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Auditório Armando Guebuza (ULHT)

Dia do Fascinio das Plantas 2019

Livro de *Abstracts*

18 Maio, 2019

ULHT, Lisboa

Portugal

cbios UNIVERSIDADE LUSÓFONA RESEARCH CENTER FOR HEALTH SCIENCES & TECHNOLOGIES

UNIVERSIDADE LUSÓFONA

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Organization

Cíntia Ferreira-Pêgo

Patrícia Rijo (Local chairman of the event)

Vera Isca

Plantas na promoção de uma alimentação saudável

"Plants promoting healthy diet"

18 de Maio de 2018 – Auditório José Araújo

Descrição

As plantas são importantes na promoção de um estilo de vida saudável. Os nutrientes e os produtos naturais são componentes conhecidos por prevenir doenças e agir sinergicamente com os fármacos e tratamentos médicos. Neste evento, reuniremos diferentes trabalhos que mostram a importância das plantas na promoção de uma dieta saudável. As apresentações ilustrarão os trabalhos não apenas sobre segurança e toxicologia, mas também sobre o uso de ervas aromáticas no contexto da dieta mediterrânea, novas técnicas tecnológicas de fluidos supercríticos adaptados à nutrição e valorização de subprodutos industriais do vinho com uma demonstração de novas aplicações alimentares.

DESCRIPTION

Plants are important in the promotion of a healthy lifestyle. The nutrients and natural product components are known to prevent diseases and to act synergetically with medical treatment and drugs. In this event, we will bring together different works that show the importance of plants in the promotion of a healthy diet. The presentations will illustrate works not only about safety and toxicology but also about the use of aromatic herbs in the context of the Mediterranean diet, new technological supercritical fluids technics adapted to nutrition and the valorization of industrial wine by-products with a demonstration of its new food applications.

Programa:

Plantas na promoção de uma alimentação saudável

"Plants promoting healthy diet"

18 de Maio de 2018 – Auditório Armando Guebuza

9:00 – 10:15h **Registo / Colocação de Posters**

10:15 – 10:30h **Início**: L. Monteiro Rodrigues - Director do CBIOS

Patrícia Rijo – Organizadora Local - CBIOS

Sessão 1 |

C01 - Patrícia Rijo (CBIOS, Lisboa, Portugal)

"Safety works about edible *Plectranthus* spp"

C02 - Amilcar Roberto (CBIOS, Lisboa, Portugal)

"Social preconceptions against the use of natural products from the plants!"

C03 -Marisa Nicolai (CBIOS, Lisboa, Portugal)

"Effect of antioxidants from vegetables and fruits on Osteosarcoma Cells"

Sessão 2 |

C04 - Lídia Palma (CBIOS, Lisboa, Portugal)

"Plants as a source of dietary fiber. Types of fiber."

C05 -Paula Pereira (CBIOS, Lisboa, Portugal)

"Plants Extraction with Supercritical Fluids"

C06 - Cíntia Ferreira-Pêgo – (CBIOS, Lisboa, Portugal)

"Aromatic herbs: the pleasure of eating"

Encerramento, Sessão de Posters e Almoço

C01: Safety works about edible *Plectranthus* spp.

