Print ISSN 0975-4261
Online ISSN 0975-6892

Special Issue • Supplement 2 • December 2025

Medicinal Plants

International Journal of Phytomedicines and Related Industries

PROGRAMME & ABSTRACTS

9th Global Summit on Medicinal and Aromatic Plants

December 18-20, 2025

Hotel Ariyana Reach, Maharagama, Sri Lanka

In collaboration with

Society for Conservation and Resource Development of Medicinal Plants
www.medplantsociety.com

IndianJournals.com
A product of Diva Enterprises Pvt. Ltd.
www.indianjournals.com

Organized by
V Sivaram Research Foundation, India

Co-organized by
Society for Conservation and Resource Development of Medicinal Plants, New Delhi

Academic Partners

9th Global Summit on Medicinal and Aromatic Plants

December 18-20, 2025, Sri Lanka

Advisory Committee:

Prof. S. Manian, Former Vice Chancellor, Annamalai University, India
Prof A.K. Bhatnagar, Former Head, Dept. of Botany, University of Delhi
Prof. MacDonald Idu, Dept. of Botany, University of Benin, Nigeria
Dr. Jitendra Kumar, Asst. Director General, ICAR, Govt. of India, New Delhi
Dr. A. Arunachalam, Director, Centaral Agroforestry Research Institute, Jhansi, India.
Prof. M. S. Reddy, Founder and Chairman - "Asian PGPR Society for Sustainable Agriculture" Auburn University Auburn, Alabama - USA
Prof HB Singh, Former Head, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi

International Organizing Committee:

Prof. V. Sivaram, V Sivaram Research Foundation, Bangalore, India - Chairman
Dr G.P. Rao, Secretary, Society for Conservation and Resource Development of Medicinal Plants, New Delhi, India -Vice Chairman:
Dr R. Shubharani, V Sivaram Research Foundation, Bangalore, India - Organizing Secretary
Prof Dr Yogasphree Naidoo, University of KwaZulu -Natal, Durban, South Africa
Dr. Mayuri Munasinghe, Dept. of Botany, University of Sri Jayewardenepura, Sri Lanka
Dr B R Kishore, V Sivaram Research Foundation, India
Dr K Hemalatha, Dept. of Horticulture, Govt of Karnataka, India
Prof. Kasia Baczek, Warsaw University of Life Sciences, Warsaw, Poland
Prof H R Raveesha, Dept. of Botany, Bangalore University, India

Scientific Committee:

Prof Dr Nazım ŞEKEROĞLU, Department of Biology, Faculty of Art and Sciences, Gaziantep University, Gaziantep, Turkey
Prof Dr Kusum Arunachalam, Dept. of Environmental Science, Doon University, Dehradun
Prof . Zenon Weglarz, Warsaw University of Life Sciences, Warsaw, Poland
Dr Rachana, IIT/Jiit, Noida, India
Dr Sulaiman, C.T., Centre for Medicinal Plants Research, Arya Vaidya Sala, Kottakkal, Kerala
Dr Anita Patil, Sant Gadge Baba Amaravati University, India
Prof Rajan Kumar Gupta, Depat. of Botany, Banaras Hindu University, Varanasi, India

Local Coordinator:

Dr. Mayuri Munasinghe,
Dept. of Botany, University of Sri Jayewardenepura, Sri Lanka

9th Global Summit on Medicinal and Aromatic Plants
(GOSMAP-2025)

December 18-20, 2025, Sri Lanka

PROGRAMME & ABSTRACTS

9th Global Summit on Medicinal and Aromatic Plants (GOSMAP – 9)

December 18-20, 2025

Hotel Ariyana Reach, Maharagama, Sri Lanka

SCIENTIFIC PROGRAMME

INAUGURATION OF THE CONFERENCE:	**09:30-10:15**
TEA BREAK	**10:15-10:30**
KEY NOTE ADDRESS : Natural products sector in Türkiye: Present situation and future perspectives **Nazim Sekeroglu (Turkey)**	**10:30-11:15 (P1)**
PLENARY LECTURE I: Optimizing Targeted Mangiferin-Based Interventions to Modulate Integrated Pathogenic Mechanisms in Neurodegeneration. **Rachana R (India)**	**11:15-11:45 (P2)**
PLENARY LECTURE II: Pro-biotic Bacterial Consortia for Cultivation of Organic Onions in Sri Lanka and India. **Abeysinghe, S (Sri Lanka)**	**11:45-12.15 (P3)**
PLENARY LECTURE III: Soil Micro biomes of Medicinal Plants: Emerging Bio-resources for Growth and Secondary Metabolites. **G.P. Rao (India)**	**12:15-12.45 (P4)**
LUNCH BREAK	**12:45-13.30**

SCEINTIFIC SESSION

December 18, 2025 **Roses Hall**

Technical Session I - Phytochemistry and Antioxidants ; Advances in Natural Products Chemistry; Biodiversity and Bioprospecting; International Trade and Commerce of medicinal and aromatic plants

Chairperson: Prof. Yogasphree Naidoo & Ivan Salomon (Slovakia)

13.30-13.45	OS1	*Lablab purpureus* & *Clinacanthus nutans* Phytochemicals as Potent Anticancer Agents. **Shashanka Prasad (India)**	5

13.45-14.00	OS2	Effect of Different Extraction Technologies on the Phytochemical Composition, Antioxidant and Photoprotective Activities of *Leucas zeylanica* (L.) W.T.Aiton for Potential use in Cosmeceuticals and Nutraceuticals. **Imanthika Kurukohogama (Sri Lanka)**	6
14:00-14:15	OS3	Analysis of Secondary Metabolites in *Hypericum perforatum* and *Capsicuma annuum* Plant Samples Collected from Earthquake Zones in Türkiye. **Nazim Sekeroglu (Turkey)**	7
14:15-14:30	OS4	Digital Marketing Opportunities and Risks in Spices and Herbs Market **Andriy Popovych (Poland)**	8
14:30-14:45	OS5	Antioxidant Activity, Total Phenolic Content, Total Flavonoid Content and GC-MS Analysis of the Leaf Extracts of "Kataka-Taka" *Kalanchoe pinnata* (Lam) Pers. **Dorothy Liz June Baay (Philippines)**	9
14:45-15:00	OS6	Phytochemical Screening, Antioxidant Activity and Cytotoxic Activity of the Ethanolic And Decoction Leaf Extracts of *Sida rhombifolia* L. In Kapai, Lanao Del Sur, Philippines **Fatmah Johayriah Mambuay (Philippines)**	10
15:00-15:15	OS7	Comparative Analysis Antioxidant Capacity and Carrageenan Composition of *Gracilaria verrucosa* and *Gracilaria multipartita*. **Shamali Abeywardhana (Sri Lanka)**	11
15:15-15:30	OS8	Evaluation of Nutritional and Nutraceutical Properties of *Macrocybe crassa* (Sacc.) Pegler & Lodge 1998. A Wild Mushroom of Western Ghats of Karnataka, India. **Raja Naika (India)**	12
15:30-15:45	OS9	GC-MS Based Qualitative and Quantitative Chemical Constituent Analysis of *Melaleuca leucadendra* Essential Oil Extracted from Sri Lanka. **Ashani Upeksha (Sri Lanka)**	13
15:45-16:00	OS10	Phytochemical Screening and Antibacterial Potential of *Averrhoa bilimbi* Fruit Extract against *Escherichia coli* **Pethmi Ranawaka (Sri Lanka)**	14
16:00-16:15		**TEA BREAK**	
16:15-16:30	OS11	Flavonoids in Medicinal Plant and Its Health Benefits. **Chandrika Murugaiah (Malaysia)**	15

16:30-16:45	OS12	Cytological Responses and Apoptotic Induction by *Baliospermum montanum* leaf Extracts in HepG2 Liver Cancer Cell lines. **Seethalaxmi Radhakrishna (India)**	16
16.45-17:00	OS13	Bioprospecting Endophytes in *Acacia nilotica:* Unveiling Bioactive Metabolites for Therapeutic use. **Akshatha S J (India)**	17
17.00-17:15	OS14	Bioactivity Studies and Gc-Ms Characterization of Root Extract of *Ecbolium viride* (Forssk.) Alston (Acanthaceae**).** **Renjana P K (India)**	18
17.15-17:30	OS15	Role of Botanical Identification in Medicinal Plants Research. **Vendrapati Rama Rao (India)**	19
17.30-17:45	OS16	Phytomedicinal Potential of *Amomum pterocarpum* Thwaites (Zingiberaceae). **Sinitha K (India)**	20
17.45-18:00	OS17	Bioprospecting *Ageratina adenophora*: Integrating Pharmacological Potential and Ecological Impact Reduction for Sustainable Invasive Species Management. **Jitender Singh (India)**	21

WELCOME RECEPTION **19.00 hrs**

December 19, 2025 **Roses Hall**

KEYNOTE ADDRESS: **9:00-9:30**
Chamomile, *Matricaria recutita* L., Production in Slovakia. **(P22)**
Ivan Salamon (Slovakia)

PLENARY LECTURE I: **9:30-9:50**
Nature-Inspired Anti diabetic Agents: Phyto chemical and Therapeutic insights into Ivy Gourd. **(P23)**
Anoja Attanayake (Sri Lanka)

PLENARY LECTURE II: **9:50-10:10**
Recent Trends in Medicinal Plants Research and Drug Discovery. **(P24)**
Sulaiman C T (India)

PLENARY LECTURE III:
Microbial Pesticides for Managing Diseases of Medicinal and Aromatic Plants: Current Scenario and Future Prospects. (P25) **10:10-10:30**
H.B. Singh (India)

TEA BREAK			**10:30-10:45**

Technical Session - Bio fertilizers and Bio pesticides for Production of MAPs; Emerging Trends in Ayurveda; Impact of Climate change on medicinal plant;, Isolation and Characterisation of Bio active Compounds; Molecular Techniques to Augment MAP; Pharmacognocy and Ethnopharmacology; Recent Trends in Nano- Technology; Safety and Efficacy of Phytomedicines

Chairperson: Dr Mayuri Munasinghe (Sri Lanka) & Dr G P Rao (India)

10:45-11:00	OS18	Exploring In Vitro Techniques for Enhanced Production of Active Natural Products from *Valeriana jatamansi* Jones. **Sushma Pandey (Nepal)**	26
11:00-11:15	OS19	Ethno-Veterinary Practices (EVP) as an Alternative to Antibiotics and other Chemical Veterinary Drugs. **M N Balakrishnan Nair (India)**	27
11:15-11:30	OS20	A Qualitative Study on the Nutritional Role, Beliefs, and Awareness Regarding Moringa (*Moringa oleifera*) in Preventing Iron Deficiency Anemia among Pregnant Women**.** **Alka (India)**	28
11:30-11:45	OS21	Medicinal Effect on Autism Spectrum Disorder : A Case Study. **Abha Rani Sinha (India)**	29
11:45-12:00	OS22	Shatavari: Empowering Women Physically, Emotionally and Economically. **Alka (India)**	30
12:00-12:15	OS23	An Exploratory Review of *Luffa* Species – Pharmacognostic and Clinical Perspectives. **Prashanth A S (India)**	31
12:15-12.30	OS24	Vrukshayurveda: Wisdom of Classical Ayurvedic Principles for Sustainable Cultivation of Medicinal Plants. **Prashanth A S (India)**	32
12:30-12.45	OS25	Exploring the Potentiality of Ayurvedic Herbal Medicines in Preventing the Insulin Resistance in *Diabetes mellitus* (Dm). **Shashidhar H Doddamani (India)**	33
12:45-13.00	OS26	Evaluation of Nutritional and Nutraceutical properties of Scleroderma verrucosum (Bull.) Pers. 1801. A wild mushroom of Western Ghats of Karnataka, India. **Naveen Kumar Naik, S (India)**	34
13.00-13.45		**LUNCH BREAK**	
13.45-14.00	O27	Phenology of Terrestrial Orchids in Shimogga District, Karnataka: Implications of Climate Change on Medicinal Plant Resources. **Soumya Hegde (India)**	35

POSTER PRESENTATIONS

DECEMBER 20, 2025 - OPTIONAL TOUR

NATURAL PRODUCTS SECTOR IN TüRKIYE: PRESENT SITUATION AND FUTURE PERSPECTIVES

Nazim Sekeroglu[*1]

[1]Gaziantep University, Art and Sciences Faculty, Biology Department 27310, Gaziantep, Turkiye,
Art and Sciences Faculty, Biology Department 27310, Gaziantep, Turkiye

Abstract

Türkiye has a rich plant biodiversity, long-standing traditional knowledge of medicinal and aromatic plants, and a unique strategic geographical location, positioning it as a significant player in the global natural products sector. This constantly evolving sector encompasses a wide range of products, including conventional herbal products, traditional herbal medicines, food supplements, natural cosmetic ingredients, and pharmaceutical natural compounds. In recent years, increasing global demand, sustainability-oriented policies, and export-driven strategies have reinforced Türkiye's role in this industry. Despite this potential, challenges such as changing standardization requirements, quality control applications, difficulties in the certification processes, and expensive research and development investments continue to constrain the sector's competitiveness on a global scale. This study provides a comprehensive analysis of the current status of Türkiye's natural products sector, examining production capacity, export trends, regulatory frameworks, and the contributions of key stakeholders. Furthermore, future perspectives are discussed, highlighting the critical role of sustainable and good agricultural practices, innovative and green extraction technologies, biotechnology-based approaches, and international collaborations in advancing the sector. Strategies for strengthening industry-academia partnerships, enhancing the value chain, and improving brand recognition are emphasized as essential for long-term growth. In conclusion, the findings indicate that with appropriate policies, strategic investments, and global engagement, Türkiye's natural products sector holds significant potential not only to consolidate its regional leadership but also to achieve a prominent position in the international market. In the ever-evolving and ever-changing natural products sector, turkey will further increase its position among the major players in the global market in the coming period with its resources, accumulated knowledge, experience and appropriate and timely use of technology.

Key words: Medicinal and Aromatic Plants, Natural Products, Cosmetics, Türkiye

OPTIMIZING TARGETED MANGIFERIN-BASED INTERVENTIONS TO MODULATE INTEGRATED PATHOGENIC MECHANISMS IN NEURODEGENERATION

Rachana R[*1], Sujata Basu[2]
[1]Department of Biotechnology, JIIT Noida, Noida Sec 62, UP, India, 201307
[2]Department of Biochemistry, Manipal College of Medical Sciences, Deep Heights, Pokhara, Nepal, 33700, Pokhara, Nepal

Abstract

Neurodegeneration refers to the progressive, age-related deterioration of neuronal structure and function, culminating in cognitive decline and various forms of dementia. In healthy neurons, a diverse array of proteins including ion channels, proton pumps, scaffolding and structural proteins, and anti-apoptotic regulators play critical roles in maintaining cellular integrity and synaptic function. The onset and progression of neurodegenerative disorders are intricately linked to disruptions in molecular pathways involving these proteins, triggered by oxidative stress, mitochondrial dysfunction, chronic inflammation, metabolic dysregulation, vascular impairment, and alterations in neurotrophic signaling. Mangiferin, a naturally occurring xanthonoid, has shown strong preclinical efficacy against Parkinson's disease (pd). It has been shown to restore motor performance, suppressed oxidative and nitrosative stress, reduced microglial/astrocytic activation, and inhibited inflammatory mediators like nf-κb and cox-1/2 in various pd models. Mechanistically, mangiferin enhances antioxidant defenses and mitochondrial stability through activation of the g-protein-coupled receptor-interacting protein 1 (git1), triggering the keap1/nrf2/ho-1 pathway, as well as modulating erk signaling. By integrating disease-specific pathogenic cascades with therapeutic targeting strategies, this review seeks a prompt reflection on whether existing approaches sufficiently address the core mechanisms of neurodegeneration—and how close we are to realizing meaningful clinical translation.

Key words: Mangiferin, Parkinson's Disease, Oxidative Stress, Amyloid Beta, Cox, Amyotrophic Lateral Sclerosis, Neuroinflammation

PROBIOTIC BACTERIAL CONSORTIA FOR CULTIVATION OF ORGANIC ONIONS IN SRI LANKA AND INDIA

Abeysinghe, S[*1]

[1]Dept. of Botany, University of Ruhuna, Ruhuna, Sri Lanka

Abstract

In commercial cultivations of onions, large numbers of synthetic fertilizers and pesticides are used. Although onions are usually used as a vegetable, they have a long history of medicinal uses. In both instances, onions are used as fresh without cooking or processing. Therefore, organic cultivation of onions has an important application in medicine. In traditional medicine, onion has been used for a large variety of ailments. Onions are high in vitamins c and b, which may help support immune function, play key roles in metabolism, and perform other important functions in the body. It also possesses antioxidant and antimicrobial properties. In the cultivation of onions, fast seed germination, rapid rooting, and the supply of balanced nutrients are important for higher and better-quality production of bulbs. Auxins are important for seed germination and fast root formation, while balanced nitrogen, phosphorus and potassium are essential in early growth and other minerals, such as zinc and magnesium, are important for bulb formation and maturity. Excess nitrogen will encourage excessive leaf growth and reduce the size of bulbs, and an adequate supply of phosphorus promotes good growth and yield. A good supply of potassium is important for proper ripening and storage. Therefore, this research was focused on isolating bacteria associated with onions grown in India and Sri lanka, having higher IAA production, nitrogen fixing, phosphate, magnesium and zinc solubilizing abilities. We have been able to isolate both free-living and endophytic bacteria from onion plants from both countries, identified as pseudomonas Nitroreducens, Acinetobacter, *Klebsiella veriicola, Kosakonia oryzendophyta* from Sri Lanka and Kosakonia cowanii, *Acineto bacterpittii*, *Acineto bacter calcoaceticus*, *Priestiaendophytica*, and pseudomonas *Mandelii* from India. These bacteria were selected based on multiple plant growth-promoting attributes. In the pot experiments and field experiments conducted, it has been clearly shown that t-4 (a. Calcoaceticus bhujpvon14) recorded the highest bulb yield under pot conditions (115.43 g/pot; +35.5% over control), followed by t-13 (+31.2%) and t-12 (+30.1%). Bulb protein content was highest in t-5 (55.81 mg/g), t-9 (54.57 mg/g), and t-4 (54.29 mg/g), while t-4 also showed the maximum carbohydrate accumulation (348.13 mg/g). Micronutrient enrichment varied across treatments, with elevated cu and zn in t-13, and higher mn and Fe in t-3 and t-12, respectively. Soil nutrient availability and enzymatic activities (urease, dehydrogenase, alkaline phosphatase, and β-glycosidase) were significantly enhanced in t-4, t-12, and t-13 compared to the control. In the 2023 field experiment conducted at Azamgarh, t-9 (a. Calcoaceticus bhujpvon14 + p. Endophytica bhujpvon15) achieved the highest bulb yield (42.80 t/ha; +39.4% over control) and improved bulb carbohydrate content (328.27 mg/g). Treatments t-13 and t-4 also demonstrated significant enhancements in micronutrient accumulation (cu, mn, fe, zn) and soil biochemical properties. Soil enzyme activities were maximized in t-13, particularly for urease and alkaline phosphatase.

