

International Phytocosmetic Congress (IPC2015)

16-19 March 2015, Bogota, Colombia

ABSTRACT 1

Electrolyte Balance of Freeze-dry Oral Re-hydration Flavored Coconut Water

Puran Bridgemohan

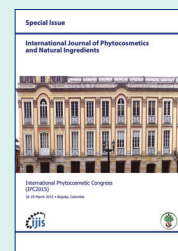
ABSTRACT

The treatment of tropical diseases, particularly gastro-intestinal/viral diseases in low income and rural areas have created a demand for oral rehydration salts with better taste, quality, accessibility and storage. The recommended use of fresh coconut is limited by availability, consistent quality and rapid nutritional deterioration. Reconstituted powdered products have not retained the natural flavor and are often unpalatable. This study evaluated the process of freeze drying fresh [F] coconut water at different maturity stages in its pure form and enhanced with natural fruit flavors (mango and passion fruit). Samples were frozen (-30°C for 48 hours) and then vacuum freeze dried (VFD) using a Labconco FreeZone® 2.5 Liter Freeze Dry System at a pumping speed of 5.0 m³/hour. The rehydrated crystals were analyzed for its electrolyte contents and vitamins using Atomic Absorption Spectrophotometer. The results indicated that the electrolytes balance increased with maturity of the coconut fruits, and that there were no differences between the mango and passion fruit juices. In some cases, the electrolyte content was higher in the fruit juices than the water. The general trend of the electrolytes were: P 1509 to 2191 (mg/L); Ca 160 to 499 (mg/L); Na .01266 to 0.00881 (mg/L); Mg 60.68 to 65.21 (mg/L); Fe <1.0 ppb to 0.1436 (mg/L); Zn 0.3071 to 65.93 (mg/L); Mn 2.08 to 80.2 (mg/L); Cu < 5 ppb to 0.419 (mg/L). The taste and shelf-life were also comparative and some cases better than the commercial rehydration salts.

KEYWORDS Electrolyte; Freeze-dry; Oral Re-hydration; Flavored coconut water

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ABSTRACT 2

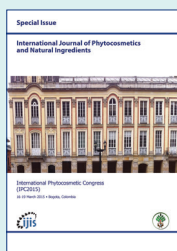
Leaf morphoanatomy, growth and production of essential oil of *Lippia organoides* H.B.K under different levels of irradiance and effect of bioregulators

Delmira Silva, Larissa Costa, Jordany Gomes

ABSTRACT

Lippia organoides H.B.K (Verbenaceae) popularly known as salva de marajó and oregano hill. Its essential oil has antimicrobial properties, and proven antiparasitic insecticide. Environmental factors such as light plays a fundamental role in the development, plant growth and consequently in the synthesis of secondary metabolites, such as the case of essential oils. Plant growth regulators, may also influence the response of many plant organs, however, this response depends on the species and the interaction between various environmental factors. Thus, the aim of the present study was to evaluate the effects of plant growth regulators and different levels of irradiance in the growth, morphoanatomy, the content and composition of the essential oil of *L. organoides*. The experiment was conducted at the Ilhéus, BA, the treatments were characterized by different levels of irradiance (100%, 50%, 35% and 25%) and treated and untreated plants with growth regulators, in a 4x2 factorial. We verified an increase in the biomass of the leaves and the total with the use of growth regulators in irradiance to 100%. Was observed an increase in the density of glandular trichomes in plants cultivated in full sun, causing increases the essential oil content of the species. Treatments did not affect the chemical profile of the essential oil, with thymol as the major component. Changes in leaf anatomy were also verified observing an increase in thickening of the tissues with the increment of irradiance. The application of the growth regulator provided in full sun to an increment in the production of leaf dry biomass, reflecting the production of essential oil.

Keywords: Biostimulants; Medicinal plants; Shading



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ABSTRACT 3

Acetogenin profile of two types of sour- sop (*Annona muricata*) varieties

Puran Bridgemohan

ABSTRACT

The use of graviola (*Annona muricata*) as a tea decoction in the treatment of cancer and as broad spectrum antimicrobial, and anti-internal parasites and lowering blood pressure has continued to increase. This study evaluated extracts of the leaf, fruit, seed, bark and roots of two types of fruit cultivated locally which have high fibre or fibreless fruit. The alcohol extracts of the different plant part were analyzed by LC-MS to determine the phyto-chemical and cytotoxic [anti-tumor] properties and to classify them into the group of active annonaceous acetogenins. The samples were subjected to 3 [MS \hat{e} ve, +ve mode, and UV] chromatograms. The results indicated that present in the seeds were the confirmed acetogenins - Annomutacin or cis-Annomontacin [10.26 with MW about 625], and the cyclic peptide called annomuricatin [MW 11.05]. The leaf contained the similar compounds as the seed with a few other things at MW 300. The UV spectrum identified two phenolic chromophores, and several flavonoid type compounds. Basically, there were more flavonoid type compounds in the leaf extracts and fewer if any acetogenins. Based on the molecular weight, there are new compounds which are found in the root and bark samples. Acetogenins are of great interest for their cytotoxic activities (anti cancer) and are also toxic to insects.

KEYWORDS Graviola; Acetogenins; Annomutacin; cis-Annomontacin; LC-M

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ABSTRACT 4

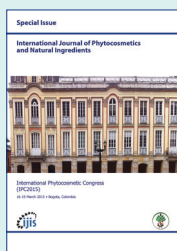
Medium term in vitro conservation of two Argentinian oregano cultivars “ preliminary results of the effect of mannitol and sorbitol as growth retardants

María Belén Marengo, Paula Bima, Marta Susana Ojeda, Lorena Elizabeth Torres

ABSTRACT

The aim of this work was to develop an efficient protocol for the medium term in vitro conservation of oregano. Two concentrations of mannitol and sorbitol were tested in order to evaluate their effect as growth retardants over oregano plants belonging to Alpa Sumaj FCA “ INTA and Aguanda FCA “ INTA cultivars. Both cultivars are preserved in the in vitro collection of oregano germplasm of the Laboratorio de Biotecnología Vegetal (Facultad de Ciencias Agropecuarias - Universidad Nacional de Córdoba). Plants of each cultivar were multiplied by microcuttings and placed in tubes containing 5 ml of five different culture media: MS medium (control), MS added with 25 g.l⁻¹ and 50 g.l⁻¹ of mannitol and MS medium added with 25 g.l⁻¹ and 50 g.l⁻¹ of sorbitol. The oregano plants were maintained in breeding chamber under controlled conditions of temperature (22°C) and photoperiod (16 hours light and 8 hours of darkness). Every six weeks the length of major axis of plants (cm), fresh weight (g.plant⁻¹) and dry weight (g.plant⁻¹) were measured. At 18 weeks, plants were transferred to fresh MS control medium (active growing medium) to evaluate the plants response when mannitol and sorbitol were removed from the culture media. Regardless the cultivar, after 18 weeks of cultivation in slow growth conditions, best results were observed in plants growing in MS medium added with 25 g.l⁻¹ of sorbitol; even though plants cultured on this medium were significantly smaller than those cultured on MS control medium, they showed a healthy appearance and when they were transferred to active growth medium its development was not significantly different from the control plants. These results represent an important contribution for the medium term in vitro conservation of oregano, since it will allow space subculture periods preserving the strength and quality of the plants.

Keywords: Oregano cultivars; In vitro conservation; Slow growth culture; Mannitol; Sorbitol



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ABSTRACT 5

Ethnomedicinal uses of plants among the employees federal, in Ouro Preto, Brazil

Melissa Maia Bittencourt, Viviane Flores Xavier, Rosana Gonçalves Rodrigues das Dores

ABSTRACT

The use of plants for medicinal purposes in the treatment, prevention and cure of diseases is one of mankind's oldest practices. In Latin America, Ethnomedicine is rooted in traditional knowledge of the people. In Brazil, there are differences in practices and techniques of the use of medicinal plants, which are incorporated into daily life, influenced by habits, traditions and customs. These practices as the use of plants in nature, medicinal teas or phytotherapeutic as a viable alternative to the treatment or prevention of disease, with good acceptance by communities of developing countries. It is noteworthy that over the centuries, due to the industrialization of medicines and local growth, this knowledge has dissipated. Ouro Preto, city Cultural Heritage of Humanity, keeps traditions, among which the use of medicinal teas. The purpose of this study was to survey the prevalence, form and frequency of use of medicinal plants among the employees (women older than 21 years) of Federal University of Ouro Preto through semi-structured interviews (snowball). The project was approved in research ethics committee (CAAE: 0057.0.238.000-10). 291 servers were interviewed, with 38.8% men and 61.2% women. Of the women interviewed 40% made use medicinal plants. The plants cited are *Mentha* sp. (10.6%); *Camellia sinensis* (L.) Kuntze (9.6 %); *Ilex paraguaiensis* A. St. Hill. (6.2%) e *Matricaria recutita* L. (6.2%); *Lippia* sp. (5.3%); *Leonurus sibiricus* L. (3.5%); *Pimpinella anisum* L. (2.6%); *Phyllanthus* sp.; *Fragaria* sp.; *Plantago major* L. e *Foeniculum vulgare* Mill (1.8%) e *Bidens pilosa* L.; *Malus* sp., *Equisetum* sp., *Uncaria tomentosa* (Willd.) D.C.; *Sechium edule* (Jacq.) Sw.; *Cassia angustifolia* Vahl; *Rumex* L., *Achyrocline satureioides* (Lam.) DC.; *Citrus* sp., *Ruta graveolens* L.; *Melissa officinalis* L.; *Morus* sp.; *Rosmarinus officinalis* L; *Gossypium Hirsutum* L.; *Valeriana officinalis* L.; *Glechoma hederacea* L.; *Petroselinum crispum* (Mill.) Nyman; *Zingiber officinale* Roscoe; *Echinodorus* sp. (1%). The form of use was the industrialized teas, in sachets. The therapeutic purposes cited most frequently were as hypotensive, diuretic and sedative. Other uses were sporadic as an emollient, tonic, coagulant, stimulant, intestinal regulator, purifying, remineralizing and restorative. These data showed that the prevalence of women using medicinal plants is average and good taking into account the study and socio-economic independence of these. The species used are correlated the most prevalent conditions of the local population (hypertension, diabetes, stress, obesity). It was observed that the form of use and are often cited in relation to the daily requirements, ease of use and cultural trends.