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The *Plectranthu*s genus belongs to the Lamiaceae family, such as mint (*Mentha piperita* L.), sage (*Salvia officinalis* L.) and lemon balm (*Melissa officinalis* L.). This genus is traditionally used in Tropical Africa, Asia and Australia as culinary herb and also for the treatment of different digestive, skin, respiratory, infective and tumoral ailments[1].
It exhibits a wide range of uses in different areas as Horticultury, Floricultury, Ethnobotany, Household and as Foodplants which is justified by their content in different compounds[2].
Some of the species employed to culinary purposes are *Plectranthus amboinicus* (Lour.) Spreng., *P. esculentus*, *P. laxiflorus* Benth. and *P. rotundifolius* Spreng. Different parts of the plant are used such as the tubers (*P. punctatus*, *P. edulis*, *P. rotundifolius*, *P. parviflorus*), the fruits of *P. parvifolius* (which are employed as vegetables), the leaves (*P. mollis*, *P. barbatus*, *P. amboinicus*) and the stems of *P. crassus* and *P. esculentus* (the latter case as gruel sweetener). Specifically, the tubers of *P. esculentus* N.E.Br., are rich in carbohydrates, vitamin A and minerals being used as substitute for sweet potato in most parts of Africa, while in Malaysia is used as vegetable. Moreover, one of the most commonly used are the leaves of *P. amboinicus* since because of its pungent oregano-like flavor and odor are used in food stuffings, flavouring and marinating beef and chicken, to mask odor of strong smells (goat, fish and shellfish), in spice dishes containing tomato sauces, and sometimes it is eaten raw with bread and butter and add to beer and wine (India).
Furthermore, this genus is rich in different bioactive secondary metabolites, namely diterpenes[2]. These diterpenes, which can be obtained by diverse extraction methods, are cytotoxic molecules such as Parvifloron D from *P. ecklonii* and 6,7-dehydroroyleanone from *P. madagascariensis*[3,4]. In the bioactivity studies, acetonic extracts of this genus showed high general toxicity in the lethality test against *Artemia salina* L., and cytotoxicity in different human cancer cell lines (HCT116, MCF-7, H460); some of them also showed activity against cells resistant to the conventional treatment (NCI-H460/R, DLD1-TxR).
Thus edible *Plectranthus* spp. have toxic compounds so the extractions and use of these spp. must be studied for their safety use.

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C02: Social preconceptions against the use of natural products from the plants

Amilcar Roberto[a]

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Pure compounds directly isolated from plants to be used to produce drugs that are approved by the regulatory international agencies. Some of this compounds, namely, alkaloids such as ephedrine, morphine, codeine, papaverine, noscapine, 5ydrolysed5, scopolamine and many others are very important remedies as painkillers, to treat cancer, cardiac diseases, and many others. However, the illicit and abusive use of these compounds have a high cost for the society and cause a wide type of misconceptions and preconceptions among the people. The right information transmitted by the health workers to the society is of great importance for the right use and advantages that this compounds = drugs have in the treatment of the illness.

References:

[1]. Samuelsson G, Bohlin L (2015). *Drugs of Natural Origin, A Treatise of Pharmacognosy, 7th ed.*

C03: Effect of antioxidants from vegetables and fruits on Osteosarcoma Cells

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Several edible plants are a good source of antioxidants. Many of the natural products found in these plants can be used in the prevention and treatment of numerous diseases.
Previous studies support the properties of dietary antioxidants as chemopreventive agents, while other reports suggest potential pharmacological anticancer activity.
However, these studies were performed under different experimental conditions, precluding a comparative analysis of the anticancer properties of these phytochemicals.
Osteosarcoma is the third most common cancer in adolescence. Although it has a low overall incidence, this type of cancer is generally aggressive and tends to produce early systemic metastases, making it harder to develop novel therapeutic approaches.
This work assessed the cytotoxic profile of ten antioxidants found in edible plants on human osteosarcoma cells (U2-OS): catechin, kaempferol, quercetin, resveratrol, gallic acid, ferulic acid, ascorbic acid, melatonin, lycopene, and β-carotene. The crystal violet assay was performed after 24 h of exposure to the selected compounds to measure cell viability. B-carotene and gallic acid considerably reduced cell viability, with IC50 values of 19 µM and 185 µM, respectively. The remaining compounds did not significantly reduce U2-OS cell viability. These findings might contribute to the rational and evidence-based selection of natural antioxidants to be included in anticancer strategies and to further explore possible food-inspired drugs.

