is providing an excellent balance between safety and minimal processing, between acceptable economic constraints and superior quality, and between unique approaches and traditional processing resources (Zhang et al., 2011). Nonthermal food processing is often perceived as an alternative to thermal food processing; yet, there are many nonthermal preparatory unit operations as well as food processing and preservation opportunities and challenges that require further investigation by the food industry. Nonthermal technologies are useful not only for inactivation of microorganisms and enzymes, but also to improve yield and development of ingredients and marketable foods with novel quality and nutritional characteristics (Bermudez-Aguirre and Barbosa-Canovas, 2011).

Effect of PEF Processing on Ascorbic Acid (Vitamin C) and Carotenoids

A number of studies have proven the effectiveness of PEF technologies in achieving higher ascorbic acid (vitamin C) content in comparison with heat treatments. Vitamin C retention in a heat-treated (90°C, 60 s) tomato juice was

79.2%, whereas in a PEF-processed juice (35 kV/cm for 1500 µs in bipolar 4-µs pulses at 100 Hz), a 86.5% retention was attained just after processing (Odriozola-Serrano et al., 2008a). Consistently, vitamin C retention reported in a heat-treated strawberry juice (94%) was significantly lower than in a PEF-treated juice (98%) (Odriozola et al., 2008b).

Most of the differences in vitamin results between PEF and heat treatments can be explained through the temperatures reached during processing. The concentration of vitamin C in thermally and PEF-processed juices gradually decreased with storage time. However, it has been demonstrated that vitamin C is better retained in PEF-treated juices than in thermally processed juices after 56 days of storage at 4°C (Morales-de la Peña et al., 2010a; Odriozola-Serrano et al., 2008a,b).

Vitamin C juices in PEF juices also depend on PEF-processing factors and, thus, the lower the electric field strength, the treatment time, the pulse frequency, or the pulse width, the higher the vitamin C retention in orange (Elez-Martínez and Martín-Belloso, 2007), tomato (Odriozola-Serrano et al., 2007, 2008b), and straw-berry juices (Odriozola-Serrano et al., 2009a).

Ascorbic acid is an unstable compound, which under less-desirable conditions, decomposes easily; hence, the milder the treatment, the better the vitamin C retention in juices. However, differences in vitamin C pressure stability during storage could be explained by the initial oxygen content and possible endogenous prooxidative enzyme activity. Bioavailability is defined as the proportion of the nutrients, bioactive compounds, or phytochemicals that are digested, absorbed, and metabolized throughout the normal pathway (Sánchez-Moreno et al., 2009). Drinking two glasses of PEF-treated or HP (high-pressure)-treated orange juice (500 mL/day) containing approximately 180 mg of vitamin C was associated with a significant increase in plasma vitamin C concentration and a decrease in plasma levels of 8-epiPGF2α (biomarkers of lipid peroxidation) (Sánchez-Moreno et al., 2003, 2004).

Effect of PEF Processing on Carotenoids

Recent studies have suggested that carotenoids content increases significantly after PEF processing compared to the untreated juice. Odriozola-Serrano et al. (2007) observed an enhancement of up to 46.2% in the lycopene-relative concentration of tomato juices after applying different PEF treatments (35 kV/cm for 1000 µs). It has been hypothesized that thermal treatments may lead to an increase in some individual carotenoids, owing to greater stability, inactivation of oxidative and hydrolytic enzymes, and unaccounted moisture loss, which concentrates the sample (Rodríguez-Amaya, 1997). Nguyen and Schwartz (1999) suggested that homogenization and heat treatment disrupt cell membranes and protein–carotenoids complex, making carotenoids more accessible for extraction and probably more bioaccessible.

Recent studies also show a higher stability of carotenoids throughout storage in PEF-treated products compared to heat-treated equivalents. PEF-processed tomato juices at 35 kV/cm for 1500 μs maintained higher contents of carotenoids (lycopene, neurosporene, and γ-carotene) through refrigerated storage than heat-processed juices at 90°C for 30 s. The major cause of carotenoid losses in vegetable products is the oxidation of the highly unsaturated carotenoid structure (Tokusoglu et.al.,2015).

Effect of PEF Processing on Phenolics

Flavonoids are the most common and widely distributed group of plant phenolics. Among them, flavones, flavonols, flavanols, flavanones, anthocyanins, and isoflavones are particularly common in fruits. Regarding the main flavanones identified in orange juice, HP treatments (400 MPa/40°C/1 min) increased the content of naringenin by 20% and the content of hesperetin by 40% in comparison with an untreated orange juice (Sánchez-Moreno et al., 2005). These results are in accordance with those obtained by other authors showing higher extraction of phenolic compounds due to HP processing. PEF processing (35 kV/cm for 1500 μs with 4-μs bipolar pulses at 100 Hz) and thermal treatments (90°C, 30 s and 90°C, 60 s) did not affect phenolic content of tomato juices. Both PEF- and heat-treated tomato juices undergo a substantial loss of phenolic acids (chlorogenic and ferulic) and flavonols (quercetin and kaempferol) during 56 days of storage at 4°C. Caffeic acid content was slightly enhanced over time, regardless of the kind of processing, whereas PEF- and heat-treated tomato juices underwent a substantial depletion of *p*-coumaric acid during storage.