KEYWORDS Ethnomedicine; Ethnobotanical; Etnopharmacology; Medicinal tes; Medicinal Plant; Phytotherapy

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ABSTRACT 6

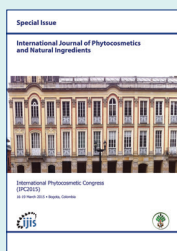
Control effect of biological and medicinal plants in the physiological quality and moisture content of coffee seeds, stored in different environmental conditions and packaging

Genaina Aparecida de Souza, Raquel Maria de Oliveira Pires, Natália Machado Silva, Samyra Alves Condé, Paola Andrea Hormaza Martínez, Lucas Castro Alves, Marcelo de Freitas Ribeiro

ABSTRACT

Reduced moisture can favor the low of metabolism increasing the life time of the storage seeds. However, coffee seeds are classified like intermediate, what difficult the reduction of water content to ideal levels. The objective of this work was to verify the variations in the water content of coffee seeds stored in three different packages and in two environments and relate them to the germination and longevity. Were used coffee seeds from the cultivar Red Catuaí IAC 44 with initial water content of 42%. The randomized design was in block with four replications. Seeds were conditioned in three packages (polypropylene flasks, kraft paper bags and nylon bags) and stored in cold chamber and natural environment, treated with medicinal plants (Rosemary-Rosmarinus officinalis; basil-Ocimum americanum L.; garlic-Allium sativum; cinnamon-Cinnam spp.; horsetail-Equisetum arvense; clove-Caryophyllus aromaticus; fennel-Pimpinella anisum; ginger-Zingiber officinalis, basil-Ocimum basillium. Which were tested at the concentration of 200 g/kg seed. Were also tested three biofungicides: Trichoderma SP (1 g/kg seed) Trichodel (50 g/kg seed), Trichoplus (50 g/kg seed) and the control. After three, nine, twelve and fifteen months were evaluated the germination percentage and the moisture content, when stored in natural environment, the seeds kept viable only until the six months. The polypropylene flasks and nylon bags were efficient on keep the moisture content of seed superior than 40% while the paper package did not present a good performance. The high moisture can negatively affected the metabolism of seeds accelerating it. In this way, a possible consume of reserve compounds and a higher proliferation of microorganisms, may have contributed for the reduction of viability of seeds. Already in those seeds conditioned in paper package, was verified decrease in the moisture content of seeds (lower than 20% at six months). The short content of moisture can also contributed to the decrease of metabolism activity, favoring the oxidation of reserve compounds and the death. Seeds stored in cold chamber, behaved it similarly in relation to moisture content, when conditioned in different packaging, but these presented viability up to fifteen months. This behavior possibly is related to the control of temperature (10°C) and relative humidity (60%) of the storage environment. It is possible to conclude that not only moisture influences the storability of coffee seeds, but the temperature has a strong influence on cellular metabolism which directly affects the life and the percentage of seed germination.

Keywords: Moisture; Medicinal Plants; Biofungicides; Coffee seeds



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ABSTRACT 7

Secretory structures in “guaco” *Mikania laevigata* Sch. Bip. Ex Baker: histochemical identification of medicinal compounds

I.A.C. Coutinho, M.C.M. Fonseca, R.M.S.A Meira

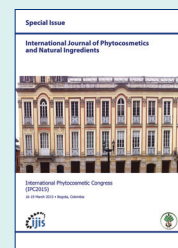
ABSTRACT

Mikania laevigata Sch. Bip. Ex Baker (Asteraceae), popularly known as “œguaco”, has been long employed in the folk medicine as antiseptic, anti-inflammatory and antibacterial. Therapeutic properties have been exhibited by whole guaco plants, however, the pharmacological effects of guaco are generally attributed to the leaves. Although anatomical descriptions of the stem and leaf have been reported, no correlations between the anatomical descriptions and the sites responsible for the production of the guaco medicinal compounds have been performed. The present study aimed to fill the knowledge gaps on the anatomy of the secretory structures reported for *M. laevigata* as well as to conduct a histochemical study in order to reveal the sites responsible for the synthesis and/or accumulation of the guaco metabolites in mature leaves. Samples from three different cultivars (UNICAMP, UNAERP and CENARGEM) were subjected to standard light microscopy techniques and histochemical analyses. A single-layered epidermis on both adaxial and abaxial sides and a hypodermis only the adaxial side were observed. Dorsiventral mesophyll, collateral vascular bundles and secretory ducts associated with the xylem were present. Secretory trichomes were found on the abaxial epidermis. Such trichomes are uniseriate and have the apical cells turned downwards in a way that resembles a comma. The midrib is composed of 3-5 vascular bundles, secretory ducts on both adaxial (associated with the xylem) and abaxial (associated with the phloem or near it) sides and subepidermal collenchyma. The ducts are lined with a single-layered secretory epithelium. The secretory trichomes turned positive results to polysaccharides and lactones while the epithelial cells as well as the secretion of the duct lumen to oils, resins, lactones and rubber. Our results show that the guaco medicinal metabolites are produced by the secretory epithelial cells lining the ducts and such metabolites are made up by a mixture of compounds. Although the literature reports that coumarins (lactones) are the predominant compound in guaco tinctures, it is quite possible that the medicinal properties of guaco are the result of such a mixture of compounds identified by the histochemical tests instead of coumarins only.

KEYWORDS Anatomy; Lactones; Oils; Resins; Rubber; Secretory ducts

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ABSTRACT 8

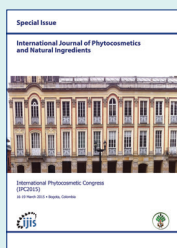
Strategies for building a productive arrangement of medicinal plants in Minas Gerais - Brazil

Ivan Magalhães, Maria Souza, Crisangela Souza, Maira Fonseca, Claudia Pinto

ABSTRACT

The use of medicinal plants is an ancient practice, but restricted to groups and communities that traditionally transferred from generation to generation. However, this form of transference, by itself, is not enough for the people enjoy the potential benefits of therapies based on the use of these plants. Furthermore, local systems which provide medicinal species participatory methodologies require the establishment of production arrangements. The Medicinal Plants Research Program in Brazil, part of Brazilian researchers and the Ministries of Science and Technology, Health, Environment and Agriculture has encouraged the association of "popular wisdom" to "technical-scientific" as an incentive to the construction of a development program that includes local production of these species by family farmers and their providing safely. Therefore, it is necessary the development of strategies that involve people who use, to collect, or produce medicinal plants in home gardens. This article intends to present strategies for creating an enabling environment to implement a Development Program for the use of medicinal plants. The work was developed in partnership with rural communities in the Zona da Mata, state of Minas Gerais, Brazil, and integrates initiatives of the Association of Rural Families School (EFA's), professionals of research and extension companies, and involves: a) Ethnobotanical raising activities carried out by elementary and highschool students of EFA's, as part of the theme of action plans addressed in schools; b) Production of informative booklet shaped calendar; c) Sociocultural Rescue of the Traditional Plant Fair; d) Workshops of identification and herborization of local species with students; e) Training and involvement of students in the researches on plant science and phytochemical with species certified for use in the National Health System in Minas Gerais; and f) Technical guidance on the cultivation, use and Good Manufacturing Practices. For consolidation of practices and knowledge there was the participation of researchers, technicians and farmers in the context of the Agroecology Program Research of the Agriculture and Livestock Research Enterprise of Minas Gerais (EPAMIG), including research activities, institutional coordination, health professionals, pharmacies, seminars by schools with distribution of medicinal plants and unconventional vegetable seedlings, technical events, making booklets with schools and awareness of young farmers and local residents. The strategies employed contributed substantially to greater appreciation of medicinal plants and the appropriateness of its use, essential factors for the implementation of a local development program and strengthening of family farming.

Keywords: Medicinal species; Research and extension; Participatory methodology



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ABSTRACT 9

Productivity and content of phenolic compounds in *Mikania laevigata* genotypes cultivated in Brazil

Paulo Silva, Maira Fonseca, Maria Sediama, Rosana das Dores, Clarice Souza

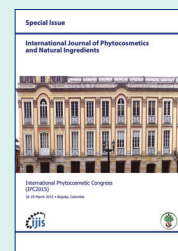
ABSTRACT

Mikania laevigata (guaco) is widely used in the treatment of respiratory diseases and it was selected by the Program for the inclusion of herbal medicine in the Health System of Minas Gerais state (Brazil). Among the phenolic compounds, there are structures derivative from coumarin, a chemical marker of guaco. The cultivate system, the genotype selection adapted to the producing region and the quantification of the active ingredient guarantee the quality of raw material and the therapeutic safety. This work aimed to evaluate the productivity and the yield of phenolic compounds in guaco genotypes in organic cultivation system. Herbarium specimens of genotypes (EMBRAPA, CPQBA and UNAERP) were incorporated into the Herbarium PAMG under the numbers 57032, 57033 and 57031 respectively. The cuttings were rooted and transplanted in a 2 x 1 m spacing on the Research Extension Farm of EPAMIG in Oratórios-MG, Brazil. It was used 5kg/hole of cattle manure for planting. At harvest (September 2013), it was evaluated the fresh leaves and branches weight and the content of phenolic compounds in the leaves. Samples of 1 kg of dried leaves (10% moisture) were taken and from each samples a 2 g was taken for preparation of methanol extracts (maceration). When dosing was added phenolic extracts (0.8 mg), 1.0 ml of Folin-Ciocalteu reagent diluted (1:10) and 1.6 ml of sodium carbonate solution at 7.5% by test tube. Homogenized by vortexing, incubated (18°C and RH=43%) for 30 minutes and the absorbance was measured in a spectrophotometer (750 nm). The standard curve was prepared with PA gallic acid (Sigma) and the results were expressed in mg/g gallic acid. There were significant differences (Tukey 1%) in the fresh weight of the branches and leaves, especially the EMBRAPA genotype (5.1 t/ha-1) as the most productive, followed by CPQBA (4.1 t/ha-1) and UNAERP (3.9 t/ha-1). The phenolic compounds yield is higher in EMBRAPA genotype (271.09 mg/g) followed by CPQBA (238.26 mg/g) and UNAERP (182.01 mg/g). The phenolic compounds yield depends on the genotype and environment interaction. Aiming at the quality of the raw material produced, EMBRAPA genotype is recommended, possibly for being more adapted to the conditions of the region.

