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ORIGINAL PAPER

Alkali-Extracted Feruloylated Arabinoxylans from Nixtamalized Maize Bran Byproduct: A Synonymous with Soluble Antioxidant Dietary Fiber

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Abstract

Feruloylated arabinoxylans were obtained from nixtamalized maize bran under alkaline conditions (0.5 N NaOH) at different times (2 h, 4 h and 6 h). They were analyzed for neutral sugars composition, dietary fiber and ferulic acids content, as well as the antioxidant capacity, to establish if they can be considered as soluble antioxidant dietary fiber. The yields of the arabinoxylans following alkaline extraction treatments were 4.89%, 8.23% and 7.17% for 2 h, 4 h and 6 h, respectively. The purity of arabinoxylans ranged from 55.58 to 61.16%, while arabinose to xylose (Ara/Xyl) ratio ranged from 0.82 to 0.87 which indicated that all arabinoxylans had a moderately branched structure. The soluble dietary fiber accounted for more than 85% of the chemical composition of feruloylated arabinoxylans. Monomeric and oligomeric forms of ferulic acid were influenced by the alkali extraction time. The monomeric form was the main phenolic acid in feruloylated arabinoxylans (77.05–86.97%), followed by dimers (11.57–14.20%), and trimer (0.93–9.36%). Total phenols ranged from 9.01 to 6.48 mg FAE/g, while antioxidant capacity ranged from 29.49 to 31.69 µmol TE/g, 16.60 to 21.27 µmol TE/g, 39.23 to 58.33 µmol TE/g and 17.03 to 60.65 µmol TE/g in DPPH, ABTS, FRAP and ORAC methods, respectively. The phenol content and antioxidant capacity were in the order: 2 h extract > 4 h extract > 6 h extract and in accordance to the ferulic acid content. The results indicated that alkali extracted feruloylated arabinoxylans obtained from nixtamalized maize bran byproduct are synonymous with soluble antioxidant dietary fiber.

Keywords Feruloylated arabinoxylans · Soluble antioxidant dietary fiber · Ferulic acids · Antioxidant capacity

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Studied of Defatted Flour and Protein Concentrate of *Prunus serotine* and Applications

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Abstract: *Prunus serotine* seed, was processed to produce a defatted flour (71.07 ± 2.10% yield) without hydrocyanic acid. The total protein was 50.94 ± 0.64%. According to sensory evaluation of cookies with *P. serotine* flour, the highest score in overall impression (6.31) was at 50% flour substitution. Its nutritional composition stood out for its protein and fiber contents 12.50% and 0.93%, respectively. Protein concentrate (*Ps*PC) was elaborated (81.44 ± 7.74% protein) from defatted flour. Emulsifying properties of *Ps*PC were studied in emulsions at different mass fractions; ϕ = 0.002, 0.02, 0.1, 0.2, and 0.4 through physicochemical analysis and compared with whey protein concentrate (WPC). Particle size in emulsions increased, as did oil content, and results were reflected in microscope photographs. *Ps*PC at ϕ 0.02 showed positive results along the study, reflected in the microphotograph and emulsifying stability index (ESI) test (117.50 min). At ϕ 0.4, the lowest ESI (29.34 min), but the maximum emulsifying activity index (EAI) value (0.029 m^2/g) was reached. WPC had an EAI value higher than *Ps*PC at $\phi \geq 0.2$, but its ESI were always lower in all mass fraction values. *Ps*PC can compete with emulsifiers as WPC and help stabilize emulsions.

Keywords: *Prunus serotine*; defatted flour; soluble protein; protein concentrate; emulsifying properties; emulsion stability

1. Introduction

Nowadays, there is an increasing demand for products of high nutritional quality [1]. Proteins are one of the major components of the human diet because of their nutritional properties. They are also responsible for physicochemical properties such as solubility, water, and oil retention capacity, foaming and emulsifying capacity, viscosity, and gelation, among others. The proteins impact not only the quality of the products, but also acceptance by consumers [2].