Keywords: PGPR, Onion, Organic Agriculture, Indigenous Medicine

SOIL MICROBIOMES OF MEDICINAL PLANTS: EMERGING BIORESOURCES FOR GROWTH AND SECONDARY METABOLITES

G. P. Rao[*1]

[1]Division of Plant Pathology, ICAR-Indian Agricultural Research Institute,

New Delhi, India

Abstract

Sustainable enhancement of growth and bioactive secondary metabolite production in medicinal plants requires a balanced integration of inorganic, organic, and biofertilizer-based nutrient microbial sources. Such an approach helps maintain soil fertility, productivity, and ecological balance. Achieving this goal demands a deep understanding of the complex interactions between soil microbial communities and their influence on medicinal plant performance. The rhizosphere of medicinal plants harbors diverse microorganisms, including fungi, bacteria, actinomycetes, archaea, and mycorrhizal fungi, that play vital roles in nutrient uptake, plant growth, protection against pathogens and insects, and modulation of secondary metabolite production. Notably, many phytotherapeutic compounds are synthesized or enhanced through interactions between these microbes and their medicinal plant host, underscoring the significance of plant–microbe symbioses. Despite the rich bioresource potential of medicinal plants, their microbiomes remain largely underexplored. Soil-associated microbes establish symbiotic relationships that enhance plant fitness, nutrition, and resistance to abiotic and biotic stresses, while also promoting the formation of beneficial mycorrhizal associations. Key genera such as trichoderma, bacillus, and pseudomonas dominate the rhizosphere and are recognized for their biocontrol and growth-promoting effects. With the advent of next-generation sequencing technologies, the intricate dynamics of plant–microbe interactions should be studied in greater depth. Understanding these associations offers promising avenues for sustainable agriculture, improved crop yields, and enhanced production of pharmacologically important compounds. The overall role of plant–microbe interactions in medicinal plants, highlighting their potential for sustainable bioactive compound production and agricultural advancement are discussed.

Keywords: Herbals, Rhizosphere Microbes, Symbiosis, Growth, Protection, Development, Secondary Metabolites

****

LABLAB PURPUREUS & CLINACANTHUS NUTANS PHYTOCHEMICALS AS POTENT ANTICANCER AGENTS

Shashanka Prasad[*1], Smitha Bhat[1], Sushma Jahagirdar[1]

[1]Biotechnology and Bioinformatics, JSS Academy of Higher Education and Research, Mysuru, India

Abstract

Lablab purpureus (Lp) and *Clinacanthus nutans* (Cn) are widely cultivated in south and southeast asia, where the former is used as a food crop and the latter for traditional medicine. This study explores their ethnobotanical significance and investigates their anticancer potential against breast and lung cancers through in vitro and computational approaches. methodology: methanolic extracts of Lp and Cn were evaluated for anti-proliferative activity against mcf-7 (breast) and a549 (lung) cancer cell lines. Flow cytometry and staining assays were used to assess cell cycle arrest and apoptosis. Bioactive fractions obtained via column chromatography were analysed using HR-LCMS. Differentially expressed genes (degs) were identified in silico, and molecular docking with dynamics simulations was performed to evaluate interactions between phytochemicals and cancer-related proteins. results: phytochemicals from from both Lp and Cn demonstrated dose- and time-dependent inhibition of cancer cell proliferation, comparable to cisplatin, while exhibiting lower toxicity toward normal mouse fibroblasts (l929). Flow cytometry confirmed induction of cell cycle arrest and apoptosis. Computational analyses further suggested strong interactions of phytochemicals with key upregulated proteins involved in cancer progression. conclusion: phytochemicals from Lp and Cn show significant anticancer activity against breast and lung cancer cells. These results highlight their potential as therapeutic candidates, meriting further in vivo studies to elucidate underlying mechanisms.

Key words: *Lablab purpureus*, *Clinacanthus nutans,* Anticancer, Deg, Md Simulations

EFFECT OF DIFFERENT EXTRACTION TECHNOLOGIES ON THE PHYTOCHEMICAL COMPOSITION, ANTIOXIDANT, AND PHOTOPROTECTIVE ACTIVITIES OF *LEUCAS ZEYLANICA* (L.) W.T.AITON FOR POTENTIAL USE IN COSMECEUTICALS AND NUTRACEUTICALS.

Imanthika Kurukohogama[*1], Isuru Sakbo Uyangoda[2], Thivanka M. Peiris[3], Menasha Perera[3], Helani H. Munasinghe[4], Mayuri Munasinghe[1]

[1]Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka., Nugegoda, Sri Lanka

[2]Center for Plant Materials and Herbal Products Research, University of Sri Jayewardenepura, Nugegoda, Sri Lanka., Nugegoda, Sri Lanka

[3]Faculty of Humanities and Sciences., Sri Lanka Institute of Information Technology, Malabe, Sri Lanka, Nugegoda, Sri Lanka

[4]Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka., Nugegoda, Sri Lanka

Abstract

Leucas zeylanica (L.) W.T.Aiton (Family: Lamiaceae), commonly known as “Geta Thumba”, is a native herb in Sri Lanka. It has recently become popular with its photoprotective and antioxidant properties, with potential applications in herbal cosmeceuticals. The optimization of proper extraction techniques plays a crucial role in harnessing the properties of these plants for translational and economic applications. This study aimed to evaluate and compare the different extraction strategies on phytochemical, antioxidant, and photoprotective properties of *L. zeylanica.* Plant materials were collected from palanwatte, colombo, srilanka (6°49’40” n 79°56’47” e). The ethanolic extracts were obtained from dried and powdered plant materials through refluxing, soxhlet extraction, cold maceration, and ultrasonic-assisted extraction (uae). Crude extracts were subjected to qualitative and quantitative phytochemical screening and antioxidant evaluation. Photoprotective activity was evaluated for the 1 mg/ml extracts. The results demonstrated significant variation ($p < 0.05$) among the extraction techniques for all tested parameters. The highest crude yield was obtained from the soxhlet extraction method (17.07 ± 1.58%), followed by UAE. Qualitative phytochemical screening revealed the presence of phenolics, alkaloids, saponins, and flavonoids in different extracts, with variations. Considering quantitative analysis, the UAE extract showed significantly higher ($p < 0.05$) total phenolic (TPC) and flavonoid content (TFC) as 230.65 ± 5.65 mg gae/g and 31.85 ± 3.46 mg qe/g, respectively. Considering antioxidant activity, the lowest ic_{50} values in the DPPH and H_2O_2 assays (52.21 ± 3.21 µg/ml and 35.12 ± 3.15 µg/ml, respectively) were also determined for uae extracts. It validated the higher extractability of compounds responsible for antioxidant activity. The same extract also demonstrated the highest sun protection factor (spf = 40.04 ± 1.33). Overall, the extracts from soxhlet and refluxing methods showed significantly weaker ($p < 0.05$) phytochemical recovery and bioactivities. These findings recommend that the UAE technique can be utilized for the efficient extraction of *L. zeylanica* extracts for commercial or translational studies. It maximizes the recovery of the secondary metabolites responsible for antioxidant and photoprotective activities. Therefore, UAE extracts have potential for incorporation into nutraceuticals and herbal cosmetic products.

Keywords: *Leucas zeylanica*, Ultrasonic-assisted Extraction, Antioxidant Activity, Photoprotection, Herbal Products

ANALYSIS OF SECONDARY METABOLITES IN *HYPERICUM PERFORATUM* AND CAPSICUM ANNUUM PLANT SAMPLES COLLECTED FROM EARTHQUAKE ZONES IN TüRKIYE

Nazim Sekeroglu[*1], Mehmet Hakan Morcali[1], Yusuf Yilmaz[1], Feridun Kocer[2], Basak Simitcioglu Gokpinar[1], Semiye Burçin Karakoç[1], Bahar Surmelihindi[3]

[1]Biology Department, Gaziantep University, Art and Sciences Faculty, 27310, Gaziantep, Turkiye

[2]Biology Department, Kahramanmaras Sutcu Imam University, Gaziantep, India

[3]Biology Department, Gaziantep University, Art and Sciences Faculty, 27310, Gaziantep, Turkiye

Abstract

This project presented the comparison of the secondary metabolites in *Hypericum perforatum* and *Capsicum annuum.* Sampling was carried out in 2023 in the earthquake-affected provinces of Türkiye (Hatay, Kahramanmaraş, Malatya, Adıyaman, and Gaziantep) and in two control provinces (Aydın and Manisa). To investigate the changes in the compounds involved in the development of the sampled plants, the concentrations of chlorophyll, carotenoids, ascorbic acid, capsaicin, and dihydrocapsaicin in *C. annuum* tissues, as well as hypericin and hyperforin in H. *perforatum* tissues, were analyzed. Chemical pre-treatment procedures were applied to all samples, and extraction processes were performed according to the required protocols and instructions. the experimental results on *C. annuum*, when the control samples collected from Manisa/Akhisar were compared, it was determined that the mean concentrations of capsaicin and dihydrocapsaicin were significantly higher than those of the other regions (capsaicin ~2.73 mg/g; dihydrocapsaicin ~4.65 mg/g). Such differences have been attributed in the literature to factors including cultivar differences, maturity/harvest stage, environmental conditions (climate, soil properties), and variations in processing and instrumentation. another secondary metabolite in *C. annuum,* chlorophyll, also exhibited high levels in the control samples from Manisa/Akhisar, while notably lower levels were observed in the earthquake-affected regions of Gaziantep/İslahiye and Kahramanmaraş/Pazarcık. The highest chlorophyll concentrations were recorded in Manisa, whereas carotenoid levels reached their maximum in Gaziantep and Adıyaman. These variations may be associated with differences in environmental stress, soil fertility, and light intensity across regions. St. John's wort and pepper plants collected from the earthquake-affected areas are among the widely cultivated, consumed, and exported plant species in Türkiye. Therefore, this project is expected to provide comprehensive insight into the condition of export-oriented crops and, more importantly, into the broader context of national food security. The resulting data is anticipated to make a substantial contribution to determining the extent of impacts associated with natural disasters. Acknowledgments: this study was supported by the scientific and technological research council of Türkiye (Tubitak) under grant number 223z209. The authors thank Tubitak for their support.

Key word: environmental stress, soil fertility, and light intensity, *Hypericum perforatum* and *Capsicum annuum*

DIGITAL MARKETING OPPORTUNITIES AND RISKS IN SPICES AND HERBS MARKET

Andriy Popovych[*1]

[1]Market, Agricultural and Food Economics State Research Institute, Warszawa, Poland

Abstract

The need for proper nutrition and a healthy lifestyle, urbanization, tourism development, and increased migration has influenced the increasing number of people incorporating spices and herbs into their diets. This paper examines the specifics of the spices and herbs market, consumer preferences, and the specifics of marketing communications. The article examines the macro-environment in the spices and herbs market, identifies the main risks and their impact on companies in the industry, and conducts analytical work to understand the current market situation for the development of business recommendations in this sector. The research methods include collecting data from open sources, such as expert publications, industry reviews, and company activity reports. It is found that digital marketing tools are effective in promoting this type of product, with consumers placing particular emphasis on social media and influencers. The data obtained allowed us to formulate recommendations for spice and herb producers and sellers, taking into account the needs of the target audience and their preferences regarding purchase location, content, and communication channels.

Keywords: Spices and Herbs Market, Digital Marketing, Target Audience, Consumer Research

ANTIOXIDANT ACTIVITY, TOTAL PHENOLIC CONTENT, TOTAL FLAVONOID CONTENT AND GC-MS ANALYSIS OF THE LEAF EXTRACTS OF "KATAKA-TAKA" KALANCHOE PINNATA (LAM) PERS.

Dorothy Liz June Baay[*1]

[1]Department of Biological Sciences, Mindanao State University-iligan Institute of Technology, Iligan City, Philippines

Abstract

Plants have historically been humanity's main source of medicine and continue to offer innovative treatments. *Kalanchoe pinnata* (Lam) pers. Leaves has been used in many traditional cultures in the Philippines to treat various illnesses such as respiratory infections, gastrointestinal disorders, skin diseases, inflammation, mumps, headache, toothache, boils and cancer. This study aims to determine the antioxidant activity of the decoction and ethanolic leaf extracts of *K. pinnata* using 2,2 diphenyl-2-picrylhydrazyl hydrate (DPPH) assay method and ascertained by total phenolics content (TPC) by Folin-ciocalteu's assay and total flavonoids content (TFC) by aluminum chloride methods, respectively. GC-MS of the ethanolic extract was also performed to identify the semi-volatile compounds present in the leaf extract. Decoction showed higher phenolics than the ethanolic extract. However, ethanolic extract showed higher flavonoids than the decoction. It was also observed in the DPPH assay for both decoction and ethanolic extracts that the % inhibition was also significantly increasing with the increased of concentration of the extract. The inhibitory concentration (IC_{50}) values (in ppm) of scavenging activity of the decoction and ethanolic extracts were 173.8 ± 1.7 ppm and 21.09 ± 0.16 ppm respectively, compared to the standard ascorbic acid 2.29 ± 0.04, which indicated a weak antioxidant for decoction and very strong antioxidant for ethanolic. The antioxidant activities were closely associated with the content of total phenols and flavonoids present. Furthermore, gc-ms analysis revealed the presence of bioactive compounds which has antioxidant properties such as: (a) 2-methylresorcinol, (b) propylene glycol, (c) 4'-methoxyflavanone, (d) betulin, (e) octadecatrienoic acid, (f) epifriedelinol, (g) fucoxanthin, (h) di-n-decylsulfone, and (i) dodecanoic acid. The results from the study indicated that *K. pinnata* exhibit promising antioxidant properties and possess active metabolites which could explain its traditional therapeutic applications.

Key words: Antioxidant, Bioactive Compounds, DPPH Assay, Free Radical Scavenging Assay, Medicinal plants

PHYTOCHEMICAL SCREENING, ANTIOXIDANT ACTIVITY AND CYTOTOXIC ACTIVITY OF THE ETHANOLIC AND DECOCTION LEAF EXTRACTS OF *SIDA RHOMBIFOLIA* L. IN KAPAI, LANAO DEL SUR, PHILIPPINES

Fatmah Johayriah Mambuay[*1]
[1]Department of Biology, MSU-IIT, Iligan City, Philippines

Abstract
Decoction and ethanolic extracts of *Sida rhombifolia* has been widely used as folkloric medicine in the Philippines. Though widespread use of this plant, its phytochemical constituents, antioxidant activity, total phenolic content and total flavonoid content were understudied. Thus, this study aims to investigate its phytochemical constituents, antioxidant activity, total phenolic content and total flavonoid content. Plant extracts were prepared through extraction with water (decoction) and ethanol (ethanolic extract). The phytochemical analysis revealed that the decoction and ethanolic leaf extracts of *Sida rhombifolia* l contain flavonoids, alkaloids, saponins, tannins, steroids, terpenoids and phenols. The ethanolic and decoction leaf extracts possess strong free radical scavenging activity with ic50 = 153.4 ppm and ic50 = 30 ppm, respectively. Also, there was a positive correlation between the scavenging activity percentage, total phenolic content and total flavonoid content. The results showed that the leaf extracts are potent source of antioxidant compounds.

Key words: Decoction, Ethanol, DPPH Assay, Sapar, Traditional

COMPARATIVE ANALYSIS ANTIOXIDANT CAPACITY AND CARRAGEENAN COMPOSITION OF *GRACILARIA VERRUCOSA* AND *GRACILARIA MULTIPARTITA*

Shamali Abeywardhana[*1], Samawansha Tennakoon[2], Kumudu Bandara[3], Laksiri Weerasinghe[4], Pathmalal M. Manage[1], Dinithi C. Peiris[1]

[1]Department of Zoology, University of Sri Jayewardenepura, Colombo, Sri Lanka
[2]Genetics and Molecular Biology Unit, University of Sri Jayewardenepura, Colombo, Sri Lanka
[3]Department of Aquatic Bioresources, University of Sri Jayewardenepura, Colombo, Sri Lanka
[4]Department of Chemistry, University of Sri Jayewardenepura, Colombo, Sri Lanka

Abstract

Marine red algae are a rich source of natural antioxidants. Yet, they remain an underexplored resource with great potential as therapeutic agents, owing to their potent antioxidant properties. Antioxidants are substances that can react with free radicals and neutralize them. This study focuses on assessing the antioxidant potential of two *Gracilaria* sp. Collected from the coastal region, and the study aims to identify promising species, *Gracilaria verrucosa* and *Gracilaria multipartita* that could be further developed for use in cosmeceutical industry. The extraction process was performed with 80% methanol for two red algal species. Antioxidant potential was assessed through in-vitro bioassays, including the 2,2-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) and the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging methods. Also, carrageenan content was determined via an alkaline extraction procedure. Among the two red algal species, *G. Verrucosa* exhibited the lowest 50% inhibitory concentration (IC_{50}) values with both assays, indicating higher antioxidant capacity than g. Multipartita. The DPPH assay results showed IC_{50} values of 0.83 ± 0.06 and 1.59 ± 0.08 mg/ml for *G. verrucosa* and G. multipartita, respectively. Similarly, in the ABTS assay, *G. verrucosa* exhibited a relatively lower IC_{50} (0.60 ± 0.12 mg/ml) than G. multipartita (1.43 ± 0.23 mg/ml), indicating that *G. verrucosa* has a better capacity to scavenge radicals. Trolox, or the positive control, exhibited ic_{50} values of 0.005 ± 0.0009 mg/ml for DPPH and 0.019 ± 0.003 mg/ml for ABTS. The carrageenan content differed notably among the species investigated. *G. multipartita* had higher total carrageenan content (13.04%) than G. verrucosa (5.4%), suggesting an inverse relationship between carrageenan abundance and antioxidant strength. This contrast highlighted the dual functions of red algae: one species exhibiting potent antioxidant properties, while the other species serving as a polysaccharide source, underscoring their combined potential as a natural cosmeceutical ingredient for skin protection and bioactive effects. The University of Srijayewardenepura grant No: RC/URG/Sci/2024/15 is acknowledged.