The increase of caffeic acid in tomato juices after 28 days of storage could be directly associated with residual hydroxylase activities, which convert coumaric acid into caffeic acid (Odriozol-Serrano et al., 2009). In strawberry juices, *p*-hydroxybenzoic content was enhanced slightly, but significantly after PEF processing (35 kV/cm for 1700 μs in bipolar 4-μs pulses at 100 Hz) compared to the untreated juice, whereas ellagic acid was substantially reduced when the heat treatment was conducted at 90°C for 60 s.

Anthocyanins are a widespread group of plant phenolic compounds that have been regarded as a natural alternative to replace synthetic food colorants. The content of individual anthocyanins significantly depended on the high-intensity pulsed electric fields (HIPEF) treatment time and electric field strength applied during HIPEF processing of the strawberry juices. Anthocyanins were not affected by HIPEF processing when strawberry juice was treated at 22 kV/cm. At electric field strengths from 27 to 32 kV/cm, it was observed that the lower the treatment time and electric field strength, the greater the anthocyanin retention. By the contrary, strawberry juices subjected to the most intensive treatment (37 kV/cm) exhibited the highest anthocyanins content (110–151%) when the longest HIPEF treatment was conducted. It has been reported that proanthocyanins are converted into anthocyanins after processing in acidic water-free conditions (Saint-Cricq de Gaulejac et al., 1999).

No significant differences in flavonol (kaempferol, quercetin, and myricetin) contents were obtained between fresh and treated strawberry juices; thus, these phenolic compounds were not affected by processing (Odriozola-Serrano et al., 2008b). The degradation of phenolic compounds during storage has been mainly related to the residual activity (RA) of polyphenol oxidase (PPO) and polyphenol peroxidase (POD) (Odriozola-Serrano et al., 2009).

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Recent Advances on Intelligent and Active Packaging in Food and Beverage Technology

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ABSTRACT/INTRODUCTION

International markets are demanding packaging with increasingly sophisticated features including those for controlling food quality, for example selective diffusion of gases and moisture vapor, detection of chemical metabolites, monitoring storage temperature or accumulation of heat. Gas and moisture permeable packaging have improved substantially extending distribution channels and product shelf life. Intelligent sensors that monitor cumulative heat exposure provide shelf life predictors for individual food containers at point of sale helping to ensure safe and high quality food for consumers.

Recent concerns over intentional food contamination and widespread global recalls involving chemical and microbiological contamination have led to greater requirements for traceability on individual retail packaging. This is driving the incorporation of sensors, for example radio frequency identification devices (RFID) into food packaging with the rapid adoption of this technology driving down the cost of these sensors. Earlier difficulties with sensitivity, range and ability to use these devices in with frozen foods or in high moisture environments have been overcome. Active and intelligent packaging advances continue with the incorporation of biochemical, chemical and physical taggants and holographic features for authentication and tamper evidence into primary and secondary packaging is becoming more widely adopted as the cost of these technologies drops. Recent advances in nanomaterial technologies have led to the development of enhanced control release and adsorbent containing packaging limit microbial growth and the production of compounds that cause loss of product quality.

RESULTS AND DISCUSSION

Packaging serves many roles from simply a container for a product to a sophisticated electronic media capable of delivering customer directed advertising/information while simultaneously providing inventory control support and protection/indication of spoilage or purposeful contamination. It is integral to protecting and preserving products as well as facilitating product transportation, distribution, storage, information dissemination, sale and use. Food packaging constitutes over half of the total packaging market worldwide. Unfortunately, many companies and individuals, throughout the value chains of many products, fail to dedicate the appropriate attention to package requirements and benefits, often to their detriment.

Consumers are willing to pay more for well packaged food because of its higher perceived quality and safety. Although regulatory requirements garner much attention, the primary driving force in packaging is the market. Then net impact is an ever increasing demand upon packaging, with its integral labeling, for improvements in food packaging for protection, increased shelf life, quality, safety, inventory control and point of sale utility. Packaging also provides identification of the food item, use instructions, advertising, and additional food safety features such as tamper evidence, inventory, pricing and traceability. New printing methods and other computer based technology have reduced the cost of generating labels and graphics on packaging while simultaneously permitting greater flexibility for the producer/manufacturer at the time of packaging or labeling. This benefit has not only been realized by major manufactures but has allowed small businesses to customize packaging and enter new markets.

International markets are demanding environmentally friendly packaging and a reduction in packaging waste. This has put pressure upon the industry to develop biodegradable and recyclable packaging while at the same time minimizing the resources used in its production. Even China, which has now become the largest consumer of grocery items in the world, is finding an ever increasing number of their consumers applying pressure for recycling and reduced carbon footprints similar to the trends existing in most of the world's consumer markets.

Functionality is also an important factor in selecting the most beneficial packaging for one's products. This includes continuously innovative and sophisticated laminated wrapping to "Active Packaging" which describes that packaging resulting in changes to the characteristics of the packaged food such as extended shelf-life and employing such inclusions as sachets placed in the packaging headspace, labels attached to the inside of the container usually on the closure, and absorbent or emitting films. Intelligent features within packaging monitor the conditions of the packaged food and incorporate inventory control, pricing and traceability features. Among the most common active packaging components are absorbers or scavengers that remove undesired compounds such as oxygen, carbon dioxide, and/or ethylene). Release systems emit compounds into the headspace including carbon dioxide antioxidants and preservatives.