KEYWORDS Guaco; Genotypes; Organic system; Productivity; Active compounds

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ABSTRACT 10

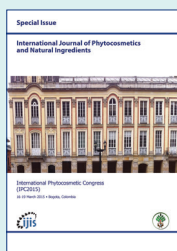
Quality assurance of herbal and homeopathic products

Marina Leite, Maira Fonseca, Claudia Pinto, Joaquim Duarte-Almeida

ABSTRACT

In Brazil, herbal medicine and homeopathy use have grown with consequent increase in the number of homeopathic pharmacies and herbal medicines. Therefore, it is important to implement quality policies in these establishments associated with the existing barriers as: poor quality of raw materials; processing drugs in violation of the rules; difficulty of specifying the characteristics of the raw material and, dispensing and wrong use of pharmaceutical forms as herbal tinctures and mother tinctures. This study aimed to evaluate the physical and chemical quality, presence of active ingredients and the content of flavonoids and phenolic compounds dyes national pharmaceutical companies on the standards of Pharmacopoeias (Brazilian and British) and the analysis of certified laboratories. We evaluated samples of the *Avena sativa* L., *Arnica montana* L. and *Valeriana officinalis* L. from three Brazilian laboratories: a herbal (LAB1) and two homeopathic (Lab2 and LAB3). The samples were purchased directly from these laboratories, performing determinations: amount, alcohol content, pH, dry, relative density and active principle by Thin Layer Chromatography (TLC). Moreover, total flavonoids and total phenolic contents were evaluated. The analyses were performed in duplicate and the results expressed as average \pm standard deviation and were compared with recommendations of the Pharmacopoeia (Brazilian and British) and certificates of analysis of the manufacturers. Differences were found between the characteristics evaluated dyes with those described in certificates of analysis of the products or with the recommendations of the Brazilian Pharmacopoeia. It was observed low values in dry oat herbal tinctures and Arnica (LAB 1) when compared with the recommendation of the pharmacopoeias and low density values in the homeopathic dyes (LAB 2 and 3) compared with the certificates of analysis. There were differences between phenolic compounds and total flavonoids contents between homeopathic and herbal tinctures. The CCD showed retaining profiles (Rf) similar to the respective standard substances to all tinctures. Although not were observed signs of the adulterations or forgery in the tinctures, some quality deviations (dry matter and the density out of standard, for example) can alter the therapeutic efficacy. Thus, there is need for standardization in obtaining the medical plant used in the preparation of tinctures. More studies are necessities to the creation of the others parameters to evaluate the quality with emphasis on principle actives, such as flavonoids and phenolic compounds.

Keywords: Medicinal plants; Quality assurance; Phenolics; Flavonoids



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ABSTRACT 11

Exploring bioactive compounds from nine species of passiflora and its relation with their free radical dpph scavenger activity

Daniel A.V. Montero, Milena Borguini, Marizete Vieira, Sara Fabian, Laura Meletti, Geuseppina Lima, Lin C. Ming

ABSTRACT

Natural antioxidants are our first line of defense against free radical damage and are critical factors for maintaining optimum health. Main bioactive substances identified from the genus *Passiflora* L. include polyphenols, flavonoids, carotenoids, anthocyanins and other natural antioxidants. Phenolic compounds mainly belonging to the flavones C-glucoside class are present in commonly us species such as *P. edulis*, *P. incarnata* and *P. alata*. However, phytochemistry of most *Passiflora* species remain little explore and itâ€™s for this reason that we address our work at the comparison between most cultivated (*P. edulis* L., *P. alata* Curtis., *P. incarnata* L., *P. ligularis* Juss., *P. tripartita* (Juss) Poir) and less common (*P. coccinea* Aubl., *P. gardneri* Mast., *P. laurifolia* L. and *P. mucronata* Lam.) species. Three experiments with completely randomized designs were performer in order to compare total amount of flavonoids, phenols and free radical DPPH scavenger activity (%DPPH) of the nine species of *Passiflora*. Non parametric Kruskal-wallis and Friedman test (falvonoids), parametric analyses of variances (Anova) and the last significant differences (LSD) tests (phenols and %DPPH) were performed to compare the studied species and a correlation analyses was carried out to assessed the interaction between the studied variables using RStudio. Results showed significant differences between the studied passionflowers for the total amount of flavonoids ($p=4.4e-5$), total amount of phenols ($p=2.2e-16$) and scavenger activity of the free radical DPPH ($p=2.2e-16$). Also, we found a positive correlation between %DPPH scavenger activity and the total content of phenolic compounds (0.706) and a negative one between flavonoid (-0.485). The results suggest that scavenger activity of the free radical DPPH (antioxidant capacity) is more related with phenolic constituents rather than flavonoids in passionflower leaves samples and by this mean, passionflowers with high content of phenols have the strongest scavenger activity of the free radical DPPH.

KEYWORDS Passionflower; Free radical; DPPH; Flavonoids; Phenols

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ABSTRACT 12

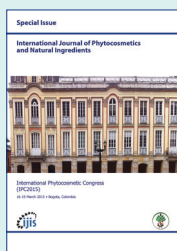
Plants used to treat malaria in the regions of Rio Branco-acre and southern Amazonas state - Brazil

Almecina Balbino Ferreira, Chau Ming Lin, Moacir Haverroth, Douglas Charles Daly

ABSTRACT

Malaria is a parasitic disease caused by organisms in the genus Plasmodium. Approximately 400 species of Anopheles have been described, of which 60 are implicated in the transmission of malaria in different parts of the globe. The first autochthonous case of malaria in Brazil dates to the 16th Century and arose as a natural consequence of European colonization. Along the Acre and Purus rivers, ribeirinho (riverside) populations make use of numerous plant species, both native and exotic, to treat malaria and its symptoms; these populations are familiar with the plants' modes of use and habitats. The present study examined wild plants and cultivated used to treat malaria and associated riparian communities by ailments in the Municipalities of Pauini and Xapuri in Acre and Amazonas states, respectively. During the year 2013 the present study interviewed 86 persons in nine rural communities in Pauini and Xapuri that were known for their use of medicinal plants. After each interview, walks were made (walk in the woods), with the main informant of the family, for identification of plants and to collect the samples of the species indicated. A total of 86 plant species were indicated by seringueiros and ribeirinhos for the treatment of malaria and for associated symptoms, while 26 species were indicated for the treatment of malaria, of which two had no previous indication of use for that purpose. Other species were indicated for the treatment of liver ailments (closely associated with malaria), headaches, body pains, inflammation of the stomach, and anemia. Among the plants mentioned in the survey, we highlight the ten most cited and used by respondents living in the two regions. They are: quina-quina - *Stenostomum acreanum* (40), carapanaúba - *Aspidosperma nitidum* (39), Picão ou carrapicho-agulha- *Bidens pilosa* (29), Copaíba - *Copaifera sp.* (21), melão-de-são-caetano - *Momordica Charantia* (19), quina-quina - *Geissospermum reticulatum* (16), Paracanaúba / carapanúba - *Aspidosperma megaphyllum* (14), Amor-Crescido/ Alecrim- *Portulaca pilosa* (11) species in test 2 (8) and picão-plantado - *Leonotis nepetifolia* (7). The regions of Pauini and Xapuri have an important flora to prospect promising plants for new antimalarial drug, communities studied have a great knowledge about the forest and communities have used medicinal plants for malaria and its symptoms.

Keywords: Malaria; Medicinal plants; Brazilian Amazon; Traditional communities



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ABSTRACT 13

Effect of organic fertilizer on biomass production and bioactives of *Passiflora incarnata* L.

Chau Ming Lin

ABSTRACT

The objective of this study was to evaluate the growth of biomass of *Passiflora incarnata* L. in response to different levels of organic fertilizer on the content of total polyphenols, total flavonoids and TEAC in leaves and stems of wild passion. The experiment was conducted with family farmers, Botucatu, between October 2013 and February 2014. Seedlings were grown in a greenhouse and then transplanted to the field with spacing 0.30 m x 0.60 m without staking, the thicket system irrigated by sprinkler. The experimental design was a randomized block design with seven treatments and four blocks (T1: control, T2: lime; T3: limestone + organic matter; T4: limestone + manure + organic matter; T5: limestone + manure + organic matter + Yoorin T6: 1 organic commercial production; T7: organic commercial production 2. the organic fertilization and liming were made in the row with rabbit manure, chicken manure, organic waste and dolomitic limestone 30 days before transplanting. The extract for analysis of the levels of total flavonoids was performed according to the spectrophotometric method. The total polyphenols were evaluated according to the spectrophotometric method using the Folin-Ciocalteu reactive in the leaves and stems of wild passion fruit, which were dried in an oven with air circulation at 40°C/48 h. Although not statistically different, it can be observed increased levels of flavonoids and polyphenols in leaves of wild passion the T3 and T5 and the commercial products (T6 and T7). From the results obtained, it can be concluded that organic fertilization gives a positive and direct response on the vegetative development of the plant with increased biomass production of fresh and dry matter and directly related to the content of total polyphenols and total flavonoids in *Passiflora incarnata* L. The *Passiflora incarnata* showed a direct correlation between the doses of organic fertilizer and increased production (dry weight) of fresh and dry matter. The culture was highly influenced by the recommendations classified as MEDIUM and HIGH organic fertilizer to the presence of polyphenols and flavonoids. The results obtained on the levels of flavonoids present in shoots of wild passion fruit are considered promising, although present significant differences between the doses of organic fertilizer, were highly related to the factors of production of leaves and stems.

