

Solid-state fermentation assisted extraction of bioactive phenolic compounds from grape pomace

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Mexico has an annual grape production of 351.31 million tons [1], of which 80% is destined for the wine industry. This industry generates between 60-50% of waste during processing, generating a problem with the treatment and final disposal of this waste, which could be used to obtain bioactive compounds by different methodologies. The effect of solid-state fermentation (SSF) of grape pomace with *A. niger* GH1 on the release of bioactive phenolic compounds with antioxidant capacity was studied. Methodology. A SSF was carried out using grape pomace as substrate and support; the conditions for SSF were temperature of 30°C, the humidity of 70%, pH 5, inoculum number of 1x10⁶spores/mL, in 108 h kinetics with sampling every 12 h [2]. Results. In the evaluations of compounds of interest, total flavonoids and condensed tannins showed increases according to the initial values, for total flavonoids an increase of 4.5 with respect to the initial value was registered for 84 hours of fermentation, and for condensed tannins an increase of 1.2 was obtained for 12 h of fermentation. HPLC analysis showed the presence of compounds such as quercetin and 4-vinylgaultherin, which report anti-inflammatory activity [3,4]. Conclusions. The ability of the fungus to degrade the cell wall allows the release of bioactive phenolic compounds present in grape pomace.

Keywords: *Extraction, Grape pomace, Fermentation, Bioactive compounds.*

REFERENCES

- [1] Planeación Agrícola Nacional 2016. México: SAGARPA. [2] Amaya-Chantaca, D. et al., 2022 Journal of Chemical Technology & Biotechnology, 97(6), 1494-1505. [3] Nagula, R. L., et al., 2019. Journal of controlled release, 296, 190-201. [4] Munekata, P. et al., 2020. Food Research International, 134, 109242.

Natural colourant extracted from the *Passiflora biflora* Lam fruit

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The antioxidant activity and the antiradical capacity have attracted interest due to mainly health benefits of anthocyanin content in fruits and this content have a potential nutritional and therapeutic effect therefore the development of products that contain them is an interest issue [1]. The presence of this group of compounds has been demonstrated in *Passiflora* species, which used as foods coloring; Therefore, the extraction a characterization of natural colourant from the *P. biflora* represents an option for productive diversification in tropical and subtropical regions since it is an endemic species of México and Central America countries [1,2]. The objective of this research work is to obtain a natural colourant of the wild species of *P. biflora*, in extract with two solvent and their mixture (water, ethanol and water: ethanol) and two fruit parts and their mixture (epicarp, mesocarp, and epicarp: mesocarp), to enhance the use of this fruit. Studies as antioxidant activity and phenolic compounds, as well as characterization by Mass spectrometry and High-Performance Liquid Chromatography (HPLC) are used to identify of anthocyanin presents in the fruit. To the obtention of a solid colourant a freeze-drying process was used, resulting an intense purple colourant. Results can be indicated that a natural colourant from the *P. biflora* fruits is viable, both for the benefits of its components, the reported health properties of genus *Passiflora* and the use of wild species with high productive potential that decreases their presence by being cut down as weeds.

Keywords: *Passiflora, Colourant, Anthocyanin, Antioxidant*

REFERENCES

[1] Espín et al., 2000. *J. Agric. Food Chem*, 48, 1588–1592. [2] Kawasoe et al., 2021. *LWT - Food Science and Technology*, 136, 110412.

Elaboration of a fermented sauce based on white Chile from Chiapas

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The "white chili of Chiapas" is considered a wild chili within the region, it is usually consumed fresh and pickled. The objective of the project was to characterize and give added value to the raw material by the elaboration of a sauce applying a lactic fermentation. The analyses were carried out based on the manual of the A.O.A.C.[1][2] in which moisture, ashes, proteins, fats, fiber and carbohydrates were determined, characterizing the physico-chemical properties of fresh chili and sauce due to it does not have scientific information that enhances its use. The analyses obtained from the two samples were compared and the following was obtained: in the moisture determination the fresh chili decreased by 2.18%, while in the ash determination an increase of 1.61% in the fermented sauce was identified, this increase arises due to cellular metabolism [3]. The fat content wasn't a significant difference. Regarding the protein content, it was recorded that the sauce decreased by 0.13%, this due to the technological treatments to which it was subjected and also for the presence of antinutritional factors that affect the bioavailability of amino acids [4]. In the fiber content a decrease of 1.61% was obtained with respect to the product obtained, and for carbohydrates an increase of 1.82%. The results obtained show that lactic fermentation process is an alternative for the exploitation of the raw material, since by making use of these technologies the catalogue of products and by-products of this wild chili from the region of Chiapas can be extended.

Keywords: *White chile, characterization, sauce, fermentation, added value.*

REFERENCES

- [1] Horwitz, William, 2000. Agricultural chemicals, contaminants, drugs. 17a ed. Official methods of analysis of the association of official analytical chemists. , vol. 1. Maryland, USA: A.O.A.C. INTERNACIONAL. [2] Horwitz, William, 2000. Food composition; additives, natural contaminants. 17a ed. Official methods of analysis of the association of official analytical chemists, vol. 2. Maryland, USA: A.O.A.C. INTERNACIONAL. [3] Saavedra, et al., 2018. Journal of the Faculty of Basic Sciences, 16, 13-27. [4] Matínez y Martínez, 2006. Nutrición Hospitalaria, 21, 01-14.

Phytochemical analysis and in vitro bioinsecticide effect of plant extracts

on sucking pests

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Given the need for global awareness about reversing the current serious trend towards environmental deterioration and consumer health due to the indiscriminate use of pesticides, have highlighted the importance of modifying the forms of phytosanitary control through the application of bioinsecticide products that are extracted from plants, microorganisms and minerals. The study of the biological activity of some compounds present in these plants offers an opportunity for the formulation of new and efficient bioinsecticides for the control of pests and diseases [1,2]. The objective of this work was to determine the in vitro insecticidal activity of the vegetable extracts of neem seed, castor seeds and chilcuague root on adults and nymphs of whitefly (*Bemisia tabaci* Genn.) and paratrioza (*Bactericera cockerelli*). Methanolic and ethanolic extraction was performed, and then, high-performance liquid chromatography was used to identify and quantify the bioactive compounds. It was possible to identify saponins, alkaloids, terpenoides and tannins, while the HPLC analysis show that there was no statistically significant variation between the total content of phenols and flavonoids of chilcuague root, neem seed and castor seed. A complete experimental design with three replications was used, three treatments including the control and six concentrations were evaluated. The in vitro test data was analyzed to obtain the mean lethal concentration (LC 50) by Probit analysis. The best treatment for the suppression of adults and nymphs of whiteflies was castor oil extract from 60%, finding the best effects from 90% with survival percentages less than 2%; The best treatment for adult paratrioza suppression was chilcuague extract from 50%, however, at a dose of 80%, the lowest percentage of survival was obtained.

Keywords: *Bioinsecticide, Azadirachtin, Affinin, Paratrioza, Whitefly.*

REFERENCES

[1] Stashenko et al., 1996. Journal of chromatography A, 223-232. [2] Liu, 2004. Insect science, 3, 605–609.

Effect of the organic production system on plant growth, morphological

parameters and phytochemical profile in grape tomato fruit (*Solanum lycopersicum* L. var. *trambellino*)

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Food security is constantly facing challenges due to several factors [1], so the use of biofortifying (organic) products in agriculture helps to increase the productivity of crops [2] such as tomato (*Solanum lycopersicum*) with a reduction in environmental impact. In this research, the effect of organic treatments on morphological parameters and phytochemical profile of the grape tomato crop (*S. lycopersicum* L. var. *trambellino*) was evaluated, these treatments were biofortifying, vermicompost and conventional. The fruit was also harvested to evaluate morphological parameters and the phytochemical profile (phenols, flavonoids and carotenoids), the content of phenolic acids (gallic, ρ -coumaric, cinnamic and sinapic) and a flavonoid (quercetin) was analyzed by HPLC. As for the evaluation of morphological parameters, an average weekly plant growth of 25.03 cm was observed in the biofortifying treatment, and an average of 10.7 fruits per bunch was obtained. For the fruit evaluations, the following average values were obtained: 10.9 g fruit weight, 13.04 N polar firmness, 11.29 N equatorial firmness, 3.49 cm polar diameter and 2.58 cm equatorial diameter. The treatment with biofortifiers favored the content of carotenoids by 5.59 % of β -carotene and 0.97 % of lycopene with respect to the control, while, for the production of phenols and flavonoids showed an increase of 8 and 27.08 % respectively, with respect to the conventional treatment. Complementary to the phytochemical profile, gallic, ρ -coumaric and sinapic acids were identified by HPLC. It is concluded that the application of biofortifiers has an effect on the improvement of the phytochemical profile, because it positively increases the content of antioxidants and nutritional compounds. The impact of this study lies in contributing to the knowledge of organic production systems, where the effect of biofortifying products on the quality and nutraceutical characteristics of tomato is evaluated.

Keywords: *organic production system, phytochemical, biofortifiers, grape tomato.*

REFERENCES

[1] FAO, 2019. [2] Garg et al., 2018. *Frontiers In Nutrition*, 5, 1-33.

Making cookies from a combined flour

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Around the world, the pandemic caused by Covid-19 has changed the lifestyles of millions of people [1], since there has been a high consumption of ultra-processed foods and a decrease in those that represent health benefits and that influence nutrition [2]. One of the alternatives to improve the nutritional quality of the consumer is the development of accessible, safe and sustainable food products based on combined flours. In this project, a biscuit enriched with protein, fiber and carbohydrates was made based on combined oatmeal, whole banana flour (*Musa balbisiana*), and papaya pulp and bark powder (*Carica papaya* L.). A cookie was developed because there is a consumer demand of up to 99.7% in Mexican households [3]. The research consisted of the elaboration and nutritional characterization of the cookies applying the analytical methods of the manual A.O.A.C [4] [5], obtaining the following results: it was recorded that fiber contains 7.7370%, protein 2.9336%, fat 15.7290% and total carbohydrates of 70.4850%. Regarding the total carbohydrate load is considered low since compared to commercial cookies they declare that the carbohydrates available without the added sugars is 64.7%. Due to the above, the developed cookies are considered a source of nutrients and energy for the consumer, and in this way encourage the consumption of foods from alternative sources that can be beneficial to health.

Keywords: *Combined flour, cookies, nutrition, carbohydrates.*

REFERENCES

- [1] Páez, et al., 2020. Repositorio de la Red Internacional de Investigadores en Competitividad, 14(14) [2] Ramos, et al., 2021. redalyc.org CIENCIA ergo-sum, Revista Científica Multidisciplinaria de Prospectiva, 28(4) [3] Mercado, et al., 2019. dialnet.unirioja.es In Anales Científicos (Vol. 80, No. 1, pp. 269-279). Universidad Nacional Agraria La Molina [4]. A.O.A.C. 2000. worldcat.org Volume I.17a edition. E.S.A [5] A.O.A.C. 2000. worldcat.org Volume II.17a edition. E.S.A

Production of single-cell protein from agro-industrial waste from corn cob, orange peel, avocado peel and seed

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Mexico generates around 76 billion tons of agro-industrial waste per year. During their consumption, processing or cultivation, they have consequences for both the environment and human health because they are improperly treated. In recent years, there has been increasing interest in the research of alternative food sources, due to food shortages, one of which is the production of unicellular protein (SCP) which can balance the consumption of conventional proteins. This can be obtained by using agro-industrial waste as a carbon source where the most cost-effective levels can be achieved. Through fermentation technology, microorganisms are able to carry out the biotransformation of high value-added products such as SCP. Therefore, in the present research, the evaluation of three of the most widely produced wastes in Mexico was carried out for the production of SCP through submerged fermentation with *Candida utilis* using agro-industrial wastes corn cob, uncel peel and avocado peel and seed as the sole carbon source. Where the highest biomass and total sugars production was obtained with uncel peel residues and was $12.23 \text{ g/L} \pm 5.99$ y $851.79 \text{ g/L} \pm 142.96$ respectively. The crude protein content obtained was $8.28\% \pm 0.002$ with uncel peel, $7.64\% \pm 0.002$ with corn cob and $4.36\% \pm 0.004$ with avocado peel and seed. It was concluded that the greater amount of biomass produced is associated with the higher 7nicelular sugars present in the uncel and that it is also unicelu to produce unicellular protein from the three residues used in this work, allowing their reuse. [1, 2, 3]

Keywords: *Agro-waste, Single-cell protein, Candida utilis, Fermentation.*

REFERENCES

- [1] Carrillo-Nieves D. et al., 2019. Renewable and Sustainable Energy Reviews, 102, 63-74. [2] Bessada, S. M. F. et al., 2019. Trends in Food Science & Technology, 93, 53-68. [3] Fasolin et al., 2019. Food Research International, 125, 108586.

Antimicrobial and antioxidant potential of *Eysenhardtia texana* leaf extracts

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Bacterial infections represent a critical problem for the health sector, coupled with the rapid increase in pharmacological resistance developed by this type of microorganisms. Due to this problem, new alternatives that can combat this problem, are an alternative to the use of plant extracts from arid zone given their bioactive properties (antioxidant, antimicrobial, anticancer, etc.) and its low commercial use. Different species of the genus *Eysenhardtia* have been shown to effectively inhibit the growth of bacterial strains of clinical importance (*Escherichia coli*, *Staphylococcus aureus*, among others); however, for the species *E. texana* there is little information on its properties and phytochemical content, despite its wide distribution in Mexico. For these reasons, the characterization and evaluation of the potential antimicrobial properties of *E. texana* leaf extracts for obtaining potential antibacterial agents and elucidation of its phytochemical content. The physicochemical analyses of palo dulce leaves were carried out according to AOAC Official Methods. Subsequently, solutions of 20 g of dry leaves or brunch in 400 mL of distilled water (AE) or hydro-alcohol solution (50:50, v/v, HAE) were prepared. The extracts were characterized in terms of yield, sugar composition (total and reducing sugars), total phenolic compounds (TPC), antioxidant activity by the FRAP, DPPH and ABTS methods expressed in MIC, and antibacterial activity against *E. coli* and *S. aureus*. The results show a high TPC in the AE and HAE in leaves and branches (44.5 and 85.9 mg GA/g extract, respectively). For *S. aureus*, a MIC of 5000 and 4000 mg/g extract in HAE and AE, respectively, was obtained. *E. coli* did not show an inhibitory effect.

Keywords: *bioactive compounds, antioxidant activity, antimicrobial activity, E. texana.*

REFERENCES

[1] García-Campoy, A., et al. , 20120. *Plants*, 9, 1124.

Probiotic potential of lactic acid bacteria isolated from cocoa fermentation

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Probiotics are live microorganisms that, when administered adequately, confer a health benefit to the host [1]. There is growing interest in isolating lactic acid bacteria (LAB) from plant sources for use in products targeted at vegan consumers. Some of the most promising plant sources of probiotic microorganisms are fermented foods, such as kimchi, olives, and cocoa. During cocoa fermentation, LAB strains may exhibit probiotic characteristics. However, the probiotic potential of LAB strains isolated from cocoa has been poorly studied [1]. This work aims to evaluate the in vitro probiotic potential of autochthonous LAB from cocoa, mainly from the *Lactiplantibacillus*, *Limosibacillus*, and *Levilactobacillus* genera. The tests used for this study were gastrointestinal tract survival, adhesion capacity, auto- aggregation, co-aggregation, antifungal and antimicrobial activity, hemolytic capacity, and antibiotic resistance. *L. plantarum* 299v strain was used as a control. None of the strains studied showed hemolytic activity. *L. brevis* LAB-CTA-18-4 and *L. fermentum* LAB-CTA-18- 2 were resistant to all antimicrobials (<15 mm). *L. plantarum* LAB-CTA-18-8 showed intermediate susceptibility to clindamycin. Also, *L. plantarum* LAB-CTA-18-8 and *L. plantarum* LAB-CTA-18-3 were the only strains that showed intermediate susceptibility to clindamycin and gentamicin. Two strains of *L. plantarum*, *L. fermentum* LAB-CTA-18-2 and *L. brevis* LAB-CTA-18-4, showed high hydrophobicity (>66 %) [2]. As for auto-aggregation, the commercial strain *L. plantarum* 299v and *L. plantarum* LAB-CTA-18-6 showed a low percentage (<20 %), while other strains showed moderate auto-aggregation capacity, with *L. plantarum* LAB-CTA-18-3 showing the highest percentage (66.18 %). Some of the strains studied also showed survival to intestinal tract conditions, antimicrobial activity, and antifungal activity. The strains studied showed probiotic potential in vitro, so it is suggested to continue studying the probiotic potential by in vivo tests.

Keywords: *Lactic acid bacteria, Probiotic potential, Cocoa fermentation, In vitro.*

REFERENCES

[1] Blohem-Pessoa, W.F., et al., 2017. *BioMed Res Int*, 2017, 1-10. [2] Rahman, M.M., et al., 2008. *World Journal of Microbiology and Biotechnology*, 24, 1593–1598.

