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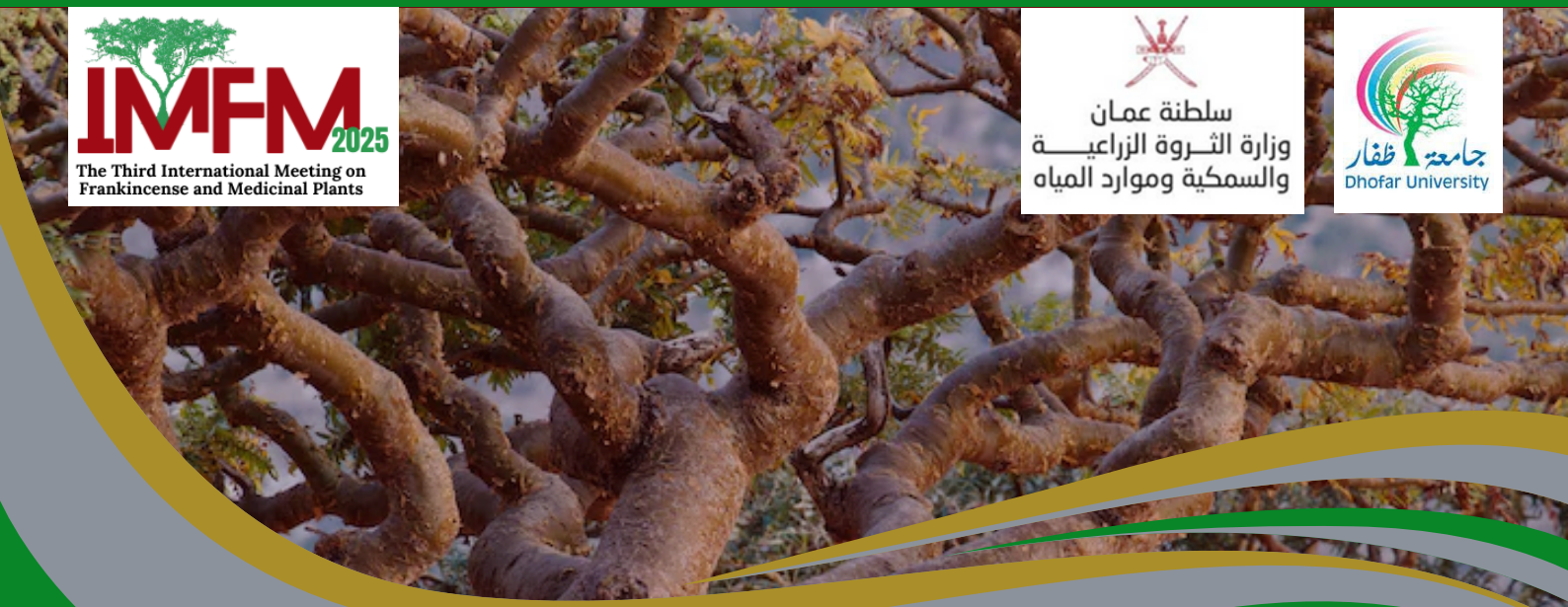

IMFM 2025
The Third International Meeting on Frankincense and Medicinal Plants

سلطنة عمان
وزارة الثروة الزراعية والسمكية وموارد المياه

جامعة ظفار
Dhofar University

Abstract Book of Third International Meeting on Frankincense and Medicinal Plants

3rd IMFM 2025

SEP 14-16 2025

HYBRID EVENT

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Editors
Prof. Luay Jamil Rashan
Director &Principal Investigator
Research Center
Dhofar University, Salalah, Oman

Dr. Adeeb Shehzad
Associate Professor
Biodiversity Research Center
Dhofar University, Salalah, Oman

Conference Organizers
Dhofar University, Salalah, Oman

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3rd IMFM 2025

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About the Conference

The Third International Forum on Frankincense and Medicinal Plants (IFMP 2025), hosted by Dhofar University in collaboration with the Ministry of Agriculture, Fisheries, and Water Resources, is set to take place from 14 to 16 September 2025, in a hybrid format. This prestigious scientific gathering aims to bridge the gap between traditional Omani heritage and modern pharmaceutical innovation by bringing together global researchers, industry experts, and entrepreneurs. Led by Professor Louay Rashan, the forum focuses on the therapeutic potential of *Boswellia sacra* and other medicinal flora, exploring their roles in health, economic development, and sustainable industrial applications. By fostering international academic exchange and supporting local stakeholders, IFMP 2025 seeks to transform scientific discoveries into practical phytotherapeutic solutions while preserving the environmental and cultural value of the “Land of Frankincense”.

3rd IMFM 2025

The Healing Properties of Woodfordia Uniflora (A.Rich.) Koehne from the Dhofar Region of Oman Against Ulcers and Clostridium Perfringens Infections

Ian Edwin Cock[1], Luay Rashan[2]

[1]Centre for Planetary Health and Food Security, Griffith University, 170 Kessels Rd, Nathan, Queensland 4111, Australia

[2]Frankincense and Biodiversity Group, Dhofar University, Salalah 2509, Oman

ABSTRACT

Gangrene is a serious condition, which is characterised by tissue death. It results from restricted blood flow and anoxic conditions and is frequently caused by atherosclerosis, tissue damage, diabetes mellitus and some pathogen infections. Gas gangrene (clostridial myonecrosis), a common class of gangrene, results from bacterial (particularly *Clostridium perfringens*) infections following tissue injury. *Woodfordia uniflora* is used in traditional Arabian healing systems to treat gangrene ulcers and skin sores. However, despite its well-documented uses, *W. uniflora* has not yet been rigorously tested against bacterial causes of gangrene ulcers and skin sores. Additionally, *W. uniflora* extracts are yet to be tested for therapeutic potential against other aspects of ulcer/wound healing, including inflammation and tissue regeneration. Solvent extracts prepared from *W. uniflora* leaves were tested against *C. perfringens* as well as a panel of epidermal bacteria. Antimicrobial activity was quantified by MIC determination. The anti-inflammatory activity of the extracts was evaluated using COX-2 and PGE2 ELISA assays. Toxicity was evaluated using ALA and HDF cell viability bioassays. The methanolic, ethanolic and aqueous extracts displayed noteworthy inhibitory activity (≤875µg/mL) against *C. perfringens.* The ethanol extract was particularly good, with an MIC of 250µg/mL. The extracts also had noteworthy inhibitory activity against several antibiotic-resistant epidermal bacteria, including MRSA (MICs 250-650µg/mL). Additionally, the *W. uniflora* extracts (1.25mg/mL) significantly inhibited COX-2 activity and PGE2 secretion. The ethanol extract was particularly promising, decreasing COX-2 enzymatic activity and PGE2 secretion by approximately 60% and 73% respectively. All *W. uniflora* extracts were non-toxic in the ALA and HDF cell viability assays, indicating their safety for therapeutic use. Taken together, these results indicate that *W. uniflora* extracts have therapeutic potential in the treatment of gas gangrene by inhibiting *C. perfringens* (and several skin bacteria), as well as inhibiting COX-2 mediated inflammation. Further studies are required to determine whether the extracts also affect extracellular matrix formation and tissue remodeling, and to identify the extract components responsible for those activities.

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Treatment of Renal Stones with Frankincense: A Dream to be Translated into a Clinical Trial

Mohamed Salim Al-Marhoon[1], Luay Rashan[2]

[1]Sultan Qaboos University Hospital, University Medical City, Muscat, Oman
[2]Biodiversity Research Center, Dhofar University, Salalah, Oman

ABSTRACT

Frankincense (Luban) is a resin obtained from trees of genus *Boswellia*. The south of Oman hosts *Boswellia sacra* (BS) trees known to have many medicinal uses. Renal stones are common and people prefer non-surgical treatment approaches such as natural products. Recently, Al-Marhoon *et al*. have proved that Luban has a significant effect in the treatment and prevention of experimentally induced renal stones in rats-model. The aim of this phase I & II (Safety, Efficacy) randomized double-blind placebo-controlled clinical trial, is to explore the safety and efficacy of a novel boswellic acids (Luban-S) in the treatment of renal stones. The study will involve 34 participants divided into phase I (n=18) and phase II (n=16). Phase I to determine the safe dose (maximum tolerated dose) gradually testing 3 levels of daily doses (3000 mg, 5000 mg, 10000 mg) as calculated based on our pre-clinical animal study and pilot clinical trials, will be used in two and three divided doses to determine the proper scheduling of treatment (BID or TID). Once the safe dose and proper schedule is determined, phase II case-control study will proceed to examine the efficacy of the new drug (Luban-S) in patients with radiopaque and radiolucent renal stones (placebo n=8; Luban-S n=8). The inclusion criteria are: adult male and female patients with renal stones ≤ 10 mm in size. The exclusion criteria are: pregnant women, patients with known existing renal pathology or comorbidities such as DM, CKD, multiple renal cysts and renal tumors. The outcome measures of the study will include: a) Primary end point: effect of three months Luban-S treatment on the stone size (50% reduction or complete disappearance) or relieve of stone symptoms (50% reduction of symptoms); and b) Secondary end point: patients' intolerance of the treatment (toxicity) or development of side effects. If this study proves an effect of Luban-S on renal stones it will be an outbreak in the management of renal stones using an effective and safe eco-friendly natural product.

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Exploring Bioactive Compounds in Boswellia Sacra through Innovative Particle Size Eco-Separation Methods

Luay Rashan[1], Rachid Soulimani[2]

[1]Biodiversity Research Center, University of Dhofar, Oman
[2]Neurotoxicology and Bioactivity, University of Lorraine, France

ABSTRACT

The extraction of bioactive compounds from plants, specifically from Boswellia resin, typically relies on methods using organic solvents based on polarity gradients. Although this approach allows for the production of extracts rich in bioactive ingredients, it has drawbacks, including the presence of solvent residues that may pose toxic risks. To operate in a dry natural environment and identify active compounds, we adopted an ecological method of particle size separation through differential sieving, following controlled grinding at temperatures below 40°C. This precaution aims to minimize thermal effects on bioactive compounds, including volatile ones, while enabling the production of extracts concentrated in quality and functionality markers. This method, validated by several previous studies, allows us to separate particle size families to isolate the most concentrated fractions, avoid the use of organic solvents, and preserve the interaction and synergy between active biomolecules. In this preliminary study, we isolated five particle size fractions from the resin of *Boswellia sacra* L. using controlled differential sieving. These fractions were subjected to phytochemical analyses, followed by toxicological and pharmacological assessments, in comparison with reference substances, including pure biomolecules and an extract from another variety, *Boswellia serrata* L. The objective is to characterize the most bioactive fractions in relation to their chemical composition and identify the activity supports, thereby contributing to a more precise targeting of biomolecules of interest.