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Development and Characterization of Gelled Double Emulsions Based on Chia (*Salvia hispanica* L.) Mucilage Mixed with Different Biopolymers and Loaded with Green Tea Extract (*Camellia sinensis*)

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Abstract: The aim of this research was to develop and characterize five gelled double emulsions based on chia mucilage (CM) and different biopolymers (κ-carrageenan, C; locust bean gum, L; thixogum, T; and whey protein concentrate, W) loaded with green tea extract (GTE). Gelled double emulsions consisted of W_1 (whey-protein-concentrate/sodium-azide/NaCl/GTE)/O and (PGPR/canola-oi)/W_2 (CM, CMC, CML, CMT and CMW), and were characterized based on physicochemical properties during 35 days of storage. Optical microscopy clearly showed the drops of the internal phase surrounded by droplets of oil dispersed in the second aqueous phase; the droplet size was higher for CMT and lowest for CMW. In addition, all emulsions were highly stable at creaming and were effective in reducing the loss of antioxidant activity (88.82%) and total phenols (64.26%) during storage; CMT, CML and CM were the most effective. Furthermore, all emulsions showed a protective effect by modulating the release of the GTE in a simulated gastrointestinal environment, allowing a controlled release during the gastric-intestinal digestion phases and reaching its maximum release in the intestinal phase (64.57–83.31%). Thus, gelled double emulsions are an alternative for the preservation of GTE and could be a potential alternative for their application in the development of functional foods.

Keywords: gelled double emulsion; chia mucilage; green tea extract; antioxidant activity; stability

1. Introduction

Nowadays, consumers are focusing their attention on the consumption of high-quality foods that provide basic nutritional properties and provide beneficial effects to health, reducing the risk of disease [1,2]. Green tea is obtained from the *Camellia sinensis* L. plant native to China and is one of the most popular and beverages consumed around the world [3,4]. Green tea extract (GTE) is mainly composed of polyphenols, such as catechins (e.g., (−) epigallocatechin gallate, (−) epicatechin gallate, (−) epillogallocatechin and (−) epicatechin), gallic acid, quercitin and caffeine, among other substances [5,6]. Due to its composition, green tea has a wide variety of antioxidant, antimicrobial, anticancer, anticardiovascular and antihyperglycemic properties, among others [2,7,8]. In recent years, interest in the development of a wide variety of food products (e.g., meat, lactic and bakery

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Chemical Composition and Biological Activities of Oregano Essential Oil and Its Fractions Obtained by Vacuum Distillation

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Abstract: Oregano (*Poliomintha longiflora*) essential oil (Ooil) is a product of high commercial value and many applications, including chemotherapy. Aiming to achieve the best use of this resource, the present study focuses on the characterization of separated fractions of Ooil by fractional vacuum distillation at low pressure. Four fractions (F1–F4) and undistilled oil (Unoil) were separated from Ooil and analyzed for their chemical composition and biological activities, such as antioxidant and antimicrobial activities. Gas chromatography–mass spectrometry shows differences in the composition among the fractions and Ooil. The amount of monoterpenes oxygenated (MO), sesquiterpenes hydrocarbon (SeH) and monoterpenes hydrocarbon (MH) varied between the fractions in ranges of 1.51–68.08, 3.31–25.12 and 1.91–97.75%, respectively. The major concentrations of MO and SeH were observed in F4 and Unoil. On the other hand, the highest concentrations of MH were found in F1 and F2, while the lowest were in F4 and Unoil. These results were correlated with the biological activity. Free-radical scavenging activity varied among fractions, with F4 and Unoil showing the highest activity. The antimicrobial test showed that F4 and Unoil had the highest activity in almost all cases. The correlation between the variables studied in the different fractions allows the definition of the particular properties for each one of them.

Keywords: oregano; *Poliomintha longiflora*; essential oil; antioxidant activity; antimicrobial activity; vacuum fractional distillation

1. Introduction

Essential oils are "volatile oils or essences derived from vegetation and characterized by distinctive odors and a substantial measure of resistance to hydrolysis" according to the Encyclopedic Dictionary of Polymers [1,2]. These are a complex mixture of different volatile compounds present in aromatic plants in a natural way that, due to their properties and their fragrance, are widely used in cosmetics, in the food industry to improve the taste and the organoleptic properties, and in a variety of household products. In addition to their flavor and fragrance, many essential oils and their isolated components exhibit muscle-relaxing, antibacterial and antifungal activities. These properties are used in applications such as the preservation of raw and processed foods, pharmaceutical products and alternative medicine [2–4].

