

Application of calahuala complex (*Phlebodium* spp.) for the formulation of diverse cosmetic products

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Extracts of the tropical fern complex *Phlebodium* spp. (Polypodiaceae) common to Central American forests, have demonstrated beneficial properties for the skin attributed to the presence of numerous compounds with diverse pharmacological and cosmetic properties. Orally administered *Phlebodium* complex extracts may provide protection against the detrimental photoaging effects of sunlight and can help to reduce the frequency and severity of polymorphous light eruption. It has also shown to be beneficial for the prevention and potential treatment of several aesthetically relevant conditions. The purpose of this review is to show the beneficial role of *Phlebodium* complex as an adjunct treatment for vitiligo, melasma, and post-inflammatory hyperpigmentation and show the most important studies developed in Guatemala. Various extracts of *Phlebodium* complex applied topically or taken orally, have demonstrated several beneficial effects, such as antioxidant, photoprotector, immunomodulatory and antimutagenic. Modern studies have evaluated the efficacy of *Phlebodium* extracts as a photoprotective agent and for use in several photo-aggravated dermatologic disorders, such as polymorphous light eruption, other photodermatoses, vitiligo, melasma, psoriasis, atopic dermatitis, and more recently, in minimizing infections in high-performance athletes. It is these multiple mechanisms of action, in combination with a favorable side effect profile, which makes *Phlebodium* complex a promising adjunctive treatment for several dermatologic disorders, as well as application to the cosmetic industry. Aerial part has proven to exert antioxidant, photoprotective and immunomodulatory activities; extracts of fronds or rhizome are a natural mixture of phytochemicals endowed with powerful antioxidant properties, mainly due to the content of flavonoids, steroids and adenosine. *Phlebodium* fern frond and rhizome extracts block the deleterious effect of UV irradiation both in vivo and in vitro, showing potential as a natural photoprotectant and potential adjuvant to phototherapy of various skin diseases. Preclinical and clinical studies have demonstrated the immunomodulatory effect that can control vitiligo, atopic dermatitis and other chronic dermic diseases.

Key words

Antioxidant, photoprotective, immunomodulatory, rhizome, fronds

***Hypericum* species effective against depression and other neuro-psychiatric disorders**

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Depression and other neuro-psychiatric disorders are among the major health problems in the world. There is an emerging need for better antidepressant drugs in terms of their efficacies and side effects. *Hypericum perforatum* L. (St.-John's Wort) have been used both in traditional and modern medicine as a remedy for the cure of depressive disorders and other neuro-psychiatric disorders. It seems to have some advantages and superiorities relative to synthetic antidepressants. In addition, there are many reports demonstrating the effectiveness of other *Hypericum* species in neuro-psychiatric diseases. In one hand, pharmaceutical industry has made research for new therapeutic modalities and medicinal plants have been a potential source for their research having background of ethnomedical data accumulated over the centuries. On the other hand, strong climate changes and environmental pollution altering flora may cause the extinction of some medicinal plants without a substantial scientific investigation on their usefulness. Therefore, there is an urgent need, more than ever, for the pharmacological screening and phytochemical investigations of medicinal plants for their activities, including *Hypericum* species for their possible antidepressant activities and other related neuro-psychiatric effects.

Key words

Ethnomedicine, depressive disorders, pharmaceutical industry, pharmacological screening

The new marijuana

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For the past several decades, the United States banned the use of the plant commonly known as marijuana with laws enforced by local, state, and federal officials. Marijuana was considered to be a health hazard that needed to be forcibly removed from society, even though a number of individuals were using the plant material for medicinal and recreational purposes without ill effects. Within the recent past, however, many U.S. citizens rejected the no marijuana policy, recognizing the plant as generally safe for use. Beginning in 2001, a legal challenge to the U.S. Drug Enforcement Agency was initiated to grow marijuana for testing whether the plant or the plant extract could improve patient health and/or relieve patient pain. While this legal challenge ultimately failed, the following few years brought political pressure on elected state officials to change the law. When asked in a 2015 survey if marijuana should be legalized, 58% answered yes, contrasting the 34% that supported legalizing the plant in 2001 and the 11% that supported the legalizing the plant in 1969. As scientists and medical doctors begin to access the potential medicinal properties of marijuana, a new perspective on possible health benefits of the plant constituents, such as cannabidiol (CBD) become important. Early research suggests that this marijuana sourced cannabinoid has inhibitory activity against several cancers and brain tumors. Other research suggests that cannabidiol has anti-inflammatory activity that could treat arthritis and autoimmune disorders. These new test programs suggest several positive benefits can be expected from the new marijuana.

Key words

Drug Enforcement, marijuana policy, legalizing, health benefits, cannabidiol, autoimmune disorders

Current affairs: Black currants in health and disease

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Black currant (*Ribes nigrum* L., Grossulariaceae) represents a small, perennial shrub native to central Europe and northern Asia, which is now cultivated throughout the world including the United States. In addition to its use in traditional herbal medicine, modern scientific investigations have demonstrated potent antioxidant, anti-inflammatory and antimicrobial activities of black currant phytochemicals in various disease conditions. Phytochemical analysis of black currants reveals the presence of various bioactive phytoconstituents, including anthocyanins (cyanidin-3-O-glucoside, cyanidin-3-O-rutinoside, delphinidin-3-O-glucoside and delphinidin-3-O-rutinoside), flavonols, phenolic acids and polyunsaturated fatty acids. Numerous studies have been published during the last decade with focus on black currants therapeutic potential related to several disease states, including hypertension and other cardiovascular illnesses, neurodegenerative, neoplastic and ocular disorders, nephrolithiasis as well as diabetes. Our laboratory has provided substantial evidence on mechanism-based chemopreventive effects of black currant phytoconstituents against experimental hepatocellular carcinoma utilizing preclinical models reminiscent of human disease. This presentation aims to demonstrate the potential of black currants in health promotion and disease prevention with special emphasis on cancer preventive attributes and associate biochemical and molecular mechanisms of action reported from our own laboratory. Current limitation and future directions of research on this medicinal and dietary plant will also be discussed.

Key words

Antioxidant, anti-inflammatory, cancer prevention, health benefits, anthocyanins

Phytocosmetic herbs from South East Asia

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Herbs and spices have been used in retaining and boosting human beauty since time immemorial. The natural content in the botanicals are not usually harmful on the human body; instead enriches the body with nutrients and other useful minerals. The increased demand for the natural product has created new avenues in cosmeceutical market. Herbal extracts are primarily added to the cosmetic formulations due to its many associated properties such as antioxidant, anti-inflammatory, skin whitening, antiseptic, photo protection, anti-aging and antimicrobial properties. Today, phytocosmetic products are well researched and tested for its mildness, efficacy, biodegradability, low toxicity, cleansing ability, emulsification, miniaturization, skin appearance, feel, fragrance, and lubrication. Asia Pacific is expected to be the largest consumer of cosmeceuticals, with substantial growth in Southeast Asia. Hence, a review of herbs from this region to provide an insight of its distribution, phytochemistry, bioactivity, and suitability as a potential cosmetic ingredient would be useful. A review of herbs from the South East Asian region was carried out using the databases EMBASE, Pubmed, AMED and Google Scholar. The distribution, phytochemistry, bioactivity, toxicology, dosing and suitability as a potential cosmetic ingredient of the herbs were studied. A total of the following herbs were identified based on traditional knowledge and pharmacological evidence: *Allium sativum*, *Aloe vera*, *Centella asiatica*, *Curcuma longa*, *Hibiscus rosa-sinensis*, *Lawsonia inermis*, *Tamarindus indica*, *Labisia pumila* and *Ficus deltoidea*. The suitability of the herbs as potential cosmetic ingredients were further evaluated based on their stability, toxicity, availability, among others. A summary of herbs from the South East Asian Region with claimed and/or proven potential for cosmeceutical applications is presented. There is however a lack of information on its formulation stability/shelf-life and *in vivo* efficacy.

Key words

Cosmetic, cosmeceutical, natural products, *in vivo* efficacy

Current trends in Phytocosmetic ingredients

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Every year, the cosmetic formulator is tempted with a wide range of new and novel phytocosmetic ingredients from manufacturers all over the world. In many cases, these ingredients typically satisfy traditional or current market trends as well as the expected “flavour of the month” ingredients.

Methods: Few phytocosmetic ingredients are truly revolutionary in tackling specific skin or hair problems, but those that are introduced, reveal the complexity by understanding the science behind the interaction with our body and their resulting health benefits. This talk will review recent phytocosmetic ingredient trends over the past five years as well as discussing possible opportunities for development of new phytocosmetic ingredients, linking traditional use of botanicals and the benefits of understanding the science behind their biological activity.