Keywords: Antioxidant Activity, ABTS, DPPH Carrageenan, Cosmeceutical

EVALUATION OF NUTRITIONAL AND NUTRACEUTICAL PROPERTIES OF *MACROCYBE CRASSA* (SACC.) PEGLER & LODGE 1998. A WILD MUSHROOM OF WESTERN GHATS OF KARNATAKA, INDIA.

Raja Naika[*1], **Naveen Kumar Naik S**[*2]
[1,2]Applied Botany, Kuvempu University, Shimoga, India

Abstract

Macrocybe crassa is a large, edible mushroom found in India, belongs to the mushroom family of Tricholomataceae, known for its high nutritional value and medicinal properties. It produces a big, pale cream to brownish sporocarp, have approximately 40 cm diameter caps and can weigh up to 1.25 kg. *M. crassa* a wild mushroom found growing largely in the forests of Western Ghats of Karnataka, India. They are popular wild edible mushrooms consumed in large quantities by local peoples. To understand and scientifically validate its nutritional and nutraceutical properties, the sporocarps of the said mushroom were collected from the identified locations, during monsoon season, between June to October of the year 2021. The collected mushroom materials were subjected to laboratory experiments. *Sporomas* of collected mushroom were analyzed for their proximate chemical composition viz., moisture, proteins, carbohydrates, fat, fiber and ash major and minor mineral elements viz., N, P, K, Ca, Fe, Mg, Mn, Cu, Zn and heavy metal contents viz., Pb, Cd, Cr, Ni on dry weight basis. The result reveals that, *M. crassa* has found rich in carbohydrates (61.62%), having low amount of fat (1.23%), it also contains moderate amount of protein (9.41%), fibre (8.04%) followed by ash 11.84% and moisture (7.86%). The energetic contribution was found to be 295.01 kcal/100g. The nitrogen and potassium are the most abundant minerals in *M. crassa* and showed higher concentration of N (5.57%) and K (2.90%), also contains least amount mg (0.08%), ca (0.06%) and p (0.49%). The fruiting bodies of *M. crassa* were also assessed for the presence of trace elements viz., Fe, Mn, Zn and Cu. The result reveals that, Fe and Cu were found to be highest which is about 186.35ppm and 182.85ppm respectively. Whereas Zn (57.20ppm) and Mn (7.60ppm) were found to be in moderate concentration. The heavy metals viz., Ni, Pb, Cr, Cd concentration was analyzed by atomic absorption spectrophotometer (AAS), the cr content was found to be highest (14.0%), followed by Pb (3.45%), Ni (2.85%) whereas cadmium concentration was found to be least (0.70%). The sporocarps were subjected for estimation of b group vitamins viz., b1, b2, b3, b6 and b9 these were determined by using chromatographic method (Zhang et al., 2017). Amongst these vitamins only vitamin b3 was detected (1673.32 mg/kg). The mycochemical and GC-MS analysis of methanolic extract of *M. crassa* was done by using standard protocols (Thangavel et al., 2015). The results of *M. crassa* confirm the presence of 27 secondary metabolites. The major metabolites detected in higher percentage includes, butanol, 3-methyl- (44.1%), followed by hexanal (8.1%), 2-butanone, 1-(2-furanyl)- (5.4%), benzene, 1,3-bis (1,1-dimethylethyl)- (5.0%) and dodecane (4.3%).

Keywords: *Macrocybe crassa*, Mycochemicals, Mushroom Secondary Metabolites, GC-MS Analysis, Western Ghats of Karnataka India

GC-MS BASED QUALITATIVE AND QUANTITATIVE CHEMICAL CONSTITUENT ANALYSIS OF *MELALEUCA LEUCADENDRA* ESSENTIAL OIL EXTRACTED FROM SRI LANKA

Ashani Upeksha[1], Buddika Edirisinghe[2], Mayuri Munasinghe*[1,3]

[1]Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

[2]Bandaranaike Memorial Research Institute, Nawinna, Sri Lanka

[3]Center for Plant Materials and Herbal Products Research, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

Abstract

Melaleuca leucadendra (L.) (Lothsumbul) is a Myrtaceae plant introduced to Sri Lanka as an ornamental. The leaves of *M. leucadendra* produce an essential oil with broad-spectrum antimicrobial, antioxidant, and anti-inflammatory properties, which can be used in the pharmaceutical, cosmetic, and wellness industries. The objective of this study is to investigate valuable chemical constituents present in the *M..leucadendra* leaf essential oil extracted in Sri Lanka compared with *Melaleuca cajuputi* essential oil. During this study, leaves of *M. leucadendra* were collected from wet-zone areas of Sri Lanka. The extraction of *M.leucadendra* essential oil was carried out using hydro-distillation. Gas chromatography analyzed the chemical constituents of the essential oils coupled with mass spectrometry (GC–MS) using an hp5ms ultra-inert column. During GC-MS analysis of the extracted *M. leucadendra* essential oil, a total of 50 volatile compounds were detected, with 86.4% being terpenes. The major components were 1,8-cineole (54.3%), o-cymene (13.57%), α-terpinyl propionate (7.38%), (-)-alpha-pinene (3.36%), and (-)-4-terpineol (2.19%). According to the GC-MS analysis results of imported *M. cajuputi* essential oil, a total of 41 volatile compounds were detected, with 93.43% of terpenes. The major detected compounds were isobornyl acetate (20.15%), (-)-alpha-pinene (12.98%), (-)-camphor (11.96%), 1,8-cineole (10.29%), β-pinene (9.92%), and o-cymene (7.08%). Both types of essential oils exhibit a high percentage of terpenes. The results suggest that *M. leucadendra* grown under Sri Lankan climatic conditions produces an essential oil which is higher in 1,8-cineole compared to the imported m. *Cajuputi* oil. The presence of a high amount of 1,8-cineole in essential oil exhibits strong antimicrobial, anti-inflammatory, and expectorant properties, making the oil valuable for pharmaceutical, cosmetic, and aroma therapeutic applications.

Keywords: 1,8-cineole, *Melaleuca cajuputi*, Terpenes

PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL POTENTIAL OF *AVERRHOA BILIMBI* FRUIT EXTRACT AGAINST *ESCHERICHIA COLI*

Pethmi Ranawaka[1], Ayoddya Edirisinghe[1], Meedhya Divyanjalee[1], Ishadi Perera[1],Mayuri Munasinghe*[1,2]

[1]Department ofBotany, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

[2]Center for Plant Materials and Herbal Products Research, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

Abstract

Averrhoa bilimbi, a tropical fruit-bearing plant of the family Oxalidaceae, which is used traditionally in southeast asia for its medicinal values that have been reported to exhibit antibacterial properties. The present study aimed to evaluate the antimicrobial potential of fruit samples' methanolic extracts of A. bilimbi against *Escherichia coli*, which is one of the most common pathogenic bacteria that cause serious infections and antibiotic resistance. Dried and powdered fruits underwent soxhlet extraction using methanol, followed by concentrated with a rotary evaporator. A dilution series of the crude extract was prepared (100 – 500 mg/ml) and assayed using the disc diffusion method for *E. coli* cultured on mueller-hinton agar plates. Respectively chloramphenicol and methanol served as positive and negative controls. The findings demonstrated a dose dependent mechanism of action with an increase in inhibition zone diameter from 12.0 mm at 100 mg/ml to 16.5 mm at 500 mg/ml, indicating excellent efficacy. Flavonoids, tannins, saponins, phenols, and terpenoids were major bioactive phytochemicals implicated in the antimicrobial action; that disrupts bacterial membranes, inhibit enzymes, and induce oxidative damage. These results confirm that fruit extract from *A. bilimbi* could be used as an alternative natural therapeutic agent against *E. coli* infection and can help resolve some problems of antibiotic resistance. Further research through isolation and characterization of active principles, along with in vivo efficacy and safety evaluations, is warranted to validate the clinical application.

Keywords: *Averrhoa bilimbi*, Methanolic Extract, Antimicrobial Activity, *Escherichia coli,* Phytochemicals, Antibiotic Resistance

FLAVONOIDS IN MEDICINAL PLANT AND ITS HEALTH BENEFITS

Chandrika Murugaiah[*1], **Suprava Das**[2], **Tin Tun**[1], **Samteen M Shiek**[1]
[1]Department of Biochemistry, Manipal University College Malaysia, Melaka, Malaysia
[2]Pharmacology, MUCM, Bukit Baru, Malaysia

Abstract
Flavonoids are non-essential nutrients characterized by their anti-inflammatory and antioxidant properties, which are metabolized by gut microbiota and various tissues, with over 8000 distinct compounds identified. The primary dietary sources of flavonoids include fruits, vegetables, and tea, all of which are abundant in these compounds. Flavonoids possess the ability to scavenge free radicals, safeguard cells against oxidative damage, and inhibit inflammatory responses by blocking enzymes and modulating signaling pathways. Research indicates that the antioxidant and anti-inflammatory properties of flavonoids may aid in the prevention of chronic diseases such as cancer, cardiovascular conditions, and metabolic disorders. In addition to their roles as antioxidants and anti-inflammatories, flavonoids function as signaling molecules, regulate cellular growth, and affect immune mechanisms. They are plentiful in fruits, vegetables, tea, red wine, and other plant-based foods, providing a natural means to enhance the intake of health-promoting compounds. Their consumption is associated with a reduced incidence of cancer, cardiovascular diseases, and other chronic conditions, as well as the mitigation of age-related disorders. There has been a growing body of research and publications regarding the antioxidant flavonoids found in these foods, which demonstrate that metabolism influences the immune system, thereby reducing the risk of chronic diseases and modulating intestinal immune function. The diverse properties of flavonoids include antioxidant, anti-allergic, anti-inflammatory, anti-obesity, anti-microbial, and anti-cancer effects. Studies have shown that flavonoids can modulate the human immune system by promoting the proliferation of white blood cells and increasing cytokines or other factors involved in immunological defense. This review emphasizes the advantageous roles of flavonoids in health, particularly concerning cardiovascular health, aging, allergies, obesity-related inflammation, atherosclerosis, and cancer.

Key words: Flavonoid, Antioxidant, anti-allergic, anti-inflammatory

CYTOLOGICAL RESPONSES AND APOPTOTIC INDUCTION BY *BALIOSPERMUM MONTANUM* LEAF EXTRACTS IN HEPG2 LIVER CANCER CELL LINES

Seethalaxmi Radhakrishna

Surana college, Bangalore, India

Abstract

Baliospermum montanum is a traditional medicinal plant valued for its potent phytochemicals, contributing to significant therapeutic applications in various diseases. In this study, the plant leaf extract were comprehensively evaluated for their apoptotic and anticancer potential using a series of in-vitro assays relevant to hepatocellular cancer. The experimental design incorporated cytotoxicity, cell cycle, and apoptosis-based methodologies to obtain a comprehensive systematic profile. All assays were conducted on HepG2 hepatocellular carcinoma cell lines to ensure model specificity and relevance.

Cytotoxic effects were first quantified using the MTT assay, followed by detailed cell cycle analysis to determine extract-induced phase-specific arrest and disruptions in cellular proliferation dynamics. Additionally, apoptosis in HepG2 cells was assessed using PI/Annexin V-FITC staining, and the extent of early and late apoptotic events was quantified through flow cytometry. Doxorubicin was used as standard. Evaluation of cytotoxicity through MTT assay against the extract showed IC50 value of 94.33µg/ml inhibition and Standard Doxorubicin showed 23.38µM inhibition. For cell cycle analysis the treatment of HepG2 cells at the concentrations of 80µg/ml and 160µg/ml with extract has shown S phase and G2M phase arrest. Standard Doxorubicin at 25µM showed a S phase arrest. Additionally, assessment using PI/Annexin V-FITC staining, the extract treated at 80µg/ml and 160µg/ml has induced 13.14%, 23.37% early apoptosis and 13.68%, 20.89% late apoptosis in HepG2 cells respectively. Standard Doxorubicin at 25µM shown total apoptosis of 51.4%.

The collective findings from these assays demonstrated a marked reduction in HepG2 cell viability, a clear phase-specific interruption of the cell cycle, and a pronounced induction of both early and late apoptosis. when compared with the untreated control. The extract's performance, evaluated against doxorubicin, consistently showed significant cytotoxic and apoptotic effects, thereby confirming its strong anticancer potential against hepatocellular carcinoma. Overall, the results suggest that the plant could serve as a potential lead material for the development of novel anticancer drug formulations.

Key words: Phytochemicals, cytotoxicity, cell cycle, apoptosis, HepG2 cell lines

BIOPROSPECTING ENDOPHYTES IN *ACACIA NILOTICA*: UNVEILING BIOACTIVE METABOLITES FOR THERAPEUTIC USE

Akshatha S J[*1], Soundarya MS[2]

[1]School of Life Sciences, Department of Microbiology, Mahajana Post Graduation and Research Centre, University of Mysore, Mysore, India

[2]School of Life Sciences, Department of Microbiology, Mahajana Post Graduation and Research Centre, University of Mysore, Mysore, India

Abstract

Acacia nilotica, a leguminous medicinal tree native to Indian subcontinent has been widely used traditionally to treat gastrointestinal, inflammatory and urogenital infections. The plant is potentially rich with phytochemicals and exhibits a broad spectrum of biological activities. Beyond its intrinsic photochemistry, *Acacia nilotica* harbors a unique population of endophytic fungi. These organisms residing in the plant are emerging as prolific producers of bioactive metabolites with therapeutic applications. The research study focused on bioprospecting of endophytes isolated from plant tissues (leaves and stem). The endophytic fungal strains identified by the arrangement of sporulation, spore bearing hyphae and spore chain mycelia structures were examined by slide culture method. The divergent species were mass cultivated for fourteen days, the bioactive compounds with respect to antibacterial activity were extracted from extracellular homogenate following the standard method for solvent extraction. The separation of active compounds was detected by thin layer chromatography. The active compounds of endophytic fungal strain procured from acacia nilotica were evaluated for antioxidant activity using ferric reducing antioxidant power assay. These findings suggested that the endophytic fungi associated with the acacianilotica produces metabolites are capable of donating electrons to neutralize free radicals, indicating their potential role as natural antioxidants. The antiproliferative potential of *Acacia nilotica* endophytic strains was assessed against yeast cells to determine its cytotoxic efficacy and found the significant disruption in mutant cellular process. Our work was further extended to examine the anticancer potential of *Acacia nilotica* endophytic fungal strain against burkitt's lymphoma cells (raji a cell line). Raji cells were treated with bioactive metabolites at dose dependent concentration (20µg/ml-100µg/ml) and cell viability was determined at regular intervals indicated early signs of apoptosis. To confirm the cytotoxic action, quantitative determination was performed against raji a cell using endophytic fungal metabolites. The significant cytotoxicity was evident at highest concentration 100 µg/ml with 12% cell viability possessed IC_{50} value 48.5±0.5µg/ml, where a sharp decrease in absorbance was recorded comparing standard cisplatin drug (1mg/ml) reflecting reduced metabolic activity of raji cells. In conclusion, the endophytic fungal strain associated with *Acacia nilotica* represent a valuable untapped source of natural metabolites with promising therapeutic potential for sustainable drug discovery and development.

