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International Phytocosmetics & Phytotherapy Congress (IPPC2017)

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ABSTRACT 1

Acetylcholine and Butyrylcholine Esterase Inhibition of Selected Plants

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ABSTRACT

Background: Neurodegenerative disorders such as Alzheimer and demantia etc., featured by intellectual retardation and abnormal demeanour. Plant-derived drugs related to neurodegenerative disorders are limited in the world.

Methods: The acetylcholinesterase (AChE)/butyrylcholinesterase (BChE) inhibitory effects of methanolic plant extracts were assessed by Ellman colorimetric method. Phosphate buffer (pH=8.0), test solutions in methanol: DMSO (%80, v/v) with different concentrations and 0.1 U/mL acetylcholinesterase or butyrylcholinesterase enzyme solution were incubated. A solution of acetyl-thiocholine/butyryl-thiocholine and 5, 5-dithiobis-2-nitrobenzoic acid (DTNB) were added and the absorbance of the mixture was measured at 412 nm in a microplate reader. The percentage inhibition of enzyme activity was calculated (Positive control was galanthamine hydrobromide).

Results and discussion: Acetylcholine, and butyrylcholine esterase inhibition were defined in methanolic plant extracts. *Nigella sativa* has the lowest AChE inhibition activity (795.34 µg/mL), whereas *Rubus sanctus* has the lowest BChE inhibition activity (721.35 µg/mL). It was found that *Verbascum* sp. has the highest AChE inhibition activity (387.22 µg/mL), whereas *Melissa officinalis* ssp. inodora has the highest BChE inhibition activity (166.82 µg/mL).

Conclusions: There are few plant-derived drugs against neurodegenerative diseases like galanthamine. This study will help us to create resources for discovering new anti-Alzheimer drugs.

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ABSTRACT 2

An Aqueous Extract from *Pleurotus* Mushroom Induces Polarization to the M1 Subtype in Murine Macrophages

Gabriel Llauradó, Paul Cos, Humberto Morris, Ellen Lanckacker, Maira Bidart, Yamila Lebeque, Davie Cappoen

ABSTRACT

Background: The diversity of mycochemical compounds identified in *Pleurotus* mushroom suggests a wide spectrum of medicinal activities. Nowadays, several studies support the immunopharmacological potential of different biopreparations derived from the oyster mushroom. Nevertheless, there is no consensus regarding to how those bioproducts trigger the activation of different immune cells like macrophages. Therefore, the goal of this work was to evaluate the *in vitro* modulatory effect in murine macrophages (peritoneal and RAW 264.7 macrophages) by an aqueous biopreparation from *Pleurotus* sp.

Methods: An aqueous extract was prepared from mycelia of *Pleurotus* sp. (ExHW-P), and the mycochemical profile was identified. The study included the measurement of biological mediators with an important function on phagocytic cells, such as nitric oxide (NO), TNF- α , IL-6 and lysosomal enzymes, by Griess reaction, ELISA and colorimetric assays, respectively. The gene expression of NOS2 (inducible nitric oxide synthase), arginase-1 and FIZZ was quantified by real-time PCR. Macrophages stimulated by LPS and IFN- γ were maintained as control of classical activation.

Results and discussion: The crude aqueous extract obtained from the oyster mushroom contained different myco-substances such as proteins, polysaccharides and low-molecular weight secondary metabolites. *Pleurotus* extract can be considered a non-cytotoxic bioproduct because it did not affect the viability of macrophage cells. The hot water mycelia extract stimulated the nitric oxide production in RAW 264.7 macrophages probably mediated by the up-regulation of the NOS2 expression. In contrast, the arginase-1 and FIZZ genes were not expressed. The production of pro-inflammatory cytokines such as TNF- α and IL-6 by RAW 264.7 macrophages was also evidenced after stimulation with ExHW-P, thus suggesting a polarizing effect toward classically activated macrophages or M1 subtype. Finally, the lysosomal enzyme (acid phosphatase) activity in peritoneal murine macrophages was also enhanced positively compared to negative control.

Conclusions: The current study shows that *Pleurotus* mushroom contain mycosubstances that can functionally activate macrophage populations *in vitro*, thus supporting the significance of these cells as the first defence line against infectious diseases.



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ABSTRACT 3

Antibacterial Activity of Essential Oil and Ethanolic Extract of *Cymbopogon nardus* (L.) Rendle Against Mature Biofilm of *Helicobacter pylori*

Anderson Silva, Luciani Toledo, André Santos, Taís Bauab

ABSTRACT

Background: Medicinal plants are important due to the use of their metabolites in the development of new drugs, medicines and cosmetics. *Cymbopogon nardus* (L.) Rendle is a plant that has antioxidant, anti-inflammatory and antibacterial properties. Antibacterial activities are relevant on infectious diseases, especially in infections caused by *Helicobacter pylori*. This bacterium promotes stomach lesions: gastritis, ulcers and gastric cancer. Thus, this study evaluated the biological potential of *C. nardus* essential oil and ethanolic extract against biofilms of *H. pylori*.

Methods: After obtaining the essential oil (hydrodistillation) and ethanolic extract (maceration), the microdilution technique was used for this test, where glass beads were deposited in each well for biofilm formation. The activity of the derivate plants was evaluated in several concentrations considering the minimal inhibitory concentration (MIC) of each compound. The evaluation of the presence or inhibition of the biofilm was determined by reduction (XTT®) and by spectrophotometric readings.

Results and discussion: The essential oil (3.125 mg/mL) inhibited 100% of the mature biofilm of *H. pylori*, while lower concentrations (0.195 to 3.125 mg / mL) inhibited around 60 to 90%. The ethanolic extract showed antibiofilm activity (100%) of *H. pylori* with concentration of 6.25 mg/mL. Moreover, lower concentrations (0.390 to 3.125 mg/mL) inhibited mature biofilm of *H. pylori* from 50 to 85%. This activity is probably related to the bioactive components present in the essential oil and ethanolic extract of the leaves from *C. nardus*.

Conclusions: The results demonstrate that *C. nardus* presents antibiofilm activity as a promising source of antibacterial molecules, mainly in infections caused by *H. pylori*.

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ABSTRACT 4

Antibacterial Activity of Palmarosa (*Cymbopogon martinii*) Essential Oil on *Propionibacterium acnes* and Clove (*Syzygium aromaticum*) on *P. acnes* and *Staphylococcus epidermidis* Strains

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ABSTRACT

Background: Essential oils (EOs) come from plants secondary metabolism and are known by their antiseptic properties, mainly antimicrobial actions. The major component of palmarosa EO is the geraniol (70-80%) and clove EO is eugenol (80-90%). Thus, our aim was to evaluate the antibacterial action of these compounds aiming the development of dermocosmetic with nanoparticles in the future to treat acne vulgaris as well as the EOs are good option due to its structural similarity with skin hydro-lipid balance.

Methods: Resazurin Microtiter Assays (REMA) was performed to determine the Minimum inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) for palmarosa and clove EOs and geraniol against American Type Culture Collection (ATCC) strains of *Propionibacterium acnes* 11827, 11828 and 6919 and the clindamycin was used as control. Clove EO was tested in addition against *Staphylococcus epidermidis* ATCC 12228 and 35983 strains and the experiments were carried out in triplicate.

Results and discussion: The range of MICs for palmarosa EO was 1.2 to 2.5 mg/mL against *P. acnes* strains and geraniol was 1.2 mg/mL. Clindamycin, a well-known antibiotic for its bacteriostatic action, showed the MIC of 0.009 mg/mL against *P. acnes* ATCC 6919 and 0.001 mg/mL against the ATCC 11828 and 11827 strains. Clove EO resulted in MICs of 0.31mg/mL and 2.5 mg/mL against *P. acnes* and *S. epidermidis*, respectively. The MBC results of palmarosa EO were of 5.0 mg/mL against *P. acnes* ATCC 6919 and 11828 while against *P. acnes* ATCC 11827 was of 2.5 mg/mL. The clindamycin had MBC of 5.0 mg/mL for all *P. acnes* strains while the geraniol provides the same bactericidal action also for all *P. acnes* strains of 2.5 mg/mL. The MBC of clove EO against *S. epidermidis* and *P. acnes* were of the 2.5 mg/mL, therefore, showing the same inhibitory potential for the two bacterial species studied.

Conclusions: The antimicrobial effects of palmarosa EO are due to major compound, geraniol, there is a synergism among the compounds, and the bactericidal activities of the compounds were similar, showing that in the future, EOs of palmarosa and clove can be products with potential to treat acne.



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ABSTRACT 5

Antibiofilm Activities of the *Campomanesia dichotoma* Aqueous Extract on Multidrug-Resistant Strains from *Staphylococcus aureus*

Amanda Barbosa, José Junior, Barbara Azevedo, Alice Pontes, Mateus Silva, Makyson Leal,
Marcia Silva

ABSTRACT

Background: The discovery of the therapeutic properties of plants has become a healing and improving tool of health. This study investigates the antibiofilm activities of aqueous extracts from *Campomanesia dichotoma* leaves. Biofilm producers strains were tested with *C. dichotoma* aqueous extract. For the test of antibiofilm, the extracts were added to the microtiter plate with *S. aureus* strains and stained with crystal violet. All concentrations used of extract have different results. At where these results represent a promising source identification of new compounds.

Methods: Aqueous extract of *C. dichotoma* was diluted in dimethylsulfoxide (DMSO) and sterile distilled water at concentrations of 2 mg/ml and 0.2 mg/ml. For test used *Staphylococcus aureus* strains obtained from Microorganisms Collection of Antibiotics Department, Federal University of Pernambuco. The extracts were added to the microtiter plate with the bacteria and growth medium. For the fixing of biofilm the material was incubated for 1h/55°C and the revelation with crystal violet at 0.4%. The optical density was visualized at 570 nm.

Results and discussion: For antibiofilm test, were used four strains of multidrug-resistant *S. aureus* (700, 705, 726 and 02). Strains 700 and 705 in the two concentrations tested did not show antibiofilm action. The strain 726 has reduced biofilm formation in $58.7 \pm 9.2\%$ and $66.7 \pm 0.5\%$ in an extract concentration of 2 mg/mL and 0.2 mg/mL, respectively. While the bacteria 02 had reduced their formation in $63.2 \pm 3.7\%$ at a concentration of 2 mg/mL extract and $41.7 \pm 1.1\%$ at the concentration of 0.2 mg/mL. Bacteria present in the biofilm state are much more resistant to antibiotics than free-living bacteria, complicating the treatment of nosocomial infections. In this study, the concentrations tested of *C. dichotoma* extract, were not satisfactory for all strains of *S. aureus*, however, represent a source identification of new compounds able to control or interfere in the bacterial resistance mechanisms. Moreover, the Myrtaceae family is recognized for present diverse biological activities. Thus, more detailed studies are needed to deepen the knowledge of the biological potential of *C. dichotoma*.

Conclusions: Our findings show that aqueous extract of *C. dichotoma* have anti-biofilm properties for the *S. aureus* different strains.

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ABSTRACT 6

Anti-Inflamat Creme Moisturizing for Wrinkle Creams

Poliana Araujo, Moacir Haverroth, Walderes Jezek, Jessica Sampaio, Silvia Basso

ABSTRACT

Background: The market for cosmetic products continues to expand, especially with the use of vegetable oils, thus meeting the high consumer demand for more natural products. Among the many species, a brazil nut (*Bertholletia excelsa*) from its almond extracts the oil that has a great moisturizing power because it has phenolic compounds such as alpha-linoleic acid, cis-linoleic acid (n-6); its moisturizing characteristics, in the cosmetology, was formulated a moisturizing cream in order to moisturize the cracks in the feet.

Methods: Stability tests were performed as; centrifugation which is related to phase separation, viscosity which is the ability to move a fluid, pH which defines the concentration of acid and metals and salts. Microbiological as; presence of total coliforms. The tests were carried out at the Natural Products Laboratory of the Technology Foundation of the State of Acre- FUNTAC. All tests were performed on days 0, 30 and 60 after their development

Results and discussion: Cracking cream on the feet was presented to the extractive reserve community of cazumbá iracema in the municipality of sena Madureira-Acre. Volunteers were selected with dry feet and fissures, where they were able to prove the effectiveness of the moisturizer provided by the product developed. During a second stage of the presentation of this product, a questionnaire was applied to identify the benefits of it, where the volunteers reported feeling enormous hydration in the skin of the feet, once resected, as well as in the fissures. To prove the quality of the product developed, sensitivity tests and primary irritability were requested and are being performed in a private laboratory accredited by ANVISA.

Conclusions: This study was financed by Banco da Amazônia S / A as part of a project. Development stages of the productive chain of three seed oils with phytotherapeutic potential in the extractive reserve Cazumbá municipality of Sena Madureira, Acre. The development of this new formulation, contemplates the growing concern of the consumer to choose less aggressive products, of natural origin.



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ABSTRACT 7

Antimicrobial and Antioxidant Activities of Combined Traditional Essential Oils and Hydrosols

Yann-Olivier Hay, Miguel Antonio Abril, Gonzalo Sequeda

ABSTRACT

Background: This study evaluates the *in vitro* antimicrobial and antioxidant efficacies of combinations of essential oils and essential oils and hydrosols of *Lippia alba*, *Rosmarinus officinalis*, and *Thymus vulgaris*.

Methods: First, the EOs and HDs were characterized by GC-FID and GC-MS. Then, they were screened against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Candida albicans* and *Aspergillus niger* using the microdilution method for the four first strains and the agar diffusion method for *A. niger*. Antioxidant activity was evaluated using ABTS.

Results and discussion: Interactions between essential oils, and essential oils and hydrosols were found to be as microbicidal, and for the first time, antioxidant using the fractional inhibitory concentration. When compared with individual EOs, EO-EO combinations diminished the microbicidal minimum concentration. Impressive results obtained with thyme EO-HD combination; in comparison with individual extracts, it diminishes by four times the MBC against *E. coli* and decrease by half their antioxidant activity.

Conclusions: Although the IC_{50} of Thyme HD is very high compared with a synthetic antioxidant used in the formulation of a cosmetic or phytopharmaceutical product, if it is used as therapeutic principle, it could also allow the preservation of the product with its antioxidant efficacy. The results obtained with Thyme EO and HD combination showed that these extracts are good candidates.