Key words

Phytocosmetics, formulation, biologically active, botanicals

Collaborative research on Traditional Medicine and Cosmetics in Latin America and Michigan, USA: New opportunities to link traditional knowledge with Academia and Industry

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Abstract

Over the last five years researchers from Alma College, a small undergraduate institution in the state of Michigan, have been engaged in ethnobotanical and ethnopharmacological research in Ecuador and Michigan. Our efforts in Ecuador have focused on the documentation of traditional knowledge in an indigenous community, while in Michigan plants were collected at random and extracts were prepared for subsequent biological and chemical analysis. One of the reasons for the two different approaches is that there is still much to learn from indigenous people in remote regions with high biodiversity such as the Ecuadorian Amazon. On the other hand, it has been suggested that there is little, if any, ethnobotanical knowledge to be learned from indigenous people of the USA that has not already been documented. Another reason is the challenge of obtaining authorization to conduct ethnopharmacological research in regions of high biodiversity as opposed to the USA. This challenge must be overcome by making a convincing case to governmental authorities for the value of ethnopharmacological research, developing meaningful collaborations within the host country, and collaborating with industry to develop marketable products that will benefit all participants. As we develop new collaborations with academic researchers in Ecuador and with industry in Michigan, and as we begin a new project in Brazil, we must consider first and foremost how the bearers of the traditional knowledge will benefit from our work. Based on our own experiences and current best practices, we have outlined a benefit-sharing program that consists of four interconnected elements: education, cultural preservation, health impact, and financial incentive.

Key words

Ethnopharmacological research, biodiversity, cultural preservation, health impact

Interactions between herbal medicines and drugs

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Abstract

Simultaneous intake of drugs and herbal products or dietary supplements may cause additive, synergistic, or antagonistic interactions, which may complicate the dosing regimen of long-term medications, or lead to undesirable side effects. Drug-herbal/food interactions may be significantly important for drugs with narrow therapeutic margin (e.g. warfarin, digoxin, antiarrhythmics), and for sensitive populations such as elderly patients, pregnant women and nursing mothers as well as children and very sick individuals (e.g. AIDS/HIV, cancer and organ transplant patients). Herbal preparations can interact with a drug at different levels (pharmacokinetics, pharmacodynamics, etc). In this work interactions between herbal medicines and conventional drugs are showed. Pharmacovigilance has now become an essential component of drug regulation. The pharmacovigilance network in Cuba is presented and how it works. Reports about side effects of traditional medicines and main interactions between herbal medicines and drugs in Cuba are described and the proposed mechanism of action. For example, Caña santa (*Cymbopogon citratus* (DC.) Stapf.) and captopril produce low blood pressure, Guava (*Psidium guajava* L.) and kanamicyn, cause epigastric disorders, Noni (*Morinda citrifolia* L.) and warfarin produce gingival bleeding. It is important to evaluate potential drug interactions prior to market approval as well as during the post marketing period. All these data allows reinforcing the rational use of herbal medicines in order to guarantee the safety, efficacy and quality control of traditional and complementary medicines.

Key words

Cuban Regulatory Agency, CECMED, synergistic interactions, antagonistic interactions, herbal products, Simultaneous intake

Antioxidant activity of *Pleurotus* sp extracts with potential uses as nutricosmetic

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BACKGROUND: Mushrooms are interesting sources of bioactive metabolites with medicinal applications. Many studies have found that some species of mushrooms have therapeutic properties such as antioxidant, antimicrobial, anticancer, cholesterol lowering and immuno-stimulatory effects, among others. There are numerous potential medicinal products from mushrooms that could be used in cosmeceuticals (products applied topically, such as creams, lotions, and ointments) or nutricosmetics mushrooms are a good source of valuable nutrients and compounds, with potential antioxidant properties, useful as nutricosmetics.

METHODS: The study included the in vitro evaluation of two hot water *Pleurotus* sp extracts (mycelium or Myc-E and fruiting bodies or FB-E). The methods examined were: determination of proteins, carbohydrates and total phenols and the antioxidant activity by the scavenging effects for DPPH and ABTS radicals, power reduction and the inhibition of lipid peroxidation.

RESULTS: The content of proteins was (32.6 % and 15 %), carbohydrates (28.6 and 70.4%) and total phenols (38 mg/100g and 58 mg/100 g) for Myc-E and FB-E, respectively. At the concentration of 10 mg/mL, the extracts showed the most potent scavenging effects for DPPH radical (96.05% and 90.35%), ABTS radical (55% and 80%) power reduction (2.35 mg/mL and 2.16 mg/mL, $p < 0.05$ as Ec 50 values) and inhibition of lipid peroxidation (47.2% and 51.2%) for Myc-E and FB-E, respectively. These results suggest that both extracts (Myc-E and FB-E) may be useful in the prevention of diseases mediated by reactive oxygen species and for the design of nutricosmetics.

CONCLUSION: The present study suggests that hot-water extracts from *Pleurotus ostreatus* in view of their antioxidant effects, could serve as potential food supplements, nutraceuticals or even as nutricosmetic.

Key words: Medicinal mushrooms, *Pleurotus* sp, hot-water extracts, antioxidant effect, nutricosmetic

Natural cosmetic products: a review on the available certifications and regulation in the EU

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Abstract

BACKGROUND: Cosmetic regulation, like many other regulations, is in the state of constant changes based on improving knowledge in toxicology and safety of ingredients.

OBJECTIVE: The objective of this presentation is to provide an overview on the European Union (EU) regulation for finished cosmetic products. As well, the challenges for a unified natural certification in the EU will be discussed.

METHODS: Despite the growth for natural cosmetics and ubiquitous use of this term, it is surprisingly difficult to regulate the term natural due to lack of legal definition for the term. Comparative law on assessing the safety of finished cosmetic products and ingredients has been chosen as the method for this research.

RESULTS: In the EU, a consortium of the non-governmental bodies founded the COSMOS-standard AISBL (an international non-profit association registered in Belgium) in order to define common requirements and definitions for organic and/or natural cosmetics. However, compliance to different natural certifications is not sufficed to place a product legally on the market. Any cosmetic product to be placed on the EU market shall comply with EC No. 1223/2009, The EU the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC No. 1907/2006), and Commission Regulation on claims in cosmetic products (EU No. 655/2013). Based on the new EU regulation 1223, 2009, after July 2013 ingredients and finished cosmetic products shall not be tested on animals. The safety of cosmetic products is based on main pillars of Good Manufacturing Practices (GMP), safety of each ingredients and non-clinical safety studies prior placing the products on the market. Non-dangerous substances, which occur in nature, are exempted from registration based on REACH, but this exemption does not cover essential oils and substances obtained from natural sources, if they are chemically modified.

CONCLUSION: here is a special emphasis on safety of each ingredient that can be a hurdle to introduce new ingredients from natural origin due to complexity of their compositions, ban on animal tests and possible impurity due to harvest conditions.

Key words

Finished cosmetic products, EU cosmetic regulation, REACH, safety

Colombia's potential development of the cosmetic and personal care industry

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Abstract

BACKGROUND: The identification of these sectors was done through a competitive process. Sectors represented by their associations, accredited information of their economic results as well as production, investment and potential to compete in foreign markets in order to develop a Public/Private Partnership business case or "Plan de Negocio" as it is called, will be discussed.

METHODS: The Production Transformation Program was created in 2009, having Cosmetics and Personal Care Products as one of their main sectors under the category of manufacturing. To begin, a snap shot of the manufacturing sector was completed by the government and a consulting firm that assisted the process. As a result of the exercise, Biodiversity was identified as the country's unexplored resource with potential to foster innovation.

RESULTS: Since then, different entities belonging to the government such as the Ministry of Environment, Colciencias, DNP (National Planning Department) and some private association as well as companies got instructed to develop a policy document regarding two main topics: the first included regulating the Andean Decision 391 that dictates the access to genetic material and benefit sharing of the retributions; the second aimed to create the needed institutions in order to implement the proposed policies. Today, that document serves as the backbone of different projects and programs seeking to promote the sustainable use of our biodiversity mainly through a legal framework that allows access to genetic material and the commercialization of its derivatives in reasonable time period. Although very few results have been harvested, the country's interest in promoting cosmetic, pharmaceutical and nutritional products from our biological resources hasn't lost the attention of key stake holders from companies to Government institutions and multilateral organizations.

CONCLUSION: Our aim is to present the potential that Colombia has by linking the needs of markets to the industrial stakeholders, guarantee the development of a solid bio-economy.

Key words

Government institutions, sustainable use, plan de Negocio, public policies, consulting firm

Natural ingredients in skin diseases

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Abstract

BACKGROUND: Aside from the moisturising substances, phytonutrients represent one of the most important ingredients for skin's health and the maintenance of its functions. There are animal, vegetable and mineral sources, and may even be combined in the dermatological and cosmetic formulations in skin diseases.

METHODS: Recent scientific studies have served to strengthen the concept and validation regarding the efficacy of several active principles from natural sources at the molecular level in keratinous tissues. These findings, along with successful clinical studies, have helped to establish the healthful role of dietary components, in the form of nutricosmetics and cosmeceuticals as a component of a food.

RESULTS: Pathologies such as acne, vitiligo, psoriasis, atopic eczema or alopecias, require a thorough review from the high percentage of failures observed with the conventional therapeutic in exclusively topical use methods.