Effect of the use of native basidiomycetes supernatants in the bread color and texture

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The use of enzymes in food processing has taken great interest, mainly in the chemical additives' substitution [1]. Although enzymes can be obtained from plants or animals, most are from microbial sources. These organisms have got advantages such as fast growth rates, high yields, and are relatively easy to genetically manipulate [2]. However, new sources of enzymes capable of producing high levels in low-cost media are constantly being sought [3]. In this sense, the white-rot fungi are an alternative little explored although these stand out for their enzymatic system of extracellular lignocellulases. In this work was evaluated the effect of the supernatants of two cultures and one co-culture two basidiomycetes in bread color and texture. With respect the enzymatic content, laccase, amylases, cellulases and xylanases were evaluated in supernatant before to be added in the doughs. In the bread were evaluated the color change, elasticity, hardness, weight loss, pores per mm and height. These three last parameters showed statistic differences ($P < 0.05$) between treatments. In relation to color changes, the values of L^* and a^* were different ($P < 0.05$). In general, the breads treated with the supernatant had higher height ($P < 0.05$) and minor weight loss ($P < 0.05$). These results showed the potential application of basidiomycetes supernatant in bakery industry. However, are requires studies related with the optimization of the concentration.

Keywords: *Celullases, Laccase, Trametes maxima CUI, Pycnoporus sanguineus CS2.*

REFERENCES

- [1] Miguel et al., 2013. Journal, 11, 22-32. [2] Author2 et al., 2019. Food industry, 278-321. [2] Patel et al 2017. In Biotechnology of Microbial Enzymes, 13-41. [3] Kathirgamanathan 2017. Ceylon Journal of Science, 46, 77-84.

Garlic (*Allium sativum*) peel extracts and their potential as antioxidant and antimicrobial agents for food applications: Influence of pretreatment and extraction solvent

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Antioxidant and antimicrobial properties of Garlic are well known [1]. During its processing, large quantities of waste are discarded [2]. Aiming to support the valorization of this residue, a 2x2 factorial design was applied to determine the influence of different pretreatments and extraction solvents (60%v/v aqueous solutions of ethanol and methanol) over the total phenolic content TPC, flavonoid content FC, antioxidant capacity AC and antimicrobial activity AA against some food-spoilage associated bacteria (*Salmonella* sp., *Listeria innocua*, *Escherichia coli* and *Staphylococcus aureus*) of garlic peel extracts GPE. A solid-state fermentation pretreatment FP with *Lactobacillus plantarum* or a 10-minute roasting pretreatment RP of garlic peel were carried out prior solvent extraction at 50°C for 18h and 120 rpm. RP-methanol treatment achieved the highest extraction yield: 11.53%, TPC: 60.06±0.18 mgGAE/gGPE, FC: 17.90±0.13 mgQE/gGPE and AC as DPPH-IC50: 149.75±1.69 µmolTrolox/gGPE. However, AA ranged from 23.67 to 38.91% inhibition against studied microorganisms at 5 mgGPE/mL. In comparison, FP-methanol treatment resulted in yield: 9.98±0.09%; TPC: 40.37±0.79 mgGAE/gGPE; FC: 14.03±0.30 mgQE/gGPE and AC: 119.48±0.50 µmolTrolox/gGPE. FP achieved the highest AA regardless the solvent, resulting in 100% inhibition in all cases. A Pearson correlation matrix showed a positive correlation ($p<0.05$) between PC and AC and between gram-positive and gram-negative bacteria. These results suggest the potential of GPE as antioxidant and antimicrobial agents for food applications while reducing food waste disposal.

Keywords: *Garlic, peel, waste, phenolic compounds, antioxidant, antimicrobial.*

REFERENCES

[1] Melguizo-Rodríguez, L. et al., 2022. *Food & Function*, 13, 2415–2426. [2] Naqvi, S. et al., 2020. *Anais Da Academia Brasileira de Ciências*, 92, 1–12.

Impact of the reversion conditions against 1-Methylcyclopropene (1-MCP) on bioactive compounds from ‘Rocha’ pear (*Pyrus communis* L. cv. Rocha)

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

‘Rocha’ pear is the 4th pear cultivar in Europe and the 1st cultivar in Portugal with more than 170k tons/year, resulting in >100 M€/year of income to the country’s economy [1, 2]. Its high exportation demands suitable conditions for long-term cold preservation. The 1-MCP has been used to preserve pear from chilling damages. However, this compound is an inhibitor of ripening, leading to significant fruit and economic losses [3]. The main objective of this study was to evaluate the effect on sugars, organic acids, volatile compounds and phenolics of seven strategies (C1: Temperature (T)=0 °C and 4 °C; C2: T+C₂H₄; C3: T+CO₂; C4: T+C₂H₄+CO₂; C5: 1-MCP; C6: low O₂; C7: control) applied to revert the 1-MCP ripening blockage effect. Maturation effects were evaluated at 0 and 7 days after strategies application. The average concentration of sucrose and fructose was slightly higher in all the conditions (t₀=4 and 2.5 to t₇=2 and 1.5 g/100 g of fresh fruit (FF), respectively), when compared to the C7. The concentration of malic acid decreased principally in condition C1 vs C7 (t₀=0.46 and 0.82 to t₇=0.39 and 0.68 g/100 g FF, respectively). Butyl acetate increase during all the pretreatments vs C7. Chlorogenic acid decreased (t₀=25 to t₇=12 mg/100 g FF), while arbutin slightly increased (t₀=0.7 to t₇=1.1 mg/100 g FF). These findings showed that the reversion strategies had a big impact on the bioactive compounds presents in pears, however, they still could exhibit their organoleptic and nutritional properties.

Keywords: Rocha pear, 1-MCP, Ethylene, Volatile compounds, Phenolics, Sugars.

REFERENCES

[1] Dias et al., 2020. Antioxidants 9,4, 356. [2] Dias et al., 2021. Trends in Food Science & Technology 113, 382-396. [3] Dias, et al., 2022. Scientia Horticulturae 299, 111033.

Valorization of orange peel waste by solid state fermentation for the accumulation of condensed tannins with antioxidant activity.

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Currently, there is great interest in obtaining biomolecules from agricultural by-products.[1] Obtaining juice from the citrus industry (in this case the orange) represents a good opportunity to take advantage of and value the large amount of waste that it generates.[2] The aim of this research was to take advantage of orange peel wastes for the accumulation of condensed tannins through the solid-state fermentation process. It was established that the *A. niger* GH1 strain was the most suitable for use in the bioprocess. Through the Plackett-Burman experimental matrix, it was found that the maximum amount of hydrolyzable tannins was 0.71 mg/g and the maximum amount of condensed tannins was 5.93 mg/g. It was determined that temperature and moisture were the factors that most influenced the bioprocess for obtaining naringin. In the identification of molecules, compounds belonging to the flavonoid family were found, highlighting naringin. It was determined that the best extract obtained from the fermentation process inhibited the growth of *Staphylococcus aureus* but did not show activity against *E. coli*. The fermentation extract has no antifungal activity. The best extract presented a good antioxidant activity. It is concluded that the solid state fermentation process is a good biotechnological alternative for obtaining molecules that can be used in the pharmaceutical, cosmetic, and food industries.

Keywords: *E. coli*, citrus, *Staphylococcus aureus*, naringin, hydrolyzable tannins.

REFERENCES

[1] Oboh, et al., 2012. Journal of food science and technology, 49(6), 729–736. [2] Moreno, et al., 2004. Interciencia, 29(9), 532-538.

Techno-functional properties of cricket proteins (*Acheta domesticus*) extracted by sonication

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Proteins are biomolecules made up of amino acids essential in the human diet with techno- functional properties that allow them to be incorporated as additives in processed products to improve their physicochemical and sensory characteristics and reduce costs in some cases [1,2]. In the present work, the objective was to evaluate the techno-functional properties of cricket flour (HG), defatted cricket flour (HGD), protein concentrate obtained by alkalization-agitation (CPA), and alkalization-sonication (CPS). Different extraction methods were used to obtain extracts and concentrates of cricket (*Acheta domesticus*). The techno-functional properties tested were water retention capacity (WRC), oil retention capacity (ORC), foaming capacity (FC), foaming stability (FS), emulsifying activity index (EAI), emulsion stability (ES), and heat coagulation (HC). The results indicated that CPS had the highest properties (2.8 g/g WRC, 3.49% ORC, 386.67% FC, 99% FS, 29.96 EAI, and 80% SE). HG and HGD are not significantly different ($p < 0.5$) in WRC (2.43 and 2.33 g/g). The worst properties are in HG, which does not present FC and FS and has low EAI (5.05 m²/g). The defatting process significantly improved ($p < 0.05$) the properties FC, FS, EAI, and ES. HC did not present significant differences for HG (30.58%) and HGD (30.33%), and it is higher than the concentrates CPA (4.25%) and CPS (9.64%). In conclusion, the HG HGD and CPA do not have good techno-functional properties, but an ultrasound-assisted protein extraction process improves the techno-functional properties, which could be used as food additives.

Keywords: *Keywords: bigels, starch, beeswax, beta-carotene, rheology, XRD.*

REFERENCES

- [1] Damodaran S. 1997. Food Proteins and Their Applications, 1, 1-30. [2] Fennema O. R. 1996. Food Chemistry, 3, 321-429.

Encapsulation of β -galactosidase using *Salvia hispanica* L. biopolymers

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Chia (*Salvia hispanica* L.) is an endemic seed of Mexico, that produces an interesting mucilaginous polysaccharide able to interact with other biopolymers to form coating materials [1]. The objectives of this work were to design an encapsulation system based on chia mucilage and chitooligosaccharides (Qo), to evaluate its ability to encapsulate the β - galactosidase for its application in the delactosing process using goat milk as a model of study. The capsule-forming solutions were based on a 2- factor Taguchi experimental design at two levels (high and low) of chia (40 and 60%, w/v) and Qo with a molecular weight of 1000 and 3000 Da (0.4 and 0.6 %, w/v), thus generating eight combinations in total (S1 – S8). The results confirmed the production of microcapsules as a size range between 2.5 - 3.2 μ m. Regarding hardness, only S1 and S5 showed significant differences; detecting that, at a lower molecular weight of the Qo, the microcapsules presented a greater hardness (8.2 ± 0.6 N). The TGA analysis showed that S1 had better thermal stability. The K_m (0.0995- 0.1002 mmol L⁻¹) and V_{max} (0.125-0.013 mmol L⁻¹ min⁻¹) values of o-NOG substrate demonstrate the high affinity of the encapsulated enzyme. The efficacy of the S1 and S5 encapsulation systems to protect and release the enzymatic activity was confirmed, as interesting activity of the β galactosidase was obtained on the different substrates (o-NFG and lactose), as well as on goat milk.

Keywords: *Microencapsulation; chitooligosaccharides; enzymatic activity ;goat milk; lactose intolerance*

REFERENCES

[1] Charles-Rodríguez, et al. , 2020. Coatings, 10,2-15.

Effect of transglutaminase crosslinking on solubility and thermomechanical properties of cold water gelatin fish bilayer films

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Fish gelatin is a structural protein that can be obtained from the fish processing industry waste. Used as a raw material in bioplastics manufacture contributes to reducing the environmental impact of the unused fish components, giving it an added value [1]. Bioplastics made from fish gelatin have great potential for their use as food packaging because they are smooth, homogeneous, transparent, provide UV protection and have a good oxygen barrier. However, their high hydrophilic profile limits their use. There are several methods used to reinforce the properties of hydrophilic materials [2]. In this work, an enzymatic crosslinking using microbial transglutaminase (mTGse) was performed to reduce the hydrophilic behavior of this polymer. Bilayer crosslinked films based on fish gelatin crosslinked with mTGse and amylopectin were fabricated by the casting method. The effect of crosslinking and bilayer lamination on the solubility, contact angle, thermal (glass transition temperature) and mechanical (Young's modulus) properties was evaluated. Results demonstrated a decrease in solubility (about 30 % compared to neat protein) and contact angle (from 52.0 ± 0.9 to 69.6 ± 0.5) with mTGse addition. This improvement can be attributed to the protein structure change, which influences its compactness and polarity [3]. Also, bilayer treatment decreased the solubility (about 48%). The suitable solubility to produce bioplastics depends on its final application. The obtained solubility of crosslinked fish gelatin bilayer films is desirable to produce packaging that protects food during the shelf life and can biodegrade at the end of its useful life [4]. Regarding the thermomechanical properties, the crosslinking fish gelatin and amylopectin bilayer film shows an improved thermal and mechanical stability. The present work offers an effective alternative to produce bioplastics from fish gelatin with enhanced water resistance and thermomechanical properties which could be useful in the packaging industry.

Keywords: *Fish gelatin, Transglutaminase, Bilayer, Crosslinking*

REFERENCES

- [1] Pereira et al., 2021. Journal of Composite Material, 55, 4169-4181. [2] Huang et al., 2019. Trends in Food Science and Technology, 86, 260-269. [3] Ahammed et al., 2021. Hydrocolloids, 116, 106649. [4] Park et al., 2021. Carbohydrate Polymers, 254, 117317.

Physicochemical, nutraceutical, and techno-functional characterization of Mexican hawthorn fruit (*Crataegus mexicana*)

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Mexican hawthorn fruit (*Crataegus mexicana*) is a species distributed in Mexico's southern and central states. This fruit is well-known due to its high pectin content; nevertheless, it is highly sub-utilized [1]. Some studies have reported that it contains bioactive compounds like phenolic compounds and other antioxidants. Furthermore, hawthorn extracts have proven to possess pharmaceutical properties; thus, there is scientific and commercial interest in its characterization for its use in the elaboration of functional ingredients [2,3]. This research aimed to characterize the physicochemical, nutraceutical, and techno-functional attributes of the different fractions of the Mexican hawthorn fruit. For this, the fruit was separated into three fractions (pulp, peel, and seed), dried, and ground. Then, official AOAC methodologies were used for the proximate characterization. Finally, total phenolic compounds (TPC), antioxidant content, and technical functionality were analyzed. For each fraction (pulp, peel, and seed), the results obtained, respectively, showed a content of dietary fibers ($\text{g} \cdot 100\text{g-d.w.}$) of 48.3 ± 0.5 , 59.4 ± 1.4 , and 92.4 ± 1.3 . Antioxidant content ($\mu\text{g} \cdot \text{mL}^{-1}$) by DPPH was 3.2 ± 0.1 , 3.9 ± 0.0 , and 1.5 ± 0.1 , and ABTS was 2.9 ± 0.2 , 5.9 ± 0.0 , and 1.7 ± 0.1 . TPC ($\text{mg} \cdot 100\text{g-d.w.}$) by Folin-Ciocalteu were 2.8 ± 0.3 , 10.7 ± 0.1 and 7.4 ± 0.2 . Peels had the highest protein content: $4.2 \text{ g} \cdot 100\text{g-d.w.}$, a value 3.6 times greater than that found in seeds. Pulp showed the best properties of water retention capacity ($16.1 \pm 0.5 \text{ mL} \cdot \text{g-d.w.}$) and solubility ($26.8 \pm 1.0 \%$), while seed got the highest oil retention capacity ($18.8 \pm 0.1 \text{ mL} \cdot \text{g-d.w.}$). In conclusion, the highest antioxidants and TPC were obtained from the peel, whereas the seed had the highest dietary fiber content, and the pulp showed the best technical properties. This evidence suggests that the Mexican hawthorn may be a potential alternative in the elaboration of functional ingredients, and its characterization contributes to its revalorization as raw material in the food or pharmaceutical industry.

Keywords: *Hawthorn fruit, characterization, dietary fiber, antioxidant.*

REFERENCES

- [1] Ornelas-Lim et al., 2021. Saudi Pharmaceutical Journal, 29, 1258-1266. [2] Reyes- Becerril et al., 2019. Fish & Shellfish Immunology, 92, 308-314. [3] García-Mateos et al., 2013. Revista Mexicana de Biodiversidad, 84, 1298-1304.

Development of a powdered beverage to reconstitute from tamarillo, gastrointestinal evaluation and in vitro antioxidant activity.

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

A powder drink based on tamarillo (*C. betacea*) was developed by spray drying. The physicochemical properties, viability of lactic acid bacteria (BAL), antioxidant activity, gastrointestinal simulation (IGS) and sensory acceptability of the capsules were evaluated. From a tamarillo juice, 12 treatments were performed using maltodextrin as encapsulant (MD), six with ratio 1:4 and six with 1:3 (°Bx:MD), two inlet temperatures (TE) were tested (150 and 160°C) and three strains of BAL (2% p/v) were used. The capsules were refrigerated for 35 days and two treatments were selected from each proportion that showed greater survival; for 1:4 they were T1 and T2 (150°C and 160°C, respectively) and for 1:3 they were T7 and T8, under the same TE. The selected treatments contained *L. plantarum*. Regarding the encapsulation efficiency (%EE), treatments 1:3 showed significant difference ($p < 0.05$) with respect to 1:4, exhibiting 80% EE in T7 and T8, for IGS also 1:3, *L. plantarum* showed significantly ($p < 0.05$) increased release of CFU/g in the gastrointestinal phase (IGF), is attributed to the interaction of bioactive compounds of *C. betacea* [1] and drying conditions, showing stability in the strain at each stage of the digestive simulation and with amounts greater than 107 CFU/g. In addition, the capsules of 1:4 and 1:3, showed no significant difference ($p < 0.05$) in total phenolic compounds, as well as for the antioxidant activity, showing greater activity in the IGF (70-80%); this is assumed to be bioaccessibility of phytochemicals associated with dietary fiber [2,3] evidencing its release during IGS. Sensory evaluation showed a general acceptability of 7 for both reconstituted beverages. The encapsulation of the probiotics and antioxidants of tamarillo by means of spray drying is a viable alternative to contribute to the formulation of new products with local raw materials of the North-eastern Sierra of Puebla.