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ABSTRACT 8

Antimicrobial, Immunomodulatory/Anti-Inflammatory Activities of *Cymbopogon martinii* Essential Oil and its Impact on the Healthy Skin Microbiota

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ABSTRACT

Background: *Cymbopogon martinii* essential oil (EO) is usually isolated by steam distillation of leaves; it is widely used in aromatherapy as a tonic skin due its antibacterial and anti-inflammatory activities. The aim of this research was to determine the antibacterial and immunomodulatory activities of *C. martinii* EO and its major compound, geraniol (constitute ? 85% of the EO) *in vitro* and investigate its impact on the *Propionibacterium acnes* population on human skin.

Methods: A sensitivity test by resazurin broth microdilution was carried out and the minimum inhibitory concentration (MIC) of the compounds were determined. For cytokine determination by ELISA, cultured human monocytes were incubated with EO/geraniol for 18 h. Samples from the microbiota of shoulder skin (n=6) were collected before and after treatment with EO during 7 days, and the *P. acnes* population was analyzed with a MiSeq Illumina sequencing-based single locus sequence typing (SLST) approach (<http://medbac.dk/slst/pacnes>).

Results and discussion: The sensitivity test resulted in MICs from 0.7 to 1.5 mg/mL of *C. martinii* EO and geraniol for the three main *P. acnes* types (I, II and III). The MIC was consisting for all *P. acnes* type I strains tested . *C. martinii* EO and geraniol increased IL-10 production in human, TNF- α was affected by *C. martinii* EO and geraniol only at concentration of 5 μ g/mL of EO . SLST analyses revealed for the first time the *P. acnes* population of shoulder skin that is dominated by strains of types II and IA2_CC28. This is in contrast to the population of the face that is usually dominated by type I strains, sand in particular by acne-related type IA_CC18 strains. EO treatment during 7 days did not alter the *P. acnes* population on the shoulder skin.

Conclusions: *C. martinii* EO and geraniol exerted antibacterial and anti-inflammatory activities. The compounds did not change the *P. acnes* population on healthy shoulder skin. Future experiments should evaluate if the application of *C. martinii* EO in acne patients is affecting the acne-associated microbiota ,and if the compound can be used as an anti-acne product.



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ABSTRACT 9

Antioxidant Activities of the *Campomanesia dichotoma* Aqueous Extract

Amanda Barbosa, José Junior, Barbara Azevedo, Camila Paiva, Sivoneide Silva, Ana Lima, Marcia Silva

ABSTRACT

Background: The Myrtaceae family is present in several Brazilian biomes and stands out for diversity in the Atlantic Domain. Several species of this family have been broadly used in much pathology. Among the pharmacological properties presented by this group stand out the anti-inflammatory and antioxidant. Considering the wide distribution of this family in Atlantic Forest fragments as well the several therapeutic properties highlighted by their representatives, this study aimed to investigate the antioxidant activities of aqueous extracts from *Campomanesia dichotoma* leaves.

Methods: Dried leaves has triturated and submitted to extraction procedure in distilled water and then lyophilized to obtain the aqueous extract. To Antioxidants tests, the sample was weighed and diluted in methanol to a final concentration of 1 mg/mL. Total phenolic content was determined method according to Bin-Hua Li et al, (2008), 2,2-diphenyl-1-picrylhydrazyl (DPPH) was determined by the method described to BLOIS *et al*, (1958). The total antioxidant capacity (TAC), was determined by the method according to PIETRO *et al*. (1999).

Results and discussion: In the phenolic compounds evaluation of *C. dichotoma* aqueous extract, the results showed a total of 539.25 ± 9.34 mg GAE/g of extract. In the stable radical DPPH capture capability, the extract showed an $IC_{50} = 46.73$ μ g/mL where in the concentration of 1000 μ g/mL there was a scavenging percentage of $95.45 \pm 1.04\%$. In the evaluation of the TAC, showed an activity of $26.88 \pm 2.15\%$ at a concentration of 1 mg/mL. The phenols are the most abundant molecules among the secondary metabolites and can contribute to the antioxidant activity. The amount of phenols can be classified into three categories: low ($=10$ mg GAE g⁻¹), medium (10-50 mg GAE g⁻¹) and high ($=50$ mg GAE g⁻¹) (RUFINO et al., 2010). Thus, the aqueous extract of the *C. dichotoma* leaves has a high phenolic content. The TAC, the extract showed an inhibition of 26.88% compared to control. The TAC test is a redox reaction of ferric ion and as the *C. dichotoma* extract is rich in phenolic compounds, probably its antioxidant action follows other mechanisms different than reduction of ions.

Conclusions: *Campomanesia dichotoma* showed good antioxidant activity and a high concentration of phenolics compounds, However, this extract could be investigated using other accurate and specific methods for identifying the compounds responsible for the activity.

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ABSTRACT 10

Antioxidant Activity and Photoprotective Potential of Extract of the *Tribulus terrestris* L.

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ABSTRACT

Background: The antioxidant activity is observed as eliminators of free radicals, which, in excess, are associated with diseases. This study aimed to evaluate the antioxidant potential of the dry extract of *Tribulus terrestris* L. by means of *in vitro* assays.

Methods: The antioxidant activity was determined by sequestration of the DPPH radical. Total polyphenols content was determined by the Folin Ciocalteu method and, the total flavonoids content by spectrophotometric method, based on flavonoid-aluminum chloride complexation. Tests were performed in triplicate at concentrations of 0.05, 0.10, 0.25, 0.50 and 1 mg / ml. To evaluate the photoprotective potential, the extract was diluted to concentrations of 0.5 mg / mL, 1 mg / mL in 99% ethanol solution.

Results and discussion: The solutions were analyzed by UV-Vis spectrophotometer, at wavelength 260-400 nm using as blank 99% ethanol. The determination of total polyphenols and flavonoids content for the concentration 1mg / mL of dry extract was 258 µg of GAE/g dry extract and 155.13 µg of RE/g dry extract, respectively. In the antioxidant evaluation by means of the DPPH test, the extract of *T. terrestris* presented a higher activity (54.45%) among the evaluated concentrations at the concentration of 0.05 mg / mL. Both concentrations evaluated in this study showed absorbance between UVA and UVB range, giving the photoprotective properties to the extract. The maximum absorbance was at wavelengths 260 and 265 nm, by which it also could be useful for formulating compositions for sun protection.

Conclusions: According to the results obtained, the extract of *T. terrestris* showed antioxidant potential for used in formulations that could be used in the cosmetology industries.



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ABSTRACT 11

Antioxidant Activity and Photoprotective Potential of *Passiflora cincinnata* Mast. Seed Extract for Anti-Aging Formulations

Amanda da Costa Gomes, Célia C.M. Figueiredo, Kamille D. Spera, Pamela C. Santos, Regildo M.G.Silva

ABSTRACT

Background: Oxidative stress is correlated to external factors such as pollution, protein glycation, smoking, and especially solar radiation. Thus, knowledge about the beneficial effects of polyphenolic compounds as antioxidants and the search for natural anti-aging (anti-wrinkle and photoprotective) actives in the cosmetic and pharmaceutical industry is growing. *Passiflora cincinnata* Mast. is one of the Brazilian wild species of the genus *Passiflora*, found in the Cerrado and Caatinga, which presents a rich content of phytochemical compounds with potential for application in dermocosmetic formulations. The objective of the present study is to evaluate the antioxidant activity *in vitro*, the photoprotective potential and the determination of polyphenols and flavonoids in the extract of *P. cincinnata* seeds.

Methods: The crude extract was obtained by crushing the seeds (1:10 w / v) with 80% ethanol, followed by heating in a water bath and centrifugation. Antioxidant activity was determined by DPPH free radical scavenging activity and inhibition of lipid peroxidation (TBARS - thiobarbituric acid reactive substances). To evaluate the photoprotective potential, extracts were diluted to concentrations of 5% and 10% in ethanol (99%) and were analyzed by UV-Vis spectrophotometer, at wavelength 260-400 nm. Total polyphenols content was determined by the Folin Ciocalteu method and, the total flavonoids content by spectrophotometric method, based on flavonoid-aluminum chloride (AlCl₃) complexation. Tests were performed in triplicate at concentrations of 0.05, 1, 2, 3, 5 and 10%.

Results and discussion: *P. cincinnata* seeds crude extract exhibited highest antioxidant activity in the concentration of 5% (65.62%) for DPPH test (EC₅₀ 3.83 µg/mL). The concentration of 10% showed the best activity in the TBARS assay (49.68% inhibition). The total polyphenols and flavonoids content for the concentration 10% was 136.89 µg/mL of gallic acid equivalents and 167 µg/mL of rutin equivalents respectively. Both concentrations (5 and 10%) evaluated in this study showed absorbance between UVA and UVB range, giving the photoprotective properties extract. The maximum absorbance was at wavelengths 260 and 265 nm, which it also could be useful for formulating compositions for sun protection or FPS booster.

Conclusions: According to the results obtained, the seed extract of *P. cincinnata* showed antioxidant potential for used in anti-aging formulations that could be used in the cosmetology industries. The evaluated activity can be correlated to the polyphenols and flavonoids quantified in the extract.

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ABSTRACT 12

Antioxidant Activity of Beet Extract Microencapsulated by Dry Emulsion

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ABSTRACT

Background: The beet root (*Beta vulgaris* L. ssp. *vulgaris*, Chenopodiaceae) is a potential source of valuable hydrophilic nitrogenous pigments, called betalains. They are free radical scavengers and prevent active oxygen-induced and free radical-mediated oxidation of biological molecules. The aim of this study was to microencapsulate the beet extract by the dry adsorption emulsion (DAE) technique and to evaluate the antioxidant activity by the DPPH (1,1-diphenyl-2-picrylhydrazyl radicals) method. The kinetics of releases and the intumescence process were also observed.

Methods: The standard betalain and beet extract (1.74 mg/mL betalains) were dispersed in water, being incorporated into the mixture of Aerosil 380 with lipid phase. The Aerosil R974 was added, sieved with mesh 48 until to get the DAE. The antioxidant activity by DPPH of the samples was measured in time zero and between the 20 minutes intervals during 2 hours period at 550 nm. The kinetics of releases and the intumescence process were evaluated by spectrophotometer and analytical balance.

Results and discussion: The DAE presented as a free-flowing powder with phytoactive release of 72.02% in the first 20 minutes. The release continues to be progressive up to 100 minutes (80.02%), reaching the maximum in 120 minutes (80.39%). The degree of intumescence between 20 minutes (T_i) and 120 minutes (T_f) for DAE-Betalain Standard ($T_i = 0,2168 \pm 0,001$ g and $T_f = 0,1291 \pm 0,004$ g) and DAE- Beet Extract (0.09 ± 0.003 g and $T_f = 0.0707 \pm 0.007$ g) are indicative that these particles have a release mechanism which does not involve intumescence. The antioxidant activity of DAE in the time of 20 minutes with active encapsulated was 84.07% for DAE- Betalain Standard and 89.67% for DAE- Beet Extract. In the end of the test (120 minutes), DAE- beet extract had an antioxidant activity of 97.93%, being this value 13.5% higher than DAE- Betalain standard (84.43%), being justified by the fact of the extract contains other phenolic compounds. The active substances (Betalain standard and beet extract) without formulation had a final antioxidant activity of 31.61% and 47.22%.

Conclusions: The beet extract microencapsulated by dry emulsion showed a potentialized antioxidant activity after obtention of the system. This result is very important for the development of antiage phytocosmetics, applied to multifunctional makeup products.



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ABSTRACT 13

Antioxidant Activity of Polysaccharide Crude Extracts from *Pleurotus* Mushroom

Yaixa Beltrán

ABSTRACT

Background: Mushrooms are currently evaluating for their nutritional value and acceptability, as well as for their pharmacological effects. *Pleurotus* is a genus of higher fungi that includes edible species with different medicinal properties. In this sense, there have been considered as a potential source of new active principles, such as antioxidants, for the prophylaxis and/or treatment of diseases that affect human beings.

Methods: The study examined the total content of phenols, polysaccharides and the antioxidant activity of crude polysaccharide extracts from both mycelium and fruiting bodies of *Pleurotus* sp. The antioxidant activity was determined, using two methods: total antioxidant capacity (TAC) and reducing power.

Results and discussion: Total phenol content was of 5.95 and 4.36 mg/100 g for mycelium and fruiting bodies, respectively. In the case of polysaccharides, values of 53 and 32 g/100 g were determined in crude extracts from mycelium and fruiting bodies, respectively. On the other hand, the total antioxidant capacity was of 465 and 288 TAC μ mol of ascorbic acid/mg for extracts of mycelium and fruiting body, respectively. The reducing power was greater for the fruiting bodies extract (EC 50= 8 μ g / mL).

Conclusions: The polysaccharides crude extracts from mycelium and fruiting bodies of *Pleurotus* sp, showed potential antioxidant activity. This bioproducts could be considered as a new source of natural antioxidants for food, pharmaceutical and cosmetic industries.

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ABSTRACT 14

Antioxidant Screening of Extract, Fractions and Vitexin Isolated of *Croton antisyphiliticus* Mart

Regildo Silva, Célia Figueiredo, Amanda Gomes, Paulo Ferreira, Luciana Silva

ABSTRACT

Background: The *Croton* genus is the second largest group of the Euphorbiaceae family. Pharmacological studies of extracts and compounds isolated from *Croton* species have shown broad therapeutic action with emphasis on their antilipidemic, antidiarrheic, immunomodulatory, antibacterial, antifungal, anti-viral and anti-inflammatory activities. Phytochemical studies have demonstrated which classes of compounds are present in this genus, namely volatile oil, alkaloid, proanthocyanidin, flavonoids. *Croton antisyphiliticus* Mart. is a shrub found mostly in Brazilian's savanna "cerrado" and known popularly as "curraleira".

Methods: This study aimed to investigate the antioxidant potential of methanolic extract, fractions and vitexin isolated from the of *C. antisyphiliticus*.

Results and discussion: The aerial parts were dried, macerated and extracted with methanol to obtain the ME, which was fractionated through liquid-liquid extraction via solvents of increasing polarity. Antioxidant activity of the extracts and fractions was measured using the scavenging assay DPPH radical, iron ion chelating, thiobarbituric acid assay (TBARS), and NO (nitric oxide) radical scavenging. The results showed that crude methanolic extract presents antioxidant potential for DPPH radical scavenging (81%), iron ion chelating (77.8%), TBARS (32.49%) and NO scavenging (80.97%). The ethyl acetate fraction showed the highest antioxidant activity (65.46%) evaluated by DPPH radical scavenging method. Both the phytochemical screening and the determination of total phenols and flavonoids demonstrate the presence of high antioxidant activity in the extracts and fractions.