Another innovative and developing packaging sector includes nanoscale materials which by definition have at least one dimension in the 1 – 100 nm range. A myriad of nanoscale materials are being incorporated into packaging, providing advantageous properties because of their proportionally larger surface area compared to larger particle of identical composition. As an example, nanoscale clays, silicates and cellulose are incorporated into composites to enhance polymer performance by increasing mechanical strength, improving barrier properties such as increasing glass transition temperature. Silver and zinc oxide based nanoparticles are very effective antimicrobial agents and can be incorporated into paper, plastic and fabric based materials. Metallic nanoparticles can penetrate through the cell membrane of planktonic and sessile (biofilm intercalated) bacterial cells and are more effective against Gram^{+} bacterial cells. Titanium oxide nanoparticles improve the oxygen scavenging ability of films because of their high photo-catalytic activity following exposure to UV light which maintains low oxygen levels in product headspace. Gases produce during food spoilage can be detected by conducting polymer nano-composite or metal oxide particles embedded in an insulated polymer matrix resulting in a color change in the packaging. More sophisticated nano-biosensors for detection of pathogens and chemical contamination are not yet commercially available, but are under development many of which are based upon multiwall carbon nanotube technology. Migration of nanoparticles from the packaging into the food is a concern and many studies are underway to examine toxicological properties and predict risk from long term chronic exposure.

The passage of the Food Safety Modernization Act in the USA will not only force changes to food packaging in that country, but also internationally; first to importers of products into the USA and then to other countries as parts of the Act may become adopted by local regulatory agencies as has occurred in the past. The effects will include changes to labeling requirements, specifically coding, allergen labeling, traceability, and tamper evidence. Food defense applications for food packaging incorporate physical and chemical (including DNA based) taggants, the use of optically active materials including holographic bar codes and labeling, embedded and variable data, micro text print features, as well as increased applications of RFID technology. Other packaging features recently developed initially for covert authentication are being adopted as a control for economic fraud, including deterrence of counterfeiting in the food, beverage, and pharmaceutical industries. Unfortunately many of these applications require expensive readers or other peripheral elements, but regulatory and/or market driven demand for some such as taggants and RFIDs are driving expanded applications and development; this particularly true in the case of RFIDs.

Taggants, include a number of materials such as chemical or physical markers including microscopic or even nano-sized pieces of non-reactive materials, often multi-colored, that serve to identify the authenticity of the material or even its source of manufacture. The latter being a regulatory additive to certain explosives in many countries, adopted thru international treaties and agreements so as to permit a degree of traceability and a deterrent to terrorism. Taggants though have found limited utilization in the food industry due to a resistance of including any non-functional ingredients, but are being incorporated into labeling for some higher valued products, such as expensive beverages.

In contrast, RFIDs are finding ever increasing roles in packaging and marketing. Initially the most common use was as an electronic deterrent to shoplifting (direct, employee, and reverse), they are finding expanding applications in the food industry in many areas including traceability, inventory control, food defense, and point of sale data (pricing, size, etc.). Again, this effort is driven by market demand, particularly from major purchasing entities such as supermarket chains, large multi-line retailers like Wal-Mart and most notably by the US Department of Defense which is requiring that packaging or labeling of all products it purchases, food and non-food alike, include RFIDs. The tags can be passive or active, pre-written, or generated at time of application.

Standardization of data stored in a tag used for commerce has also been a problem, but again market demand has facilitated the establishment of EPCglobal Inc.™, a non-profit corporation formed by the merger of the former EAN (European Authority or formerly EAN International, now GS1) and the North American Uniform Code Council (now GS1 US). The organization's stakeholders establish the standards for the application of the RFID as an Electronic Product Code (EPC). RFID's common to the food industry contain 96 bits of information. The first 8 bits identifies the particular protocol version/application. The next 28 bits identify the data managing organization which is assigned by EPCGlobal. The next 24 bits identify the kind of product while the last 36 bit are a unique number that not only provides specific data on the product such as lot, production date/location or similar information; but further identifies the specific primary container of the product. While the RFID contains a significant amount of integral information, its utility is dynamically increased by integrating this information with data bases.

Initially commercial applications of RFIDs were plagued by high cost and closeness required for the reading/emitter device. Improved technology and increased market demand has driven the price down to a few cents and detection/reading range has increased significantly, often exceeding 15 meters. RFIDs The RFID will not be replacing the bar code in the near future, but will find more and more applications as time goes on and may well accomplish that substitution eventually.

CONCLUSIONS

Among the most interesting and cutting edge developments in packaging in recent years has been the incorporation of passive and active RFIDs for inventory control and traceability into retail food packaging. A second notable advance is bio-degradable composites with suitable barrier properties, printability features and mechanical strength for primary and secondary food packages, this has the potential to significantly reduce waste and over the long term overall packaging costs. Incorporation of nanoscale materials into packaging provides unique physical properties to food packaging and new opportunities for incorporating smart features to monitor safety and quality on individual retail containers. All stakeholders in the food industry will do well to stay on top of packaging/labeling innovations to insure that they can successfully compete in this ever expanding and competitive market.