KEYWORDS Biomassa production; Polyphenols; Flavonoids; Organic manure; Wild passion fruit

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ABSTRACT 14

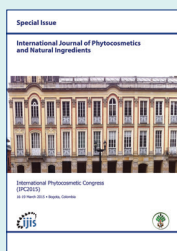
The relationship between citation of use and diversity of medicinal plants found in forest fragments in quilombo remaining in Alcântara, Maranhão State, Brazil

Lin Chau Ming, Jairo Ferreira Linhares, Claudio Urbano Pinheiro

ABSTRACT

The quilombola community Manival, is located at the municipality of Alcântara, state of Maranhão, Brazil and has a long tradition of using medicinal plants. The objective of this study was to relate the citations of use of native medicinal plants with their availability in forest fragments of that traditional community. For this study, we used the technique known as “snowball” to identify key informants and ethnobotanical information about the plants used and the type of vegetation where they occur. The second stage of the research consisted of floristic survey in forest fragments belonging to the community aiming to verify species with circumference at breast height 10= cm, for adult specimens and <10 cm for young individuals, beyond their respective absolute and relative frequencies, using parcels identified with PVC plates, containing the name of the collection site, landscape unit, vegetation type, and name of medicinal species that initiates the plot. The plots were set with dimensions of 10 meters x 20 meters, to calculate the frequencies software JMP (1995) was used. There were sampled 299 individuals distributed in 65 species in an area of secondary forest. 31 species were cited as medicinal, but only 6 species were found in the area: Amescla (*Protium heptaphyllum* (Aubl) - Burseraceae.), Bacuri (*Platonia insignis* Mart - Clusiaceae.), Campestre (*Machaerium aculeatum* Raddi - Fabaceae), Embaúba (*Cecropia sp.* - Urticaceae), Janaúba-vermelha (*Himatanthus drasticus* (Mart) Plumel -. Apocynaceae, and jatobá (*Himenaëa courbaril* L. - Fabaceae). From total of sampled plants, 159 (53%) were adult specimens and 140 (47%) young ones. The greatest absolute and relative frequencies observed in the sampled area were found in *Himatanthus drasticus* (Mart.) Plumel (Fa = 14 and f = 5%), the other species showed lower frequencies. The conclusion is that most of plants used do not occur in the forest belonging to the community, or when it happens, is in a very small number of individuals in already deforested areas and distant from primary forest fragments. Much of the acquisition of plants is done by collecting in communities where informants know where they occur or are provided by other people who go to other communities to acquire the plants.

Keywords: Medicinal plants; Traditional community; Conservation; Ethnobotany; Citation of use



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ABSTRACT 15

Antimalarial plants used by indigenous people of the Alto Negro river region Brazilian Amazon

Carolina weber Kffuri, Lin Chau Ming, Valdely Ferreira Kinupp, Francisco Celio Maia Chaves, Ari de Freitas Hidalgo

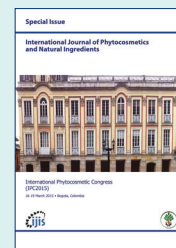
ABSTRACT

More than 3.3 million people worldwide are exposed to malaria. In Brazil, 99% of malaria cases occur in Legal Amazonia. It is an endemic disease in the study region considered to be a sui generis cultural region, as, in this area, more than 90% of the inhabitants are indigenous and more than 22 ethnic groups exist. The forest is preserved and unknown to science. The fieldwork was carried out between September 2011 and November 2013, in 5 indigenous communities. Semi-structured interviews were conducted with 89 indigenous people to record the plants used to treat malaria, the vegetal part used, the method of preparation and the dosage. The plants were collected, identified and deposited in a herbarium. An extensive literature review was performed on data supplied by academic papers published in scientific journals until January 2014, with the goal of finding data on ethnopharmacological, ethnobotanical, phytochemical and/or antimalarial activity for the species cited as antimalarial in this research. 46 species used to treat malaria were recorded. These belong to 24 botanical families and are mostly native to the Amazonian phytogeographical area. Among the species collected, three families are distinguished by species richness: Fabaceae (17.39%), Arecaceae (13.04%) and Euphorbiaceae (6.52%). In the communities included in the study, there was only a consensus of opinion on the use of seven species. The bark (33%) and root (29%) are the most used plant parts. Most of the preparations are made by decoction (65%); The most widely used form of administration is drinking tea (decoction and infusion), followed by taking a full-length bath. Most preparations are used in different doses administered three times per day. Of the 46 species: 14 species have been the subject of studies that prove their antimalarial activity in the laboratory; 4 species have records of traditional use, but little or no research on their antimalarial activity in the laboratory; 17 species have not been studied, but suggest activity based on their chemical compounds or tests of the same genre; 8 species were not found in any studies of antimalarial activity in the literature; and 2 species showed inactivity in antimalarial tests. This work indicates new plants for the chemical and pharmacological study of antimalarials, demonstrates the use of local flora by indigenous people in treating malaria and highlights the importance of cultural and environmental preservation in the search for and development of new medicines.

KEYWORDS Antimalarials; Ethnobotany; Bioprospecting; Brazilian Amazon; Indigenous people

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ABSTRACT 16

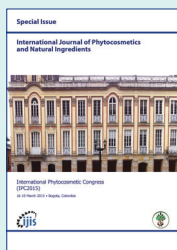
The relationship between biofungicides and medicinal plants in maintaining the physiological quality and moisture content of coffee seeds stored

Marcelo de Freitas Ribeiro, Lucas Castro Alves, Leonardo Araújo Oliveira, Paola Andrea Hormaza Martínez, Raquel Maria de Oliveira Pires, Washington Luiz Pereira, Genaina Aparecida de Souza

ABSTRACT

Coffee is a very important crop for Brazilian agribusiness. Coffee seeds are classified like intermediate, what requires much cares in the conservation, once seeds with satisfactory high physiological quality are essentials to the growth crop. The objective of this work was to evaluate the viability of coffee seeds stored in natural environment and in cold chamber under different treatments to control microbial agents. Were used coffee seeds from the cultivar Red Catuaí IAC 44. The treatments were compared by one-sided Dunnett test, where the alternative controls to microbial agents were: medicinal plants (Rosemary-*Rosmarinus officinalis*; basil-*Ocimum americanum* L.; garlic- *Allium sativum*; cinnamon-*Cinnamomum spp.*; horsetail- *Equisetum arvense*; clove- *Caryophyllus aromaticus*; fennel- *Pimpinella anisum*; ginger-*Zingiber officinalis*, basil- *Ocimum basillium*. which were tested at the concentration of 200 g/ kg seed. Besides the use of chemical fungicide mancozeb (Dithane NT 4 g/kg seeds), potassium sorbate (300 g/L) and sodium benzoate (300 g/L) were also tested three biofungicides: Trichodermil SP (1 g/kg seed), Trichodel (50 g/kg seed), Trichoplus (50 g/kg seed) and the control. After the periods of evaluation (three, six, nine and fifteen months) were counted the germination and measured the length seedlings. When seeds were stored in natural environment, was possible to verify that practically the same treatments which presented results significantly higher to control in relation to the germination, kept the same behavior for the length root, indicating higher vigor in comparison to the others treatments and to control. Among these treatments with better performance for alternative control of microorganisms, the seedlings from seeds treated with rosmarin, garlic, trichodel®, and trichodermil®, presented superior germination and higher length of root than those from the control and mancozebe. However, when stored in natural environment, seeds kept viable only until six months. When stored in cold chamber, seeds kept viable until fifteen months. Besides this, was observed germination above 70% during the experimental period in this last one. Germination and the length of seedlings from seeds treated with medicinal plants and stored in cold chamber, were significantly higher to the mancozebe (comparison treatment) and to control from nine months of storage. This behavior was kept until the end of the evaluation period.

Keywords: Arabica coffee seeds; Medicinal plants; Stored; Microbial agents



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ABSTRACT 17

Ethnobotany approach taperas of maroon communities of Alcântara, Maranhão, Brazil

Jairo Fernando Pereira Linhares, Lin Chau Ming, Claudio Urbano B Pinheiro, Maria Ivanilde A Rodrigues

ABSTRACT

The city of Alcântara has the second oldest city in the state of Maranhão, which had its splendor even at the time of colonial Brazil, when it emerged as a major producer of sugarcane and cotton. The agrarian history of the city is old, dating back more than three centuries. Founded in 1648, was an important Maranhão region because besides the production of cane sugar and cotton producing cattle, salt, and food crops, mainly cassava, maize, rice and beans, reaching its best productive time in the mid-nineteenth century. Currently there are about 200 quilombo remaining areas in Alcântara. The objective was to survey existing medicinal species in taperas (areas previously occupied by human presence, recognized by traces of their occupation, such as ruins) of quilombola communities of Manival - coordinates (S 02° 22 '26.6' ; WO 44 29' 27.4 ") and Castelo - coordinates: (S 02° 24 '43.1' ; WO 44 36' 07.03 "). For purposes of this study were interviewed five residents in Manival community and 7 residents of Castle community to locate taperas and date the time of abandonment. As results were found Taperas aged between 30-50 years of neglect, where two plant species were intentionally introduced for cultivation and at one point abandoned as cultivated species: cotton (*Gossypium arboreum* L. - Malvaceae), and hose (*Mangifera indica* L. - Anacardiaceae), but some species are ruderal: melon-de-são-caetano (*Momordica charantia* L., Cucurbitaceae), castor bean (*Ricinus communis* L., Euphorbiaceae), ground cherry (*Physalis angulata* - Solanaceae), jurubebão (*Solanum lycocarpum* A. St. Hil. - Solanaceae), bellyache bush (*Jatropha gossypifolia* L. - Euphorbiaceae), white spinning top (*Jatropha mollissima* (Pohl) Baill. - Euphorbiaceae), macaúba (*Acrocomia aculeata* (Jacq.) Lodd Ex Mart - Arecaceae).