CONCLUSION: This talk will show new targets of these pathologies from the association of different natural products, both through internal and external routes. Among them are highlighted: seropeptides, metallothioneins, borrago and tea tree oils, butters, marine algae and medicinal muds.

Key words

Phyto dermatology, nutricosmetics, cosmeceuticals, skin diseases, active principles, medicinal plants

Morphoanatomical and histochemical description of two Guatemalan native varieties of *Dorstenia contrajerva*

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Abstract

BACKGROUND: The genus *Dorstenia* L. (Moraceae) is widely utilized in folk medicine due to its medicinal properties, such as antiophidic, antidiarrheal, antimicrobial and anti-inflammatory properties in eruptive skin diseases (Pilon, Y. et al 2013). Despite the fact that *Dorstenia* species are annual and there are no controlled cultures, to establish quality standards is important.

METHODS: This work presents the morphoanatomical and histochemical characterization of the vegetative organs and the inflorescences of *D. contrajerva* L. and *D. contrajerva* var. *tenuiloba* (Blake) Standl. & Steyerl that grows in Guatemala, useful to establish identity marker compounds for quality control standards, especially when they are dry and / or fragmented when plant parts are dried or milled. The techniques used were freehand cutting, leaf diaphanous, dissociated and analysis of secondary metabolites by histochemical and thin layer chromatography methods and original drawings were made from photomicrographs.

RESULTS: Both varieties of *D. contrajerva* showed widely simple lobed leaves, actinodromous reticulate venation, hypostomatic sheets with anisocytic anomocytic stomata and epidermis at level and sunk; glandular trichomes with 1-2 cellular head and unicellular foot, uncinata, large and small simple trichomes. The stem and rhizome circular and irregular presents simple uncinata trichomes, angular collenchymas and open collateral vascular bundles, arranged in a eustele; Polyarc root and evident cuticle. Inflorescence simple uncinata, large and small trichomes, glandular with unicellular foot and 1-2 cellular head and papillary trichomes. The phytochemical screening showed the presence of starches, fats and oils, mucilage, saponins and coumarins.

CONCLUSION: Most of the anatomical findings in this study, matches the ones reported by other authors about other species of Moraceae, but many of them were not reported previously for varieties of *Dorstenia*. The presence of coumarins and saponins is related to its medicinal properties.

Key words

Micrograph analysis, quality control, forensic evidence, plants drugs

In vitro antifungal activity of essential oils from wild *Piper aduncum*, *P. elbancoanum* and cultivated *P. aduncum*

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Abstract

BACKGROUND: The bean (*Phaseolus vulgaris* L.), is a crop of agronomic importance in Colombia. The main plant disease is anthracnose, caused by the fungus *Colletotrichum lindemuthianum*. The strategy of control of farmers applying fungicides in excess increases the risk of resistance by pathogens and may compromise the safety of the harvest.

METHODS: Under laboratory conditions, we evaluated essential oils of wild *Piper aduncum*, cultivated *P. aduncum* and wild *P. elbancoanum*, using a chemical control (Score[®], active Ingredient difenoconazole) and an absolute control. We used tests to evaluate disk diffusion (antibiograms), minimum inhibitory concentration, percentage of conidia germination and we established the fungistatic or fungicidal effects of essential oils.

RESULTS: In antibiograms all the essential oils showed antifungal activity at 5, 7 and 9 days of evaluation. Although the antifungal effect was lost with the passage of time, the essential oil that presented higher antifungal effect was cultivated *P. aduncum* with inhibition halos of 84 mm (day 5), 59 mm (Day 7) and 38 mm (day 9). The minimum inhibitory concentration was evaluated during 10 days, using concentrations of 100, 50 and 20 µl/ml. Mycelial growth was not observed in any of the treatments. The percentage of germination of conidia of *C. lindemuthianum* was relatively low, finding significant differences among the treatments ($P < 0.0001$) at 12 and 24 hours of evaluation, where in the essential oil of cultivated *P. aduncum* the germination percentages were lower (44 and 82%, respectively). It was determined that the effect of the evaluated essential oils was fungistatic, since mycelium fungus taken and grown in culture medium with essential oils and put in untreated culture medium showed growth.

CONCLUSION: We conclude that the essential oil showed higher antifungal effect on *C. lindemuthianum* than cultivated *P. aduncum*.

Key words

Piperaceae, antifungal, antibiogram, plant pathogen

Screening plants from the genus *Silene* for 20-hydroxyecdysone

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Abstract

BACKGROUND: Phytoecdysteroids are common plant constituents and have been isolated from all types of plants, including ferns, gymnosperms, and angiosperms. Use of phytoecdysteroids as an alternative medicine to anabolic-androgenic steroids may be desirable due to the apparent lack of any adverse effects.

METHODS: The aerial parts of eight *Silene* plant species growing in Uzbekistan were screened for 20-hydroxyecdysone (20E). The screened species included *S. brahuica* Boiss., *S. guntensis* B. Fedtsch., *S. linicola* L., *S. oreina* Schischk., *S. praemixta* M. Pop., *S. pseudotites* Besser ex Rchb., *S. viridiflora* L., and *S. wallichiana* Klotzsch. Structures and content of isolated constituents were established on basis by physical-chemical constants and HPLC. 20E in the samples was confirmed by co-chromatography.

RESULTS: Of the examined plant species, all, except for *S. oreina*, contained the phytoecdysteroid 20E. The concentrations of 20E, however, differed among the tested species. The screening confirmed the presence of 20E in most species of *Silene* growing in Uzbekistan.

CONCLUSION: More than 170 *Silene* species have been analyzed for phytoecdysteroid content. Of these, 140 were positive for phytoecdysteroids, yielding 93 different ecdysteroids. Regional variations in the concentration levels of 20E have been observed.

Key words

Anabolic, medicinal plants, phytoecdysteroids, *Silene viridiflora*

Effect of essential oils of wild herbs on germination and seed bank of a commercial lot in Fusagasuga (Colombia)

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Abstract

BACKGROUND: One of the problems encountered in agriculture which affects most crops, is weed control. Herbicide use has created environmental problems, toxicity and resistance of some species. An alternative is the use of essential oils, which can produce allelopathic effects causing inhibition of germination and growth of weeds.

METHODS: The trial was set up in a greenhouse at an Esperanza farm (Fusagasuga, Colombia), consisting of placing soil in trays and apply uniform irrigation with a completely randomized design with nine treatments with five replications. Treatments included a *Lippia alba* extracts in three concentrations of 100, 300 and 500 mg/L, water, water plus coadjuvant and a commercial herbicide as control. Germination rates of different groups of weeds were valued and control rates were determined.

RESULTS: For dicotyledonous treatments both *Baccharis trinervis* (100 mg/L) and *L. alba* (500 mg/L) showed the best values controls 59.9 and 54.9 % against uncontrolled treatment. A second group includes all treatments of *L. alba* with values showing a regular control against uncontrolled treatment. The herbicide atrazine showed a percentage of control to 37.3% is a poor control as measured for scale Latinoamerican Association for Weed Management (ALAM). To treat grass weeds with atrazine worth 76.6%, within the range that ALAM is a good control. *Baccharis trinervis* (500 mg/L) with 59.8% and *B. trinervis* (300 mg/L) with 50.9% appear as a regular ALAM control. For sedges, weeds show better controls corresponded to *L. alba* (500 mg/L) and the commercial herbicide with values of 59.7 and 54.0%, respectively. Continue treatments *B. trinervis* (100 mg/L and 300 mg/L) controls 50.7 and 43.6%. Controls obtained are largely due to the metabolites present as sesquiterpenes Essential Oils (EO) as acting as inhibitors of seed germination.

CONCLUSION: The E.O. of *B. trinervis* and *L. alba* showed better control of dicotyledonous weeds and sedges that the herbicide. Grass weeds in herbicide outperformed the other treatments but – showed percentages of acceptable control.

Key words

Baccharis trinervis, *Lippia alba*, germination, escale ALAM, percent control

Evaluation of cytotoxic activity of organic fractions from leaves and roots of *Piper patulum* Bertol. from Guatemala

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Abstract

BACKGROUND: *Piper patulum* Bertol., is a Mesoamerican native species. Previous studies have demonstrated that its leaves have antioxidant activity and the essential oil has shown cytotoxic activity against brine shrimp (*Artemia salina*) at a concentration of 0.5 mg/mL. The aim of this research was to demonstrate the antioxidant, cytotoxic and genotoxic activity of fractions of the vegetal material.

METHODS: Fractions were obtained by separate sequential extraction of leaves and root, respectively. Phytochemical groups were evaluated to determine the composition, indicating the possible pattern to continue the study of cytotoxic activity. Qualitative antioxidant activity by 2,2-diphenyl-1-picrylhydrazyl (DPPH) was evaluated by TLC, quantitative DPPH and total phenolics by spectrophotometry. Activity against *A. salina* was evaluated macrometrically, and cancer cell lines [U251 (glioma), MCF-7 (mammary) and NCI-H460 (lung)] by micrometric cytotoxic sulforhodamine B assay, measuring the Total Growth Inhibition (TGI); genotoxicity by *Allium cepa* assay.