ACKNOWLEDGEMENTS

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INNOVATIVE MANDARIN PEEL EFFERVESCENT TABLET as Antioxidant and Anticarcinogen Food Supplement: Bioactive Flavanones and Phenolic Acids By HPLC-DAD and LC-ESI-QTOFF-Mass Spectrometry

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Abstract

Recently, the utilization of the potential bioactive phenolics has been the focus of attention owing to their consumption imparts health benefits including various cancer types, reduced risk of coronary heart diseases. Dietary supplements, food tablets, capsules and fortificated foods based on food by-product may be alternative for healthy public nutrition. In this research content, the preliminary data was obtained; the detailed chemical properties of innovative mandarin peel effervescent tablet was determined. Bioactive flavanones and phenolic acids of mandarin peel tablet by HPLC-DAD and LC-ESI-QTOFF-Mass Spectrometry has been put forwarded.

Keywords: Mandarin, effervescent, tablet, bioactive, phenolic, antioxidant, food supplement

Introduction

The citrus production is estimated at 80 million tones per year, making it an important source for useful to human health components. The main waste of the citrus fruits after processing is the citrus peel (Tokusoglu,2018).

Citrus by-products are a good source of phenolic compounds, especially the characteristic flavanone glycosides which mainly include naringin, hesperidin, narirutin, and neohesperidin. Their extraction from citrus peels has attracted considerable scientific interest to use them as natural antioxidants mainly in foods to prevent the rancidity and oxidation of lipids (Tokusoglu,2018; Anagnostopoulou et.al.,2006; Peschel et.al.,2006). Flavonoids, a group of polyphenols, possess potent cardioprotective efficacy and significantly reduce the risk of cardiovascular disease (Bast et al., 2007; Du et al., 2007). Some research groups have reported that flavonoids exhibit protective effects against cardiomyopathy and cardiomyocyte apoptosis induced by doxorubicin (Bagchi et al., 2003). It is investigated that the effects of naringenin-7-O-glucoside on cardiomyocyte apoptosis induced by doxorubicin has been reported. The results demonstrated that naringenin-7-Oglucoside was able to attenuate doxorubicin-induced H9C2 cell apoptosis, having an effect comparable to that of quercetin.

Recently, the utilization of the potential bioactive phenolics has been the focus of attention owing to their consumption imparts health benefits including various cancer types, reduced risk of coronary heart diseases. Dietary supplements, food tablets, capsules and fortificated foods based on food by-product may be alternative for healthy public nutrition.

The aim of this research paper is to study the extraction of polyphenolic compounds from Seferihisar mandarin peels, to determine the phenolic profiles by mass spectrometric analysis, and to determine the compositional structure and antioxidant activity of mandarin peel based innovative effervescent tablet.

Material and Methods

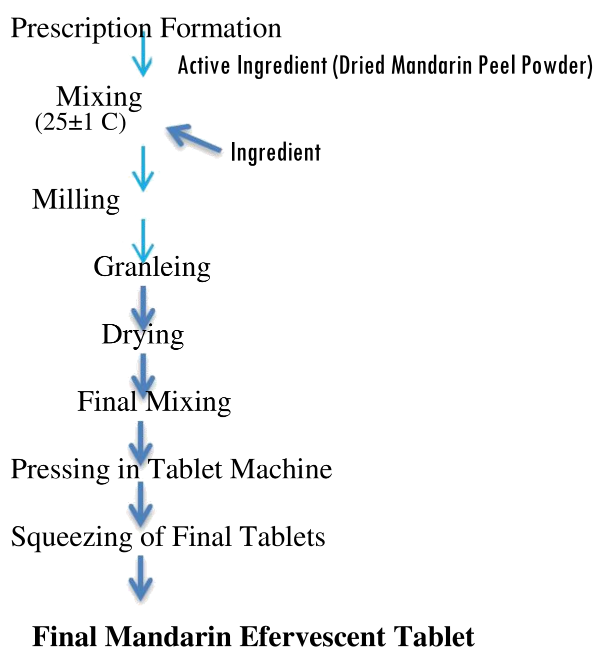
Plant materials

Fresh mandarins, (Citrus reticulata Seferihisar cv.) were harvested at 2018 for two further harvestings in January and late February 2018, as total of 3 replicates from the same area in Seferihisar district, Izmir Province, Turkey. The mandarin peels were cleaned with tap water and cut into 1 cm^2 pieces which were dried by

geothermal system in Seferihisar Doğanbey (as hot air tunnel at 50 °C until reaching a moisture content of 5%). In geothermal drying, peels has been submitted to drying with warm air at relatively low temperature (35 to 75 C). The dried peels were ground with a blade mixer, sieved through a 200 µm sieve and the powder kept in an amber glass bottle at -18 °C until utilized.

Tablet Formation

Mandarin efervescent tablets were man



The manufacturing strategies were applied according to Tokusoglu (2017).

Total phenolic content

The total phenolic content of the freeze dried mandarin peel was determined according to the Folin-Ciocalteu colorimetric method (Anagnostopoulou et al.,2006). The total phenolic content was expressed as mg gallic acid equivalent/100 g dried weight (DW).

Quality Analysis

Basic component analyses (total moisture, total protein, total ash, total fat, total sugar and invert sugar, total fiber were done according to TSE Standard methods (TSE,2018). Total fiber, acidity, pH and mineral analysis [calcium (Ca), potasium (K), magnesium (Mg), aluminium (Al), phophorous (P)] and vitamin C (ascorbic acid) were done according to AOAC international methods (AOAC,1999). DPPH antioxidant activity was done by Tokusoglu and Yıldırım (2012). LC-ESI-QTOFF-Mass Spectrometry was performed by Cai et.al. (2005).