KEYWORDS Tapera; Medicinal Plants; Ruderal

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ABSTRACT 18

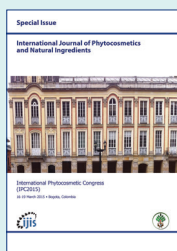
Flavonoids content in different organs and developmental stages of *Bidens pilosa* L.

Ana Carolina Granghelli Sisti, Lin Chau Ming, Marcelo A. Oliveira Junior, Gabriela Granghelli Gonçalves, Maria Izabela Ferreira, Giuseppina Pace P. Lima

ABSTRACT

Bidens pilosa L, belongs to the Asteraceae family and is popularly known as beggartick. All parts of the plant are used in traditional medicine. Studies have shown that the species has hepatoprotective, anti-inflammatory activity with antibiotic and cytotoxic properties in the presence of poliacetilenostiofanos derivatives, flavonoids, sterols, various fatty acids, tannin, acetylenes, etc. Was valued the content of total flavonoids in different plant organs and in different stages of development (pre-flowering, flowering and post-flowering) of *Bidens pilosa* L. The treatments were: T1 = pre-flowering stage, T2 = flowering stages and T3 = post-flowering stage. Trees were planted in March 2014. They were spaced in a month's time and after reaching their stages of development, the separate parts were collected as leaves, stems, flowers and fruits to perform the biochemical analysis of flavonoids, using spectrophotometric methods. Data were subjected to analysis of variance and means compared by Tukey test at 5% significance. The results indicated that the beggartick leaf has more flavonoids in the first phase of its development (harvest 1) than the results obtained for the last harvest (harvest 3). Comparing the flavonoid content in all parts of the plant, the flower was the one with the highest values, followed by leaves, stems and fruits finally. The beggartick has the highest content of flavonoids in the flowers. Regarding the leaf has the highest values before flowering.

Keywords: Beggartick; Bioactive compounds; Medicinal plants; Picão-preto; Flavonoids; Traditional medicine



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ABSTRACT 19

Chemical composition of extracts from *Chaetomorpha Linum*. A potential use in cosmetic Industry

Sylvain SUTOURS

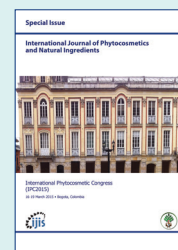
ABSTRACT

Mediterranean Sea is recognized to be a global biodiversity hotspot. Its surface represents only a small percentage (0.8%) of World Ocean surface; but the biodiversity is paradoxically rather high (12%). 26.6% of Mediterranean plants are endemic. Around 76 species are known from the *Chaetomorpha* gender. Among them, the *linum* (Miller) Kütz. species, a green alga growing wild in Mediterranean has never been subjected to a phytochemical investigation. The composition of the green alga *Chaetomorpha linum* (Miller) Kütz., growing wild in Corsican lagoon was investigated by GC-MS and ¹³C NMR. 20 compounds have been identified from both pentane and ethyl acetate extract. Fatty acids, mainly saturated are the main compounds from the pentane extract, whereas sterols derivatives are major compounds from the ethyl acetate extract. Beside common fatty acids found in green alga extract, we report here the identification of uncommon compounds. Indeed 5 compounds were identified for the first time in a *Chaetomorpha* species. Moreover the three diterpens compounds bearing an abietane skeleton (abietic acid, methyl abietate and methyl dehydro-abietate) were identified for the first time from a marine source. This chemical composition seems to be characteristic from the *linum* species found in the Corsican area. Diterpens bearing an abietane skeleton are known to possess a high anti-oxidant activity. A fraction rich in these compounds could be used for the formulation of an antiaging cream.

KEYWORDS Alga; Cosmetic; Terpen; Abietane; NMR; Corsica

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ABSTRACT 20

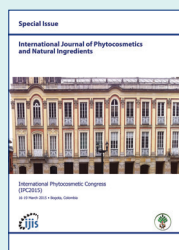
Rapid screening of chemical compositions of *Gracilaria dura* and *Hypnea Sp.* growing wild in Corsican lagoons by GC-MS derivatisation methods

Tao Xu, Sylvain SUTOUR

ABSTRACT

Marine macrophytes are important ecological and commercial biomasses to many regions of the world. They are valuable food resources and most promising sources of bioactive compounds. Phytochemical offline investigation by the separation and isolation of secondary metabolites are time, material and human resources consuming. Thus, in our studies a GC-MS online analysis with pretreatment (chemical derivatisations) was used for chemical profiling of two wild growing algae: *G.dura* and *Hypnea Sp.* from Corsica (France). Three GC-MS derivatisation methods were adapted: transmethylation for the acids, hydrolysis follows transmethylation for esters, and TMSi-silylation for compounds possess -OH/-NH function. The application of the method on *G.dura* and *Hypnea Sp.* leading to an identification of fat acids, phytosterols, esters, simple phenol compounds and sugar from n-pentane, ethyl acetate and n-butanol extracts. In addition, one new natural product, 3-bromouracile along with thymine were isolated and identified from *G.dura* under the guidance of the method. Else, antioxidant activity and total phenol contents of algae extracts were measured. This method is quick and low-cost for chemical profiling of marine biomass, it adapt not only fundamental but also in the cosmetic industries researches.

Keywords: *Grailaria dura*; *Hypena sp.*; GC-MS; Derivatisation; Chemical profiling; Corsica



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ABSTRACT 21

Transformation of *Rhodiola rosea* with rol-genes from *Agrobacterium rhizogenes* to enhance the production of bioactive compounds and analyses of key genes in their pathways

Jimmi Stofberg, Natalia-Meropi Antypa, Renate Müller, Henrik Lütken

ABSTRACT

Rhodiola rosea known as roseroot contains the secondary metabolites salidroside and rosavins. These compounds are bioactive and plant products containing these compounds have been used for centuries to alleviate depression and stimulate the memory. Exploitation of the plant has led to decreasing wild populations and climate changes threaten the plant further. Hence, alternatives are needed to circumvent this development. The objective of this study is to increase the content of bioactive compounds of *R. rosea* in planta. Transformation with root oncogenic loci (rol) genes from *Agrobacterium rhizogenes* leads to development of hairy roots (HRs) at the infection site. Transformed HRs have for several plants resulted in a higher contents of secondary metabolites compared to untransformed wild types. The method comprises clonal propagation of in vitro and in vivo material followed by *A. rhizogenes* mediated transformation of leaf explants to obtain HRs. It consists of two steps: a) growth of HRs in bioreactors and b) regeneration of entire plants derived from nodular tissue. Another part of the study involves gene expression analyses of key genes in the biosynthetic pathway of salidroside and the rosavins. This will be approached e.g. by gene expression analyses of the phenylalanine ammonia-lyase gene (PALr1). PALr1 is involved in the salidroside biosynthetic pathway catalysing its precursors. Leaves from *R. rosea* were sterilized in 70% (v/v) ethanol for 1 min. and 1.4% (v/v) NaOCl and 0.03% (v/v) tween 20 for 5 minutes. Leaf cuttings were then inoculated with *A. rhizogenes* strain ATCC4305 pRiA4 for more approximately 30 min. The inoculated leaf cuttings were then co-cultivated with the bacteria for 2 days in darkness, washed in MilliQ water with 10 g l⁻¹ timentin and transferred to a 1x MS medium containing 100 mg l⁻¹ timentin. After this explants were monitored for development of HRs. Approximately 60% of the transformed explants developed HRs compared to 27% for the untreated controls. Our preliminary data showed that the transformed HR formation peaked between 5 and 10 weeks after inoculation with 65 HRs. HRs from control explants peaked with 16 HRs after 3 weeks after inoculation. The putatively transformed explants also had a perpendicular increase between the 1st and 2nd weeks after inoculation. The HRs will then be isolated and subjected to various hormone treatments comprising auxins and cytokinins to stimulate further root growth and nodule formation for regeneration.

KEYWORDS *Agrobacterium rhizogenes*; Phenylalanine ammonia-lyase; *Rhodiola rosea*; Rol-genes; Rosavin; Salidroside

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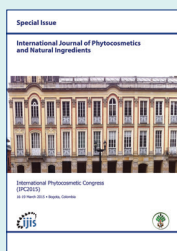
ABSTRACT 22

Evaluation of antimicrobial activity of ethanol extract of *Cestrum buxifolium* Kunth

Diana Carolina Corzo

ABSTRACT

The proliferation of diseases caused by pathogenic microorganisms is widespread concern that constitutes a risk factor for public health, which is why natural sources that inhibit bacterial growth, plants are bioactive compounds for this purpose are sought. Colombia has a territory with a high richness in plant resources, globally, it is classified within the diverse countries of the world. In the Andean region are native species with potential use in food, industrial and medical level, which have been little studied, for this reason the Botanical Garden of Bogota (JBB) conducts studies and research on the integrated and sustainable use of species in the high Andean paramo ecosystem. One of these species is also called red or purple Uvito *Cestrum buxifolium* Kunt, to which the antimicrobial activity of the different organs of the species *Cestrum buxifolium* Kunt was evaluated against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, by the technique of disk diffusion; ethanolic extract of the fruits and leaves of *C. buxifolium* inhibit the growth of *E. coli* in concentrations of 30 mg/ml, the ethanol extracts of fruits and stems inhibit growth against *P. aeruginosa* in the same concentration, with respect the positive control. Also the minimum inhibitory concentration was determined against the reference bacteria, which was performed by the technique of microdilución microplate, making dilutions of the extract. The proliferation of diseases caused by pathogenic microorganisms is widespread concern that constitutes a risk factor for public health, which is why natural sources that inhibit bacterial growth, plants are bioactive compounds for this purpose are sought.