Key words*:* *Acacia nilotica,* Endophytic Fungi, Antioxidants, Anticancer, Antiproliferation, Raji A Cells, Therapeutic Potential

BIOACTIVITY STUDIES AND GC-MS CHARACTERIZATION OF ROOT EXTRACT OF *ECBOLIUM VIRIDE* (FORSSK.) ALSTON (ACANTHACEAE)

Renjana P K[*1]

[1]Department of Botany, Govt Arts & Science College Calicut, Kozhikode, India

Abstract

Ecbolium viride (Forssk.) Alston, a perennial woody under shrub of the family Acanthaceae, has been widely valued in traditional medicine for its diverse therapeutic applications. Various parts of the plant—roots, leaves, stem, and the whole plant—are used in folk remedies for treating tumors, jaundice, menorrhagia, rheumatism, and inflammatory disorders. It also serves as one of the plant sources of the well-known ayurvedic formulation 'sahachara', prescribed for rheumatism and neurological conditions. Despite its ethnomedicinal importance, limited scientific validation exists for its traditional claims. The present investigation aimed to assess the bioefficacy and characterize the metabolite composition of the methanolic root extract of e. Viride, thereby providing scientific support for its therapeutic potential. the study evaluated the antioxidant and anti-inflammatory properties of the extract and identified its major bioactive constituents using gas chromatography–mass spectrometry (GC–MS). Antioxidant potential was assessed in vitro through DPPH, ABTS, superoxide, and hydroxyl radical scavenging assays, along with lipid peroxidation inhibition studies. In vivo anti-inflammatory activity was tested in swiss albino mice using carrageenan-induced paw edema (acute inflammation) and formalin-induced paw edema (chronic inflammation) models. the methanolic root extract exhibited strong, dose-dependent antioxidant activity across all assays and effectively inhibited lipid peroxidation. The IC_{50} values for DPPH, ABTS, superoxide, and hydroxyl radical scavenging were 74.90 ± 1.62, 57.30 ± 2.91, 81.51 ± 2.38, and 108.3 ± 0.94 µg/ml, respectively, while lipid peroxidation inhibition recorded an IC_{50} of 72.80 ± 1.71 µg/ml. These findings confirm the extract's potent free radical scavenging efficiency. In in vivo experiments, the extract demonstrated significant anti-inflammatory effects in both acute and chronic models. Carrageenan-induced inflammation was inhibited by 49.64 % at 100 mg/kg and 63.50 % ($p < 0.001$) at 250 mg/kg body weight, while formalin-induced paw edema was reduced by 32.24 % at 100 mg/kg and 43.17 % ($p < 0.01$) at 250 mg/kg. GC–MS analysis revealed 24 major phytoconstituents, representing 91.14 % of the total extract. The identified compounds included terpenoids, sterols, phenolics, and esters, with terpenoids and steroids being dominant. Notable constituents—lupeyl acetate, isoeugenyl acetate, α-spinasterol, lupeol, τ-cadinol, estragole, and betulinic acid—are recognized for their antioxidant and anti-inflammatory activities. The synergistic action of these compounds likely contributes to the observed pharmacological effects. in conclusion, the study provides scientific validation for the traditional therapeutic use of *E. viride* and emphasizes its potential as a natural source of antioxidant and anti-inflammatory agents. The diversity of bioactive metabolites identified supports its ethnomedicinal relevance and indicates promising applications in developing herbal formulations for managing inflammation and oxidative stress-related disorders.

Keywords: *Ecbolium viride,* Antioxidant Activity, Anti-inflammatory Activity, GC-MS Analysis, Phytochemical Profiling

ROLE OF BOTANICAL IDENTIFICATION IN MEDICINAL PLANTS RESEARCH

Vendrapati Rama Rao[*1], Srinivasulus C[2], Bhavana R[1], Ritu Sinha[1], Kumar Y[1]

[1]Survey of Medicinal Plants, Central Ayurveda Research Institute, Bengaluru, India
[2]Survey of Medicinal Plants Unit, Central Ayurveda Research Institute, Bengaluru, India

Abstract

Proper identification is a crucial and primary step in any medicinal plant research to ensure safety and efficacy of herbal products. Traditional identification methods, like morphological analysis, taxonomic keys, and the expertise of specialists, are essential for research on medicinal plants. This is directly linked to quality research and can support the herbal industry's increasing need for high-quality plant raw materials. key inputs for correct and detailed identification are provided by macro features such shape, structure, size, colour, odor, arrangement, number, and special characters like hairs, glands of plant parts like stem, root, tuber (if available), leaf, flower, fruit, seed, etc. Further, accurate identification helps in proper utilization of natural resources by sustainable way of harvesting, documentation, validation, and preservation of traditional knowledge, conservation of endangered plant species, preventing the use of toxic or inappropriate species, etc. Despite its intricacy and time-consuming factor, manual identification of natural herbs by means of study and comparison of morphological characters by a taxonomic expert is always a top priority, as this method yields accurate identification. Provided the user has sufficient training, the traditional method of plant identification is gold standard for formal taxonomic work and highly reliable for scientific and educational purposes. Alternatively, digital technologies such as pl@ntnet, inaturalist, leafsnap, greg, plantora, google lens, etc. Offers quick and easy ways of plant identification which is excellent for educational purposes, common public, casual enthusiasts, and quick field reference. Further, most of these computer-based identification tools relay on expert validation for final confirmation. in this article, the authors emphasize the important morphological features and physical characteristics of medicinal plants that one can relay for identification.

Keywords: Plant Identification, Morphological Characters, Taxonomy, Medicinal Plant Research

PHYTOMEDICINAL POTENTIAL OF AMOMUM *PTEROCARPUM THWAITES* (ZINGIBERACEAE)

Sinitha K[*1]

[1]Department of Botany, Government Arts and Science College, Kozhikode, Kozhikode, India

Abstract

Introduction many members of family Zingiberaceae are medicinally and ethnobotanically important. The genus Amomum of this family has 108 currently accepted species and is distributed in tropical and subtropical asia. Many of the *Amomum* species are used as spices and flavours. *A. pterocarpum thwaites* is a herb that grows along the margins of evergreen forests and semi evergreen forests. Despite some traditional uses, scientific data on its chemical composition and pharmacological potential remain limited. Therefore, the present study focuses on the phytochemical profiling of a. *Pterocarpum* using chromatographic techniques and evaluates its antiproliferative activity. methodology the plant material was collected, chopped, dried and powdered. The powder was run in soxhlet apparatus for extraction. Methanol was used as solvent. Gc/ms were done for the phytochemical characterization. Quantification of major classes of compounds such as phenols, flavonoids, terpenoids, alkaloids and tannins were done as per the standard methods. Cytotoxicity of the extract on dla and eac cell lines was investigated. The antiproliferative activity of the species was evaluated on colon cancer cell line (ht-29) using MTT assay. Results the phenolic content was observed to be 89.65 ± 1.45. The total flavonoid content was estimated to be 14.93 ± 3.32 mg qe/g dw. The tannin content in the extracts was estimated using vanillin reagent and was expressed as mg tannic acid/g dw. The tannin content in the extract was 21.17 ± 1.86 and the alkaloid content was found to be 5.57 ± 1.39. A total of 10 compounds were identified from the methanolic extract of a. *Pterocarpum* by GC/MS analysis. The major compounds detected were d-glyceric acid (35.06%) and hexanoic acid (21.23%). The major alkaloid present in the extract was 4-methoxy-2-oxo-1, 2-dihydro-pyridine-3-carbonitrile (9.98%). The extract also contained terpenes like 22,26-epoxycholestane (9.6%), α-amyrin acetate (4.56%) and squalene (2.67%). The cytotoxic effect of the selected taxa was studied using trypan blue exclusion method on dalton lymphoma ascites (dla) and ehrlich ascites carcinoma (eac) cell lines. The result showed 3.51 ± 0.42 to 93.65 ± 1.90% of cell death for a range of concentrations 10-200 µg/ml. The antiproliferative effect of methanolic extracts was tested on ht-29 cell lines using MTT assay. The results showed that the effect was dose dependent. Conclusion from the results - it is concluded that the species exhibited considerable activity and may serve as a potential source of chemical compounds for developing novel therapeutics.

Keywords: *Amomum pterocarpum*, Antiproliferative, Phytochemical Characterization

BIOPROSPECTING *AGERATINA ADENOPHORA*: INTEGRATING PHARMACOLOGICAL POTENTIAL AND ECOLOGICAL IMPACT REDUCTION FOR SUSTAINABLE INVASIVE SPECIES MANAGEMENT

Jitender Singh[1], K.S. Kanwal[2], Anubha Srivastav[3]

[1]Forest Research Institute, Deemed to be University, Fri, Dehradun, Uttarakhand, India

[2]Dept of Environment, 2g.b. Pant National Institute of Himalayan Environment, Almora-263643, Uttarakhand, India

[3]Eco Rehabilitation Centre, ICFRE, Prayagraj-211002, U.P., India

Abstract

Ageratina adenophora, an aggressively expanding invasive species in the Himalayan and adjoining regions, poses a serious ecological threat by rapidly colonizing disturbed landscapes, outcompeting native medicinal and aromatic plants (maps), altering soil properties, and disrupting ecosystem processes. While ecological studies primarily highlight its invasive behaviour and negative impacts, emerging evidence suggests that a. *Adenophora* also possesses considerable medicinal and pharmacological potential, making it an underutilized but promising resource for bioprospecting and sustainable management interventions. The present work integrates the dual perspectives of ecological threat and medicinal value, exploring how phytochemical insights can contribute to more sustainable and innovative management strategies. On the ecological front, evidence shows that species richness and shannon diversity varied notably across sites, with mid- to high-altitude sub-sites in site i (Haldwani) and site iii (Pithoragarh) showing higher diversity than site ii (Almora). Abundance and dominance were greatest at mid-altitudes, especially on ne and sefacing slopes, while low dominance at several low and high-altitude plots, mainly in site ii, indicated more even species distribution. Mixed forest types (pine–oak–rhododendron–alnus) supported the highest richness. Overall, high altitude, aspect, and forest composition jointly influenced diversity, with mixed and higher-altitude forests sustaining more stable and diverse communities. The review identified 73 studies on the bioactive properties of *Ageratina adenophora,* highlighting strong acaricidal, antibacterial, and antimicrobial activities (n = 7) along with antifungal and antioxidant properties (n = 4). Additionally, 57 publications reported its use in bio-product development, with biochar being the most explored (n = 18). These results demonstrate its significant potential for both pharmacological applications and sustainable invasive biomass utilization.By synthesizing ecological dynamics, invasion mechanisms, and phytochemical characteristics, this study proposes a bioprospecting-based utilization model that supports both invasive biomass reduction and biodiversity conservation. Harvesting a. *Adenophora* for extraction and product development could serve as a nature-based solution to reduce its spread, manage its biomass, and alleviate pressure on native communities. Such an approach aligns with the principles of sustainable utilization, where the nuisance value of an invasive species is converted into economic and medicinal benefit while simultaneously addressing ecological degradation.

Key words: *Ageratina adenophora*, nophora, Pithoragarh, *Rhododendron–alnus*

CHAMOMILE, *MATRICARIA RECUTITA* L., PRODUCTION IN SLOVAKIA

Ivan Salamon[*1]

[1]Department of Ecology, Faculty of Humanities and Natural Sciences, University of Presov, 01, 17th November St., Sk-081 16, Presov, Slovakia

Abstract

German chamomile, *Matricaria recutita* L., is one of the most important medicinal plants cultivated in the central europe. A common folk in Slovakia states one should always bow before the curative powers of the chamomile plant. Chamomile is marketed in three main forms – dried flower anthodia, steam-distilled essential oil and solvent-produced extracts. Recent and on-going pharmacodynamics research is identifying its specific anti- inflammatory, anti-microbial, anti-allergenic, anti-spasmodic, anti- ulcer, sedative and CNS activities. Anyway, topical application of its preparations has shown benefit in the treatment of eczema, dermatitis and ulceration. The main active constituents of chamomile include essential oil (0.3-1.5 %), containing /-/-α-bisabolol and chamazulene, which have become an important indicator of drug quality and value. Selection of this special crop has resulted in the development of varieties with higher oil concentrations and considerable differences in essential oil substances. In the Slovakian chamomile drug production, there were several turning points. After identification of chamomile chemical types and the improvement of new varieties, of prime importance comes the large- scale cultivation and special agricultural production techniques. Tests on mechanical harvesters indicated a vacuum system worked best for transport of flower heads, preventing damage to the tissue. On level fields of uniform density, the harvester captures 85 % of first-quality chamomile flowers. Drug yield is rather changeable during individual years of cultivation. It ranges from 400 to 600 kg of dry flower drug/ha. The sale price of the tea quality dry flowers is approximately 10.-€ per kg. An average yield is 500 kg/ha, resulting in a product worth 5,000.-€. Under optimal conditions and 3 inflorescent harvests per cultivation season, yields of chamomile can reach 1,000 kg/ha.

Key words: Breeding, Cultivation, Composition, Harvesters, Chamomile, Yield

NATURE-INSPIRED ANTIDIABETIC AGENTS: PHYTOCHEMICAL AND THERAPEUTIC INSIGHTS INTO IVY GOURD

Anoja Attanayake[1]

[1]Faculty of Medicine, University of Ruhuna, Wellamadama Matara,

Sri Lanka

Abstract

Natural products have long been used as a source of modern medicines, as their structural diversity and biological adaptability enable interactions with multiple molecular targets, making them effective modulators of complex cellular pathways. These properties contribute to their clinical relevance in managing multifactorial diseases such as diabetes mellitus (t2dm), offering improved binding specificity, lower toxicity, and better clinical outcomes. Ivy gourd, namely *Coccinia grandis* (L.) Voigt (Family: Cucurbitaceae) is a medicinal plant abundant in the southern, western, and north central regions of Sri Lanka. The leaves of this plant have been extensively used in the management of diabetes mellitus in ayurveda, the major traditional medicine practice in Sri Lanka. The present work describes phytochemical and pharmacological insights into the Ivy gourd as a source of an antidiabetic agent in three main studies. Standardization and bioactivity-guided isolation of antidiabetic compounds from the ivy gourd, preclinical evaluation of antidiabetic mechanisms of ivy gourd, and clinical assessment of ivy gourd capsule in newly diagnosed patients with type 2 diabetes mellitus. the standardization data of ivy gourd extract supported its safety and stability for human consumption with a profound nutritive value. Fucosterol and coccinoside c were isolated from ivy gourd as potent drug leads targeting α-amylase, α-glucosidase, and dpp-iv enzymes. Dose- response data confirmed that the ivy gourd leaf extract showed dose-dependent acute glucose- lowering effects in stz-induced diabetic rats. The biochemical assessment and histopathological, and immunohistochemical assessments were conducted on pancreatic tissues. The ivy gourd possessed glucose-lowering potential through increased biosynthesis of insulin, probably by β-cell regeneration in the pancreas of stz-induced diabetic rats. The sub-acute administration of ivy gourd (0.75 g/kg) to healthy wistar rats revealed the existence of biochemical and hematological parameters within the physiological limits compared to the untreated control group, ensuring the in vivo safety as per OECD guidelines. Further, the normal tissue architecture of the vital organs of the treated rats was also observed. the results of the three-month, randomized, double-blind, placebo-controlled clinical trial revealed that the administration of the herbal capsule of ivy gourd (500 mg per day) improved glycemic indices and lipid profile parameters in newly diagnosed patients with t2dm, corroborating the pre-clinical findings. The herbal capsule of ivy gourd would be a therapeutic promise against the development and progression of cardiovascular diseases while improving antioxidant status. This dual therapy of action through glucose-lowering potential and improvement of lipid profile, together with the safety and tolerability of the ivy gourd capsule, could be beneficial as a new therapeutic approach for the early management of patients with t2dm.

Key words: Natural products, cellular pathways, *Coccinia grandis*, diabetes mellitus

RECENT TRENDS IN MEDICINAL PLANTS RESEARCH AND DRUG DISCOVERY

Sulaiman C T[*1]

[1]Phytochemistry, CMPR, Arya Vaidya Sala, Kottakkal, Malappuram, India

Abstract

Traditional systems of medicine across the world, including Ayurveda, Siddha, Unani, and traditional Chinese medicine, encompass a vast repository of empirical knowledge on medicinal plants and their therapeutic applications. Medicinal plants have been central to global drug development — nearly 60% of currently used anticancer and antimicrobial drugs are derived directly or indirectly from plant sources. This highlights the untapped potential of traditional pharmacopoeias as valuable leads in modern drug discovery. In recent decades, remarkable advances in phytochemistry, molecular biology, pharmacognosy, and computational pharmacology have facilitated the scientific validation of traditional medical knowledge. Sophisticated analytical tools such as LC-MS, HPTLC, and NMR are being employed to characterize phytoconstituents, while molecular docking, network pharmacology, and systems biology approaches help in predicting molecular targets and mechanisms of action. Integrative research models combining in vitro, in vivo, and in silico studies are contributing to the discovery of novel bioactive molecules from ayurvedic herbs. Validation of classical ayurvedic formulations through standardization, pharmacological screening, toxicity profiling, and clinical trials has strengthened evidence-based credibility. Moreover, the incorporation of artificial intelligence, high-throughput screening platforms, and chemoinformatics has accelerated the identification of potential lead compounds for diseases such as cancer, diabetes, neurodegenerative, and inflammatory disorders. Despite these advances, challenges such as lack of standardization, limited molecular data, and sustainability concerns remain. Therefore, a multidisciplinary collaborative framework involving botanists, chemists, pharmacologists, clinicians, and data scientists is essential to bridge traditional ayurvedic wisdom with contemporary drug discovery paradigms. Establishing robust scientific evidence for the safety, efficacy, and mechanism of ayurvedic drugs will enhance their global acceptance and promote the sustainable utilization of medicinal plant biodiversity for future therapeutic innovations.

Keywords: Medicinal Plants, Drug Discovery, Validation, Traditional Medicine, Phytochemistry

MICROBIAL PESTICIDES FOR MANAGING DISEASES OF MEDICINAL AND AROMATIC PLANTS: CURRENT SCENARIO AND FUTURE PROSPECTS

H.B. Singh[1]

[1]Department of Agriculture, Integral Institute of Agricultural Sciences and Technology (IIAST), Integral University, Kursi Road, Lucknow-226026, India

Abstract

India is a paradise of large number of medicinal and aromatic plants. Most of the medicinal and aromatic plants are growing wild in forest and only few are cultivated for their use in pharmaceuticals, perfumery and other industries. Like other plants, medicinal and aromatic plants too are prone to many diseases caused by fungi, bacteria, viruses, phytoplasma and nematodes. Out of several diseases reported on medicinal and aromatic plants, soil-borne diseases caused by fungi cause considerable loss in productivity and quality of the produce. biopesticides based on living microbes and their bioactive compounds have been promoted as replacements for synthetic pesticides for control of plant diseases. However, lack of efficacy, inconsistent field performance, low shelf life and strict regulatory requirements by CIBRC has generally relegated them to niche products. Significant increases in market penetration have been made, but microbial pesticides still only make up a small percentage of disease control products. Thirty four microbes have been included in the schedule to the insecticide act 1968 for production of microbial based biopesticides. While working with some important antagonistic microbes (*Trichoderma* spp.), we have documented the biocontrol ability of these organisms at field level as well as up to the extent of commercialization. we have started promoting the usage of biopesticide formulations as a component of integrated farming practices with involving farmers of eastern Uttar pradesh in order to produce pesticide residue free crop. the research on biocontrol agents (BCAS) can be fruitful only when we commercialize and register the product based on superior strains. Biopesticide registration require data on technical and formulation related information such as biological characteristics, pathogenic contaminants, other microbial contaminants, bioefficacy, toxicity, container compatibility and shelf life etc. To achieve this, certain norms specified by central insecticides board are to be followed. Till date, about 970 microbial based biopesticides products are registered with CIBRC (http://cibrc.Nic.In/bpr.Doc) under section 9(3b) and 9(3) of the insecticides act, 1968 Government of India). None of the biopesticides registered in India have level claim of controlling the diseases of medicinal plants. During the presentation emphasis will be given on organic cultivation of medicinal plants using microbial pesticides in order to increase the farmers income and also to provide pesticide residue free quality raw material to pharmaceutical industries.

