



IPPC 2021

## 12<sup>th</sup> International Phytocosmetics and Phytotherapy Congress IPPC 2021 Greece (Virtual)

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### ABSTRACT 1

# The anti-neoplastic use of the active substances of biological products based on the extract of basidiomycete fungi

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#### ABSTRACT

**Background:** It is known that cancer is one of the most common causes of morbidity and mortality in the world. The combination of recent research on different species of fungus and their effect on human health, as well as the folklore traditional uses, led us to investigate the use of the active substances of biological products, based on the extract of basidiomycete and its pharmacological action as anti-neoplastic.

**Materials and Methods:** Fungus rarely found in Greece, detected twice a year for a short period, was collected at the mature. They belong to the species basidiomycetes. Fresh extracts were prepared and used in in vitro and in vivo studies. The biological activity of the fungal substances was checked by in vitro tests with appropriate cell cultures and pathophysiological study. The biological activity of these was also tested in vivo, using rats, followed by pathological evaluation of the findings. Anti-cancer activity was also tested in Wistar rats inoculated with cancer cells (colon, breast, hepatocellular carcinoma, and leiomyosarcoma).

**Results:** The pathological examination in rats, revealed inhibition of chemical carcinogenesis, inhibition of metastasis in Vivo and enhancement of the cytotoxic action of natural killer cells. Different types of cancer, such as sarcoma, pancreatic neoplasm, melanoma, had positive outcomes after treatment with the extract. The cytotoxic activity of the extract was defined in tumor cell lines. Pathological findings in the experimental models that were sacrificed and necropsied showed the absence of the disease.

**Conclusion:** Fungi extract (basidiomycetes) have a pharmacological action as anti-neoplastic. The presented findings suggest that it could be the basis of medicine, while applications in clinical study are following.

**Keywords:** Cancer; Anti-proliferative; Basidiomycetes

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## ABSTRACT 2

### A regulatory science viewpoint on herbal medicinal products

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#### ABSTRACT

In recent years there is widespread use of Herbal Medicinal Products across Europe. While recognising the significant role of modern pharmacology and products of synthesis in controlling major diseases, we consider that even now there is a need and a place for herbal medicinal products in practice and as such, a better exploitation of their therapeutic potential is necessary. The scope of the research is to review, analyze and discuss herbal medicinal products Regulations and Directives in the European Union, the significance of these regulations, the reasons for the increasing use of herbal medicines during the last decade and the effectiveness of the legislation. Because of the patients right to choose their treatment and patients autonomy is important to provide them with sufficient information about herbal medicinal products.

Nowadays where thousands of herbal medicinal products are available worldwide as therapeutic agents, proof of safety and efficacy through an evidence-based approach is required, therefore, various challenges appeared which are also discussed and analyzed. According to EMA, various guidelines must be followed to safeguard safety, quality, and efficacy of herbal medicinal products and to secure consumers health. Moreover, three different types of application for herbal medicines marketing authorization are available.

In our study we review the main provisions of the European in order to establish a simplified registration procedure, and the criteria a traditional herbal medicine must fulfil. Additionally, because of the market growth and the huge number of natural products this create confusion to consumers between herbal medicinal products and other natural products (food supplements, homeopathy medicinal products), these differences between herbal medicinal products and the other natural products are also analyzed.

The European Union place herbal medicinal products under EU pharmaceutical legislation to guarantee the quality, safety, and efficacy of herbal medicines and to ensure those using herbal medicinal products that the products they are buying are safe and contain what they are claimed to. Some gaps were identified especially on the way some products are marketed and advertised. Therefore, more research is needed in the field of herbal medicines with new scientific techniques, methods and legal tools for the benefit of the consumers.

**Keywords:** Herbal medicinal products; Directives; Regulations; Traditional use; Well-established use; Herbal medicinal product monograph

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## ABSTRACT 3

### Development and evaluation of the physicochemical stability of a cosmetic emulsion containing rosewood (*Aniba rosaeodora*) essential oil

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#### ABSTRACT

**Background:** Essential oils are mixtures of complex substances, present in aromatic and medicinal plants, which present therapeutic action. The species *Aniba rosaeodora* (Lauraceae), has an essential oil of wood aroma, being of notorious characteristic, attributed to its major compound linalool, with fungicide and bactericidal applicability, along with analgesic and anti-inflammatory activities. Thus, the present study aimed to evaluate the antimicrobial activity of rosewood essential oil, as well as to formulate and evaluate the physicochemical stability of a cosmetic emulsion from rosewood essential oil (REO) that present antimicrobial activity.

**Materials and Methods:** Three formulations of O/W emulsion were developed, in triplicate, through mechanical agitation: (F1) blank (without antimicrobial agent); (F2) REO; and (F3) levofloxacin (standard antimicrobial agent). Preliminary stability was evaluated by thermal stress, freezing-defrost cycle, sun exposure and light protection. Organoleptic characteristics, pH, relative density, conductivity, electrical resistivity and dynamic viscosity were evaluated. The antimicrobial activity was determined by the microplate dilution technique for REO and emulsions. Antimicrobial activity was evaluated against *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Staphylococcus epidermidis*, *Streptococcus pneumoniae*, *Proteus mirabilis*, *Enterococcus faecalis*, *Salmonella enteric*, *Serratia marcescens*, *Bacillus subtilis*, *Candida albicans*, *Candida parapsilosis* and *Aspergillus brasiliensis*. Statistical analysis was carried out using Tukey test ( $P > 0.05$ ).

**Results:** The formulations containing REO showed a characteristic odor of the plant, without color change, even after the stability tests. There was no significant difference ( $P > 0.05$ ) between the pH values of the emulsions F1 (3.28) and F2 (3.94), after the stability tests. The formulation F3 showed a pH increase, from 3.92 to 5.49, after the freeze-defrost cycle. The conductivity of the 3 formulations increased after thermal stress, as well as the electrical resistivity after the freezing-defrost cycle. The values of dynamic viscosity, after thermal stress, showed a significant decrease, ranging from 916.95 and 2100.0 mPa.s. The REO showed activity against all microbial strains evaluated, with minimum inhibition concentration (MIC) ranging from 0.62 to 5.00 mg/mL. The emulsion F3 (control) presented MIC of 40.00 mg/mL against all bacteria evaluated, except *S. aureus*. Emulsion F2 showed activity against *P. aeruginosa*, *S. epidermidis*, *B. subtilis* and *C. parapsilosis* (MIC between 10.00 and 40.00 mg/mL).

**Conclusion:** The REO showed a broad-spectrum antibacterial activity, and the emulsion containing REO inhibited four pathogenic strains. The formulations presented minor modifications in their physicochemical parameters after the stability tests and need further investigation. Therefore, it was verified the potential of using the REO in topical cosmetic formulations with antimicrobial activity.

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## ABSTRACT 4

# The Ancestral Human Diet: Misconceptions and Lessons for the Health and Nutrition Industry

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### ABSTRACT

What is an ancestral human diet? Does understanding what human ancestors ate tell us how we should nourish our bodies today? This review gives a broad characterization human diets around the world prior to colonization, widespread globalization, and the industrialization of food. Then, it explores how dispelling myths and building awareness of the ancestral human diet might advance health, nutrition, and industry science.