Keywords: *Cyphomandra betacea*, encapsulation, probiotics, prebiotics, bioactive compounds.

REFERENCES

- [1] Gannasin, S.P. et al., 2015. *J. Funct. Foods*. 19, 10–19. [2] Saura-Calixto, F. 2011. *J. Agric. Food Chemistry*. 59, 43–49. [3] Diep, T., Pook, C., & Yoo, M. (2020). *Antioxidants*, mdpi.com 9(2), 169.

Moral leaves: A potential source for the generation of an analogous drink of Kombucha with antioxidant potential

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The food industry is responsible for the generation of a considerable volume of agro- industrial waste [1]. Therefore, they are a source that can be used in fermentation processes with the kombucha consortium, this fermentation will promote greater bioaccessibility to polyphenolic compounds with potential health benefits [2]. Objective: obtain an analog of kombucha from moral leaves, with functional properties. For this, fermented were prepared with the kombucha consortium from concentrations of 0.25% to 1% of moral leaves, following the fermentation until days 7, 9 and 11. Physicochemical properties was carried out, establishment of the consortium (Scoby), determined the profiles of phenols and flavonoids by UPLC-PAD/ESI-QqQ MS/MS and antioxidant capacity by ORAC, ABTS+ and FRAP assay. Results: It was determined that high concentrations of the moral leaf affect the acidity and pH parameters and the establishment of the Kombucha consortium, consequently affecting the fermentation process. Finding by means of a correlation analysis that, due to the influence of compounds such as Urolitin A, 2 Hydroxybenzoic, coumaric, in fermented with high concentrations of moral leaf they disfavor the development of the kombucha consortium. Greater antioxidant capacity was observed in the longest fermentations of 0.25%. Conclusion: Indicating that a concentration of 0.25% of moral leaf is the adequate concentration for the development of kombucha analogs with antioxidant potential. Impact of the work: Generation of a drink kombucha analogue with functional potential from agroindustrial waste.

Keywords: *Moral leaves, Kombucha, Polyphenolic compounds, Antioxidant.*

REFERENCES

[1] Campos et al., 2020. Molecules. [2] Dutta et al., 2019. Beverages, 259-288.

Aloe vera foods against Alzheimer's disease

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Aloe vera is a natural source of multiple benefits due to the joint action of compounds (vitamins, amino acids, phenolic compounds, enzymes, among others) contained in the plant, it has more than 70 active compounds, which are related to the improvement of some brain diseases (Alzheimer's, Parkinson's, depressive disorders, autism) [1]. Alzheimer's disease (AD) is a progressive neurological disease and the common form of dementia, there is still no adequate treatment option for the disease[2]. However, there are treatments related to the use of some medicinal plants to improve brain function. The objective of the present investigation is to carry out bioinformatic analysis on the transcripts present in the leaves and root of Aloe vera for its use as in food for human consumption, as well as enrichment analysis on the expression of genes in patients with AD and determine the possible metabolic routes where Aloe vera compounds intervene. To develop the analysis, we use Rstudio 1.4, multiple packages (Geoquery, lima, dplyr, ggplot2, among others), in addition to the NCBI Gene Expression Omnibus database (GSE24389, GSE138260). As a result of the analysis, it was obtained that the gel present in the leaf is the main source of transcripts (heatmap) to be added to the food, in the enrichment analysis it was determined that the main metabolic route in which the gel compounds could intervene in the precursor protein (APP) and α -amyloid production pathway. Aloe vera gel added to food could work as a preventive treatment in the generation of Alzheimer's disease.

Keywords: *Aloe vera, bioinformatics, foods, leaf.*

REFERENCES

[1] Majumder et al., 2019. *Pharmacological Research*, 148, 1-12. [2] Aaldijk et al., 2022. *Ageing Research Reviews*, 75, 1-10.

Wheat flour tortillas added with holy herb (*Piper auritum*)

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The tortilla is part of the culinary identity of Mexicans, it is a basic component of snacks, which accompanies various festive dishes and is essential in every meal of the day [1]. Currently, food products enriched with ingredients or raw materials of natural origin have been developed to promote a healthier diet [2]. Due to the above, the notion of making a wheat flour tortilla flavored with holy herb leaves (*Piper auritum*) arises in order to propose an innovative food with high nutritional value. The sacred herb or sacred leaf is an aromatic plant of the Piperaceae family. The leaves of this plant are used as a condiment and have an important presence in various regional cuisines [3]. The elaboration of the tortilla has a standardized process in which no salt or sugar is added. In the investigation, the proximal analyzes of the tortilla were carried out applying the analytical methods of the A.O.A.C manual [4,5]. It was obtained that for every 100 grams it contains 19.3106% fat, 10.6964% fiber, 10.2290% protein and 29.2453% carbohydrates, compared to commercial tortillas and they are in a range of 3.8-9% protein and between 1.5-3.5% fiber per 100 grams [6]. With the present investigation, it is demonstrated that the developed product has a higher protein content, unlike commercial wheat tortillas. Therefore, it is suggested to expand the use of this plant in the development of new food products.

Keywords: *Sacred herb, Tortilla, Protein, Fiber, Innovative.*

REFERENCES

- [1] Basilia, et al., 2016. *Región y Sociedad*, 28(66), 161-162. [2] Torres, et al., 2020. *Polo del Conocimiento: Revista Científico-Profesional*, 5(4) 70-85. [3] Mendoza. 2017. Tesis: Universidad Veracruzana. 5-8.[4]. A.O.A.C. 2000. *Agricultural chemicals, pollutants, drugs*. Volume I.17th edition. USA [5] A.O.A.C. 2000. *Composition fod; Additives; Natural pollutants*. Volume II.17th edition. E.U.A. [6] Piñol. 2017. *Spanish Association of Cereal Technicians*. Valladolid.

Characterization of edible films made with pitahaya mucilage (*Hylocereus undatus*)

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Recently, the interest of edible films formulated with new ingredients has increased. One interesting option is pitahaya mucilage containing water-soluble polysaccharides, which may help to film formation [1]. Mucilage can be obtained from different plants and parts of plants, including seeds, fruits, leaves, roots, among others [2]. The aim of this investigation was to evaluate the properties of pitahaya mucilage (from pulp or peel) and pectin-based films. Also, the effect of glycerol concentration (0.5-1.0%) was evaluated. Films were characterized by measuring thickness, color, water vapor permeability (WVP), tensile strength and elasticity. Results showed that WVP and elongation were higher in pulp-based films, whereas tensile strength was higher in peel-based films. On the other hand, the addition of glycerol had a significant effect ($p < 0.05$) on the mechanical and barrier properties of films, without a notable change in the color. Films added with 1% glycerol presented a higher tensile strength and a lower elasticity than those added with 0.5%. It was also observed that PVA was higher in films with higher content of glycerol. Glycerol acts as a plasticizing agent, modifying the properties of the films [3]. The incorporation of a plasticizer in the polymeric matrix decreases intermolecular interactions between polymer chains, decreasing the free volume and increasing molecular mobility. Similarly, by increasing the molecular mobility, it also increases the elasticity of the film, but the tensile strength decreases [4]. These results will allow to select the most appropriate formulation to its possible applications on food products. Then, importance of this work lies in the elaboration of biodegradable films as an alternative to plastic packaging, contributing to the reduction of plastic waste.

Keywords: *Edible film, mucilage, pitahaya, pectin, glycerol, physical properties.*

REFERENCES

- [1] Olawuyi et al., 2021. Carbohydrate Polymers, 272, 118371. [2] Kamel et al., 2020. International Journal of Biological Macromolecules, 165, 2550-2564. [3] Jouki et al., 2013. Carbohydrate polymers, 96(1), 39-46. [4] Gheribi et al., 2018. Carbohydrate Polymers, 190, 204-211.

Optimization of an alternate culture medium to produce bacteriocins from *Enterococcus faecium*

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The lactic acid bacteria *Enterococcus faecium* CABA-01, producer of bacteriocins, was previously isolated from artisanal Cotija cheese [1]. The present work deals with optimizing a culture medium to produce bacteriocins by *E. faecium*. Based on the Man, Rogosa, Sharp (MRS) medium [2], in terms of its content of carbon and nitrogen sources, the media were formulated considering factors such as the concentrations of whey, sugar cane molasses, yeast extract, trypticase soy broth, and honey from the sap of maguey pulquero. A Plackett- Burman design [3] was used for the initial screening, and the optimization of bacteriocin production as a function of medium composition, a central composite design, and response surface methodology [4] were used. The definitive experiments of this research are currently being developed, and the main results will be shared and discussed at the congress. This research is vital since Mexico lacks technological developments that allow the industrial production of bacteriocins, taking advantage of our resources, and contributing to genuinely sustainable development.

Keywords: *Lactic acid bacteria, Enterococcus faecium, Bacteriocin, Fermentation.*

REFERENCES

- [1] Trejo-González, L., 2021. Tesis Doctoral, ICAP, UAEH. [2] De Man et al., 1960. *J Appl Microbiol* 23, 130-135. [3] Box et al., 2005. *Statistics for experimenters. Design, innovation, and discovery*. NJ: Wiley. [4] Montgomery, 2001. *Design and analysis of experiments*. USA: Wiley.

Evaluation of tannin accumulation using solid state fermentation from nopal prickly pear cactus (*Opuntia ficus-indica*) husk.

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Tannins are a group of compounds widely studied due to their outstanding biological properties, and alternatives are being sought to obtain these compounds, for which solid-state fermentation (SSF) is a viable alternative because it is considered an environmentally friendly methodology in which filamentous fungi can be used. Different substrates have been used in SSF, an alternative substrate for research is the residue of the prickly pear *Opuntia ficus-indica* (the husk), which has been reported to contain pigments, sterols and vitamins, making it a viable source for obtaining tannins through SSF. The objective of this project will be to evaluate the processing conditions of SSF from prickly pear (*Opuntia ficus-indica*) husks for the accumulation of tannins with biological properties, As results, it was concluded that prickly pear peel was a good support for FES. From the solid state fermentation conditions, the best fermentation time was between 48 and 60 hours for *A. niger* GH1, and the best treatment for the accumulation of condensed tannins was treatment 13, while the best treatment for the accumulation of hydrolyzable tannins was treatment 16. The bioprocess with *Aspergillus niger* GH1 allowed the accumulation of condensed and hydrolyzable tannins, the variables with significant effect on the FES process were temperature, inoculum and humidity. [1,2].

Keywords: *Aspergillus sp.*, *antioxidant*, *polyphenols*, *Agro-industrial wastes*.

REFERENCES

- 1] Cano, A. et al., 2021. Carbohydrate Polymer Technologies and Applications, 2, 100156. [2] Gulsunoglu-Konuskan, Z. et al., 2021. Food Bioscience, 42, 101058.

Physicochemical characterization of must from waste apple from Canatlán

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The municipalities of Canatlán, Nuevo Ideal and San Dimas in Durango state, produced 3977.02, 1316.13 and 999.5 tons in 2020, respectively [1]. The origin of fruit wines dates to the Middle Ages when apples and berries were used to replace grapes when they were not available. Some fermented products have been made from Manzana de Canatlán, such as Tepache [2], however, they are products that are not marketed. The present work consisted of the physicochemical characterization of juice of apples considered waste to have the bases for the elaboration of a fermented beverage. The analyzes performed were: Reducing sugars by the DNS method, pH, total acidity by neutralization with NaOH 0.1 N using phenolphthalein as an indicator and expressed as malic acid in g/100 mL [3]. Total nitrogen was determined by the Kjeldhal method [3] and easily assimilable nitrogen was determined by the formalin method [4]. The results obtained showed that the sugar content is approximately 140 g/L, while the nitrogen content is low; the acidity and pH allow this juice to be used as must for fermentation; however, its enrichment in terms of nitrogen content is recommended to avoid fermentation stops. The impact of the work consists of giving an alternative to apple producers for the use of waste apples.

Keywords: *Sugars, Acidity, Nitrogen, Wine.*

REFERENCES

- [1] SIAP., 2021. Servicio de Información Agroalimentaria y Pesquera. <http://www.siap.gob.mx/opt/estadistica/siembycos/p-v/secomagpv.pdf>. [2] Velázquez- Quiñones S.E et al., 2021. *J Food Process Preserv.*, 45 (7), e15597. [3] IAL, 2008. IAL, Normas Analíticas. São Paulo: Instituto Adolfo Lutz., 33-38 [4] Julien, A. et al., *Am. J. Enol. Viticult.*, 51 (3), 215-222.

Effect of solid-state fermentation on functional properties of maize

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Maize is one of the most widely cultivated cereals in the world and contains a large number of antioxidant compounds, such as phenolic compounds. However, many of them are not available since they are bound to components in the maize cell wall [1]. Solid-state fermentation (SSF) with *Rhizopus oryzae* has been applied to increase the antioxidant capacity in grains and legumes [2]. This work aimed to evaluate the effect of SSF on the following functional properties of maize with fungus *R. oryzae*. For this, SSF was performed in zip lock bags (5 cm²) at 30 °C for 72 h, with an inoculum size at 1x10⁷ spores/g. Samples were withdrawn every 12 h, and the extract was recovered with 80% ethanol, and used to determine the total polyphenol content (condensed + hydrolyzed) and antioxidant capacity (ABTS, DPPH and FRAP assays). The highest values were obtained at 60 h of culture time, with values of 1.45 mgGAE/gdm (gram of dry matter) and 1.92 mgGAE/gdm for condensed and total phenolic content, respectively. Also, the antioxidant capacity for ABTS, DPPH and FRAP was 1.47 mgTE/gdm, 1.27 mgTE/gdm and 5.38 mgFe²⁺/gdm, respectively. The use of SSF allowed increase up to 0.68 and 1.33-fold the total phenolic content and antioxidant capacity of maize, with respect to the maize without fermented. Thus, the maize fermented should be considered as a raw material for the develop functional food because of its antioxidant properties.

Keywords: *Maize, Rhizopus oryzae, antioxidants, solid-state fermentation.*

REFERENCES

- [1] Streimikyte, P., et al., 2022, International Journal of Molecular Sciences. 23. [2] Londoño-Hernández, L., et al., 2017, International Journal of Food Microbiology. 257: 110- 127.

Microbiological and sensory evaluation of a gelatin added with inulin and starch from malanga (*xanthosoma sagittifolium*)

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Man has always believed in the virtues of certain foods and products on health. This belief has been reinforced in recent decades thanks to research on the effects of certain food components that improve the "functionality" of the organism [1]. The aim of the present work was to design a whey gelatin with pre- and probiotic characteristics, using malanga starch and inulin as gelling agents, and strawberry pulp as flavoring. Malanga corms from the Zoque region of central Chiapas, Mexico, were used. The extraction method used was that reported by Arango et al. [2] with some modifications. Lactic acid bacteria (LAB) were isolated in a previous study of samples of fermented Chiapaneco pozol by Velázquez et al. (2018) [3], reactivated in MRS broth, inoculated in whey, then incorporated into gelatin made with fresh and innocuous whey and flavored with strawberry pulp. The results indicated that the growth of LAB is higher than what is established by NOM-181-SSA-2018 [4] to be considered as a probiotic food (1×10^6 CFU/g), in addition, microbiological tests were performed where the samples analyzed did not present growth of total coliforms [5], as well as Salmonella and Shigella [6], so it is considered as a safe product. The gelatin complies with the characteristics of a functional food, it presented a shelf life of three months, according to the estimated viability of the LAB. Respect to the sensory analysis applied to the three gelatin formulations, sample G420 is the one that statistically ($p < 0.05$) presented the highest level of liking, with respect to odor and flavor attributes. The potential shown by whey, malanga and its components (starch and inulin), the functionality of both and their nutritional characteristics for use in the food industry are promising, and a highly viable alternative to improve health and nutrition conditions in vulnerable groups.

Keywords: *malanga, Xanthosoma sagittifolium, prebiotic, probiotic.*

REFERENCES

- [1] Beltrán, María. 2016,30, 12-14.[2] Arango et al. 2008. 6 no. 2. [3] Velázquez et al. 2018. 13. [4]NOM-181-SCFI-2010. [5]NOM-112-SSA1-1994 [6]NOM-114-SSA1-1994.