Extraction Methodology for HPLC analysis of Naringenin and Phenolic Acids

2 g of mandarin peel tablet sample was weighted and added 20 ml of H_2O and homogenized with ultra turrax (Ika T25) during 5 min, agitated at 180 rpm for 30 min, then centrifuged at 4000 rpm for 8 min; the supernatant was taken and filtered with 0.45 PTFE syringe, injected to HPLC.

HPLC Conditions of Naringenin

HPLC Apparatus : Agilent 1260 infinity HPLC system with quat pump vacumm degas unit (with Autosampler G1329B, with column oven G1316A, with Diode Array Detector (DAD) G4212B, with Agilent lab advisor chemstation software program)
Detector : DAD-Diode Array Detector
Column : Agilent C18 ODS column, 250 x 4,6 mm 5µm
Column Temperature : 30 °C
Elution Duration : 35 min
Wavelength : 289 nm
Injection volume : 30 µl
Flow Rate : 1 ml/min.
Elution : Gradient
Mobile Phase : A: Distilled Water + Formic acid (99.9 : 0.1)
B: % 95 Acetonitril

Naringenin HPLC Analysis Elution Profile

Duration (Min)	A%	B%
0	75	25
25	55	45
30	55	45
35	75	25

HPLC Conditions of Phenolic Acids

HPLC Apparatus : Agilent 1260 infinity HPLC system with quat pump vacumm degas unit (with Autosampler G1329B, with column oven G1316A, with Diode Array Detector (DAD) G4212B, with Agilent lab advisor chemstation software program)

Detector : DAD-Diode Array Detector
Column : Agilent C18 ODS column, 250 x 4,6 mm 5µm
Column Temperature : 40 °C
Elution Duration : 70 min
Wavelength : 280 nm and 320 nm
Injection volume : 10 µl
Flow Rate : 0.8 ml/min
Elution : Gradient
Mobile Phase : A: Distilled Water + Formic acid (99.8 : 0.2)
B: Methanole

Phenolic Acid HPLC Analysis Elution Profile

Duration (Min)	A%	B%
0	100	0
3	95	5
18	80	20
20	80	20
30	75	25
40	70	30
50	60	40
55	50	50
70	0	100

Results and Discussion

The preliminary data was obtained from mandarin peel effervescent tablet. We aimed to obtain potential healthy components from Seferihisar mandarin peel and Seferihisar mandarin peel based food tablet and also we identified in detail as quantitatively by HPLC-DAD and LC-ESI-QTOFF-Mass Spectrometry.

In mandarin peel tablet, subsequent to fundamental chemical analysis (moisture, protein, ash, fat as 3.44%;5.09%; 29.65%; 0.40%, respectively whereas dried mandarin peel powder includes moisture, protein, ash, fat as 5.24%;4.55%; 3.41%; 0.00% ,respectively. In our mandarin peel tablet; sucrose, invert sugar and total sugar was found as 10.97%; 8.30%,; 11.54%,respectively whereas dried peel powder contained 17.71%; 10.02; 18.64% of level for mentioned sugars . Total fiber, acidity (as citric acid equivalent), pH of mandarin peel tablet was found as 3.03%, 2.74%, 5.96, respectively whereas in dried peel powder, 9.24%, 1.06% and 5.52, respectively (*p* 0.05). It was found that calcium (Ca), potasium (K), magnesium (Mg), aluminium (Al), phophorous (P) (mg/kg) of efervescent tablet was 4616.0; 2988.4; 417.2; 4.0; 367 mg/kg,respectively whereas 21916.9; 10204.0; 3459.6; 9.7; 572 mg/kg level was determined in dried mandarin peel powder, respectively. Potassium and magnesium were major minerals in innovative tablet (*p* 0.05).

Vitamin C (ascorbic acid) was determined as 89.3 mg/100 g in mandarin peel efervescent tablet while 216.4 mg/100 g in dried peel powder. The avg.141.22 mg gallic acid equivalent phenolics [mg gallic asid equivalent (GAE) phenolic /100g] in mandarin peel effervescent tablet whereas avg.128.15 mg GAE /100 g in dried peel powder of

Seferihisar mandarin (p 0.05). DPPH antioxidant activity (%) was found as 27.10% in innovative efervescent tablet and it was found 26.56% was in dried mandarin peel powder (p 0.05).

Majorly L-ascorbic acid, citric acid, malic acid, succinic acid, galactaric acid, glucaric acid (*Saccharic acid)*, glucaric acid lactone, *p*-salicylic acid as organic acids; (+)-naringenin, hesperedin, naringenin-7-O-glucoside, nobiletin , tangeretin, eupatorin (3’,5-dihydroxy-4’,6,7-trimethoxyflavone), gallic acid, *p*-coumaric acid, chlorogenic acid, caffeic acid, ferulic acid, quinic acid, rutin, diosmin flavone, casticin (methyoxylated flavonol) were determined as phenolics; also sucrose, , trehalose sugars and DL-phenylalanine, D-Tryptophan aminoacids were found by LC-ESI-QTOFF-Mass Spectrometry as qualitative and quantitavely (Figure 1). Major antioxidant phenolic was naringenin in mandarin efervescent tablet (p 0.05).