Conclusions: It can be concluded that the species *C. antisyphiliticus* presents flavonoids with potential for the development of new assets in the cosmetic and pharmaceutical industry.



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ABSTRACT 15

Antioxidant Screening of *Hancornia speciosa* Fruit

Kamille Daleck Spera, Pamela Cristina e Santos, Amanda da Costa Gomes, Celia Cristina Malagutti Figueiredo, Regildo Marcio Gonçalves dos Santos, Gustavo Rafagnin Martins

ABSTRACT

Background: Oxidative stress is correlated with onset of diseases. Studies have shown that plant origin compounds, antioxidants, are able to prevent such complications. Thus, the present work evaluated the antioxidant and verified the presence of polyphenolic compounds by different techniques of the hydroethanolic extract of *H. speciosa* Gomes. fruits.

Methods: Oxidative stress is correlated with onset of diseases. Studies have shown that plant origin compounds, antioxidants, are able to prevent such complications. Thus, the present work evaluated the antioxidant and verified the presence of polyphenolic compounds by different techniques of the hydro-ethanolic extract of *H. speciosa* Gomes. fruits.

Results and discussion: Oxidative stress is correlated with onset of diseases. Studies have shown that plant origin compounds, antioxidants, are able to prevent such complications. Thus, the present work evaluated the antioxidant and verified the presence of polyphenolic compounds by different techniques of the hydroethanolic extract of *H. speciosa* Gomes. fruits.

Conclusions: It was possible to verify the antioxidant activity, besides contributing to the identification of the active compounds and possibility of further studies from the elucidation

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ABSTRACT 16

Anti-Urease Activity of Native Species of Genus *Piper* with Potential Application in Control of Infections

Armando Cáceres, Hirma Almeda, Laura Astorga, Andrea Orellana, Ligia Sampuel, Vivian Zelada, Vivian Zelada

ABSTRACT

Background: Urease is an enzyme that catalyzes the hydrolysis of urea in the gastrointestinal and urinary system and relates with the chronic bacterial infection of both systems. *Piper* is a basal angiosperm genus with ethnobotanical application.

Methods: Leaf from five species of *Piper* genus was collected in Samayac, Suchitepequez and in Lachua, Alta Verapaz. Dichlorometane (DCOH) and methanol (MethOH) extracts were prepared by maceration and concentrated by rotavapor. Qualitative determination of anti-urease activity was demonstrated by thin layer chromatography (TLC) and developed by phenol red. Urease activity was quantitative shown by micro-colorimetry at 630 nm with phenol red and urea.

Results and discussion: Seventeen extracts out of twenty demonstrated anti-urease activity by TLC, showing one decoloration band with R_f 1.4 and 5.8, *P. psilorachis* showed two decolorations bands at R_f 5.3 and 5.8. *P. psilorachis* MethOH extracts showed the best activity (C I50 MethOH $1.9 \pm 0.08 \mu\text{g/mL}$ and DCOH $2.1 \pm 0.06 \mu\text{g/mL}$), similar to the positive (omeprazol C I50 $1.4 \pm 0.05 \mu\text{g/mL}$). Two other species *P. umbellatum* (C I50 MethOH $2.5 \pm 0.06 \mu\text{g/mL}$) and *P. retalhuelenses* (C I50 MethOH $4.1 \pm 0.7 \mu\text{g/mL}$, DCOH $4.8 \pm 0.06 \mu\text{g/mL}$) showed a moderate activity.

Conclusions: Three species showed potential anti-urease activity that deserves future studies by bio-guided fractionation. The review of the literature demonstrated that this is the first report about the urease activity of these *Piper* species.



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ABSTRACT 17

Application of Natural Ingredients in Hair Care Cosmetic Formulations

Marcella Gabarra Almeida Leite, Patricia M.B.G. Maia Campos

ABSTRACT

The application of natural ingredients in hair care cosmetic formulations have been a highlight in the research and development field. Previous studies from our research group showed that hair care is essential in women's quality of life and well-being, since the hair has a significant role in the body image. Several active ingredients have been used for hair care cosmetic formulations, such as amino acids, vitamins and silicones. In addition, the application of natural products, such as botanical extracts, vegetable oils and essential oils have been widely explored. Botanical extracts, due to its antioxidant properties have shown great results in the application of cosmetic products. Among them, we can highlight the green tea extract (*Camellia sinensis*), that presents great antioxidant activity, as well as complex B vitamins and minerals. It has been reported in the literature that the association of green tea extract with UV filters can increase the UV protection. Besides, according to previous studies of our research group, the acai (*Euterpe oleracea*) and grape (*Vitis vinifera* L.) extracts, that are rich in phenolic compounds, vitamins and minerals presents potential to be apply in hair care products. The combination of botanical extracts with antioxidant properties in hair care cosmetic formulations can prevent the sun damage of the hair fiber, promoting an improvement in the hair fiber conditions due to their composition. Vegetable oils have also been explored as an alternative to be applied in more effective hair care cosmetic products. We can highlight the Brazil nut oil and Olive oil. The Brazil nut oil is composed of polyunsaturated fatty acids, protein, selenium, calcium, iron, magnesium and complex B vitamins, that can improve the hydration, nutrition and strengthening of the hair fiber. Olive oil consists of monounsaturated fatty acids, triglycerides, tocopherol, carotenoids and squalene. This way, it presents great antioxidant activity and other properties that can increase the hydration and also prevent hair damage. Our studies showed that olive oil and Brazilnut oil presented an increase of break force, reduction in the combing force and increase of shine. Furthermore, essential oils have been studied due to its beneficial properties. They have been a focus of study, for its anti-microbiological properties, but they also present application in hair and skin care products. Studies showed that the application of essential oils on hair scalp can promote hair growth as they stimulate the hair follicles and make the hair grow faster and even stimulate the growth of follicles that are no longer promoting the hair growth. The Bergamot extract (*Citrus aurantium* L. subsp. bergamia) is known for its use in the perfumery industry, as well as, its use as an antiseptic and anti-inflammatory. Studies also showed that the Bergamot extract can improve hair growth. The *Chamaecyparis obtusa* essential oil is also known to stimulate hair growth. The combination of essential oils, such as peppermint essential oil (*Mentha balsamea*), Rosemary essential oil (*Rosmarinus Officinalis*), Tea Tree essential oil (*Melaleuca alternifolia*), Clary Sage essential oil (*Salvia sclarea*) and Lavender essential oil (*Lavandula angustifolia*), have demonstrated good effects in promoting the hair growth.

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In this context, the application of natural products in hair care cosmetic formulations, have shown great results and are presented as a good alternative to synthetic ingredients. Finally, their application in hair care cosmetic products can result in safe and effective formulations with good benefits for the hair treatment.



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ABSTRACT 18

Application of Olive Extract for the Melasma Treatment: A Clinical Pilot Study

Julia Bagatin, Patricia Maia Campos

ABSTRACT

Background: Melasma is a common chronic acquired hyperpigmentation disorder that affects predominantly the face region and can cause significant psychosocial life quality impairment. Therapy remains a challenge, as the main topical treatments does not prevent its relapsing characteristic and is associated with diverse adverse effects. Thus, the application of alternative treatments for melasma, as the use of active substances with antioxidant properties obtained from natural sources has been of great interest in the clinical area. In this context, natural extracts containing antioxidant compounds as hydroxytyrosol presents potential depigmenting action as it inhibits tyrosinase, the central enzyme enrolled in melanogenesis. This way, the objective of the present study was to evaluate the clinical efficacy of a topical treatment based on a olive extract titrated in hydroxytyrosol for melasma control.

Methods: For this, a double-blinded, randomized and placebo control clinical study protocol was conducted by recruiting 28 female subjects with the inclusion criteria: aged 30-50 years, Fitzpatrick phototype III-IV and diagnosed melasma. The melasma area and severity index were calculated using skin imaging techniques before (baseline values) and after 30 and 60 days of daily topical treatment with 1% of olive extract. In addition, pigmentation measures were performed using biophysical techniques.

Results and discussion: The obtained results showed that the topical application of a formulation with olive extract during 60 days significantly reduced melasma measure by reflectance spectroscopy when compared to baseline values.

Conclusions: The proposed formulation containing 1% of olive extract titrated in hydroxytyrosol showed a depigmenting effect after 60 days of treatment, which suggests that even with great inter-individual melasma variability, the proposed therapy could be an effective alternative to support dermatological treatment for this condition.

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ABSTRACT 19

***Calendula officinalis* and *Coriandrum sativum* Extracts Do Not Have Side-Effects on a Generalist Insect Predator**

Juliana Oliveira, Maira Fonseca, Madelaine Venzon

ABSTRACT

Background: Marigold (*Calendula officinalis*) and coriander (*Coriandrum sativum*) are medicinal and aromatic plants with proved insecticidal activity. The use of such botanical insecticides to control pests is an accessible and safe strategy to humans. In order to be a sustainable strategy, to be used in concern with other strategies as biological control, these botanical must be compatible with natural enemies. We evaluated the side effects of different concentrations of marigold and coriander extracts on the generalist insect predator *Chrysoperla externa* (Chrysopidae).

Methods: Predators were exposed to different concentrations of marigold (5 g of dried flowers/100 ml 30% alcohol)(5, 10, 25, 40 and 50 mg/ml) and of coriander seed extracts (10 g of dried seeds/100 ml 30% alcohol)(10, 25, 40, 70 and 100 mg/ml). Water was used as a control. Aphids were transferred to individual pepper seedlings that were after sprayed with the extracts. A second instar larvae of the predator was transferred to each seedling and left for 72 hours.

Results and discussion: Survival curves were estimated by the Kaplan Meier technique. Both extracts at all tested concentration had no side effects on the predator. Survival of predator did not differ from control and calendula extracts (Chi sq = 4.4, d.f. = 5, p= 0.495) and from control and coriander seed extracts (Chisq= 5.5, d.f. = 5, p= 0.357).

Conclusions: Marigold and coriander extracts have insecticide activity against several pests. They also do not have negative effects on a commonly found insect predator. This information contribute to the safe use of such botanical por pest management in different crops, including other medicinal and aromatic plants.



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ABSTRACT 20

Calibration and Standardization of Instruments of Cosmetic Efficacy (Cutometer) *in Vivo* Studies

Francisco López, Karla Tituaña

ABSTRACT

Background: The MPA 580 Cutometer is a non-invasive device that allows a biomechanical assessment of the skin providing to doctors and researchers with the ability to quantify skin properties such as flexibility and elastic recoil of the skin, therefore, an undefined protocol of use or the lack of the equipment calibration generates uncertain results as well as the lack of definition of variables that interfere with the evaluated subject and the measurement instrument.

Methods: Biomechanical evaluations (elasticity and firmness) were performed with Cutometer on volunteer women subjects between 20 - 35 years of age with healthy skin and skin with stretch marks in order to define a protocol for use: position control and probe-operator pressure. The repeatability and reproducibility of the data obtained in different conditions of T=25°C and HR=50% were evaluated through the R & R study: is an evaluation of the measurement with different operators and the same established method.

Results and discussion: Finally the reproducibility and reproducibility of 100 data were evaluated with % R & R and the results are 9.55% (Study is Apt).

Conclusions: A protocol of use is define which includes: the material preparation, equipment calibration, patient preparation, execution and precautions.

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ABSTRACT 21

Chemical and Biological Potential Evaluation of Endophytic Fungus *Aspergillus unguis* Associated to Antarctica Alga *Palmaria decipiens*

Verônica Moraes, Karen Rangel, Niege Furtado, Lorena Rigo, Pio Colepicolo, Hosana Debonisi

ABSTRACT

Background: Marine organisms are recognized by present high potential for the production of natural products with unique molecular structures. In this context, the endophytic fungi are considered as a promising source of bioactive compounds, showing molecules from the secondary metabolism more biologically meaningful than those produced by their hosts. Within this context, this work had as main objective the evaluation of the chemical and biological profiles of the endophytic fungus *Aspergillus unguis* isolated from the Antarctic alga *Palmaria decipiens* (collected at Robert Island).

Methods: *A. unguis* secondary metabolites profile was obtained by chromatographic methods as thin-layer chromatography (TLC) and high performance liquid chromatography (HPLC). The isolated compounds structures were established by spectroscopic and spectrophotometric techniques such as NMR 1-D and 2-D, LC-MS, GC-MS. All obtained data were compared with those described in the literature and/or with those presented in the MarinLit[®] software and the Dictionary of Natural Products.

Results and discussion: From the studied fungi, three substances were isolated: Niduline (DEP-1) besides Emeguesin B (DEP-2) and DEP-3. All molecules present depsidone skeleton, whose Niduline is the most molecule reported in the literature. On the other hand, DEP-3 is an unpublished structure in the literature until now. At the same time, experiments were performed to evaluate the biological activity of extracts, fractions and isolated substances. The crude extract of *A. unguis* was considered to be photostable, as well as the fraction 21, from which DEP-1 was isolated. DEP-1 was submitted for photostability and phototoxicity evaluation, being considered as photostable with an absorption of 0.8 nm in the region of UV 290-350 nm and a drop in photostability of less than 0.1. The compounds DEP-2 and a mixture of DEP-2 and DEP-3 were investigated to evaluate the antimicrobial potential against *Staphylococcus aureus*. A synergic effect was observed, since DEP-2 alone showed a MIC value of 100 µg/mL and when in mixture with DEP-3 it was 6.25 µg/mL, respectively.

Conclusions: Further studies are being performed aiming to evaluate the photoprotective potential of isolated compounds DEP-2 and DEP-3, besides antimicrobial activity of DEP-3 against *S. aureus*.



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ABSTRACT 22

Chemical Studies on Soybean Crop Residues

Ariadne Magalhães Carneiro, Maiara Borges, Daniel Rinaldo, Cristiano Funari

ABSTRACT

Background: Soybean is one of the main sources of isoflavones, a class of flavonoids with innumerable properties for human health. These compounds, because of the similar to the female human hormone, estrogen, can be considered as a phytoestrogen, and are very indicated for the treatment of women who are passing through the climacteric. This work aims to investigate the presence of isoflavones in soybean crop residues, which is currently the largest agricultural crop in Brazil.

Methods: The samples used were soybean pods, leaves and branches collected at the experimental farm of the Faculty of Agronomic Sciences (FCA / UNESP). They were extracted by dynamic maceration at 30° C with acetonitrile, ethanol and acetone, with and without 0.1% HCl. The extracts obtained were analyzed by HPLC-UV . The comparison between the solvent performances was based on the parameters number of total peaks in the chromatogram, total area and yield of the extraction.