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Assessing the bioactivity of Boswellia sacra compounds on human immune cells

Claude Lambert[1], Seung Ae Yim[1], Rachid Soulimani[1], Luay Rashan[2]

[1]Neurotoxicology and Bioactivity, University of Lorraine, France

[2]Biodiversity Research Center, Dhofar University, Oman

ABSTRACT

Background: Frankincense, a dried resin from Boswellia trees, have been shown empirically to have immune regulatory activity. Few scientific evidences have been reported, mainly using Boswellia serrata resin and in animal models. The most active compound has been identified to be the boswellic acid. But boswellic acid is usually extracted from the solid resin using toxic solvents we want to avoid for human usage. We also believe that natural mixture of compounds may have better activity as compared to the pure, synthetic boswellic acid. The aim of this study is to analyses immunoregulatory activity of Boswellia sacra natural extract using nontoxic extraction process, on human leukocytes.

Methods: the Frankincense from Boswellia sacra has been processed Controlled Differential Sieving Process (CDSp). Active compound extraction were tested with different nontoxic, buffers. The Boswellic acid content was analyzed using Gaz Chromatography. Extracts were tested on human Peripheral blood leukocytes measuring their effect on bacteria induced oxydative bust using 123 DiHydroRhodamine oxidation (DHR123) or on specific T cell activation using T cell Receptor ligand. Immune responses were analyzed by flow cytometry.

Results: the solubilizing experiments have shown the Di Methyl Sulfoxide (DMSO) gives the best extraction of compounds out of Frankincense ultrafine powder without any toxicity on cells. Few fractions of ultrafine powder have shown an improved yield in boswellic acid extraction. The preliminary results show that Frankincense extract reduce the inflammatory reaction in terms of bacterial induced production of free radicles, in a dose dependent manner. Our results also evidenced some effects on the T cell reaction to Physiological stimulus.

Conclusion: Our preliminary results show the feasibility and high added value of Flow cytometry multiparametric analysis in measuring immunoregulatory, anti-inflammatory and antioxidative activity of Frankincense of bioproducts and confirmed the added value of Controlled Differential Sieving Process of Boswellia Sacra resin.

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Boswellia as a Promising Adjunctive Treatment for Radionecrosis Following Stereotactic Radiosurgery

Mohammad Suleiman[1,2], Luay Rashan[3]

[1]Radiation-Oncology, Bürgerspital Solothurn-Switzerland,[2]Radiation-Oncology, University Hospital, Bern-Switzerland

[3]Dhofar University Research Center, Dhofar University, Salalah, Oman

ABSTRACT

Radionecrosis is a serious complication of stereotactic radiosurgery (SRS), occurring in 5–25% of patients and often presenting with neurological symptoms and perilesional edema[3]. Standard treatments such as corticosteroids and bevacizumab are limited by toxicity and long-term inefficacy. Boswellia serrata, a botanical extract rich in boswellic acids, has demonstrated anti-inflammatory, antioxidant, and anti-edema properties. It inhibits 5-lipoxygenase and reduces leukotriene synthesis, thereby dampening neuroinflammatory cascades, stabilizing the blood–brain barrier, and mitigating vasogenic edema—all key drivers of radionecrosis pathology. A 2024 retrospective study of 94 patients with MRI-confirmed radionecrosis reported a 59.6% response rate to Boswellia, with 12% achieving complete and 48% partial responses; 63.8% of patients off corticosteroids responded favorably[1]. A 2024 meta-narrative review of 130 patients found approximately 50% showed clinical or radiologic improvement, and one-third were able to reduce corticosteroid use[2]. MRI scans consistently demonstrated perilesional edema reduction. Doses ranged from 300 to 4,200 mg/day and were well tolerated with minimal adverse effects. Given that Boswellia sacra extracts have demonstrated anti-inflammatory, antioxidant, neuroprotective, and anti-edematous properties in both in vitro and in vivo studies, and considering their higher content of boswellic acids compared to B. serrata, we recommend prioritizing the investigation of B. sacra for their therapeutic potential in the treatment of radiation-induced necrosis. Furthermore, their prophylactic application alongside stereotactic radiosurgery (SRS) warrants exploration as a potential strategy for preventing radionecrosis.

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IDH-dependent Effects of *Boswellia Sacra* in Glioma Cells

Filippo Torrisi[1], Anastasiia Badaeva[2], Alexey Danilov[3], Moh'd Suleiman[4], Luay Rashan[5], Rosalba Parenti[6], Vittorio Calabrese[6]

[1]Department of Medicine and Surgery, University of Enna "Kore," 94100 Enna, Italy

[2]Department for Pathological Physiology, I. M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation, Moscow, Russia

[3]Department for Nervous Diseases, I.M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation, Moscow, Russia

[4]Division Radio-Oncology Bürgerspital Solothurn, Solothurn, Switzerland

[5]Biodiversity Unit, Dhofar University, Salalah, Oman

[6]Department of Biomedical and Biotechnological Sciences, University of Catania, Catania, Italy

ABSTRACT

Glioblastoma is an aggressive and lethal brain tumor with limited treatment options. The current standard therapy includes surgical resection followed by radiotherapy and temozolomide, which offers only a modest survival benefit. A key molecular marker in gliomas is the IDH1 mutation, commonly Arg132His, which is linked to better prognosis compared to IDH wild-type tumors [1]. This mutation triggers metabolic reprogramming and oxidative stress due to NADPH depletion, impairing antioxidant defenses like glutathione recycling. Consequently, reactive oxygen species (ROS) accumulate, partly driven by the production of the oncometabolite R-2-hydroxyglutarate (R-2-HG) [2]. While this increases tumor vulnerability to oxidative damage, R-2-HG also promotes tumor progression and alters the epigenetic and metabolic microenvironment. Given this altered redox balance in IDH-mutant gliomas, exploring cellular responses to oxidative stress becomes highly relevant. Nutraceuticals, known for their antioxidants and anti-inflammatory properties, are promising tools in this context. Our study investigates the effects of Boswellia sacra resin, a natural compound with strong anti-inflammatory potential, on glioma cells. Boswellic acids have shown efficacy in reducing oxidative stress and inhibiting proliferation of glioblastoma stem-like cells [3]. Preliminary results indicate that Boswellia sacra reduces cell viability, with IDH1-mutant cells showing greater sensitivity, even at lower concentration when combined with temozolomide (1 µg/ml). Further studies will explore cell survival and molecular pathways, focusing on IDH1 status and O6-methylguanine-DNA methyltransferase (MGMT) expression.

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Boswellia Sacra (Bs7) Alleviates Behavioral Alterations and Improves Gabaergic System in Valproic Acid-Induced Autism

Ylenia Marino[1], Francesca Inferrera[1], Alexey Danilov[2], Anastasiia Badaeva[3], Daniela Impellizzeri[1], Rosalba Siracusa[1], Salvatore Cuzzocrea[1,4], Marika Cordaro[5], Roberta Fusco[1*], Luay Rashan[6], Rosanna Di Paola[7], Vittorio Calabrese[8]

[1] Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina, Viale F. Stagno D'Alcontres 31, 98166, Italy

[2] Department for Nervous Diseases, I. M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation, Moscow, Russia

[3] Department for Pathological Physiology, I. M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation, Moscow, Russia

[4] Link Campus University, Via del Casale di San Pio V, 44 00165 Rome, Italy

[5] Department of Biomedical, Dental and Morphological and Functional Imaging University of Messina, Via Consolare Valeria, 98125 Messina, Italy

[6] Biodiversity Unit, Dhofar University, Salalah, Oman

[7]Department of Veterinary Sciences, University of Messina, Viale SS Annunziata, 98168 Messina, Italy

[8]Department of Biomedical and Biotechnological Sciences, University of Catania, 95125 Catania, Italy

[*]Corresponding Author

ABSTRACT

Pre-natal and post-natal valproic acid (VPA) exposure in mice results in behavioral impairment, aberrant sensitivity to sensory stimuli, and self-harming behavior, hallmarks of autism. According to previous reports, Boswellia Sacra (BS7) has a protective effect on the brain. The goal of the current investigation was to assess how BS7 affected the neurobehavioral and metabolic changes caused by VPA in mice. Pregnant mice received a single intraperitoneal injection of VPA at a dose of 450 mg/kg on day 12.5 of gestation. After the birth, mice pups were orally administered with BS7 at a dose of 200 mg/kg daily from 14 to 40 days of age. Mice pups were placed through behavioral tests during the trial to evaluate motor skill growth, nociceptive response, locomotion, anxiety, and cognition. Following behavioral testing, mice were killed, and the brain was removed and subjected to biochemical analyses (glutathione, malondialdehyde, and nitric oxide) and histopathological analysis. Additionally, we examined the modulation of this pathway and the alteration in Gamma-amino butyric acid (GABA) production using Western blot analysis. According to our research, BS7 daily administration greatly reduced behavioral alteration, reversed the disorganization of the cerebellum and hippocampus, and significantly improved the VPA-induced neuroinflammation.

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Exploring the Effectiveness of Omani Frankincense Boswellia Sacra Oleo-Gum Resin Extracts and Essential Oils Against the Parasite Causing Cystic Echinococcosis Invitro Effect

Baraa Basil Ramadhan[1], Asmaa Abdulazeez[2], Luay Rashan[3]

[1]College of Pharmacy, Ninevah University, Mosul, Iraq
[2]College of Education for Pure Science, Mosul University, Mosul, Iraq
[3]Research Center, Dhofar University. Salalah, Oman

ABSTRACT

Cystic echinococcosis (CE) is a life threating disease and a major public health problem caused by the larval stage of the tapeworm named Echinococcus granulosus. Cystic echinococcus is transmitted from animals to human (zoonotic disease). In endemic areas, the incidence rate reaches over 50 per 100,000 person/year and prevalence may be as high as 5-10%. It is found in most countries worldwide, but it is not an epidemic disease. Current treatment involves surgical removal of the cysts, percutaneous drainage, or chemotherapy with anthelmintic drugs like albendazole. While albendazole is effective in treating (CE) in both humans and animals, though, it has drawbacks, including poor absorption, vertigo, liver enzymes elevations plus the risk of recurrence. Recently, there was a high tendency among researchers to evaluate and present herbal plants as an alternative option due to being easily available, inexpensive, cheap and with low side effects. Therefore, the current project aims to explore the scoliocidal potential of Boswellia sacra extracts, and essential oils on Echinococcus granulosus both in vitro and in vivo. Protoscolices were collected from hydatid cysts obtained from infected sheep livers. Many polar and non-polar solvents were used to obtain a wide range of extracts from B. sacra gum resin. Extracts were prepared and applied at various concentrations (e.g. 30, 3, 0.3 µg/ml) for different exposure times (2-60 minutes). The mortality rates were assessed using 0.1% eosin staining by light microscopy. The results so far obtained indicate that all extracts used in the current study displayed promising significant scoliocidal effects against E. granulosus in vitro speaking. However, the standardized B. sacra gum resin extract showed the highest scoliocidal activity in vitro, achieving 100% mortality at 3µg/ml after 10 minutes of exposure compared to both negative and treated positive control with albendazole. These results are promising, however, additional in vivo studies are in progress to confirm such activity.

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The Combined Effect of Nerium Oleander Cold Leaf Extract and Some Selected Omani Frankincense Boswellia Sacra Oleo-Gum Resin on the Parasite Causing Cystic Echinococcosis Invitro Effect

Huda Fawaz Yasin[1], Asmaa Abdulazeez Ali[1], Luay Rashan[2]

[1]College of Education for Pure Science, Mosul University, Mosul, Iraq

[2]Research Center, Dhofar University. Salalah, Oman.