A comparative study of bioprocess to recover bioactive compounds from pomegranate peel

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Pomegranate is a source of various beneficial phytochemicals for health, it contains ellagitannins, gallotannins, among other polyphenolic compounds [1]. The use of agricultural waste can be achieved by extracting high-value components such as phytochemicals and it can be used for the development of functional foods for the prevention of chronic diseases [2]. The peel is rich in hydrolysable tannins, mainly Punicalagin [3]. The aim of this work was the evaluation and comparison the effect of the fermentation bioprocess in a solid medium of pomegranate peel using *Aspergillus niger* GH1 and *Saccharomyces cerevisiae* on the content of bioactive compounds. The bioprocesses were carried out with pomegranate peel powder as a support for 48 hours. The initial conditions for the fungus correspond to those reported by Sepúlveda et al. (2012) and for the yeast by Moccia et al. (2019). Bioactive compounds were obtained through solid state fermentation with the fungus and yeast, which were analyzed by Folin Ciocalteu and HCl-butanol, where it was found that the highest extraction of total polyphenols occurred at a time of 30 hours for *A. Niger* GH1 with an approximate value of 188.3 mg/g and for *S. Cerevisiae* 104 mg/g at 24 hours. The main compounds present during bioprocesses were: Punicalagine, punicaline and ellagic acid. Enzymatic activities, cellulase, β -glucosidase and ellagitanase were detected.

Keywords: *ellagitannins, solid state fermentation, extraction, enzymatic activities.*

REFERENCES

[1] Bonzanini et al., 2009. *Food Chemistry*, 117, 745-749. [2] Kumar et al., *Bioresources and Bioprocessing*, 4:18, 2017. [3] Seeram et al., *Separation and Purification Technology*, 41, 49-55, 2005

Effect of the combination of *Bacillus atrophaeus* and semperfresh coatings applied in tomato fruit (*Solanum lycopersicum*) on the physiological, enzymatic, and physicochemical parameters in the postharvest stage

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

This study investigated the effect of the application of the semperfresh coating combined with *B. atrophaeus* on the physiological, physicochemical and enzymatic parameters of tomato at the postharvest stage [1,2]. The treatments applied were: 2% semperfresh+B. atrophaeus at 1.8x10⁹ CFU/mL and Kings B culture medium as control, to physiologically ripe tomato fruits that were stored at room temperature and the parameters of firmness, °Brix, pH, titratable acidity (TA), Physiological weight loss (%PFP), ethylene production rate (EPV), respiration rate (VR). Pectin methylesterase (PME) and β-galactosidase (β-GAL) enzymatic activity were evaluated at 0, 2, 4, 6, and 8 days post-treatment. The application of semperfresh+B. atrophaeus showed significant differences regarding the control in the quality parameters of the fruit. In addition, the reduction in the deceleration of the %PFP, VR, and VPE is attributed to an additive effect between the treatments due to the metabolites synthesized by the bacteria could influence the permeability of the coating, reflecting a decrease in gas exchange. In addition, a decrease in the production of endogenous ethylene was obtained, corresponding to the decrease in the activity of the pectinolytic enzymes PME and β-GAL. The low activity of pectinolytic enzymes indicates the decrease in the loss of firmness, which represents the extension of the useful life of the tomato fruit [3]. In conclusion, the combination of the semperfresh+B. atrophaeus coating turned out to be effective in extending the shelf life of tomato fruit, positioning it as an effective strategy that helps reduce postharvest losses in climacteric fruits.

Keywords: *Inhibition, ethylene, additive, coating.*

REFERENCES

- [1] Alexander et al., 2002. Journal of Experimental Botany, 53, 2039-2055. [2] Guardado- Valdivia et al., 2018. Microbiological Research, 210, 26-32. [3] Amaya et al.,2009. Dyna, 162, 67-73.

Effect of alcoholic fermentation on the nutritional composition of sauces based on white chili from Chiapas

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The white chili from Chiapas is considered a wild variety, with a lack of scientific evidence about its use and consumption; culturally consumed in fresh and pickles. To contribute to the economic activity of Chiapas residents, alcoholic fermentation was evaluated as sustainable and functional techniques for the development of a new product. Sliced chilis were fermented to make sauces. Sauces were classified into A and B. For sauce A, were used *Saccharomyces cerevisiae* and saccharose, for sauce B, only saccharose was used. In this study, the nutritional content of each sauce obtained was evaluated; the proximal analyzes were based on the analytical methods of the A.O.A.C. manual [1, 2]. To evaluate statistically significant differences, it was used the statistical software STATGRAPHICS Centurion XVI.I, an ANOVA analysis of one factor was applied with multiple range tests (LSD), with a confidence level of 95%. The statistical evaluation showed that the effect on the nutritional composition between sauces A and B, only presented a significant difference ($p \leq 0.05$), in the fiber content, for B of 3.05 ± 0.19 and for A of 2.57 ± 0.10 . Sauce A has no significant effect in terms of protein and fat content, compared to sauce B, in addition to presenting possible functional characteristics, because *Saccharomyces cerevisiae* is within the group of probiotics [3].

Keywords: *White chili, sauce, fermentation, Saccharomyces cerevisiae, probiotic.*

REFERENCES

- [1] A.O.A.C. 2000. Agricultural Chemicals, contaminants, drugs. Volume I.17a edition. E.U.A. [2] A.O.A.C. 2000. Food Composition; Additives; Natural Contaminants. Volume II.17a edition. E.U.A. [3] Quevedo, et al., 2020. Revista de la Facultad de Medicina Veterinaria y de Zootecnia, 67(3), 239-252.

Fungal lipase obtained by surface adhesion fermentation using magnetic chitosan-coated nanoparticles

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The objectives of the present work were: The characterization of an immobilization process *A. niger* spores in nanocomposite of magnetic nanoparticles coated with chitosan (NPM-Q) and application of this bio-nanostructured system to produce lipase in repeated cycles of the fermentation by adhesion to surface (FAS) [1,2]. It was demonstrated that the process of the adhesion of the spores to the NPM-Q reaches the state of equilibrium in a 30-60 min period. The isotherm obtained at 30 °C conforms to the Freundlich model [3,4]. Then fermentation was carried out in 20mL of mineral medium with 0.5% sucrose and 2% olive oil as carbon sources, in the presence of 4.5mg of magnetic support and 1x10⁶ spores/mL [1] It was demonstrated that the levels of lipase activity in the first, third and fourth cycles of the FAS were like those ones detected in submerged fermentation (on average 17.86 IU/L at 12 h and 21.74 IU/L at 24 h). However, in the FAS second cycle at 24 h the activity was 68.73 IU/L. The biofilm is strongly adhered to the magnetic material, thus the system can be removed with the external magnetic field and applied in a new fermentation cycle. The FAS with NPM-Q demonstrates one obvious advantage when compared to submerged fermentation[1]:The repeated application of the biomass generated in a cycle of fermentation in subsequent cycles achieving equal or greater levels of lipase activity, which saves the time related to the production of the spores commonly applied in the submerged fermentation as inoculum and decreasing production time.

Keywords: *surface adhesion fermentation, magnetic nanoparticles, chitosan, A. niger.*

REFERENCES

Reference: [1]Cruz-Aldaco, et al., 2014., [2] Gutiérrez-Correa, M. et al., 2003; [3] Peng, Y. et al., 2010; [4]Gregorio-Jauregui, K. M. et al., 2012.

Milks fermented with *Lactococcus lactis* inhibit the HMG-CoAR under simulated gastrointestinal digestion and ex vivo intestinal absorption

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Hydroxy-methyl-glutaryl coenzyme A reductase (HMG-CoAR) is a regulatory enzyme in cholesterol biosynthesis and is a target for hypercholesterolemia treatment through its inhibition [1]. Fermented milks (FM) with *L. lactis* have demonstrated hypocholesterolemic effect, however, the inhibitory activity of HMG-CoAR by peptides-derived from FM is still unclear. The objective of this study was to evaluate the inhibition of HMG-CoAR by peptide fractions derived from FM. FM were prepared with *L. lactis* NB-572 and NB-600 for 48 h and further subjected to simulated gastrointestinal digestion (SGD) [2]. Subsequently, the digested samples were exposed to *ex vivo* intestinal absorption [3]. Peptide absorption was analyzed by RP-HPLC and fractions from undigested, digested and absorbed FM were tested for HMG-CoAR inhibitory activity (%). Non-fermented milk (nFM) was used as control. As results, peptides were absorbed in a range of 5-12 %, where nFM>FM-572>FM600. Undigested milks inhibited the HMG-CoAR in a range of 21.00-46.68 %, where FM600 show the best inhibitory activity. Nevertheless, after SGD, the inhibitory activity of all milks decreased to 6.65-20.26 %, where FM600 exhibits the highest inhibitory activity. After intestinal absorption, only absorbed FM600 significantly inhibits the HMG-CoAR (20.03 %). Thus, this absorbed fraction was next purified by RP-HPLC obtaining six collected chromatographic fractions (CF). The inhibitory activity of CFs was 4.54-27.68 % and the highest inhibitory activity was found in CF1 (27.68 %). In conclusion, FM-600 could provide peptides with HMG-CoAR inhibitory activity which may be associated with the hypocholesterolemic effect of this FM. Further studies will focus on identify the structure of peptides involved in the inhibitory activity and assessment their effect in an *in vivo* model.

Keywords: *bioactive peptides, hypercholesterolemia, bioaccessibility, bioavailability*

REFERENCES

- [1] Pak et al., 2022. J. Mol. Struct., 132909. [2] Kopf-bolanz et al., 2012. J Nutr. 142(2), 245-250. [3] Dixit et al., 2012. J. Pharmacol. Toxicol. Methods. 65(1) 13-17.

Phenolic compounds and antioxidant activity of the pulp and peel of *Pouteria campechiana* fruits

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Pouteria campechiana (yellow zapote, canistel or mante) is a tropical tree belonging to the *Sapotaceae* family. It is native to southeastern Mexico and Central America, and it is currently distributed from Florida to Brazil. It produces a yellow fruit whose pulp is edible, but not highly appreciated [1]. Therefore, most of the fruit is wasted. The objective of the present work was to analyze the content of phenolic compounds, flavonoids and the antioxidant activity of the peel and pulp of *P. campechiana* fruits that grow in Cd. Mante, Tamaulipas, Mexico. Fruits were collected from six *P. campechiana* trees in different areas of the locality. The peel and pulp were separated and dried at 60 °C to constant weight. The samples were ground and extracted with 70% ethyl alcohol. The content of phenolic compounds was determined by the Folin-Ciocalteu method, flavonoids by the aluminum chloride method and antioxidant activity by the ABTS method. The content of total phenolic compounds was from 2.8 to 5.4 mg/g for the pulp and from 4.0 to 6.9 mg/g for the peel. flavonoid content was 0.12 to 0.26 mg/g for the pulp and 0.15 to 0.24 mg/g for the peel. The antioxidant activity of the ethanolic extracts was from 70.2 to 87.9% for the pulp and from 69.2 to 87.2% for the peel. These results indicate that the mante fruit is a potential source of bioactive compounds that can be used as food additives.

Keywords: *Mante, Pouteria campechiana, Antioxidants, Phenolics, Flavonoids.*

REFERENCES

[1] Evangelista-Lozano, S. et al., 2021. *Fruits* 76, 116–122

Cardioprotective effect of milks fermented with specific *Lactococcus lactis* strains in hypercholesterolemic Sprague- Dawley rats

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Hypercholesterolemia is a condition that involves high levels of atherogenic lipoproteins (LDL-C, VLDL-C) and low levels of HDL-C [1]. This lipid profile alteration conduces to high risk for development cardiovascular diseases [2]. Milks fermented as adjuvant in the treatment of hypercholesterolemia is a promise approach for enhance cholesterol levels [3]. In this sense, the objective of this study was to evaluate the hypocholesterolemic effect of fermented milks with *L. lactis* in hypercholesterolemic rats. Fermented milks (FM) were prepared with *L. lactis* NB-572 (FM572), NB-571 (FM571) and NB-600 (FM600) for 48 h. Rats were divided into six groups consisting in 1) standard diet, 2) high cholesterol diet (HCD), 3) HCD + Unfermented milk, 4) HCD + FM571, 5) HCD + FM572 and 6) HCD + FM600. After seven weeks of treatment, plasma and hepatic lipid profile were determined. Furthermore, total lipid, cholesterol, and bile acids. After intervention, milks fermented decreased total cholesterol in order FM572 >FM600 >FM571 (21.2, 13.7 and 10.8 % of reduction, respectively). HDL-C levels were improved in the group treated with FM-600. Moreover, LDL-C levels decrease in the groups treated with FM-572 and FM-600. Therefore, these FM significantly reduced atherogenic index. Liver lipids (total lipid, cholesterol, and triglycerides) were slightly modified with FM in a downward trend. Total bile acids excretion was no affected; however, total cholesterol was mildly excreted after FM-600 and FM-572 intake. In conclusion, this study demonstrated that FM specifically with NB-572 and NB-600 exert cardioprotective potential effect, which could be used as functional food for hypercholesterolemia treatment adjuvant.

Keywords: *Hypercholesterolemia, Lactococcus lactis, Fermented milk, Functional foods*

REFERENCES

- [1] Ganjali et al., 2017. Prog. Lipid Res., 67, 16-26. [2] Koon y Talha, 2021. Can J Cardiol., 37(5), 733-747. [3] Companys et al., 2020. Adv Nutr., 11(4), 834-863.

Functional potential of corn tortillas added with cabbage (*Brassica oleracea* var. *capitata* L.) to type 2 diabetes management

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Type 2 diabetes (T2D) is characterized by hyperglycemia caused by alterations associated with oxidative stress [1]. Corn tortillas (CTs) are essential in the Mexican diet, although reducing their consumption in T2D patients is recommended [2]. Cabbage (*Brassica oleracea* var. *capitata*) has a high bioactive compound content and functional properties; therefore, would be useful in developing healthier foods in T2D management [3]. This study determined the functional potential of CTs added with cabbage flour. CTs were prepared with three different levels of cabbage flour (5, 10, and 15%, w/w) and CTs without cabbage as a control (T0). The total phenolics (TPC) and flavonoid content (TFC) were determined. The antioxidant and antidiabetic activity were measured by inhibiting DPPH and ABTS radicals and α -amylase and α -glucosidase activity, respectively. Bioactive compound content (TPC and TFC) increased as follows: T0 (71.55 and 0 mg/100g), T5 (663.57 and 99.19 mg/100g), T10 (757.12 and 247.62 mg/100g), T15 (926.84 and 383.51 mg/100g). T15 registered a significant ($p < 0.05$) effect on antioxidant and antidiabetic activity compared to T0. T15 inhibited DPPH (40.34%) and ABTS (35.37%); these results also were expressed as Trolox (3.86 and 295.47 mg/g), catechin (2.65 and 117.34 mg/g), and gallic acid (54.93 and 1.01 mg/g) equivalents. T15 decreased the activity of α -amylase (44.33%) and α -glucosidase (16.43%); these inhibitions also were expressed as acid gallic (0.40 and 0.78 mg/g) and catechin (0.91 and 0.85 mg/g) equivalents. The increased TPC and TFC in T15 by including cabbage flour could explain higher antioxidant and antidiabetic activity than T0 reported. Thus, CTs added with cabbage flour (15%) would attenuate oxidative stress and reduce hyperglycemia. The addition of cabbage flour increased bioactive compounds content and the CTs functionality. Cabbage can enhance the functional value of essential foods in the diets of diabetic patients in Mexico, such as CTs.

Keywords: *Functional foods, bioactive compounds, cabbage, oxidative stress.*

REFERENCES

- [1] Galicia et al., 2020. *Food & Function*, 11, 8768–8779. [2] Juárez et al., 2019. *Public Health Nutr.*, 22, 3238–3249. [3] Uuh et al, 2021. *J. Food Sci*, 86, 4775–4798.

Purified extracts of an endemic black and pinto bean (*Phaseolus vulgaris* L.) from Chiapas, México present antioxidant potential

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Phenolic compounds present in common beans have an important role in human health. [1, 2]. The objective of this work was to determine the antioxidant potential and phenolic compounds content from non-purified and purified extracts of black and pinto bean unique varieties. For total phenolic content, the purified pinto bean (P-RB) presented the highest content with 443.88±13.74 mg GAE/g extract. The purified black bean (P-BB) extract presented 335.86±8.72 mg GAE/g extract, while the non-purified black bean (C-BB) and non-purified pinto bean (C-RB) extracts presented 174.01±9.96 and 217.11±17.67 mg GAE/g extract, respectively (p<0.05). For total anthocyanins determination, P-BB presented the highest content with 49.86±3.28 mg C3GE/g extract, while C-BB presented 21.40±0.65 mg C3GE/g extract (p<0.05). On the other hand, the pinto bean extracts presented low anthocyanin content with values of 2.22±0.13 and 2.64±0.5 mg C3GE/g extract for C-RB and P-RB, respectively (p>0.05). Phenolic compound tentative identification was made through UHPLC. The main compounds identified in pinto bean extracts were cyanidin-3- glucoside and catechin. In the case of the black bean extracts, the main compounds identified were cyanidin, malvidin, delphinidin, and petunidin-3-glucoside. For antioxidant activity, in DPPH scavenging assay, P-RB showed the highest antioxidant activity with a value of 0.902±0.05 mg Trolox equivalents/mg extract (mg TE/mg extract). P-BB extract presented 0.790±0.05 mg TE/mg extract (p>0.05). In ABTS assay, P-RB showed a value of 0.861±0.02 mg TE/mg extract, and 0.801±0.01 mg TE/mg extract in P-BB (p>0.05). In ORAC assay, P-RB presented a value of 1.08±0.15 mg TE/mg extract and P-BB a value of 0.9±0.12 mg TE/mg extract (p>0.05). The purified extracts from both varieties presented the highest phenolic compound content and antioxidant activity. Endemic common bean cultivars could be used in the development of functional ingredients with outstanding biological potential.