Results and discussion: The results of this work showed that ethanol and acetone solvents, both of low toxicity, biodegradable and that can be produced from renewable sources by fermentation process, were equally or more efficient than the solvent acetonitrile, depending on the parameter analyzed . The presence of the acid solution also visibly altered the chromatographic profile obtained for the three solvents, leading to more efficient extractions when the three parameters analyzed were quantified. Considering that for each ton of grain of soybean harvested, 2.7 tons of the advantages of efficient extractive processes based on ethanol or acetone relative to those based on acetonitrile, an environmentally undesirable solvent are evident.

Conclusions: This work demonstrated the extracting potential of green solvents in the extraction of soybean residues to extract isoflavones, opening opportunities for the use of agricultural residues for the production of extracts rich in compounds of medicinal interest, such as isoflavones.

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ABSTRACT 23

A Moisturizing Cream Containing *Salvia hispanica* Gel and *Jacaranda* Extract for Dry Skin

Cumandá Játiva, Veronica Cevallos

ABSTRACT

Background: Skin dryness is a frequent concern among people above 40 year old leading to the need of moisturizing creams for daily use. The objective of this work was to evaluate the effect of the substitution of some chemical components of a basic formula by natural products with known useful biological activities on its texture its moisturizing ability.

Methods: *Salvia hispanica* gel (2 g), *Jacaranda* ethanolic extract (0.2 g), magnesium oxide (5 g) and coconut oil (10 g) were the substances added. The pharmacological activity was assessed on rabbit shaved skin with Lubriderm as a positive control. The effect on human skin dryness was evaluated with 50 volunteers.

Results and discussion: A smooth cream with acceptable texture, no toxicity and skin moisturizing effect was obtained, demonstrating the possibility to use this formulation with natural products for daily treatment of skin dryness.



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ABSTRACT 24

Cymbopogon nardus Plant: Action on *Candida albicans* Mature Biofilm

Luciani Gaspar de Toledo, Matheus Aparecido dos Santos Ramos, Veridiana de Sá Gomes, Anderson Noronha da Silva, André Gonzaga dos Santos, Margarete Teresa Gottardo de Almeida, Taís Maria Bauab

ABSTRACT

Background: The ability of *Candida albicans* to colonize and proliferate in humans is closely related to its pathogenicity. The main pathogenicity mechanisms of *C. albicans* are hyphae and biofilm formation. Several chemical compounds have been evaluated for their ability to inhibit the biofilm formation. Thus, this study aimed to assess the antifungal activity of essential oil (EO) from *Cymbopogon nardus* (L.) Renlde (Citronella), in order to determine the minimal inhibitory concentration and inhibition of mature biofilm of *C. albicans*.

Methods: The strains used were *C. albicans* (ATCC 90028 and clinical isolate). The minimal inhibitory concentration (MIC) determination was evaluated by microdilution method according to CLSI, with modifications. The minimal fungicidal concentration (MFC) was determined according to Ramos and co-workers, with modifications. The biofilm adhesion assay was performed as protocol described by Pitangui and co-workers, with modifications. The assays were performed in triplicate.

Results and discussion: The results showed that EO inhibited planktonic cells of *C. albicans* with MIC of 1000 µg/mL against ATCC e clinical isolate. Moreover, the EO exhibited fungicidal profile against *C. albicans* ATCC with MFC similar to MIC (1000 µg/mL). EO was able to inhibit and to control the main virulence factor attributed to *Candida* species, such as, the mature biofilms. The EO demonstrated strong inhibition of the mature biofilm of *C. albicans*, with inhibition percentage of 97.7 % (ATCC) and 82 % (clinical isolate).

Conclusions: The EO from *C. nardus* present as a promising source of new agent with anti-*C. albicans* activity especially to the inhibition of the main virulence factor such as mature biofilm.

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ABSTRACT 25

Development and Evaluation of a Nanoemulsion Containing *Brosimum gaudichaudii* Extract for Topical Treatment of Vitiligo

Wanessa Quintão, Lívia Sá-Barreto, Guilherme Gelfuso

ABSTRACT

Background: *Brosimum gaudichaudii*, also known as œmamacadelã, is a Brazilian plant that contains high concentrations of furocoumarins, like bergapteno and psoralen. Such substances are associated to a therapeutic potential for treating vitiligo. Considering the application of natural compounds of this plant in topical formulations, this work aimed to develop a nanoemulsion containing extract from *B. gaudichaudii* for topical treatment of vitiligo.

Methods: Ethanolic extracts from *B.gaudichaudii* root powder were prepared (1:20 p/v) by maceration during 7 days. Different nanoemulsions containing the extract were prepared using nonionic surfactants, and it was chosen one formulation based on a three-phase diagram. Nanoemulsion particle size and zeta potential were characterized using a Zetasizer. Physicochemical characteristics, as pH and coumarins content, were also evaluated. Bergapten and psoralen contents in the extract and nanoemulsion was quantified by an validated, selective analytical method using High-Efficiency Liquid Chromatography (HPLC).

Results and discussion: The oil-in-water nanoemulsions were prepared after evaporation of extract solvent using a rotary evaporator. Formulations containing deionized water, Labrasol and Plurol surfactants and ethyl oleate were prepared by high-energy stirring method (500 rpm), with the dispersion of the aqueous phase in the oil phase. The nanoemulsion obtained presented a pH average of 4.6 ± 0.01 , droplet size of 139.3 ± 11.7 nm and polydispersivity (PDI) of 0.16 ± 0.03 , demonstrating uniformity between droplets. The zeta potential was negative (-15.1 ± 2.28 mV). The formulation presented 255.8 ± 3.3 µg/ml of psoralen and 88.3 ± 1.8 µg/ml of bergapteno.

Conclusions: Non-ionic surfactants, such as Labrasol and Plurol, were suitable for preparing an oil-in-water, thermodynamically stable nanoemulsion. The formulation presented adequate size, PDI and zeta potential. It is expected that further skin permeation studies may show the potential of the formulation developed with the *B. gaudichaudii* extract as a new safe and effective topical therapeutic option for vitiligo treatment.



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ABSTRACT 26

Development and Evaluation of Antioxidant and Photoprotective Formulation Based on *Cocos nucifera* L.

Mariana Sampaio, Ingrid Pimenta, Lilian Vandesmet, Cicero Dos Santos, Flavio Costa

ABSTRACT

Background: Atopic dermatitis is defined as a chronic inflammatory dermatosis with a multifactorial etiology, characterized by intense pruritus and cutaneous xerosis. The lesions are constituted by erythema, papules, vesicles, sometimes confluent, very pruritic. Virgin coconut oil is not a medicine, but a complementary food to help prevent various diseases, however due to the presence of fatty acids it acts as a silky smooth olive oil very recommended for irritated and inflamed skin.

Methods: development of an innovative product from *Cocos Nucifera* L oil, aiming to present its properties and its important therapeutic action in the treatment of atopic dermatitis in children. For this, a formulation of nonionic cream was formulated, which exerts a hydrating, antioxidant, anti-inflammatory, photoprotective and waterproof action.

Results and discussion: For the treatment of childhood atopic dermatitis, waterproof cream of coconut oil was used to minimize clinical symptoms. The tests performed to control product quality were pH, viscosity and water resistance test. The final product had good oil fixation, the optimum pH for the skin and water proof. According to studies, coconut oil obtained from the fresh mature coconut pulp is composed of saturated fatty acids (more than 80%) and unsaturated fatty acids. Due to the presence of these compounds, it presents humic characteristics, important in process of hydration and nutrition of the skin which justifies its use in the treatment of dermatitis.

Conclusions: In conclusion, the application of the waterproof cream of coconut oil in topical use, presents antioxidant property when used in the lesions. Since coconut oil acts on the skin like a protective cap helping to retain moisture.

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ABSTRACT 27

Development and Evaluation of Depigmenting and Antioxidant Formulation Based on *Punica granatum* L.

Cicero Dos Santos, Marília Carvalho, Lilian Vandesmet, Mariana Sampaio, Flavio Costa

ABSTRACT

Background: Pomegranate, which is rich in various polyphenols, has been used for centuries in ancient cultures because of its medicinal properties. It is a potent antioxidant, aiding in the treatment of cardiovascular diseases, neoplasias and skin bleaching. Several studies show that pomegranate can neutralize the damaging action of free radicals produced by UV radiation, slowing the aging process of the skin.

Methods: The cream was developed from the pomegranate extract obtained by the percolation method. In this way a formulation was elaborated using a nonionic base cream, to which pomegranate extract, photoprotect and essence were incorporated. At the end of the formulation, viscosity, pH and antioxidant activity tests were performed.

Results and discussion: In this work, the antioxidant action of Pomegranate was analyzed in order to reduce the effects of skin aging in the elderly. The developed cream showed good spreadability, ideal viscosity, a pH equal to 5.0, a white color and a very pleasant and mild herbal scent. The results obtained indicated the success of the cream production, since when tested against antioxidant activity, it can be observed that after 15 seconds of the addition of potassium permanganate, the color changed from light yellow to light pink, thus determining a positive result for antioxidant activity. This justifies its use in the treatment of skin injuries.

Conclusions: It is concluded that the results obtained in this work show the importance of therapeutic indications of medicinal plants as an alternative method for the protection of the skin. Since pomegranate has proven antioxidant potential and several other therapeutic applications, such as anti-inflammatory and antimicrobial properties.



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ABSTRACT 28

Development and Validation of High Performance Liquid Chromatography (HPLC) Method for Dillapiole Determination in Evaluation of Topical Formulations Containing Essential Oils

Giulian N Menezes, Tamara Ângelo, Joyce K R Silva, Tais Gratieri

ABSTRACT

Background: *Piper aduncum* L. is a shrub that grows naturally in the Amazon and in the Atlantic Forest of Brazil. Since the species is a source of dillapiole, an essential oil (EO) characterized by performing antifungal properties, the quantification of dillapiole in EO has importance in elaboration process of formulations. Therefore, this work aimed to develop and validate a simple and selective chromatography method (HPLC) for dillapiole determination in evaluation of topical formulations containing EO.

Methods: The method was validated to determine the selectivity, linearity, limit of detection (LD), limit of quantification (LQ), precision and accuracy parameters, according to ICH guidelines.

Results and discussion: The separation was performed using as a stationary phase a RP-C18 column (150 mm x 4.6 mm, 5 µm), which was held at 40 ° C during all analyzes. A methanol /water mixture (75: 25, v / v) composed the mobile phase, at a flow rate of 0.8 mL / min. The injection volume and the detection wavelength were set at 15 µL and 290 nm, respectively. The method presented linearity between the concentrations of 1.5 to 20.0 µg / ml ($r^2 = 0.999$); Accuracy with a coefficient of variation below 4% and dillapiole recovery from skin layers over 90%. In addition, the method was sensitive (detection limit = 0.11 µg / ml, quantification limit = 0.34 µg / ml) and selective at satisfactory levels considering skin interferences, other essential oil components and signal corresponding to the solvent.

Conclusions: A high performance liquid chromatography (HPLC) method was developed, resulting in a simple and selective assay for dillapiole determination from essential oils. This method is versatile and can be used for quantification of this phenylpropanoid in characterization, stability, kinetic release and permeation studies of formulations containing dilapiol in composition.

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ABSTRACT 29

Development of Chromatographic Method for Catechin Determination in Topical Formulations Containing Natural Extracts

Ricardo Ferreira Nunes, Tamara Ângelo, Sandra Márcia Mazutti da Silva, Pérola Oliveira Magalhães, Taís Gratieri, Marcílio Sérgio Soares da Cunha-Filho, Guilherme Martins Gelfuso

ABSTRACT

Background: This work aimed to present and validate a simple and selective high performance liquid chromatographic (HPLC) method for catechin determination from natural sources (*Eugenia dysenterica* DC and *Syzygium cumini* (L.) Skeels) and suitable to be used in development of topical formulations, considering both skin permeation studies and stability assays.

Methods: The developed method was validated according to International Conference on Harmonization (ICH) guidelines (ICH, 2005), considering parameters of selectivity, linearity, limits of detection and quantification (LOD and LOQ), precision, accuracy and robustness.

Results and discussion: Separation was achieved using a RP-C18 column (300 x 3.9 mm; 10 µm), with a mobile phase of methanol/phosphoric acid 0.01 M (15: 85, v/v), flow rate of 0.8 mL/min, temperature set at 40°C, and UV detection at 230 nm. Method was linear in a range from 0.5 to 10.0 µg/mL ($r = 0.999$); precise with an overall variation coefficient of 5.5% and accurate with catechin recovery from the skin layers higher than 85%. Additionally, the method was sensitive (limit of detection = 0.109 µg/mL, limit of quantification = 0.342 µg/mL) and selective against plant extracts, skin matrices and formulation interferents, as well as catechin degradation products.

Conclusions: A simple and selective HPLC-UV method for catechin quantification in different matrices was developed. It showed suitability for formulation characterization, stability analysis and skin permeation tests, proving its versatility for application in different experimental studies.



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ABSTRACT 30

Development of Pet Shampoo with Bitter Melon (*Momordica charantia* L.)

Luis Souza, Renata Santos, Gessica Pereira, Paula Freitas, Aylane Machado, Dalvanize Lima, Silvia Basso

ABSTRACT

Background: The search for Amazonian feedstock is worldwide, and currently it has been an increased attention also for the pet products industry. Among the numerous therapeutic species used, mainly in pet phytocosmetics, the bitter melon is in highlight due to its antifungal properties. It is found in almost all Brazil, commonly present in Acre state. This work aims the development of a pet shampoo with bitter melon (*Momordica charantia* L) for the scabies treatment.

Methods: After harvesting, the plants were dried in a greenhouse for 48 hours at 40°C, and then a glycolic extract was prepared with them, which was used in the pet shampoo formulation. The plant extract and the shampoo formulation developed were subjected to physico-chemical analysis such as- pH, density and viscosity. Additionally, the following analyses were carried out on the pet shampoo: melting point determination; organoleptic characteristics (including color, odor and general appearance); and microbiological (total and endogenous coliforms, mesophiles and Pseudomonas).