ABSTRACT

Cystic echinococcosis (CE) is a severe zoonotic disease that poses a significant threat to humans and animals, slow animal husbandry, caused by larval stages of Echinococcus granulosus. Canines are the definitive host, while humans are the accidental host. E. granulosus infections often remain asymptomatic for years before the cysts grow large enough to cause symptoms. Hepatic and pulmonary signs and symptoms are the most common clinical manifestations. Approximately 4 million people are infected with hepatic hydatid disease globally, and an additional 60 million are at risk of infection. The liver is the most involved organ, although it may affect other organs. The diagnosis of cystic echinococcosis relies on immunodiagnostic methods alongside radiological methods in combination with clinical findings. Albendazole and Mebendazoles are the drugs for choice in treating small cysts and preventing recurrence after surgery. In general, herbal extracts from different plants have gained attention in recent years for the prevention and treatment of a variety of chronic conditions due to their multi-targeted characteristics. Nerium oleander has a wide range of potential activities including anticancer, antibacterial and anti-inflammatory properties. B. sacra gum resin possesses a wide range of potential activities such as anti-cancer, anti-inflammatory, anti-asthmatic, analgesic, immunomodulatory. Given the side effects of the medications used and the risks of surgical procedures, the present study aimed to investigate the effect of combining extracts of N. oleander leaves and selected B. sacra gum resin extracts. The samples were exposed for different time periods (5-20-35-50) minutes using different concentrations (30µg/ml-3µg/ml-0.3µg/ml) for each exposure period. The combination of the extracts had a clear effect on the percentage of killing protoscoleces in vitro. The percentage of killing protoscoleces increased with increasing concentration and exposure period of the extracts in vitro, the highest percentage of killing was recorded in the N. oleander extract, reaching 70% at a concentration of 30mg/ml for a 50-minute exposure period. After combining the extracts, the highest percentage of killing was recorded, reaching 64% at a concentration of 30mg/ml for a 50-minute exposure period. The highest percentage of killing was recorded for the B. sacra extracts reaching 58% at a concentration of 30mg/ml for a 50-minute exposure period. The current results in vitro are interesting and encouraging, indicating some synergistic effect between these extracts, however, additional animal studies are required to further validate the synergistic effect of B. sacra and Nerium oleander leaves.

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Curcumin: A Drug of Choice for the Treatment of Various Cancers

Adeeb Shehzad, Luay Rashan

Research Center, Dhofar University, Salalah 211, Oman

ABSTRACT

Plants have been used for hundreds of years for the treatment and prevention of various diseases. The gradual change in cell signaling mediated by regulatory proteins is the main reason for the formation of cancer. Curcumin is a diferuloylmethane phytochemical, isolated from the dried rhizomes of turmeric, has shown potential against wide range of cancers including gastrointestinal, genitourinary, gynecological, hematological, pulmonary, thymic, brain, breast, and bone cancers. The underlying molecular mechanism of curcumin actions against various cancers remains under investigation. The multifaceted role of this compound includes the modulation of several deregulated cell signaling pathways. Curcumin may limit the risk of cancer by regulating the transcription factors transcription factors (NF-kB, STAT3, b-catenin, and AP-1), growth factors (EGF, PDGF, and VEGF), enzymes (COX-2, iNOS, and MMPs), kinases (cyclin D1, CDKs, Akt, PKC, and AMPK), inflammatory cytokines (TNF, MCP, IL1, and IL6), upregulation of proapoptotic (Bax, Bad, and Bak) and downregulation of antiapoptotic proteins (Bcl2 and BclxL). Many animal and human studies have supported the safety of curcumin and even well tolerated in very high doses. Current study explores the chemopreventive effects of curcumin through its multiple molecular pathways and highlights its therapeutic value in the treatment and prevention of a wide range of cancers.

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Yield Dynamics and Sustainable Management of Boswellia Sacra: Insights from Oman's Diverse Agro-Ecological Zones

Ahmed Bakhit Salim AL-Shanfari

Ministry of Agriculture, Fisheries, Wealth & Water Resources, Salalah, Dhofar Governorate, Sultanate of Oman

ABSTRACT

The frankincense tree (Boswellia sacra) is a key economic plant in Oman, but its populations have recently declined sharply due to improper tree-tapping practices. Current scientific understanding of frankincense trees in Oman is limited, particularly regarding yield variations across different agro-ecological zones, the impacts of resin extraction methods and cutting frequencies on yield, and issues related to plant regeneration. This study was conducted in four distinct agro-ecological zones, involving a total of 180 healthy, non-harvested frankincense trees, with four replications for each location. The highest olibanum yield was recorded after the fourth tapping pick. Average resin yields across the four locations were 650 g, 620 g, 360 g, and 470 g per tree per season over ten tapping sessions. The findings revealed a positive correlation between olibanum yield and factors such as stem diameter, crown size, trunk size, and the number of tapping spots, while an inverse correlation was observed with tree flowering and elevation. Sustainable harvesting practices for frankincense trees should include limiting cut depth to the phloem without reaching the hardwood, avoiding cuts in sensitive areas of the tree bole, maintaining adequate distances between cuts, employing traditional tapping methods, and designating specific periods during which tapping is prohibited.

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Antimicrobial and Antifungal Activity of Standardized Omani Frankincense Extract Powder

Sergey Dobretsov[1*], Laila Al-Naamani[1], Luay Rashan[2]

[1]Department of Marine Science and Fisheries, College of Agricultural and Marine Sciences, Sultan Qaboos University, Muscat, Oman

[2]Research Center, Dhofar University, Salalah, Oman

ABSTRACT

Frankincense, the aromatic resin obtained from *Boswellia* species, has been traditionally valued for its medicinal and antimicrobial properties. A standardized extract of *Boswellia sacra* (Omani frankincense) was evaluated for its antimicrobial and antifungal properties. The chemical composition of the powder was analyzed using HPLC/MS, revealing a rich profile of bioactive triterpenoids including boswellic acids (AKBA, KBA, α-BA, β-BA, α-ABA, and β-ABA) and lupeolic acids (LA and ALA). Among these, β-ABA (86 µg/mg) and AKBA (50 µg/mg) were the most abundant. Antibacterial activity was assessed using minimum inhibitory concentration (MIC) assays, showing moderate inhibition of *Escherichia coli* (MIC: 512 mg/mL) and *Staphylococcus aureus* (MIC: 1024 mg/mL). Antifungal testing revealed stronger effects, with 38% inhibition of *Fusarium* sp. at 0.25 mg/mL after 5 days of incubation. However, the inhibition of *Alternaria alternata* at 0.5 mg/mL was 45%. These results support the potential of this standardized extract as a natural antimicrobial and antifungal agent and underscore the value of Omani frankincense in traditional and modern therapeutics.

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Characterization of Protein Extracted from the Omani Seaweed "Hypnea bryoides"

Hala Hilal Al-Mawali[1] and Ahmed Ali Al-Alawi[2*]

[1]Department of Food Sciences and Nutrition, College of Agricultural & Marine Sciences, Sultan Qaboos University, P.O. Box 34, Al-Khoud 123, Muscat, Sultanate of Oman.

[2]Centre of Excellence in Marine Biotechnology, Sultan Qaboos University, P.O. Box 50, Al-Khoud 123, Muscat, Sultanate of Oman.

ABSTRACT

Hypnea bryoides (H. bryoides), a species belonging to the red seaweed group (Rhodophyta), was previously found to contain a significant amount of protein. This study aimed to extract protein from H. bryoides and examine its functional and chemical properties. The protein was extracted in an alkaline solution (0.3 M NaOH, pH 12). HPLC analysis was performed to assess the protein's molecular weights and amino acid profile. The molecular characteristics of the protein extract were analyzed using the FTIR-ATR technique. The extraction yield was 6.00 ± 0.35%, and the purity was 88.50 ± 0.71%. The protein demonstrated a higher oil-holding capacity (13.56 ± 0.26 g oil/g protein) compared to its water-holding capacity (9.61 ± 0.15 g water/g protein). The highest protein foaming capacity, solubility, emulsifying capacity, and stability were observed at pH 8 and 10 ($P \leq 0.05$), while the greatest foaming stability occurred at pH 4. The in-vitro digestibility of the protein was 62.62 ± 3.29%. Furthermore, the FTIR-ATR analysis revealed that β-sheet structures constitute the primary secondary structural component of H. bryoides proteins. Different protein molecules with a broad range of molecular weights (0.4 -125.2 kDa) were identified by HPLC. The amino acid profile results indicated that essential amino acids accounted for 35.08% of the total amino acids, with methionine + cysteine being the limiting amino acid (Amino acid score: 0.003). Overall, the protein from this seaweed exhibited good functional and chemical properties, making it suitable as an emulsifying or foaming agent in various food products. Moreover, future research is needed to enhance the yield and investigate the biological activities of H. bryoides protein.

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Sustainable Bioactive Composite Hydrogels from Local Waste and Dhofar's Indigenous Plant Extracts: A Frontier in Natural Biomedical Materials

Mazhar Ul-Islam, Fay Al Mashli, Fatima Koofan, Atiya Fatima

Department of Chemical Engineering, College of Engineering, Dhofar University

ABSTRACT

This study aims to develop sustainable and bioactive composite hydrogels by integrating bacterial cellulose (BC) with indigenous plant extracts from Dhofar and local waste sources, targeting biomedical applications. BC was synthesized using food waste as a low-cost carbon source, promoting both environmental and economic sustainability. Ex situ impregnation of BC hydrogel was performed using extracts from Punica granatum (pomegranate) peel, Euclea schimperi, Aloe vera, and cactus plants known for their traditional medicinal value in Dhofar. Comprehensive characterization techniques revealed that the incorporation of these botanical extracts enhanced the hydrogels' liquid retention, mechanical strength, and biological performance. Antimicrobial efficacy was assessed via MIC, MBC, disc diffusion, and plate count methods, demonstrating significant activity against Staphylococcus aureus and Escherichia coli. Notably, composites enriched with Aloe vera and cactus showed superior mechanical integrity, suggesting potential for durable biomedical use. The findings underscore the potential of combining locally sourced waste and traditional plant wisdom to produce eco-friendly, functional biomaterials for pharmaceutical and cosmetic applications.

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Exploring the Pharmaceutical Potential of Traditional Phytopigments

Siva Ramamoorthy

Department of Biotechnology, School of Bio Sciences and Technology, Vellore Institute of Technology, Vellore-632014, India

ABSTRACT

The colossal use of plant extracts to alleviate various ailments was described by healers, merchants, explorers, and missionaries throughout the centuries. The plant extracts, their key bio-actives, and transcendent curing power are no longer an enigma, while it rooted in the emergence of ethnopharmacology. Among these plant-derived bio-actives, phytopigments such as curcumin gained worldwide recognition for their impeccable therapeutic properties and have become an imperative component of the traditional medicine system. Lately, there have been immense endeavors to scientifically validate the therapeutic potential of phytopigments in in vitro and in vivo disease models. Carotenoids, anthocyanins, anthraquinones, and flavonoids are some of the widely investigated and therapeutically utilized phytopigments. Pigments are reported for their therapeutic implications in cardiovascular diseases, ging, neurodegenerative diseases, cancers, respiratory and blood disorders. Phytopigments demonstrated several desirable characteristics of drug candidates, including high molecular mass, high sp3 carbon atoms, hydrogen-bond acceptors and hydrogen donors, and remarkable molecular rigidity. Therefore, phytopigments are a promising solution for the mitigation of several ailments. Furthermore, extensive clinical interventions are obligatory to substantiate their effects on humans.