RESULTS: The dichloromethane fraction from the roots showed the best activity (IC₅₀ of 0.61 ± 0.04 mg/ml) and the greatest concentration of total phenolics (848.42 ± 9.89 µg of gallic acid equivalents/ml). Cytotoxic activity was determined against *A. salina* and neoplastic cell lines. For *A. salina*, the best activity was observed in the methanol (DL₅₀ 0.26 ± 0.02 mg/ml) and dichloromethane (DL₅₀ 0.29 ± 0.02 mg/ml) organic fractions from the roots. In cytotoxic assays, the best TGI were obtained in the dichloromethane (U251: 68.9 µg/mL, MCF-7: 23.5 µg/mL, NCI-H460: 74.4 µg/mL) and ethyl acetate leaf fractions (U251: 53.8 µg/mL, MCF-7: 42.0 µg/mL, NCI-H460: 71.6 µg/mL), and the dichloromethane root fraction (U251: 94.2 µg/mL, MCF-7: 31.0 µg/mL, NCI-H460: 88.6 µg/mL). By the *A. cepa* assay, no genotoxic activity was demonstrated.

CONCLUSION: The dichloromethane fraction of the leaf from *P. patulum* shows interesting cytotoxic activity, which deserves further investigation of a responsible molecule by bioguided fractionation.

Key words

Antioxidant, genotoxic, *Artemia salina*, *Allium cepa* assay

Purification of an extract of *Mangifera indica* L. bark for the development of a cosmetic cream.

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Abstract

BACKGROUND: One of the current trends in the cosmetic sector is to develop products where herbal medicines benefits are attributed. The purpose of this work was to develop an extract from *Mangifera indica* L. bark to be used in cosmetics and which does not add an intense browning color in the final product.

METHODS: Six variants of solvents were tested, propylene glycol/water, isopropyl myristate, isopropyl alcohol, octyldodecanol, glycerin and sunflower oil (at two concentrations), following the recommendations described in the USP. The extraction method to obtain the active principle was maceration and temperature, the light presence and the time of extraction were considered as the parameters to be evaluated.

RESULTS: The colors obtained from the extracts were determined by the Pantone scale introduced by DHACAM.™ Physico-chemical characteristics of the extract were variable in these samples that will be discussed . The Folin Ciocalteu method was used for the quantification of total phenolics using gallic acid as a standard. Variability in colors were also observed, for example, water-soluble solvents produced darker extracts.

CONCLUSION: Isopropil myristate and sunflower oil, resulted in an extract suitable to be used in development a cosmetic cream from *M. indica* bark.

Key words

Herbal medicines, maceration, Pantone scale, Folin Ciocalteu method

Application of macromolecular antioxidants, a new natural functional ingredient in cosmetic and nutricosmetics

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Abstract

BACKGROUND: High amount of macromolecular antioxidants in plant food in peer-reviewed journals and some related patents have been recently reported. These are polymeric matrices with an appreciable amount of phenolic and carotenoid antioxidants that exhibit a significant biological activity and health related properties.

METHODS: The content of macromolecular antioxidants in many plant foods is similar or even higher than low molecular size antioxidants (vitamins C and E, flavonoids, β -carotene, lutein, etc.) .

RESULTS: After reporting the main sources of macromolecular antioxidants and their properties, this talk will address potential applications of this novel functional ingredient in cosmetics and in nutricosmetic as well as in dietetics.

CONCLUSION: Study supports the importance of research focusing on nutricosmetic beverage enriched with macromolecular antioxidants .

Key words

Bioactive compounds, novel ingredients, low molecular size, health

Extraction of flavonoids from the leaves of *Annona muricata* L.: Their potential in the cosmetic formulations

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Abstract

BACKGROUND: Studies of leaves of *Annona muricata* L., have confirmed the presence of flavonoids, which have anti-aging properties and the ability to reorganize skin collagen fiber. This work aims to evaluate the influence of extraction parameters in obtaining flavonoids from the leaves of *A. muricata* and the use of this extract as an ingredient in the future development of a cosmetic cream.

METHODS: Evaluation of variables was performed from an experimental compound rotational central design of response surface 23 with star points, by selecting the intervals between 50 and 70 mL/g for the material plant-volume relationship of solvent, between 40-80% ethanol concentration and 2-3 h of extraction. The quantification of flavonoids was performed by colorimetric method at 430 nm, expressed as quercetin equivalents. Experimental pre-formulations used concentrations of 0.4-1% of active ingredient.

RESULTS: The presence of quercetin and other flavonoids in the extracts were determined. The optimum condition in extracting total flavonoids was obtained at an ethanol concentration of 96%, a relation of 70 mL/g solvent and a time of 1.6 h, to obtain a process yield of 87%. Based on color (1% of yellow) and characteristic odor the best preparation method was identified.

CONCLUSION: The best extraction conditions in obtaining an extract from leaves of soursop containing (or rich in) flavonoids were selected with potential use in production of an anti-aging cream.

Key words

Phytocosmetic, color and characteristic odor, Soursop containing, Anti-aging

Antiparasitic plants in El Salvador

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Abstract

BACKGROUND: In El Salvador parasitic infections are still a problem for the population due to lack of hygiene and to deficiencies in the supply and quality of drinking potable water. On the other hand there is a rich tradition of using more than 50 plants known for their antiparasitic properties among by the population.

METHODS: For the study, a survey was conducted nationwide covering a total of 65 municipalities representing a total of 24.80% of all municipalities in the country. A set of 180 plants with reported antiparasitic property, using only vernacular names, was considered to select only 10 species. Preliminary phytochemical screening of extracts was conducted on the 10 species.

RESULTS: The results obtained agreed with reports of past studies considering same properties. The properties of such antiparasitic characteristics in many essential oils, tannins, flavonoids and saponins was also found in those plants.

CONCLUSION: Antiparasitic potential opportunities in the selected plants were found that coincided with the knowledge of Salvadoran population. Such plants could be the raw material for the development of new products to be incorporated into new domestic and international markets and supporting entrepreneurs in the pharmaceutical industry and agricultural industry in El Salvador.

Key words

Ethnology, ethnobotany, ethno-medicine, phytochemical screening

The long and hard way to get permission to access traditional knowledge associated with genetic resources in Brazil: the case of antimalarial plants in the Amazon.

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Abstract

BACKGROUND: Brazil is the country with the highest biodiversity in the world, housing approximately 20% of known species, as well as being home to some 250 indigenous peoples and other 30 traditional communities.

METHODS: Since 2001 the Brazilian legislation on access to traditional knowledge associated with genetic resources is based on a fragile provisional amendment (PL 2,186 / 2001) supported by a number of complementary texts that hinder their understanding and conducting research in the area by this legal tangle. Brazilian law follows the provisions of the Nagoya protocol and whose principle that any research or activity with people and traditional communities should sign a term of Prior informed Consent.

RESULTS: From this term many permits are required for work in Brazil depending on the type of research, region and communities involved. In some cases it is required up to eight different permits that are issued for up to five ministries, which takes several months, because of the bureaucracy and inefficiency of these bodies. The project "Network studies of chemical compounds to fight malaria from ethnopharmacology in the states of Acre and Amazonas" gathered **between** the years 2010-2014 a group of researchers from several Brazilian institutions for the study of antimalarial plants used by people and traditional communities of the Rio Negro and Rio Purus basins, in the Brazilian Amazon region, participating people from 55 communities in eight municipalities. In all, the process for obtaining all permits took three years, the result of several requests for information, and an unjustifiable delay analysis process. The case has become emblematic for its complexity and delay. In November 2015, the Brazilian Congress passed a law which replaced this legislation (Law 13,123 / 2015) and it was sanctioned by the Presidency, although still in the regulatory process.

CONCLUSION: Finally the new law facilitates the activities of research and bioprospecting, but at the same time withdrew the fundamental rights of peoples and traditional communities, without doubt the biggest losers with this new legislation.

Key words

Ethnopharmacology, bioprospection, traditional communities, regulatory process

Development of an Amazon açai hair line tested by region beauty professionals

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Abstract

BACKGROUND: Açai (*Euterpe oleracea* Mart., Arecaceae) is a plant native to the Amazon, whose fruits are known as "black gold". They have many nutrients and proteins, and the juice made from their pulp is rich in anthocyanin, which is useful for fight against hair aging and promotes hair hydration. Based on that, the Natural Products Laboratory developed the hair products line, targeting cost-effectiveness.

METHODS: A workshop with 10 professionals from the beauty cooperative Coper-Styllus was held in two stages in 2015: the first, on October 23 consisted in training on the handling of each product; and the second, on October 25, was a test of the products on individuals. A questionnaire was applied, in which clients and professionals evaluated the results.