**Keywords:** Anthropology; Ancestral diet; Food history

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## ABSTRACT 5

### Potassium sorbate as an alternative to paraben-based preservative blend in creams containing plant extracts

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#### ABSTRACT

**Background:** Alkyl esters of 4-hydroxybenzoic acid, known as parabens, are the commonly used cosmetic preservatives. However, recent studies indicated that they could potentially interfere with the functioning of the endocrine system. Sorbic acid and its potassium salt are alternatives to parabens and their application is well-established in the cosmetic industry. Originally extracted from rowan berries (*Sorbus aucuparia* L., Rosaceae), although nowadays it is synthetically produced. The aim of our study was to compare the influence of paraben-based preservative blend (Gujsol-1®) and potassium sorbate on the stability of cream containing plant extracts.

**Materials and Methods:** In the model emulsion (O/W) of the same composition (Aqua, Propylene Glycol, Glycerol Stearate, Caprylic/Capric Triglyceride, Persea Gratissima Oil, Butyrospermum Parkii (Shea Butter), Hydrolyzed Elastin, Cetareth-20, Cetareth-12, Cetaryl Alcohol, Cetyl Palmitate, Calendula Officinalis Extract, Rosa Canina Fruit Extract, Hexylene Glycol, Fructose, Glucose, Sucrose, Urea, Dextrin, Alanine, Glutamic Acid, Aspartic Acid, Hexyl Nicotinate, Dimethicone, Tocopheryl Acetate, Ethylhexyl Methoxycinnamate, Butyl Methoxydibenzoylmethane, Ethylhexyl Salicylate, Disodium EDTA, Parfum) Gujsol-1® (Phenoxyethanol, Methylparaben, Ethylparaben, Propylparaben, Butylparaben; 1 %) – **cream A** and potassium sorbate (0.6 %) – **cream B** were incorporated as preservatives. Samples were subjected to 6 freeze-thaw cycles (accelerated stability test) consisting of 40 °C/24 h; 25 °C/24 h and 4 °C/24 h.

**Results:** Creams A and B were evaluated (organoleptic quality, pH, and centrifugation tests) after preparation and after 6 freeze-thaw cycles. Furthermore, the microbiological stability of the creams was investigated. Immediately after processing, creams A and B were white, soft, and homogenous, as well as after accelerated stability testing. Moreover, no phase separation was observed after the centrifugation test (3000 rpm for 30 minutes) in both formulations immediately after processing and after accelerated stability testing. The pH value (5.11 and 6, respectively) of creams A and B were close to the neutral pH of human skin. Furthermore, the pH of creams A and B was stable after accelerated stability testing (5.31 and 5.99, respectively). Microbiological assays (total mesophilic counts, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, *Candida albicans*) have shown that creams A and B were stable during storage.

**Conclusion:** Therefore, it can be concluded that potassium sorbate could be an efficient alternative to paraben-based preservatives such as Gujsol-1® in the cream containing plant extracts. Further studies are needed in order to estimate the efficacy of potassium sorbate and Gujsol-1® during challenge test and real-time stability studies.

**Keywords:** Preservatives; Parabens; Potassium sorbate; Accelerated stability testing; Cream

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## ABSTRACT 6

### Ancestral foods, preparations, and health within sustainable food systems

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#### ABSTRACT

**Background:** There are many ancient civilizations in the world that established our food systems and food culture. Globally we have advanced with the most significant achievements in feeding and healing our inhabitants. However, with these advances, we have missed building upon what was already working. There is overwhelming evidence that the foods we eat and how we prepare them can cause damage to our health. However, this was not a humanity issue around 200 years ago. Back then, we were more worried about providing enough food to feed our growing populations. In a rush to produce, sell and distribute food for all, we as humans have damaged hardly our environment so much that we are in the Anthropocene era with just a few decades to reverse the damage for the health of ourselves and our planet. Surrounded by this chaos, there are traditional and indigenous communities trying to safeguard these plants, seeds and food preparations that have healed our communities by centuries where health services and sanitation were not available. One example is the ancient Mayans; they were one of the earliest and influential civilizations globally. They behold a traditional healthcare system that attends to the Guatemalan and Honduran populations where the healthcare system is fragmented and difficult to access. These practices include a holistic Indigenous healthcare model that encompasses energy healing with plant-based preparations, mesotherapy, chiropractic, midwifery, and other specialties. Most impoverished populations from Low- and Middle-Income Countries coexist with a mix of a traditional and occidental healthcare system. However, the traditional healthcare system usually attracts more people because three main reasons: 1) there is no universal coverage of the national health systems; 2) the traditional healthcare system is caring, and people feel more comfortable in the approach to their health needs; 3) uses the ancient foods and plants that they have available in their local communities surrounded by nature.

We conducted a scoping review that aims to identify knowledge gaps in existing healthcare systems for Indigenous people and critical characteristics suitable for a holistic Indigenous healthcare model for the intervention of NCDs, stunting, and COVID-19 (SARS CoV-2) in low-resource settings.

**Materials and Methods:** Peer-reviewed articles and grey literature were searched through PubMed/Medline, CINAHL, Google Scholar, University of Saskatchewan's library U-search (Primo bu Ex Libris). Grey literature was also identified from known researchers, government and non-government organizations, and associations for the indigenous population. Data were extracted and synthesized using a narrative approach. We also included interviews with traditional healers and health professionals working mingled with conventional practices. We obtained ethics approval from the University of Saskatchewan BEH312.

**Results:** In the scoping review, a total of seventeen articles met the inclusion criteria. After data extraction

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and synthesis, nine key characteristics were identified for the indigenous healthcare model, which is culture; health strategies and policy, advocacy, collaboration, research, community engagement, health education and empowerment; primary healthcare and social service, traditional medicine, healing and holistic care, cost-effective care, the role of community health workers and allied health professionals, and mobile technology. The most prominent feature is culture for developing a holistic healthcare model. We found valuable examples of traditional foods with the healing of preventing properties.

**Conclusion:** the cultural and traditional deification of health and disease as well as the ways for seeking treatment cannot be ignored. Currently, there are efforts to bridge traditional health beliefs and practices and dominant biomedical system and implement public policies to assure the notion of traditional health practice and culture are taken into account in a holistic way of providing healthcare services.

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## ABSTRACT 7

### Hydro-distillation and microwave-assisted distillation of *Angelica archangelica* root: Comparison of the composition of the essential oil and hydrolate

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#### ABSTRACT

**Background:** Essential oils from aromatic medicinal plants have been known to possess different biological activities, such as antibacterial, antifungal and antioxidant. The use of essential oils in the pharmaceutical, cosmetic, and food industries has become increasingly important. Essential oils obtained from *Angelica* species have been used for the treatment of various health problems. Anti-inflammatory, antimicrobial and antioxidant activities have been reported for this oil. Extraction techniques, used to obtain essential oils from plants, also generate commercially important hydrolats, also known as hydrosols or floral waters. Hydrolats contain water soluble aromatic compounds from essential oil and other plant volatiles that remain dissolved in the H<sub>2</sub>O phase. It is significant to know hydrolats composition, because these products might become new valuable raw materials for the cosmetic industry. The aim of our study was to highlight the effect of classical hydro-distillation (HD) and microwave-assisted hydro-distillation (MAHD) at different power levels on the chemical composition of the *Angelica archangelica* root essential oils and hydrolats.