Key words: Microbial Pesticides, Medicinal Plants, Biocontrol Agents

EXPLORING IN VITRO TECHNIQUES FOR ENHANCED PRODUCTION OF ACTIVE NATURAL PRODUCTS FROM *VALERIANA JATAMANSI* JONES

Sushma Pandey[1], Bijaya Pant[2]
[1]Plant Sciences, Annapurna Research Center, Kathmandu, Nepal, Nepal
[2]Department of Botany, Tribhuvan University, Kathmandu, Nepal

Abstract

Valeriana jatamansi jones (Sugandhawal) is a perennial herb, belonging to the Caprifoliaceae family known for its medicinal and ethnobotanical values. The species is threatened in its natural habitats as its rhizomes and roots are used for the production of medicines in the herbal and pharmaceutical industries due to the presence of valepotriates. Research has been carried out to optimize an efficient plant tissue culture system for mass propagation in Murashige and Skoog medium (ms) supplemented with 10% coconut water. Rapd and ISSR markers were used to confirm the genetic integrity of the in vitro plants, acclimatized plants and wild plants. The effects of sodium nitroprusside (snp), a nitric oxide (no) donor, and various growth regulators on callus induction and shoot organogenesis of *V. jatamansi* were investigated. Root cultures were established and analyzed for their phytoconstituents and antioxidant potential. Methanolic in vitro extracts of the roots of *V. jatamansi* in naa (2 mg/l) gave the highest content of phenols (55±1.00 mg gae/g), flavonoids (219±1.00 mg qe/g) and DPPH activity (84.33±0.577%) as compared to the wild plants. Valepotriates such as valeric anhydride, valeric acid, and derivatives were found in areas of the treated roots that had higher concentrations than those of the wild plants using GC-MS technology. The examination of gene expression using the sesquiterpene synthase genes revealed that the tps2 gene expression was significantly higher in both samples (more than five folds increase) while tps5 had the highest gene expression (16 folds) and tps6 had a four-fold increase in the NAA treated in vitro root cultures compared to the in vivo root cultures. This study describes the application of biotechnology approaches to preserve its natural population and to cultivate high-value secondary metabolites for sustainable usage in the production of pharmaceutical medications. keywords: *Valeriana jatamansi*, micropropagation, RAPD, ISSR, GC-MS, gene expression, valepotriates.

Key words: Valeriana Jatamansi, Micropropagation, RAPD, ISSR, GC-MS, Gene Expression, Valepotriates

ETHNO-VETERINARY PRACTICES (EVP) AS AN ALTERNATIVE TO ANTIBIOTICS AND OTHER CHEMICAL VETERINARY DRUGS

M N Balakrishnan Nair[1]

[1]Ethno-veterinary Science and Practice Group, The University of Trans-disciplinary Health Science and Technology, Bangalore, India

Abstract

Livestock keeping is a full-time livelihood occupation for over 70% of rural indigent people in India. To enhance production of milk, a cross-breeding strategy with exotic breeds was introduced in India in 1960s. There was a high incidence of diseases in cross-bred animals and therefore antibiotics had to be extensively used which led to antibiotic residue in the animal products like milk and meat. A high priority need in the livestock sector is therefore to find safe and cost-effective medicinal plant-based formulations to replace antibiotics. Ethno-veterinary medicines based on local herbs have shown effective results. The trans-disciplinary university (TDU), along with Tamilnadu Veterinary And Animal Sciences University (TANUVAS) has documented441ethno-veterinary herbal formulation for 51 conditions from 10 states and 25 locations in India and rapidly assessed them using ayurveda and established that these formulations are safe and efficacious.1060,000 cases treated for 34 disease conditions using evp shows overall 80% cure. The recovered animals produced 7.3 % of additional milk per day. Intervention impact study indicates 87.78% reduction of antibiotic residue in the milk in the study area. The incidence of mastitis, enteritis, infertility and pox like disease on the udder reduced84%, 98.2%, 98.2.7% and 100% respectively. We have trained over 3134 vets, 10,076 ah personals and 30,000 dairy farmers, established 613 demonstration plots across the country (TDU-NDDB data). A total of 79,832 veterinary service calls from farmers have reduced in 2019-20 compared to 2017-18. The intervention resulted in adouble fold increase in awareness on Evp among stakeholders, awareness of antibiotic residue in the milk and six fold reduction of preference of antibiotic for mastitis among farmers. There is a reduction of cost of purchase of antibiotics from rs.18.86 m (2017-18) to rs.5.44 m (2020-21) and other veterinary drugs from rs. 48.12 m (2017-18) to rs.34.31 m (2020-21) in the dairy cooperatives (NDDB data). There is high potential for reduction of use of antimicrobials in veterinary care through mass popularization of evp as alternatives. Adopting the ethno-veterinary science and practice to combat infectious diseases in livestock has been identified and tested as a key game changer in reducing the use of antibiotics and the other chemical drugs in veterinary practices.

Key words: Livestock, antibiotics, veterinary practices, chemical drugs

A QUALITATIVE STUDY ON THE NUTRITIONAL ROLE, BELIEFS, AND AWARENESS REGARDING MORINGA (MORINGA OLEIFERA) IN PREVENTING IRON DEFICIENCY ANEMIA AMONG PREGNANT WOMEN

Alka[1], Vibha Roy[2]
[1]Department of Botany, Patna Science College, Patna, India
[2]Department of Home Science, B. R. Ambedkar Bihar University,

Muzaffarpur, India

Abstract

Moringa (*Moringa oleifera*), popularly known as the “miracle tree,” is an excellent source of nutrition, especially beneficial for pregnant women vulnerable to iron deficiency anemia. Its leaves are rich in iron, calcium, vitamin c, protein, and other essential micronutrients that help improve hemoglobin levels and support overall maternal health. Vitamin C in *Moringa* enhances iron absorption, while its high protein and calcium content contribute to fetal growth and maternal strength. Despite such remarkable nutritional properties, the consumption of *Moringa* during pregnancy is often limited due to traditional beliefs and food taboos. In several communities, misconceptions about its effects lead to avoidance, even though it has been used in traditional medicine for centuries to boost strength and immunity. Lack of proper awareness and health education further prevents women from including this affordable and easily available plant in their daily diet. Promoting accurate knowledge about the nutritional and medicinal value of *Moringa* can help in preventing iron deficiency anemia and improving the dietary behavior of pregnant women. Encouraging its safe and regular use may serve as a simple, sustainable, and culturally acceptable approach to enhance maternal nutrition and reduce anemia-related complications.

Key words: *Moringa oleifera,* iron, calcium, vitamin C, protein, essential micronutrients

MEDICINAL EFFECT ON AUTISM SPECTRUM DISORDER: A CASE STUDY

Abha Rani Sinha[1]

[1]University Dept. of Psychology, B. R. A. Bihar University, Muzaffarpur,

Bihar, India

Abstract

Autism is a neurological and developmental disorder in which the person is unable to communicate properly. They can't interact as others and suffer from learning and behavioral problems. In this study a child (male) suffering from autism spectrum disorder (ASD) is being observed from birth to till date (0 - 10 yrs). The child was normal at the time of birth but just two days after birth he suffered with convulsion and it continues for three years. as the child was of three month the symptoms appear in the form of late sensory motor development ie; not so attentive, late muscular development, dull look, poor responding etc. objective of this study is to know the problem of such a child and this study emphases the role of parent of asd children for better survival with the help of medicinal plant and homeopath. Result - with homeopath treatment parents cooperated with child very well, their feeling, touch and tactful behavior with the child makes some markable differences in him. now the child started responding a little and slowly he learns to complete his own work such as; brushing his teeth, wear clothes without any help, learnt some meaningful sentences, improvement in conversation, started eye contact for 15-20 seconds and many more. Now the child is of 10 yrs old and studying in central school at Patna, Bihar, (a central govt. School) and able to write alphabets (not in proper manner) all the progress in the asd child is without any training center.

Keywords: Autism Spectrum Disorder (ASD), Homeopathy,

SHATAVARI: EMPOWERING WOMEN PHYSICALLY, EMOTIONALLY, AND ECONOMICALLY

Alka[1]

[1]Department of Botany, Patna Science College, Patna, India

Abstract

Shatavari (*Asparagus racemosus*), a key herb in ayurvedic medicine, has long been recognized for its therapeutic benefits, particularly in supporting women's health. This abstract explores the multidimensional role of Shatavari in empowering women physically, emotionally, and economically, aligning with contemporary frameworks of gender-responsive healthcare and sustainable development. physically, Shatavari acts as a reproductive and hormonal regulator. Rich in phytoestrogens and adaptogenic compounds, it supports menstrual health, fertility, lactation, and menopausal transition. Clinical and ethnobotanical studies indicate its effectiveness in alleviating symptoms of hormonal imbalance, such as dysmenorrhea, polycystic ovarian syndrome (pcos), and postnatal weakness, thus contributing to improved quality of life. Emotionally, Shatavari is known for its capacity to modulate stress responses and improve emotional stability. By regulating cortisol levels and enhancing resilience to psychological stressors, it serves as a natural adjunct in managing mood disorders often associated with hormonal fluctuations. This dual action—physical and emotional—positions Shatavari as a holistic intervention in women's health care. Economically, Shatavari cultivation and processing provide significant opportunities for rural and marginalized women. As demand for herbal products increases globally, promoting its cultivation through women-led cooperatives and self-help groups fosters income generation, entrepreneurship, and local economic development. This aligns with the goals of sustainable agriculture and women's economic empowerment. in conclusion, Shatavari exemplifies how traditional knowledge can intersect with modern health and development paradigms. Its integration into public health and livelihood programs can offer a culturally rooted, scientifically supported pathway to comprehensive empowerment for women.

Key words: Shatavari, *Asparagus racemosus*, Ayurveda, Women's Health

AN EXPLORATORY REVIEW OF LUFFA SPECIES – PHARMACOGNOSTIC AND CLINICAL PERSPECTIVES

Prashanth A S[*1]

[1]Indian System of Medicine- Ayurveda, Ayurveda Mahavidyalaya and Hospita, Hubli, India

Abstract

The genus *Luffa* comprises approximately seven species distributed throughout tropical and subtropical regions of Asia, Africa, and the Americas. Among these, *Luffa acutangula* (ridge gourd) and *Luffa cylindrica* (sponge gourd) are the most extensively cultivated and studied, while *L. echinata, L. aegyptiaca, and L. operculata* exhibit diverse ethnomedicinal utilization across several countries. In ayurvedic classics, luffa is described as dhamargava, characterized by tikta–katu rasa, uṣṇavīrya, and vamakāri karma, indicated in kāsa, shvāsa, jvara, and kamala. This paper aims to synthesize ayurvedic and ethnobotanical data on luffa species, correlating traditional therapeutic claims with contemporary pharmacognostic and phytochemical evidence. *Luffa* species exhibit anti-inflammatory, anti-diabetic, antioxidant, hepatoprotective, immunomodulatory etc. mechanism: the hepatitis b virus attacks liver cells (hepatocytes), causing inflammation and damage. This damage hinders the liver's normal function of conjugating and excreting bilirubin (a yellow pigment produced when red blood cells break down). Kamala is a term used in ayurveda to describe a disease which resembles jaundice. Pandu and kamala are said to be the diseases which are interrelated. They are also said to be have common origin. Pandu is said to be nidanarthakara for kamala, i.E. When pandu is not treated properly it can lead to kamala. Thus kamala can be considered as an effect of untreated pandu or pandu which runs a chronic course. Pandu and kamala thus have cause and effect relationship. Pandu roga and kamala are treated on same principles and same formulations. Symptoms: the accumulation of bilirubin in the bloodstream causes the characteristic yellowing of the skin and eyes (jaundice), along with other symptoms like dark urine, pale stools, fatigue, and abdominal pain. clinical evidence from ayurvedic management of hepatitis b virus–induced kamala further supports this hepatoprotective role. This trial involving 15 patients treated through virechana with avipathichurna, followed by shamanaoushadhi (kamalaharakashaya yoga), all subjects achieved marked relief in jaundice symptoms and significant improvement in liver function. Serum bilirubin levels reduced by approximately 85%, sgot and sgpt by 67% and 61% respectively, and all patients turned hbsag-negative, indicating complete recovery and restored hepatic function ($p < 0.001$). The review highlights Luffa as a botanically versatile yet underexplored genus with promising pharmacological value. Future investigations integrating pharmacognostic standardization with bioactivity-guided screening may establish *Luffa* as a potential lead for novel herbal therapeutics and sustainable raw-drug development.

Keywords: *Luffa, Luffa acutangula*, Echinata, antioxidant, Hepatoprotective, Immunomodulatory. the Hepatitis, kamala, causing Inflammation and Damage

VRUKSHAYURVEDA: WISDOM OF CLASSICAL AYURVEDIC PRINCIPLES FOR SUSTAINABLE CULTIVATION OF MEDICINAL PLANTS

Prashanth A S[*1]

[1]Indian System of Medicine- Ayurveda, Ayurveda Mahavidyalaya AndHospita, Hubli, India

Abstract

Vṛukṣayurveda, the ancient Indian science of plant life, represents ecological frameworks integrating agriculture, botany, and sustainability. The most notable surapala's vṛukṣyurveda outlines comprehensive guidelines for soil assessment, seed treatment, irrigation, organic manuring, pest management, and ethical plant care. This paper revisits these classical principles through a modern scientific lens, exploring their relevance to contemporary challenges in medicinal and aromatic plant cultivation. a comparative review demonstrates strong parallels between vṛukṣayurveda and modern frameworks such as good agricultural and collection practices (GACP), integrated pest management, and organic farming. Core ayurvedic concepts like desha, kala, rasa, and guṇa are influencing the soil fertility, climate adaptation, and phytochemical variation. by bridging ayurveda with agronomic science, the study reaffirms vṛukṣayurveda as a timeless, integrative framework for sustainable herbal raw-drug production and ecological balance. The paper advocates for incorporating its principles into contemporary cultivation policies, research, and community-based herbal farming which declares vrukshayurveda as a viable global model for green and ethical agriculture. in the present timing where modern agriculture is under pressure to produce more with fewer resources, while also facing soil degradation, environment pollution, and climate change, a 3,000-year-old indian science is making a powerful comeback. Known as vruksh ayurveda—literally "ayurveda for plants"—this ancient plant-care methodology is being re-explored for its sustainable, eco-friendly, and holistic approach to cultivating, preserving and identifying plants and trees mentioned in atharvaveda and systematized by shalihotramaharshi around 500 BC, vruksh ayurveda is not just traditional; it is a comprehensive, scientific framework for managing medicinal plant health, and it offers solutions to some of the most pressing agricultural challenges of the current era.

Keywords: Vṛukṣayurveda, Shalihotra, Traditional, Atharva Veda

EXPLORING THE POTENTIALITY OF AYURVEDIC HERBAL MEDICINES IN PREVENTING THE INSULIN RESISTANCEIN DIABETES MELLITUS (DM)

Shashidhar H Doddamani[1], Shubhashree M N[2], V Rama Rao[3]

[1]Department of Ayurveda, Central Ayurveda Research Institute, CCRAS, Min. of Ayush, Govt of India, Bengaluru, India

[2]Department of Ayurveda, Central Ayurveda Research Institute, CCRAS, Min. of Ayush, Govt of India, Bengaluru Urban, India

[3]Department of Botany, Central Ayurveda Research Institute, CCRAS, Min. of Ayush, Govt of India, Bengaluru, India

Abstract

Diabetes mellitus (dm) is a chronic metabolic disorder characterised by persistently elevated blood glucose levels resulting from insufficient insulin secretion or impaired insulin utilisation. In ayurveda, diabetes mellitus corresponds to a spectrum of disorders described under the terms prameha and madhumeha. Meda (fat/adiposity) is considered the central pathological factor in prameha. An obesogenic diet and sedentary lifestyle are regarded as major causative elements. Insulin resistance develops due to disturbances in lipid metabolism and elevated circulating fatty acids, which accumulate in insulin-sensitive tissues such as skeletal muscle, liver, and adipose tissue. Increased fatty-acid flux is strongly associated with insulin-resistant states, including obesity and type-2 diabetes mellitus. Elevated fatty acids impair glucose transport by inhibiting insulin action. Several ayurvedic herbs possess potential in the management of prameha/madhumeha due to their metabolic, hypoglycaemic, and lipid-modulating properties. These include suṇṭhi (*Zingiber officinale)*, trivṛt (*Operculina turpethum*), gaja- pippali [*Scindapsus officinalis* (Roxb.) Schott], Maricha (*piper nigrum* L.), kaṭuki (picrorhizakurroaroyle ex benth.), yavani [*Trachyspermum,ammi* (L.) sprague ex turril], harītakī (*Terminalia chebula Retz.), Karanja [Pongamia pinnata (L.)* Pierre], *Kuṣṭha* [*Saussurea lappa* (Falc.) Kasana & A.K.Pandey], devadaaru [*Cedrus deodara* (Roxb.) G.Don], Asana (*Pterocarpus marsupium* Roxb.), Nimba (*Azadirachta indica* A.Juss), Saala (*Shorea robusta* Roth), Aśmantaka [*Bergenia ligulata* (Wall.) Engl], and Jambu [*Syzygium cumini* (L.) Skeels], etc.. present paper highlights on the traditionally documented to support glucose metabolism, reduce adiposity, enhance digestion, and correct derangements in meda-dhātu, thereby contributing to improved metabolic balance in prameha.