Scientific evidence shows that manufactured mandarin peel tablet can be used as dietary supplement and is beneficial for overall health and for managing some health conditions. By utilizing of Seferihisar mandarin peel, mandarin peel tablet was produced at DEPARK Technopark Spil Innova LLC as industrial health innovative. We revealed the chemical characterization, functional properties, its unique bioactive features and its comprehensive antioxidative, anticarcinogenic reports of new manufactured mandarin peel effervecent tablet.

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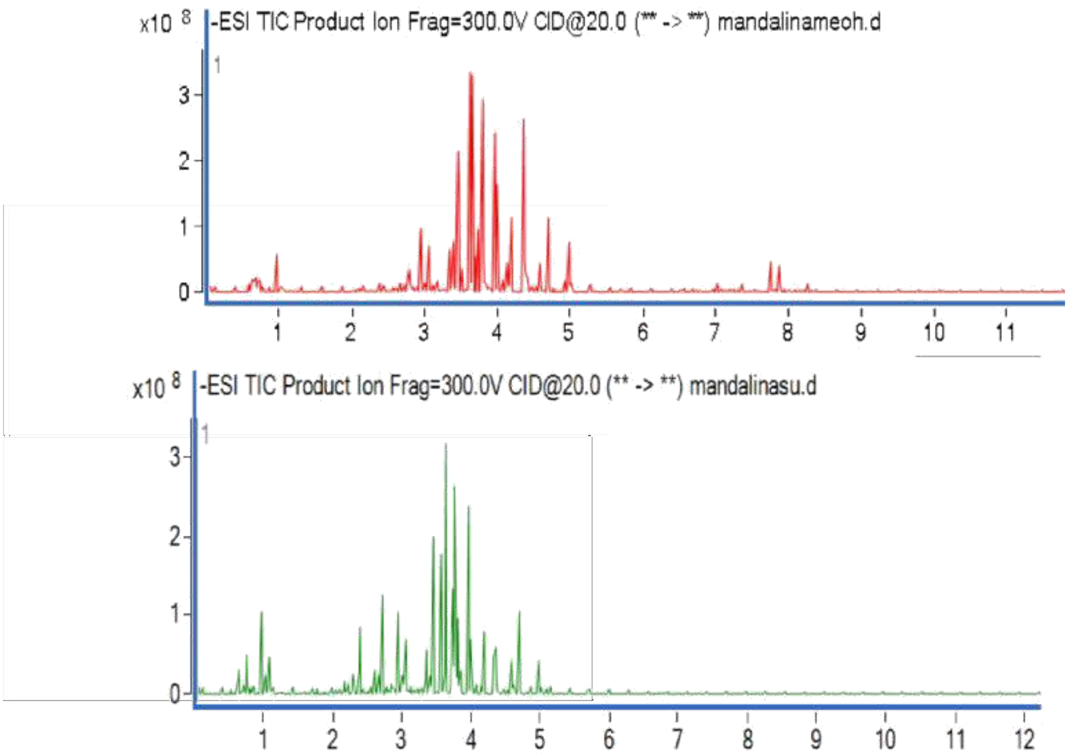

Figure.1.LC-ESI-QTOFF-Mass Spectrometry Analysis Chromatograms of Mandarin Tablets as methanol and water utilizing.

Changes of Weight of Grain String Beans at Soaking in Room Temperature

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Abstract

Beans boiled soft slow, so before cooking, they should be soaked. Pre-soaking makes it possible not only to reduce the duration of their heat treatment, but also to keep the grain during cooking in general form. The collection of recipes of dishes and food products for catering noted, that soaking can be considered complete when the mass of beans will be doubled. To investigate the changes in hydro-processing of new trade beans soak at room temperature.

In studying dynamics of absorption water of a string bean have been used 15 grades of a string bean which grown up in Kyrgyzstan. Research of change of weight was spent in time intervals from 20 mines till 30 o'clock at room temperature. The obtained data has been analyzed and compared to results of similar researches in this area. As has shown research some grades of a string bean absorb sufficient quantity of waters in a current of 8-12 hours. Some kinds of a string bean demand soaking more than 12 hours. Also at studying of dynamics of absorption of water changes of physical indicators have been studied.

Keywords: Grain, Bean, Weight, Soaking

Introduction

String bean (The Latin name Phaseolus vulgaris) belongs to group of the major leguminous cultures having big food value, especially for the population of developing countries. Bean cultures, along with grain and vegetable, make the base of vegetative food of the person. They are characterized by a peculiar structure of food substances – contain a lot of protein, food fibers, mineral substances, it is not enough fat. The content of protein in the bean reaches 20-30 %. From amino acids there is a lot of lysine, leonine, asparagines and glutamine acid. Different types of haricot contain 10-18 % of cellulose that does them irreplaceable in prevention of a number of diseases. Mineral substances include a wide range of elements – iron, calcium, magnesium, selenium, etc.