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Secondary Metabolites from Medicinal Natural Products

Jae Sik Yu

Department of Integrative Biological Sciences and Industry, Sejong University, South Korea

ABSTRACT

Medicinal natural products, shaped by evolutionary pressures and ecological interactions, are reservoirs of structurally diverse and biologically potent secondary metabolites. These compounds, including terpenoids, flavonoids, alkaloids, and lignans, serve as crucial chemotaxonomic markers and therapeutic agents, contributing to both traditional medicine systems and modern drug discovery pipelines. South Korea is also known to have many indigenous medicinal plants that show excess number of secondary metabolites. My research integrates classical natural product chemistry with advanced metabolomics, spectroscopic techniques, and bioactivity-guided isolation to uncover and characterize novel secondary metabolites from understudied medicinal plants. This presentation will highlight recent findings from our investigation of regionally significant species, and other endemic flora with documented ethnomedical use. Emphasis will be placed on the structural elucidation of novel compounds, the biosynthetic logic underlying their production, and their functional roles as anti-inflammatory, antimicrobial, and metabolic disease-modulating agents. Moreover, the talk will address how climate-adaptive metabolomics and traditional knowledge integration can together illuminate new leads for therapeutic development and valorization of biodiversity. By bridging phytochemistry, omics technologies, and bioactivity screening, our work contributes to the growing field of evidence-based natural product research and supports sustainable bio-utilization of medicinal plant resources.

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Pharmacological Mechanisms and Therapeutic Implementation of Traditional Chinese Herbal Medicine for Depressive Disorders

Wang Ping

College of Pharmaceutical Sciences, Zhejiang University of Technology

ABSTRACT

Depression is a common mood disorder characterized by persistent depressive states, accompanied by symptoms such as low mood, physical discomfort, and sleep disturbances. It falls under the category of “depression syndrome” (Yu Bing) in Traditional Chinese Medicine (TCM). TCM has a long history in treating depression, forming a unique theoretical system and therapeutic approach based on its holistic concept and syndrome differentiation. Traditional Chinese herbs—particularly frankincense, saffron, and Bupleurum (Caihu)—exert antidepressant effects through multi-target mechanisms, including regulating neurotransmitters, modulating brain-derived neurotrophic factor (BDNF) levels, exerting anti-inflammatory and antioxidant effects, regulating the hypothalamic-pituitary-adrenal (HPA) axis, and modulating gut microbiota structure. These herbs demonstrate comparable efficacy to first-line antidepressants while exhibiting fewer side effects. As a treasure of Chinese civilization, TCM is now being revitalized through innovation. Contemporary TCM practitioners are writing a new chapter for this ancient medical tradition, contributing Chinese wisdom to global health governance.

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Quantitative Analysis of Antioxidant Activity in Methanolic Extracts of Newly Developed Polyphenolic Agents

Aymen Al-Sammarra'e, Zeena Ezzat Younus, Hana Sultan Abdullahm, Noor Al- Huda Moatasem Mohammed, Faris T. Abachi*

Department of Pharmacy, College of Pharmacy, Al-Hadba University, Mosul, Iraq

*Corresponding Author

ABSTRACT

The free radical plays a role in damaging DNA and many chronic health issues such as cancer, inflammatory, and cardiovascular diseases. Several specific flavonoid-rich foods appear to lower the risk for non-alcoholic fatty acid liver disease (NAFALD) in adults. This study aimed to extract and characterize Pitaya (dragon fruit) (Hylocereus polyrhizus), soursop (Annona muricata), ginger (Zingiberaceae), and curcumin (Curcuma longa), which are members of a plant kingdom family and important in both consumed dietary and antioxidant agents. The methodology involved collecting and authenticating the plant, processing samples, extracting using cold methanol, purifying the extract, conducting phytochemical screening, UV-VIS spectrophotometric scanning, and HPLC techniques. Our identification and quantitative determination of L-Rutin, R-Rutin, Apegnin, and Qurectine. These polyphenol and flavonoid groups play a role in protecting against oxidation and reducing free radical production. The antioxidant scavenging activities of all solvent extractions in the DPPH assay were found to be the highest as compared to the other assays at 200 µg/mL that were determined.

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Ultrasonic Waves Induce Callus Induction and Plant Regeneration of the Medicinal Plant Senna (*Cassia acutifolia*)

Karam T. Aziz Al-obaedi[1], Shifa M. Salih[2,*]

[1]General Directorate of Education in Nineveh Governorate

[2]Department of Biology, College of Education for Pure Sciences, University of Mosul, Mosul, Iraq

[*]Corresponding author

ABSTRACT

Senna (*Cassia acutifolia)* is a medicinal plant belongs to Fabaceae family. It is considerably used in folk medicine as a purgative. In addition, it has antimicrobial, antioxidant and anticancer activities. 30-day-old seedlings were used as a source of explant. different explants were cultured on solidified Murashige and Skoog (MS) medium containing different concentrations of growth regulators. All parts showed a good response to callus induction, and the best medium was MS containing 2.0 mg.L-1 2,4-dichlorophenoxy acetic acid (2,4-D) and 0.5 mg. L-1 benzyl adenine (BA). On the other hand, ultrasonic waves (47.6 kHz) at different exposure periods were applied. It was clear that 45 minutes exposure period was the best treatment for hypocotyls as the fresh weight reached 5.24g as compared to 40.2g for the control. Whereas a 35 minutes exposure time was very suitable for stems as the fresh weight was 4.87g. This study highlights on the other**,** the efficient and stimulative effect of ultrasonic waves at 35 and 5 minutes exposure period in enhancing the ability of shoot tips and stem callus for shoot regeneration, as it reached 160% and 130% respectively**.** The results of the study provide the possibility for utilizing plant tissue culture technique, to produce the active compounds of this important plant sustainably.

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The Effect of Strawberry and Almond in Some Physiological and Biochemical Traits of Rabbits

Rana Suhail AL-Juwary[1,*], Muntaha Mahmood AL-Kattan[2]

[1]Biology Department, College of Education for Girls, Mosul University, Iraq

[2]Biology Department/ College of Science, Mosul University

[*]Corresponding Author

ABSTRACT

The current study revealed The influence of strawberry-derived polyphenols and almond-derived omega-3, and a combination of omega3 and vit. E in reducing the risk of experimental fatty liver disease caused by Triton. The study included 100 male white rabbits. They were separated into ten groups. as follows: control group, rabbits administered 300 milligrams of triton per kilogram of body weight, rabbits given Strawberry-extracted polyphenols, rabbits given Strawberry-extracted polyphenols with Triton, rabbits provided Almond-derived omega-3, rabbits provided Almond-derived omega-3 with Triton, Rabbits provided Strawberry-extracted polyphenols and Omega3 extracted from almonds, provided rabbits Polyphenols from strawberries and omega-3 from almonds with Triton, rabbits given omega3 , Vit. E provided the final group with vitamin E and omega-3with triton. The dose administered daily for four months. Study Outcomes showed a notable rise in ALT and AST activity in rabbits groups handled with Triton while in contrast to each of the other groups. Whereas in the rabbit groups given polyphenols made from strawberries, Omega3 extracted from almonds, and Omega3, vitamin E, the activity of the indicated enzymes decreased. Compared to the other groups, the rabbits treated with Triton had higher levels of urea and creatinine with a probability of ($P \leq 0.01$).

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Anti-mosquito Repellent of Nano-Practical Extraction from Frankincense Leaves (Nano Luban Product)

Imad Bait Abaidoon

Senior Lab Analyst at OQ Base Industries (OQBI), Oman, Salalah, South Saddah, Salalah 211, Oman

ABSTRACT

In recent years, the incidence of mosquito-borne diseases such as Zika and malaria has increased significantly. The effectiveness of conventional insecticides used to control and treat various mosquito species has declined year by year, while their negative impact on human health and the environment remains a major concern. In this study, we investigate the potential of a synthesized nanomaterial extracted from frankincense (Boswellia) leaves using the Soxhlet extraction method with water as the green solvent. Chemical analysis of the extract identified alpha- and beta Boswellic acids as the main active compounds. Cytotoxicity analysis indicated that the LC_{50} concentration is 600 ppm. Acute toxicity testing (oral and dermal) classified the extract in Toxicity Category 5 (low toxicity), with an LD_{50} of 5000 mg/kg. Bioassay results demonstrated that the final product is capable of repelling mosquitoes with an efficiency exceeding 91%. The nanoscale formulation of frankincense leaf extract offers a promising, eco-friendly alternative for mosquito control—enhancing both public health and environmental safety compared to conventional chemical insecticides.

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Moringa Peregrina: The Unutilized Treasure of Nature

Ali Rafeet

Engineer (retired)/ Member of NCS in Dhofar Governorate Under Environment Authority,
Salalah/North Auqad/Othman Ben Affan St., Salalah 211, Oman

ABSTRACT

Moringa peregrina, commonly known as the Arabian Moringa, is a rare and highly valuable native tree species thriving in the arid and semi-arid regions in different regions of the Arabian Peninsula and East Africa, including Dhofar. This presentation highlights the botanical characteristics, ecological significance, and traditional uses of *Moringa peregrina*. Recent studies have shown its high potential in the fields of nutrition, medicine, and cosmetics, regarding to its rich biochemical composition. Given the threats of habitat loss and overexploitation, the talk emphasizes the urgent need for more scientific research, sustainable investment, and conservation efforts to unlock the full economic and medicinal potential of this unique tree.

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Frankincense Formulation: A Field-Based Study in Skincare Performance and Heritage-Driven Innovation

Atheer Tabook

Founder of Lubaniah, Oman

ABSTRACT

This study explores the therapeutic performance of Boswellia sacra (Omani frankincense) in modern dermo-cosmetic formulations through a comprehensive approach that integrates formulation science, botanical research, and extended user-based testing. Core ingredients include 0.25% to 1.5% essential oil, 5% to 45% hydrosol, resin infusion, resin residue, frankincense-derived glycerides, and the integration of key actives such as AKBA and α- pinene. Botanical by-products such as leaves, nectar, and petals are also explored for their potential to enhance formulations. Formulas were designed within dermal safety guidelines and tested over 1–3 month periods by users experiencing acne, eczema, sensitivity, pigmentation, and age-related wrinkles. Results indicated significant reductions in inflammatory symptoms, with up to 80% wrinkle reduction in women aged 35–43, as well as sustained control of acne and eczema without recurrence. Stability was verified through 12-week stress testing protocols. Products were subjected to third-party microbiological analysis. The study was conducted through the research platform established by Lubaniah, an Omani-founded skincare initiative focused on science-driven formulation using frankincense. This work proposes a real-world framework for ethical, sustainable, and efficacious frankincense-based skincare rooted in local biodiversity and aligned with emerging cosmetic science.