Keywords: Ayurveda, Diabetes Mellitus, Herbs, Insulin Resistance, Lipid Metabolism

EVALUATION OF NUTRITIONAL AND NUTRACEUTICAL PROPERTIES OF SCLERODERMA VERRUCOSUM (BULL.) PERS. 1801. A WILD MUSHROOM OF WESTERN GHATS OF KARNATAKA, INDIA

Naveen Kumar Naik S[*1], Raja Naika[2]
[1]Applied Botany, Kuvempu University, Bhadravathi, India
[2]Applied Botany, Kuvempu University, Shimoga, India

Abstract
Scleroderma verrucosum is a large, edible mushroom found in India, belongs to the mushroom family of Sclerodermataceae, known for its high nutritional value and medicinal properties. The fruiting bodies of the fungus exhibits in various potato-like shapes, often somewhat flattened on top, sessile or stipitate, 19 - 162 mm high, 22 - 160 mm wide, with internal, passively discharged spores. *S. verrucosum* found growing largely in the forests of Western Ghats of Karnataka, india. To understand and scientifically validate its nutritional and nutraceutical properties, the sporocarps of the said mushroom were collected from the identified locations, during monsoon season, between june to october of the year 2021. The collected mushroom sporocarps were subjected to laboratory analysis. *Sporomas* of collected mushroom were analyzed for their proximate chemical composition viz., moisture, proteins, carbohydrates, fat, fiber and ash major and minor mineral elements viz., N, P, K, Ca, Fe, Mg, Mn, Cu, Zn and heavy metal contents viz., Pb, Cd, Cr, Ni on dry weight basis. The result reveals that, *S. verrucosum* has found rich in carbohydrates (44.62%), and low amount of fat (2.03%) also contains moderate amount of protein (13.45%), fibre (27.01%), ash (8.84%) and moisture (4.04%). The energetic contribution was found to be 250.55 kcal/100g. Nitrogen and potassium are the most abundant minerals in *S. verrucosum* and showed higher concentration of N (5.88%) and K (1.67%), also contains least amount Mg (0.16%), Ca (0.37%) and P (0.26%). The fruiting bodies of *S. verrucosum* were also assessed for the presence of trace elements viz., Fe, Mn, Zn and Cu. The result reveals fe and Zn were found to be highest which is about 349.50ppm and 65.35ppm respectively. Whereas Mn (25.20ppm) and Cu (7.50ppm) were found to be in moderate concentration. Heavy metals viz., Cr, Ni, Pb, Cd concentration was analysed by atomic absorption spectrophotometer (AAS), the Cr content was found to be highest (7.40%), followed by Ni (2.45%), Pb (1.90%) whereas cadmium concentration found to be least amount (0.30%). The sporocarps were subjected for the estimation of b group vitamins viz., B1, B2, B3, B6 and B9. The result were determined by using chromatographic method (Zhang et al., 2017). Amongst these vitamin B6 and B3 was found highest (B6 724.9 mg/kg) and (642.36 mg/kg) and vitamin B1 contains moderate amount (13.35 mg/kg). The mycochemical and gc-ms analysis of methanolic extract was done by using standard protocols (Thangavel et al., 2015). The results of *S. verrucosum* confirm the presence of 18 secondary metabolites. Out of 18 secondary metabolites, 15 compounds were known for their biological properties, whereas, other 3 compounds were unknown for their biological properties.

Keywords : Scleroderma Verrucosum, Mycochemicals, Mushroom, Secondary Metabolities, Gc-ms Analysis, Western Ghats of Karnataka India.

PHENOLOGY OF TERRESTRIAL ORCHIDS IN SHIMOGGA DISTRICT, KARNATAKA: IMPLICATIONS OF CLIMATE CHANGE ON MEDICINAL PLANT RESOURCES

Soumya Hegde[*1]
[1]Botany, KLE Society's S Nijalingappa College, Bangalore, India

Abstract
The phenological patterns of thirty-five terrestrial orchid species in Shimoga district, Karnataka, India, were studied to understand how climate change affects plant life cycles with direct implications for medicinal plants. Orchids, known for their ethnobotanical and medicinal value, depend heavily on seasonal rainfall patterns to trigger critical developmental stages, including sprouting, flowering, and fruiting. Our findings reveal that most species exhibit synchronous emergence and flowering, with peak blooming between mid-July and August, following the onset of the monsoon in early June. However, climate change, by altering monsoonal rainfall timing, intensity, and predictability, poses a serious threat to these orchids' life cycle synchronization. This could lead to mismatched flowering periods, reduced seed production, and lower reproductive success, directly impacting both orchid populations and the medicinal plant industry that relies on these species. Given the increasing disruption of rainfall patterns, understanding these phenological patterns is crucial not only for orchid conservation but also for sustaining the herbal industry that depends on them. This study contributes valuable data on the phenology of terrestrial orchids in the Western Ghats—a biodiversity hotspot—emphasizing the urgency of adaptive conservation strategies and the need for monitoring climate-induced changes in medicinal plant resources.

Key words: Phenology; Terrestrial Orchids; Climate Change; Monsoon Rainfall; Medicinal Plants; Western Ghats; Conservation Strategies

BIODIVERSITY AND MEDICINAL PLANT CONSERVATION ACROSS NORTHWESTERN HIMALAYA: NEED TO SCALE UP ECOSYSTEM-BASED APPROACHES FOR CLIMATE CHANGE MITIGATION

Anil Kumar[*1], Khilednra Singh Kanwal[1]

[1]Centre for Biodiversity Conservation & Management (CBCM), Govind Ballabh Pant 'National Institute of Himalayan Environment'(NIHE), Almora, India

Abstract

Himalayas are the lifeline for living beings, and their conservation is vital for sustaining life in the Asian region. Maintaining forest ecosystems in the Indian Himalayan region (IHR) is indispensable to preserving endemic species and global biodiversity. The present study was conducted in Talra wildlife sanctuary (TWS) across the northwest Himalayas to assess vegetation patterns, including medicinal plants and carbon stocks, in coniferous and broadleaf forest stands. The diameter at breast height (DBH) of each tree, greater than 10 cm, at a girth height of 1.37 m, was measured and enumerated at all sites in the sanctuary. A total of 270 species, including 25 trees, 35 shrubs, 191 herbs, 9 ferns, and 10 climbers belonging to 73 families and 198 genera were recorded in the TWS. The Asteraceae was the most dominant family, with (30 spp) contributing solely 11.3% to the total species composition in the forest stand, followed by Ranunculaceae and Lamiaceae (17spp each), collectively shared (12.6%) respectively. A total of 112 species of medicinal plants are used to make herbal medicines for treating various ailments, owing to their distinct phytochemical compounds and properties. The remedies for fever and infections, as well as for respiratory diseases, have the highest information consensus factor (ICF) value of 0.8. The ICF lies between (0.3 to 0.8) with a mean ± sd (0.63± 0.15), indicating that all documented plant species play an important role in people's daily life. Based on the relative frequency of citation (RFC), *Fritillaria cirrhosa* and *Taxus contorta* had the highest citation rates at 0.9, highlighting their importance and utility in the communities' knowledge. Furthermore, the use value (uv) of these medicinal plants ranged from 0.20 to 2.50, with an average value (UV) of 1.30 ± 0.7. The taxus contorta (2.50) was the highest use value (UV), followed by the podophyllum hexandrum (2.4), fritillaria cirrhosa (2.2), respectively. The total carbon stock values ranged from 131.5 to 357.7 mg ha-1. The piceasmithiana-abies pindrow (ps-ap) mixed forest community had the highest carbon stock, at 357.7 ± 48.3 mg ha-1. There is a need to facilitate ecosystem-based approach (eba) projects in the ihr, along with strengthening policy integration and community participation, to increase the scalability and sustainability of efforts, which currently are lacking in the Himalayan region. To address these gaps — particularly in biomass dynamics, decomposition rates, and biodiversity patterns intensifying research on financial support for biodiversity credits, biodiversity finance, and carbon credits, as well as long-term data collection using a scientific approach, is needed in the Talra wildlife sanctuary. By doing so, the eba green credit program can effectively support conservation of endemic species and forest ecosystem management, thereby helping slow the escalation of forest vulnerability in the Himalayas.

Keywords: Biodiversity, Conservation; Carbon Stock Potential; Climate Change Mitigation; Permanent Plot; Forest Structure

ADVANCES IN NANOTECHNOLOGY FOR TARGETED CANCER TREATMENT: CURRENT PROGRESS AND FUTURE OUTLOOK

Suprava Das[*1], **Chandrika Murugaiah**[2]
[1]Pharmacology, Mucm, Bukit Baru, Malaysia
[2]Department of Biochemistry, Melaka Manipal College Malaysia, Bukit Baru, Malaysia

Abstract

Abstract: background nanotechnology has revolutionized cancer treatment by enabling precise targeting of tumor cells while minimizing damage to healthy tissues. The unique physicochemical properties of nanoparticles, such as their high surface-area-to-volume ratio and ability to cross biological barriers, facilitate the development of advanced drug delivery systems, imaging agents, and therapeutic nanodevices. These innovations help overcome some of the biggest challenges with traditional cancer treatments, like severe side effects and drug resistance, ultimately leading to better patient outcomes and improved quality of life. objectives: this study aims to review recent advancements in nanotechnology-based cancer therapies, with a particular focus on nanoparticle-mediated targeted drug delivery, nanodiagnostics, and theranostics (diagnostics into one platform). The review highlights key nanomaterials like gold nanoparticles, liposomes, and magnetic nanoparticles, discussing how they work, their benefits, and the hurdles that remain. methods: a comprehensive literature review was conducted utilizing research articles from scopus, google scholar, and researchgate published over the last five years. We focused on studies that demonstrated how nanocarriers can effectively deliver chemotherapy drugs directly to tumors, as well as on nanodiagnostic tools that enhance imaging. results and discussion: nanoparticles enable targeted delivery of chemotherapeutic drugs, such as doxorubicin and cisplatin, increasing intratumoral drug concentrations and reducing systemic toxicity. Gold nanoparticles and liposomes are among the most promising platforms, capable of functionalization with ligands for specific tumor markers. Magnetic nanoparticles can be used for heating tumors (hyperthermia) and imaging, providing both treatment and diagnostic capabilities—known as theranostics. Despite these advances, challenges persist regarding nanoparticle stability, potential toxicity, immune responses, and large-scale manufacturing. Looking ahead, combining nanotechnology with immunotherapy and gene editing offers exciting possibilities for treating resistant or metastatic cancers. Future research should focus on making nanomaterials more biocompatible, creating multifunctional nanostructures, and establishing clear regulations to help bring these innovations into routine clinical practice. **Conclusion**: nanotechnology holds enormous promise for revolutionizing cancer treatment by enabling highly targeted, less invasive, and more personalized therapies. Overcoming current hurdles will require collaboration across disciplines, but doing so could significantly improve survival rates and quality of life for cancer patients around the world.

Key words: Nanotechnology, Targeted Drug Delivery, Cancer Theranostics

NANOFORMULATIONS FOR *SALACIA*: ENHANCING BIOAVAILABILITY AND THERAPEUTIC EFFICACY

Rachana R[*1], Sujata Basu[2]
[1]Department of Biotechnology, Jiit Noida, Noida Sec 62, UP, India, 201307
[2]Department of Biochemistry, Manipal College of Medical Sciences, Deep Heights, Pokhara, Nepal, 33700, Pokhara, Nepal

Abstract
Salacia species is a traditional medicinal plant with antidiabetic, anti-inflammatory and anti-obesity properties due to which it is progressively being used in therapeutics. Some biologically active constituents of extracts, such as flavonoids, tannins, and terpenoids, are highly soluble in water, but unable to cross the lipid membranes of the cells due to less absorption and excessively high molecular size which thus affects its bioavailability and makes them pharmacologically inactive. The application of nanotechnology helps in overcoming all these hurdles. The review considers the latest developments on the fabrication of nanoparticles, polymeric nanoparticles, nanoemulsions, lipid based nanocarriers for Salacia extracts and compounds. These formulations on a nanoscale provide greater therapeutic value because of a higher solubility and stability, ease of cellular targeted uptake, controlled cellular release, and prolonged release duration. Moreover, preclinical studies using Salacia extract nanoformulations with liposomes and solid lipid nanoparticles showed better pharmacokinetics and biological responses than conventional dosages. Salacia-based phyto-nanomedicine served as a new treatment for metabolic and inflammatory disorders by combining phytotherapy and nanomedicine.

Key words: Nanoformulations, *Salacia* Species, Nanotechnology, Bioactive Compounds, Therapeutics

UTILIZATION OF ORANGE AND LEMON PEEL POWDER AS MEDICINAL PLANT DERIVATIVES IN THE DEVELOPMENT OF FUNCTIONAL FOOD PRODUCTS

Vijay Lakshmi[*1], **Rosy Kumari**[2]

[1]Ganga Devi Mahila Mahavidyalaya, Patliputra University, Patna, India

[2]Department of Home Science, Ganga Devi Mahila Mahavidyalaya, Patliputra University, Patna, India

Abstract

The present study entitled “utilization of orange and lemon peel powder as medicinal plat derivatives in the development of functional food products” was conducted to explore the nutritional and sensory potential of citrus peel powders as natural, value-adding ingredients in food preparation. Orange and lemon peels, often discarded as waste, are rich sources of bioactive compounds such as flavonoids, pectin, vitamin c, and dietary fibre that contribute to improved health and nutrition. The peels were washed, blanched, dehydrated, powdered, and incorporated into cookies, doughnuts, and fried rice at varying concentrations (4%, 7%, and 10%). Sensory evaluation was performed by a panel of five judges using a nine-point hedonic scale, while chemical and nutrient analyses were conducted following aoac (1990) methods. Statistical analysis was carried out using one-way anova. The results revealed that orange peel powder (7%) and lemon peel powder (4%) produced the most acceptable sensory attributes in all food products. Nutritional analysis indicated increased levels of protein, carbohydrate, fibre, vitamin c, calcium, and potassium with higher incorporation levels. The study concluded that orange and lemon peel powders can be successfully utilized to develop flavour-enriched and nutritionally superior food products. Their incorporation also offers an effective method of citrus peel waste management while promoting functional food development.

Keywords: Orange Peel, Lemon Peel, Functional Foods, Medicinal Plant, Citrus Waste Utilization, Nutritional Value, Sensory Evaluation

IN SILICO EVALUATION OF PHARMACOKINETIC AND BIOPHYSICAL PROPERTIES OF FUCOSTEROL AND COCCINOSIDE C: ADMET PROFILING AND MOLECULAR DYNAMICS SIMULATIONS

Saritha Dassanayake*[1], Demidu Bookoladeniya[1], Piyumi Wasana[2], Anoja Attanayake[3]
[1]Department of Molecular Life Sciences, Institute of Biochemistry and Molecular Biology and Biotechnology, University of Colombo, Sri Lanka
[2]Department of Postgraduate Studies, Faculty of Health Sciences, Cinec Campus, Malabe, Sri Lanka
[3]Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka

Abstract

Coccinia grandis (L.) voigt (Family: Cucurbitaceae) is recognized as an antidiabetic agent due to its wide array of bioactive compounds. Phytochemical investigations on *C. grandis* revealed that bioactive compounds, among which fucosterol and coccinoside c, exert antidiabetic activity via α-amylase, α -glucosidase, and dipeptidyl peptidase-iv (dpp-iv) inhibition. Despite their in vitro antidiabetic activity, comprehensive insight into their pharmacokinetic and biophysical properties remains limited. Evaluation of these is crucial for developing drug leads, as they reflect molecular stability and interaction dynamics. The present study aimed to evaluate the pharmacokinetic and biophysical behavior of fucosterol and coccinoside c through admet profiling and molecular dynamics simulations. In silico adme and toxicity prediction were carried out using swissadme and admetlab platforms. Molecular dynamics simulations were performed with gromacs 2022.4 for 100 ns on each of the complexes. The acarbose was used as the positive control for α -amylase and α -glucosidase, whereas diprotin a was used as the positive control for dpp-iv. The system equilibration was assessed through the evaluation of the potential energy, temperature, pressure, density, and total energy. Fucosterol, which showed moderate bioavailability (0.55) with low gastrointestinal absorption, satisfied most of the drug-likeness criteria, except for the ghose rule. Fucosterol showed high lipophilicity (logp> 4.15), poor water solubility (logs = −7.64), favorable safety with low mutagenicity (ames = 0.084), and hepatotoxicity (0.619). Coccinoside C showed similar bioavailability (0.55) and moderate lipophilicity (logp = 5.19) despite its violation of lipinski, ghose, and veber rules. Coccinoside c exhibited higher predicted toxicity than fucosterol, as indicated by its elevated mutagenicity (ames = 0.225) and hepatotoxicity (0.825) values. However, these values remained within the acceptable limits defined by pfizer's toxicity thresholds. Molecular dynamic results demonstrated that coccinoside C exhibits higher stability with α-amylase (~0.05 nm) and α-glucosidase (~0.1 nm) than acarbose, whereas fucosterol showed strong stability with dpp-iv (~0.3 nm), when compared to diprotin a. Hydrogen bond analysis demonstrated that coccinoside C forms an average of 2 hydrogen bonds with α -amylase (70% occupancy), 2 with α -glucosidase (60% occupancy), and 1.5 with dpp-iv (50% occupancy), while fucosterol forms fewer hydrogen bonds. Radius of gyration values remained consistent (~2.0–2.5 nm), indicating the stability of molecular complexes. Coccinoside C binding energies were -180 kj/mol, -160 kj/mol, and 140 kj/mol with α-amylase, α-glucosidase, and dpp-iv, respectively, while fucosterol demonstrated −120 kj/mol, −100 kj/mol, and −170 kj/mol, respectively. Coccinoside C matches the effect of acarbose against α -amylase and α -glucosidase, whereas fucosterol exceeds the action of

diprotin a, which demonstrates the potent dpp-iv inhibitory activity, through mm/pbsa entropic estimates and 100 ns dynamics simulation. In conclusion, both fucosterol and coccinoside c exhibit acceptable pharmacokinetic profiles and safety margins, facilitating their potential as natural antidiabetic agents targeting key enzymes in carbohydrate metabolism.