Results and discussion: In order to be commercialized, any product of pet line is required, according to ANVISA, to be physical, chemical and microbiological analysed. Therefore preliminary analyzes were carried out. For the glycolic extract analysis those were the results: viscosity 1252cps; pH 6.0; and density 1.11 g / ml. The pet shampoo analysis results are presented followed by the values established by ANVISA: viscosity 1437 cps (1200-1800); pH 6.0 (5-7); density 1.03 g / ml and melting point 90°C. Regarding the organoleptic characteristics and general aspect all the results were normal, according to specified in ANVISA. No presence of microorganisms was detected in all samples tested. The results obtained for each analysis showed that the developed product was within patterns established standards determined by the current legislation. The further analyses to be done are the skin tests and effectiveness in order to be commercialized as a natural option for scabies treatment.

Conclusions: The bitter melon is an effective for scabies treatment, according to the literature. All physico-chemical analyzes results showed parameters within the limits to be used in phytotherapeutic according to the Brazilian Pharmacopoeia. In addition, the results indicate that the developed formulation was adequately prepared and also presented stability. This pet shampoo is qualified to be used as a prototype.

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ABSTRACT 31

Effect of Different Organic Fertilization Doses on the Growth and Flower Yield of *Brunfelsia uniflora*

Guilherme Moleiro, Lucas Borges, Helena Ronchi, Daniel Oliveira, Filipe Bonfim

ABSTRACT

Background: The aim of this paper is to analyze the effect of different organic fertilization doses on the growth and flower yield of the native species *Brunfelsia uniflora* (Manacá de cheiro).

Methods: The experiment was managed in vase with capacity of 20 liters; it was exposed by 50% of the sunrays on a greenhouse (50% luminosity during all day). It was evaluated using completely randomized design with five different doses of organic fertilization (0, 3, 6, 9, 12 t/ha-1), with six repetitions. The source compound used as organic fertilizations was characterized by its prepared from sugarcane bagasse ashes (SCBA).

Results and discussion: The data collection and analysis of the biometric parameters (plant height,) was month by month, while the other method of analysis measurement, it was concluded between the period of September 2016 to February 2017, (this is its flowering period). The production of flowers each day was defined as gathering all the flowers, measuring the weight of them and then quantifying the yield of the day. The results were submitted by variance analysis and after, regression analysis, fitting the equation models to the obtained data. The software SISVAR helped with the computational approach of data. It is verified both for biometric parameters and for flower yield that there is no significant statistic difference between the doses of organic fertilization, even the plants that shows similar results. . Thus, according to the results analysis, it showed that the ashes could be incorporate into the vases, in addition or not, without causing significant alterations in its yield of fresh matter flower and in its growing.

Conclusions: This study can influence the discovery of new potential chemical substances to incorporate in the cosmetics industry, due to the flower of *B. uniflora* which exhales an enjoyable fragrance.



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ABSTRACT 32

Ethnobotanical Survey of Medicinal Species with Anti-Inflammatory Properties of North-east Brazil

Saulo Menezes, Benedito Portela, Cicero Dos Santos, Mariana Sampaio, Leandro Lima, Lilian Vandesmet

ABSTRACT

Inflammation is characterized by heat, redness, pain, edema and loss of function of tissues and organs, being normal result of host protective responses to tissue injury due to physical traumas, infectious agents, chemicals, heat or any other factor. Thus the high incidence of diseases in which the inflammatory process is involved as a pathological entity and the presence of adverse effects in many of the anti-inflammatories commonly used in current medical practice guides the search for new molecules with the aim of finding new compounds that are effective and that safely limit the harmful effects of inflammatory processes and their associated pathologies, within these molecules are those of natural origin. Considering these factors, the present work aimed to carry out an ethnobotanical survey of native medicinal plants of the Brazilian North-east with anti-inflammatory activities. This bibliographic research was developed through a review about the scientific production of plant species with anti-inflammatory properties of the Brazilian North-east. For that, scientific papers published in the period from 2012 to 2017 were analyzed in the databases consulted. In the research, we considered all the scientific articles available as a complete and free text in the Google Scholar bases, SciELO (Scientific Electronic Library Online), PubMed (US National Library of Medicine) and Science Direct in Portuguese, English and Spanish. It can be observed that the Brazilian North-east presents a wide range of species with medicinal characteristics, among them 30 species were cited as anti-inflammatory potencies. The presence of secondary metabolites such as quercetin, support the popular use of several species as anti-inflammatory. Quercetin is a natural flavonoid found in several species such as those belonging to the genus *Boerhavia*.

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ABSTRACT 33

***In vivo* Evaluation of Cosmetic Efficacy of Formulations Containing *Aristeguetia glutinosa* (matico) and *Ocotea quixos* (ishpingo) Essential Oils**

Stephanie Alvarez, Tatiana Mosquera, Sebastián Peña, Paco Noriega

ABSTRACT

Background: Ultraviolet radiation is a known cause of cutaneous damage due to oxidative stress. Therefore, the development of antioxidant substances for topical or systemic administration is a permanent scientific goal. The objective of this work was to develop two cosmetic formulas containing essential oils of two plant species.

Methods: Combinations of different concentrations of *Aristeguetia glutinosa* (matico) and *Ocotea quixos* (ishpingo) essential oils were prepared and their *in vivo* pharmacological cosmetic efficacy was evaluated. Both formulas were compared with respect to the preference by a sensorial analysis. In addition, primarily the cutaneous irritability of selected formula was assessed by the Patch's Test and the cosmetic efficacy was evaluated by the use of a Cutometer which determines the changes of skin elasticity and stiffness. The percentages of the raw materials for the formulas were selected according to the information from the literature.

Results and discussion: For creams and lotions 0.4 % of the combination of the essential oils was established as the highest possible percentage. There was not statistical difference between the formulas with respect to the results of sensorial evaluations. All the formulas showed good results in Patch's test with values below 1,5, a limit of acceptability. Moreover, the evaluations with a Cutometer device did not demonstrate clear changes with respect of the studied variables.

Conclusions: Cosmetic formulas containing *A. glutinosa* (Matico) and *O. quixos* (ishpingo) were effective to improve skin elasticity but did not modify skin stiffness.



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ABSTRACT 34

In vivo evaluation of cosmetic efficiency of two formulas containing *Ocotea quixos* (Ishpingo)

Mónica Espadero

ABSTRACT

Background: The market of natural cosmetics is facing a number of obstacles for its future development. The lack of knowledge, standard laws and credibility of these products to consumers are just some of the obstacles they face. Certification of natural cosmetics, can generate credibility of these products. For the present investigation it was used an active ingredient which is the essential oil of *Ocotea quixos* (Ishpingo) with the objective of evaluating in vivo the efficiency of two formulations (lotion and cream).

Methods: We defined the acceptable concentration of the active ingredient used, based on the sensorial preference and performance of hedonic tests. For the evaluation of the cosmetic efficacy of formulations was performed to determine elasticity and firmness using the Dermatological Analyzer Cutometer, the parameters analyzed were: R0 (firmness of the skin), R2 (elasticity), R2 (elasticity). R5 (rough elasticity), R6 (visco-elasticity), F0 (elasticity) and the evaluation of skin irritability was tested according to the parameters stated in the Official Mexican Standard NOM-039-SSA1-1993.

Results and discussion: The study consisted on working with three replicates per treatment giving a total of 24 experimental units, the results varied according to the area of application. Changes were observed in the elasticity and firmness of the skin at 28 days of application and in the front there changes were in R0, R2, R5, R6 and F0 at 28 days, maintaining the characteristics of the skin at 56 days.

Conclusions: The hypothesis presented in the study confirms that there are positive changes in the values of the parameters of elasticity and firmness of the skin in the participating volunteers, formulations made with essential oil of *Ocotea quixo* (Ishpingo) are effective, reducing the extensibility and improving the viscoelasticity characteristics of the skin.

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ABSTRACT 35

Glycolic Extracts in Phytocosmetics: Evaluation of Photo-protective Activity and Development of Sunscreen Formulations

Rebeca Gasmenga, Marili Rodrigues, Rodney Rodrigues

ABSTRACT

Background: Excessive sun exposure and lack of protection represent some of the biggest risks for the occurrence of skin cancer, photoaging and immunological alterations. Considering the increasing interest in the development of UV filters based on natural products, given the current trend towards green cosmetics, this work had as objective the evaluation of the use of raw materials of plant origin as glycolic extracts to increase SPF, incorporated in photoprotective creams.

Methods: Ethanolic solutions of the glycolic extracts of the species selected were prepared and their absorption spectra at wavelengths of 290 to 320 nm were obtained. After this screening, photoprotective creams formulations were prepared with the incorporation of glycolic extracts (3%), with the ones that presented higher SPF. An *in vitro* evaluation of the photoprotective activity of the formulations was performed by the Mansur's method.

Results and discussion: The results indicated that the species with the greatest photoprotective potential were *Calendula officinalis* and *Mentha suaveolens*. These extracts individually can not be considered natural sunscreens (FPS <2). Afterwards, a stability study of the developed formulations was performed, which were stable for 28 days under the following conditions: climatic chamber with temperature and humidity control (40°C ± 2,0°C and 75% RH), refrigerator (8°C ± 2,0°C) and room temperature with exposure to light radiation.

Conclusions: Through a statistical analysis, compared to the formulation that had no addition of extracts, there was no increase in SPF in the formulations incorporated with the glycolic extracts. However, it is important to emphasize that these glycolic extracts may confer phytotherapeutic properties that would bring benefits to these skin formulations.



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ABSTRACT 36

Immediate Effects of Starch-Based Gel Formulations on Skin

Elisa Felippim, Victor Infante, Patrícia Maia Campos

ABSTRACT

Background: Starches are film-forming polymeric products that can be applied in cosmetic products for the maintenance of skin's hydrolipid balance and for the improvement of the stability and sensory properties of formulations. This way, the objective of the present study was to develop a gel formulation based on starches with low cost associated to the improvement of skin hydration and oiliness control.

Methods: 10 participants, aged between 20-27 years old were recruited. The parameters of stratum corneum water content (Corneometer), transepidermal water loss (Tewameter - TEWL), sebum content in the surface and infundibulum (Sebumeter and Sebifix, respectively) and percentage of pores were performed by biophysical techniques. The measurements were done before (baseline) and after 2 hours of application of the product under study on the face region (malar) and a control region (without the application of product) was also analyzed.

Results and discussion: The results showed that after a single application (immediate effect) of the formulation the trans-epidermal water loss values were maintained and a increase in the stratum corneum water content was noted. The control group presented the opposite result, showing an increase of TEWL and decrease of stratum corneum water content. Furthermore, the starch formulation did not change the content of sebum in the surface after 2 hours of application. However, a significant increase of sebum content in the control region was observed. In addition, in the infundibulum, starch-based gel formulation the sebum content was maintained, which suggest that the formulation was able to control the sebum of the skin and had lower values when compared to the control region.

Conclusions: In the experimental conditions of this study, the studied starch-based formulation was effective in the maintenance of the hydrolipid conditions of the skin and can be a good alternative for the development of moisturizing cosmetic products besides helping to the natural hydration and oiliness control of the skin.

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ABSTRACT 37

Immunodulatory Profile of the Methanolic Fraction of *Buchenavia Tetraphylla* (AUBL.) R.A. Howard

C.F.O Silva, C.M.L. Melo, T.H. Napoleão, V.M.B. Lorena, M. V. Silva, M.T.S. Correia, A.A.M.O.S. Vicente

ABSTRACT

Background: *Buchenavia tetraphylla* (Aubl.) R. A. Howard (Combretaceae: Combretaceae) is known as Tanimbuca and is widely used by local communities by Caatinga as ethnomedicinal plant. In resume, this plant is used by people as expectorant and against coughs and diarrheas, as tonic against general weakness and aids the digestion when used after meals. In this work we evaluated immunological profile promoted by *Buchenavia tetraphylla* methanolic extract (BtMeOH) in Balb/c splenocytes cultures.

Methods: The phytochemical characterization of the extract was performed by the Thin Layer Chromatography test on silica gel plates to identify the secondary compounds. Mice splenocytes were treated with BtMeOH at 50, 25, 10 and 5 µg/mL. Cell viability analysis was performed by the annexin V-FITC test and staining with propidium iodide. Measurement of cytokine levels in the splenocyte supernatants by the Cytometric Beads Matrix System and *in vitro* nitric oxide (NO) analysis were performed for the immunological profile.

Results and discussion: The chemical profile pointed to the presence of flavonoids derivatives of quercetin and tannins. The concentration of 25 µg/mL did not promote significant necrosis or apoptosis. BtMeOH also stimulated the production of cytokines IL-2, IL-6 and TNF-α, and did not stimulate the production of nitric oxide. These results induce the possibility of methanolic fraction of *B. tetraphylla* (BtMeOH) promotes proliferative action in target cells once IL-2 and IL-6 are mitogenic cytokines to lymphocytes. In our study (data not showed) IL-17 was produced in lower amounts, so it is possible that IL-2 production induced by BtMeOH was directed by proliferation and not to pro-inflammatory activity (as observed through lower nitric oxide and IFN-α production). In fact, TNF-α plays a double role in regulation of immune responses, acting as pro-inflammatory and immunosuppressive mediator. These features of TNF-α exert a vital role in maintenance of immune homeostasis by limiting the extent and duration of inflammatory processes. Moreover, another factor to be considered is the higher TNF-α production induced by BtMeOH in mice splenocytes which may have led to an increase of IL-6 release.

Conclusions: These results induce the possibility of methanolic fraction of *B. tetraphylla* (BtMeOH) promotes proliferative action in target cells once IL-2 and IL-6 are mitogenic cytokines to lymphocytes.



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ABSTRACT 38

Liquid-Liquid Extraction of the Copaiba Oleoresin

Carmen Lucia Queiroga, Adilson Sartoratto, Peter Hewitson, Svetlana Ignatova

ABSTRACT

Background: *Copaifera* is a tree occurs mainly in the Amazonian rain forest. The oleoresin is used by folk medicine for treating diseases. In recent years, the scientific contribution has confirmed a wide range of biological activities of the copaiba oleoresin such as anti-inflammatory activity, antipsoriatic effect and antileishmanial activity. The oleoresins are used as raw material in cosmetics, pharmaceutical and perfumery industries. Our goal was to isolate diterpenic acids using a liquid-liquid extraction (High Speed Counter Current Chromatography).

Methods: A Quattro QuikPrep MK6 CCC system was used with a two phase solvent system Hex:EtOH:H₂O (74:66:20,v/v/v) in the reversed-phase elution mode. Experimental conditions: head to tail; rotational speed: 850 rpm; flow rate: 8mL/min; stationary retention: 82%. A sample enriched with diterpenic acids (400mg), obtained from copaiba oleoresin distillation, was dissolved in 3mL UP and 3mL LP. The fractions were first analysed by TLC(4) (Hex:Acetone, 4:1,v/v). After derivatization fractions containing diterpenic acids were submitted to GC/MS.