C04: Plants as a source of dietary fiber. Types of fiber

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The West civilization lifestyle has adopted a dietary pattern with an important impact on nutrition which is characterized for a low intake of dietary fibers (DFs) and the increased amounts of fat and sugar. The DFs are present in cereals, vegetables, and fruits and can be classified in different ways however, until now, there haven´t been a consensual definition. DF´s can be classified according chemical composition or physiological effects. Trowell in 1972, suggested a definition based on the chemical composition in which DF consists of the remnants of edible plant cells, polysaccharides, lignin and associated substances resistant to digestion by the alimentary enzymes of humans, which include cellulose, hemicelluloses, lignin, gums, mucilage, oligosaccharides, pectin, and other associated minor substances (e.g., waxes, cutin, suberin)[1]. The Codex Alimentarius commission from 2009 define DF´s as "Carbohydrate polymers with ten or more monomeric units, which are not 7ydrolysed by the endogenous enzymes in the human small intestine and belong to the following categories: 1) edible carbohydrate polymers naturally occurring in the food as consumed, 2) carbohydrate polymers which have been obtained from raw materials by physical, enzymatic, or chemical means and which have been shown to have a physiological effect of benefit to health as demonstrated by generally accepted scientific evidence to competent authorities, and 3) synthetic carbohydrate polymers which have been shown to have a physiological effect of benefit to health as demonstrated by generally accepted scientific evidence to competent authorities."[2]. In the past decade the studies regarding the relationship between "gut microbiota and there interactions with host development and physiology, suggest that a low intake in micro-biota-accessible carbohydrates (MACs), may irreversibly reduce microbial diversity and lead to the disappearance of specific bacterial species in the digestive system that have been related to a several disorders included metabolic and inflammatory chronic disease[3]. This is why the food authorities included daily recommendations for fiber intake of 25 grams for women and 38 grams for men[4]. As an example of high foods fiber we have: avocado (6,7%), raspberries (6,5%), artichoke (8,6%), lentils (7,9%), kidney beans (6,4%), and oats (10,6%)[5]. In terms of plants Mashmallow leaves (10% de mucilages), carob seed (40% mucilages) linseed seeds (10% mucilages) and psyllium seed (20 a 30% mucilages)[6].

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C05: Plant Extraction with Supercritical Fluids

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The supercritical fluid extraction (SFE) technique dates back to the mid-1980s and has been being applied for several decades now. Commercial application of SFE began in 1978 with coffee caffeine extraction and hop extraction[1]. Nowadays, SFE applications are already very numerous and varied, covering very different areas. Supercritical fluid extracts obtained from plants is such an example.
SFE technology is considered an environmentally friendly technology because it replaces the common organic solvents for supercritical fluids. This is advantageous for the food, cosmetic and pharmaceutical industries because the extracts obtained are free of toxic residues and without the degradation of active compounds often observed due to hydrolysis reactions[2].
There is therefore considerable interest in replacing traditional extraction for this technology, though SFE require an initial high financial investment which often prevents its use.
The supercritical fluid more often used as a solvent in SCF processes is carbon dioxide, a substance with no toxicity, abundant, inexpensive and with a very low supercritical point (31ºC and 73 bar). This last characteristic is important from the economic point of view and because it makes possible to process thermo-liable matrices.
The efficiency of the extraction depends on several parameters such as pressure, temperature, solvent flow rate, particle size of the substrate and the use, or not, of a co-solvent.
A selection of studies that have been conducted on different plants such as *Ulex parviflorus* e *Ulex* densus, Rosmarinus officinalis, elderberry, *myrtus communis* L., *vitis vinera* L., Plectranthus is presented.