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Medicinal and Nutritional Potential of Acacia senegal (Gum Arabic Tree) in Dhofar, Oman: A Neglected Natural Resource

Said Musallam Bakhit Tabook[1], Abdulaziz Ahmed Ali Al-Mashani[2]

[1]Agricultural Engineer at Royal Razat Farm, Royal Court Affair

[2]College of Arts and Applied Sciences (CAAS), Dhofar University, Oman

ABSTRACT

This study explores the significance of the gum-arabic tree (Acacia senegal), locally known as "Tur" (/θur/) in Dhofar, the only region in the Arabian Peninsula where it naturally grows. Its gum, called "Malukh" (/məlɔx/), holds exceptional medicinal and nutritional value. Traditionally, both the bark and gum have been used to treat wounds, infections, respiratory and digestive disorders, joint pain, kidney failure, and eye diseases. It is also valued for enhancing immunity, fertility, and overall vitality. Secondary products such as camel milk and honey derived from trees' nectar further contribute to its health benefits. The dark red gum considered the highest quality, is rich in carbohydrates, dietary fiber, and essential minerals like calcium and magnesium. Its solubility, lack of taste or color, and low caloric content make it suitable for therapeutic use, weight management, and cholesterol reduction. Furthermore, it plays a role in skincare, cosmetic products, and pharmaceutical formulations. Despite its proven properties, its use remains largely confined to older generations. This study highlights the urgent need to scientifically document, preserve, and promote this underutilized national resource, recognizing its potential in both medical applications and sustainable economic development.

Keywords: Gum-Arabic, Acacia Senegal, Dhofar, Nutritional value, Medical Uses

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Synthesis and biological evaluation of some new coumarin derivatives

Hiba A. AL-Ameen[1], Adnan O. Omer1, Badie A. Ahmed[2,*]

[1]Department of Chemistry, College of Science, Mosul University, Mosul, Iraq

[2]Al-Hadba University, Mosul, Iraq

[*]Corresponding author

ABSTRACT

A series of new N-(5-substituted phenyl-1,3-thiazole-4-yl-amino) quinoline has been synthesized from the reaction of 2-amino-4-arylthiazoles with coumarin in the presence of pyridine. The starting amines were prepared in the solid phase from the reaction of different substituted acetophenones with thiourea. Aminocoumarins and their related compounds represent an important class of versatile scaffolds in organic synthesis. They have been consistently used as a building block in the synthesis of different heterocyclic compounds. Moreover, 4-aminocoumarins attract more attention because of their wonderful biological applications as antiproliferative, antimycobacterial, antibacterial, antiplatelet, anti-glycant, antioxidant, antitumor, anti-strogen, and enzyme inhibitory. The presence of an amino group and enamine carbon enhances their chemical reactivity. Meanwhile, chemists have developed various synthetic methodologies for the synthesis of such a privileged precursor. The purpose of this current review is to demonstrate different synthetic methodologies for the construction of 4-aminocoumarin derivatives and the investigation of their biological and medicinal applications. All the newly synthesized compounds were screened for their biological activity. The structure of the newly synthesized compounds was suggested in the light of IR, UV, 1H-NMR and C, H, N, S analysis.

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Traditional Healing with Medicinal Plants in the Western Desert of Dhofar: A Study on Peganum harmala L and Aloe vera L. Burm. f.

Amina Saleem Salim Qamsit

Department of Education, College of Arts and Applied Sciences, Dhofar University, Salalah, Oman

ABSTRACT

This study addresses the topic of traditional medicine with medicinal plants in the western desert of Dhofar Governorate, which is an area rich in heritage knowledge related to folk medicine that the inhabitants have relied on since ancient times to treat diseases. This region is characterized by the use of a variety of medicinal plants that have proven effective in treating several health issues, within therapeutic practices linked to the environment and local cultural heritage.Among the most prominent of these plants is the Harmal locally known as “Athifir” (Peganum Harmala L), which is one of the medicinal plants used since ancient times in alternative folk medicine to treat various types of diseases and health problems such as fever and skin ulcers. As for the local plant Sabra locally known as “Al-Saical (Aloe vera (L.) Burm.f), it is known for its ability to accelerate the healing of wounds and regenerate skin cells, and it is also used to disinfect wounds due to its antiseptic and soothing properties. The study also reviews the benefits and challenges associated with traditional treatments. The research is based on several main axes, where the first section discusses the types of folk plants used in treatment in the western desert of Dhofar, while the second section highlights the methods of their use and their therapeutic properties circulated among the inhabitants. It is expected that the study will reveal the extent of the spread and impact of traditional medicine with plants in the Dhofar desert, along with the culture and beliefs in preserving it, in addition to clarifying the extent of the local community’s acceptance of combining it with modern medicine.

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A Novel Investigation of the Effect of Clove (*Syzigium aromaticum)* and Silver Nanoparticles (AgNPs) Conjugated Clove on *N. gonorrhoeae* and Prostate Cancer Cell Line

Ameera Mahmood Alrawi[1,*], Qasim Mustafa Al-Dobardani[2]

[1]Ministry of Higher Education and Scientific Research, Mosul, IRAQ

[2]College of Science, University of Mosul, Mosul, IRAQ

ABSTRACT

Our study highlighted the investigation of effect of clove (*Syzigium aromaticum)* and silver nanoparticles (AgNPs) conjugated clove on each of *N. gonorrhoeae*, prostate cancer cell line PC3 and normal cell HdFn. The study consisted of studying the ability of *N. gonorrhoeae* isolates to biosynthesize the silver nanoparticles based on the colour change from pale yellow to brown. The biosynthetic silver nanoparticles were characterised using several techniques, including the ultraviolet spectrum (UV-vis), a fourier transform infrared spectroscope (FTIR), X- ray diffraction (XRD) and a transmission electron microscope (TEM). By disc diffusion method the results showed that the clove extract inhibited the growth of *N. gonorrhoeae* at a concentration of 100% with an inhibition zone of 8mm, while the inhibition zone created by AgNPs-clove compound was 13mm. The results also revealed that the rate of inhibitory activity of clove extract on PC3 cell line were 1.59%, 9.54 %, 1154%, 4.54% and 4% at the concentrations of 400, 200, 100, 50 and 25µg/ml respectively. The rate of inhibition of clove on normal cells HdFn ranges from 48.5 % to 4.8% at the concentration of 400-200 µg/ ml, the IC50 value was 140 µg/ml on PC3 cell line and 142 µg/ ml on the normal cell line. The results also show that the clove coated with AgNPs has higher activity against PC3 cell line than the clove extract alone as it inhibited the cells by .51%, 1.51%, 9.53%, 4% and 151% at the concentrations of 400, 122, 422, .2, and 1µg/ml respectively. At the same time the clove coated with AgNPs showed a low cytotoxicity against normal cells where the inhibition rates were 33.3%–4.2% at the concentrations of 400 – 25 µg/ml, as well as the results showed significant differences by calculating the value of IC50 when the coated clove compound was applied to both PC3 cell line and normal cell at a concentration of 67.44 ug /ml and 132.5 ug/ml respectively.

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Separation, Characterization and Pharmacological Studies of Some Hypoglycemic Active Components in Alfalfa

Salih Burhan Ahmed

Erbil Polytechnic University, Kurdistan, Irbil, Iraq

ABSTRACT

The present study investigates the hypoglycemic activity of an aqueous extract of alfalfa (Medicago sativa) leaves and focuses on the isolation and purification of its active constituents. Preliminary in vivo experiments demonstrated that alfalfa leaf extract possesses significant antihyperglycemic effects in both normal and alloxan-induced diabetic rodents. Building upon these findings, an elaborate purification protocol was employed—including gel filtration, ion-exchange chromatography, and hydrophobic interaction chromatography—to isolate a biologically active hypoglycemic protein fraction, designated as HF-I. Intraperitoneal administration of HF-I at doses of 5 and 10mg/kg body weight resulted in a marked reduction in blood glucose levels in both normal and diabetic mice. Notably, HF-I also enhanced glucose tolerance and stimulated insulin secretion from isolated hamster pancreatic islets under both low (3.3mM) and high (16.7mM) glucose conditions. To the best of our knowledge, this is the first report describing a hypoglycemic protein isolated from alfalfa. These findings suggest that HF-I holds promising potential for the development of novel therapeutic agents targeting diabetes mellitus.

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The importance of the frankincense tree and its environmental and economic benefits

Ghanim Musallam Mohammad Almahri

Directorate of Agriculture, Dhofar, Oman

ABSTRACT

The frankincense tree is considered one of the world's most valuable trees, especially in the Sultanate of Oman, and more specifically in the Dhofar Governorate. This tree holds significant historical importance, as its resin was exported to ancient civilizations such as the Pharaohs, Phoenicians, Romans, and Persians. These civilizations used frankincense for medicinal purposes, and it also held religious value—it was burned as incense in temples and palaces and was considered sacred by some cultures and religious figures. Frankincense has played a global economic role through its medicinal, aromatic, and spiritual benefits, and it has greatly enriched Dhofar economically, culturally, and socially. The total area of frankincense-growing land is estimated to exceed 10,000 hectares (though no comprehensive surveys have been conducted to confirm the exact size of this sector). Due to its historical, cultural, and economic significance—and its emerging value in the medical, perfumery, and cosmetics industries—frankincense is gaining renewed attention today. The frankincense tree belongs to the Burseraceae family, which includes around 550 species. Among these are shrubs like Awoqar, Shayquf, Akeebut, Aqreet, and Mughur (or Mur), also found in Dhofar. There are about 40 known species of Boswellia worldwide, three of which are not yet officially classified. The frankincense tree generally grows to a height between 3 and 7 meters. However, in certain valleys and ravines such as Wadi Qayfar (Anzur) and Wadi Hilah east of Haluf, the trees can reach up to 10 meters in height. Frankincense trees are typically found in small clusters or as isolated individuals. In most cases, the trunk branches out into multiple stems above ground, though it can occasionally grow with a single trunk, which is relatively rare.

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Microwave-Assisted Green Synthesis of Silver Nanoparticles using Plant Extracts as Antimicrobial Additives for Biopolymer-Based Wound Dressings

Amal AlRubaiei[1], Madhia Alawaid[1], Fatima Alamri[1]

[1]Department of Chemical Engineering, Dhofar University. Salalah, Oman.

ABSTRACT

This project investigates the microwave-assisted green synthesis of silver nanoparticles using plant extracts from dates and turmeric, focusing on their antibacterial properties. The study aims to offer an eco-friendly and sustainable alternative to chemical synthesis by leveraging the bioactive compounds in plant materials as reducing and stabilizing agents. Silver nanoparticles were synthesized by mixing silver nitrate with plant extracts, followed by microwave irradiation. UV Vis spectrophotometry confirmed the successful synthesis, with characteristic absorption peaks at 428nm for dates and 431nm for turmeric, indicating nanoparticle formation. The antimicrobial efficacy was evaluated using the Disk Diffusion Assay against Escherichia coli and Staphylococcus aureus. Results showed significant zones of inhibition, demonstrating the potential of date and turmeric-synthesized silver nanoparticles as effective antibacterial agents. This green synthesis approach highlights the potential for reducing reliance on hazardous chemicals in nanoparticle production while promoting sustainability. Also, the BC-composites showed same antibacterial effect against S. aureus and E.coli. We monitored the stability of our samples and the results showed that silver nanoparticles can remain stable for a long time.