Results and discussion: Three two-phase solvent systems were previously tested to provide a best partition coefficient. A sample of the copaiba oleoresin enriched with diterpenic acids was purified with a solvent system Hex:EtOH:H₂O (74:66:20,v/v/v) in the reversed-phase elution mode. The major spot of the diterpenic acid was found on TLC plates in the fractions 17 to 21. After esterification and GC/MS analysis, methyl ester of polyalthic acid was obtained in the fraction 17 (12.6mg, 84.1% of purity) and fraction 18 (17.6mg, 77.6 % of purity). The fractions together add up 91.5mg (22.8% yield) of polyalthic and hardwickii acids mixture that can be repurified.

Conclusions: These results demonstrate that HSCCC is a valuable method in separating and purifying of diterpenic acids from copaiba oleoresin.

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ABSTRACT 39

Morphoanatomical Study of *Acalypha guatemalensis* Pax & Hoffm (Euphorbiaceae), a Medicinal Species Popularly Used in Guatemala

Maria Eugenia Paredes Sánchez, Sonia Castellanos, Sharol Reinoso, María Lourdes Flores

ABSTRACT

Background: The genus *Acalypha* belongs to family Euphorbiaceae and sub-family Acalyphoideae. The species is used in folk medicine to treat protozoal infections, gastrointestinal and venereal diseases, rheumatism, cancer and for several other purposes. Inhibitory effect on classical pathway of the complement system, antibacterial, antiprotozoal, antiproliferative and antioxidant activities were already confirmed.

Methods: A descriptive study of fresh and dried leaves and petioles of *Acalypha guatemalensis* Pax & Hoffm, native from Guatemala, and popularly known as hierba del cancer was carried out, in order to establish and document characters useful in quality control standards. Characteristics were analyzed through freehand cutting, leaf diaphanization and maceration. Screening of secondary metabolites was performed by histochemical methods. Moisture and total ashes were done in order to guarantee the quality of plant material used.

Results and discussion: Lamina transverse section shows a dorsiventral leaf, both adaxial and abaxial epidermis are unistratified and covered with a thin cuticle. Epidermal cells are large and irregular with wavy anticlinal walls. Palisade parenchyma with large cells in one layer and 1-3 compact spongy parenchyma. At the midrib level, shows open collateral bundles, angular collenchymas and multicellular aciculate, non-glandular hairs and numerous crystals. On diaphanized leaf, the indumenta is composed by a variety of non-glandular hairs, like unicellular and multicellular ones, uniseriate, hooked or aciculate ones, and attenuated ones on the borders. All parenchyma shows large amount of calcium oxalate druses. Paracytic and anisocytic stomata can be found. Petiole transverse section shows an oval shape but reniform at the median section, open collateral vascular bundle with 5-6 bundles. Medullar parenchyma with crystals and multicellular non glandular hairs are also seen.

Conclusions: Most of the results had been reported to be useful in the proper identification, delineation and classification of this genus.



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ABSTRACT 40

Nanoencapsulation of Amazon Oils: Rosewood Oil, Chestnut Oil and Copaiba Oil- Innovation in Cosmetics and Pharmaceuticals

Mariangela Azevedo

ABSTRACT

The review describes applications of polymer nanoparticles from Amazon oils, such as pink wood oil, such as rose wood oil, copaiba oil and chestnut oil with important applications in cosmetics and pharmaceuticals. Nanocapsules have been increasingly used in cosmetics and pharmaceutical formulations. This is because the biological activity of the active ingredients is increased as well as the chemical stability of the compounds. The micro or nanoencapsulation of bioactive oils is an excellent tool to control drug release because it can decrease their volatility, increase biological activity, protect from interactions with the environment avoiding decomposition, gives greater physical and chemical stability and reduces toxicity and still in the case of drugs can optimize the number of doses to the patient. Amazon's oils both fixed and essential oils have been widely used because of their biological properties as antiparasitical, insecticidal, bactericidal, fungicidal, and for their pharmacological properties as locally anesthetic, anti-inflammatory, analgesic. The oils are susceptible to easy decomposition with heat, light, humidity, or the presence of oxygen. A review describes the various factors that can influence your stability: knowing its properties and chemical composition. Most of the reports in the literature refer to the microencapsulamento of oils with the objective of protecting against variations of pH, light, humidity and oxygen, besides controlling the volatility and the transformation of the oil in powder occurs which in many cases is a great advantage. Nanoencapsulation, in addition to all the benefits described, may increase the mechanisms of cellular absorption and the bioefficiency of the confined oils. Nanocarriers can be structured by a great variety of material and designs. This review is focused on nanocarrier systems, as the polymer-based nanoparticles with high biodegradability and biocompatibility. The number of papers reporting nanoparticles containing bioactive compounds has been growing a lot in recent years. In the case of oils is a very important strategy to provide chemical stability avoiding the decomposition in the presence of air, light, humidity, high temperatures, and the degradation of its active components. Another great advantage for application in pharmaceuticals and cosmetics is that the nanocarriers provide greater solubility of the hydrophobic ingredients in water, increase the bioavailability and the effectiveness, makes the oil safer and easier handling, controlled release and decreases the toxic side effects.

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ABSTRACT 41

Natural Innovative Anti-aging Solution

Lilian Mussi

ABSTRACT

In this presentation we intend to demonstrate a practical example of a technological solution materialized in a commercial product, obtained from natural sources and the result of an innovation process starting from a current challenge in the cosmetic area. Because of their major biological effects, retinoids are among the most prescribed and recommended active in dermatology. However, its use is often associated with photosensitivity and skin irritation. Revinage is an active ingredient that is composed of a supercritical botanical extract, an advanced green chemistry technology that allows the extraction of highly concentrated, solvent-free extracts and satisfies all requirements for an environmentally sustainable product. Revinage is rich in phytol, a precursor of phytanic acid, which is a retinoid X receptor (RXR) ligand, as shown by our *in silico* studies. Revinage® has a multi-target concept aimed at combating aging of the skin. *In vitro* tests show its ability to: Increase in collagen synthesis by 24% and elastin by 26%; an increased levels of cell growth factors such as EGF and TGF-Beta by 108% and 41%, respectively; an increase in the antioxidant enzymes CAT and SOD by 47% and 247%, respectively; reduced the inflammatory mediators COX-2, PGE2 and LTB4 by 69%, 26% and 28%, respectively. Clinical trials also prove the remarkable effects of Revinage. After 42 days of treatment with Revinage, volunteers had a 28% reduction in deep wrinkles and a 36% skin roughness reduction. The elasticity and re-densification of the dermis also increased by 13% and 25%, respectively. Revinage® is a plant alternative to retinoids and is safe to use even when exposed to sunlight as opposed to retinoids due to their high oxidation and UV radiation stability.



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ABSTRACT 42

Natural Products: Bench to Market

Daniel Weingart Barreto

ABSTRACT

The growth forecasts for the Market of natural cosmetics in the world show that this market grows at rates significantly higher than those observed for the cosmetic market in general. Although the definition of naturalness of a cosmetic is still a matter of discussion, there is no doubt that the availability of natural ingredients is fundamental for the development of cosmetics that meet the minimum composition requirements, but also deliver the benefits and expected effects of the final product to the consumer. In this context the development of new bioactive ingredients plays an extremely important role, since these ingredients will be the main responsible for the cosmetic benefits that differentiate each product that comes to the Market. The development of an bioactive ingredient is a complex process, involving many stages, different areas of knowledge and ultimately involves considerable risks of failure. In this presentation we will discuss the main steps in the development of a bioactive cosmetic ingrediente and present a case study illustrating the development of a bioactive ingrediente, from the creation of the concept until it's launch in the Market.

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ABSTRACT 43

Novel Nanobiocatalyst of Hybrid Nanoflowers Comprising Medicinal Plant Extracts for Potential Applications in Medicine and Cosmetics

Ufuk Koca Çaliskan, Nalan Özdemir, Cevahir Altinkaynak, Ceylan Aka

ABSTRACT

Background: Recent years have witnessed various nanotechnological applications leading to growing efforts to develop protein-incorporated hybrid nanostructured materials with potential applications in functional materials, drug delivery, enzymatic catalysis, and analytical sciences. As we know that plant extracts contain molecules with protein structures, therefore, we reported a novel protein-inorganic hybrid nanoflowers using *Achillea wilhelmsii*, *Solanum melongena* and *Cuscuta arvensis* extracts as the organic components and Cu^{2+} as the inorganic component and investigated for their peroxidase and antioxidant activities.

Methods: Powdered plants were extracted with methanol for 24 hours. The hybrid nanoflowers were synthesized. The extracts with concentrations from 0.02 to 0.2 mg mL⁻¹ were separately added into the 10 mM PBS (pH 7.4) and 0.8 mM Cu^{2+} ion. The precipitates were washed at 5000 rpm for 10 min. The final products were dried and the hybrids were characterized using SEM, EDX, FTIR and XRD. The catalytic peroxidase activity of the nanoflowers were tested towards guaiacol using spectroscopic method.

Results and discussion: The effects of the plant extracts on the morphology of nanoflowers were systematically examined by evaluating the effects of different plant extracts concentrations on flower-like morphology of nanoflowers that were analyzed by SEM. These results proved that the extract concentrations, which have different amount of amine group can influence the flower-like morphology. The elemental composition of each nanoflower was analyzed by EDX. The crystal structure and chemical structure of nanoflowers were characterized using XRD and FT-IR spectroscopy, respectively.

Conclusions: The hybrid nanoflowers showed higher effective antioxidant activities than plant extracts and strong peroxidase activity. The synthesis of protein-inorganic hybrid nanoflower containing plant extracts is an important factor considering its suitability for commercial applications in pharmacy and cosmetics.



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ABSTRACT 44

Oenocarpus bataua - Traditional Knowledge, Science and Sustainability from the Field to the Shelf

Iguatemi Costa

ABSTRACT

Background: The development of a plant-based cosmetic product can be a multistep process that demands a multidisciplinary approach. The success in all these approaches can result in virtuous cycle, which can illustrate a good example of sustainable development.

Methods: Genic screening of natural oils. Human keratinocytes and fibroblasts assays. Chromatographic and supportive phytochemistry analysis. Social technology for climbing palm trees. Phytocosmetics formulation.

Results and discussion: In this presentation is described a case of development of a new line of products based on the pataua (*Oenocarpus bataua*), a palm tree native to the Amazon region, which have an oily edible fruit. The traditional knowledge was accessed and helped to direct the studies of possible mechanism of action, among a genic screening of natural oils. Further results in human keratinocytes and fibroblasts proved that pataua oil is able to inhibit the JAK-STAT via, stimulating the anagen phase of capillary, allowing it to grow in the follicle for longer. Parallel studies were carried out to determine the correct process of production that guarantee the bioactive in the oil, that otherwise could not keep the correct activity. The differentiated process starts from the harvesting of the fruits continuing to the processing of the oil, passing through the transport of the fruits. Finally, the formulation of the final products should guarantee the activities in an entire line of hair products, including a hair tonic with an observed effect in the thickness of the hair, complimenting the previous described activity.

Conclusions: The case of the research and development of a new line of phytocosmetic products based on a new vegetable oil, including traditional knowledge elements, good science, best practices and closing a virtuous cycle of sustainable development is presented.

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ABSTRACT 45

Phytochemical Standardization of Hydroalcoholic Extracts of Ishpingo, *Ocotea quixos* (Lam.) Kosterm.

Michelle Parra, Tatiana Mosquera

ABSTRACT

Background: Investigations have proved the presence of components such as cinamaldehyde, cinamyl acetate and phenolic compounds in *Ocotea quixos*, these components have been attributed antimicrobial disinfectants, antifungal and healing activities. It is important to point out that to evaluate any biological activity is necessary to have standardized extracts to obtain reliable and reproducible results.

Methods: The investigation consisted in standardizing hydroalcoholic extracts of ishpingo, evaluating the influence of three experimental variables: vegetal material (fresh and dry), solvent (ethanol and cane ethanol) and solvent concentration (90, 70, 50) % v/v through an experimental factorial design, from which it was obtained 12 different extracts. The extracts were obtained through a percolation process. A phytochemical screening showed the presence of tannins, catechins, saponins, quinones, coumarins, lactones and alkaloids; Folin - Ciocalteu method was used to determine the polyphenols concentration.

Results and discussion: By statistical analysis ANOVA (Tukey 95%), it was proved that there is significant difference between the 12 established treatments where the extracts with the highest quantity of polyphenols are AMF50:50 (Alcohol, Fresh Material, Concentration 50% v/v) and CMF90:10 (Cane alcohol, Fresh Material, Concentration 90% v/v) with 12,538 and 13,298 mg of gallic acid / mL of extract respectively; concluding that, this last combination allows to obtain greater quantity of total polyphenols following the established standardized protocol.

Conclusions: The 36 hydro-alcoholic extracts obtained significant amounts of total polyphenols. However, in the statistical analysis of the results, it was possible to conclude that the interaction between the variables considered in the experimental design (solvent type, plant material status and solvent concentration) influences the final result of total polyphenols.



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ABSTRACT 46

Polyphenols Fractioning Using Colloidal Gas Aphron Methodology

Carolina Beres, Nurmahani Maidin, Caroline Mellinger, Lourdes Cabral, Suely Freitas,
Paula Jauregi

ABSTRACT

Background: Wine making industry has as main byproduct grape pomace rich in polyphenols. There is an increase attention to beauty products with natural composition. Antioxidant activity and UV protection effect of polyphenols from plants are well established. Usually those chemical compounds are obtained using solvent extraction. This work aimed to propose a fractioning methodology to separate polyphenols from grape pomace using Colloidal Gas Aphron, which is based on the use of surfactants normally used in the cosmetic industry to improve molecules permeation.

Methods: Hot water and ethanolic extraction were conducted. Both extracts were analysed according to polyphenols concentration and antioxidant activity potential. Extracts were fractioned using CGA methodology. Two surfactants were tested, non ionic (Tween 20) and cationic (cetyltrimethylammonium bromide, CTAB). Each extract were treated with both surfactant, phenolic recovery was a relation between the mass of phenol in the Aphron phase, and in the extract.