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ABSTRACT 23

Getting Facial Tonic from leaves *Macleania rupestris*

Diana Carolina Corzo

ABSTRACT

Preliminary phytochemical analysis showed that the species has high tannin content (Plazas 2012). So the use of leaves of the species *Macleania rupestris* to obtain an astringent lotion is raised, were performed two pre-experimental formulations of alcoholic lotion with different concentrations of plant material to which they were tested for stability under different conditions of temperature and various parameters such as pH, microbiological control, sensory evaluation and qualitative determination of tannins, these were evaluated once a day for a week and then weekly for two months were evaluated at different storage conditions. The pH showed no significant differences in any of the storage conditions during the time of observation, the astringent lotions in different temperature conditions maintained their physicochemical properties. Microbiological control at 24 hours and 48 hours in microbial growth did not report any of the formulations. The organoleptic evaluation showed that the formulation 1 during the observation time maintained its appearance, odor and characteristic color, while the formulation 2 presented in appearance a slight sediment, and dark yellow brown, the other characteristics has remained the same this variation is due to increased plant material in this formulation. Tannins qualitative determination of ferric through chloride color reaction indicates the presence of astringent lotions have phenolic compounds and/or tannins, moreover the quality test in gelatin-salt, which is specific for determination of tannins, evidenced in formulation 2 significantly precipitation. With this we can conclude that the leaves of the species can be exploited for obtaining cosmetic products because they contain tannins to be extracted by maceration, continue being present in the final product formulation 1, showed best organoleptic characteristics, although the other parameters evaluated showed no significant differences. However the formulation 2 showed higher content of tannin, a substance of interest for this product.

KEYWORDS *Macleania rupestris*; Tonic; Organoleptic assessment

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ABSTRACT 24

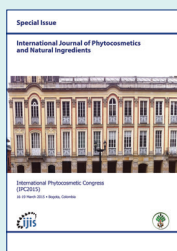
Shampoo preparation from leaves *Diplostephium rosmarinifolius*

Diana Carolina Corzo

ABSTRACT

This species has been used mainly as an ornamental, however ethnobotanical studies reported use in applications of aqueous extract in hair treatments, so a shampoo was developed to verify their effectiveness qualitatively and its effectiveness was assessed by qualitative tests made to a group of volunteers who used the product for a period of time. The test was performed empirically to demonstrate whether the species like rosemary (*Rosmarinus officinalis*) had effect anti fat, for which a qualitative test was performed, which was to test two white (commercial shampoo to serve as a comparison, the first was used 1ml of oil to which I was added 0.2 ml of lemon juice (citric acid), after stirring, the mixture was evidenced as the fat is cut to the development of the second reference point 1 ml of oil was used and. 1 ml of commercial shampoo for oily hair. Given these benchmarks, 1 ml of oil used and 1 ml of shampoo rosemary paramo, to see if it reacted similarly to one target. Visually the effect of shampoo was similar to white 2. Test effectiveness of the finished product, established that 83.33% of users said the product has grease effect and 16.33% think that the product has antifall effect; of users surveyed none presented irritability or allergy to the use of the product. The respondent volunteers agreed that the color, smell and texture is nice. In the open question the 66.66% of respondents said the product would present a better effectiveness if it could add a conditioner or enriched with other plants that improve the appearance of hair, as the combination of several plants with positive effect on the scalp and adding a conditioner improve outcome and hence the preference of consumers, which currently show preferences by choosing products with natural ingredients.

KEYWORDS *Diplostephium rosmarinifolius*; Shampoo; Natural ingredients



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ABSTRACT 25

Insecticidal activity of essential oil of *Piper aduncum* against larvae of *Spodoptera frugiperda*

Cristina Mendoza, Karol Lizarazo, Marco Pachón, Xiomara Orrego

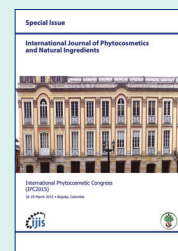
ABSTRACT

Objective Control of *Spodoptera frugiperda* generates a high use of agrochemicals. However there are alternative control as the use of essential oils due to biological activity of its metabolites, as has been reported in plants of genus Piper. In this research the insecticidal effect of the essential oil of *Piper aduncum* inflorescences on *S. frugiperda* larvae in controlled conditions was evaluated. Methods and results The essential oils of *P. aduncum* were obtained by distillation by steam distillation. Different concentrations (100, 300 and 500 mg L⁻¹ *) using Tween 80 as an emulsifier were prepared. A commercial biological control of *Bacillus thuringiensis*, an absolute control (water) and a control with Tween 80 were prepared. The effect of the application of the essential oil by contact and diffusion was determined in *S. frugiperda* larvae (maintained under controlled conditions with a natural diet based leaves *Ricinus communis* L.). Mortality at 24, 48, 72, 96 and 120 hours was evaluated after application of the essential oil. The percentage of efficacy was determined using the formula Schneider-Orelli: (% Efficiency = ((% dead individuals with treatment) - (% dead individuals in the Absolute Control)) / (100 - (% dead individuals in the Control Absolute)) * 100. Toxicological category OILB were also determined, where 1. Harmless (reduction <30%), 2 slightly toxic (30%-79% reduction), 3 moderately toxic (80%-99% reduction), 4 toxic (reduction > 99%). In contact evaluation, each larva was applied 0.1 ml of the respective treatment. In Diffusion evaluation 0.1 ml of the solution was placed in a vial and this vial inside a container with a larva and hermetically sealed, in order that the larva, inhaled volatile essential oil compounds, without direct contact. Tween 80, did not cause mortality of larvae, and can be used as an emulsifier for OE. *P. aduncum* 100mg * L⁻¹ showed insecticidal effect 72 hours after application with 11% mortality toxicological category OILB grade 1 (Harmless). With 300mg * L⁻¹ an insecticidal effect at 96 hours with 88.9% mortality and category OILB grade 3 (Moderately toxic) was generated. The application of 500mg * L⁻¹ 100% mortality occurred after 96 hours with category OILB grade 4 (Toxic), similar to what happened with the control with BT. Inhalation generated a mortality of 66%, grade 2 (slightly toxic). The application in maize seedlings AE generated a high mortality of 77% at 120 hours, grade 3 (Moderately toxic). Conclusion: The results suggest that the application by contacting the essential oil of *P. aduncum* at a concentration 500 mg x L⁻¹ is possible to control *S. frugiperda* because of its effect insecticide effective from 96 hours since according to the toxicological category is grade 4 (toxic), generating an insecticidal effect on third instar larvae, similar to commercial control based on *Bacillus thuringiensis* (BT). The essential oil *P. aduncum* inflorescence has an insecticidal effect due to metabolites mainly dilapiol, which has a structure similar to the chemical structure vegetable biopesticides that can inhibit the nervous system of insects.

KEYWORDS Effect by contact; Inhalation effect; Dilapiol; *P. aduncum* inflorescences; OILB toxicological category

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ABSTRACT 26

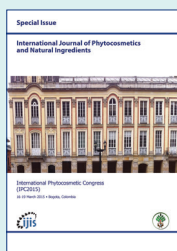
Relationship between soil and essential oil profiles in *Salvia desoleana* populations: preliminary results

Emma Rapposelli, Sara Melito, Giovanni Gabriele Barmina, Marzia Foddai, Emanuela Azara, Grazia Maria Scarpa

ABSTRACT

Salvia desoleana is a herbaceous perennial shrub endemic of Sardinia (Italy). The leaves are a source of essential oil, used in pharmaceutical and cosmetic industries. The therapeutic function of this species has been associated to the presence of essential oils rich in α/β -pinene, γ -cimene, linalool, linalyl acetate and 1,8 cineole. Today the industrial request of *Salvia* genus essential oils is increasing and most of the biomass is exploited from the natural populations which are under severe risk of genetic erosion. In order to improve the essential oil production, the study of the environmental parameters that influence composition, quality and quantity of the essential oils, turns out to be necessary. Soil physical and chemical structure represents one of the determinant factors in secondary metabolites production, and could also be involved in volatiles fraction composition in the same species. The main aim of this research was to explore the relationship between essential oil profiles and soil characteristic in *S. desoleana* populations. GC/MS analysis performed on the essential oil extracts identified 22 principal compounds, which are extremely variable among the 5 *S. desoleana* populations studied. The analysis of the essential oils revealed different composition in the terpenes fractions: 68.18% of monoterpenes, 27.27% of sesquiterpenes and 4.55% of diterpenes. Analysis of chemical and physical soil parameters at the collection sites, revealed that silt and sand contents were correlated to α -pinene and sclareol fractions and the total K was significant correlated to several compounds belonging to the three terpenes fraction identified. These results will provide guidelines for the in site conservation and for the improvement of the commercial value of the species.

KEYWORDS Sage; Soil composition; Terpenes fractions



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ABSTRACT 27

Phylogenetic analysis of *Citrus x monstrosa*, an endemic species of Sardinia

Grazia Viglietti

ABSTRACT

Germplasm of the genus *Citrus* in Sardinia belongs to cultivars imported from external cultivated areas. The taxonomy and phylogenesis of this genus is rather complicated because of interspecific sexual reproduction and high frequency of bud mutation. The hybridization maybe played an important role in development of many species of *Citrus*. The presence of *Pompia* species (*Citrus x monstrosa* nomen nudum) in the island, was noticed as first on 1780, even if some authors report a description of an analogous plant between the 3rd century BC and the first century AD. The species have a strong relationship with the territory, even if the cultivation is limited to a restricted area. The fruit is not edible, but the pericarp contains a high percentage of essential oils. The species appear suitable for cosmetic use and phytotherapy, because of the presence of limonene, citral, and ? myrcene in the essential oil. The aim of the present work is the individuation of related species of *Citrus x monstrosa*, by genetic analysis and to compare it with known *Citrus* species. Samples were collected in two areas of central East Sardinia. The sequence analysis of the ITS region codifying for ribosomal DNA 5.8S revealed that the sampled plants of *Pompia* were strongly related to *Citrus medica* and with no kinship with *Citrus reticulata* or *Citrus maxima*. These results may be useful to increase the knowledge about the origin of this peculiar plant.