RESULTS: The clients and the professionals approved the overall quality of the line, certifying that the products have high moisturizing power and pleasant fragrance. They stated that they would replace the products they already use. Women's hair can be a major source of concern, specially when aging signs begin to appear. Some women believe that this is a problem restricted for the elderly, but they are incorrect. The aging of the hair strands can be caused by various factors which can be internal, such as biochemical and hormonal disorders; or external, such as exposure to sun, dust, wind and chemicals. The development of this line is of great interest to beauty professionals for their benefits. Its composition aids in anti-aging treatment for the hair, reducing dryness and consequently ensuring deep hydration. In addition to enhancing customer loyalty, it can create a significant increase in profitability by the reduced cost of the products.

CONCLUSION: We conclude that the Açai line will bring numerous advantages to professionals and clients alike thanks to the benefits it brings to the hair and to its low cost.

Key words

Beauty products, *Euterpe oleracea* Mart., elderly and hair, reducing hair dryness

Hair line professional development with Murmuru butter (*Astrocayium ulei*)

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Abstract

BACKGROUND: The cosmetic industry is constantly seeking natural products. On the Brazilian Amazon, the murmuru (*Astrocaryum ulei* Burret, Arecaceae) butter, a potential source, with fruits contains an odorless, white fat, that doesn't become rancid easily. It is rich in short chain saturated fatty acids with moisturizing characteristics. We developed a cosmetic murmuru line, that moisturizes, protects and restores the skin and hair.

METHODS: Viscosity tests were conducted with a Ford cup viscometer. pH tests, associated with concentration of acid, metal and salts, were made with a pH meter. The tests were performed at the Natural Products Laboratory of the State of Acre Technology Foundation (FUNTAC). The product line was presented in to professionals of Cooper Estyllus, who evaluated its quality.

RESULTS: Viscosity and pH were acceptable for the industry parameters. The professionals were able to prove the effectiveness of hydration and regeneration of the hair strands provided by the developed products. During a second stage of the line performance, the products were tested by customers and a questionnaire was used to identify the line acceptance by both professionals and customers. All customers noticed significant difference in hair hydration, as well as brightness. The professionals also approved the murmuru line of hair products for its cosmetic benefits and because this line may represent a higher profit, as the products can be made locally at lower cost. The hair cosmetics line murmuru was developed in order to nourish and moisturize the strands damaged by wind action, sun and chemicals, in addition to causing a feat "antifrizz" in curly hair.

CONCLUSION: Because of its high concentration of oleic acid, the product creates a protective layer on the strand, restoring its hydrolipidic structure, besides being highly nutritious, and promoting natural elasticity and moisture of the hair.

Key words

Cosmetics, hair line products, moisturizer, antifrizz

Pharmacological properties of lucidone, a naturally occurring cyclopentanedione

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Abstract

BACKGROUND: Lucidone is a naturally occurring cyclopentenedione, initially isolated from the fruits of *Lindera lucida* Bl. Boerl. (Lauraceae) and subsequently from other species, including *L. erythrocarpa* Makino. Accumulating scientific evidences indicate that lucidone possesses various therapeutic effects including, anti-inflammatory, anti-oxidant, anti-diabetic, hepato-protective, dermato-protective and skin-whitening effects. An initial study by Oh et al. (2005) reported that lucidone inhibited human farnesyl protein transferase activity, with an IC₅₀ value of $40 \pm 3.5 \mu\text{M}$.

METHODS: The anti-inflammatory activity of lucidone was evaluated by our team and reported that lucidone has strong anti-inflammatory activity against lipopolysaccharide-induced inflammation via suppression of NF- κ B and MAPKs signaling pathways in vitro and in vivo.

RESULTS: Lucidone also showed anti-inflammatory activity against croton oil-induced mouse ear edema. In addition, we reported that lucidone protects hepatic cells against alcohol-induced oxidative stress via inducing anti-oxidant genes through the activation of Nrf-2 signaling pathway. Lucidone also suppress hepatitis C virus replication by Nrf-2-mediated anti-oxidant genes. Moreover, Lucidone shows anti-diabetic activity by suppressing adipogenesis in adipocytes and attenuates obesity and consequent metabolic disorders in high-fat diet mice. Furthermore, we found that lucidone has the anti-melanogenic effect that inhibits melanin production in melanocytes through the down-regulation of tyrosinase and its corresponding transcription factor MITF.

CONCLUSION: We recently reported that lucidone protects human skin keratinocytes against free radical-induced oxidative damage and inflammation through the up-regulation of HO-1/Nrf2 antioxidant genes and down-regulation of NF- κ B signaling pathway. These studies suggest that lucidone could be a potential candidate for the development of drug against inflammatory disorders.

Key words

Lindera erythrocarpa, anti-inflammation, hepatoprotection, anti-melanogenesis, anti-obesity

Effect of ethanolic extracts of *Rhizophora mangle* L. in fibroblast proliferation for possible application for its healing effect

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Abstract

BACKGROUND: Fibroblasts play an important role in the regeneration of tissues, because they are involved in migration, proliferation, and collagen production. The aim of this study was to evaluate the effect of mangrove ethanol extracts on proliferation of two fibroblast cell lines to determine their possible application for its healing effect.

METHODS: Murine (L-929) and Chinese hamster lung (QC) fibroblasts, Sigma medium: minimum essential Eagle medium, fetal bovine serum, incubation at 37°C with 5% CO₂: 95% air atmosphere were used. The extracts were dissolved in 50% ethanol and were done dilutions (62.5, 31.25, 15.6, 7.8 and 3.9 mg/mL). Cells were incubated for 48 hours with the extract; and the proliferation was measured with MTT reagent (5 mg/mL); reading was performed at 570 nm, by calculating the percentage of proliferation.

RESULTS: Traditionally, the red mangrove cortex is used for its healing effect, but obtaining it can cause loss of this species if a management plan is not established; whereby, it is interesting to evaluate the activity of the leaf to promote the conservation and better use of the species. Ethanolic extracts of leaf showed greater stimulation of fibroblast proliferation at a concentration of 3.9 µg/mL; while cortex extracts showed no remarkable activity. Mangrove ethanolic extracts have a favorable effect on the stimulation of fibroblasts, therefore they can promote healing processes; being a viable alternative that can ensure the sustainability of the species.

CONCLUSION: Ethanolic extracts of mangle leaf showed the highest stimulation in two lines of fibroblasts at a concentration of 3.9 µg/mL.

Key words

Fibroblasts, proliferation, regeneration of tissues, mangrove

The link between skin conditions and lipoperoxidation: possible application of Traditional Chinese Drugs

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Abstract

BACKGROUND: Topical inflammation underpins almost every skin condition. The search for new safer therapies to eczema, psoriasis, and atopic dermatitis, among other chronic skin conditions, is therefore warranted. Inhibition of lipid peroxidation may be a therapeutic target. However, unspecific inhibitors of lipid peroxidation that may successfully quench the free radicals, stop the chain reaction leading to lipid peroxides and MDA but at the same time impair the synthesis of eicosanoids, which may promote wound healing in the early phases of skin damage. We here discuss if there is a link between the inhibitory properties of lipid peroxidation and eicosanoid biosynthesis in Traditional Chinese Medicinal plants. From 1993 to 2001, a systematic pharmacological and biochemical study of a selected set of TCM drugs was carried out in order to provide a comprehensive account of their activities at tissue, cell and molecular levels [1–3]. All the published data provide a unique overview as they are derived from the same certified materials, which were supplied by the TCM School in Amposta (Spain).

METHODS: With the help of cluster analysis we could understand patterns between their Traditional Chinese Attributes and their differential inhibition of lipid peroxidation and / or eicosanoids release.

RESULTS: Preliminary results point towards the idea that “Cold and Bitter” plants externally used in skin conditions by MTC inhibit with great potency both lipoperoxidation and eicosanoids synthesis. “Warm and Sweet” drugs internally used preferentially inhibit eicosanoids synthesis. An heterogeneous group of cold, warm and neutral drugs, acting upon “Qui”, “Yin” or “Wind” do not effectively inhibit any of these processes and correspond to drugs used as liver and spleen tonics, hence endowed with potential immunomodulatory action.

CONCLUSION: The data may lead to a rational use of these plants in cosmeceutical products. Eicosanoid biosynthesis; Inhibition of lipid peroxidation; Eicosanoids release; Skin conditions.

Key words

Eicosanoids synthesis, chronic skin conditions, lipid peroxidation, immunomodulatory action

A shampoo with *Rosmarinus officinalis* and *Verbena litoralis* for the treatment of dandruff and hair fall

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Abstract

BACKGROUND: This work was aimed to assess the possibility of dandruff reduction and hair growth improvement with a shampoo containing *Rosmarinus officinalis* (RO) (Lamiaceae) and *Verbena litoralis* (VL) (Verbenaceae) extracts.