References:

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C06: Aromatic herbs: the pleasure of eating

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Aromatic herbs are widely recognized for the organoleptic characteristics they attach to dishes, enhancing the taste of foods as well as their medicinal properties (1).
Among the various places in the world, the Mediterranean region stands out for being a place where one can find the most different and distinct aromatic plants. One of the principles of the Mediterranean Diet is the presence of aromatic plants in the diet, which gives the amalgam of flavors and aromas that are traditionally recognized in this dietary pattern. The Mediterranean diet pyramid encourages and highlights the consumption of aromatic herbs, recommending their daily consumption, whether in the preparation of dishes or food seasoning. It's important to remark that aromatic herbs play a key role as a representative element of local culture and cuisine (2).
Aromatic plants supply proteins, fibers, volatile compounds (essential oils), vitamins (A, C, B complex ...), minerals (calcium, phosphorus, sodium, potassium, iron, ...) and bioactive substances as phytochemicals (phenolic compounds) (3). They also have some benefits already studied such as antioxidant, bactericidal, antiviral, and enzyme-inducing or inhibiting effects, modulation of the carcinogenesis process, decreased cholesterol levels and reduced LDL cholesterol oxidation, prevention of cardiovascular pathologies, reproductive system disorders and nervous, digestive system stimulant and immune system enhancers (2).
However, as they are consumed mainly in food and low quantities, their biggest benefit is the consequent reduction in salt consumption. Aromatic plants are one of the main strategies for reducing salt in the daily diet, either by reducing the amount of salt in the diet or by the beneficial properties that have health (4). Their addition also gives a multiplicity of flavors and aromas that allow masking the absence of salt in culinary preparations, for which they play an important role in reducing the incidence and prevalence of the cardiovascular disease.

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Plantas na promoção de uma alimentação saudável

"Plants promoting healthy diet"

18 de Maio de 2018 – Auditório Armando Guebuza

List of Posters

P01 - Ferreira-Pêgo C, Rodrigues J, Costa A, Sousa B

"Mediterranean dietary pattern adherence of university students"

P02 - Paula Pereiraa, Maria João Cebola, Gabriela Bernando-Gil

"Comparison of the antioxidant activity of myrtus communis L extracts obtained with different techniques"

P03 - Epole Ntungwe N, Vera Isca, Joana Tavares, Amílcar Roberto, Lucilia Saraiva, Patrícia Rijo

"Plectranthus species: novel sources of cytotoxic compounds"

P04 - Vera M.S. Isca, Epole Ntungwe, Joana Tavares, Raquel Pereira, Filipa Siopa, Carlos A.M. Afonso, Patrícia Rijo

"Phytochemical study of a cytotoxic royleanone from P. grandidentatus and in silico prediction of new derivatives"

P05 - Nicolai, M, Pereira, P, Rijo, P, Palma L

"Nutritional and chemical characterization of Portuguese grape pomace"

P06 - Joana F. Almeida, Inês M. Ferreira, Patrícia Rijo

"Preparation and chromatography analysis of Plectranthus amboinicus extracts"

P07 - Inês M. Ferreira, Joana F. Almeida, Patrícia Rijo

"Research of antioxidant and antimicrobial activity of Plectranthus extracts"

P08 - Ana Morais, Marisa Nicolai, Pedro Fonte, Patrícia Rijo

"Lamiaceae phytochemicals as a suited reducing agent in catalytic material assembly for sensitive detection of bioactive compounds"

P01: Mediterranean dietary pattern adherence of university students

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Mediterranean diet (MedDiet) is one of the most recognized healthy dietary patterns. Although the well-known beneficial effects of healthy eating habits on academic performance, the university students used to present unhealthy food choices. Cross-sectional information regarding MedDiet adherence was collected in 305 students, from different academic courses, related or not with health sciences. Nutrition students presented significantly higher MedDiet adherence compared to those studying pharmaceutical sciences and also from other courses not related to health sciences. 28.90% of the total population presented poor MedDiet adherence, 58.70% presented an average adherence and only 12.50% presented a good MedDiet adherence. Pharmaceutical students and other students not related to health sciences presented a significantly higher risk of poor MedDiet adherence.
Nutrition students presented the highest MedDiet adherence of all the students analyzed. Pharmaceutical students, although being health professionals, showed poor adherence to the MedDiet, similar to students from courses not related to health sciences.