In recent years, due to restrictions on the use of synthetic food additives and the constant increase in the survival capacity of detrimental microorganisms caused by resistance to antibiotics and preservatives, there has been an increase in the search for alternatives, such as natural antimicrobial

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Effect of Agave Fructans as Carrier on the Encapsulation of Blue Corn Anthocyanins by Spray Drying

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Abstract: Effects of agave fructans as carrier agents on the encapsulation of blue corn anthocyanins using spray-drying were evaluated. Blue corn extract was mixed with 6%, 8%, 10%, and 12% (*w/v*) of agave fructans in duplicate and dried at 150 °C. The extract showed good contents of anthocyanins, polyphenols, and antioxidant activity. The increase of agave fructans in the encapsulated powders caused a significant increase ($p < 0.05$) in the humidity, water activity (a_w), pH, bulk density, water solubility index (WSI), and color L^* values. On the contrary, the agave fructan addition decreased the hygroscopicity, water absorption index (WAI), antioxidant activity, total anthocyanin, total polyphenol, and individual anthocyanin contents. The encapsulation of blue corn extract with 6% agave fructans (*w/v*) resulted in good physical, thermal, morphological, and high antioxidant properties. The results suggest that the use of agave fructans as wall material represents advantages in the conservation of anthocyanins and other bioactive compounds from blue corn extract during their encapsulation. The application of blue corn anthocyanin encapsulated powders as a food ingredient is promising for food pigmentation, representing additional advantages for their contribution as a soluble fiber that can benefit the health of consumers.

Keywords: blue corn; agave fructans; anthocyanins; encapsulation; spray-drying

1. Introduction

The interest in blue or pigmented corns (*Zea mays* L.) has increased in recent years due to their nutraceutical properties beneficial to the health of consumers. This is attributed to phenolic compounds, mainly anthocyanins, present in these grains [1,2]. These water-soluble pigments besides giving color, have biological activity including antioxidant, anticarcinogenic, anti-inflammatory, and neuroprotective effects, and they have been associated with the prevention of diabetes and obesity, cardiovascular diseases, and brain dysfunction, among other disorders [3,4]. The high content of anthocyanins in blue corn makes it competitive as a natural source of pigments and it can be considered as a substitute for synthetic food dyes. However, due to the instability of anthocyanins during processing and storage, their application as natural pigments in the food industry is limited [5]. Therefore, it is of general interest to apply techniques for their protection before their use in food. Microencapsulation is a promising alternative technique to improve the stability of natural pigments and protect them by entrapping with a carrier agent or wall material [6,7]. Microencapsulation by spray-drying is the most popular

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Feruloylated Arabinoxylans from Nixtamalized Maize Bran Byproduct: A Functional Ingredient in Frankfurter Sausages

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Abstract: Feruloylated arabinoxylans obtained from nixtamalized maize bran were evaluated in terms of physicochemical characteristics and antioxidant capacity when incorporated in frankfurter sausages. Concentrations of 0.15% and 0.30% of feruloylated arabinoxylans were incorporated in frankfurter sausages formulations and a control without feruloylated arabinoxylans was also prepared. Shear force, hardness, color measurement, proximate analysis, pH, titratable acidity, water-holding capacity, total phenols, and antioxidant capacity were evaluated. Phenolic content and antioxidant capacity were significantly higher ($P < 0.0001$) in all treatments, sausages containing feruloylated arabinoxylans compared to the control. The results showed that there was a significant difference ($P < 0.0001$) in total phenolic content and antioxidant capacity with all feruloylated arabinoxylans sausages treatments higher than control. Additionally, significant differences ($P < 0.0001$) were obtained in the physicochemical parameters.