Table 1 Food value of 100 g string bean

100 g string bean content			
Protein – 23%	B1 (thiamin) – 0,50	phosphor – 480	potassium – 1100
Carbohydrates – 46.6%	B2 (riboflavin) – 0,18	Iron – 5,9	Calcium - 150
Fat acids – 2.3 %	PP (nicotine acid) – 2,10	magnesium – 103	Power value – 292 kcal (for comparison mutton – 203 kcal; beef – 187 kcal; a horse-flesh – 167 kcal)

String bean is one of most export of the focused and competitive types of production of Kyrgyzstan in a foreign market. Production is exported for 90 % to 20 countries of the world. In Kyrgyzstan grow up more than 20 grades of a string bean. In scales of the Kyrgyz Republic, the Talas area is the main producer of leguminous cultures. Gathering string bean in 2009 made 54552 (37.7 billion dollars) tons, in 2010 made 71498 tons and in 2011 made 65820 tons (45.5 billion dollars). It makes 32,3 % in specific volume to the general gross output of plant growing of the region [1, 9]. Despite rather huge scale of manufacture, technological properties of a string bean of local grades aren't studied. [9, 11, 12]. Local population doesn't use so valuable, rich food as string bean in the diet. Because of shortage of sufficient quantity information about local string beans [1, 13, 14].

Material and Methods

In the researches we studied the main physical parameters of seeds: color, form and size of seeds, mass of 1000 grains, hade, volume weight, hardness, water activity. After researches of physical parameters we could classify these grades of string bean shown in Table 2.

Table 2. Classification of Type String Bean

№	Name of bean	Type
1	Lopatka	**I Type – Monophonic, white**
2	Kitayanka	
3	Saharniy	
4	Chernaya Fasol	**II Type – Color monophonic**
5	Elita	
6	Tashkentskiy	
7	Pestriy	**Color motley**
8	Rebaya	
9	Yubka	
10	Korolevskiy	
11	Motosiklist	
12	Dichka	
13	Gusiniye Lapki	
14	Skorospelka	
15	Bokser	

Time, hour	I I Type – color monophonic		
	Chernaya Fasol	Elita	Tashkentskiy
	Weight after soaking at room temperature, g	Weight after soaking at room temperature, g	Weight after soaking at room temperature, g
1	0.56	2.46	2.47
2	1.08	3.77	5.68
3	1.15	4.71	4.21
4	1.23	7.90	4.82
5	1.33	10.20	8.41
6	1.49	10.51	11.57
7	1.68	10.97	9.58
8	**1.81**	12.55	16.61
12	2.76	**20.49**	**20.56**
24	2,45	21,98	22.25
30	2,50	23,25	22.90

The aim of research was find optimum time soaking for each kind of string bean which grown up in Kyrgyzstan. The water absorb ability of string bean is one of important indicators when using string bean in food appointments. Beans boiled soft slow, so before cooking, they should be soaked. Pre-soaking makes it possible not only to reduce the duration of their heat treatment, but also to keep the grain during cooking in general form. The collection of recipes of dishes and food products for catering noted, that soaking can be considered complete when the mass of beans will be doubled. Double mass after soaking and we take as a reference for researching.

Results

For I Type – monophonic, white 12 hours is optimum soaking time for Kitayanka and Saharniy. After 8 hours weight of Kitayanka and weight of Saharniy increases in 1.2 and 1.4. As showed research string bean Lopatka as much as possible increases in 1,5 after 30 hours (Table 3, Fig. 1(a).

Table 3. Change of weight of I type string beans after soaking

Time, hour	I Type – monophonic. white		
	Lopatka	Kitayanka	Saharniy
	Weight after soaking at room temperature, g	Weight after soaking at room temperature, g	Weight after soaking at room temperature, g
1	1.61	2.11	3.43
2	2.42	3.58	4.80
3	1.77	2.21	7.72
4	3.39	3.69	8.22
5	2.05	4.15	10.26
6	3.95	4.89	12.58
7	3.45	10.59	15.20
8	2.58	11.95	13.37
12	6.26	**23.22**	**21.93**
24	12.60	21.64	21.41
30	15.84	22.19	21.73

For type Chernaya fasol 8 hours its optimum for soaking. 12 hours it is enough, during this time its weight increased more then in 2.8 times. 12 hours optimum time for Elita and Tashkentskiy. The increases in mass for Elita and Tashkentskiy is given Table 4, Fig. 1 (b).

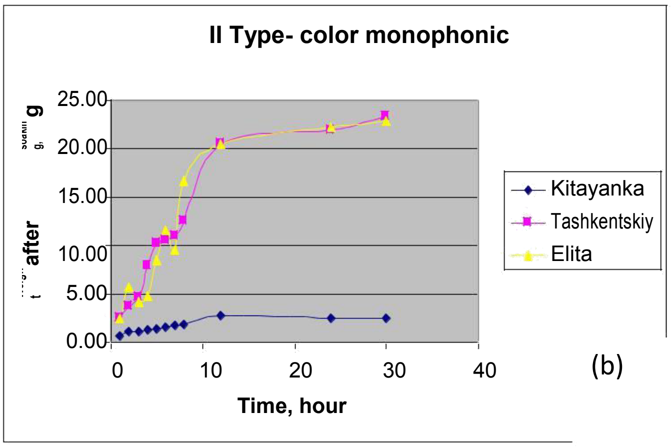
Table 4. Change of weight of II type string beans after soaking.

Form water absorption features we can classify string beans of III Type two groups. I group enter type: Korolevskiy, Pestriy, Rebaya, Motosiklist, Skorospelka and Yubka (Fig. 1 (c). They absorb water faster then other types. The 12 hours is optimum for this type. Some of them a little bit don't gather weight (Pestriy and Motosiklist). But for food appointments it's enough.