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Mass Propagation of Medicinal Plant Tissues through Bioreactor Technology

Priyanka Verma

University of Technology and Applied Sciences-Sur, Shariya, 411, Oman

ABSTRACT

The production of high-value secondary metabolites from medicinal plants has gained significant attention due to their pharmaceutical and therapeutic importance. This study explores the use of bioreactor systems for the large-scale propagation and metabolite production from various tissue types of selected medicinal plants, including Catharanthus roseus, Vinca minor, Tanacetum cinerariifolium (pyrethrum), and other economically important species. Explants such as leaves, callus, roots, hairy roots, suspension cultures, and synthetic seeds were cultured using a range of media formulations supplemented with specific plant growth regulators (auxins, cytokinins, and elicitors) to induce and maintain desired tissue morphogenesis. Optimization of bioreactor conditions—such as aeration, agitation, pH, and nutrient supply—enabled efficient biomass accumulation and enhanced production of bioactive compounds. Hairy root cultures, in particular, demonstrated superior stability and metabolite yield, while suspension cultures facilitated rapid cell division and metabolite extraction. Synthetic seed technology also showed potential for long-term preservation and large-scale regeneration of elite lines. The bioreactor-based scale-up approach presents a sustainable and controlled alternative to traditional field cultivation, offering consistent quality and yield of plant-derived compounds such as vincristine, vinblastine, and pyrethrins. This study underscores the potential of integrating plant tissue culture techniques with bioreactor technologies for the industrial production of phytochemicals from medicinal plants.

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Kemerot (Ipomoea nil): A Multipurpose Medicinal Plant of Dhofar

Said Musallam Bakhit Tabook[1], Qureshi Mohammed Ahsan Alhaq[1]

[1]Royal Razat Farm, Royal Court Affair, Oman

ABSTRACT

Kemerot (Ipomoea nil), locally known by this name in Dhofar, is a seasonal climbing plant that flourishes across the region's mountains during the monsoon season. Originally native to tropical America, the plant has naturalized well in Dhofar's humid environment and is easily recognized by its striking blue flowers. This plant holds notable ecological, medicinal, and cultural significance. Ecologically, it helps reduce soil erosion during the rainy season and provides forage for livestock. Medically, the seeds are the most valued part and are widely used in traditional remedies. They are applied to treat head lice, skin fungal infections, constipation, fever, joint pain, and swelling. The seed decoction is also used to ease respiratory discomfort and headaches. In veterinary practices, seed preparations are used to treat mastitis and eye infections in livestock. Additionally, the seeds are known for their cleansing properties and are traditionally used in personal hygiene and ritual purification. The diverse applications of Kemerot underline its importance as a multifunctional plant in Dhofar, combining ecological value with a rich tradition of medicinal and cultural use. Its inclusion in discussions on local medicinal plants is essential for sustainable development and cultural preservation.

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An Approach to Establish and Conserve Endemic Omani Frankincense Tree Species: A Comprehensive Tissue Culture and Molecular Analysis of Boswellia sacra under Invitro Level

Shamshad Ahmad Khan

University of Technology and Applied Sciences-Sur, 411 Oman

ABSTRACT

This presentation explores the feasibility of establishing a comprehensive protocol for the rapid in vitro regeneration of Boswellia sacra (frankincense), a medicinal plant of significant cultural and economic importance in Oman. The proposed research encompasses key stages aimed at the efficient propagation and conservation of this endemic species, including the development of in vitro protocols, callus culture, and synthetic seeds—an area yet to be explored in this plant system. Also, the study aims to establish a gene bank for B. sacra, facilitating the generation of novel variants with enhanced traits through accelerated propagation and somaclonal variation. Furthermore, the research will contribute to insights into plant metabolic engineering by developing regeneration systems from diverse explant sources. The study will also evaluate the bioactive potential of plant extracts against selected phytopathogenic bacteria and fungi, expanding the understanding of the species' therapeutic applications.

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Microbial Adaptation to Natural and Synthetic Antimicrobials: Implications for Risk Assessment and Understanding the Evolution of Resistance to Antimicrobials

Al Khansa Khalid Al Hashmi

Postgraduate Researcher, Faculty of Biology, Medicine and Health, University of Manchester, UK

ABSTRACT

This research explores the antimicrobial properties of pure frankincense oil (FKO) and investigates microbial adaptation to its prolonged exposure, focusing on resistance development and phenotypic changes. Despite FKO's recognized antimicrobial properties, significant knowledge gaps remain regarding its long-term effects on microbial resistance mechanisms and adaptation. With the global rise in antimicrobial resistance (AMR), it is crucial to understand how natural antimicrobials, such as FKO, influence microbial behavior and whether they drive resistance or unique adaptive behaviors over time. The project aims to explore microbial responses to FKO at both genetic and phenotypic levels, using Escherichia coli as a model organism. Initially, the antimicrobial activity of FKO is confirmed through well diffusion assays, followed by determining the Minimum Inhibitory Concentration (MIC) to establish its potency. A selection experiment exposes E. coli to sub-lethal concentrations (6.25% v/v) of FKO over several passages to simulate prolonged exposure. The evolved bacteria demonstrate an increase in MIC values compared to the ancestral strain, suggesting the development of resistance. Genomic sequencing of the adapted bacteria will reveal mutations or other genetic changes responsible for resistance, providing deeper insight into the underlying mechanisms of adaptation. In addition, phenotypic assays will be conducted to assess potential cross-resistance to biocides, antibiotics, and other essential oils, to evaluate the broader implications of prolonged exposure to FKO on antimicrobial resistance patterns. This research will contribute to a more comprehensive understanding of FKO's antimicrobial efficacy and its role in the evolution of microbial resistance. It will also offer valuable insights for risk assessment and inform the safe application of natural antimicrobials in clinical and environmental settings. By integrating antimicrobial testing, genomic analysis, and adaptation mechanisms, the study will advance the knowledge of how natural antimicrobials shape microbial resistance in both clinical and ecological contexts.

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Enhanced Antibacterial and Biocompatible Bacterial Cellulose-Aloe Praetermissa Latex Hydrogels for Advanced Wound Healing Applications

Fay Almasahli, Atiya Fatima, Fatima Koofan, Mazhar Ul-Islam*

Department of Chemical Engineering, College of Engineering, Dhofar University, Salalah, Oman

*Corresponding Author

ABSTRACT

Bacterial cellulose (BC) hydrogels have garnered significant attention in biomedical research due to their exceptional water retention, biocompatibility, and tunable antibacterial properties, making them ideal candidates for wound dressing applications. In this study, a novel BC-based composite hydrogel (BC-AL) was developed by incorporating Aloe praetermissa latex into the BC matrix. The resulting hydrogels exhibited enhanced antibacterial properties, demonstrating a 1.6 mm zone of inhibition against both Gram-positive (S. aureus) and Gram-negative (E. coli) bacteria in disc diffusion assays. Additionally, bacterial viability assays revealed a significant reduction in bacterial counts, with a 85 % decrease observed through plate count methods. Compared to pure BC hydrogels and the negative control, the BC-AL composites exhibited superior antibacterial activity, improved wound closure rates, and enhanced cellular proliferation in vitro wound healing assays. The combination of BC's structural integrity with the bioactive and antimicrobial properties of Aloe praetermissa latex suggests an improved capacity to accelerate wound healing, reduce infection risks, and support tissue regeneration. These findings position BC-AL hydrogels as promising candidates for next-generation wound dressings, offering an effective solution for chronic and acute wound management.

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Aromatherapy and Mental Well-being: A Critical Review of Clinical and Experimental Studies

Fatemeh Khozaei[1], Tariq Mohsen Ahmed Hardan[2], Qamar Ul Islam[3], Zahra Khozaei[4]

[1]Department of Architectural Engineering, College of Engineering, Dhofar University, Salalah, Sultanate of Oman

[2]Computing & Networking Center (CNC), Dhofar University, Salalah, Sultanate of Oman

[3]Department of Electrical and Computer Engineering, College of Engineering, Dhofar University, Salalah, Sultanate of Oman

[4]Department of Foreign Languages, School of Literature and Humanities, Shahid Bahonar University of Kerman, Kerman, Iran

ABSTRACT

Aromatherapy, the therapeutic use of essential oils derived from plants, has garnered increasing attention in recent years for its potential to enhance psychological well-being. This review synthesizes findings from peer-reviewed studies published between 2000 and 2024 to assess the efficacy of aromatherapy in reducing stress, anxiety, depression, and enhancing mood and cognitive function. A growing body of evidence supports the calming and mood-enhancing effects of essential oils such as lavender, bergamot, and rose. Clinical trials indicate that inhalation of lavender essential oil significantly reduces anxiety and improves sleep quality in both clinical and non-clinical populations (Perry & Perry, 2006; Lee et al., 2011). Similarly, studies have shown that bergamot oil can lower cortisol levels and induce positive emotions in controlled environments (Watanabe et al., 2015). Mechanistically, the olfactory system directly influences the limbic brain, particularly the amygdala and hippocampus, which are central to emotion regulation. However, methodological limitations—such as small sample sizes, lack of long-term follow-ups, and variations in oil purity—warrant caution. Overall, the evidence suggests that aromatherapy may serve as a complementary intervention for enhancing psychological well-being, especially when integrated with mindfulness or therapeutic settings. Future research should focus on randomized controlled trials with larger cohorts and standardized protocols to strengthen the evidence base.

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Design and Synthesis of Glabridin Analogues as Potent Anticancer Agents

Atiya Fatima, Luay Rashan

Biodiversity Unit, Research Center, Dhofar University, Salalah, Oman

ABSTRACT

The present study focuses on the identification and structural optimization of *Glabridin*, a bioactive constituent isolated from *Glycyrrhiza glabra*, known for its antimycobacterial and anticancer properties. Based on preliminary findings, we designed and synthesized novel analogues of Glabridin, aimed at enhancing antiestrogenic activity. Two distinct series—2,3-diaryl-1-benzopyrans and 4-aryl chromenones—were developed and screened against various cancer cell lines. Notably, several analogues demonstrated potent cytotoxicity, particularly against MCF-7 hormone-dependent breast cancer cells. These results highlight glabridin analogues as potential candidates for anticancer drug development. The promising analogues from both series require additional structural improvement to enhance their therapeutic potential.