Keywords: feruloylated arabinoxylans; nixtamalized maize bran by-product; frankfurter sausages; physicochemical properties; functional properties

1. Introduction

Cooked sausages are a complex mix of different food components, including proteins, salts, gels made from muscular proteins and emulsions that contain stabilized fat. Any type of meat can be used to make cooked sausages and they are commonly consumed either hot or cold. Frankfurters are short and small-diameter sausages, made in a finely chopped form and typically used as appetizers [1,2]. Frankfurter sausages are produced with a high fat content, therefore, it is necessary to use fat replacer ingredients in their production to get a product with less fat content, dietary fiber being a good ingredient

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Comparative Reduction of Egg Yolk Cholesterol Using Anionic Chelating Agents

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Abstract: Egg yolk is used as an emulsifying agent. Nevertheless, its high concentration of cholesterol is linked to chronic degenerative diseases that cause cardiovascular disease. In this study, three methods for reducing the level of cholesterol in egg yolks were studied. The first method consisted of physical separation of the granules contained in the yolk (Na_G). The second method applied was the use of anionic chelating biopolymers, such as arabic gum solution (AG) and mesquite gum solution (MG), and the third method was extraction with a solvent (S_A). For this purpose, the cholesterol present in egg yolks, the microstructure, particle size, zeta potential, and its emulsifying capacity were determined. The amount of cholesterol removed was 97.24% using 1% mesquite gum ($MG_{1\%}$), and 93.26% using 1% Arabic gum ($AG_{1\%}$). The zeta potential was determined, and the isoelectric point ($\zeta = 0$) of egg yolk was identified as pH 4.6. While, at this pH, the zeta potential of mesquite gum was −14.8 mV, the zeta potential for the arabic gum was −16 mV. The emulsifying capacity of $MG_{1\%}$ was 62.95%, while the emulsifying capacity of $AG_{1\%}$ was 63.57%. The complex obtained can be used in the development of functional foods reduced in cholesterol.

Keywords: egg yolk; cholesterol extraction; granules extraction; anionic chelating biopolymers

1. Introduction

Egg yolk is a good source of lutein, zeaxanthin, proteins, lipids, and vitamins in human nutrition and is made up of practically 50% solids. The major constituents of the solid matter are lipids (65–70% on dry basis) and proteins (30% on dry basis). The proteins present are livetins, lipoproteins [1], and some particles including high-density lipoproteins (HDLs), low-density lipoproteins (LDLs), and phosvitin [2,3].

Egg yolk is an efficient ingredient in many food products, and its functional properties include emulsifying, coagulating, foaming, and gelling properties [4]. Moreover, it contains proteins, vitamins, minerals, essential fatty acids, phospholipids, and other compounds. However, it has high cholesterol

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Physicochemical, Functional, and Nutraceutical Properties of Eggplant Flours Obtained by Different Drying Methods

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Abstract: The importance of consuming functional foods has led the food industry to look for alternative sources of ingredients of natural origin. Eggplants are a type of vegetable that is valued for its content in phytochemical compounds and it is due to the fact that this research is conducted towards the development of eggplant flour as a proposal to be used as a functional ingredient in the food industry. In this study, the eggplant fruits were divided into four groups, based on the drying method and the equipment used: Minced, drying oven (T1); sliced, drying oven (T2); sliced and frozen, drying tunnel (T3); and sliced, drying tunnel (T4). All the eggplant flours showed the same trend regarding their antioxidant capacity and phenolic content in the order T2 > T4 > T1 > T3. The freezing of eggplant was found to have a negative effect on functional and antioxidant properties. With respect to their nutritional composition, the flours did not change in their crude fiber, protein, and fat contents. In general terms, the T2 flour is a potential ingredient for the preparation of foods with functional properties since it is rich in phenolic compounds and antioxidants.

Keywords: eggplant; flour; phenolics; antioxidant activity; functional ingredient

1. Introduction

In recent years, the food industry has focused its efforts in the development of new products with properties that not only provide the necessary nutrients for human food, but also help prevent diseases related to nutrition such as diabetes, obesity, hypertension, and cardiovascular complications. It has been found that there is a significant correlation between the regular intake of phytochemicals and the prevention of these lifestyle-related diseases [1]. Antioxidants have attracted great attention as possible agents to prevent and treat diseases related to oxidative stress [2]. The antioxidants used by the food industry can be either from natural sources or from a synthetic origin (such as butylated hydroxytoluene and butylated hydroxyanisole). The latter has been found to be potentially carcinogenic and toxic [3]. Consequently, a niche in the food industry is opened to replace the existing synthetic antioxidants with those of natural origin found in fruits and vegetables, which are mainly vitamins and polyphenols [2].