Keywords: *Common beans, Phenolic compounds, Anthocyanins, Antioxidant capacity, Purification.*

REFERENCES

[1] Rodriguez et al., 2021. *Foods*, 10, 1-12. [2] Hernandez et al., 2021. *Molecules*, 26, 1-14.

New process to fermentation of sugarcane juice by produced a beverage rich in fructooligosaccharides

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Fructooligosaccharides (FOS) are recognized as prebiotics for their multiple health benefits in the prevention of diseases and promoting the growth of probiotics in the gut microbiota [1]. FOS are usually synthesized by microbial enzymes using high concentrations of sucrose [2]. The objective of this study was to evaluate a new process by a co-fermentation and successive fermentation process to produce FOS on sugarcane juice. The two fermentation processes were carried out by first inoculating *K. marxianus* (10% v/v) and then inoculating *A. oryzae* (2×10^7 spores/mL), in the co-fermentation the biomass was separated by centrifugation and in the successive fermentation a thermal treatment was carried out to inhibit *K. marxianus*. Were using two concentrations of sugarcane juice (100 and 50%), shaking (with and without) at which the production of FOS, °Brix, pH and reducing sugars were evaluated. *A. oryzae* and *K. marxianus* showed a non-negative association because both grew adequately on the medium. In the co-fermentation there was no FOS production, possibly because both microorganisms were active and there was a greater consumption of sugars. In addition, co-fermentation showed a total sucrose consumption, a higher content of residual sugars such as glucose and fructose and a higher pH decrease associated with the production of organic acids by *K. marxianus*. While in the successive fermentation there was a FOS production of 30.12 and 16.94 g/L for the 100% and 50% sugarcane juice, respectively. The successive fermentation process was better for FOS production and should be studied for optimization.

Keywords: *Aspergillus oryzae*, *Kluyveromyces marxianus*, prebiotics, co-fermentation.

REFERENCES

[1] Singh et al., 2017. Appl Biochem Biotechnol, 183, 613-635. [2] Bali et al., 2015. Crit Rev Food Sci Nutr, 55, 1475-1490.

Functional sweet baked snack from flour composed of corn, beans added with plantain powder and turmeric

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Consumption of healthy snacks globally has significantly increased in recent years. Nearly 83% of consumers state that they eat snacks for their nutritional benefits. The flavor is still the determining parameter when choosing a snack [1]. Beans are an important source of protein, calories, B-complex vitamins, minerals, and fiber. As an alternative to this problem, the use of legumes has increased. In México, 70% of Mexicans are overweight and almost a third suffer from obesity; this disease is mainly associated with diabetes and cardiovascular diseases, and between 20 and 40% of the adult population suffer from hypertension [2,3,4]. Different prototypes of a baked snack made of a flour compound (corn flour, beans and plantain powder) were developed, with a varying ratio of the components (60-40%, 30-15%, 30-15%, respectively) and adding turmeric to obtain a low-fat product with acceptable characteristics and better nutritional value. The prototype that presented the best sensory attributes was the one that contained 56.66% corn flour, 16.66% bean flour, and 26.66% plantain flour. The chemical composition of the prototype was 5.47% protein, 10.02% fat, 2.32% fiber, 58.23% carbohydrates, 7.71% moisture and 0.75% ash, being low in sugar, fat and sodium according to the regulations of labeling (NOM-051-SCFI/SSA1- 2010), since the fat content and 20% of total sugars were reduced by more than 10%, compared to a commercial snack. An affective sensory test was carried out to evaluate the degree of preference as compared to an existing snack on the market with similar characteristics, resulting competent and preferred by 55%.

Keywords: *Snack, nutritious snack, baked snack, plantain.*

REFERENCES

- [1] International Markets Bureau, 2011. Official Website of the International Trade Administration. [2] Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado, 2016. Gobierno de México. [3] Piña et al., 2020. Gobierno de México. [4] Instituto Nacional de Salud Pública, 2015. Gobierno de México.

ACE-I and DPP-IV inhibitory activity of a healthy snack with microencapsulated bioactive peptides

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Pharmaceutical treatments for hypertension and diabetes cause undesirable side effects in the body, for this reason, the design and encapsulation of sustainable sources of functional ingredients [1]. The evaluation of the in vitro functionality of these ingredients will allow projecting their use as preventive molecular therapeutic agents [2]. A portion of the bar mathematically formulated with cereals (51.8%), nuts (44.2%) and microencapsulated peptide inhibitors of ACE-1 and DPP-IV (4%) was subjected to an in vitro simulation at a temperature of 37°C and 200 rpm in salivary fluid (1 min), gastric fluid (30 min), and intestinal fluid (2 hours). At the end of the simulation, the inhibitory activity of ACE-1 and DPP-IV was evaluated through the colorimetric assays proposed by Barba de la Rosa (2010) [3] and SIGMA-ALDRICH. Control tests of peptides with and without microencapsulation were performed. Before the simulation, it was determined that the bar (100µg/mL) inhibited 23.255±1.258% of ACE-1 and 19.446±1.778% of DPP-IV. After simulation in the different fluids, a value of 18.527±0.589% and 14.547±1.254% was obtained for the inhibition of ACE-1 and DPP-IV, respectively. While the control (bar with peptides without microencapsulation) showed a value of 6.998±1.25% and 2.582±0.583% for the inhibition of ACE-1 and DPP-IV, respectively, finding a statistically significant difference (Tukey p<0.05). According to the results, performing the microencapsulation of ACE-1 and DPP-IV inhibitory peptides increases the in vitro intestinal functionality of the cereal bar and nuts, the above allows to have a background to carry out in vivo tests and project its possible use as a functional food.

Keywords: *Bioactive-Peptides, Snack, Microencapsulation.*

REFERENCES

- [1] Hernández-Ledesma, B. et al., 2013. Bioactive Food Peptides in Health and Disease. IntechOpen, 45-58. [2] Chakrabarti, S., et al., 2018. Food-Derived Bioactive Peptides in Human Health: Challenges and Opportunities. Nutrients, 10(11), 1738. [3] Barba de la Rosa, A. P et al., 2010. Nitric Oxide-Biol Ch, 23:106–111

Microencapsulation of bioactive compounds from bean seed coats using spray drying

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Common bean seeds are an important source of bioactive compounds, such as peptides and polyphenols [1,2]. However these phenolic compounds are sensitive to light, heat, and oxygen; they are also volatile and unstable compounds [3]. Therefore, encapsulation can positively affect them and prevent their degradation. The aim of this study was to microencapsulate bioactive compounds and the antioxidant capacity of the methanolic extract of bean (*Phaseolus vulgaris*, L.) coat flour. A mix of the methanolic extract of bean coat flour was prepared with modified starch as wall material. A design central composite rotatable model with two factors: Inlet air temperature (100–140°C) and total solids of wall material (20–30%) were the spray drying conditions evaluated. The most optimal conditions for the drying process were air inlet temperature of 115°C and 28.54% of total solids. The highest concentrations of bioactive compounds per g of encapsulated were founded: phenol compounds (34.8 mg equivalents of gallic acid), anthocyanins (2.1 mg equivalent of cyanidin-3-glucoside), flavanols (9.1 mg catechin equivalents) and flavonols (2.2 mg quercetin equivalents) as well as higher values of free radical scavenging capacity of 91.4% and 80.9% by ABTS and DPPH methods respectively. The SEM micrographs showed the formation of encapsulates ($\approx 20 \mu\text{m}$) with concavities on the surface as a result of the rapid evaporation of the water. The spray drying process using modified starch as wall material allows to obtain microencapsulates from bean coat extract with functional properties for food area.

Keywords: *Microencapsulation, bean seed coat, functional foods, spray drying.*

REFERENCES

- [1] Do Evangelho et al., 2017. Food Chemistry, 214, 460–467. [2] Petropoulos et al., 2019. Journal of the Science of Food and Agriculture, 99, 6049-6059. [3] Trucillo et al., 2018). Journal of Supercritical Fluids, 135, 152-159.

Effect of steeping and germination of Huauzontle seeds (*Chenopodium berlandieri subsp. Nuttalliae*) in antioxidant capacity, α -amylase inhibition and adipogenesis attenuation

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Given previous studies based on improvement in functionality of protein hydrolysates of cereals and legumes [1,2], this study aimed to evaluate the effect of steeping and germination on huauzontle seeds (*Chenopodium berlandieri subsp. Nuttalliae*), a Mexican endemic plant, by analyzing the bioactivity of resulting peptides. Through a solubility curve, an alkaline extraction was concluded to be optimal. Proteins from three samples (H1: unaltered seeds; H2: steeped; H3: germinated) were extracted in an aqueous solution at pH 10 [3]. After centrifugation, supernatants were ultrafiltered using a 5 kDa membrane. A posterior hydrolysis was performed using alcalase at a 1:90 (E:S) ratio (w/w) for 180 minutes at 60°C and pH of 8.5. Protein and peptide concentrations were determined via Bicinchoninic Acid Assay. After desalting with a HiTrap Desalting LC column, H1, H2 and H3 hydrolysates had a peptide concentration of 10.36, 6.13 and 6.94 mg/ml, respectively. An SDS-PAGE revealed that, before hydrolysis, H1 presented 5 bands smaller than 63 kDa, whereas H2 and H3 showed 2 similar bands smaller than 17 kDa. A biological hydrolysis is hypothesized to occur during steeping and germination. Hydrolyzed samples did not present any bands. An α -amylase inhibition assay revealed a hormetic effect for H2 and H3, where a concentration of 0.2 mg/ml had the highest inhibitory effect. Moreover, germination promoted a greater ($p < 0.05$) ABTS radical scavenging in protein hydrolysates than steeped and untreated seeds. A DPPH assay demonstrated that seed steeping and germination had a significantly higher antioxidant capacity, given that H1's activity accounted only for 34.7% and 27% of their effect, respectively. A cytotoxicity assay revealed that H1 promotes cell growth at lower concentrations, H2 is slightly toxic (<10%) at the same concentrations, and H3 is also slightly toxic (<10%) at 1 mg/ml. An adipogenesis retardment is observed morphologically for the 3 samples, and will be confirmed via Oil Red O staining assay.

Keywords: *huauzontle, bioactive peptides, adipogenesis, antioxidant, hypoglycemic.*

REFERENCES

- [1] Hernández-García et al., 2022. Journal of Food Biochemistry, 46, e14139. [2] Awosika et al., 2019. International Journal of Food Science & Technology, 54, 2021-2034. [3] Hernández-Marín et al., 2019. iCASAT, 1-6.

Protein hydrolyzate from inflorescence of *Astrocaryum mexicanum* with antioxidant and antidiabetic activity

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Currently, the use of proteins of plant origin to generate bioactive peptides has gained importance, so that peptides with antioxidant [1], antitumor, antidiabetic [2], antihypertensive [3] properties, etc. have been obtained from enzymatic protein hydrolysates consist of evaluating the antioxidant and antidiabetic activity of the protein hydrolyzate of *A. mexicanum*. To obtain the hydrolyzate, a 2% protein solution was prepared, on which the effect of pepsin (1:25, E:S) was evaluated for 300 min. The DPPH and ABTS antioxidant techniques were used to evaluate the effect of the different times of the hydrolyzate, while the determination of the antidiabetic activity was carried out enzymatically, by the α -amylase inhibition technique. The results showed significant differences ($p \leq 0.05$) regarding the residual content of protein, antioxidant effects of 75.44 and 97.50%, by the ABTS method; by the DPPH method, effects of 32.19 to 42.50% were observed with significant differences ($p \leq 0.05$); the foregoing, with respect to hydrolyzing times. In relation to the antidiabetic effect, an increase in activity was found with significant differences ($p \leq 0.05$) in the inhibition of α -amylase, from 60 min, with values close to 91%, similar to acarbose (control positive). This study reveals that the hydrolyzate obtained with pepsin has effects of biological interest, as its effects are verified in vitro at all times, particularly at 120 min.

Keywords: *Astrocaryum mexicanum*, bioactivity, chapaya, protein.

REFERENCES

[1] L. Zheng, et al., 2016. Food Chem., 197, 807-813. [2] Harnedy et al., 2018. Food Res. Int., 106, 598-606. [3] de Castro et al., 2018. Trends Food Sci. Technol., 76, 82-89.

High-value compounds from Canary (*Phalaris canariensis*) and amaranth (*Amaranthus cruentus*) seeds

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Canary seed (*Phalaris canariensis*), mainly used as bird feed, is now considered as a novel food ingredient that can be used in bakery products, and snacks (among others); additionally it can be used to mitigate celiac disease, obesity and diabetes [1]. While amaranth (*Amaranthus cruentus*), which is used for human consumption, is also recognized for its health-promoting properties, like decreasing plasma cholesterol levels, and blood glucose levels, as well as stimulating the immune system [2]. The objective was to characterize both seeds in terms of chemical composition, mineral content, phenolic and carotenoid content. Both seeds showed a similar carbohydrate and lipid (~64 % and 5 %, respectively) content, but canary seed demonstrated a higher protein and ash content (17.17 ± 0.32 % and 5.85 ± 0.11 %, respectively) when compared to amaranth (15.30 ± 1.32 % of protein and 3.29 ± 0.09 % of ashes). But amaranth had a higher concentration ($p < 0.05$) of minerals such as Mg (412 ± 10.88 mg/100 g), Ca (137 ± 2.79 mg/100 g), Fe (11.1 ± 0.35 mg/100 g), than canary seed (273 ± 7.66 , 53.1 ± 1.72 , and 5.69 ± 0.06 mg/100 g, respectively). Epigallocatechin gallate and β -carotene were identified in methanol (11 and 15 mg/L, respectively) and water (17 and 9 mg/L, respectively) extracts of amaranth. Epigallocatechin gallate was not detected in canary seed extracts, while the β -carotene concentration in both methanol (2 mg/L) and water (6 mg/L) extracts was significantly lower. This study proved that amaranth and canary seed have important antioxidant compounds, as well as minerals, apart from their nutritional value. Exploring the nutritional and the non-nutritional composition of underutilized cultivars (such as canary seed) could enhance their usage or exploit the by-products of the industry to obtain high-value ingredients for functional foods.

Keywords: Mineral composition, polyphenols, canary seeds (*Phalaris canariensis*), amaranth seeds (*Amaranthus cruentus*), nutraceuticals

REFERENCES

[1] Abdel-Aal ESM. 2021. Trends in Food Science & Technology, 111, 680-687. [2] Caselato-Sousa VM et al., 2012. Journal of Food Science, 77, R93-R104.

Proximate analysis of Tepache beverage

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Tepache is a traditional fruit beverage from Mexico which is commonly elaborated with pineapple shells. Usually the macerated fruit is blended with brown sugar cane and allow to ferment naturally in wood casks called “tepacheras”, obtaining a refreshing, sweet beverage with a low alcohol content. Beneficial health effects have been attributed to its consumption [1,2]; however, the proximate composition of this beverage had not been studied, for this reason the aim of the present work was to determine the proximate analysis and the physicochemical characteristics of tepache. For this propose, two different tepaches were analyzed. Proximate composition was determined following the AOAC methodology Carbohydrates were determined by difference. The pH was evaluated using a pH meter the acid content by titration method. The soluble solids were determined with an automatic refractometer and reported as Brix degrees (°Brix). Data is presented as mean± standard deviation and comparisons between samples were determined by t test for independent samples using the software GraphPad Prism 9. Results shows that there were no significant differences among samples in regard to its moisture content ($p>0.05$) finding that Tepache has an 84.4% of moisture, also no significant differences were found in fat (0.1%) and carbohydrate content (12.6%). Significant differences were found on ashes and protein contents ($p<0.05$). The pH of the samples ranged between 2.5 and 2.6 with an acid lactic content of 0.24%. The total solids ranged between 13.5 and 14.5°Brix. Until our knowledge, this is the first report of the proximate composition of tepache, finding that this beverage has an excellent macro and micronutrient profile giving the scientific facts to use it as a beneficial drink.