METHODS: RO and VL plants were collected during the flowering time, processed by hydro-distillation and stored in dark bottles until use. Essential oils from RO were obtained later and a shampoo commercial formulation elaborated. Stability analysis was performed on three batches at accelerated conditions ($40\pm 2^\circ\text{C}$) and $70\pm 5\%$ relative humidity and compared by ANOVA with $p < 0.05$. The presence of 1, 8 cineol, as determined by plaque chromatography, was used as a chemical marker of quality. A dandruff fungi culture was developed on Dixon medium *in vitro* for evaluation of fungicide activity. Patients (100) suffering from hair fall and dandruff used this shampoo three times a week for clinical evaluation.

RESULTS: Reduction of dandruff, hair fall and alopecia area was seen after treatment, like with a commercial shampoo containing 2 % ketoconazole.

CONCLUSIONS: A combination of 2 mL RO essential oils and 40 mL of conventional shampoo inhibits dandruff fungi growth *in vitro*. Its chemical composition and clinical effectiveness is stable for at least two years.

Key words

Romero, verbena, dandruff, hair, essential oils

A steroid-like phytochemical Antcin M is an anti-ageing reagent that eliminates hyperglycemia-accelerated premature senescence in skin fibroblasts by direct activation of Nrf2 and SIRT-1

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Abstract

BACKGROUND: Hyperglycemia, a characteristic feature of diabetes mellitus, accelerates stress-induced premature senescence (SIPS) in dermal fibroblasts. Several hypoglycemic agents from natural sources have possible anti-aging effects. In the present study, we investigated the anti-aging properties of antcin M (ATM), a unique triterpenoid isolated from the fruiting bodies of *Antrodia salmonea* fungus, and elucidated the molecular mechanism underlying the effects.

METHODS: Human normal dermal fibroblasts (HNDFs) were exposed to high glucose (HG) with or without addition of ATM for 3 days. The HG-induced oxidative stress, cellular senescence and cell-cycle arrest were determined.

RESULTS: We found that exposure of HNDFs to HG (30 mM) for 3 days, accelerated G0/G1 phase arrest and senescence. Indeed, co-treatment with ATM (10 μ M) significantly attenuated HG-induced growth arrest and promoted cell proliferation. Further molecular analysis revealed that ATM blocked the HG-induced reduction in G1-S transition regulatory proteins such as cyclin D, cyclin E, CDK4, CDK6, CDK2 and protein retinoblastoma (pRb). In addition, treatment with ATM eliminated HG-induced ROS through the induction of anti-oxidant genes, HO-1 and NQO-1 via transcriptional activation of Nrf2. Moreover, treatment with ATM abolished HG-induced SIPS as evidenced by reduced senescence-associated β -galactosidase (SA- β -gal) activity. This effect was further confirmed by reduction in senescence-associated marker proteins including, p21CIP1, p16INK4A, and p53/FoxO1 acetylation. Furthermore, treatment with ATM increased SIRT-1 expression, and prevented SIRT-1 depletion. Further analysis revealed that ATM partially protected HG-induced senescence in SIRT-1 silenced cells. A similar effect was also observed in Nrf2 silenced cells. However, a complete loss of protection was observed in both Nrf2 and SIRT-1 knockdown cells suggesting that induction of both Nrf2-mediated anti-oxidant defense and SIRT-1-mediated deacetylation activity.

CONCLUSION: Taken together, the present study concludes that antcin M ameliorates HG-induced oxidative stress-mediated premature senescence in dermal fibroblasts via directly activating Nrf2 and SIRT-1 pathways.

Key words

Antcin M, hyperglycemia, Nrf2; SIRT-1, G1-S transition regulatory

Characterization of seed oil from *Arachis hypogaea* for applications in lip gloss and skin cream

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Abstract

BACKGROUND: Peanut (*Arachis hypogaea* L., Fabaceae) is grown worldwide in the tropics and temperate zones, primarily as an oil seed crop. Peanut seeds make an important contribution to the diet in many countries. Chemical and microbiological characteristics of seed oil extracted by expression from *A. hypogaea* are evaluated for applications in lip gloss and skin cream.

METHODS: Oil was obtained by expression. The physical and chemical properties of the oil and cosmetic products were evaluated, including color, acidity, iodine and peroxide values, saponification index, melting, boiling and freezing points, rancidity value, pH, density, centrifugal and reversibility tests, homogeneity, and technical and economic feasibility for product development.

RESULTS: The physical properties of the oil showed to be fluid at room temperature (25-30°C) and the color to be pale-yellow or golden-yellow; density was 0.911 ± 0.004 g/mL, refraction index 1.4696, boiling point >218°C, and freezing point 7°C. Chemical properties of the oil were: Acid value (Av) $0.71 \pm 0.09\%$; Peroxide value (Pv) (8.29 ± 0.51 meq O₂/Kg), Saponification value (Sv) (188.57 ± 1.39 mg KOH/g), and Iodine value (Iv) of 88.11 ± 1.29 mg/100. This oil offers the possibility of being used at industrial level since quality results for lip gloss and skin cream were satisfactory in compliance with the parameters evaluated. The oils and glycerides act in cosmetic formulations as skin-conditioning agents; the fatty acids as a surfactant-cleansing agent; and the flour as abrasive, bulking and/or viscosity-increasing agent.

CONCLUSION: Compliance with the quality parameters indicates that the seed oil of *A. hypogaea* can be used as raw material in the formulation of cosmetics because the products evaluated were stable.

Key words

Cosmetics, chemical, microbiological, analysis, stability

Mycelia from *Pleurotus* spp. (oyster mushroom): a new wave of antimicrobials, anticancer and antioxidant bio-ingredients

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Abstract

BACKGROUND: There has been an upsurge of interest in mushrooms, such as *Pleurotus* species, as an important source of bioactive compounds with antitumor, antioxidant and antimicrobial properties. Only 15% of all mushroom products are based on mycelial extracts. Therefore, mycelia-submerged culture represents a promising approach to search new safe and healthy myco-products with standardized quality in addition to mushroom fruiting bodies.

METHODS: The study examined the in vitro antimicrobial, antitumor and antioxidant activities of a hot-water extract from *Pleurotus* sp. mycelium. The antimicrobial activity was screened through the activation of the microbial autolytic system of four bacteria and four yeast strains. The anti-proliferative effects on NB4 human leukemia cells were measured by flow-cytometry analyses. The antioxidant activity was investigated at the concentration of 10 mg/mL by the scavenging of DPPH and ABTS radicals, the reducing power and the inhibition of lipid peroxidation.

RESULTS: The extract activated the microbial autolytic system of eight strains: seven autolyzing strains with intensity values (Is) ranging from 2.7% in *Candida* sp. to 36.1% in *Saccharomyces cerevisiae*, while autolysis was of 1.8% in one non-autolyzing strain (*Bacillus cereus*). Thus, the microbial autolytic system of the strains tested (including Gram-positive and Gram-negative bacteria as well as yeasts) could be activated in vitro by mycelial extract. *Pleurotus* extract reduced the viability of NB4 leukemia cells, particularly at the concentration of 200 µg/mL to 82% compared to control cells, and induced apoptosis demonstrated by an increase in annexin V-FITC+ cells (25% at 200 µg/mL). The cells were arrested in the G2/M phase supporting a cell-cycle dependent anticancer mechanism. At 10 mg/mL, the extract showed the most potent scavenging effects for DPPH and ABTS radicals (96.05% and 55%, respectively) and the inhibition of lipid peroxidation (47.2%). Moreover, the mushroom extract at 5 mg/mL manifested reducing power of 1.105. Although carbohydrates (76.8%, w/w) appear to be the most important

antitumor compound, secondary metabolites-like phenolics would also contribute to the antioxidant, antimicrobial and anti-proliferative activities.

CONCLUSION: The hot-water extract obtained from *Pleurotus mycelium*, in light of its in vitro antimicrobial, antitumor and antioxidant effects could be considered as a good candidate for developing nutraceuticals and for designing innovative phyto- (myco-) therapeutics and phytocosmetics applications.

Key words

Nutraceuticals, phytotherapy, microbial autolytic system, antitumor compound

Quality control of Buriti (*Mauritia flexuosa* L. f.) oil for use in triphasic oil for skin moisturizing

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Abstract

BACKGROUND: Buriti (*Mauritia flexuosa* L. f., Arecaceae) is a palm tree native to Brazil. Its fruit has a hard and scaly shell covering a soft and oily pulp. Buriti oil is rich in oleic acid and beta-carotene, which is a very powerful antioxidant. This study aimed to evaluate the oil and create a product using higher amount of it.

METHODS: Fruits collected in the State Forest of Antimary, in Bujari, Acre, were processed, dried and then extracted cold by mechanical pressing. Chromatographic analyzes and the following physicochemical analysis were performed under the rules of AOCS: acid value (AV), peroxide value (PV) and saponification index (SI). The sample of different batches were submitted to gas chromatography. After the quality of the oil was verified, a formula was developed for a triphasic oil for moisturizing the skin.