Eggplant is an economically important vegetable crop from the tropical and subtropical zones of the world [4]. This crop produces fruit of different colors, sizes, and shapes [5]. Eggplant is a

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Increasing Antioxidant Activity and Protein Digestibility in *Phaseolus vulgaris* and *Avena sativa* by Fermentation with the *Pleurotus ostreatus* Fungus

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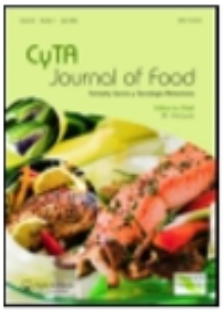
Abstract: The aim of the research was to determine the impact of fermentation with *Pleurotus ostreatus* on kidney beans, black beans, and oats. The results indicate that the fungus has a positive effect on the substrates when compared to the controls. The antioxidant activity (39.5% on kidney beans and 225% on oats in relation to the controls) and content of total polyphenols (kidney beans three times higher regarding the controls) increased significantly by the presence of the fungus mycelium, even after simulated digestion. There was a significant increase in protein digestibility (from 39.99 to 48.13% in black beans, 44.06 to 69.01% in kidney beans, and 63.25 to 70.01% in oats) and a decrease of antinutrient tannins (from 65.21 to 22.07 mg in black beans, 35.54 to 23.37 in kidney beans, and 55.67 to 28.11 in oats) as well as an increase in the contents of some essential amino acids. Overall, this fermentation treatment with *Pleurotus ostreatus* improved the nutritional quality of cereals and legumes, making them potential ingredients for the elaboration and/or fortification of foods for human nutrition.

Keywords: *Pleurotus ostreatus*; antioxidant activity; polyphenols; digestibility; fermentation; cereals; legumes

1. Introduction

Foods today are intended not only to satisfy hunger and provide the necessary nutrients for humans but also to prevent nutrition-related diseases that impact physical and mental wellness [1]. Functional foods have been introduced in markets, and they are usually defined as "modified foods which contain ingredients that have demonstrated actions that increase the welfare of the individual or decrease disease risk beyond the traditional role" [2]. The legume, a particularly common bean (*Phaseolus vulgaris*), is one of the main sources of vegetable protein available in developing countries [2]. The high lysine content protein of *Phaseolus vulgaris* makes it an ideal cereal protein; it supplements the deficiency in this essential amino acid and is also a staple ingredient in developing countries, where the availability of animal protein is low. Also, it provides adequate nutrition due to its contribution of carbohydrates [3] and high-quality protein. *Phaseolus vulgaris* has also been associated with various health benefits, including the reduced risk of diabetes and cardiovascular disease attributed to the presence of polyphenols [4,5]. *Phaseolus vulgaris*, however, contains antinutritional factors such as protein inhibitors (inhibitors of trypsin, chymotrypsin, and amylase), lectins, phytates, and tannins [6].



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Chemical composition, antimicrobial, and antioxidant activities of orange essential oil and its concentrated oils

C. Torres-Alvarez, A. Núñez González, J. Rodríguez, S. Castillo, C. Leos-Rivas & J. G. Báez-González

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Brenda Luna-Sosa, Humberto Rodríguez-Fuentes, Cristian Martínez-Ávila, Cristobal N. Aguilar, Juana Aranda-Ruiz, Mayra Treviño Garza & Romeo Rojas.
UANL, México.

Dear Contributors:

We are pleased to inform you that your chapter: ***Edible films based on hydroponic mucilage from nopal*** has been accepted for publication in our forthcoming book: ***NEW TRENDS IN BIOCONTROL, PLANT FACTORY AND PHYSIOLOGY***, which will be published by Apple Academic Press, APP ((http://www.appleacademicpress.com/), exclusive worldwide distribution by CRC Press, Taylor & Francis Group.