**Materials and Methods:** Essential oils and hydrolats were analysed by gas chromatography and gas chromatography-mass spectrometry.

**Results:** The main components of the *A. archangelica* root essential oils were elemicin (23.42% for HD and from 52.40 to 53.33% for MAHD) and methyl eugenol (6.24% for HD and from 5.72 to 11.67% for MAHD). If considering only the main volatiles identified in the root hydrolats, their chemical profiles were comparable to those of the corresponding root oil (elemicin - 67.05% for HD and from 85.06 to 87.90% for MAHD; methyl eugenol - 6.11% for HD and from 8.03 to 10.52% for MAHD).

**Conclusion:** It can be concluded that MAHD is more appropriate extraction technique for *A. archangelica* root essential oil and hydrolat than HD with respect to the concentration of elemicin and methyl eugenol.

**Keywords:** *Angelica archangelica*; Microwave assisted hydro-distillation; Essential oil; Hydrolate

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## ABSTRACT 8

### *Caenorhabditis elegans* Survival Assay under Heat Stress

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#### ABSTRACT

Wild type strain (N2) of *C. elegans* was obtained from *Caenorhabditis* Genetics Center (CGC). Worms were maintained using standard protocols at room temperature (1). Nematode Growth Medium (NGM) was prepared to provide a living environment for worms using agar (Multicell) 17 g/L; NaCl (Carlo Erba) 3 g/L; peptone (Multicell) 2.5 g/L; 1 M MgSO<sub>4</sub>·7H<sub>2</sub>O (Merck) 1 mL/L; 1 M CaCl<sub>2</sub> 2H<sub>2</sub>O (Merck) 1 mL/L; 5 mg/mL cholesterol (Sigma-Aldrich) in ethanol 1 mL/L; 1 M KPO<sub>4</sub> buffer (Sigma) 25 mL/L; 100 µg/mL penicillin-streptomycin (Multicell, WISENT INC.) 1 mL/L and poured aseptically into petri dishes. After that, the plates were seeded with heat-killed *E. coli* culture (OP50-1 strain) in LB Broth to feed the nematodes. The extract mixture was added in *E. coli* culture for experimental groups, and for the control group, a blank mixture was prepared (2). The tests were performed on age-matched, healthy, uncontaminated worm populations (3). Obtaining synchronized worms is possible after treating worms and eggs together with bleach (5% sodium hypochlorite solution). Because worms lose their physical integrity when treated with it, but at the same time, the eggshell protects embryos from it. After obtaining eggs, they were transferred to a clean NGM plate with *E. coli* lawn. Eggs were followed as they hatch and grow until the L4 stage. Synchronized worms were transferred to fresh NGM plates with extracts-mixed and blank *E. coli* lawn to initiate the exposures. For each condition, triple plates were prepared. Worms were left for 24 hours of exposure at room temperature. After that, all plates were transferred to a pre-heated incubator at 35°C. Their images were captured every 20 minutes with a high-resolution scanner (Epson Perfection, V800 Photo) till every worm dies. The worms were accepted as dead when they are not moving in two consecutive scans.

Survival analysis:

Survival analysis was performed by using OASIS, an online application (5).

**Results:** Glycerin, the solvent of the extracts, was used as the control group. A combination of 0.1% pine and grape seed was compared against glycerin. The graph of life span versus survival time has been examined. It has been observed that the result has a significant positive effect on the life span of worms. However, when the concentration of combination has increased two times and with single use of extracts, there is no positive contribution to the lifespan observed.

**Keywords:** *Caenorhabditis elegans*; Beach pine extracts; Grape seed extracts; Antioxidant activity; Phytocosmetics

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## ABSTRACT 9

# Medicinal Plants And Phytoproducts As A Supplement To The Nutritional Regimen For Immunostimulation

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### ABSTRACT

The use of medicinal plants and plant products is one of the most widespread therapies of complementary and alternative medicine worldwide. In many countries there has been a long-lasting tradition related to the utilization and the knowledge about the traditional medicinal plants, which are also part of the cultural history.

In this article we have presented the results from a study on the use of medicinal plants which have been proven to have an antimicrobial and antiviral effect as a supplement to the diet for immunostimulation.

This study is intended for specialists in the sphere of nutrition and provides information about the following: their knowledge about the medicinal plants, the appropriate season for immunostimulation, the suitable form of use, the attitudes and the impediments preventing the execution of the activity. In this study we focus on the rational and legal use of traditional medicinal plants applied in the nutritional regimen in different forms in order to ensure a better quality of life.

**Keywords:** Medicinal plants; Immunity; Diet; Echinacea; Elderberry; Children

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## ABSTRACT 10

### Contributions and approaches in Ethnobotany, Food and Nutrition studies in the conservation of indigenous collective intellectual property in Guatemala

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#### ABSTRACT

**Background:** This conference examines different approaches in ethnobotanical, nutritional and food studies in Guatemala in terms of conceptual and theoretical focus, analytical tools and important debates related to the intellectual property and cultural rights of the Mayan population.

**Materials and Methods:** In this work, four approaches were analyzed: a) research that examines public policy on indigenous intellectual and cultural property related to native knowledge in ethnobotany and medicine; b) cultural studies focused on the analysis of the national food pattern and its impact in Mayan communities and knowledge keepers; c) research from a nutritional perspective, studying food consumption and its relationship with the nutritional status of the Mayan population. d) the contribution of anthropological and nutritional research as a tool for the promotion of indigenous collective rights and the conservation of their ancestral knowledge.

**Keywords:** Intellectual and collective property of indigenous peoples; Native knowledge, Public policy; Mayan culture; Food culture

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## ABSTRACT 11

### Extraction of lemon verbena essential oil (*Cymbopogon citratus* (DC) Stapf) and evaluation of antimicrobial and antifungal activity in antibacterial alcohol-gel

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#### ABSTRACT

**Background:** The lemon verbena (*Cymbopogon citratus* (DC) Stapf) is cultivated in Ecuador, has wide medicinal use and contains essential oil used in cosmetic products. The objective of the work was to extract, determine the physical properties, determine the composition of representative secondary metabolites of the essential oil, and prepare antibacterial alcohol-gel. Finally, to determine the antibacterial efficacy of the alcohol-gel with lemon verbena essence.