P02: Comparison of the antioxidant activity of *myrtus communis* L extracts obtained with different techniques

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Myrtle (Myrtus communis L.) is an evergreen shrub belonging to the family of Mirtaceae that grows spontaneously throughout the Mediterranean area and typical of the Portuguese flora, commonly known as myrtle. In its composition, this plant contains essential oils, polyphenols and hydrolysable tannins with important pharmacological and antimicrobial activity, being described in the literature as an antioxidant (AO) source.
The Portuguese Myrtle studied was collected from the area of Sintra (central west coast of Portugal). Different extraction techniques were used, namely: supercritical fluid extraction (SFE), hydrodistillation followed by liquid-liquid extraction (LLE), Soxhlet (Sox), and ultrasound assisted extraction (USAE). As to the solvents tested, SFE used supercritical carbon dioxide with ethanol as a co-solvent, and ethanol was used in the remaining methods.
The efficiency of SFE depends on several parameters such as pressure, temperature, solvent flow rate and the use of a co-solvent. The operational conditions used in this work, previously optimised [1], were a pressure of 23 Mpa, temperature 45 ºC, a CO2 flowrate of 0.3 Kg/h, and a co-solvent (ethanol) flowrate of 0,09 Kg/h-1. In the USAE method was used a sonication bath (Sonorex Super RK, 510 H, 35 kHz, maximum input power 320 W) during 30 min, followed by a stirring period of 24 h, in the dark. The polyphenolic compounds in the extracts were identified using high-performance liquid chromatography with diode-array detection coupled to electrospray ionization ion trap tandem mass spectrometry (HPLC-DAD-ESI/MSn).
The results found showed that the highest value for antioxidant activity was obtained by the USAE method while the lowest value was obtained with LLE technique.

References:
[1] Pereira, P. Bernardo-Gil, M.G. Cebola, M.J. Mauricio, E. Romano, A (2013). *J. Supercritical Fluids*, 83, 57–64.

P03: *Plectranthus* species: novel sources of cytotoxic compounds

Epole Ntungwe N[a,b], **Vera Isca**[a,d], Joana Tavares[a], Amílcar Roberto [a], Lucilia Saraiva[c], Patrícia Rijo[a,d*]

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Natural products and their derivative compounds are the most successful source in the discovery of potential drugs. Medicinal plants have evolved and adapted over millions of years and produce structurally diverse unique secondary metabolites with antitumor properties [1]. Plants from *Plectranthus* genus (Lamiaceae) have demonstrated several uses, including the treatment of various infections [2]. *Plectranthus* spp. are known to be a good source of bioactive compounds namely, abietane-type diterpenoids as common secondary metabolites with reported biological activities [3].

The objective of this study was to evaluate the biological activity of sixteen *Plectranthus* spp. acetonic extracts and identify the bioactive compounds in the most active extracts. *P. mutabilis* had the highest extraction yield (30.03%, dry weight % w/w). All extracts were screened for their antimicrobial activity against Gram positive (*Staphylococcus aureus* and *Enterococcus faecalis*) Gram negative (*Pseudomonas aeruginosa* and *Escherichia coli*) bacteria and two yeast strains (*Candida albicans* and *Saccharomyces cerevisiae*). Nine extracts were active against *C. albicans* and two against *S. aureus* using the well diffusion test. The most active extracts *P. hadiensis* and *P. mutabilis* were tested through the microdilution method (*P. hadiensis* extract: MIC value of 15.625 µg/mL against *S. aureus* and MIC value of 3.91 µg/mL in MRSA strain). All the extracts showed antioxidant activity by the DPPH assay and *P. hadiensis* (36.24%) and *P. mutabilis* (46.14%) had the highest percentage scavenging activity. Furthermore, the antitumor activity of the five most cytotoxic extracts was explored in different cancer cell lines: HCT116, MCF-7 and NCI-H460. *P. ramosior* was the most cytotoxic in all the cancer cell lines (HCT116 = 3.45±0.35, MCF-7 = 2.90 ±0.10, NCI-H460 = 3.00±0-10).