Results and discussion: The ethanolic extraction was about 3.7 times (387.5 ± 3.1 mg Gallic acid/L) more efficient for obtaining total phenols than hot water extraction (105.5 ± 0.4 mg Gallic acid/L). Antioxidant scavenging capacity was also higher in the ethanolic extract (2266.7 ± 25.2 μ Mol Trolox/L) than in hot water extract (1820.0 ± 29.2 μ Mol Trolox/L). After CGA fractioning, Aphron phases had a significant recovery of phenolic compounds. CTAB fractioning applied on ethanolic extract had the higher recovery (97%) of total phenolics. Tween 20 resulted similar recovery in both extracts, 79% of total phenolics were fractionated from the hot water extract, and 77% from the ethanolic extract one. The combination of hot water extract and CTAB was the less efficient with a recovery of 59%. Surfactants are used in cosmetic products to improve permeation of desired molecules. The charged surfactant was more efficient, however non-ionic surfactants are known to cause least irritating effect to the skin.

Conclusions: Colloidal Gas Aphron fractioning was presented as a technological alternative for the skin delivery of bioactive molecules, such as grape pomace polyphenols. The combination of hot water extract and Tween 20, represented the most promising alternative for the cosmetic industry using 79% of total phenolics obtained from an agricultural residue being an environmental and economical alternative application of this byproduct.

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ABSTRACT 47

Antiradicalar Potential of Extracts of *Tagetes patula*

Pamela Cristina e Santos, Kamille Daleck Spera, Amanda da Costa Gomes, Célia Cristina Malagutti Figueiredo, Luciana Pereira Silva, Regildo Márcio Gonçalves da Silva

ABSTRACT

Background: *Tagetes patula* (Asteraceae) has therapeutic properties to combat various diseases. In phytochemical studies the presence of different flavonoids and terpenes were observed. These include lutein belonging to the class of xanthophylls with potential as an antioxidant, thus reducing the risk of developing chronic degenerative diseases and cancer, as well as acting in the anti-aging action. The present work evaluated the antiradical potential by different methods, physico-chemical characterization and quantified the polyphenols and total flavonoids in the extracts of *T. patula*.

Methods: Antiradical activity was evaluated by sequestration of the DPPH radical and the iron reducing power (FRAP). For the total phenol test the Folin ciocauteau reagent was used and the flavonoid test was performed by means of the aluminum chloride complexation method. All tests were performed in triplicate at all concentrations analyzed. Finally, the physico-chemical properties of the extracts were determined, such as pH, osmotic potential and electrical conductivity.

Results and discussion: In the physico-chemical characterization a pH variation of 4.25 to 7.00 was verified in the extracts *T. patula*, which characterizes an acid pH for neutral, pH between 5.5 and 6.5 are compatible with cutaneous pH. As for the osmotic potential the results showed a variation of -0.017 to 0.000 MPa for the different extracts. The electrical conductivity values for the extracts ranged from 0.53-7.37 mS/cm, all of which are analyzed criteria for the stability of pharmacological and cosmetic formulations. For the sequestration method of the DPPH radical, the highest activity observed for *T. patula* extracts was at the concentration of 4000 µg/mL, where the values exceeded 50% of activity. Similar results were observed in the FRAP test, where the highest values of the iron reducing power were observed at the concentration of 1000µg/mL. The values obtained for the total phenol test varied from 32.81 to 42.25 mg equivalents of gallic acid/g of dry extract. The values for flavonoids obtained, ranged from 20.11 to 72.89 mg of rutin equivalent/g of dry extract.

Conclusions: The different medicinal activities of this species may be correlated with the antiradicalar potential and this may be directly related to the presence of phenolic compounds, mainly flavonoids.



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ABSTRACT 48

Research Needs and Educational Strategies for Integration of Phytotherapy to Health Services

Milagros Tomasa Garcia Mesa

ABSTRACT

Background: There is a growing consensus about the need of a rational use of herb products. Therefore, the information about popular believes in this respect and scientific evidence supporting it, may contribute to identify research and strategies necessary for Phytotherapy integration to medical practice.

Methods: A survey was performed among patients of the National Institute of Angiology and Vascular Surgery. The characteristics of the use of plants as medicinal remedies and the names of species considered useful for the treatment of diabetes, arterial hypertension and dyslipidemia were recorded. In addition, the results of pharmacological studies that could support these claims were reviewed.

Results and discussion: More than 80 % of 245 participants in the study used medicinal plants at least occasionally and confided on their therapeutic efficacy. Fifteen species from 11 botanical families were mentioned by participants. Most patients' claims about plants' properties were scientifically supported to some extent. Nevertheless, the majority of the pharmacological evidence relies on pre-clinical studies and results of clinical trials are not conclusive. The lack of standardized plant preparations with identified active principles and demonstrated clinical effectiveness are limitations for recommending their therapeutic use. Thus, it is necessary to increase the number of well-designed clinical trials of plant products. This fact and the poor involvement of physicians in the use of medicinal plants by patients demonstrated by this study, suggested the need of an educational strategy for doctors preparations to take part of research groups for the development of herb products as well as for the integration of Phytotherapy on health services on a rational basis. For this purpose, a Diplomat program was approved by the University of Medical sciences of Havana. The results of its first edition are presented.

Conclusions: Clinical pharmacological research and educational strategies for physicians are needed to provide a scientific basis to the integration of Phytotherapy to health services.

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ABSTRACT 49

Screening of *Leishmanicida* Extract Activity of *Plectranthus amboinicus* (Lour.) Spreng. against *Leishmania* (Viannia) *braziliensis*

Thiully Braga Gonçalves, Mariana Gomes Vidal Sampaio, Maria Jania Teixeira, Aparecida Tiemi Nagao-Dias

ABSTRACT

Background: Cutaneous leishmaniasis are anthroponoses caused by protozoa of the *Leishmania* genus. *Leishmania braziliensis* the most popular species in Brazil. *Plectranthus amboinicus*, popularly known in Brazil as malvarisco, belongs to the family Lamiaceae. It has a great economic importance because of its wide medicinal use. In this work, the *in vitro* effect of the ethyl acetate extract of *Plectranthus amboinicus* (EAEPA) on *L. braziliensis* infection has been evaluated.

Methods: The extracts of hexane, dichloromethane and ethyl acetate of *P. amboinicus* were initially tested *in vitro* for activity against *Leishmania* promastigotes. To evaluate the effect against amastigote forms, murine intraperitoneal macrophages were infected or not with *L. braziliensis* and treated with different concentrations of EAEPA for 24h. Cytotoxicity, parasite load, and cytokine production have been analyzed.

Results and discussion: Phytochemical analysis of EAEPA revealed the presence of flavonoids, digitalis glycosides, tannins and steroids. *In vitro* results have presented that EAEPA exhibited cytotoxicity from the 0.125 mg/mL concentration with 43% inhibition of cell growth. Since the EAEPA has shown the inhibition of 98.5% promastigotes at the concentration 4mg/mL. Treatment with EAEPA in amastigotes forms has presented a significant reduction of parasite load from the 0.03 mg/mL concentration. In cells treated with EAEPA, increased levels of TNF- α and IL-10, maintenance of TGF- β levels, and decreased IL-4 production have been observed. It suggests that this may occur because the reduction of parasitic load, such as through immunoregulation of the inflammatory process.

Conclusions: The leishmanicidal action of *P. amboinicus* elucidated in this work through the treatment in two animal models of infection by *L. braziliensis* opens possibilities for the development of a new herbal medicine capable of reducing parasitemia or even cure, with low toxicity and few adverse effects.



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ABSTRACT 50

Screening Phytochemical Activity of Native Bamboo (*Guadua weberbaueri*) Shoots in Acre State

Renata Santos, Poliana Araujo, Paula Freitas, Silvia Basso

ABSTRACT

Background: Worldwide there is a search for new resources, mainly those of Amazonian socio-biodiversity. Bamboo is a plant used as raw material in various parts of the world, mainly in Asia. The species *Guadua weberbaueri*, known in Acre as “taboca”, is abundant in the Amazon region, arousing interest of evaluating chemical composition (screening) of its shoots aiming future application as a natural active in cosmetic formulations.

Methods: Shoots were collected in the vicinity of FUNTAC. Then were dehydrated in a greenhouse and grounded. The drug was qualitatively analyzed for alkaloids, using the reagents Dragendorff, Mayer, Bertrand, Bouchardat; The afrosimetric index for saponins and the chemical reactions for tannins and flavonoids. Additionally, chromatographic analysis was performed using High Efficiency Liquid Chromatography (HPLC - DAD), with 0 to 100% water / acetonitrile (0.1% TFA) used in the run, with 20ul of hydroalcoholic extract (100g / 800ml) during injection.

Results and discussion: Qualitative tests showed that alkaloids are present, being sensitive only to two reactives (Bouchardat and Dragendorff). Flavonoids were detected only by three reactions (Oxalo-boric, Aluminum chloride and Shinoda). Saponins were also found through the 133.33 ml afrosimetric index. Regarding the dosing of tannins the most sensitive reagents were Copper Acetate, Lead Acetate and Glacial Acetic Acid. Analysis by HPLC showed the presence of alkaloids and peptides in a higher concentration than proteins and flavonoids. Analysis of the alkaloids showed the presence of at least 12 components with a predominance of a hydrophilic alkaloid P1 (C = 8,98) and a more hydrophobic P8 (C = 16.95). Peptide analysis demonstrates the presence of at least 8 components with a predominance of a hydrophilic peptide P1 (C = 18,57) and a more hydrophobic P6 (C = 24.75). The results showed the presence of chemical groups with cosmetic and pharmacological importance.

Conclusions: Phytochemical research of the bamboo shoots (*Guadua weberbaueri*) submitted to qualitative tests showed that the secondary metabolites identified are similar to those of Bamboo (*Bambusa vulgaris*), already used in the cosmetic industry, thus confirmed its importance in the market. The data obtained from the characterization by CLAE is according with the qualitative tests, evidencing also peptides presence.

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ABSTRACT 51

Shelf Life Cosmetic Creams Made from Essential Oils of *Aristeguietia glutinosa* and *Ocotea quixos*

Tatiana Mosquera, Karla Tituaña, Francisco López, María Augusta Vega

ABSTRACT

Background: The preparation of creams with essential oils with antioxidant activity *Aristeguietia glutinosa* and *Ocotea quixos* represents an interesting option in the cosmetic market, being necessary the evaluation of useful life of the formulations to guarantee in some way the action of the natural asset.

Methods: The behavior of the formulations, packaged in glass and plastic, in two storage conditions (ambient conditions and controlled conditions at 45°C - 75% of Relative Humidity) were studied monthly for three months, allowing to evaluate parameters such as: pH, viscosity, organoleptic characteristics, microbial count and the total phenols concentration, chemical characteristic related to the cosmetic effect given to the formulations (antioxidant activity) concentration variation used to determine the useful life of the creams using the Poppe method.

Results and discussion: The results of the study were analyzed by ANOVA in conjunction with the Duncan test at 5%, the analysis showed that creams stored under environmental conditions maintained physical and chemical characteristics in the three months of studies, while those at 45 ° C and 75% RH did not retain their characteristics in the time. In the phenol concentration, the formulations with combinations of the essential oils were kept for a longer time, showing a significant difference in one of the four formulations tested. Using the Poppe method, a useful life of less than two years is determined for all formulations.

Conclusions: The concentration of phenols, in all formulas there is a decrease as a function of time, and under all conditions, so that the natural active is susceptible to degradation, results that could guide future studies with different packaging materials. The Poppe method determines that the different formulations have a useful life of less than two years.



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ABSTRACT 52

Skin Hydration and Regeneration with Moisturizing Emollient of Patauá (*Oenocarpus batauá*) Oil

Dalvanize Aguiar, Gessica Sampaio, Silvia Basso, Poliana Araujo, Claudio Conde, Paula Freitas, Raimundo Alab

ABSTRACT

Background: The Patauá (*Oenocarpus batauá*) is a palm tree, Arecaceae family, found in the Amazon rainforest. The importance of its oil is due to physicochemical properties such as proteins and fatty acids. Studies indicate that it regenerates the hydrolipidic skin barrier, with a high antioxidant power, anti-inflammatory action, in addition to calming the skin and reducing marks. It also strengthens tissue cells. There is a great potential to be used as a therapeutic alternative and in the cosmetic industry.

Methods: The patauá oil was obtained at the Cooperfrutos extraction plant, Mâncio Lima - Acre, by mechanical pressing of the pulp. In the Natural Products Laboratory, FUNTAC, the physicochemical and chromatographic analyzes of the oil were carried out to verify the quality and identify the main present assets. After this step, formulations with three different concentrations were elaborated: 1,5; 2 and 3% oil. Then the stability tests were done to each product.

Results and discussion: The oil physico-chemical analysis showed patauá oil was within the parameters for use in cosmetic formulations. The GC-FID chromatographic analysis indicated: 12,37% hexadecanoic acid (palmitic acid); 4.16% octadecanoic acid (stearic acid)80.3% and 9-octadecenoic acid (oleic acid) that reduces the loss of transepidermal water, maintaining the moisture levels and conferring skin flexibility. After the oil quality was guaranteed, three formulations with different concentration of oil were made: 1,5; 2 and 3%, aiming to determine the best percentage of the active. The following analyses were carried out shortly after the formulations were prepared: sensory (pick up and rub-out evaluations); organoleptic characteristics (color, odor and general appearance); physical (pH, density, melting point) and microbiological (total coliforms). Stability tests (centrifugation, thermal and shelf stress) were performed over time: 0, 7, 14 and 30 days after the formulation. The results obtained indicate that the formulations developed remained stable during this time, preserving its characteristics according to the Product and Cosmetic Quality Control (ANVISA) guide.

Conclusions: This study demonstrated that all formulation prepared presented great quality characteristics according to the analysis, however the concentration that provided the best emollient moisturizer was the one with 3% concentration of vegetal oil. This developed product could be used as an important help to combat free-radicals and protect even the most dry skin, helping to obtaining healthiest skins.

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ABSTRACT 53

Spermicidal Activity of Brazilian North-eastern Plants

Alisson Carvalho, Nadine Maciel, José Silva, Maria Espindola, Rosangela Falcão, Vladimir Filho, José Junior

ABSTRACT

Background: Currently several contraceptive methods are described in the medical literature as an alternative to avoiding an unplanned pregnancy. How spermicides, among them nonoxynol-9, however, nocive effects such as inflammation and genital ulceration are pointed out with use of these agents. Today, many medicinal plants are known to have antifertility properties, either by spermicidal action or by interruption of spermatogenesis. Thus, we intend to evaluate the spermicidal activity of some endemic plants in the North-east.