**Materials and methods:** The leaves of lemon verbena were collected in the Milpe de Los Bancos Botanical Garden, and for the extraction of essential oil by the method of water vapor entrainment. Separating the essential oil, the yield, appearance, color, odor, flavor and density were determined, which are the organoleptic characteristics of each essential oil. (Sharapin 2000, 1976, Martini 2003) The presence of representative secondary metabolites is established by thin layer chromatography. (Blader 1997, UTPL, Del Pozo) An antibacterial alcohol-gel was elaborated with the addition of lemon verbena essential oil. For the efficacy evaluation, mass seeding was applied in PCA medium for bacteria and Saboraud for fungi of the smear with a 1% peptone solution swab of unwashed hands. Then the alcohol-gel was applied to the hands and left to act for 5 minutes, then samples were taken from the hands by rubbing with swabs moistened in 1% peptone water, and sowing was carried out in other petri dishes with PCA and Saboraud Agar maintaining the PCA in an oven at 20°C for 72 hours. The Saboraud medium is kept at 23°C for 120 hours to count the CFU (colony forming units) in the two processes. (Range 2000)

**Results and Discussion:** The method of dragging water vapor is effective for the extraction of essential oil from the leaves of Lemon grass. This method has a yield of 0.08%, the oil has the appearance of an oily liquid, a transparent yellow color, the smell of lemon, bitter taste, density 0.567g / ml. similar to lemon verbena oil from Loja. The thin layer chromatography indicates the presence of Myrcene, neral, geranial, geraniol as representative secondary metabolites, all these compounds confer antimicrobial properties to the Lemon grass. It can be corroborated with several studies carried out for Lemon grass. (6)

For the effectiveness of the gel with the addition of Lemongrass essential oil, counts of the bacterial population (UCF / hands) were obtained in each treatment, a high bacterial growth of the hand smear without applying gel (around 3000 CFU) and with Gel application showed a decrease in bacterial growth, with an average reduction of 1.18E10 CFU corresponding to 72%, and for fungi with excellent results in a decrease of 100%. (7)

**Conclusion:** The antibacterial gel with lemon verbena essential oil has excellent results as an antimicrobial, due to its chemical compounds myrcene, neral, geranial, geraniol, it does not cause an allergic reaction to the skin. Taking advantage of the plant's properties justifies its use as a mosquito repellent, keeping slugs away from orchids, to cure athlete's foot, these are traditional uses in Ecuador by the empiricists.

**Keywords:** *Cymbopogon citratus*; Essence; Antibacterial; Alcohol-gel

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## ABSTRACT 12

### Functional Food and Nutrition

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#### ABSTRACT

**Background:** The traditional belief that a daily diet must provide the right balance of essential nutrients to maintain optimal health, has changed over past years. Now it's known that certain foods can provide physiological active compounds that, as with essential nutrients, have benefits and reduce the incidence of several chronic illnesses, they are as important as essential nutrients on a healthy diet. A plant-based diet has the potential to reduce the risk of chronic illnesses, the impact of having a diet high in fruits and vegetables is the reduction in risk of cancer and metabolic syndrome related diseases. Besides the traditional ingredients we are usually interested in (fiber, carbohydrates, protein or fats), a high intake of fruits and vegetables shows that there are other food compounds that contribute to the reduction of several diseases. Consumers are really interested in optimal diets to keep good health, to have longer life span, they have less trust on "processed food" and an increased interest in natural food markets or "clean eating" diets. There's a change in food technologies as well, there's an increasing market on functional foods or "designed foods" Vegetal source is the main origin of these compounds or phytochemicals, but also probiotics, prebiotics and other supplements which play an important role on functional foods and functional nutrition. These non-nutritive compounds in functional foods do not contribute to energy intake, but are the interest of studies in the formulation of new products that benefit overall health.

As consumers become aware of their health and benefits of healthy eating to prevent diseases, there's been an increase in the development of functional nutrition/food. There's no specific definition or consensus about what exactly is the definition of a functional food. Functional foods are health promoting foods, they have a physiological effect beyond their basic or traditional nutritional value. Magazine articles, news reports and scientific journals report the benefits of "functional foods" which claim they can do everything. It is common to find plenty of foods and beverages with a list of health claims on their labels. One of the last suggestions of a commonly agreed definition was presented by the Functional Food Center: Natural or processed foods that contain known or unknown biologically active compounds, which, in defined, effective, and non-toxic amounts, provide a clinically proven and documented health benefit for the prevention, management or treatment of chronic diseases. (Gur, Mawuntu, & Martirosyan, 2018)

Based on these definitions, most foods are functional in general. Food fortification can also be part of a healthy eating plan. Some fortified foods provide nutrients that might be low on its natural or unfortified form.

**Diet trends:** A healthy eating lifestyle should include a variety of foods from each food group, is it recommended to cut food groups such as carbohydrates or fats? It's important to meet nutrient needs and reduce the risk of chronic diseases through a healthy and complete diet, focusing on fruits, vegetables, whole grains, lean protein and healthy fats; including most food groups assures an optimal functional nutrition.

**Guatemalan Functional Foods under the scope:** Chaya, amaranthus, avocado, chia seeds, a variety of chilis and a diversity of native plants have provided the Mayans with great source of nutrients in ancient times. With the recent trend of fast food, occidental-diet introduction and a food shift from traditional cuisine to processed food consumption, these native foods, as part of everyday cooking, are being forgotten. The quality and potential synergy of the functional compounds found on these local functional foods could be the solution to many nutritional and public health problems.

**Keywords:** Healthy diet trends; Healthy diet; Functional nutrition; Functional food; Nutrition

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## ABSTRACT 13

### Implementation of Clinical aromatherapy in oncology EHU Oran experience

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#### ABSTRACT

**Background:** Highly concentrated in active molecules, Essential Oils "EOs" are products endowed with a therapeutic activity described according to multiple indications but remaining poorly known to prescribing clinicians. Scientific and medical aromatherapy is a branch of herbal medicine which uses the therapeutic potential of essential oils. We recently started the integration of essential oils within the hospital for the first time in Algeria and this by formulating a disinfectant solution based on essential oils and olfactory sticks in complementary prevention of COVID 19 , afterwards we wanted to extend this use to other services namely the medical oncology service of the 1st November hospital center . The aim of the project is to integrate Clinical aromatherapy at the palliative care to alleviate chemo-induced adverse effects such as nausea and vomiting, stress, anxiety and sleep quality.

**Materials and Methods:** For the implementation of this practice, it is necessary to have EOs which meet the criteria of hospital quality as well as devices and materials allowing the use of this therapy.

**Discussion:** As for drugs, the rules of good use of scientific aromatherapy are based on knowledge of the therapeutic properties of EOs, their methods of manufacture, dispensing, dosages prescribed wisely and methods of information, education and monitoring of patients who benefit from it. The main symptoms targeted by aromatic treatments are nausea and chemo-induced vomiting. Essential oils can be used to stimulate hair regrowth at the end of chemotherapy treatment. The olfaction and skin application practices are described in several feedbacks allowing to observe a decrease in the consumption of anxiolytics and antiemetics. Aromatherapy is also used to support psycho-emotional disorders (anxiety, stress, sleep disorders) etc. Patients under palliative care have complex profiles for which additional management and the use of EO can benefit daily practice.

**Conclusion:** The therapeutic use of EOs can meet the usual hospital criteria in terms of effectiveness, adequacy with current treatments, individualization of care and economy.

**Keywords:** Aromatherapy; Essential oils; Oncology

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## ABSTRACT 14

### HPTLC characterization and investigation on the phenolic profile, and antioxidant potential of *Sideritis lanata* L. infusion and hydroalcoholic extract

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#### ABSTRACT

**Background:** Since oxidative damage is a major reason for various diseases, protecting the body against free radicals is crucial. Phenolic ingredients of the plants are responsible for the utilization of herbal remedies as an antioxidant. *Sideritis* spp. are extensively consumed as herbal tea and used as a remedy in traditional medicine in Turkey. There are numerous studies related with the *Sideritis* spp. however studies related with *S. lanata* are very scarce. Accordingly, this study was designed to assess the antioxidant potentials, phenolic compositions and HPTLC fingerprints of hydroalcoholic extract and infusion.