It is important to have in mind that the final submission of the full manuscript by the corresponding author (ROMEO.ROJASMLN@uanl.edu.mx) has been scheduled before February 15th, 2020.

Attached to this letter, we are sending you the instructions for authors. For queries, questions or concerns regarding your chapter, please contact us by email: romeo.rojasmln@uanl.edu.mx. We appreciate your opportune contribution and hope to hear from you soon!

Kind regards

R. Rojas, G.C.G. Martínez-Ávila, J.A. Vidales-Contreras & C.N. Aguilar
Book Editors

Handbook of **Research** on
Food Science and **Technology**
Volume 2 ***Food Biotechnology and Microbiology***

CHAPTER 7

PHYTOCHEMICAL MOLECULES FROM FOOD WASTE AND DESERT PLANTS FOR CONTROL OF FOODBORNE PATHOGEN BACTERIA

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ABSTRACT

Currently, with the constant increase of global commerce, the possibility of propagation of foodborne pathogen bacteria has arisen. This may generate animal health problems in both, developing and developed countries. Synthetic chemicals have been used for control of pathogenic bacteria. However, now, customers demand low of null presence of synthetic chemicals in food. For these reasons, the food industry is searching for bioactive molecules with capacity to control pathogens from natural sources. Use of different plant extracts with antimicrobial activity has been reported.

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Investigación y Desarrollo en Ciencia y Tecnología de Alimentos

Cáscara de berenjena *(Solanum melongena)* como indicador pH.

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RESUMEN:

La berenjena (*Solanum melongena*) es una planta herbácea perteneciente a la familia Salanáceas, se ha demostrado que contiene compuestos fenólicos, dentro de ellos se encuentran las antocianinas que posee una característica importante, pigmentos hidrosolubles que colorean sustancias dependiendo del pH de el medio en donde se encuentren. El pH se puede medir de forma precisa mediante un potenciómetro que mide la diferencia de potencial de hidrógeno entre dos electrodos, otra forma de calcular es en una disolución empleando indicadores que presentan diferente color según el pH del medio El objetivo del presente trabajo es obtener indicador de pH natural capaz de cambiar de color dependiendo de las características fisicoquímicas de la solución en función del factor acidez o basicidad..

Palabras clave:

Berenjena, pH, antocianinas

ABSTRACT:

The eggplant (*Solanum melongena*) is a herbaceous plant belonging to the Salanáceas family, it has been shown that it contains phenolic compounds, inside of them are the anthocyanins that has an important characteristic, water soluble pigments that color substances depending on the pH of the medium where be found. The pH can be measured accurately by means of a potentiometer that measures the hydrogen potential difference between two electrodes, another way of measuring it is in a solution using indicators that have different color according to the pH of the medium. The objective of this work is to obtain an indicator of natural pH capable of changing color depending on the physicochemical characteristics of the solution depending on the acidity or basicity factor..

Keywords:

Eggplant, pH, anthocyanins

Área: Alimentos funcionales

INTRODUCCIÓN

Un indicador químico es un ácido o base débil cuya forma disociada tiene diferente color a diferencia de la forma sin disociar. Actualmente los indicadores ácido-base pueden clasificarse en indicadores naturales o sintéticos. Los indicadores ácido-base naturales, se debe fundamentalmente a la proporción de los pigmentos naturales que contiene conocidos como antocianinas y antoxantinas, la cantidad en que contiene la mezcla de pigmentos hace que los frutos, flores y raíces tengan distintos colores que se pueden modificar según el pH del medio ya que son hidrosolubles (Panameño, 2012). La antocianina frecuentemente encontrada en la berenjena es delfinidina-3,5, diglucósido (Lopes, 2002), al estar en contacto con medio ácido es roja, purpura en medio neutro y azul en medio básico(Juarez,2010)

En la siguiente investigación se obtuvieron indicadores naturales ácido-base en soluciones en medio ácido con ácido clorhídrico (HCl) y medio básico con hidróxido de sodio (NaOH), a una escala de pH de 1 hasta 13. El objetivo es obtener indicadores naturales que sean sometidos a pruebas de tipo cualitativas que nos indican el cambio de color en función de la acidez y alcalinidad a partir de los extractos de berenjena y cáscara de berenjena (*Solanum melongena*).