In conclusion, *P. hadiensis* was the most cytotoxic extract, and the chromatographic methodologies resulted in the isolation of the compound 7α-acetoxy-6β-hydroxyroyleanone. The bioactive compound is the potential responsible for the cytotoxic activity of the extract, which was confirmed by the studies in human cell lines (NCI-H460, NCI-H460/R and MRC-5).

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[3]. Burmistrova O Fatima, M, Rijo P, Quintana J, Bermejo J, Estevez F (2013). *Journal of Natural Products* 10-1021.

P04 - Phytochemical study of a cytotoxic royleanone from *P. grandidentatus* and *in silico* prediction of new derivatives

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Plectranthus genus is a great source of bioactive compounds, mainly abietane diterpenes like royleanones [1, 2]. Compound 7α-acetoxy-6β-hydroxyroyleanone (Roy, figure 1) can be isolated from the extract of *P. grandidentatus*, in high amounts [2]. This royleanone showed promising biological activities, including antitumoral activity [3]. Additionally, Roy has two acidic hydroxyl groups (positions C-6 and C-12, figure 1) suitable for derivatization, which can be explored for further drug development. In fact, one patented derivative of Roy, previously synthetized [4], showed enhanced antitumoral activity, with selective activation of the PKC-δ [5].

In this work, was possible to extract and isolate the desired compound (Roy). Air dried aerial parts of *P. grandidentatus* were extracted with acetone in ultrasound equipment. The extraction yield was 2.3% w/w. The crude extract obtained was subjected to several chromatography technics, affording the pure compound for further hemi-synthetic studies. Roy structure was confirmed by NMR. Additionally, molecular docking studies were performed to assess which derivatives can be synthetized from Roy to promote PKC-δ activation. Some theoretical derivatives of Roy were design through modification of C-6 and C-12 hydroxyl groups. Then, the designed compounds were screened against the crystallographic structure of human PKC-δ regulatory domain, using Fred program. Docking results suggests that position C-6 can bear a large diversity of structural groups while small groups (e.g. -OH, -OMe and -OAc) in position C-12, should favor PKC-δ activation. Based on the described results, new hemi-synthetic derivatives from Roy will be prepared for structure-activity relationships.

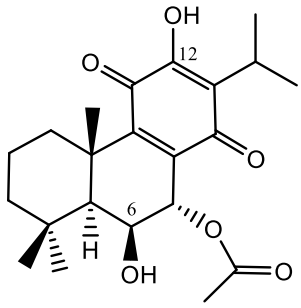

Figure 1 - 7α-acetoxy-6β-hydroxyroyleanone (Roy)

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P05 - Nutritional and chemical characterization of Portuguese grape pomace

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One of the great challenges in the 21st century is the environment ally to the sustainable production processes taking in account industrial and technological development, follow by a growing worldwide pattern of production and consumption.
Sustainable development must be based on a new conception, according to the circular economy, through the feasibility of projects focus on the regeneration of systems providing renewable resources and high added-value products in order to minimize the environmental impact.
Portugal is one of the world largest wine-producing countries, so it was considered that there was a great interest in the reuse of winery by-products passing by application in foods or cosmetic industry. In this way, it is necessary the characterization of the grape pomace.
Some nutritional and biological activities parameters were assay in other to characterize different Vitis vinera L. Portuguese varieties, collected in different regions, Alentejo and Ribatejo. In this study, pH (4-5), ash content (4-8%), moisture content (5-15%), total phenolic (0.2-2 nmol GAE Eq/g extract), antioxidant activity (3-81%) studies were carried out. These are preliminary results allows the characterization of Portuguese grape pomace and showed a high correlation between antioxidant activity and polyphenol contents.