KEYWORDS *Citrus* taxonomy; *Pompia*; DNA analysis; Ribosome

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ABSTRACT 28

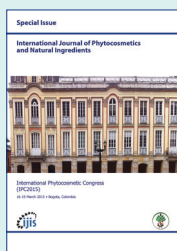
Sacha Inchi, an Amazonian nut transformed by Colombian demand

E Chamorro, M Carrillo, M Hernandez

ABSTRACT

Sacha Inchi is an Amazonian natural resource with high levels of Omega 3, 6 and 9. Due to its composition, many small producers raise this promising plant in Putumayo, Colombia. ECHZ is an Amazonian company that started technological research on *Sacha Inchi* six years ago. ECHZ has developed a strategy to identify research gaps in *Sacha inchi* knowledge and allies that help the company to enhance the *Sacha inchi* agroindustrial transformation. Through scientific visits to other countries and technological supervision, ECHZ has promoted *Sacha inchi* recognition as a promising plant for agro-alimentary and cosmetic purposes. *Sacha inchi* oil is among the valuable derivatives of seeds. In the beginning, in order to process seeds, ECHZ adapted equipment that was used for other biological products, such as coffee. It was not easy to introduce the technology or solve the technological challenges for these seeds. After the first press expeller batches were constructed to obtain the first *Sacha inchi* oil samples, it was noticed that the operation of these units during the extraction process requires special attention due to the particular seed anatomy, i.e. seed coat separation before seed expression is necessary; otherwise, the efficiency of the process is reduced by 50%. Additionally, the shelling process needs to be perfected because the nut must be separated from the seed coat for increased oil production and reduced losses. The pneumatic principle was introduced to separate the seed coats from the nuts. Finally, a continuous expeller/extractor machine was designed and constructed to facilitate the *Sacha inchi* extraction process. The final unit that the ECHZ Company incorporated into its operation one year ago starting uses the plate-filter process, which increases oil production and quality. Oil standardization was the first step in the agroindustrial production lines of ECHZ, followed by product diversification. Currently, flavored snacks are produced as well as some byproducts, seed coats for organic fertilizers and protein leftover from the oil extraction process for human and animal consumption. ECHZ produces *Sacha inchi* oil and the other products in a plant located in Valle de Guamuez, where more than 100 small producers sell their raw seeds. *Sacha inchi* is a growing business that extends from Putumayo to the Amazonas department, where new small producers from Puerto Nariño were incentivized by the Productive Alliances program (Agriculture Ministry). A production increase is expected in response to the blooming demand for seeds and their derivatives what Instituto Sinchi might support.

KEYWORDS Nuts; Biodiversity; Value chain; Added value



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Physicochemical characterization and pectin content evaluation of Colombian Amazonic Fruits

D Molina, M Carrillo, M Hernandez, R Gutierrez, D Molina, M Hernandez

ABSTRACT

This study aimed to evaluate the pectin content of eight Amazonian fruits that were physicochemically characterized (pH, acidity, ° Brix) to determine their maturity grade, before pectin extraction potential. Acid hydrolysis was used for the extraction method and the volumetric method was used for the pectin methoxyl percentage. Quantitative analyzes were carried out in duplicate and descriptive statistics were used to analyze the obtained results with measures of central tendency and dispersion. The higher yields were found in the fruits of the Canangucha palm (*Mauritia flexuosa*) with $12.82 \pm 0.11\%$, Cocona (*Solanum sessiliflorum*) with $11.79 \pm 1.37\%$ and Huito (*Genipa americana*) with $10.51 \pm 0.27\%$. The following pectin contents were measured: $8.75 \pm 0.65\%$ in Arazá (*Eugenia stipitata*), $7.56 \pm 0.33\%$ in Marañon pseudofruits (*Anacardium giganteum*) and $4.52 \pm 0.22\%$ in granadilla de monte (*Passiflora foetida*). The lower contents were obtained with matandrea (*Renealmia Alpinia*) at $1.59 \pm 0.02\%$ and in the fruits of the Strychnos genus with $1.51 \pm 0.11\%$. The pectin obtained in the mesocarp and epicarp of Huito was high methoxyl pectin ($7.849 \pm 0.062\%$), with an equivalent weight of 851.66 ± 4.61 and free acidity of 1.17 ± 0.01 , and the pectin obtained from cocona, arazá and canangucha was low methoxy pectin, with values less than 7.0%. This study determined that, in order to obtain higher pectin yields and better quality pectin, studies must be conducted that take into account the maturity of the utilized fruits and the conditions used for extraction (pH, solid:liquid ratio, extracting agent, time and temperature). Pectin is a very valuable natural ingredient for different industries, such as agro alimentary, as well as cosmetic. As a result promising results of this preliminary study reinforces the original perspective about Amazonian fruits as source of many natural ingredients.

KEYWORDS Byproducts; Natural ingredient; Added value; Biodiversity

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ABSTRACT 30

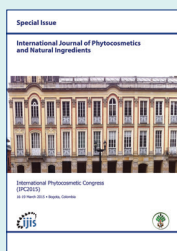
Antioxidant activity of two species of *Meriania* genus

Claudia Lorena Valverde, José Hipólito Isaza Martínez, Ana Julia Colmenares Dulcey

ABSTRACT

The risk factor for developing some of the diseases that afflict humanity is associated with oxidative stress, including aging and its signs like skin damages; therefore, today searching for new antioxidants has grown to be used as pharmaceuticals, cosmetics or agrochemicals to delay those disorders. Many phenolic compounds have been reported as promising secondary metabolites for this goal. Melastomataceae is a plant family, rich in these compounds; consequently in this research it was compared antioxidant power for two species of *Meriania* genus (Melastomataceae), *Meriania nobilis* and *M. hernandoi*. Both species were extracted in hexane followed by acetone 70%. The latest was liquid-liquid partitioned in ethyl acetate (Mn o Mh 2.1), n-butanol (Mn o Mh 2.2) and aqueous fractions (Mn o Mh 2.2). Antioxidant activity was measured by DPPH free radical scavenging (FRS50, mg.L-1), ferric reducing antioxidant power assay (FRAP, mg FeSO₄.7H₂O (100 g)-1ES) and total phenolics content (TPC, (mg AG) g-1 ES) by Folin-Ciocalteu method. The present study revealed that Mh 2.1 and Mh 2.2 from *M. hernandoi* has a strong antioxidant power DPPH FRS50 = 5.71 ± 0.085, FRAP = 53 ± 1.5 and TPC = 224 ± 7.1 and DPPH FRS50 = 4.22 ± 0.001, FRAP = 65 mg ± 1.5, TPC = 240 ± 8.6 respectively, as compared with positive controls, quercetin DPPH FRS50 = 4.20 ± 0.410, FRAP = 61 ± 1.3 and vitamin C (Ascorbic acid) DPPH FRS50 = 5.34 ± 0.114; while *M. nobilis* exhibited poor antioxidant power for DPPH FRS50 = 286 ± 1,5, FRAP = 2.01 ± 0.079 and TPC = 26 ± 1.5. This research showed *M. hernandoi* as good source in antioxidant compounds from natural origin with potential usage as cosmetic, pharmaceutical or agrochemical ingredients. Authors are grateful to COLCIENCIAS, Grant CT-410-2011 and to Universidad del Valle CI 7848.

KEYWORDS DPPH free radical scavenging; FRAP; Total phenolics; *M. nobilis*; ; *M. hernandoi*; Melastomataceae



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ABSTRACT 31

Malondialdehyde quantification as a biomarker for lipid peroxidation in *Pisum sativum* by n-methyl-2-phenyl-indol colorimetric method

Maria Juliana Restrepo, José Hipólito Isaza Martínez, Ana Julia Colmenares Dulcey

ABSTRACT

Land and soils constitute the foundation for sustainable agricultural development, essential ecosystem functions and food security. The recent increase of heavy metals in agricultural soils is a threat for this latter since they induce a toxic reaction in crops, lipid peroxidation, by increasing ROS generation. When a hydroxyl ion attacks a polyunsaturated fatty acid (PUFA), cell membrane is altered causing a dramatic effect of cell integrity. Thus, research of synthetic and natural agents to mitigate effects of lipid peroxidation has grown. A novel and selective method to quantify lipid peroxidation consists in measuring a carbocyanide product of the reaction of one of its secondary products malondialdehyde (MDA) with N-methyl-2-phenylindol in presence of HCl. Therefore the validation of this method was achieved to assess lipid peroxidation in *Pisum sativum* exposed to copper. Two way anova was performed to determine if interaction between time and treatment result in a significant difference between MDA levels in twelve plants. Bonferoni test revealed that treatment was not consistent with time. The day that resulted in significant difference of MDA was the eighth day. MDA to perform the reaction was extracted from groups of twelve 8-day plants by sonication in chlorhydric acid. A calibration curve using 1,1,3,3, tetramethoxypropane as MDA standard, HCl 1 N in methanol, acetonitrile-methanol (3:1) as solvent was performed. its linear range was $0,0078 \mu\text{M} \hat{=} 1 \mu\text{M}$ with a 99,8% correlation. Sensibility of the method was enhanced by variation of time and temperature. Repeatability reported as variation coefficient yielded 7,8% for the standard curve and 18,6% for the samples, being these latter representative of combined biological and chemical variability. A natural flavonoid rich fraction extracted from *Siparuna gigantotepala* and a synthetic pyrimidine-type compound were evaluated as potential lipid peroxidation inhibitors. Flavonoid rich fraction inhibits the reaction by scavenging radicals while pyrimidine-type compound inhibits LOX and COX enzyme-catalized lipid peroxidation. Both showed lipid peroxidation inhibition by returning stressed plants to its natural values of MDA ($0,8 \pm 0,13$) $\mu\text{mol/mg}$ fresh weight according to one way ANOVA analysis. Authors are grateful to COLCIENCIAS, Grant CT-557-2011 and to Universidad del Valle CI 7852.