Investigación y Desarrollo en Ciencia y Tecnología de Alimentos

Aprovechamiento de los residuos del cultivo de alcachofa (*Cynara scolymus* L.) para el desarrollo de harina ricas en antioxidantes

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RESUMEN.

En el cultivo de la alcachofa (*Cynara scolymus L.*) solo se aprovecha entre 30-35 %, generando un alto porcentaje de residuos incluyendo el tallo y la flor. Del proceso industrial de la elaboración de harinas de alcachofa se obtienen numerosos compuestos químicos de reconocida actividad farmacológica, entre ellos los antioxidantes, sustancias capaces de neutralizar la acción oxidante de los radicales libres mediante la liberación de electrones. El objetivo de este trabajo está inclinado a la elaboración de una harina rica en antioxidantes a partir de los subproductos del cultivo de alcachofa (tallo y flor). Para esto se realizaron pruebas de ABTS y DPPH, obteniendo como resultados de la 71.28y 220.35 µM equivalentes de Trolox/g de harina, y también con un porcentaje de inhibición del 14.93% y 36.7% respectivamente, y para DPPH siendo estos de un 6.76 y 16.5 µM equivalentes de Trolox/g de harina, y de un 27.37% y 102.21% respectivamente. Los valores obtenidos de humedad en las muestras de harina de tallo y flor de alcachofa fueron de 5.99% y de 5.9% respectivamente valores que se encuentran dentro del máximo permitido de humedad en harinas de cereales. En el aw se obtuvieron resultados de 0.4772 y 0.5152 respectivamente, los cuales se encuentran por debajo del necesario para la proliferación de microorganismos. En la determinación de color se deduce que las harinas tienen colores parecidos que tienden más al verde y al amarillo obteniendo diferencias significativas entre estos con una luminosidad (L*) media acercándose más a lo claro..

ABSTRACT.

Of the production of the artichoke (*Cynara scolymus L.*) only 30-35% is used, generating a high rating of residues including the stem and the flower. From the industrial process of making artichoke flours it can be obtained a great part of chemical compounds from the pharmacological area, among them the antioxidants, the agents able to neutralize the oxidant action of the free radicals through the liberation of electrons. The objective of this work is to lean towards the elaboration of a flour rich in antioxidants from the residues of the cultivation of the artichoke (stem and flower). For this, ABTS and DPPH tests were performed, obtaining results of the 71.28 and 220.35 µM equivalents of Trolox/g of flour, and also with a percentage of inhibition of 14.93% and 36.7% respectively, and for DPPH being these of 6.76 and 16.5 µM equivalents of Trolox/g of flour, and of 27.37% and 102.21% respectively. The humidity values in the samples of stem and artichoke flower were 5.99% and 5.9%, respectively, the values that were found within the maximum allowed humidity in cereal flours. Results from the water activity (aw) test, 0.4772 and 0.5152 respectively were obtained, which are below that necessary for the proliferation of microorganisms. In the determination of color it is deduced that the flours have similar colors that have more green and to the yellow with a luminosity (L *)..

Palabras clave:

Alcachofa, tallo, flor, residuos, antioxidantes, desperdicio, harina, ABTS, DPPH.

Área: Alimentos funcionales

INTRODUCCIÓN.

La alcachofa es una hortaliza con un bajo contenido de grasa y altos niveles de minerales (potasio, sodio, fósforo), vitamina A, B2 y C, fibras, polifenoles, flavonas e inulina (Ceccarelli *et al*., 2010; Pandino *et al*., 2011*a, b*). De esta hortaliza solo se aprovecha entre 30 -35 % de su cultivo, generando un alto porcentaje de residuos (tallo y flor).

Los antioxidantes son sustancias capaces de neutralizar la acción oxidante de los radicales libres mediante la liberación de electrones en nuestra sangre, los que son captados por los radicales libres (Avello et al. 2006). En la actualidad, existe un creciente interés por los antioxidantes, por su efecto positivo frente el control de enfermedades cardiovasculares, sobrepeso y obesidad, algunos tipos de cáncer, entre otras. (Decker, 2010).

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