P06 - Preparation and chromatography analysis of *Plectranthus amboinicus* extracts

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Nowadays it is recognized nearly 3000 species of plants of genus *Plectranthus*, spread along the world in countries like Africa, South America, Asia and Australia, being mostly used in the treatment of digestive disorders, infectious, inflammatory and even respiratory diseases. Studies on pharmacological activity are done in extracts or oils. [1]
The aim of this work was investigate the bioactivity and chemical composition of the sample under study. Thus, we analyzed two samples of plant, one with acetone and the other with methanol, dissolved using the ultrasound.
The results obtained were too high for those expected for retention factors (Table 1) and the TLC results (Figures 1-6) were the ones we expected.

References:

[1]. Vasconcelos S, et al. (2017). *BMC Complement Altern Med*., 17(1):462. 10.1186/s12906-017-1968-9.

P07 - Research of antioxidant and antimicrobial activity of *Plectranthus* extracts

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Nowadays it is recognized nearly 3000 species of plants of genus *Plectranthus*, spread along the world in countries like Africa, South America, Asia and Australia, being mostly used in the treatment of digestive disorders, infectious, inflammatory and even respiratory diseases. Studies on pharmacological activity are done in extracts or oils. [1]
The aim of this work was the analysis of 12 species of *Plectranthus*.
The antioxidant activity was analyzed using the discoloration DPPH test which demonstrated that 2 extracts have this activity. The antimicrobial activity revealed that none of the bacteria or yeast tested were sensitive to the extracts analyzed.

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[1]. Vasconcelos S, et al. (2017). *BMC Complement Altern Med*., 17(1):462. 10.1186/s12906-017-1968-9.

P08 - *Lamiaceae* phytochemicals as a suited reducing agent in catalytic material assembly for sensitive detection of bioactive compounds

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Currently, electrochemical biosensing is of utmost importance in the detection of analyte nanomolar concentrations. Thereby an accurate technique for the diagnosis/therapy of various health conditions, such as obesity, diabetes, neurodegenerative and cardiovascular diseases, etc. Still, electrochemical biosensor performance is closely dependent on the catalytic activity of biosensors' transducer material.

Given their unique physicochemical features-properties, like large surface-to-volume and significant electrical conductivity, metallic nanoparticles are a catalytic material good choice. Based on their odd properties, silver nanoparticles (AgNPs) have been widely used in many biomedical applications, such as drug delivery system, optical biosensing and wounds healing. [1]. However, unsafe intermediary chemical compounds involved in the conventional synthesis of metallic nanoparticles urged researchers to develop other eco-friendly alternative pathways [2]. The most commonly used natural alternatives in nanoparticle synthesis are plant extracts. Among this class, *Plectranthus* genus is an excellent supplier of prominent phytochemicals for AgNPs biogenic synthesis [3,2], with *P. amboinicus* leaf-extract proving to be a remarkable reducer and stabilizer of monodisperse and spherical shaped AgNPs [3].

The aim of this work was the development of a proficient method for AgNPs synthesis based on *Plectranthus ciliatus* and *Rosmarinus officinalis* aqueous extracts, and subsequent use on biomarkers sensor as a catalytic material. An initial evaluation of prepared AgNPs was carried out by dynamic light scattering (DLS), and electrophoretic light scattering (ELS) techniques. *P. ciliatus*-based synthesis conceived a high-steady colloid, which leads to high stabilized AgNPs, whereas *R. officinalis* mediated synthesis yielded nanoparticles with surface area eligible to their catalytic performance. Synthesised AgNPs average size and surface charge density, based on *P. Ciliatus* and *R. officinalis*, was about 410 and 200 nm, and 30 and 26 mV, respectively. Accordingly, *P. Cilliatus*-based AgNPs, are particularly relevant as vehicles for drug delivery therapy, as their high surface charge density prevent their aggregation, avoiding their recognition and deletion by the macrophages of the immune system [4]. In turn, AgNPs mediated by *R. officinalis*, are potentially effective as catalytic material in biomolecules sensing. Electroanalytical systems aiming the development of high sensitivity biosensors supported on the catalytic performance of prepared nanoparticles are currently ongoing.

References:

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