Keywords: *Tepache, Proximate Analysis, Acidity, °Brix, Beverage*

REFERENCES

[1] Moreno-Terrazas, R et al., 2001. Food Sci Tech Int, 7, 411-415. [2] Gutiérrez-Sarmiento, W et al.,2022. Microbiol Res, 260, 127045

Effect of different thermal treatments and particle size on the antioxidant concentration in a tea mixture

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Tea is one of the most consumed beverages in the world of Asian origin [1], the beverage is one of the main sources of polyphenolic compounds to which beneficial antioxidant properties for health are attributed [2]. In various countries such as Mexico, different mixtures of herbs known as tea are used in traditional medicine. The objective of this work is to evaluate the effect of thermal treatments and particle size on the concentration of antioxidant compounds in a mixture of plant species used in traditional medicine in Mexico. The experimental strategy consisted of homogenizing the sample and separating it by particle size and determining the concentration of antioxidant compounds at different thermal treatments (infusion, maceration and decoction), a statistical analysis was carried out and the difference in Tukey's means was verified. According to the statistical analysis, it was shown that there is a significant statistical difference in the concentration of antioxidant compounds due to thermal treatments, with the decoction and maceration treatment showing the highest concentrations of flavonoids and total phenols, respectively. On the other hand, it was decreased that the particle size does not influence the concentration of antioxidant compounds. This work could contribute in the sense of seeking heat treatments to obtain higher concentrations of antioxidant components in beverages used in traditional medicine made from mixtures of plant species.

Keywords: *tea, traditional medicine, phenols, flavonoids, antioxidant compounds.*

REFERENCES

- [1] Hu et al., 2018. *Regulatory Toxicology and Pharmacology*, 95, 412–433. [2] Namal et al., 2013. *Journal of Functional Foods*, 5(4), 1529–1541.

Antihypertensive activity of chromatographic collections from *Hibiscus sabdariffa* aqueous extract

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Hypertension is a disease caused by sustained changes in blood pressure, it is a condition that annually causes 41 million deaths globally [1]. Nowadays, some natural sources with antihypertensive effect have been studied such as *Hibiscus sabdariffa* (HS). In Mexico, HS, is an important and popular plant, widely used for beverages and traditional medicine. Different studies of HS, have reported the presence of bioactive compounds such as some organic acids, anthocyanins, polysaccharides and flavonoids [2]. The aim of this research is based on the evaluation of in vitro antihypertensive activity of different chromatographic collections of aqueous extract, which prepared of *Hibiscus sabdariffa* dry calyces, criolla Guerrero variety, obtained in May 2021. The dry calyces were macerated with water (10% w/v), during 7 days at room temperature, according to the methodology [3]. Chromatographic collections of aqueous extract, were obtained by column separation with different solvents as mobile phase (hexane, hexane: ethyl acetate, ethyl acetate, ethyl: methanol, methanol), the chromatographic collections were grouped by FT-IR spectroscopy. Eight chromatographic collections were evaluated, according to inhibition of angiotensin converting enzyme activity, using the method described [4]. Different percentages were obtained, having the lowest percentage 5.25 ± 2.75 in collection A (obtained with hexane 100%, hexane 90 %: 10% ethyl acetate) and the highest percentage 96.47 ± 12.69 in collection M (obtained with ethyl acetate 40%: 60% methanol, methanol 100%). The results obtained could be related to the presence of bioactive compounds, which represents future research to isolation and purification which allows obtaining an adjuvant natural dose for pharmacological treatment.

Keywords: Antihypertension, *Hibiscus sabdariffa*, Angiotensin Converting Enzyme.

REFERENCES

- [1] World Health Organization. 2018. Noncommunicable Diseases Country Profiles 2018. Switzerland. [2] Ojeda et al., 2010. Journal of Ethnopharmacological, 127, 7-10. [3] Portillo- Torres et al., 2019. Antibiotics. 8, 218. [4] Tovar-Benitez et al., 2016. Revista Mexicana de Ingeniería Química. 15(3), 797-807.

Sensory evaluation, bioactive compounds content and antioxidant capacity of tortilla based on *Hibiscus sabdariffa* L. decoction calyxes L.

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The utilization of industrial food byproducts in the development of novel foods represents an important new step for the food industry. This study aims to develop flour tortilla formulas using different amounts of *Hibiscus decoction* calyx flour (T-FDCH, 10%, 20%, 50% and 70%) [1]. Each formula was evaluated for sensory acceptability by preference test. Subsequently, the content of total soluble phenols content (TSPC; Folin-Ciocalteu method) and antioxidant capacity (ABTS) were analyzed [2]. Two types two groups of tortilla (without preservative: T-FDCH woA and with preservative: T-FDCH wA; potassium sorbate 0.2% w/w) were made. The T-FDCH woA 20% had the best sensory analysis results, having satisfactory acceptability in all five attributes evaluated and overall acceptability (score = 9), while the T-FDCH wA had less impact on the analysis (score = 4). The TSPC and antioxidant capacity by ABTS of this formulation was 4.60 ± 0.49 mg GAE/g db and 25.00 ± 0.91 mmol/g db, respectively. In conclusion, T-FDCH woA 20% can be used for consumption by all people as it can improve the nutritional quality without affecting the sensory quality of the product. The impact of this project is to offer the consumer a product with compounds that can contribute positive effects on health and above all, free of additives that are usable for the preservation of the product.

Keywords: *Hibiscus sabdariffa*, Tortilla, Decoction calyx, phenolic compounds, antioxidant capacity.

REFERENCES

[1] Villasante et al., 2022. LWT, 160, 113299. [2] Mercado-Mercado et al., 2015. Journal of Functional Food, 18, 171-181.

Characterization of *Arracacia xanthorrhiza* and *Ullucus tuberosus* flours produced in Cauca, Colombia for the development of a functional food.

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The Andean zone in South America is considered a center of biodiversity in which there are various species of domesticated plants, highlighting roots, grains, fruits and vegetables, of which there is still not enough scientific research turning them into thus in undervalued species. The Andean tubers (*Arracacia xanthorrhiza* and *Ullucus tuberosus*) are part of these plants and are rich in nutrients such as: carbohydrates, carotenoids, anthocyanins and phenolic acids, with starch being the main compound [1]. The objective of this research was to carry out the physicochemical characterization of the flours of these two tubers. Bromatological analysis was carried out to determine fat content (0.9 % and 0.2), fiber (3.7% and 14%), ash (5.2% and 6. 2%), starch (67% and 72%), total and reducing sugars, corresponding values for *Arracacia xanthorrhiza* and *Ullucus tuberosus* respectively, and a mineral analysis that allowed identifying and quantifying the mineral content in the flours through an X-ray fluorescence spectrometer (XRF), being potassium (K) the mineral present in greater proportion. Additionally, a phytochemical scan was made by HPLC-MS of the flours and husk of both tubers, which allowed finding different hydroxycinnamic acids, of which biological properties are reported [2]. Therefore, it is concluded that *Arracacia xanthorrhiza* and *Ullucus tuberosus* flours have properties with potential application for development of functional foods, thus, allowing their use to be enhanced and added value to the tubers produced in the Andean region.

Keywords: *Andean tubers, Arracacia xanthorrhiza, Ullucus tuberosus, characterization, Functional Foods.*

REFERENCES

[1] Velásquez-Barreto et al., 2021. *Biological Macromolecules*, 182, 472–481. [2]. Abramovič, 2015. *Coffee in Health and Disease prevention*, 843-852.

Antioxidant activity of tapioca pearls added with fermentative extract of Mexican oregano (*L. graveolens*) fermented with *R.oryzae* by solid state fermentation

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The residue from the essential oil (EO) extraction from Mexican oregano (*Lippia graveolens kunth*) has potential as a source of bioactive molecules [1] that could be extracted by fermentation methods. In a previous stage, the fermentative extracts from Mexican oregano by *Rhizopus oryzae* englobes a novel source of polyphenols with potential bioactivities that could be used for developing a novel food product. In this context, the objective of the experimental stage was to develop a tapioca pearl added with fermentative extracts and evaluate the antioxidant activity through time. The tapioca pearls (TPs) were submerged in different concentrations of fermentative extracts (0 to 6000 mg L⁻¹), and it was evaluated the polyphenols retention capacity in tapioca peels for 24 h. Then, the antioxidant activity was studied in TPs extracts by ABTS and FRAP assay to determine the best treatment for TP production. Also, the stability of antioxidant activity in TP was evaluated using two temperatures (4°C and 21°C) for 21 days. The retention evaluation determined that the TP submerged for 24 h (6000 mg L⁻¹) englobes the higher concentration of polyphenols in the TP; also, the antioxidant determination showed an increase in antioxidant properties through time. The storage evaluation showed a decrease in antioxidant capacities in both temperatures. Finally, the study allowed to determine the capacity of TPs for retention of polyphenols and evaluate the storage stability of the product.

Keywords: *Oregano, tapioca peel, antioxidant activity, polyphenolic compounds.*

REFERENCES

[1] Arias et al., 2020. Industrial Crops and Products, 146, 22-32.

Nutraceutical quality of habanero pepper sauces from Mexican commercial brands and fresh pepper (*Capsicum chinense* Jacq.)

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Habanero pepper fruits are known to be an excellent source of phytochemical compounds [1]. In Mexico, pepper fruits is preserved mainly through drying, pickling, brining, pickling, or sauces, but this processing can cause degradation of its nutraceutical compounds and antioxidant capacity, mainly due to exposure to heat [2]. The aim of the present work was to know the nutraceutical quality of six habanero pepper sauces of Mexican commercial brands and fresh pepper (FP). The variables analyzed were total carotenoids (TC), total capsaicin and antioxidant capacity (AC) (DPPH). There was a significant statistical difference ($p < 0.05$) between sauces and with FP in all variables. The FP sample had a higher concentration of capsaicin than the sauces with an average of 322.12 mg/g and 291.02 mg/g, respectively. While the comparison between sauces showed that the Clemente Jacques® brand presented the highest concentration of this compound with 298.51 mg/g, and Zaashila® the lowest with 283.51 mg/g. Likewise, the orange Lol-Tun® brand presented the highest concentration of TC with 166.03 µg/100g. Regarding CA, on average fresh chili had a higher percentage of inhibition (50.03%I) than sauces (28.87%I). Being México Lindo® sauce the one with the highest CA with 40.56% inhibition, while in the rest of the samples there was no significant difference between them. It is concluded that the nutraceutical quality of the habanero pepper tends to decrease significantly due to the effect of the processing in which the raw material is exposed to high temperature conditions in the transformation of fresh peppers into sauces.

Keywords: *habanero pepper, commercial sauces, bioactive compounds, antioxidant capacity*

REFERENCES

[1] Segura et al. 2013. Food Nutr. Sci. 4,47-54. [2] Málaga et al. 2013. Rev. Soc. Quím. Perú, 79, 162-174.

Evaluation of ascorbic acid for bioactive compounds preservation during flour elaboration from Ciricote fruit (*Cordia dodecandra* A. DC.)

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The fruit of ciricote (*Cordia dodecandra* A. DC), native from the Peninsula of Yucatan, is a forgotten and underutilized product with antioxidant potential due to its total phenolic compounds (TPC). It is highly vulnerable to oxidation during processing [1] and its preservation with an organic acid as ascorbic acid (aa) [2] could represent an alternative source to phytochemicals from traditional sources. The objective of this work was to evaluate the aa use to preserve TPC and antioxidant activity (AA) of extracts obtained by ultrasound- assisted extraction (UAE) from ciricote flour. Two groups of pulp: 1) Submerged in 1% aa solution, 2) Control, were freeze-dried and ground. The UAE was by 10 min, 50% ethanol. The TPC and AA were analyzed by the Folin, DPPH and ABTS methods, respectively and the phenolic profile by UPLC-PDA. The TPC and AA were favored when the aa was applied: TPC of 51.75 ± 0.95 mg GAE g-1dw; AA of 434.26 ± 5.73 , 290.66 ± 6.40 μ M ET g-1dw (by DPPH, ABTS respectively). The aa avoided the loss of phenolic compounds such as caffeic and two phenolics acids derivatives (1, 2) increasing its content up to twice (5.29 ± 0.12 , 7.22 ± 0.80 , 52.05 ± 2.59 μ mol g-1dw, respectively). The rosmarinic acid content, was not significantly different ($p < 0.05$) with or without aa, after the freeze-drying (57.47 ± 2.89 μ mol g-1dw). The aa represented a viable and economic method to favor the phytochemicals of interest with possible pharmaceutical or food applications from a traditional fruit.

Keywords: *Cordia dodecandra*, freeze drying, ultrasonic, phenolics, ascorbic acid.

REFERENCES

[1] Janick et al., 2008. The Encyclopedia of Fruits and Nuts, 188-190. [2] Jang et al., 2011. Food Chemistry, 124(2), 444-449.

Antihypertensive Activity in Prickly Pear Varieties Harvested in Zacatecas

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Angiotensin I-Converting Enzyme (ACE) is a key component in regulation of blood pressure by virtue of the rennin-angiotensin system [1]. *Opuntia spp.* are the most abundant of the Cactaceae family, grown throughout America [2]. Its fruit, known as cactus pear or prickly pear, is an oval berry grouped in different colors. Some studies have shown its antioxidant activities which may help in preventing chronic pathologies such as diabetes [3]. The objective of the present study was to evaluate the content of phytochemicals (flavonoids, tannins and phenolic compounds) and the antihypertensive activity of three mature prickly pear fruits varieties (white, xoconochtle and red) collected in Zacatecas. The potential antihypertensive activity of prickly pear was evaluated by their ability to inhibit Angiotensin- Converting Enzyme (ACE). This study shows a high percentage of ACE inhibition by prickly pears varieties which lead to consider this species as a potential source of ACE inhibitor secondary metabolites. These findings support that the prickly pear harvested in Zacatecas are a good source of phytochemicals with high nutraceutical activity as antihypertensive effect. The antihypertensive activity evaluated by means of the inhibition of the angiotensin converting enzyme I, presenting an inhibition of 61, 65 and 55% in white, xoconochtle and red varieties, respectively. The content of flavonoids, tannins and phenolics compounds in the white, xoconochtle and red varieties were 246, 293 and 735 mg equivalents of catechin (EC)/100 g, 280, 320 and 610 mg equivalents of catechin (EC)/100 g and 253, 320 and 560 mg equivalents of gallic acid (EAG)/100 g, respectively. The methanolic extracts contained high values of phenolic compounds, possible secondary metabolites responsible for the inhibition of the enzyme.

Keywords: *Phenolic compounds, antihypertensive activity, phytochemicals, prickly pear.*

REFERENCES

- [1] Herrera-Chalé et al., 2014. *Process Biochemistry*, 49, 1691-1698. [2] Stintzing et al., 2001. *Eur. Food Res. Technol*, 212, 396–407. [3] Kuti et al., 2004. *Food Chem*, 85, 527– 533.

Exploring the physicochemical, phytochemical, and techno- functional properties of *Pithecellobium dulce* Roxb. Benth fruit

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Currently, the food industry has been exploring the use of plants as nutritive and functional food ingredients. In this research, a partial characterization of the physicochemical, antioxidant and techno-functional properties of the guamuchil (*Pithecellobium dulce*) fruit was carried out. Its proximal composition showed $78.1 \pm 1.2\%$ moisture, $6.7 \pm 0.1\%$ fiber, $3.9 \pm 0.4\%$ carbohydrates, $3.7 \pm 0.1\%$ fat, $3.9 \pm 0.1\%$ protein, and $1.7 \pm 0.3\%$ ash. The presence of proteins, lipids and carbohydrates was also confirmed by infrared spectroscopy analysis of the lyophilized fruit. According to SDS-PAGE analysis [1], ten proteins of different molecular weights (ranging from 21 to 97 kDa) were found. HPLC analysis [2] found high amounts of aspartic and glutamic acids, leucine, histidine and valine with an interesting amount of taurine. Phytochemical analysis [3] detected terpenoids, alkaloids, steroids, glucosides, phenols, and tannins, with some contributing to the overall antioxidant activity of the fruit against DPPH• (70.3 ± 1.8 mg EAG/100 mL) and ABTS•+ (42.7 ± 1.9 mg EQC/100 mL) radicals. The techno-functional properties of the lyophilized fruit were mainly associated with water and oil holding capacities ($20.7 \pm 1.6\%$ and $20.5 \pm 1.3\%$, respectively). The results showed that *Pithecellobium dulce* fruit has attractive physicochemical, nutritive, and nutraceutical attributes that can be explored in food formulations.

Keywords: *Pithecellobium dulce*, physicochemical properties, antioxidant activity.

REFERENCES

- [1] Laemmli, 1970. Nature, 227, 680-685. [2] Vázquez-Ortíz et al., 2004. Journal of Liquid Chromatography, 18, 2059-2068. [3] Samejo et al., 2013. Journal of Pharmacy Research, 7, 181-183.