RESULTS: The average for each parameter measured in the physicochemical analysis was compared with the maximum limit set by the ANVISA standard RDC-270. The results with their comparisons are as follows: AV- 2.05 compared to a maximum of 4 mg KOH /g set by ANVISA; PV- 3.24 to a maximum of 15 meqO₂/kg; SI- 193.56 to a maximum of 250 mg KOH/g. The chromatographic data showed that on average the Buriti oil of the region contains 64.37% oleic acid and 14.75% of palmitic acid. These results demonstrate that the analyzed oils have an excellent composition for use in cosmetics and are good raw materials for production of triphasic oil, particularly when accompanied with other elements such as mineral oil and propylene glycol, having the power of moisturizing and smoothing the skin. A triphasic oil formula with high power of moisturizing was developed. It protects the skin and offers extraordinary softness, combining visual and moisturizing with a pleasant and refreshing fragrance. The use of triphasic oil promotes the formation of a light film that provides a glossy and fragrant touch throughout the day.

CONCLUSION: Buriti oil is excellent for the cosmetic and pharmaceutical industry. Triphasic oil provides optimum moisturizing and softness of the skin. In addition it perfumes without a feeling of greasiness, as long as it is used correctly.

Key words

Chromatography, physicochemistry, oleaginous, cosmetic hydration

Essential oil composition, phenolic contents and antioxidant activity of Lamiaceae herbs

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Abstract

BACKGROUND: Composition of the essential oils in the fresh aerial parts of mint, sage, and thyme were compared. Also, the plant extracts were analyzed for the phenolic contents and antioxidant activity.

METHODS: A total of 20 species belonging to the Lamiaceae were studied for the essential oil constituents, phenolic acids and flavonoids in the extracts, and the antioxidant activity. Oil extracted from the fresh aerial parts was analyzed using the GC-FID and GC-MS for the identification and quantification of the constituents. The results were validated using authentic standards and library comparisons. Phenolic and flavonoid content in the methanolic extracts from the herbage were separated using a RP-HPLC.

RESULTS: The main oil constituents identified were thymol in the creeping and common thyme and geraniol in golden lemon thyme. In the sage species the major constituent identified was α -thujone. Whereas the major constituent in the mint species were as follows: (-)-carvone in spearmint; menthol in pineapple mint; acetate in grapefruit mint; linalool in apple mint and ginger mint; caryophyllene oxide in peppermint; linalyl acetate in orange mint (*Mentha citrata*); pulegone in pennyroyal mint (*Mentha pulegium*). Significant differences were noted in the antioxidant activity of various species.

CONCLUSION: Lamiaceae oils can be potential sources of natural antioxidant agents, in particular, peppermint and sages.

Key words

Mentha pulegium, Thyme, Sage, plant extracts

Oil composition and phenolic acid contents of summer squash seeds

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Abstract

BACKGROUND: This study compared the oil yield, fatty acids, and phenolic contents in seeds of several summer squash genotypes. Fatty acids extracted from squash seeds have important applications in the nutrition and cosmetic industries. The unsaturated omega fatty acids linoleic and oleic help control cholesterol, while the saturated fatty acids palmitic and stearic are used in cosmeceuticals.

METHODS: A total of 20 genotypes and two hybrids of summer squash (*Cucurbita pepo* L., Cucurbitaceae) were studied for seed oil content, fatty acid composition, phenolics and flavonoids. Oil extracted from seeds was esterified with methanol to produce Fatty Acid Methyl Ester (FAME). The FAME components were identified and quantified using GC-FID and GC-MS as compared with authentic standards. Phenolic and flavonoid content from defatted seeds were sonicated and separated by HPLC.

RESULTS: Oil content ranged from 7.05 to 26.70% among seeds of the selected genotypes. The predominant fatty acids (76.39 to 80.89% unsaturated) in the oil were linoleic, oleic, palmitic, and stearic. Significant differences were noted among the genotypes for stearic, oleic acid content of oil. Low linolenic acid levels were observed (about 0.6 %). The major phenolic acids were vanillic, syringic, and p-hydroxy benzoic acids.

RESULTS: The results showed potential for squash seed oil from all 20 genotypes to have high unsaturation and phenolic acid contents plus the saturated fats that could improve the nutritive value of human diets and the use in cosmetic industry.

Key words

Squash seed oil, *Cucurbita pepo*, oilseed, Cucurbitaceae, fatty acids; phenolic acids

From farm to science: The experience of bringing the goodness of nature from eco-friendly farming to products that improve human health.

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Abstract

BACKGROUND: Lisan® Laboratories is a Costa Rican Company with over 32 years experience in producing generic pharmaceutical and veterinary products. Lisan® creates its Lisanatura® division in 1998 and invests its utilities in research, development and innovation (R&D&I) of natural products.

METHODS: Lisanatura® possesses a multidisciplinary scientific staff of professionals in fields such as botany, pharmacy, medicine, chemistry, biotechnology and agronomy that develop a new natural products. Raw material suppliers are systematically screened, yet Lisan® Laboratories gives priority to Costa Rican farmers and women's groups that implement eco-friendly practices. Our production plant complies with Food and Drug Administration (FDA) regulations, Good Manufacturing Practices (GMP) and the laboratory achieved a Certified Quality System (ISO 9001).

RESULTS: These technological efforts are rewarded with the commercialization of some products of the Lisanatura® division: Cuamara - *Quassia amara* bark extract and supplement tablets. Hombre grande bark has traditionally been used successfully as a bitter tonic to improve digestion, reduction of bloating, gases, discomfort and distension. It also promotes a healthy liver function. Cuamara is manufactured from Costa Rican Hombre grande. Serenum™ *Justicia pectoralis* extract, Supplement tablets. Tilo inflorescences have traditionally been used very effectively in relieving stress and tension. It aids in restoring emotional balance and improves sleep quality. Serenum™ is manufactured from Costa Rican Tilo. +VIVO™ *Coffea arabica*, *Theobroma cacao* extract. Coffee and Cacao seeds have been used by tradition as energizers to improve mood, fight fatigue, recover physical strength and also enhances mental performance. +VIVO™ is manufactured from Costa Rican Coffee (*Coffea arabica*) and Cacao (*Theobroma cacao*), both internationally recognized as premier raw materials.

CONCLUSION: Costa Rica is a country rich in biodiversity of great potential in terms of human health. Lisan® created its Lisanatura® division in 1998 and invests its utilities in research, development and innovation (R&D&I) of natural products. It is possible to develop excellent products in pharmaceutical industry manufactured and commercialized under environmental responsibility and fair trade. This results in a standardized and safe natural product. All raw materials have showed concentration, bioactivity and purity and are cultivated in organic small farms which include Indigenous communities and Costa Rican women farmers. The products are lactose, gluten and yeast free.

Key words

Quassia amara, *Justicia pectoralis*, *Coffea arabica*, *Theobroma cacao*, standarization, supplements

***Lithraea molleoides* (Vell.) Eng: an Argentinian plant with antichlamydial activity**

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Abstract

BACKGROUND: *Lithraea molleoides* ([Vell.](#) [Engl.](#) (Anacardiaceae) is a tree that grows in Argentina. Leaves extracts are known in folk medicine for the treatment of inflammation and respiratory affections. *Chlamydia trachomatis* causes bacterial infections and treatment failures have been observed. Previous investigations on different extracts of *L. molleoides* have reported antiviral and antimicrobial activities.

METHODS: An infusion, an insoluble fraction of methanol extract and a resorcinol derivatives compounds fraction obtained from dichloromethane extract were assayed. Five *Chlamydiae* strains were assayed in five different conditions: pre incubation with the extract before chlamydial infection; pre incubation and inoculation with the extract; only inoculation with the extract; inoculation and post incubation with the extract, and only post incubation with the extract. Reduction in the number of inclusions was determined with immunofluorescent staining (% of inhibition of infection).

RESULTS: Only insoluble fraction showed positives results. In all the cases, inhibition of *C. trachomatis* was observed when the extract was present during inoculation. According to phytochemical studies conducted to characterize the insoluble fraction, its 90% corresponds to ellagic acid.

CONCLUSION: *L. molleoides* fractions were selected on the basis of their ethnomedical use. Due to the inhibitory effect of insoluble fraction during inoculation we remark the potential use of *L. molleoides* extracts in *C. trachomatis* infection prevention.

Key words

Antimicrobial activities, immunofluorescent staining, ellagic acid, Argentina

Herbal raw material: new regulatory instruments implemented in Argentina

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Abstract

BACKGROUND: ANMAT cooperates in protection of human health, ensuring quality of drugs, medicines, cosmetics and dietary supplements. The main objective is to ensure efficacy, safety and quality. In all these cases provision of raw vegetable materials is done through the same provider channel. ANMAT has accumulated a lot of information about them to be used for public health.

METHODS: ANMAT has adopted the new regulatory paradigm based on science promoting shared among various agencies like University of Buenos Aires, Belgrano University and University of Cordoba efforts, focused on business strategies, control of good manufacturing practices, production of pharmacopoeia monographs and technical advisory group with experience in the field. In 2015, ANMAT has launched Provision No. 5482/2015 for approval of laboratories involved in all aspects of production and marketing of products which included companies processing plant extracts.