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Research on the Cultural Value and Commercial Applications of Frankincense in China

Lanxin Jhang

Chinese Cultural Promotion Society, Muscat, Oman

ABSTRACT

Frankincense, a culturally and historically significant aromatic resin, embodies a rich global heritage and deep cultural symbolism that spans regions and civilizations. This study explores the cultural background and commercial potential of frankincense, focusing on its role within aromatic health culture and its alignment with Sino-Arab cultural narratives. The research aims to examine the commercial selection of aromatic and health-oriented cultural ecology associated with frankincense and its resonance within transnational cultural frameworks. Using literature analysis, interdisciplinary integration including cultural anthropology, consumer psychology, and market data—and case studies, the study investigates the deep cultural value of frankincense. Specifically, it addresses its symbolic and psychological role in religious rituals, its aesthetic and identity functions within incense culture, and its enduring presence in cultural memory and Silk Road narratives. Furthermore, the study analyzes the aromatic and health-related cultural ecology of frankincense, emphasizing symbolic reconstruction and therapeutic functionality. Commercial applications are assessed in the context of the global aromatic health industry, highlighting inheritance and innovation in traditional Chinese medicine, the sensory economy within the spice and perfume sectors, the dynamics of global trade networks, and future value propositions such as health tourism, digital aromatherapy, and sustainable commerce. The integration of cultural heritage and commercial potential is further explored through frankincense traceability tourism, addressing emerging trends such as increased Chinese travel to Oman, the cultural storytelling of frankincense origins, and the development of transnational aromatic health intellectual property rooted in Sino-Arab cultural synergy. The discussion focuses on the interplay between cultural significance and commercial opportunities, while addressing challenges such as balancing resource sustainability with cultural commercialization. It also identifies innovative research directions, including the psychological effects of frankincense aroma and the application of blockchain for traceability in the supply chain. The study concludes by emphasizing the need for joint policy initiatives between China and Arab nations to establish a sustainable, culturally enriched ecological chain for frankincense-based aromatic health industries, reinforcing its value in global health, cultural identity, and trade innovation.

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Development of a Frankincense-Dominant Compound System and Exploration of Multifaceted Applications

Huang Xiaoying

Jiangxi University of Chinese Medicine

ABSTRACT

This presentation highlights the innovative integration of Traditional Chinese Medicine (TCM) aromatherapy into chronic disease management, centered on Oman's unique medicinal resource—frankincense (Boswellia sacra). We explore the systematic development of its compound formulations and multidimensional therapeutic applications. Guided by the TCM theory of "meridian attribution based on fragrance and flavor properties, we synergize modern extraction techniques (e.g., supercritical CO_2 extraction) with advanced formulation technologies (nano-carriers, targeted delivery systems) to develop a synergistic frankincense-myrrh compound system. This approach effectively enhances the bioavailability and stability of bioactive components. Industrial-scale production of aromatherapy transdermal patches and aerosol formulations has demonstrated preliminary success in community-based health interventions, particularly in regulating emotional states and improving sleep quality among hypertensive patients. Furthermore, this speech proposes a China-Oman collaborative initiative to advance the sustainable utilization of frankincense resources and facilitate the joint establishment of international quality standards. By integrating the TCM philosophy of "preventive treatment of disease" with Omani traditional therapies, we aim to build an interdisciplinary cooperation network. This framework seeks to address global health challenges in aging societies through culturally informed, evidence-based innovations.

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Assessing the Condition of Frankincense Trees at Wadi Dowkah Natural Reserve

Mahaad Issa Shammas

Department of Civil and Environmental Engineering, College of Engineering, Dhofar University, Salalah, Sultanate of Oman

ABSTRACT

This study assessed the current condition and population dynamics of *Boswellia sacra* at Wadi Dowkah Natural Reserve to: (1) quantify the impact of intensive grazing pressure, (2) investigate pest effects on tree populations, (3) identify multiple environmental threats, (4) evaluate current management strategies, and (5) propose evidence-based conservation interventions. A total of 37 *Boswellia sacra* trees were documented across the four transects, with maximum recorded height of 4.5 m, trunk diameter of 70 cm, and crown width of 7.5 m. Critical findings revealed: (1) evidence of severe population decline with nearly one-third of trees lost over the past two decades, (2) complete absence of natural regeneration in unfenced areas, (3) distinctive "umbrella" growth form indicating chronic camel browsing with foliage removal up to 3 m height, (4) widespread pest infestation affecting majority of trees with branch injuries exceeding 1 m, and (5) compromised tree architecture and physiological stress indicators throughout the population. Unfenced areas demonstrated severe ecological degradation with no seedlings or juvenile trees, extensive browse lines, and many mature trees approaching mortality. In contrast, fenced sections showed healthy protected trees with successfully planted specimens and evidence of recovery potential. The study identified camel grazing as the primary threat, exacerbated by insect infestations that target stressed individuals, creating a synergistic decline mechanism. The research documents an extinction trajectory for *Boswellia sacra* at this UNESCO site without immediate intervention. Despite 20 years of continuous grazing pressure, surviving trees demonstrate remarkable resilience, indicating significant recovery potential if protective measures are implemented. This study provides critical baseline data demonstrating that *Boswellia sacra* populations at Wadi Dowkah Natural Reserve face imminent conservation crisis. However, the documented resilience of surviving trees and success of existing fenced areas indicate that targeted management interventions can effectively reverse population decline and ensure the long-term conservation of this culturally and economically vital species. Immediate action is required to preserve this UNESCO World Heritage site's botanical integrity for future generations. Priority actions include: (1) immediate comprehensive condition evaluation across the entire UNESCO site, (2) implementation of strategic grazing management through stakeholder engagement and rotational exclusion zones, (3) expansion of protective fencing around critical regeneration areas, (4) capacity building for local conservation personnel, and (5) government intervention to prevent species extinction at this globally significant site.

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A Chemical Study of Some Phenolic Compounds of the Genus Fenugreek Located at Mosul Dam Site Using High-Pressure Liquid Chromatography (HPLC)

Talal Taha Ali Al-Jiuari

AL Noor University-College of Health &Medical Technologies

ABSTRACT

Trigonella genus has been widely cultivated in Iraq. It has various medicinal properties, including reducing fat and blood sugar, antibacterial, anti-ulcer, and analgesic, plus common phenolic compounds such as phenolic acids, flavonoids, anthocyanins, coumarins, and lignins. The HPLC analysis is one of the most frequently applied techniques to evaluate phenolic compounds present in plants. Chemical characterization of every phenolic compound is not possible due to the rich diversity and complexity of these compounds present in plants. In addition, phenolic compounds are the most abundant compounds of some Trigonella L. species grow in Iraq. Identified of some compounds from extract materials could be used to invent new and more potent antimicrobial drugs of natural origin also to identify some active compounds through the use of HPLC technology in diagnosing and identifying these compounds, which will certainly play an important role in discovering effective medications for many disease conditions. This work will be provided a solid foundation for future pharmacological research on these plants' extracts. Also to know the active compounds and their activity for three trigonella species medicinal plants extracts. This study was conducted in 2020 which investigate the active compounds in three alcoholic extracts belong to Trigonella genus was used, representing three plant samples extracts by using the soxhlet device and then detecting the active compounds by using HPLC technique. Results: Current study is based on the extraction of free and bound phenolic compounds (PC) in aerial parts, the RP-HPLC-DAD was applied for separation and detection of phenolic compounds (PC). The HPLC profiling revealed the existence of 16 phenolic compounds, however, only 6 compounds were identified, while the rest were not identified due to the lake of reference standards. The results showed that there were many differences in the types of phenolic compounds between the diagnosed samples within the Trigonalla genus in the legume family, where seven types of phenolic compounds appeared. In the first type, Trigonella filipes, four of them were diagnosed, while the others remained unknown glycosides, and the identified compounds were Quercetin, Resorcinol, Salicylic acid. The three species share two compounds: Salicylic acid and Trigonelline.

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A Rural Gift and Blessing to Urban Commodity

Ouma. A

Department of Epidemiology and Global Health, Umeå University, Sweden

ABSTRACT

Perceptions on Inter-generational learning of traditional medicinal knowledge and intergenerational cultural heritage on Frankincense and medicinal plants -A case Study in Oman. The understanding of Traditional ecological knowledge related to the learning, transfer of knowledge on the management and conservation of frankincense trees and medicinal plants in Oman is of interest. Traditional medicinal Intergenerational learning processes, and certain wild medicinal plants are becoming scarce due to a variety of changes in land use and reduction of biodiversity. The argument in scholarships is that the erosion of people's knowledge associated with natural resources might even be a greater threat than the erosion of the natural resources themselves. This research aims to contribute to the advancement of knowledge by enhancing our understanding of the role played by Intergenerational knowledge transfer in the management and governance of frankincense trees and medicinal plants in Oman. The primary objective of this study is to identify and describe the key components of inter-generational forms of learning traditional local ethnobotanical knowledge that regulate management and harvesting practices, with the overarching goal of ensuring the long-term survival and productivity of frankincense trees and medicinal plants in the country. This study explores the attitudes of local communities towards traditional harvesting and conservation practices on frankincense and important medicinal plants. It could serve to document and preserve traditional knowledge on this millennial old vital cultural heritage which could inform contemporary efforts for sustainable social, environmental, economic development of Frankincense ecology and crucial medicinal plants. The outcome of the study would provide valuable insights into the nexus between traditional ethnobotanical knowledge and the conservation of frankincense trees and medicinal plants as a cultural heritage in Oman in efforts to bridge traditional knowledge and scientific knowledge.

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Biocompatibility and Biomineralization potential of African plant extract (AFE) as a Candidate for Regenerative Endodontics

Ahmed Mahmoud [1,2], Ahmed Ali [3], Thuy Do [1], Xia Yu [1], Reem El-Gendy [1,4]

[1]Division of Oral Biology, University of Leeds School of Dentistry, Leeds, UK.
[2]Department of Endodontics, Faculty of Dentistry, Kafr El Sheik university, Egypt
[3]Compton Group, Wychtree Street, Morriston, Swansea, UK
[4]Department of Oral Pathology, Faculty of Dentistry, Suez Canal University, Egypt

ABSTRACT

Dental diseases (such as tooth decay) and dental trauma can lead to pulp and periapical infections, often resulting in tooth loss. Regenerative endodontic procedures (REPs) offer a promising alternative to conventional treatment. However, significant challenges persist regarding the biocompatibility and antimicrobial efficacy of conventional intracanal medicaments, which may compromise dentin integrity and promote bacterial resistance necessitating the search of new antimicrobials or drugs. To evaluate the effect of the effect of Frankincense (African plant extract (AFE)) on cell viability, proliferation and mineralization of Dental Pulp Stem Cells (DPSCs) with a view of future application as an intracanal medicament for REP. DPSCs (Passage 4-8) were seeded in 6 well plate (n=3/ group, under 3 different concentrations of AFE extract (5, 10, 15 µg/ml), and an no treatment control. Confocal microscope was used to image live dead stained DPSCs to evaluate cell viability at 24 hours, 3 and 7 days. DPSCs proliferation was assessed (WST-1 assay) at the same time points. The mineralization capacity of DPSCs in the presence and absence of AFE was assessed using Alizarin Red Stain (ARS) and quantitative assay after 14 and 28 days. High cell viability was observed in all groups with no evidence of cytotoxicity at all 3 timepoints. Cell proliferation rate was similar in all groups at 24 hours. Cell proliferation rates continued to increase at 3 and 7 days. The 15 µg/mL group showed highest proliferation rate. ARS staining showed that DPSCs were able to form mineralized nodules. ARS quantification showed the highest calcium content in the 10 µg/mL group at both 14 and 28 days. A reduction in mineralization was observed across all groups by time, with the 10 µg/mL group remaining to show the highest mineral content. We have confirmed the biocompatibility and ability of AFE to induce mineralization in DPSCs. We still need to assess the antimicrobial properties of AFE and it's the differentiation potential on DPSCs to dentin pulp complex, in an invitro model simulating the endodontic clinical scenario.