Youth Beverage Consumption: Pre- and Post-Pandemic COVID-19

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The current Covid-19 pandemic generated a worldwide crisis that affected all sectors of society, causing changes in habits [1,2], and mainly changes in the consumption of beverage [3]. The objective of this study was to identify through a survey, the main beverages consumed by young university prior and post quarantine COVID-19, in Nayarit and Sinaloa. Young university students from the state of Nayarit (ITTEpic) and Sinaloa (UPSIN) Mexico, participated in the study. The results obtained in this study were that the most consumed beverages prior to the quarantine were water, soda and fruit juice; after the pandemic, there was a higher consumption of water in both institutions and a decrease in beer intake in the population of Nayarit compared to Sinaloa; in addition, Sinaloa showed a higher consumption of coffee and tea. Among the reason for preference, it was observed that prior to the quarantine 73.86% of the respondents were inclined towards organoleptic issues of the beverages, while after the pandemic 46.27% were inclined towards easy access to these, 58.31% of the young people showed a daily consumption of their preferred beverages. As conclusion in all young people daily fluid intake ranged between 1 and 2 liters per day before and after the quarantine, however there was a change in what they drank, with water being the one that increased the most in consumption after the quarantine in both states, coffee was the second most consumed beverage in Sinaloa and fruit juice in Nayarit, furthermore decrease in beer consumption was observed in both Nayarit and Sinaloa.

Keywords: *Youth, Beverages, Habits, COVID-19*

REFERENCES

- [1] Clare et al., 2021 *Addiction*, 1-10. [2] Pérez-Rodrigo et al., 2020 *Nutrición Comunitaria*, 2, 101-111. [3] Rodríguez-Weber, et al., 2013 *Acta Pediátrica de México*, 34, 96-101

Phytochemicals and Nutraceutical Properties of Quince Harvested in Zacatecas

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Fruits contain high levels of biologically active components that impart health benefits beyond basic nutritional value. Within the biologically active components, natural antioxidants have attracted interest because of their safety and potential therapeutic effect [1, 2]. The objective of the present study was to evaluate the content of phytochemicals (flavonoids, tannins, phenolic compounds and carotenoids) and the nutraceutical properties such as antioxidant capacity by the DPPH and ABTS methods, as well as the antihypertensive activity of quince harvested in the state of Zacatecas. Methanolic extracts of the full fruit were employed for the analysis. The content of flavonoids, tannins and phenolics compounds in quince was 422 mg equivalents of catechin (EC)/100 g, 250 mg equivalents of catechin (EC)/100 g and 122 mg equivalents of gallic acid (EAG)/100 g, respectively. The content of carotenoids was 46.74 mg equivalents of β -carotene (EBC). Regarding antioxidant capacity, quince presented levels of 6,853 and 11,040 μ mol equivalents of Trolox (ET)/100 g for DPPH and ABTS, respectively. The antihypertensive activity was evaluated by means of the inhibition of the angiotensin converting enzyme I, presenting an inhibition of 45%. These findings support that the quince harvested in Zacatecas are a good source of phytochemicals with high nutraceutical activity and could be used to elaborate functional foods or food additives.

Keywords: *Phytochemicals, antioxidant capacity, antihypertensive activity, phenolic compounds*

REFERENCES

[1] Mohsen et al., 2009. Food Chemistry, 112, 595-598. [2] Alvarez-Suarez et al., 2014. The Journal of Nutritional Biochemistry, 3, 289-294.

Thermal stability of the pigment contained in *Cosmos bipinnatus* flowers and their relationship with antioxidant activity

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

In recent times, the consumer has taken on the task of looking for alternatives to the use of synthetic colorants in food, making use of natural colorants from vegetable matrices, which have the advantage of being safe and nutritious [1]. For this reason, the use of pigment obtained from purple sunflower flowers (*Cosmos bipinnatus*) is potential for use in food as a natural colorant. Additionally, it has been observed that the pigment imparts important elements for nutrition and health such as vitamins, antioxidants and mineral elements that are essential for the human body [2]. The objective of the work was to evaluate the bioactivity of the pigment of Cosmos flowers subjected to different thermal conditions (4°, 25° and 65°C) for 40 days. Monomeric anthocyanins, polymeric color [3] and antioxidant activity by DPPH method were determined in the hydroalcoholic extract (ethanol:water 80:20; v/v). After extraction, a yield of 39.3% was obtained. The initial content of monomeric anthocyanins was 1.81 mg Cyn-3-glu/L, after 40 days the content decreased by 58.5, 73.5 and 98.9% for treatments at 4°, 25 and 65°C, respectively. In all treatments, an increase in polymeric color (from 32% to >95%) was observed due to the possible polymerization of anthocyanins. The antioxidant activity of the pigments was preserved until day 21 (381, 295 and 250 mg ET/g for 4°, 25° and 65°C, respectively) and was reduced by 90% in all treatments, by the end of the exposure time. It can be concluded that temperature has an effect on the stability of the pigment obtained from flowers of *Cosmos bipinnatus*, so it suggests its application in foods whose processing and storage does not exceed 65°C.

Keywords: *Cosmos bipinnatus*, bioactive pigments, edible flowers, antioxidant activity

REFERENCES

- [1] Pires et al., 2018. LWT-Food Science and Technology, 97, 668-675. [2] Gutierrez et al., 2008. Weed Biology and Management, 8(4), 291-296. [3] Giusti & Wrolstad, 2001. Protocolos actuales en química analítica de alimentos, 1, F1-2.

Antioxidant capacity of guaje (*Leucaena esculenta*) flour and protein concentrate

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Antioxidants consumed in the form of food have the potential to reduce the risk of developing diseases that afflict the world's population (cardiovascular diseases, tumors, type II diabetes, obesity, and neuro-degenerative diseases) [1]. In this context, the present study evaluated the antioxidant capacity of defatted flour and protein concentrate from mature seeds of guaje (*Leucaena esculenta*), collected in the state of Oaxaca, Mexico (16°59'21"N 96°43'26"W) during the months of February-April 2021. The seeds were reduced to particulate material of less than 0.149 mm (flour), which was defatted and served as the basis for the preparation of the protein concentrate by the isoelectric precipitation method [2]. The antioxidant capacity was determined by the 2,2-diphenyl-1-picryl hydrazyl radical (DPPH) decolorization method [3]. The defatted guaje flour presented a higher antioxidant capacity (24.2±1.9%) than the protein concentrate (20.83±1.19%).

Keywords: *Leucaena esculenta*, antioxidant capacity, flour, protein concentrate

REFERENCES

[1] Sies 2020. Antioxidants, 9(9), 852. [2] Ohara et al., 2020. Biocatal Biotransformation, 1– 9. [3] Brand-Williams et al., 1995. Microflow E-b., 28:25-30.

Proximate analysis of black sapote seeds

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The FAO exposed that a quarter of the food produced in a year is wasted, approximately 1,300 million tons of food, 40 and 50% corresponds to roots, fruits, vegetables and seeds [1]. In Mexico, some tropical zones are identified with a great variety of exotic fruits, that are not taken advantage of due not know their existence, these fruits represent part of the waste's percentage in Mexico. An alternative is the research of exotic fruit by-products such as peel and seeds in order to give them an added value [2]. The aim of this study was to determine the proximate analysis of black sapote seeds. The flour was prepared by grinding the dry seeds and proximate analysis by the official AOAC method (Association of Official Analytical Chemists). It was found that 10% of the fruit corresponds to seeds, which are discarded. The black sapote seeds showed an interesting composition, their main components were protein (12.36%), crude fiber (47.27%) and carbohydrates (21.93%). The study shows that the seeds have the potential to be used as a complement in food processes due to their components.

Keywords: *Composition, Proximate analysis, functional, sapote.*

REFERENCES

- [1] Benítez, 2017. Food and Agriculture Organization of the United Nations (FAO), 16. [2] De Lourdes et al., 2019. CIENCIA ergo-sum, 26, 6.

Extrusion and characterization of a non-traditional source of prebiotics: avocado seed fiber by-products

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Mexico is the largest avocado producer in the globe, account for 30 percent of worldwide production [1]. Avocado is marketed and processed into value-added products; the manufacture of these products generates an important volume of seed as waste by-product. Avocado seeds contain high levels of dietary fiber (>30 % dry basis) being a promising non-traditional fiber source [2]. The aim of this research was to modify and characterize the structure of avocado seed fiber using a thermic process of extrusion, to convert the fiber content of insoluble to soluble. This can be used as a prebiotic source: a new alternative to improve nutritional value of foods [3,4]. The new prebiotic ingredients were obtained using a scalable enzymatic hydrolysis and wet milling process from extruded avocado seed flour. Proximate composition, contents of total starch (TS), resistant starch (RS), color and techno-functional properties, were evaluated in four hydrolyzed fractions of avocado seed fiber, in their native form (as control) or after the process of extrusion. Hydrolyzed fractions (native and physically modified) did not present significant differences ($p > 0.05$) in the parameters of color, protein, and ash content. While for the values of fat, carbohydrates and dietary fiber showed significant differences ($p < 0.05$). Physically modified avocado seed fiber showed 1.4 and 5-fold higher water absorption index (331 %) and total starch content (52.9 %), respectively, compared to controls. In conclusion, the thermal and the wet milling processes modify the composition and structure of the avocado fibers. Based on their composition and physicochemical properties, the avocado seed fiber ingredients (modified) could be a non-traditional source of prebiotics, which can be used as an ingredient for functional foods.

Keywords: *avocado seed prebiotics, functional ingredients, byproducts, no-waste, extrusion.*

REFERENCES

- [1] USDA FAS. (2021). Mexico: Avocado Annual. [2] Barbosa-Martín, et al., 2016. Food and Bioproducts processing, 100, 457-463. [3] Gidley et al., 2019. Trends in Food Science & Technology, 86, 563-568. [4] Cornelia et al., 2018. Int. Symp. Food Agro-biodiversity, 102, 012074.

Symbiotic of quince, apple and probiotic strains: effect on gastric protection in a model of high-performance athletes

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Athletes who practice high performance sports usually present gastric problems, due to the ischemic process generated during the execution of the sport [1]. Inducing inflammatory responses and increasing oxidative stress, mainly due to the alterations produced on the gastric barrier [2]. Objectives. To establish by means of an animal swimming model the antioxidant, anti-inflammatory and protective effect of the gastric epithelium, after the consumption of the formulation of symbiotics generated from probiotic strains (*Lactobacillus spp* and *Bifidobacterium spp*), apple (*Malus domestica*) and quince (*Cydonia oblonga* Mill.) Results. From the swimming model using the C57BL/6 strain, groups were generated that consumed the quince symbiotic-probiotic strains and apple symbiotic-probiotic strains. In the gastric tissues of these groups, the antioxidant effect of the consumption of the symbiotic was determined by enzymatic measurement of catalase and glutathione peroxidase. A higher activity was determined in the apple symbiotic treatment, compared to the group that consumed the quince symbiotic. As proinflammatory biomarkers, the cytokines TNF α and IL-6 were determined, indicating lower concentrations of these in the group that consumed quince symbiotic, compared to the group that consumed apple symbiotic, generating an increase in this group of IL-10; for the verification of gastric protection, COX-1 was determined, resulting in the highest percentage of accumulation in the apple symbiotic treatment. Conclusions. The results obtained generate evidence the consumption of probiotic quince-strains symbiotics is able to inhibit proinflammatory cytokines, increasing the anti-inflammatory effect. While the apple-probiotic strain symbiotic induced the activation of antioxidant enzymes, therefore, the difference in the biological effect may be related to its polyphenolic content and fiber content and type. Impact of the work. The consumption of the symbiotic from natural sources (apple or quince) and probiotic strains may be a preventive alternative to reduce gastric discomfort generated by the practice of high resistance exercise.

Keywords: *Symbiotic, apple, cydonia oblonga, inflammation, antioxidant*

REFERENCES

[1] De Oliveira et al., 2014. Sports Medicine. 44, 79–85. [2] Mach, et al., 2017. Journal of Sport and Health Science 6 (2017) 179–197.

Antioxidant activity and phytochemical profile of *Porphyridium cruentum* microalgal extracts

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The great phylogenetic diversity of marine microalgae is due to a wide arrange of interesting and useful metabolites. Here, we aimed to investigate the antioxidant activity and phytochemical profile of microalgal extracts that were obtained using different solvents from *Porphyridium cruentum*. *Porphyridium cruentum* was culture in F/2 medium as described previously by Norzagaray-Valenzuela [1]. Cultures were harvested in late log-phase of growth, centrifuged, and dried to obtain the biomass. Five microalgal extracts were obtained by a 25% w/v suspension of biomass and extraction solvents (hexane, methanol, ethyl acetate, and 100% and 80% v/v of ethanol). Antioxidant capacity (DPPH), Total phenolic content (TFC) and Flavonoids were determined as described elsewhere [1,2]. Results of antioxidant capacity and phytochemical profile largely varied depending on the solvent used. Eighty percentage ethanolic extract showed the highest activity followed by methanolic extract with values of 358.0 ± 41.29 Eq of quercitin/ 100 g on a dry basis (db) and 181.75 ± 23.38 Eq of quercitin/ 100 g db, respectively. Regarding to the phytochemical profile, the methanolic extract showed the highest value of both phenolic (34.99 ± 2.77 mg Eq of galic acid/100 g db) and flavonoids (1271.48 ± 229.52 mg Eq of quercitin/ 100 g db) compounds. In conclusion, the 80% ethanolic and methanolic extracts showed relatively good antioxidant capacity as determined by DPPH assay. Moreover, these two extracts were found combined with good phytochemical profile. This study highlights the potential of marine microalgae as a new source of biologically active molecules such as antioxidants for possible applications in different sectors specially in food industry.

Keywords: *Microalgae, antioxidant, phenolics, flavonoids, functional food*

REFERENCES

[1] Norzagaray-Valenzuela, CD et al., 2017. Journal of Applied Phycology, 29(1), 189–198. [2] Norizan, N et al., 2012. Research Journal of Medicinal Plants, 6(7), 489–499

Determination of functional properties of pomegranate peel flour

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The pomegranate peel represents approximately 50% of fruit weight and represents a big environmental challenge. here is a growing interest in the use of natural additives as they are considered safer than synthetic ones [1]. The aim of this work was to determine the functional properties (antioxidant, antimicrobial, and prebiotic activity) of the pomegranate peel flour (PPF). Pomegranates were obtained from The Central of Abastos in Mexico City. The fruit was processed, and the obtained peels were washed and dried in an oven (70°C, 24 h). Then, was milled to obtain a “flour type” powder. The antioxidant capacity was: 1121.4±1.8 µM Trolox equivalents (TEAC)/g was obtained, Pomegranate is rich in phenolic compounds that are responsible for this antioxidant effect. For the antimicrobial activity [2], ethanolic extract of PPF was compared versus commercial antibiotics (tetracycline and erythromycin) at 5 mg/mL of active ingredient against 8 pathogenic bacteria, the ethanolic extract proved to have a greater antimicrobial effect against *E. coli*, *Salmonella* sp., *P. fluorescens* and *B. subtilis*. The polyphenolic compounds exert antimicrobial effect through the interference of membrane glycoproteins, representing an innovative alternative against microbial infections [3]. The prebiotic activity score [4] was of 0.408 and 0.296 for *L. rhamnosus* GG and *L. acidophilus*, respectively, indicating that PPF selectively promoted growth. of probiotics [4]. Pomegranate peel flour is a co-product with potential due to its content of polyphenols that confer antioxidant and antimicrobial properties, it can also be considered a prebiotic ingredient, as it promotes the selective growth of probiotics such as those mentioned, which makes it a viable option to develop a symbiotic encapsulation.

Keywords: *Pomegranate, Prebiotic, Antimicrobial, Antioxidant.*

REFERENCES

- [1] Mabrouk, et al., 2019. Journal of Biomaterials, 3(1),7-17. [2] NCCLS. 2012. Clinical & Laboratory Standards Institute. P 76. [3] Kim, et al., 2018. Biofouling, 34(6), 710717. [4] Huebner, et al., 2007. International Dairy Journal, 17(7): 770-775.

Effect of increased bioavailability of curcumin in a murine model of steatosis

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

An increase in the consumption of high fructose beverages has been identified as the cause of metabolic-associated fatty liver disease ranging from steatosis to hepatocellular cancer [1,2]. Curcumin (from *Curcuma longa*) has been reported as an hepatoprotective agent with poor bioavailability; therefore, the use of a carrier system, nanoemulsions, is proposed. In addition, a structured emulsifier with CLA was employed, to confer additional benefits to the system [3,4]. The objective of this research was to evaluate the effect of curcumin contained in nanoemulsions stabilized with lipids structured with CLA in an animal model of steatosis. The hepatosomatic index was comparable with the healthy control group. There was a decrease in the serological parameters in the groups treated with the nanoemulsion, as well as an increase in HDL and an improvement in the atherogenic index. From the histological analysis, the group of curcumin nanoemulsion showed no evidence of alterations in the hepatic or the adipose tissues. These findings suggest that the use of the proposed structured emulsifier can enhance the hepatoprotective effect of curcumin. The impact of this work lies on the fact that this pathology is considered a growing public health problem with a prevalence of 24%, to 68% in patients with diabetes mellitus. The use of palliative therapies may contribute to prevent liver related complications such as transplants or some associated conditions such as coronary heart disease.