Keywords: Admet, *Coccinia grandis*, Coccinoside C, Fucosterol, Molecular Dynamics

PROTECTIVE EFFICACY EVALUATION OF *CURCUMA LONGA* AND *PRUNUS AMYGDALUS* ON ACETAMINOPHEN INDUCED HEPATOTOXICITY

Ravi Kiran Suripeddi[*1]

[1]Botany and Food & Nutrition, R.B.V.R.R. Women's College, Hyderabad, India

Abstract

It is well known that the miss use or excessive use of drugs can result in liver dysfunction and other associated problems. The dysfunction that causes by drugs mostly resulting in diseases called drug-induced liver injury. The rate of drug-induced liver injury (dili) was determined to be 13.9 cases per 100,000 people. Out of these, 12% needed hospital care, and 6% resulted in fatalities. In 2019, study in china revealed that the incidence was 23.8 per 100 000 persons/year. Acetaminophen, also known as n-acetyl-p-aminophenol or paracetamol (apap), has been extensively studied for its potential to cause liver damage in cases of overdose, both in experimental animals and in humans. Whether taken intentionally or unintentionally, the consumption of excessive amounts of apap can result in liver injury and in severe cases, it can progress to acute liver failure as well. This research aimed to evaluate the potential of extracts and isolated bioactive compounds from *Curcuma longa* and *Prunus amygdalus* in inhibiting inflammation, oxidative stress reduction, and apoptosis in apap-induced liver cells. Human hepatocellular carcinoma (hepg2) cells were treated with apap to induce hepatotoxicity, followed by treatment with extracts and compounds at various concentrations and subsequently measured the levels of il-1β, il-6, and il-10. Further, qrt-pcr was used to analysand the expression of the casp-3, casp-9, and jnk genes, as well as the concentration of no and ldh. The cells treated with extracts and compounds displayed a reduction of il-1β, il-6, ldh and no, as well as the expression of casp-3, casp-9 and jnk genes. Increase in the levels of il-10 was also observed with all the tested samples. The results indicate a significant hepatoprotective activity of all the extracts and compounds and thus can be implicated in the treatment of hepatocellular carcinoma.

Key words: Hepatoprotective Efficacy, Acetaminophen, *Curcuma longa, Prunus amygdalus*, Hepg2 Cells and Cytokines

BIOPOLYMERS LOADED PHYTOCONSTITUENTS AS POTENTIAL AGENTS FOR THE MANAGEMENT OF TYPE-II DIABETES

Achyutha Devi Jammula[*1]
[1]Zoology, R.B.V.R.R. Women's College, Hyderabad, India

Abstract

Diabetes mellitus, is the most common metabolic disorder of glucose metabolism, which is characterized by chronic hyperglycemia due to deficiency or reduced effectiveness of insulin. The noninsulin-dependent diabetes mellitus (NIDDM), commonly referred as type 2 diabetes, is most common and accounts for 80% of all cases of diabetes in india and worldwide as well. The prevalence is very high and expected to rise from 171million in 2000 to 366 million by 2030. Many phytoconstituents such as phenolics, flavonoids, terpenoids and alkaloids derived from various medicinal plants have been demonstrated as effective and reliable natural anti-diabetic agents with acceptable safety profile and mimics synthetic oral hypoglycemic agents. The traditional knowledge on induced health benefits of medicinal plant has been transmitted over the centuries within human communities, and natural products play a pivotal role as a productive source of drug lead compounds. The sterols and monoterpenes alcohols from medicinal plants were isolated by column chromatography and characterized by nmr and mass spectrometry. The compounds were evaluated for their anti-diabetic potential using cell lines and enzyme models in vitro. All the compounds displayed proliferation of ins-1 cell and less than 20% cell death on hepg2 and l6 myoblasts suggesting that these are the lead molecules and need to be explored for the management of diabetes. Further, remarkable results were obtained in this investigative study with potential inhibition of α-amylase, α -glucosidase, lipase, sucrase, collagenase, dpp-iv and ptb-1b enzymes which is relevant physiologically and suggesting the mechanism of anti-diabetic accomplishment of the isolated compounds. Furthermore, in silico cadd analysis was also supported the in vitro results and have given an insight into the mechanism of action of bioactive compounds. The hydrogels and aerogels prepared with the compounds and pectin were studied and all of them have offered excellent biocompatibility and excellent would healing and anti-inflammatory activities.

Key words: Bioactive Sterols, Monoterpene Alcohols, Hydrogels, Aerogels, Anti-diabetic Activity, Wound Healing Activity and Biocompatibility

ANALYTICAL AND ETHNOBOTANICAL INVESTIGATION OF ADULTERATION OF HERBAL REMEDIES

Sashinika Jayasinghe[*1], **Sumudu Ruklani**[1], **Sumudu Rubasinghe**[1], **Manjula Wijesinghe**[2]
[1]Botany, University of Peradeniya, Peradeniya, Sri Lanka
[2]Chemistry, University of Peradeniya, Peradeniya, Sri Lanka

Abstract

The increasing worldwide demand for natural products, herbal medicines, and traditional systems of medicine leads to the global resurgence of herbal medicine. The reasons for the high demand for herbal medicines compared to pharmaceutical medicines are availability, affordable prices, patient preferences and belief in herbal medicines. Due to this demand for herbal medicines, intentionally or unintentionally, the purity and efficacy of the herbal medicines decrease because of the lack of regulations when preparing them. Adulteration involves replacing partially or entirely the original medicinal substance with materials that lack or have reduced therapeutic and chemical value. This study employed an integrated ethnobotanical and analytical approach to investigate the adulteration of *Terminalia chebula, Terminalia bellirica, Phyllanthus emblica* and *Coscinium fenestratum. Terminalia chebula* is traditionally used mainly for digestive health, detoxification, respiratory health, immune system and skin health, while *Terminalia bellirica* is used as an internal cleanser, nourishes, digestive health and antioxidants. *Phyllanthus emblica* is rich in vitamin c, antioxidants and minerals, offering health benefits such as digestive health, boosting immunity and promoting hair growth. *Coscinium fenestratum* is utilized for a large variety of diseases, from fevers and diabetes to skin care and celiac disease. The main objective of the study is to document the traditional knowledge and authentic use of the specific plants under investigation and to scientifically evaluate the quality and authenticity of commercially available products derived from each plant. Ethnobotanical data were collected through an in-person survey to get an idea of the knowledge of the local community about the selected plant species and the usage of commercially available herbal remedies of each plant species, and to establish authentic use parameters. Subsequently, commercially available powdered products and their relevant original plant powder were analyzed and compared using macroscopic examination through sensory evaluation, fourier transform infrared spectroscopy-attenuated total reflectance (FTIR- ATR). The plotted graphs from the data given from FTIR-ATR for original samples of *Terminalia chebula, Terminalia bellirica, Phyllanthus emblica* and *Coscinium fenestratum* and their commercial powdered sample, showed some significant differences in the presence or absence of specific functional groups and their concentrations. Therefore, the findings confirmed widespread adulteration in the *Terminalia chebula, Terminalia bellirica, Phyllanthus emblica* and *Coscinium fenestratum* market. Highlighting a disconnection between the traditional practice and the commercial reality. This research highlights the importance of coupling ethnobotanical verification with analytical screening to ensure the quality, safety, and efficiency of herbal remedies.

Keywords: Adulteration, *Terminalia Chebula, Terminalia Bellirica, Phyllanthus Emblica* and *Coscinium Fenestratum*, Ethnobotanical Data, FTIR- ATR

ANTIMICROBIAL ACTIVITY EVALUATION OF SRI LANKAN POMEGRANATE VARIETIES

Malki Sandeepani[1], KaumadiSamarasekara[*1] ,

Jananie Kottahachchi[2],

[1]Department of Botany, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

[2]Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka.

Abstract

Natural antimicrobial compounds of plants are safer alternatives that can replace to synthetic antibiotics with the major threat of antibiotic resistance in pathogenic microorganisms. This study aims to evaluate the antimicrobial activity of peel and arils of local pomegranate varieties against gastrointestinal disease-causing microorganisms as well as the antioxidant activity of pomegranate peel of local varieties. Antimicrobial activity of peel and aril extracts was investigated by agar well diffusion method against *Escherichia coli, Enterococcus faecalis*, *Staphylococcus aureus, Shigella dysenteriae* and *Salmonella enteritidis.* The methanolic extracts of peel of all the pomegranate varieties showed higher antimicrobial activity against tested microorganisms than aqueous arils. All the varieties of pomegranate peel and arils showed the highest antibacterial activity against staphylococcus aureus. Minimum inhibitory concentration was determined by microbroth dilution method. Aqueous aril extracts of daya and nimali varieties showed mic of 3.125 mg/ml and 1.5 mg/ml for *E. coli* respectively. Nayana variety showed mic of 3.125 mg/ml and Daya variety showed mic < 0.7 mg/ml against *Enterococcus faecalis*. All three varieties of Nayana, Nimali, Kalpitiya hybrid varieties showed mic of 1.5 mg/ml for *staphylococcus aureus* while only Daya showed mic < 0.7 mg/ml. Considering the methanolic extract of pomegranate peel, daya variety showed only mic of 50mg/ml while all other varieties exhibited mic of < 0.7 mg/ml against e. Coli. All the peel extracts exhibited potent activity against *Enterococcus faecalis* (mic < 0.7mg/ml) while they showed comparatively lower activity against *Staphylococcus aureus*, *Shigella dysenteriae* and *Salmonella enteritidis* (mic of 50 mg/ml – 200 mg/ml). Considering antimicrobial activity against all the tested bacterial isolates, peel extract of Kalpitiya hybrid variety showed overall better performance compared to other varieties.

Keywords: Pomegranate, Antimicrobial Activity, Agar Well Diffusion, Minimum Inhibitory Concentration

ANTIDIABETIC POTENTIAL OF *CORDIA GRANDICALYX* EXTRACTS: EFFECTS ON GLUCOSE UPTAKE AND GLUT4 TRANSLOCATION IN MUSCLE, LIVER, AND PREADIPOCYTE CELLS

Alinah Chauke[*1]
[1]Biomedicals Sciences, TUT, Pretoria, South Africa

Abstract

Enhancing glucose uptake and promoting glut4 translocation in insulin-sensitive tissues is a well-established mechanism for maintaining glucose homeostasis and offers a promising pathway for discovering antidiabetic agents from traditional medicinal plants. The present study investigated the antidiabetic potential of cordiagrandicalyx (bark, fruit, and leaf) extracts on glucose uptake and glut4 translocation in liver, muscle, and preadipocyte cell lines. methods: the safety and efficacy of c. Grandicalyx extracts were assessed through mtt assays to evaluate cytotoxicity, while glucose uptake and glut4 translocation assays were conducted to measure glucose absorption and transportation by the cells. Extracts were tested at a concentration of 10 mg/ml, prepared using solvents of different polarities to capture a broad range of phytochemical profiles. results: the extracts significantly enhanced glucose uptake across all tested cell lines, with effects correlating to increased glut4 translocation, even at low concentrations (0.312 mg/ml), in some cases surpassing the activity of insulin, the positive control. Importantly, the extracts showed no cytotoxic effects; instead, they exhibited mitogenic properties, promoting cell viability. Furthermore, co-treatment with insulin and the plant extracts resulted in notably improved glucose uptake. Interestingly, certain extracts enhanced glucose uptake independently of glut4 translocation, suggesting the involvement of alternative pathways besides glut4-mediated mechanisms. conclusion: the results suggest that c. Grandicalyx exerts its glucose-lowering effects by enhancing the expression or translocation of glucose transporters, potentially through the pi3k signaling pathway. These findings support its traditional use as an antidiabetic agent and highlight its potential as a plant-based therapy for managing insulin resistance and type 2 diabetes mellitus.

Key words: Cordia Grandicalyx, Glut4, Glucose Uptake, Pi3k/akt, Insulin Resistance, Antidiabetic, Medicinal Plants

PHYTOCHEMICAL SCREENING AND BIOLOGICAL ACTIVITY *OF IPOMEA PES-CAPRAE LEAF*, STEM AND FLOWER EXTRACTS

Yougasphree Naidoo[*1], **Ashish Misra**[2]
[1]School of Life Science, University of Kwazulu-natal, Durban, South Africa
[2]School of Life Science, University of Kwazulu-natal, Durban, South Africa

Abstract
Ipomoea pes-caprae (Morning glory) is a coastal dune species known as a valuable medicinal plant with a broad spectrum of antibacterial and anti-inflammatory activities. Traditionally, this plant is used to treat inflammation, diuretic disorders, hypertension, and pain. This study has revealed that phytochemical compounds are present in the plant. Phytochemical tests were done on the crude extracts of the leaf, stembark and flowers. Results indicated the presence of alkaloids, carbohydrates, phenols, saponins, terpenoids and sterols (in hexane), amino acids (in chloroform) and a strong presence of flavonoids and phenols (in methanol). Further investigation was done on the hexane, chloroform and methanol crude extracts of the leaves, stembark and flowers of *I. pes-caprae for their antibacterial potential. Two gram-positive bacteria; Staphylococcus aureus* and multi-resistant *Staphylococcus aureus* and two gram-negative bacteria; escherichia coli and pseudomonas aeruginosa was tested using the disc diffusion method. Results for the leaf methanolic extract showcased the bestbioactivity against *S. aureus* and *E. coli*, with zones of inhibition for *S. aureus* (12.6 mm) which were more effective than streptomycin (11.4 mm), and outperformed gentamycin against e. Coli (14.2 mm vs. 17.5 mm). However, the methanol stem and flower extract did not yield any zones of inhibition against both bacterial strains. Antioxidant activity was measured using dpph and fraps assays, and results revealed that the methanolic extracts of the leaves had a notable DPPH inhibition of 55.1 ug/l, even though the reducing power was lower than that of ascorbic acid. The results from this study reveal that *I. pes-caprae* has a robust presence of bioactive compounds which increase the plants antibacterial properties. This was highlighted by the antibacterial assay, which revealed that the leaves yielded the best results against a variety of bacterial pathogens. With these findings, *I. pes-caprae* has proven to be a useful medicinal plant that has the potential to be a source for alternative medicines in South Africa.

Key words: *Ipomoea pes-caprae,* Antibacterial, Antioxidant, Medicinal Plants, Phytochemicals

Chemical Profiling of Stingless Bee (*Trigona iridipennis* Smith.) Propolis from Mysore–Nanjangud District using HPTLC and LC–MS analysis

Kavya B[1] and V. Sivaram[1*] and R Shubharani[1*]

[1]Department of Botany, Bangalore University, Jnana Bharathi Campus, Bangalore - 560056
*V Sivaram Research Foundation, Vijayanagar, Bangalore -560040, India

Abstract:

Stingless bee propolis, a chemically rich resinous product is known for its diverse bioactive compounds, yet its chemical composition in southern India remains underexplored and poorly documented. The present study investigates the chemical profile of *Trigona iridipennis* propolis collected from the Mysore–Nanjangud district of Karnataka. Multiple solvent extracts were analysed using High-Performance Thin-Layer Chromatography (HPTLC) and Liquid Chromatography–Mass Spectrometry (LC–MS Q-TOF). HPTLC fingerprinting showed multiple peaks across all extracts at 254 nm, 366 nm and 550 nm, indicating the presence of a wide range of phytoconstituents, including terpenes, phenolics, flavonoids and steroids. LC–MS analysis of the methanolic extract identified more than 70 compounds belonging to diverse chemical classes such as flavonoids (rutin, hyperoside), phenolic acids (ellagic acid, chlorogenic acid derivative), terpenoids, alkaloids, tannins, lignans and fatty acids. Several unique compounds such as beta-penta-O-galloyl-glucose, sanggenon D and xantho-chymuside suggest a rich and distinctive chemical profile. This finding demonstrates the significant phytochemical diversity of stingless bee propolis from the Mysore–Nanjangud region and provides a strong foundation for future chemotaxonomic studies, biological evaluation, and potential therapeutic applications.