**Materials and Methods:** The infusion and 80% ethanolic extract were prepared from the flowering aerial parts of *S. lanata* which is collected from northwestern region of Turkey. Antioxidant potentials of the samples were investigated by different antioxidant assays such as metal reducing (FRAP, CUPRAC, and total antioxidant capacity tests) and free radical scavenging tests (DPPH). In order to evaluate the phenolic composition total phenolic, phenolic acid, and flavonoid contents were measured spectrophotometrically. High performance thin layer chromatography (HPTLC) was used to measure major bioactive metabolites luteolin, luteolin-7-*O*-glucoside and chlorogenic acid.

**Results:** Results indicated that antioxidant potentials and chemical compositions were highly influenced from extraction type. Antioxidant activity was about twice in ethanolic extract compared with infusion. The IC<sub>50</sub> values for DPPH assay were calculated as 3286.48 and 1432.30 µg/ml with comparison of BHT for ethanolic extract and infusion, respectively. The ratio were similar in CUPRAC, FRAP and TOAC assays. Phenolic contents were consistent with the antioxidant activities. Thus, total phenolic, flavonoid and phenolic acid contents were measured as 194.32 ± 3.44 mg (GAE)/g, 55.46 ± 0.98 mg (QE)/g, 108.36 ± 6.40 mg (CAE)/g for ethanolic extract, and 148.73 ± 2.27 mg (GAE)/g, 25.49 ± 0.75 mg (QE)/g, 32.03 ± 3.80 mg (CAE)/g for infusion, respectively. Quantitative analysis of major bioactive compounds was practiced by employing HPTLC system. This test also verified the previous results regarding the phenolic composition. Luteolin, luteolin-7-*O*-glucoside and chlorogenic acid were respectively calculated as 0.4672%, 9.19% and 3.2255% (w/w) in ethanolic extract, whereas 0.1182%, 4.5895% and 2.286% in infusion.

**Discussion:** Herein, we evaluated HPTLC findings, chemical compositions and the antioxidant activities of *S. lanata* infusion and hydroalcoholic extract for the first time. Results supported the folkloric utilization of *Sideritis* spp. However, results also showed that hydroalcoholic extract is remarkably prosperous in terms of phenolics, with significantly higher antioxidant potential.

**Keywords:** *Sideritis lanata*; Antioxidant; Phytochemistry; HPTLC; Chlorogenic acid

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## ABSTRACT 15

# Evaluation Of Cytotoxicity And Genotoxicity Of Geraniol In Association With Nanoparticles And Hydrogel For Repellents

**Carolina Barbara Rogerio, Daniele Carvalho Abrantes, Taís Germano da Costa, Renta de Lima, Leonardo Fraceto**

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### ABSTRACT

**Background:** *Aedes aegypti* is the main vector of diseases caused by Arbovirus. In recent years, Zika and Chikungunya appeared such new arboviruses globally. It's warning of possible epidemics due to expansion concurrently with the pre-existing arboviruses of dengue and yellow fever. Research estimates that by 2050 more than half of the world's population will be at risk of contracting an arbovirus disease. Therefore, repellent helps to action against transmission of arboviruses. Aiming at the development of a repellent based on extended release systems, zein nanoparticles were prepared containing the geraniol which were later incorporated into a matrix of cellulose gels.

**Materials and Methods:** The nanoparticles were prepared by the anti-solvent methodology, and the hydrogels by high-speed homogenizer method. For characterization, the mean diameter and the polydispersity index (PDI) were evaluated by the technique of dynamic light scattering (DLS), and the potential zeta (PZ) by microelectrophoresis. In addition, the encapsulation efficiency (EE) by the centrifugation/ultrafiltration technique and release assay in vitro of actives compound in each of the formulations were evaluated. It is emphasized that the physicochemical parameters were monitored over the time. The toxicity study was performed with the methods of cell viability by mitochondrial activity (MTT) and genotoxicity from the Comet assay on human keratinocytes (HaCaT) cell line.

**Results:** The characterization of the nanoparticles showed diameter of  $224 \pm 4$  nm, PDI  $0.405 \pm 0.15$  and PZ  $39 \pm 1$ . The encapsulation efficiency rates are higher than 98%. The release studies showed a sustained release profile for the active ingredient. Also, the cytotoxicity assays in HaCaT cell culture showed low toxicity compared to the active ingredient.

**Conclusion:** Such results open perspectives for the evaluation of the repellent activity of these systems with the potential to promote prolonged protection associated with decreased toxicity.

**Keywords:** Geraniol; Nanoparticles; Insect repellents

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## ABSTRACT 16

### Phytochemical constituents and vascular protective effect of active fraction from aqueous extract of *Bixa orellana* leaf

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#### ABSTRACT

**Background:** Vascular endothelium plays an important role in regulating vascular homeostasis. Retraction of the endothelial junctions contribute to endothelial hyperpermeability. Numerous physiologic and pathophysiologic stimuli induce changes in endothelial permeability where it leads to excessive leakage of fluid and proteins from blood vessels, this eventually result in multi-organ dysfunction. Previous study documented that aqueous extract of *Bixa orellana* leaves exhibited vascular protective effect in vitro and in vivo. Due to this, current study aimed to further determine the active fraction from the extract and its possible vascular protective activity.

**Materials and Methods:** Aqueous extract of *B. orellana* leaf extract was fractionated and the active fraction was determined via nitric oxide (NO) assay in vitro. Then, the active fraction was further analyzed by gas chromatography-mass spectrometry (GC-MS) method. Vascular endothelial protective property of the active fraction was examined via an in vitro endothelial permeability where human umbilical veins endothelial cell (HUVEC) was pre-treated with the active fraction with concentration 0.05 – 0.2 mg/ml then only challenged with histamine. Flux of FITC-dextran was used as permeability indicator. In order to elucidate the possible mechanism of action, NO-cGMP (cyclic guanosine monophosphate) signaling pathway and protein kinase C (PKC) activity were examined.

**Results:** HUVEC pre-treated with active fraction significantly ( $P < 0.05$ ) attenuated the histamine-induced hyperpermeability in all concentrations, particularly 0.2 mg/ml of the active fraction significantly suppressed up to 95%. NO production was increased by histamine from  $8.65 \pm 0.67 \mu\text{M}$  to  $12.51 \pm 0.88 \mu\text{M}$  but was significantly reduced by the active fraction where 0.1 and 0.2 mg/ml showed comparable effect with reference drug, L-NAME which was approximately 70%. On top of that, 0.1 and 0.2 mg/ml of active fraction significantly inhibited the level of cGMP with percentage inhibition 57% and 75%, respectively. Moreover, active fraction also found to significantly reduced PKC activity induced by histamine in HUVEC compared to histamine alone. Through GC-MS analysis, it revealed 10 known compounds where the major compound found in the active fraction known as 2-propanamine,2-methyl.

**Conclusion:** Taken all the data together, it is suggesting that active fraction from the aqueous extract of *B. orellana* leaf exhibited vascular protective effect against histamine. This effect is associated with the suppression of NO-cGMP signaling pathway as well as PKC activity.