KEYWORDS Lipid peroxidation; *Pisum sativum*; N-methyl-2-phenylindol method; Malondialdehyde; Flavonoids; Oxidative Stress



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ABSTRACT 32

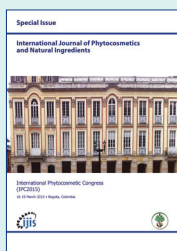
Identity characteristics of three Guatemalan edible and medicinal species

María Eugenia Paredes, Nancy Escobar, Nelly Marroquín, Claudia Mata, Claudia Osorio, Ana Paz

ABSTRACT

The identity characteristics of herbal (plant) drugs studies, does not only allow the detection of adulterants, but are also essential for their quality control. Therefore, the diagnostic characteristics of *Fernaldia pandurata*, *Cucurbita argyrosperma* and *Solanum nigrescens*, popularly used as food and medicine, where stablish with this purpose. The following studies were carried out: the macroscopical and microscopical description, the histochemical screening of secondary metabolites, the organoleptical analysis of fresh and dry drug, acute toxicity, the determination of total and acid ashes, and moisture percent for each species. *F. pandurata* flowers, strongly aromatics and greenish white in fresh plant material, became brown in the dry drug, which also include some leaves and stem parts. Microscopically, large epidermal cells, evident cuticle, lacunar collenchyma, paracytic type stomata, and different varieties of hairs, were found in leaves. Non-glandular hairs show multicellular, verrucous, papillae like or acicular shape, and diversity of bases; glandular ones, unicellular or multicellular blunt heads, and unicellular feet; sclereids and prismatic calcium oxalate crystals were also found. Pollen of circular shape with size ranges from 60-80 microns and pore-like opening were found in flowers. *C. argyrosperma* seed with green color, microscopically exhibits reticulated cover and undulations; the leaves and steam, like other Cucurbitaceae members, show annular collenchyma, anomocytic type stomata, bilateral vascular bounds surrounded by sclerenchyma, abundant non- glandular multicellular large and short elevated hairs, multicellular glandular ones with unicellular foot. *S. nigrescens* flowers are pale purple or white and exhibits a dark zone near de base; microscopically, leaves and steam shows non-glandular hairs, multicellular and verrucous with four and six cells in the base, plains with blunt end and unicellular with diversity of bases, glandular ones with unicellular foot and multicellular blunt heads and calcium oxalate druses. The macroscopic characteristics of the three plants match with those reported in the Flora of Guatemala and by others authors. The medicinal properties attributed to *F. pandurata* and *S. nigrescens* were associated with secondary metabolites found in the histochemical and phytochemical screening. None showed significant toxicity.

KEYWORDS *Fernaldia pandurata*; *Cucurbita argyrosperma*; *Solanum nigrescens*; Quality control; Exomorphology; Endomorfology



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ABSTRACT 33

Seje (*Oenocarpus bataua*) oil, a potential natural ingredient for the cosmetic sector, through the sustainable use of natural resources

Raquel Díaz, Luisa Fernanda Peña, Marcela Carrillo, María Soledad Hernández

ABSTRACT

Seje (*Oenocarpus bataua*) is a palm tree that is widely distributed in the Amazon region. Several parts of the plant are used, including the oil obtained from the fruits, which provide a promising natural ingredient for the cosmetic sector. Seje oil has a high content of unsaturated fatty acids (76%-86% oleic acid; 1.8%-3.0% linoleic acid), which gives it potential properties related to skin and hair moisturizing. With the aim of providing scientific and technological support to the seje-oil value chain of this natural resource, a research process that involved optimal fruit maturity identification, primary processing and oil extraction was developed by the Sinchi institute. Primary processing and oil extraction were evaluated at a low process temperature (-60°C) to prevent the degradation of fatty acids and other phytochemicals that occurs during artisanal oil extraction, which involves severe thermal conditions (boiling for hours). Microwave assisted extraction (MAE) and mechanical extraction, dry (expeller press) and wet (with or without enzymatic breakdown), processes were evaluated, resulting in different yields and fatty-acid compositions for the oil, depending on the process type and conditions. As a result, the collected information was displayed in technical data sheets: one for collectors to identify optimal maturity and another for oil used as a natural ingredient, with fatty acid compositions, fat quality indexes and other useful properties for the cosmetic and food industries. Fruit collecting and primary processing have been implemented and oil extraction is escalating in accordance with the characteristics of the Amazon region. Collected information might be used to define handling plan for the palm species in order to harvest wild fruits with legal permission.

KEYWORDS Biodiversity; Fatty acids; Oil extraction

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ABSTRACT 34

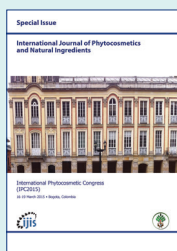
Evaluation of in vitro antifungal activity of essential oils of *Lippia alba* and *Lippia origanoides* thymol and carvacrol chemotypes against *Colletotrichum lindemuthianum*

Paola Moreno López, Judith Herrera, Alberto Garzón

ABSTRACT

One of the main problems in agriculture is the presence of pathogens in the crop production that reduce the production and quality of the products. The green bean (*Phaseolus vulgaris* L), is an important crop in the Colombian rural economy, it is affected by anthracnose caused by *Colletotrichum lindemuthianum*. Chemical fungicides are used for controlling this disease, affecting safety of production and increasing the risk of resistance to this products. For this reason we wanted to assess the antifungal capacity of aromatic plants essential oils, such as *L. origanoides* thymol chemotype and carvacrol chemotype and *L. alba*, on the growth of *Colletotrichum lindemuthianum* in laboratory conditions, using a positive control (Score®, active ingredient difenoconazole) and a negative control. We used tests for disk diffusion, minimum inhibitory concentration, percentage of conidia germination and we established the fungistatic effect or fungicide of essential oils. In difussion disk test all essential oils showed antifungal activity: the oils of the two chemotypes of *L. origanoides* inhibited completely the fungus (90 mm), *L. alba* showed inhibition halo of 22 mm. The percentage of conidial germination of *C. lindemuthianum* was relatively low, *L. origanoides* thymol chemotype showed germination of 8% as well as the positive control Score® (Difenoconazole), the carvacrol chemotype showed 10% and *L. alba* showed 18%. The minimum inhibitory concentration was assessed during 7 days, evaluating concentrations of 100, 50 and 20 µl/ml. There was no mycelial growth in none of treatments until day 7. In this assay only two chemotypes of *L. origanoides* was evaluated. We determined that the effect of essential oils is fungicide, due to after challenging the phytopathogen mycelium against to media poisoned with essential oils and then put on media without treatment, the micelia do not showed growth.

KEYWORDS Natural products; Percentage of conidial germination; Disk difussion; Minimum inhibitory concentration



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ABSTRACT 35

Yield of essential oils in lemongrass (*Cymbopogon citratus* Stapf) under different light conditions

Cristina Mendoza, Karol Lizarazo, Dexy Cruz, Andreson Useche

ABSTRACT

Cymbopogon citratus (lemongrass) is recognized for its aromatic and medicinal properties. Its essential oil is a basic material with high added value for these properties and for cosmetic use. The quality, quantity and duration of light are important factors in the physiological behavior and yields of essential oil of lemongrass. The purpose of this work was to evaluate the ecophysiological behavior and yield of essential oils under three environmental conditions of light (free exposure, 70% and 50% light). The study was carried out with outdoor conditions (20°C at 1530 meters above sea level) in Fusagasugá (Colombia). One randomized block design with five replications was performed. Three light environments (free exposure, 70% and 50% light) and two harvest times (five to six months) were established. Morphological variables (total dry weight, fresh weight, leaf stem, root) and physiological index (LAI, CGR, RGR, ARN, LAR, SLA, LAD) and the percentage of essential oil yield were evaluated. According to the results, *C. citratus* has a higher yield essential oils (0.54%) harvested at six months and 70% grow light, this condition without altering its physiological behavior, with respect to plants growing under free exposure.

KEYWORDS Harvest time; Physiological analysis; 70% light

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ABSTRACT 36

Diversity of yam bean amazonian accesses (*Pachyrhizus tuberosus*) in Manaus, Brazil

Edinei Santos da Silva, Danilo Fernandes da Silva Filho, Cesar Augusto Ticona Benavente

ABSTRACT

Yam bean or Amazonian yam bean (*Pachyrhizus tuberosus* Lam.) has content of rotenone and paquirizina in seeds mainly. Rotenone is used as insecticide and piscicide. Paquirizina is known as insecticide. Therefore, seeds are not edible for humans. However, the tuberous roots are alimentary, being consumed by traditional populations from Peru, Brazil and Bolivia. These roots have up to 9% of protein content, being a high quality food. It is well adapted to Amazonian conditions. In soils with poor nutrient, acidity, with aluminum toxicity and excess rainy. Therefore, this specie would have dual use, as food and as a source of toxic compounds. The germplasm bank of the Instituto Nacional de Pesquisas da Amazônia (INPA), in Brazil, conserve 64 accesses from Mexico and Mato Grosso, Brazil. To verify the diversity of the material an experiment was conducted in horticultural experimental station "Alejo Von der Pahlen"™, located at km 14 of the AM-010 highway from Manaus. The coordinates were 03° 15 '19, 3 "S and 60 ° 14' 23,2"W. In the period January-August 2014 (rainy season). The planting was in red-yellow argisol. We used a completely randomized design, consisting of three replications per progeny, a total of 192 plants. The characteristics evaluated were: plant height, number of secondary branches, biomass fresh shoot, stem diameter, biomass tuberous root, number of roots, width of the tuberous root, the length/width of the root tuberosa and shape of the tuberous root. Data were subjected to analysis of variance and means compared by Duncan test ($P < 0.05$) using the statistical program GENES. To cluster analysis was made using Unweighted Pair Group Method with Arithmetic Mean (UPGMA), from the Mahalanobis distance. All variables showed significant differences ($P > 0.05$) except for the stem diameter. The P52 and P22 progenies stood out for producing 4-5 roots equivalent to 5.4 kg of roots per plant. P29, P61, P22 and P45 showed higher biomass of fresh shoots and tuberous roots. Cluster analysis revealed that in 80% of dissimilarity there were four groups. These results indicate the existence of variability for rotenone and pachyrhizina content. Further studies would be needed to quantify them.

KEYWORDS Rotenone; Paquirizina; Cluster analysis; Jacatupé; Feijão-macuco