Keywords: Stingless bee propolis, Trigona iridipennis, Nanjangud, HPTLC, LC–MS

HARNESSING PLANT–VIRUS–MICROBE INTERACTIONS FOR SUSTAINABLE ENHANCEMENT OF PICROSIDE PRODUCTION IN *PICRORHIZA KURROOA*

Anish Tamang[*1], **Shiv Shanker Pandey**[2], **Vipin Hallan**[1]

[1]Biotechnology, CSIR-Institute of Himalayan Bioresource Technology, Palampur, India

[2]Fermentation and Phytopharma Technology, CSIR-Institute of Himalayan Bioresource Technology, Palampur, India

Abstract

Picrorhiza kurrooa Royle ex Benth., an endangered medicinal herb endemic to the Himalayas, is highly valued for its hepatoprotective compounds picrosides (p-i, p-ii, and p-iii). Overexploitation from the wild and poor natural regeneration has critically reduced its populations, emphasizing the need for sustainable cultivation strategies. However, cultivated plants consistently exhibit markedly lower picroside levels than wild ones, with wild rhizomes containing up to 180-fold higher p-ii concentrations. Since plant-associated microbes and viruses can modulate host secondary metabolism, understanding their roles *In P. kurrooa* could offer novel biotechnological routes for metabolite enhancement. This study investigated the impact of tomato leaf curl palampur virus (TOLCPALV), a begomovirus that naturally infects *P. kurrooa*, and its associated endophytes on picroside biosynthesis. Virus-inoculated plants displayed a substantial rise in picroside accumulation compared to controls: p-i increased by 2.1–4.2-fold, p-ii by 5.4–6.4-fold, and p-iii by up to 6.4-fold across leaf and root tissues. The enhancement was accompanied by an increase in precursor metabolites associated with the iridoid and phenylpropanoid pathways. Transcriptomic profiling further revealed significant upregulation of genes involved in the plastidialmep and phenylpropanoid pathways, alongside several regulatory transcription factors. Functional analysis demonstrated that the ac4 protein, identified as a pathogenicity determinant of tolcpalv, played a central role in mediating this metabolic reprogramming and subsequent accumulation of picroside. Parallel to this, the contribution of endophytic communities to secondary metabolism was also investigated. Comparative microbial profiling revealed that wild plants harbor a richer and more diverse endophytic microbiome than tissue-cultured plants, suggesting a loss of beneficial microbial partners during in vitro propagation. Among the isolates, a distinct trichodermaharzianum strain, designated pkrf1, showed exceptional potential as a bioinoculant. Inoculation with pkrf1 enhanced plant growth by over 225% and boosted picroside levels up to 6.34-fold for p-i and 10.4-fold for p-ii in tissue-cultured plants. Whole-genome sequencing of pkrf1 revealed genes associated with nutrient mobilization, stress adaptation, and secondary metabolite regulation, underscoring its symbiotic and metabolic potential. Collectively, this study establishes a novel framework for the sustainable production and conservation of p. Kurrooa by integrating viral and microbial interactions. The findings not only uncover previously unexplored mechanisms underlying picroside biosynthesis but also open new avenues for metabolic engineering and bioinoculant-based enhancement of high-value phytochemicals in medicinal plants.

Keywords: *P. kurroao*, Picrosides, Endophytes, Tomamto Leaf Curl Palampur Virus

SCREENING OF BIOACTIVE COMPOUNDS AND ANTIBACTERIAL EFFICACY OF *AZADIRACHTA INDICA* (NEEM) EXTRACT AGAINST *ESCHERICHIA COLI* AND *STAPHYLOCOCCUS AUREUS*

Ayuni Tiranya[1], Kithmini Kasuntha[1], Mayuri Munasinghe[*1,2]
[1]Department ofBotany, University of Sri Jayewardenepura, Colombo, Sri Lanka
[2]Center for Plant Materials and Herbal Products Research, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

Abstract
Azadirachta indica, commonly known as Neem, is a medicinal plant used in traditional medicine for its antibacterial, antifungal, antiviral, antidiabetic, anticancer and antioxidant effects. These benefits are due to the presence of various phytochemicals, such as alkaloids, tannins, terpenoids, saponins, and flavonoids. Although traditional herbal medicine remains significant globally, the predominance of synthetic antibiotics once hindered research into plant-derived therapeutics. With the increasing emergence of antibiotic-resistant pathogens, attention has shifted toward plants and other natural sources as promising reservoirs of new antimicrobial compounds. This study examined the phytochemical constituents and antibacterial ability of *A. indica* leaf extract against *Escherichia coli* (ATCC 25922) and *Staphylococcus aureus* (ATCC 25923). The main functional groups were identified using fourier transform infrared (FTIR) spectroscopy. Fresh Neem (*Azadirachta indica*) leaves were used to prepare an aqueous extract for preliminary phytochemical screening, while a crude methanolic extract was obtained through soxhlet extraction and concentrated using a rotary evaporator. Phytochemical screening was performed using standard qualitative tests, namely the ferric chloride test for phenols and tannins, the frothing test for saponins, dragendorff's and wagner's tests for alkaloids, the chloroform–sulfuric acid test for terpenoids, and the magnesium turnings test for flavonoids. This extract was then tested for antibacterial properties using the agar well diffusion method; with concentrations ranging from 100 to 500 mg/ml. Gentamicin was used as a positive control. Phytochemical analysis confirmed the presence of phenols, tannins, saponins, alkaloids, and terpenoids, but no flavonoids were found. Ftir spectra showed peaks at 3308.89 cm^{-1} for o-h stretching (phenols/alcohols), 2917.45 cm^{-1} and 2849.41 cm^{-1} for c-h stretching (alkanes), 1727.45 cm^{-1} for c=o stretching (aldehydes/ketones), 1604.70 cm^{-1} for c=c stretching (aromatic compounds), 1164.57 cm^{-1} for c-o stretching, and 814.11 cm^{-1} for c-h bending, confirming the presence of multiple bioactive functional groups. These peaks indicate the presence of several bioactive functional groups. The methanolic extract showed concentration-dependent inhibition of both bacteria. The largest mean inhibitory zones were observed at 500 mg/ml for s. Aureus (1.4 cm) and E. coli (1.45 cm), while gentamicin produced zones ranging from 3.0 to 3.4 cm. In conclusion, the methanolic leaf extract of *A. indica* showed strong antibacterial activity against both gram-positive and gram-negative bacteria. This activity relates to the presence of important bioactive chemicals. These results support the medicinal importance of Neem as an effective natural source of antibacterial agents and justify its traditional use in treatment of infectious diseases.

Keywords: *Azadirachta indica*, Phytochemicals, Methanolic Extract, FTIR, Antibacterial Activity, *Escherichia coli, Staphylococcus aureus*

PHYTOCHEMICAL SCREENING AND CONCENTRATION-DEPENDENT ANTIBACTERIAL POTENTIAL OF *DILLENIA RETUSA* (GODAPARA) FRUIT EXTRACTS

Indula Senerath[1], Harshika Wickarasooriya[1], Charuni Dahanayaka[1], Shashika Rathnayake[1], Mayuri Munasinghe[*1,2]

[1]Department ofBotany, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
[2]Center for Plant Materials and Herbal Products Research, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

Abstract

Dillenia retusa (Godapara) is an indigenous plant in Sri Lanka, traditionally known for medicinal uses, particularly against infections and inflammation. Despite its ethnomedicinal value, scientific validation of its bioactive principles and antimicrobial aspects is scanty. The purpose of this study was to analyze the phytochemical profile and antibacterial activity of *Dillenia retusa* fruit extracts against *staphylococcus aureus* and *Escherichia coli*. In the phytochemical screening, fresh fruits were homogenized with distilled water and filtered through muslin cloth to get a crude aqueous extract. Various standard qualitative tests were performed to identify major secondary metabolites. Phenolic compounds and tannins were tested using ferric chloride; the formation of a blue-green or blackish coloration indicates ferric–phenolate complex formation. Alkaloids were detected using dragendorff's reagent (potassium bismuth iodide), which forms an orange precipitate upon reaction with nitrogenous bases. Saponins were identified through the froth (shake) test, by considering the persistent foam as confirmatory for the surfactant nature of the compounds. Terpenoids were tested using the salkowski method-addition of chloroform and concentrated sulfuric acid causes the appearance of a reddish-brown interfacial ring due to terpenoid–acid complexation. Flavonoids were detected using the zinc–hydrochloric acid reduction test, which yields a magenta or red color in the case of flavonoids. The results indicated that the phytochemicals present in this plant were alkaloids, saponins, and terpenoids, while phenols, tannins, and flavonoids were absent. This suggested that the phytochemical composition is dominated by lipophilic and nitrogenous compounds.For the evaluation of antimicrobial properties, oven-dried fruits were powdered, and 10 g were extracted with 100 ml methanol by soxhlet extraction for six hours. This was then concentrated using rotary evaporation to give semi-solid crude. Serial dilutions from 10^{-1} to 10^{-4} were prepared with distilled water. Sterile cotton swabs were streaked with pure cultures of staphylococcus aureus and escherichia coli on muellerhinton agar. The agar plates were divided into quadrants, and each dilution was assayed in duplicate, along with a positive control (standard antibiotic) and a negative control (distilled water). Agar plates were incubated at 38 °c for four days, and the zones of inhibition were measured. The results showed that the stock extract, as well as 10^{-1} and 10^{-2} dilutions, had distinct inhibition zones against both pathogens, while higher dilutions (10^{-3} and 10^{-4}) showed no activity. This confirmed dose-dependent antibacterial activity. Such activity is likely because of the presence of alkaloids and terpenoids that disrupt microbial membranes and enzyme systems, and saponins that enhance permeability of bacterial cell walls. Thus, extracts of *Dillenia retusa* fruit possess significant antibacterial potential at higher concentrations, bioactive secondary metabolites in them being the probable causes. Further studies on compound isolation and mode of action are required to explore the pharmacological applications.

Keywords: *Dillenia retusa*, Phytochemical Screening, Antimicrobial Activity, Antibacterial Property

HARNESSING THE THERAPEUTIC POTENTIAL OF *VITEX NEGUNDO*: A STUDY ON ESSENTIAL OIL YIELD AND BALM FORMULATION

Anshu Kumari[*1]
[1]Forestry, FRIDU, Dhanbad, India

Abstract

Vitex negundo belonging to family Lamiaceae, is found throughout india. *Vitex negundo* is a woody, aromatic deciduous shrub growing to a small tree. Vitex negundo is also known as the five-leafed chaste tree or monk's pepper. A study was carried out at icfre – eco rehabilitation center for assessment of superior genotype of *Vitex negundo* based on extraction of essential oil in Uttar pradesh. In this study adopted the sampling method and selected 12 different districts of uttarpradesh viz., Chitrakoot, Prayagraj, Badaun, Chaudasi, Ghoorpur, Pratapgarh, Lucknow, Sultanpur, Unchahaar, Naini, Kunda and Banda for collection of leaves of *Vitex negundo*. Each district identified 15 *Vitex negundo* accessions for essential oil extraction in order to identify the superior plant. Essential oil was extracted from air-dried plant leaves using a clevenger apparatus. The result showed that the essential oil percent viz., p1 - Chitrakoot - 0.27 ± 0.03 %, p2 - Prayagraj 0.28 ± 0.02 %, p3 – badaun 0.21 ± 0.03 %, p4 – Chaudasi 0.26 ± 0.01 %, p5 – Ghoorpur 0.25 ± 0.02 %, p6- Pratapgarh 0.31 ± 0.02 %, p7- Lucknow 0.11 ± 0.01%, p8- Sultanpur 0.14 ± 0.03 %, p9- Unchahaar 0.11 ± 0.06 %, p10- Naini 0.10 ± 0.01 %, p11- Kunda 0.11 ± 0.02 % and p12- Banda 0.09-0.39 %. Knowing the significance of *Vitex* essential oil, a novel herbal pain relieving balm was prepared using vitex essential oil and few other substances like wax, jelly etc. While making the balm, different essential oil compositions obtained from 15 population were used, and the outcome was determined on a basis of physical assessment. The best formulation of herbal pain relieving balm (named vita-5) among others has an essential oil range of 2-2.5 ml. The formulated balm can be used to treat cold, coughing, and other ailments. preliminary results highlight vita-5 as a potential natural alternative to synthetic balms. Ongoing studies aim to further validate its therapeutic efficacy through clinical trials. This research underscores the value of indigenous plants like vitex negundo in developing eco-friendly healthcare solutions

Keywords: Aromatic, Population, *Vitex Negundo*, Essential Oil, Balm

Smart Tribal Farming: Medicinal and Aromatic Plants (MAP) Value Chain for Strengthening Ethno-botanical and Ethno-veterinary Practices While Enhancing Tribal Farmers' Income in India[**]

Dr. Sreekala K Nair

Associate Professor, Department of Biotechnology
Project Coordinator, Unnat Bharath Abhiyan (UBA) & Smart Tribal Farming Programme Initiative
KG College of Arts and Science, Saravanampatti, Coimbatore, India
Sreekala.n@kgcas.com

Dr. B. Mythili Gnanamangai

Associate Professor, Department of Biotechnology
Project Coordinator, Smart Tribal Farming Programme Initiative
KSR College of Technology
Tiruchengode, Namakkal District, Tamilnadu, India
mythilignanamangai@ksrct.ac.in

Vinod Kumar Kodakkat

Chief Executive Officer
Padivayal Enterprises, Padivayal Estate, Wayanad, Kerala, India
Vinod.kumar@padivayal.com

Prof. Dr. Radhamma Pillay

Former Director, ICAR – Krishi Vigyan Kendra
Kerala Agricultural University, Ambalavayal, Wayanad, Kerala, India

&

Professor Moni Madaswamy

Professor Emeritus (Informatics and e-Governance) & Chairman
Centre for Agricultural Informatics and e-Governance Research Studies (CAIRS)
Centre for Smart Tribal Farming Programme Initiative (CSTFPI)
Centre for Health informatics and Computing (CHIC)
Shobhit Institute of Engineering and Technology (Deemed To-Be University) Meerut
Uttar Pradesh, India
&
Former Director General, National Informatics Centre, Government of India, New Delhi
moni@shobhituniversity.ac.in.

Abstract

Medicinal and Aromatic Plants (MAP), in many forms, have been used since the ancient times in the traditional medicinal practices for health care. South Asia is home to several rich Traditional Systems of Medicine (TSM). A global resurgence of interest in natural health products is now driving a rapid expansion in the herbal medicine market. However, the sector faces persistent challenges, including unorganized supply chain, over-reliance on unsustainable wild collection, and a widening gap between high demand and constrained supply.

Smart Tribal Farming, as recommended by the Doubling Farmers' Income by 2022 Committee Report 2018, is an emerging initiative in India aimed at transforming agriculture in tribal areas through technology and value chain integration. Integrating Medicinal and Aromatic Plants into Smart Tribal Farming leverages traditional knowledge for contemporary economic benefit, and addresses both human and animal health. A crucial component of Smart Tribal Farming is the development of robust MAP value chains in Tribal Regions. This approach seeks to strengthen traditional **ethno-botanical** and **ethno-veterinary** practices while enhancing Tribal Farmers' Income. The Biodiversity Amendment Bill 2021 encourages the cultivation of medicinal plants and empowers local communities to utilize these resources, recognizing codified traditional knowledge.

[**] Sent to 9th Global Summit on Medicine & Aromatic Plants 2025 (GOSMAP2025) with Theme: "Herbal Medicine – Past, Present and Future", organised by V Sivaram Research Foundation Bangalore (India), University of Sri Jayewardenepura, Gangodawila (Sri Lanka, and Society for Conservation and Resources Development of Medicinal Plants, New Delhi (India), to be held on 18-20 December 2025 at University of Jayewardenepura Sri Lanka.

The knowledge by the Tribal Communities on ecology, biodiversity, and land-use management is deeply embedded in their belief system, culture and spiritual practices. Over generations, they have evolved **ecologically sound biotechnologies** to address diverse aspects of agro ecosystem management. The pioneering work of Dr. Pushpangadan bridges indigenous medicine and modern research, focusing on plants and animals used by tribal communities for health, promoting conservation, and documenting ethno-medicinal practices to counter the erosion of this knowledge. Artificial Intelligence (AI) is revolutionizing the study and practice of traditional healing systems in India by enabling the scientific validation, standardization, and digital preservation of this traditional wisdom.

In essence, this paper emphasizes that Smart Tribal Farming acts as a structured framework that bridges ancient wisdom with modern economic opportunities, creating a sustainable and profitable ecosystem for tribal farmers in India while preserving invaluable traditional knowledge systems. It also examines how the Smart Tribal Farming Project Initiative in tribal areas facilitates Medicinal and Aromatic Plants (MAP) Value Chain, thereby strengthening ethno-botanical and ethno-veterinary practices while enhancing Tribal Farmers' Income in India.

Keywords: Smart Tribal Farming, Medicinal and Aromatic Plants, Value Chain, Ethno-botanical Practices, Ethno-veterinary Practices, ethno-medicinal practices, Traditional Healing System, Doubling Farmer Income, Tribal Community, Biodiversity Amendment Bill 2021, Artificial Intelligence, Digital preservation, Herbal Medicine

3rd International Conference on Beekeeping for Sustainable Agriculture, Ecosystem Services and Rural Livelihoods

November 4 -6, 2026
Phnom Penh, Cambodia





Organized & Hosted by

V Sivaram Research Foundation, India

Co-Organized by

Cambodia Honey Association (CHA), Phnom Penh

ICPPR International Commission for Plant-Pollinator Relationships

Angkor Wat, Siem Reap

Venue : Phnom Penh Hotel, Cambodia

BEE 2024 Secretariat: No.4, CHBS Layout, 8th main, Vijaynagar, Bangalore- 560040
Mobile: +91 9606249909; 9035981481
E mail: info@sivaramfoundation.org

https://www.sivaramfoundation.org/vsrf/BEE2025

International Congress on Biofertilizers and Biopesticides for Sustainable Agriculture (ICBBS-2026)

Kuching, Sarawak State, Malaysia

November 23-24, 2026

VSRF

Supported by:

BUSINESS EVENTS SARAWAK

TRIBE LEGACY SARAWAK CAMPAIGN

SARAWAK More To Discover

Academic Partners

MICROBIOLOGISTS SOCIETY — MICROBES FOR BETTER TOMORROW — 1996

SOCIETY FOR BIOTECHNOLOGISTS INDIA — LIFE THROUGH BIOTECHNOLOGY

INDIAN SOCIETY OF AGROFORESTRY — ISAF

For details:

ICBBS 2026 - Secretariat:

V Sivaram Research Foundation

4, 8th Main Road, CHBS Layout, Vijayanagar, Bangalore- 560040, India,

Mobile: +91 9606249909; + 91 9035981481

Website; https://www.sivaramfoundation.org/vsrf/icbbs2025; https://vsrfindia.org

E mail: info@sivaramfoundation.org; sivaram900@gmail.com