Keywords: *Curcumin, Hepatic steatosis, Conjugated linoleic acid, Nanoemulsion.*

REFERENCES

- [1] Gallego-Durán et al. 2022. Gastroenterología y Hepatología, 1-11. [2] Rojas et al. 2022. Annals of Hepatology, 1-8. [3] Nayak et al. 2016. Current Pharmaceutical Design, 22, 4247- 4256. [4] Esperón-Rojas et al. 2020. Biocatalysis and Agricultural Biotechnology, 26, 1-6.

Development of red fruits-based powdered beverage with potential health benefits

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Red fruits are a rich source of micronutrients and nutraceutical compounds, which consumption helps prevent and control various metabolic diseases [1]. According to the National Health and Nutrition Survey (ENSANUT), 85 of % people consume sweetened beverages daily in Mexico, representing more than 10% of the daily caloric intake [2]. This research aimed to develop a low-calorie, phenolic compounds and dietary fiber-rich red fruits-based powdered beverage. A mixture design was used to select three possible formulations to be assessed in a sensory preference test with untrained panelists (n=50). A methanolic extract was obtained from the preferred sample to quantify the concentration of total phenolic compounds (TF, Folin-Ciocalteu assay), monomeric anthocyanins, and free-radical scavenging assays (AC; DPPH and ABTS radicals scavenge). Additionally, dietary fiber quantification was performed. A commercial beverage was used for comparison purposes. The obtained formulation consisted of 50% strawberry; 10% blackberry, blueberry, and raspberry; 2% Roselle powder (240 µm particle size), 2% peppermint powder (240 µm particle size), and 16% xylitol as a sweetener. The resulting formulation contained, on average, up to 60 % more TF (26.347 ± 0.058 mg gallic acid equivalents/g), anthocyanins (1.378 ± 0.061 mg equivalents of Pelargonidina-3-glucósido /g), and higher AC (220.700 ± 0.020 µM Trolox/g) ($p < 0.05$) compared to similar commercial beverages, whereas up to 65 % of the panelists preferred the formulation. Moreover, the formulation contained a higher fiber content than a commercial product. These findings suggest that red fruits-based beverages are low-calorie; phenolic compounds and dietary fiber-rich alternative products with potential health benefits.

Keywords: *Beverages, Nutraceuticals, Phenolic compounds, Red fruits.*

REFERENCES

- [1] Jaglan, P et al., (2022). Functional Foods and Nutraceuticals in Metabolic and Non-Communicable Diseases (359-370). [2] Batis, C et al., (2016). The Journal of nutrition, 146(9). [3] ENSANUT 2018-19. Salud Pública de México, 339-349.

Kinetic growth parameters evaluation of putative probiotics *Lactobacillus fermentum* and s6HTCH in simulated conditions of stress in vitro

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Probiotics are characterised as halotolerant and resistant to conditions of the digestive tract [1]. In previous studies, *Lactobacillus (L.) fermentum* and s6HTCH strains were isolated from Chiapas double-cream cheese and have shown probiotic properties and antioxidant and angiotensin-converting enzyme inhibitory activity [2]. This study aimed to test the BAL to different simulated barriers such as acid and salty conditions. To determine growth kinetics in MRS broth, plate colony counting and optical density techniques were implemented at different concentrations of NaCl from 0 to 12% at 37 °C. The Monod and a modified Gompertz equation were used for growth modelling [3]. The results showed that there is no lag to the exponential phase with NaCl at 0% for both strains, displaying a μ_{max} of $0.337h^{-1}$ and $0.374h^{-1}$ for s6HTCH and *L. fermentum*, respectively; they even showed an efficient exponential phase with NaCl at 3% and 6%, effortlessly adapting to the environmental conditions; however, with NaCl at 9%, a lag is evident, although the exponential phase is still present. The growth is inhibited with 12% NaCl, even presenting bacterial death. Interestingly, the maximum growth rate for *L. fermentum* was found with NaCl at 3% ($0.439h^{-1}$). These results demonstrate the resistance of both strains to the osmotic pressure indicating their potential use as probiotics and the formulation of functional food. Currently, stressful conditions with acidity and bile salts are being tested.

Keywords: probiotics, lactic acid bacteria, halotolerant, conditions, growth kinetics.

REFERENCES

- [1] Doyle P. et al., (2006). In: Falkow S, et al., (eds) Vol. 1. 3rd ed. Springer, New York, pp 797-811; [2] Gonzalez-Gonzalez, C. R., et al. (2019) LWT-Food Science and Technology, 111. pp. 449-456; [3] Benavente, B.F.J, et al. (2020). International Journal of Food Science and Technology, 56 (5) pp. 2146-2155.

Physicochemical properties, content of phenolic compounds and flavonoids of nejayote powders obtained by spray drying from different colored maize

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Nejayote, by-product of nixtamalization, is rich in dietary fiber, calcio, phenolic compounds, and other phytochemicals [1]. It could be used as an additive in food products but, since nejayote contains large amounts of water, there is a necessity to separate the compounds from the aqueous medium [2]. This study evaluated the physicochemical properties of nejayote powders obtained from different colored maize, as well as the content of phenolic compounds and flavonoids. Victory white (VW), Amber yellow (AY), Creole red (CR) and Carioca black (CB) maize were used. CB, AY, VW and CR maize presented an initial hardness of 166.25, 192.94, 218.63 and 232.79 N, respectively; same that decreased with cooking to values between 33.46 and 41.11 N. The nejayote powders were obtained at 150/75 °C (inlet/outlet) air temperatures, 80 % airflow volume, 450 lbs compressor air pressure, and 15 mL/minute feed flow rate, with 15 % the addition of maltodextrin as encapsulating agent. To determine the total phenolics contents of samples the Folin–Ciocalteu colorimetric method was used [3]. The content of total flavonoids was estimated according to Moo-Huchin et al. [4]. The yield obtained for the nejayote powders was 11.00, 10.89, 10.79 and 10.13 % for VW, CR, AY and CB maize, respectively. The powders showed a pH between 9.1 and 10.1, while their water activity was between 0.121 and 0.147. The content of total phenolic compounds on the nejayote powders was from 703.69 to 516.15 mg of gallic acid equivalents/100 g powder; while the content of total flavonoids was between 22.50 y 7.81 mg of quercetin/100 g power. The highest content of total phenols, as well as total flavonoids, was obtained for CR maize; while the lowest content of total phenols was obtained for VW maize and, the lowest content of total flavonoids was found in CB maize.

Keywords: *nixtamalization, maize, nejayote, total phenols, flavonoids.*

REFERENCES

- [1] Acosta-Estrada et al., 2014. Journal of Cereal Science, 60, 264-269. [2] Villela-Castrejón et al., 2017. Journal of food science, 82, 1726-1734. [3] Singleton et al., 1999. Methods in enzymology, 299, 152-178. [4] Moo-Huchin et al., 2015. Food chemistry, 166, 17-22.

Betalains from *Stenocereus pruinosus* studies on its inhibitory potential of carbohydrate-utilizing and diabetes related enzymes

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Pitayas (*Stenocereus Pruinosus*) are Mexican endemic fruits that have been studied as a source of betalains and their implementation as natural food pigments [1]. Given the lack of studies focused on the functional properties of this pigment, the aim of this study was to evaluate the bioactivity of pitaya betalains and its inhibitory potential on diabetes and obesity related enzymes. The pigments were extracted from the pulp of the fruit by a methanol aqueous solution (50:50 v/v), centrifuged, rotary evaporated and freeze dried, obtaining a concentrated and hygroscopic pigment. [2] The extract was resuspended in pure water for total betacyanins and betaxanthins quantification obtaining a total concentration of 15.41 µg/g and 9.68 µg/g respectively. According to ABTS radical scavenging protocol, betalains presented an IC₅₀ (1.249 mg/mL) greater ($p < 0.05$) than trolox (0.063 mg/mL). Cytotoxicity assays demonstrated that concentrations above 0.1 mg/mL presented a cytotoxicity up to 25%, indicating that concentrations equal or below 0.1 mg/mL are optimal for in vitro experiments. Even when in silico studies, using betalains, α -amilase and α -glucosidase, confirmed a potential antidiabetic activity, an *in vitro* α -amilase assay revealed that even with a concentration of 0.1 mg/mL the extract promoted their growth, which warrants further purification of the extract to analyze its viable implementation in food.

Keywords: *Betalains, Pitaya, Molecular docking, Antidiabetic activity, Anti-obesity activity.*

REFERENCES

[1] García-Cruz, L., et al., 2017, Food Chemistry, 234, 111–118. [2] Ortega-Hernández, E., et al., 2019, International Journal of Molecular Sciences, 20(21).

Effect of polyphenols on p53 stability and subcellular localization in HPV-related cancers

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

In the last 20 years, more than 30% of the drugs approved by the FDA are derived from natural compounds [1]. Polyphenols (PFs) have therapeutic potential against cancers and may be well tolerated by patients compared to chemotherapeutic drugs. Cervical cancer (CC) and head and neck cancers (HNSCC) represent an important problem for public health worldwide. There are different risk factors for developing CC and HNSCC, with high-risk Human Papilloma Virus (HPV) infection as a key player [2]. Antioxidants-rich diets with regular consumption of fruits and vegetables have been associated with a decreased risk of CC and HNSCC [3,4]. Cell transformation by HPV involves the E6 oncoprotein, which promotes p53 proteasomal degradation [5]. p53 is possibly the most important protein involved in the control of apoptosis, cell cycle and DNA repair [6]. Interaction of p53 with proteins such as NQO1 increases its half-life and thus its protective effects [7]. The evidence for the role of PFs in p53 status in HPV+ cancers is limited. The aim of this work is to evaluate the subcellular localization of p53 in cells treated with PFs. The cytotoxic activity of PFs in SCC-152, SiHa and MCF-7 cell lines was determined. PFs were found to have dose-dependent effects on the viability of the different cell types. It was found that treatments with PFs induce changes in expression and localization of the proteins of interest p53 and NQO1. The obtained results showed that the PFs can increase the levels of p53 (nucleus) and NQO1 (cytosol and nucleus) compared to untreated cells. These results are promising for exploring the possible use of PFs as treatments for HPV-related cancers.

Keywords: *Polyphenols, cervical cancer, head and neck cancers, p53.*

REFERENCES

- [1] Li F, et al., 2019. *Expert Opin Drug Discov*, 14(5), 417–20. [2] Delam H, et al., 2020. *J Heal Sci Surveill Syst*, 8(3), 105–9. [3] Key TJ et al., 2020. *BMJ*, 368(March), 1–9. [4] Tomita LY et al., 2020. *Nutr Cancer*, 73(1), 62–74. [5] Steenbergen RDM et al., 2014. *Nat Rev Cancer*, 14(6), 395–405. [6] Khoo KH et al., 2009. *J Biol Chem*, 284(45), 30974–80. [7] Patiño-Morales CC et al. 2020. *Redox Biol*, 28, 101320.

Coumarin extract of *Petroselinum crispum* with potential for the development of hypoglycemic nutraceuticals

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Petroselinum crispum (*Apiaceae*) is an aromatic plant. It contains polyphenolic compounds, among which coumarins stand out and gives it various biological properties [1]. The study focused on recovering coumarin from *P. crispum* that will be used to make a hypoglycemic nutraceutical. Coumarin extraction was done at 10% plant/ethanol. A solution of the extract was prepared at 10 mg/mL and subjected to the NaOH (10% p/v) phytochemical test to detect coumarins. The extract was separated by thin-layer chromatography using MeOH:AcEt as eluent. The extract of *P. crispum* had a yield percentage of 6.03 ± 0.33 %. The NaOH test confirmed the presence of coumarins in the extract by showing a yellow color that disappeared when acidified with HCl [2,3]. The separation of the extract by thin layer chromatography allowed the detection of coumarins in the fraction with Rf of 0.90 using ultraviolet light at 365 nm as a revealing agent. Due this fraction emitted a greenish-blue fluorescence characteristic of coumarins. The fluorescence is due to the unsaturation present in the coumarin structure [4]. Coumarins have shown a hypoglycemic and antidiabetic effect and improve cholesterol, triglyceride, and lipoprotein levels [5]. Therefore, the *P. crispum* extract has the potential for the formulation of hypoglycemic nutraceuticals.

Keywords: *Petroselinum crispum*, coumarins, hypoglycemic, nutraceutical.

REFERENCES

- [1] Ajbli, M & Eddouks, M., 2019. *Ethnopharmacology*, 242, 112039. [2] Kandeepan, C et al., 2022. *Drug Delivery and Therapeutics*, 12, 87–99. [3] Ramya, S et al., 2022. *Journal of Drug Delivery & Therapeutics*, 12, 110-118. [4] Pino, N et al., 2017. *Rev. Asoc. Col. Cienc*, 29, 30-37. [5] Punosevac M et al., 2021. *Arh. Farm*, 71, 177-196.

Physicochemical, nutritional quality and antioxidant capacity of achiote seed (*Bixa orellana* L.) from the State of Chiapas, Mexico.

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

Achiote is a crop of ancestral use in Mexico, it is currently highly demanded internationally for being a source of natural colorants [1] and rich in various bioactive compounds, mainly carotenoids [2]. However, Currently, this crop is undervalued and vulnerable, with a tendency to disappear in some producing areas of Mexico [3]. The objective of this work was to perform a physicochemical, nutritional and antioxidant characterization of achiote seed from the state of Chiapas, Mexico. The seed was collected in 2020 in the town of Nuevo Jericó, Palenque, Chiapas. The variables analyzed were length, width, pH, antioxidant capacity (AC) (DPPH), bromatological analysis and content of N, C, H and S of the seed. The length and width were obtained from 100 seeds and the macronutrients by atomic absorption spectrophotometry. The seeds showed an average length of 4.95 mm, and a width of 2.14 mm, a pH of 6.13 and an AC of 37.66% inhibition. Likewise, the seed showed a moisture content of 11.37%, and a protein content of 14.28%; a fat content of 5.27%, a dry matter content of 88.61%, a crude fiber content of 10.07%, and a carbohydrate content of 53.59% were also obtained. In addition, the seed presented 2.17% nitrogen, 42.37% carbon, 6.36% hydrogen and 0.099% sulfur. We conclude that the achiote seed from the producing area of Chiapas has a high antioxidant capacity and a high protein content, making it a crop that can not only be a source of color in food but also as a functional ingredient.

Keywords: *achiote seed; annatto, antioxidant capacity; Mexican achiote*

REFERENCES

- [1] Raddatz-Mota et al., 2016, Rev Mex Ing Quim, 15(3): 727-740. [2] Devia & Saldarriaga, 2003, Rev Univ Eafit, 39(131), 8-22. [3] Rivera-Madrid, 2021, Rev Desde el Herbario CICY, 13, 222-226.

Impact of thermal treatment on commercial sweeteners: The relationship between ingestion duration and metabolic responses of healthy mice

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Recibido: 5 de octubre de 2022

Aceptado: 16 de noviembre de 2022

The aim of this research was to evaluate the effect of thermal treatment (121°C, 15 min) on commercial sweeteners diluted in water (10°Brix) and the relationship between the ingestion duration (8 and 24 weeks) and the metabolic responses (beverage and food intake, weight gain, and biochemical parameters) in healthy C57BL6 mice. The studied sweeteners were sucrose: SC, glucose-63: GLU63, agave syrup: AS, sucralose: SUC, and steviol glycosides: STG. Through HPLC analysis, it was found that these sweeteners underwent changes in their composition after being exposed to heat treatment. Regarding the metabolic responses in healthy mice, the thermal treatment significantly increased ($p < 0.05$) both food and beverage consumption in mice ingesting GLU63, SUC and STG, food consumption in those ingesting AS, and beverage consumption in those ingesting SC. In some individuals, the thermal treatment significantly affected ($p < 0.05$) their weight gain in mice ingesting GLU63, glucose levels in mice ingesting SC, and triglyceride levels in all studied mice groups. On the other hand, thermal treatment and ingestion duration of the sweeteners led to higher food consumption in mice consuming SUC and AS, but only after 24 weeks of ingestion; the same was true for food and beverage consumption in mice consuming GES. Our results show that thermal processes give rise to changes in the composition of sweeteners; these changes, along with the duration of sweetener ingestion, may be related to weight gain and its consequences on health. These results may be explained by the fact that different sweetener composition may activate the complex of heterodimeric taste receptors (T1R2 and T1R3) and lead to the release of incretin hormones (GLP-1 and GIP) related to satiety in different ways [1, 2]. In this sense, the food industry must take into account the effect that heat treatments may have on the composition and functionality of commercial sweeteners.

Keywords: *Caloric sweeteners, C57BL6 mice, Non-caloric sweeteners, Metabolism.*

REFERENCES

[1] Ahmad et al., 2020. Nutrition reviews, 78(9), 725–46. [2] Shi Q et al., 2021. J Food Sci, 86(2), 540–5.