**Keywords:** Endothelial permeability; Histamine; Inflammation; Vascular biology

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## ABSTRACT 17

### Natural products and gut microbiota crosstalk, when the expectations fail

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#### ABSTRACT

**Background:** Gut microbiota is generally recognized as a crucial frontier in understanding the therapeutic mechanism of phytochemicals. The interplay between microbiota and phytochemicals includes (a) phytochemicals' biotransformation by gut microbiota into metabolites that possess different bioavailability and bioactivity/toxicity from their precursors; (b) mediation of the interactions (synergistic and antagonistic) between the multiple phytochemicals; (c) modulation of the composition of gut microbiota from the phytochemicals ameliorating its dysfunction as microbial enzymes are influenced by the phytoconstituents; (d) modification of the functionality of the gut microbiota, as their enzymes can be affected by the nutritional milieu of the gastrointestinal tract, therefore by phytochemicals and their metabolites (e) interference between natural products' metabolism and microbial metabolites. In recent years, the development of state-of-the-art methods used for microbiome research as well as the numbers of studies performed in this field have been virtually exploding. Despite the rapid growth of this area of research, it is admitted that still remains in its infancy.

**Results:** A systematic review on the way phytochemicals interact with gut microbiota has revealed why research expectations raised often fail and has highlighted certain drawbacks and limitations that should be considered for the design of future studies. The complexity and heterogeneity of any particular microbiota phenotype in the population has been identified as a major obstacle to understand the complete picture of mechanisms. Furthermore, there is a huge heterogeneity in bacterial populations between and within animal models and patient/healthy populations that it is still not possible to state with certainty what is normal in any given population while most human studies, based on faecal samples' analysis, disregard variations occurring in bacterial populations along the length of the gastrointestinal tract. Impressive and clear-cut results in simplified models of human disease in mice and rats do not necessarily translate to man. The most common observation regarding the phytoconstituents is that most fractions and pure compounds are usually analyzed without considering the bioavailability and chemistry of them in the colon. Another arising limitation is the vast number of different methodological approaches and experimental protocols that are in use, because the generated results are extremely difficult to be compared and reproduced and finally give meaningful information on a taxonomic as well as on a functional level. Last but not least, most studies are single point in time, rather than longitudinal, and therefore it is impossible to account possible fluctuations in disease activity or any confounding impact of therapy.

**Keywords:** Research limitations; Mechanisms; Phytochemicals; Natural products; Gut microbiota

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## ABSTRACT 18

### The temporal effect on the metabolomic profiles of *Dodonaea viscosa* var. *angustifolia* and medicinal storage potential thereof

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#### ABSTRACT

**Background:** The traditional medicinal plant *Dodonaea viscosa* var. *angustifolia* contains numerous secondary metabolites, which has been used for centuries for its medicinal value. It is well known that plant metabolites are influenced by environmental conditions and genetic constituents. The aim of this study was to determine if chemical variation occurred between localities in the Western Cape (Cederberg, De Hoop and Stellenbosch) across various years and to compare variation in tentatively identified medicinal biomarker compounds. The potential for *D. viscosa* var. *angustifolia* to maintain its phytochemical composition during post-harvest storage was also studied by comparing different population years ability to inhibit the growth of various cancer cell lines.

**Materials and Methods:** The leaf samples were gathered from the years 2015, 2017 and 2019 from each locality for the yearly comparison. For the antiproliferation potential of stored samples, plant material gathered from Stellenbosch in the year 2010, 2013 and 2014 was compared with each other. The phytochemical analysis of the methanol plant extracts was performed using liquid chromatography mass spectrometry (LC-MS). A semi-targeted and untargeted chemometrics approach was used.

**Results:** A total of 27 compounds were tentatively identified of which 6 were known to have medicinal value. The medicinal compounds comprised of 5, 7, 4'-trihydroxy-3, 6-dimethoxyflavone, dodonic acid, hautriwaic acid lactone, pinocembrin, rhamnocitrin and santin. It was found that majority of medicinal compounds did not differ significantly between the years. The main trend indicated by the principal component analysis was that the populations from 2019 were chemically distinct from the 2015 and 2017 groups. The year 2015 and 2017 were periods in which these populations experienced extreme drought conditions, suggesting that drought conditions can have a substantial effect on the phytochemical production of *D. viscosa* var. *angustifolia*. The chemical profiles of the *D. viscosa* var. *angustifolia* samples placed in storage were robust in maintaining the key metabolites assessed in this study. All the plant extracts had anticancer potential especially against the DU-145 cell line, but this was found to be a dose dependent effect. The test extracts at different concentrations showed selectivity in terms of their anticancer response with the HCC-1396 line being more resistant to the botanical extracts tested in this study.

**Conclusion:** It is also clear that the post-harvest storage of dried leaf foliage from wild *D. viscosa* preserves the integrity of the materials tested in this study, as even phytoextracts generated from plants that were close to 10 years old still exhibited bioactivity.

**Keywords:** Cytotoxicity phytochemistry; *Dodonaea viscosa* var. *angustifolia*; Liquid chromatography mass spectrometry; Phytochemistry; Principal component analysis

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## ABSTRACT 19

### Aromatherapy in hospital care in France

**Catherine Maranzana**

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#### ABSTRACT

**Background:** Improving patient care is a never-ending search for new caring services. Patients, families, and helpers are increasingly seeking complementary approaches that allow them to improve certain allopathic limits or improve the experience of illness and/or hospitalization. Desirous to answer a real demand and recurring problems, Colmar's Civil Hospitals have engaged in a true reflection on this integrative approach. They have been integrating aromatherapy into care for more than 12 years, thus strengthening the long-standing range of supportive care, particularly in oncology.

**Materials and Methods:** This complementary therapy is not without risks but has been developed rigorously and is regulated. A multidisciplinary approach secures its practice. The therapeutic use of essential oils has been modeled on pharmaceutical procedures: medical quality of essential oils, traceability identical to the drug circuit, traceability and evaluations of care, and user staff training.

**Results:** More than 8,000 aromatic treatments were provided in 2020, despite the problematic conditions of their uses caused by the global pandemic. Now, 52 care units use aromatherapy for a satisfaction rate of 82% and an average efficiency rate of 73%. During these years of practice, there has been a decrease in consuming certain anxiolytics, sleeping pills, painkillers, and anti-emetics. The introduction of gerontology reduced nocturnal wandering, and neuroradiologists were able to see a better quality of imaging, as less anxious patients remained more easily quiet during examinations. In addition to the economic arguments, many benefits have been noted. For the recipient: Improved quality of life, hospitalization, and the experience of the disease. A feeling of becoming an actor again in its care. Humanization of care with an innovative character.

**Conclusion:** It also offers a reappropriation of care to the health care teams and the satisfaction of broadening their skills to serve the patients. Even if this innovative and complementary approach seems to benefit the patient, it is nevertheless essential to secure the practice. Quality, rigor, and training are the key points needed to support and secure the patient's journey.