Methods: Samples of semen were donated by volunteers after a period of sexual abstinence. The semen was submitted to tests with concentrations of 400 µg with four types of plant extracts (*Myracrodruon urundeuva*; *Leonotis nepetaefolia*; *Hymenaea courbaril* and *Stryphnodendron barbatiman*). In order to evaluate the mobility / viability using an optical microscope (400X) in a range of 0 to 30 minutes.

Results and discussion: All samples used were within the indicated standards with motility greater than 40% and viability greater than 60%. The extracts of *M. urundeuva*, *L. nepetaefolia*; *H. courbaril* and *S. barbatiman* had an effect on decreased sperm motility, which is essential for successful fertilization. The extracts of *H. courbaril* and *S. barbatiman* presented a result with decrease of viability of sperm cells greater than 50% when compared with the control. In this way the study proved that extracts present favorable results in the decay of sperm motility.

Conclusions: It has been shown that the extracts of *M. urundeuva*; *L. nepetaefolia*; *H. courbaril* and *S. barbatiman* have certain factor with spermicidal properties where they reduce sperm motility. in view of this property, it is necessary to study the compounds that may be acting in this activity.



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ABSTRACT 54

Strategic Planning is for All of Us

Fernando Ferrer

ABSTRACT

Every member of the organization is impacted by the strategy. The creation of the strategies is concentrated in a relatively small number of professionals but both, the search and analysis of information, and the implementation of the diverse organizational strategies is in hands of almost everyone. Members of any domestic, international or global organization, public or private, for profit or not for profit, must work beyond the functional, geographical and generational boundaries and in close collaboration so as to get the maximum benefit from the strategic process. The conference is to present the key concepts of strategic planning to a wide audience, in diverse functions and levels, and with the final purpose of increasing the interest and collaboration of each and every member of any organization in the critical process of strategic planning.

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ABSTRACT 55

The Enzyme Inhibitory and Anti-Oxidative Activities of a Natural Ingredient as New Functional Additive for Phytocosmetics

Hanmou Yu, Xingtao Jiang, Xinxing Wu, Xiaoli Wang, Tao Chen

ABSTRACT

Background: The medicinal and aromatic plants are diverse in China. To exploit potential resources for research and development of new functional natural cosmetics, a plant ingredient was discovered with active functions of enzyme inhibition and anti-oxidant.

Methods: The skin-whitening, anti-inflammatory and anti-oxidative activities of water extract of the plant ingredient were tested by the *in vitro* inhibition of tyrosinase and hyaluronidase, the Ferric Reducing Antioxidant Power (FRAP) and DPPH radical scavenging assays.

Results and discussion: 74.64% of tyrosinase activity was inhibited by the plant extract at 50mg/g (vs. 95.28% by Vc at 2 mM); 66.67% of hyaluronidase activity was inhibited by the plant extract at 50mg/g (vs. 91.67% by alpha-Bisabolol at 10 mg/g); the DPPH radical scavenging rate was 73.8% and FRAP value was 1.98 at the plant extract concentration 2.5 mg/g (vs. 84% by Vc at 1 mM and 1.27 by Vc at 1 mM respectively).

Conclusions: The new ingredient was discovered to be a resource with high skin-whitening, anti-inflammatory and anti-oxidative activities. The plant extract is worth of further isolation and purification to prepare the pure candidate compounds as new functional additives for phytocosmetics.



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ABSTRACT 56

The Importance of Naturality and Its Evaluation for a Sustainable Development

Michel Philippe, Blaise Didillon, Laurent Gilbert

ABSTRACT

Development of eco-respectful processes and use of renewable raw materials with low environmental impact are key targets to comply with sustainable chemistry. It is thus vital to evaluate precisely the origin and the process of synthesis raw materials in order to assess their naturalness level and to validate their compliance with these principles. The proposed criteria of naturalness of a raw material is a component of an index linked to its origin and of a denaturation index linked to the level of transformation to which it is subjected between its origin and use. Such fundamental rating allows us not only to innovate through selecting the most eco-respectful raw materials but also to substitute the existing raw materials and processes with less favorable environmental impact. In this presentation, we are going to explain the calculation of the naturalness index and give some examples of natural raw materials.

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ABSTRACT 57

The Importance of Sustainable Sourcing of Raw Materials and How to Achieve It

Marine Clavet, Nisrine Zaaoui, Axelle Hallu, Magda Carrasco, Rachel Barre

ABSTRACT

Background: The cosmetics industry is continuously looking for the use of performant ingredients from renewable origin, in particular from plants, in order to increase naturalness of products. In this approach, it is key to develop and employ sourcing practices that are respectful of the people and the environment. At least, 54% of the volumes of raw materials used worldwide are from renewable origin. This represents approximately 1,540 raw materials from over 350 species of plant from over a hundred countries.

Methods: The first step in this methodology is to have full traceability of the raw material. Then, sustainable sourcing will be achieved by following five pillars: promotion of economic empowerment; assurance of decent and safe work; guarantee of equality; preservation of biodiversity; action against climate change.

Results and discussion: In this presentation, I will show how we are successfully deploying this methodology for the sourcing of renewable origin raw materials in Latin America.

Conclusions: Sustainable sourcing of raw materials can be very complex but it can be achieved through a robust methodology that can be applicable in different supply chains all over the world.



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ABSTRACT 58

Use of Waste from Juice Industries: Source of ingredients for Natural Cosmetics

Sandro Reis

ABSTRACT

Background: The production of fruit juices and pulps in Brazil and the world generates thousands of business opportunities. One of the great business opportunities is the reuse of waste material generated in the processing of fruits, which in addition to generating more employment and income, contributes to the reduction of environmental liabilities generated in processing.

Methods: We can find in literature numerous scientific works proving the effectiveness and success of these types of businesses.

Results and discussion: Fruits such as passion fruit, guava, soarsop, papaya, açaí, tomato and several others mainly generate vegetable oils, through the use of the seeds of the residues, with high phytotherapeutic power, since they have a high content and variety of fatty acids in its composition, becoming high quality raw material for the manufacture of soaps, moisturizing oils, exfoliating products, shampoos, among others.

Conclusions: In this sense, it is necessary to develop research related to the subject, as well as exchanges of institutional experiences for the growth of the development of scientific works, where the main beneficiary is the consumer and the general population that has the opportunity to consume 100% sustainable products that are still beneficial to the health of the body.

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ABSTRACT 59

Utilization of Discarded Rose Petals as Raw Materials for Active Ingredients

Paola Pescara, Nathália Corado, Daniel Barreto

ABSTRACT

Background: Since ancient times, roses are associated with love and beauty, mostly being used as decorations and gifts. Today, it makes part of a multi-million of dollar industry. Rose petals are residues from the production of cut flowers, as once the rose buttons open, they lose their value as ornaments and bouquets, and the flowers are discarded. Rose water extract has been known for thousands of years for its properties and uses.

Methods: This project valued the amount of anthocyanins in various rose petals extracts. The extraction was conducted in 90 °C for 15 minutes, with fresh and dried petals, in proportions from 0.5 to 30 g/100 mL of rose petals in water. The total anthocyanin content was measured using the Single pH (spectrophotometric) method adapted from the works of Fuleki & Francis (1968), and was expressed in mg of anthocyanins/100 g of petals.

Results and discussion: The Single pH method consists in extracting the anthocyanins with ethanol-1.5 M hydrochloric acid (85:15) and measuring the optical density of the extract, diluted with the extracting solvent, at 535 nm. The total content was calculated in absolute quantities with the aid of the extinction coefficients established for the major rose anthocyanins dissolved in the alcoholic solvent system. The extract with the major quantity of anthocyanins was obtained using 30 g/100 mL of fresh petals in water. This extract was concentrated on NADIR UP005 ultrafiltration membrane under a pressure system of 6 to 8 bar and, then, the anthocyanins content was measured again. The extract maximum concentration obtained was 11.8 times and the anthocyanins total content was 2.2 times concentrated, from 219.9 to 484.3 mg/100 g. Therefore, the rose water extract - produced from petals, is able to eliminate free radicals and to promote skin cell renewal, mainly due to the presence of compounds with antioxidant properties, as anthocyanin.

Conclusions: A symbol of beauty, rose has been gaining ground in the cosmetics industry as a powerful ingredient that promise to combat premature aging. The rose water may be used as a final product or applied in various formulas for skin care, such as thermal waters, soaps, serums and moisturizers, for its benefits of purifying, soothing and cleansing the skin.



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ABSTRACT 60

Vegan Cosmetics Industry with High Technology

Pedro Rocha-Filho

ABSTRACT

Background: The cosmetic industry represents a worldwide market that over the last years has gone through an impressive and rapid growth, despite the global recession's adverse effects, which have deeply changed consumers' behavior towards the purchase of cosmetic products. Beauty is certainly, as recent studies showed, one of America's most profitable industries, just behind pharmaceuticals and software, and far above the average of all industries.

Methods: Despite this isolated market success, by the 1980s the use of green cosmetics was still limited mainly to the European market. The beauty industry is progressively going green and is moving toward an eco-friendly and ethical dimension. The cosmetic industry has been able to respond to changing consumers' preferences for chemical-free cosmetics formulas and to switch to natural, organic or vegan cosmetic compounds, which are replacing harmful synthetic substances throughout the entire supply chain.

Results and discussion: A cosmetic product shall mean any substance or mixture intended to be placed in contact with the various external parts of the human body (epidermis, hair system, nails, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance and/or correcting body odors and/or protecting them or keeping them in good condition. In these requirements there is nothing about natural or organic cosmetic products. Definition of natural cosmetic products obtained from ingredients of natural origin (plant, animal mineral), obtained by physical methods (pressing, extraction, filtration, distillation, drying), microbiological or enzymatic. Natural ingredients in cosmetics should not contain any contaminants that may endanger human health. This distinction would result in the definition of: - 100% natural products- with not a trace of synthetic or banned ingredients but only natural ingredients used; depending on the percentage of organic ingredients contained:- 100% organic- the product must contain only organically produced ingredients, with the exclusion of water and salt.

Conclusions: The aim of this search was to show how new cosmetic raw material can be obtained by use of high technology like plant stem cells culture, providing raw materials with high quality, preserving nature, providing sustainability and recycling of material, and, still, it reflects a niche of work for technicians and researchers.

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ABSTRACT 61

Methodological Approach for the Development of Herbal Products: Cuban Experiences

Milagros Tomasa Garcia Mesa

ABSTRACT

Background: Medicinal plants provide unlimited opportunities for new drug leads because of the unmatched availability and chemical diversity of bioactive principles from the plant kingdom leading to enormous possibilities for the development of standardized products with safety and efficacy that should be scientifically demonstrated.

Methods: The multifaceted approach for the development of phyto-medicines described in this presentation supported by the experience with a Cuban plant product with anti-platelet activity.

Results and discussion: The use of this multifaceted approach allowed the development of a phyto-medicine from a standardized sugarcane wax extract that was first studied for its hypocholesterolemic activity and subsequently demonstrated an antiplatelet effect in pre-clinical and clinical studies. Its safety and tolerability were also demonstrated thus given the opportunity for registration as a drug with the commercial name of Policosanol that is used in the practical medicine in Cuba.

Conclusions: This experience shows that despite the difficulties associated to the characteristic variability of plant products, it is possible to develop new options for the treatment of diseases whenever this work be organized as multidisciplinary projects with this objective.



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ABSTRACT 62

Anti-*Candida* Biofilm Activity by *Astronium urundeuva* Plant Extract

Bruna V. Bonifácio, Taissa Vieira Machado Vila, Flávio Alexandre Carvalho, Leonardo P. Souza, W. Vilegas, André G. dos Santos, J. L. Lopez-Ribot, T. M. Bauab

ABSTRACT

Most microorganisms are able to grow as biofilms and the resistance against anti-fungals has stimulated the search for new antimicrobials, such as plant extracts. *Astronium urundeuva* Engl. (Anacardiaceae) (Au) has antimicrobial property and was tested against *C. albicans* and *C. glabrata* biofilms under 2 different modalities (preformed and inhibition of biofilm formation). Previous studies showed ethyl gallate was one of the compounds of Au responsible for the activity against *C. glabrata*. The activity of the crude extract and ethyl gallate was evaluated using a 96-well micro-titer plate model of bio-film formation. For the activity against preformed bio-films, yeast cells were added to each well (1×10^6 cells/mL) in a flat-bottom micro-plate, incubated for 24h (37°C). Preformed bio-films were then washed with PBS, samples already diluted (1000-1.95 $\mu\text{g/mL}$) were added and the plates were incubated for an additional 24h. For the inhibition assay, samples were added and serially diluted (500-0.97 $\mu\text{g/mL}$) in the wells of micro-titer plates, the yeast suspension (1×10^6) was seeded and plates were incubated for 24h (37°C). Bio-films from both assays were washed with PBS and the XTT reduction assay was used to measure the metabolic activity. Plates were read by spectrophotometry (490nm). Interestingly the extract inhibited *C. albicans* bio-film formation at the same concentration (MIC₉₀ 125 $\mu\text{g/mL}$) that it inhibits planktonic cells. However, preformed *C. albicans* bio-films display high levels of resistance to the free extract (MIC₅₀ 1000 $\mu\text{g/mL}$). For *C. glabrata*, the extract was more active in the prevention of biofilm formation as compared to its activity against preformed bio-films. Ethyl gallate showed much less reduced activity against bio-films compared to its activity against planktonic cells of *C. glabrata*. Au extract displays promising antifungal activity and should be further investigated as an alternative therapy to treat bio-film-associated infections caused by *Candida* species.

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ABSTRACT 63

Biodiversity, a Source of Innovation and Inspiration

Cristiane de Moraes

ABSTRACT

With 7000 plant species consumed by humans as food and 17% used for medical purposes, cosmetics, food and pharmaceutical companies rely extensively on biodiversity to create new, innovative ingredients for their products. In the last ten years, there has been a growing awareness among businesses on the importance of biodiversity for product innovation, for assuring long-term access to natural raw materials, and for responding to a growing consumer interest in naturalness. Biodiversity is now firmly on the radar of the top beauty and food companies and the issue of ethical sourcing is steadily becoming a key element on the businesses' corporate agenda. Companies have consequently started to change their practices, paying increasing attention to the traceability of their natural ingredients, and promoting approaches that respect people and biodiversity along their supply chain where their social and environmental impact is the greatest. It is in this scenario that the Union for Ethical BioTrade (UEBT), a member-based non-profit association promotes sourcing practices that advance sustainable business growth, local development and biodiversity conservation. 'Sourcing with Respect' for people and biodiversity is our mission.