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Phytochemical analysis and biological activities of active fractions of Gum Arabic (Acacia senegal)

Srinivasa Rao Sirasanagandla[1], Isehaq Al-Huseini[2], Jamal Al-Sabahi[3]

[1]Department of Human and Clinical Anatomy, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman

[2]Department of Physiology, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman.

[3]Central Instrumentation Laboratory, College of Agricultural and Marine Sciences, Sultan Qaboos University, Muscat, Oman.

ABSTRACT

The present study aimed to extract the active fractions of gum Arabic (GA) from its powder and explore the in vitro antioxidant activity and anti-microbial activity of these fractions. The GA sample's mixture was fractionated using different solvent starting from the lowest polarity to the highest. Four fraction was isolated from the methanal dissolved sample (Hexane, Dichloromethane (DCM), Ethyl Acetate and Aqueous). After freeze drying, a yield of the sample was as the followed: hexane: 0.6g, DCM: 7.9g, Ethyl acetate: 14.1g and aqueous: 477.4g. The biological activities of these fractions were tested using in vitro total antioxidant activity and DPPH assays. The results of these two assays showed that all the fractions possess anti-oxidant activities highest being in aqueous or water extract followed by other fractions. Additionally, the present study revealed that aqueous and hexane fractions are effective against the three microorganisms including *Staphylococcus aureus* and *Escherichia coli* and *Pseudomonas aeruginosa.* microorganisms. The findings of the study showed that these fractions possess potential anti-microbial activities. Further analysis for isolation of active compounds in these fractions is warranted.

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The Impact of Caroxylon cyclophylla and Atriplex tatarica on Active Substance Production in Pleurotus ostreatus Fruiting Bodies

Abed, I. Ali[1], Noor T. Hamdan[2], Ahmed Sh. Lafi[3], Hanan H. Mutlaq[3]

[1]Collage Agriculture, University of Anbar, Iraq

[2]Biology department/ Science college, Mustansiriyah university, Iraq

[3]University of Anbar, Center of Desert Studies, Iraq

ABSTRACT

The experiment was carried out to study the effect of the active substances in the extracts of the growing fungus Pleurotus ostereatus on a plant-supported medium Atriplex tatarica and Caroxylon cyclophylla growing in the desert environment with an agricultural medium of 10% and urea by 2% and extracted by ethanol and methanol and the effect of their use as an antibiotic on three types of bacteria These are Staphylococcus aureus, Pseudomonas aeruginosa and Escherichia coli. The study was carried out in the laboratories of the Center for Desert Studies / Anbar University with three replications. The results showed that the extract of the fungus growing on the urea-enriched medium and extracted with ethanol achieved the best rate of inhibition of bacterial growth. P. aeruginosa reached 18 mm and 16 mm against E. coli and the lowest inhibition was 10 mm with Staph. aureus, while Caroxylon cyclophylla fungus extract recorded the highest inhibition rate of 17 mm against Staph. aureus, 15 mm against E. coli, and the lowest inhibition was 12 mm against P.aeruginosa while the inhibitory capacity of the growing fungus extract on the medium supported by the Atriplex tatarica plant decreased to record a rate of inhibition of 10-14 mm for each of Ps bacteria. aeruginosa and E. coli. The extract of the growing mushroom fruits on a medium supported by urea and the methanol extract was clearly inhibited for the bacteria under study, as the rates of growth inhibition diameters ranged between 10-16 mm, and bacterial isolates showed their sensitivity towards the extract of the growing mushrooms on a medium supported by the Atriplex tatarica plant extracted by methanol as Growth inhibition rates ranged from 13 to 15 mm. The extract of the growing fungus on a medium supported by Caroxylon cyclophylla and methanol extract had the least effect on the growth of the three bacterial species, ranging from 10–12 mm. The results indicated the possibility of using mushroom extracts instead of some antibiotics against the studied bacterial species. The results showed that extraction using ethanol is more efficient than methanol extraction in influencing the bacterial species under study, and achieved more effective results in inhibiting bacterial growth.

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Examining the Chemical Make-Up of Lemongrass and How It Affects Antimicrobial Properties

Th. T. Mohammed[1,*], A. A. Al-Azzami[2], S. M. Abdulateef[1]

[1]Department of Animal Production, College of Agriculture, University of Anbar, Anbar, Ramadi, 31001, Iraq

[2]Dept. of Food Science, College of Agriculture, University of Anbar, Ramadi, Iraq

[*]Correspondence Author

ABSTRACT

Many people are aware of lemongrass's (Cymbopogon citratus) therapeutic benefits, especially its antibacterial and antioxidant qualities. Its plant extracts and dry powder are being researched more and more for possible uses in natural medicine and food safety. The objectives of this study were to make dried lemongrass powder, analyze its chemical makeup, create alcoholic and aqueous extracts, and measure the active phytochemical components' antibacterial and antioxidant properties against specific pathogenic microorganisms. Materials and Procedures: At the Anbar University Herbarium, Desert Studies Center, lemongrass samples were identified after being gathered from the nursery of the Department of Horticulture and Landscape Engineering, College of Agriculture, University of Anbar. Wet and dry basis moisture content, protein, fat, ash, and mineral content were all determined chemically.

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Improving Soil with Biopolymer Hydrogel: Better Soil Quality and Water Retention

Qais Al-Amri, Afrah Al-Shukaili

[1]Department of Soils, Water and Agricultural Engineering, College of Agricultural and Marine Sciences, Sultan Qaboos University, Muscat, Oman

ABSTRACT

Water scarcity and poor soil quality remain major barriers to agriculture in arid regions such as Oman. This work introduces biodegradable hydrogel composites developed from sodium alginate extracted from brown seaweed, enhanced with Boswellia sacra (frankincense) extract and palm-derived biochar. Their performance was benchmarked against a Russian acrylamide–acrylate copolymer and a Saudi potassium polyacrylate hydrogel. Hydrogel–soil systems were evaluated through soil–water retention modeling (RETC), drying–rewetting cycles, shrinkage and crack analysis, and pH/EC monitoring. Thermogravimetric Analysis (TGA) was also conducted to assess thermal stability and residue formation. The results show that the frankincense hydrogel (F) improved soil water retention, reduced shrinkage, and maintained stable pH. The biochar composite (F+B) provided the greatest structural stability and left the highest char residue in TGA, confirming its reinforcing and carbon-preserving effects. In contrast, synthetic hydrogels absorbed water rapidly but caused surface cracking, increased soil salinity, and underwent almost complete thermal decomposition, offering no long-term residue. These findings demonstrate the potential of locally sourced natural hydrogels as sustainable soil conditioners for desert agriculture. By combining biopolymer design, soil physics, and thermal characterization, this study highlights a viable alternative to synthetic polymers, supporting climate-resilient water management and soil restoration in arid environments.

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Novel Therapeutic Approach Using Herbal Nanopowder in Photodynamic Therapy

M-Ali H. AL-Akhras (AL-Omari)

Bio-Medical Physics Laboratory, Department of Physics, Jordan University of Science & Technology (JUST), P.O. Box 3030, Irbid 22110, Jordan.

ABSTRACT

Photodynamic therapy (PDT) involves administration of tumor localizing photosensitizer agent that produces reactive oxygen radicals during light irradiation and ultimately leads to cell death. There are two well-defined mechanisms for generating cytotoxic species: the first mechanism produces free radicals or superoxide ions resulting from hydrogen or electron transfer; second mechanism is singlet oxygen (1O2) which is generated via an energy transfer process that occurs during collision of excited sensitizer with oxygen. Many photosensitizers such as Photofrin, Hypericin, Lutetium Lexaphyrin, Protoporphyrin IX, Rose Bengal, Methylene Blue, etc., are already known and some of them are used in vivo. The need to search for natural photosensitizers such as some medicinal herbal materials as a drug substitute are recently received new interest. Moreover, nano herbal products such as nanocurcumin is currently used in vitro as a potential photodynamic therapy drug and remains a desirable therapeutic goal. Nano products extracted from herbal is found to be better quantum efficiency, reductions in toxicity and enhancing the killing rate.

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Study of the Most Important Financial Feasibility Indicators for the Production of Medicinal Plants on the Syrian Coast (Thymus syriacus as a Case Study)

Ziad Sarhil

Faculty of Agricultural Engineering, Department of Agricultural Economics, Specialization in Farm Business Management, University of Latakia, Syria

ABSTRACT

The cultivation of medicinal plants (Thymus syriacus) is considered one of the complementary economic agricultural activities on the Syrian coast due to the suitability of natural and environmental conditions for its growth. The primary objective of this research is to conduct a financial analysis of the costs and revenues of Thymus syriacus production on the Syrian coast and to study and analyze the economic indicators related to the economic efficiency for the agricultural season (2023-2024). Primary data were collected through a questionnaire targeting a sample of 337 Thymus syriacus farmers, with the sample size calculated according to the Steven-Thompson equation. The results showed that the average annual net profit from one dunum planted with Thymus syriacus reached approximately 1.8 million SYP /dunum. Meanwhile, the profitability ratio relative to production costs was 187%, which is considered a very good indicator in the field of agricultural investment, as the profitability rate equates to approximately 187 SYP for every 100 SYP invested annually. Additionally, the results indicated that the economic efficiency index reached 2.24, which is greater than one, demonstrating the efficient utilization of both fixed and variable capital and the feasibility of Thymus syriacus production on the Syrian coast. The study concluded the need to increase attention to Thymus syriacus cultivation, encourage and incentivize farmers to expand the cultivated areas of this crop due to the economic benefits it provides to rural families, diversify their income sources, and improve their living standards.

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Comparative Analysis of Selenium and Quercetin Nanoparticles for their Antioxidant and Hepatoprotective Effects Against Acrylamide-Induced Liver Toxicity

Uzma Faridi

Department of Biochemistry, University of Tabuk, Tabuk, Saudi Arabia

ABSTRACT

Acrylamide, a potential occupational carcinogen, is a naturally occurring by-product formed during the thermal processing of starchy foods and roasted coffee beans. Recent studies have highlighted the presence of elevated acrylamide levels in various thermally treated fast foods consumed in Saudi Arabia. This study addresses the urgent need for effective antioxidant therapies to counteract acrylamide-induced liver damage. By comparing the protective effects of selenium and quercetin nanoparticles, the research aims to identify the more potent nano-antioxidant, contributing to the development of safer and more efficient strategies for preventing chemically induced hepatotoxicity. Twenty adult male Albino Wistar rats were randomly assigned to four groups: control, acrylamide-treated, acrylamide combined with selenium nanoparticles (SeNPs), and acrylamide combined with quercetin nanoparticles (QNPs). Concurrently, there was a notable reduction in antioxidant markers such as glutathione (GSH) and superoxide dismutase (SOD) in liver tissues when compared to the control group. Treatment with SeNPs and QNPs effectively reversed these biochemical alterations and improved liver histopathological features. In conclusion, both selenium and quercetin nanoparticles demonstrated protective effects against acrylamide-induced liver toxicity in male Albino Wistar rats, indicating their potential application in mitigating liver damage caused by environmental toxins.

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