**Keywords:** Essential Oil; Aromatherapy in France; Clinical Aromatherapy; Francer

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## ABSTRACT 20

### Sunscreen effects and photoaging prevention capabilities of plants' oil

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#### ABSTRACT

**Background:** Sunlight is vital for almost all the living organisms. On the other hand, due to excessive exposure to sunlight, in other words UV radiation, undesirable physicochemical changes might occur in the cell. Exposure to extreme UV radiation can cause oxidative stress, erythema, changes in collagen and elastic fibers, loss of subcutaneous fat tissue, photoaging, and skin cancer mostly in fair skins. Sunscreen products are often used to protect against the harmful effects of UV radiation. Traditionally plant' oils are solely used such as olive, sesame, avocado oils or included in various cosmetic products due to their biological properties.

In this study, the sunscreen effects of plant' fatty and aromatherapeutic essential oils were examined and their effect mechanisms on preventing photoaging caused by exposure to sunlight were included. Several studies reported that plant' oils show (sun protection factor) SPF values that can be combined with synthetic sunscreens in the newly created formulations, consequently, the synthetic content can be reduced in the presence of natural oils. Calendula, geranium, ginger, grape seed, rosemary pomegranate and shea oils increase the sunscreen effect of the formulations to which they were added. Moreover, studies exhibited that even high concentrations of plant' oils supplementation did not create toxic effects. On the other hand, *Angelica pubescens*, *Blumea balsamifera*, *Curcuma longa*, *Magnolia sieboldii*, almond, ginger, manuka, orange peel, patchouli and sea-buckthorn oils have been found to heal or prevent skin damage caused by UV radiation. The common mechanism of action of plant' oils on damaged skin caused by UV-B radiation is to inhibit the production of inflammatory cytokines. They have an antioxidant effect by increasing the activities of superoxide dismutase, glutathione peroxidase and catalase enzymes.

**Conclusion:** Formulations containing plant' oils might eliminate skin problems safely while protecting the skin from the sun. Appropriate concentrations of plant' oils should be determined for adequate SPF values. Their compatibility with the skin and other ingredients in the formulations should be determined. Although there are many advantages of including plants' oils in sunscreen products, further studies are needed for successful formulations. Tests should be done to determine toxic effects and allergic reactions on the skin.

**Keywords:** Sunscreen; Photoaging; Plants' essential oil; Fatty oil; SPF; UV radiation; Aromatherapy; Medicinal plants

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## ABSTRACT 21

### Development of a cosmetic formulation with a phytoactive ingredient from chestnut (*Castanea sativa*) wastes: evaluation of *in vitro* stability and *in vivo* skin tolerability and efficacy

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#### ABSTRACT

**Background:** The chestnuts harvesting generates high amount of wastes, mostly spiny burs, that are usually burned or left to rot in the woods by the farmers. The cosmetic industry has a great interest in natural extracts as antioxidant polyphenols source. From a sustainability point of view and in response to the growing demand for new bioactive ingredients for formulators and consumers, in the present study, *C. sativa* bur extract was used as the active ingredient, in topical O/W creams evaluating its phyto-cosmetic application also proving chemical-physical stability, skin tolerability, and efficacy.

**Materials and Methods:** Extract (CSE) preparation: dynamic maceration using aqueous ethanol. Determination of chemical marker, free radical scavenging activity, and cytotoxicity: HPLC-DAD, DPPH and ABTS test, and MTT assay. O/W cosmetic creams preparation: with (B) or without (A) CSE, by hot/hot procedure by adding oil phase to the aqueous one. Investigation of A and B: 6 months-stability through thermostatic aging and cycle tests; rheological behavior; microstructure analysis by optical fluorescence microscopy; CSE (B) *in vitro* permeation by vertical Franz cells; *in vivo* skin tolerability by patch test; *in vivo* effect on TEWL, skin hydration, elasticity, pH, sebum, erythema, and phototype? melanin amount? content?? using the Cutometer MPA 580; consumers satisfaction by a questionnaire.

**Results:** Based on the antioxidant activity and cytotoxicity, 0.1% w/w CSE extract was added to the O/W cream (B). A blank cream (A) was prepared as control. pH and viscosity values were acceptable for cutaneous application. The cream microstructure resulted homogenous and stable over time. A and B creams showed a typical pseudoplastic non-Newtonian behavior. The presence of CSE affected the B viscosity value by reducing it, giving a desirable feature for easy skin application of the cream. The B cream was able to enhance the *in vitro* CSE skin permeation also preserving its functionality. It resulted non-irritating, with a zero value of total skin irritation and edema index. B had significant moisturizing effect on 20 Caucasian female volunteers, increasing the skin barrier function. The formulation unchanged the sebum, pH, and erythema values. The results of the sensory evaluation showed that B cream met consumer appeal and acceptance requirements.

**Conclusion:** The cosmetic industry is a field on the rise, increasing the demand for novel natural ingredients. The up-cycling of *C. sativa* bur extract as source of phytochemicals for skin-care formulations, with proven efficacy, safe and stable over time, replies to the advance of industry as well as to environmental and economic sustainability.

**Keywords:** Agri-food wastes; Antioxidant extract; Phytocosmetic creams; *in vivo* efficacy

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## ABSTRACT 22

### Potential role of extract and bioactives of *Nigella sativa* in prevention of Glycation and Glycooxidation

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#### ABSTRACT

**Background:** Plant extracts and phytochemicals possess various therapeutic properties. *Nigella sativa* extract and its bioactive compounds have been shown to have antidiabetic, anticancer, antioxidant and other features. In this work we have used the extract and Thymoquinone to characterize their role on the process of Glycation.

**Materials and Methods:** Aqueous and methanolic plant extracts were prepared and analyses for their antiglycating role by spectroscopic and fluorimetric assays. The role of Thymoquinone was also checked in the prevention of Glycation-induced structural alteration of proteins and DNA using CD analytical and gel electrophoresis methods.

The results indicate that aqueous extract is more efficient in preventing the formation of Glycation products as well as Glycation induced aggregation of proteins. Similarly Thymoquinone showed more efficiency as compared to extracts in reduction of Glycation and aggregation.

**Results:** These results indicate that *Nigella sativa* extracts possess significant potential in preventing the interactions between sugar and proteins, basis of Glycation. Thymoquinone seems to be responsible for these antiglycating and antiaggregation properties of *Nigella sativa*. Interactions studies between Thymoquinone and BSA indicate that this molecule can be a significant drug for preventing glucose or Glycation induced secondary complications of Diabetes.

**Keywords:** Antiglycating; Antiaggregation; Glycation; Glycooxidation; *Nigella sativa*; Thymoquinone

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## ABSTRACT 23

### Investigation of hyaluronidase inhibition activity of copper and zinc hybrid nanoflowers of *Cotinus coggygia*

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#### ABSTRACT

**Background:** The elastic structure of the skin deteriorates due to stress factors, uv, aging etc. Hyaluronic acid plays a crucial role in moisture balance of the skin. Our aim is to synthesize valuable hybrid plant extract (PE) and metal ion (copper Cu or zinc Zn) combined, organic-inorganic nanoflowers furthermore to examine the *in vitro* hyaluronidase activities comparatively.