RESULTS: In Argentina, pharmacies manufacture their own products with phytoingredients and the medicinal industries produce herbal products that complement its lines. Herbal drugs and its extracts were found in formulations of herbal medicines, cosmetics and dietary supplements. In this framework, all these industries share collection, handling and processing practices to obtain natural extracts. ANMAT has established quality parameters to ensure the safety of the national herbal market. After that, the number of registered companies has incremented to 60%. Groups of professionals and technicians from different universities have worked in order to efficiently fulfill the process of standardization of the natural products. In 2015 the effort of the Argentinian Pharmacopoeia herbal committee was to identify herbal drugs with the objective to include its extracts monographs.

CONCLUSION: Disposition N°5482/2015 for authorization of establishments involving raw vegetable material processing have helped to ameliorate the way of dealing with new market tendencies. Future perspectives are based on the generation of knowledge and technological innovation in value chains.

Key words

Argentinian Government Administration, plant extracts, regulation, technology in value chains

Cream added with *Plantago lanceolata* to treat UV damage of skin

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Abstract

BACKGROUND: *Plantago lanceolata* known as "llantén menor" is used in Mexican traditional medicine as antiinflammatory, astringent, healing and emollient. Acteoside is an antioxidant compound that protect against UV damage. It has been isolated of the aerial parts of the plant.

METHODS: The air-dried leaves were ground and extracted by maceration at room temperature with ethanol. After filtration the solvent was evaporated in vacuum to yield crude extract, phytochemical study of the ethanol extract of the aerial parts lead to the isolation of acteoside as a major compound. 1 % solution of crude extract in ethanol was made in order to perform an emulsion O/W with organic excipients; stability tests established by NOM-073-SSA1-2005 were made.

RESULTS: Oil phase was successfully emulsified into the aqueous phase producing an emulsion of stable and semisolid consistency at room temperature, it has a viscosity of 150,000 cps and pH of 5.6 ± 0.5 , and established parameters of stability were performed.

CONCLUSION: Acteoside exhibited protective properties against UV-damage. Extracts from plants used in Mexican traditional medicine that contain acteoside will lead to obtain potential cosmetic agents.

Key words

Acteoside, UV-damage, crude extract, antiinflammatory

A *Talipariti elatus* Sw. Fryxell flowers extract inhibits histamine-induced edema in mice

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Abstract

BACKGROUND: The flowers of *Talipariti elatus* Sw. Fryxell (Malvaceae) are popularly used to alleviate the symptoms of bronchial asthma. However, there is no scientific evidence supporting this claim.

OBJECTIVE: This work was aimed to determine whether a hydroalcoholic extract of *T. elatus* flowers (TFE) inhibits the edemagenic effect of histamine, key chemical mediator of bronchial asthma.

METHODS: Flowers were collected from *T. elatus* trees at Cerro Municipality in Havana. TFE was obtained with 70 % ethanol and characterized by a phytochemical screening. The acute oral toxicity was evaluated in both sex SD rats, TFE (67; 200 and 600 mg/kg) or ketotifen (3 mg/kg) were orally administered to male Balb/c mice 1 h before an intraplantar injection of histamine (50 µg) and the edemagenic reaction determined as the paw weight increment.

RESULTS: Saponins, tannins, phenols, anthocyanins, alkaloids, quinines, flavonoids and coumarins were the major bioactive compounds in TFE. There were neither deaths nor signs of toxicity among the rats treated with TFE. There was a significant inhibition of histamine-induced edema that was independent on TFE dose and comparable with ketotifen, thus suggesting an antihistamine effect that could be associated with flavonoids.

CONCLUSION: A hydroalcoholic extract of *T. elatus* flowers inhibits a biological reaction to histamine that is involved in the physiopathology of bronchial asthma, that could support its use as a traditional remedy for this disease.

Key words

bronchial asthma, medicinal plant, traditional medicine, antihistaminic action

Introducing Farmaya Laboratories

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Abstract

BACKGROUND: Farmaya started as a program of CEMAT (Centro Mesoamericano de Estudios sobre Tecnología Apropiada) a non-governmental organization (NGO) in 1978 under the name of ERPLAM (Rural Enterprise of Medicinal Plants), which received several international funds.

METHODS: At the beginning ERPLAM started by conducting ethnobotanical surveys to know the plants traditionally used in rural Guatemala. With this information ERPLAM started the cultivation or gathering of medicinal plants by rural groups and validation of several native species in cooperation with national and international academic institutions. Several medicinal plants traditionally used were validated in vitro, in vivo and clinically and phytotherapeutic products were developed based on the published information.

RESULTS: With this preliminary experience and after ERPLAM became Farmaya Laboratories, several phytotherapeutic products (tinctures, elixirs, extracts, capsules) were developed as well as the good manufacturing practices and quality control and are being commercialized by Farmaya and other phytotherapeutic companies. The information generated was used to train rural promoters and health professionals for the safe use of phytotherapies.

CONCLUSION: The initiative born as an NGO project with international funding became an independent self-sustainable company that has developed more than 100 products for different enterprises in the last 30 years.

Key words

NGO project, phytotherapeutic, CEMAT, ERPLAM, ethnobotanical surveys

Fertilization and mycorrhiza inoculation on yield variables of *Salvia officinalis* L.

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Abstract

BACKGROUND: Common sage (*Salvia officinalis* L., Lamiaceae) is one of the most commercially valuable aromatic herbs used for culinary and essential oil. We studied the effect of mycorrhizal inoculation and fertilization on sage cultivation. Mycorrhizal fungi have been reported to promote plant growth as external hyphae transport water and mineral nutrients to plant roots.

METHODS: Sage plants were seeded with or without a commercial mycorrhizal granular mixture, Myco Maximum, from Humboldt Nutrients. Myco Maximum was first added to seeding trays and then pots at a dose of 113g per 0.43-0.85 m³ of media. Fertilization combinations (Control, N, P, K, NP, NK, PK and NPK) were applied to both mycorrhiza infected and non-infected samples. N:P₂O₅:K₂O was applied at a ratio of 1.0-0.43-0.56 dose to the pots.

RESULTS: Yields were significantly different between mycorrhiza infected and non-infected plantings. The major components of the essential oil, extracted by distillation and identified by GC-MS, were camphor, α -thujone, β -thujone, α -humulene, viridiflorol, and eucalyptol (1.8 cineole). The highest level of camphor was produced by plants treated with P (-M) and PK (+M) fertilization with 31.64% and 33.54%, respectively. The highest α -thujone was produced by plants treated with PK (-M) and NK (+M) combinations with 27.51% and 34.24% respectively.

CONCLUSION: Myco inoculation showed the promotion of yield and leaf area indexes of sage production in both greenhouse and field experiments.

Key words

Mycorrhizal inoculation, *salvia officinalis*, sage; fertilization

Preparation of plant oil nanoemulsions and evaluation of their stability and their occlusive and hydration effects on skin

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Abstract

BACKGROUND: Nanoemulsions are used in many pharmaceutical and cosmetic products mainly because their small particle size may contribute to increased physical stability. The aim of this study was the preparation of nanoemulsions using various plant oils, and the study of their physicochemical stability and moisturizing action on the skin.

METHODS: Six emulsions and their corresponding nanoemulsions were prepared using combinations of beeswax or cocoa butter with olive, almond or apricot oil as oily phase. Their physicochemical characteristics were determined and their colloidal stability over time was assessed by monitoring particle size changes using Dynamic Light Scattering or Static Light Scattering, as appropriate, after centrifugation, storing them in various conditions (25o, 4o and 45oC) or accelerated aging (three cycles of heating and cooling: 45oC - 25oC).

RESULTS: The overall results indicated that the nanoemulsions exhibited improved stability compared to the corresponding conventional emulsions. Regardless of the vehicle (emulsion or nanoemulsions) and the oil (olive, almond or apricot oil), the greater stability was achieved at 4oC. The occlusive effect of nanoemulsions was assessed at 6, 24 and 48 hours of exposure to 30oC. The occlusive parameter (F) was calculated for each sample. All samples (emulsions or nanoemulsions) exhibited satisfactory occlusive effect ($F > 10$) mainly at 6h. Two nanoemulsions (beeswax-almond oil, cocoa seed butter-almond oil) gave better results compared to their corresponding conventional emulsions. The use of olive oil showed satisfactory occlusion only at 6h regardless of the vehicle. The occlusion effect caused by nanoemulsions that contained almond oil lasted at least for 48h, while apricot oil showed occlusion effect at least for 48h when combined only with cocoa butter regardless of the vehicle. The skin hydrating effect of the nanoemulsions and conventional emulsions was tested on the inner surface of the arm of healthy volunteers. All samples caused increased skin hydration after the 1h application at a score between 10-20%.

CONCLUSION: Better stability is achieved when stored at 4oC. All samples had satisfactory occlusive index ($F > 10$) at 6h and enhance skin hydration at 10-20%. No skin irritation was observed as a result of samples application on the skin.

Key words

Stability, almond oil, apricot oil, skin hydrating effect, nanotechnology