II group enter 3 types: Dichka which actual don't absorb water, Bokser and Gusiniye Lapki. During 24 hours Gusiniye Lapki absorb more than 1.5 water. Bokser on the contrary decreases (Fig. 1 (d).

Table 5. Change of weight of III type string beans after soaking

Time, hour	I I I Type - Motley								
	Motosiklist	Korolevskiy	Dichka	Pestriy	Bokser	Rebaya	Yubka	Gusiniye lapki	Skorospelka
	Weight after soaking at room temperature, g								
1	1.05	1.69	1.29	1.53	0.88	1.74	2.08	0.88	2.34
2	1.06	2.65	1.19	4.27	2.28	2.86	4.55	1.24	2.83
3	1.41	3.66	1.85	3.66	1.19	2.06	4.33	2.16	2.34
4	2.97	4.06	1.35	4.72	1.41	4.86	7.30	1.55	2.83
5	2.65	8.68	0.84	6.18	1.70	4.70	7.92	3.25	2.77
6	3.69	9.01	1.55	6.63	2.60	4.94	7.87	3.25	4.71
7	5.37	9.06	1.12	7.82	4.43	8.16	10.09	4.67	4.63
8	5.92	13.28	2.00	11.19	1.90	11.23	11.91	4.92	3.97
12	**17.14**	**20.42**	1.00	**16.49**	10.97	**19.57**	**18.52**	9.98	**18.32**
24	20.69	23.33	3.43	21,21	13.92	19.84	22.19	**15.12**	21.50
30	21.66	24.35	**3.97**	21,56	14.32	21.81	23.43	16.00	23.81



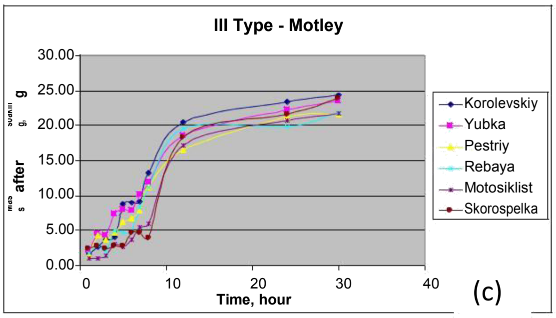
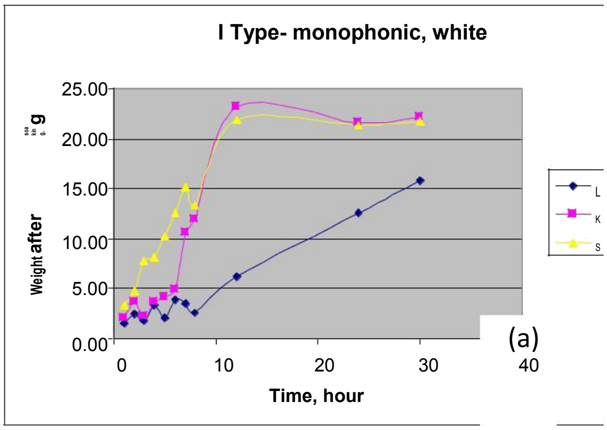
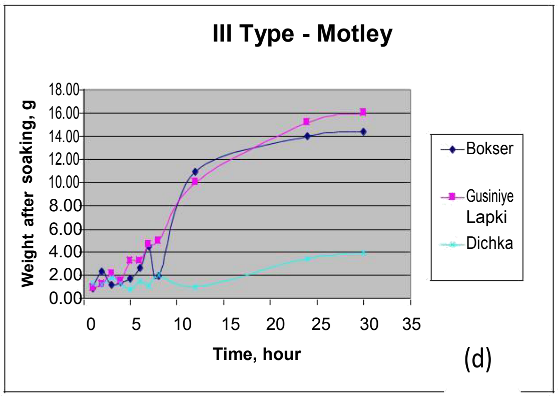


Figure 1 Changes of weight of string beans (all types)





Thus, various types of string beans have a various swelling capacity and dynamics of absorption of water. In the course of soaking that it is necessary to consider by drawing up of compounding and conducting technological process of production of these raw materials. 12 hour is optimum soaking time for majority of samples. We can classify string beans depending of their water absorption dynamics.

For I Type – monophonic, white 12 hours is optimum soaking time for Kitayanka and Saharniy, as showed research string bean Lopatka as much as possible increases in 1,5 after 30 hours. We conclude this features of Lopatka connected with chemical structure of bean.

For II Type – color monophonic 8 hours it is enough for Chernaya fasol and 12 hours optimum time for Elita and Tashkentskiy.

For III Type – motley 12 hours is optimum for Korolevskaya, Rebaya beans. Yubka, Pestriy, Motosiklist and Skorospelka require a little more time than 12 hours. Lack of the required mass of less than 1 gram. Other beans Bokser, Gusiniye Lapki gaining more than 1.5 mass from initial mass. String bean Dichka does not absorb more water even for 30 hours.

Thus, various types of string beans have a various dynamics of absorption of water in the course of soaking that it is necessary to consider by drawing up of compounding and conducting technological process of production of these raw materials. Research revealed that some types of string beans (Dichka) don't absorb water. It is speak that Dichka can be used for other purpose. At further soaking the mass of samples practically doesn't increase.

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