**Materials and Methods:** Traditionally used *Cotinus coggygia* young branches with leaves were extracted with methanol, evaporated and dried extract was further used for the synthesis of the hybrid organic (*C. coggygia*) inorganic copper and zinc nanoflowers (hCc-CuNf), hCc-ZnNf) (Koca Çalışkan at al, 2019). For the synthesis of copper nanoflowers (CuNf), 10 mM PBS (PH 6- 7.4-8), 120 mM CuSO<sub>4</sub> solution and plant extract in different concentrations were used, (0,01, 0,02, 0,05) respectively. After incubation at 30 ° C for 3 days, it was centrifuged at 5000 rpm and washed 3-4 times and kept at RT to dry them. The products obtained were characterized by SEM analysis. The synthesis of zinc nanoflowers was carried out by dissolving the plant extract in 20 mL of PBS, and 1.6 mL of zinc acetate solution, by stirring in a magnetic stirrer for 3 hours. After washing and drying processes, the precipitate was characterized by SEM analysis. A hyaluronidase inhibition experiment was carried out based on the measurement of turbidity formed by the *C. coggygia* only plant extract and the synthesized copper (hCc-CuNf) and zinc (hCc-CuNf) hybrid nanoflowers (Kass and Seastone, 1944; Tolksdorf and McCready, 1949).

**Results:** As a result of the preliminary studies, the SEM images of the synthesized hCc-CuNf and hCc-CuNf were taken and characterized. The hyaluronidase enzyme inhibition of the hCc-CuNf and hCc-CuNf were determined as higher than the only plant extract.

**Conclusion:** The hyaluronidase inhibition of the copper and zinc nanoflowers of the *C. coggygia* plant will be presented comparatively as a result of preliminary studies. In order to obtain promising environmentally friendly optimized products in new generation dermocosmetic preparations, characterization of hybrid nanoflowers with different chromatographic methods and *in vitro* biological activity studies will be continued.

**Keywords:** *Cotinus coggygia*; Nanoflowers; Hyaluronidase; Dermocosmetics; Biotechnology  
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## ABSTRACT 24

# Investigation of antityrosinase and antioxidant potentials of the extracts of endemic *Stachys bombycina* Boiss

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### ABSTRACT

**Background:** The genus *Stachys* L., one of the largest and well-known genera belonging to Lamiaceae family, is represented by around 300 species worldwide. More than 120 taxa, almost 60 of which are endemic, are widely distributed in Turkey, particularly east and southern regions. *Stachys* species have been used as a medicinal plant in traditional treatment of many diseases such as asthma, rheumatism, cough, genital tumors, ulcers, diabetes, hemorrhoids, kidney stones and various mental disorders. Among the species, *S. bombycina* Boiss., namely “arı çayçesi” in Turkish, is one of the near-threatened endemic perennial herb.

**Materials and Methods:** The methanol and water extracts of *S. bombycina* were investigated on antioxidant activity using in vitro methods, DPPH and ABTS radical scavenging, iron chelating, as well as the determination of total phenol and flavonoid contents. The extracts were also investigated on enzyme inhibition effects against tyrosinase associated with hyperpigmentation using in vitro spectrophotometric method.

**Results:** On the basis of our results, the methanol extract of *S. bombycina* demonstrated more DPPH radical scavenging activity with  $76.14 \pm 2.4\%$  than water extract ( $42.06 \pm 0.9\%$ ). Otherwise, the water extract had found as higher iron chelating activity as  $57.62 \pm 3.3\%$  than the methanol extract  $10.43 \pm 2.7\%$ . Both the methanol and water extracts showed antioxidant activities as around 75% using ABTS method. Total highest phenolic content of the water extract was determined as 81.07 mg GAE/g, although the methanol extract had more total flavonoid content as 64.76 mg QE/g. In addition, antityrosinase activity was observed as 47% in the methanol and water extracts.

**Conclusion:** Consequently, current study firstly reported the antioxidant and antityrosinase activities of the methanol and water extracts of *S. bombycina*. According to our findings on *S. bombycina*, this work can contribute for the developing bioactive agents from natural sources. Moreover, further investigations still need to be conducted for the discovery of phytoconstituents of *S. bombycina*, as well as its potential various biological activities.

**Keywords:** *Stachys bombycina*; Tyrosinase inhibition; Antioxidant activity; Hyperpigmentation  
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## ABSTRACT 25

### Pesticides residues in raw materials for the phytocosmetic and phytotherapeutical industries. Their occurrence, toxicological implications and regulatory framework

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#### ABSTRACT

“Most manufacturers of phytopharmaceuticals and cosmetics prefer to use organic raw materials or those collected in the wilderness, but the reality imposes that most of the plants and extracts in the market for pharmaceutical and personal care products were obtained after a conventional cultivation step, where agrochemicals are currently used to protect the crop against pests and to enhance productivity. The main consequence of these treatments, either pre- or post-harvest, is the presence of residues of the applied chemicals, that constitute possible threats to public health. The WHO has specific regulations on the permissible content of residues in a medicinal plant. Pharmacopoeias also rule the pesticide residues content but the approach they follow is not homogeneous. The European and the Mercosur Pharmacopoeias share a common vision for the Maximum Residue Limits compliance of medicinal herbs. Two are the main differences to other pharmacopoeias. On one side, because of globalization issues, they accept that there are pesticides that can occur in medicinal plants due to peculiar Good Agricultural Practices whose LMR has not been fixed. It must be proved then, that the residues found are below the Acceptable Residue Level (ARL), except for the worldwide banned organochlorines, that bears fixed MRLs. The second one, is that there is no established technique for the analysis of such residues. Only the analytical figures of merit of a pesticide residue protocol are required. To complicate even more the situation, many species are also raw material for the pharma industry, but the food and the pharma regulation often differ between them. Those topics will be discussed in the presentation, using selected examples in the toxicological definitions and requirements the pharmacopoeias have, based in the analytical methods employed to determine residues in common raw materials such as Chamomile, Calendula, bee products and other commodities.”

**Keywords:** Phytopharmaceuticals; Pesticide residues; Technique for the analysis; Acceptable Residue Level (ARL); Toxicological definitions

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### ABSTRACT 27

## Cleopatra's Beauty: Surviving records of her treatise "On Cosmetics"

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### ABSTRACT

Kleopatra of Alexandria (69-30 BCE), the famous beautiful Queen of Egypt, allegedly wrote works on alchemy, poisons and cosmetics. Her now lost text "On Cosmetics" survives only in fragments found in the pharmaceutical collections of Galen (129-215 CE), Aetius of Amida (ca 500-550 CE) and Paul of Aigina (ca 630-670 CE). These limited excerpts include approximately 25 formulas and simple methods of treatment for alopecia and hair-loss, head ulcers, dandruff, acme, softening, blackening and curling the hair, as well as an aromatic body unguent. Although this information seems that got somehow neglected in the medical literature of the byzantine period, we can still find their traces in various late sources, as well as in the vivid living tradition of Greek folk medicine. A good example of these ingredients is the well-known squill [*Drimia maritima* (L.) Stearn], an herb still holding a reputation for treating hair-loss in Greek folk medicine. The tracing of these applications provides us with a glimpse in the cultural mosaic of the eastern Mediterranean through the centuries. Furthermore, it can be proved a valuable source of herbal knowledge for the development in modern phytomedicine and phytocosmetics.

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