



**XXXII ANNUAL CONFERENCE OF INDIAN ASSOCIATION FOR  
ANGIOSPERM TAXONOMY AND NATIONAL SYMPOSIUM  
ON  
“The Contribution of Angiosperm Diversity to Human Wellbeing  
and the Risks Associated with its Decline”**

**November 11<sup>th</sup> – 13<sup>th</sup>, 2022**

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Department of UG, PG and Research in Botany  
Karnatak University's Karnatak Science College,  
Dharwad, Karnataka - 580 001**

**2022**

## **The Contribution of Angiosperm Diversity to Human Wellbeing and the Risks Associated with its Decline**

Prof. Y.D. Tiagi, Prof. V.V. Sivarajan Gold Medal lectures, Prof. Kameswara Rao Endowment Lecture, Lead Lectures and Abstracts of 32<sup>nd</sup> Annual Conference of Indian Association for Angiosperm Taxonomy and National Symposium

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**MESSAGE FROM PRINCIPAL DESK**



It is great honour to the department of Botany and pleasure to the Karnatak Science College, Dharwad to host 32<sup>nd</sup> Annual Conference of Indian Association for Angiosperm Taxonomy and National Symposium on “The Contribution of Angiosperm Diversity to Human Wellbeing and the Risks Associated with Its Decline” from 11<sup>th</sup> to 13<sup>th</sup> November, 2022.

Angiosperm diversity is dire and diverse. Their contribution to human society dates back to civilization. Conservation of angiosperm species and special care to an endangered species of angiosperms is necessary.

I hope three days symposium deliberations, discussions and recommendations will definitely help the plant people. Inculcate and implant biodiversity in general and angiosperm diversity in particular in the young minds to preserve and protect. Experts can focus innovative ideas and remedies for risks associated with angiosperm decline.

On the behalf of institution I extend warm welcome to all delegates and wish for the great success of this IAAT - National Symposium - 2022.

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Dr. Shivanand C. Chougala  
Principal





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## FROM THE DESK OF ORGANIZING SECRETARY

Plant taxonomy is one of the earliest disciplines of Botany. It was started as — Folk Taxonomy in early 15<sup>th</sup> century but it has grown and gone very long way in the last 500 years. The concept and scope of Taxonomy has changed a lot. Though the flora of the earth was invented in the last three centuries, yet the modern taxonomists are facing challenges. The tropical countries with rich flora are under threat. So far 4,000,000 plant species are identified of which about 3,00,000 species are of angiosperms. Among the identified plants about seventy percent belong to tropical regions.

In the modern times people are running for the applied sciences as cytology, genetics, experimental biology, ecology, molecular biology etc. but a few people are thinking of the basic or fundamental branches of botany like Taxonomy and Morphology. It has become an old fashion. No applied branch can be approached without the proper identification of the plant material on which he/she is working and for these taxonomists are very much needed.

With the increased need for conservation of biological resources, the need for biodiversity assessment during the last few years has increased. The trend has; however, reversed, and taxonomic studies are being encouraged throughout the world. This National Symposium on “The Contribution of Angiosperm Diversity to Human Wellbeing and the Risks Associated with its Decline” as a part of 32<sup>nd</sup> Annual Conference of Indian Association of Angiosperm Taxonomy is expected to fulfill the need of the hour in providing insights and solutions to the ongoing issues

in angiosperm taxonomy. To provide solutions, beforehand assessment of risks involved will be addressed in the symposium by the field experts and enthusiasts of botany.

On this occasion, it is my humble acknowledgement and gratitude to the administrative support of our Karnatak University Authority, Karnatak Science College Authority, and members and office bearers of the Indian Association of Angiosperm Taxonomy, India.

The overwhelming response from researchers is received with two gold medal lecture, one endowment lecture, 10 lead lectures, about 200 abstracts and participation of nearly 500 delegates from across the state and India. I hope this provides a great platform to discuss all the updates in respective themes of the symposium and a chance to extend collaborative works among the participants.

On behalf of the entire team of 32<sup>nd</sup> IAAT - CADHW – RAWD – 2022 extend a warm welcome to all the delegates and wish you a comfortable stay and fruitful deliberations at the Department of UG, PG and Research in Botany, Karnatak University's, Karnatak Science, Dharwad, Karnataka.

**Dr. K. KOTRESHA**  
**Organizing Secretary**  
**Department of UG, PG and Research in Botany**  
**Karnatak University's Karnatak Science College,**  
**Dharwad, Karnataka - 580 001**

## CONTENT

### Gold Medal, Endowment, Lead lectures, Award Section and Theme/s section

Sl. No	Title of The Abstract	Name of The Authors	Page No
<b>Y.D. Tiagi Gold Medal Award Lecture (Srujana Auditorium)</b>			
1	<b>My Journey from Floristics to Genomics</b>	Prof. Arun K. Pandey	
<b>Prof. V.V. Sivarajan Gold Medal Award Lecture (Srujana Auditorium)</b>			
2	<b>The Anamalai Hills: A Floristically Underestimated Micro-Endemic Centre Of Southern Western Ghats, India</b>	Dr. W. Arisdason	
<b>Prof. Kameswara Rao Endowment Lecture (Srujana Auditorium)</b>			
3	<b>Connecting the bright patches of fragmented landscape of Plant Systematics in India</b>	Prof. M.K. Janarthanam	
<b>LEAD LECTURE</b>			
<b>(Srujana Auditorium, MTA - Auditorium, MTA Hall-4, BCA Auditorium)</b>			
1	<b>Fossil History Of Angiosperms</b>	Dr. C Kameswara Rao	
2	<b>The End Of Classical Plant Taxonomy? Can Biological Sciences Survive Without Classical Taxonomy?</b>	Dr. R. Raghavendra Rao	
3	<b>Delimiting Species Boundaries In Indian <i>Pancratium</i> (Amaryllidaceae): An Unresolved Problem</b>	Dr. S. R. Yadav	
4	<b>Taxonomic Revision Of The Genus <i>Smithia</i> Aiton (Leguminosae: Papilionoideae – Dalbergae -Aeschynomeninae)</b>	Dr. M. Sanjappa	
5	<b>Plant Diversity In India: Status, Distribution And Conservation – A Review</b>	Dr.A.G. Pandurangan	
6	<b>The Role Of Wild Balsams In Decorating The Western Ghats, India</b>	Prof. Jomy Augustine	
7	<b>Ethnomedicine And Traditional Knowledge</b>	Dr. T. C. Taranath	
8	<b>Analysis Of Leaf Shape Variation In Convolvulaceae Using Elliptic Fourier Descriptors</b>	Dr. Vinay M. Raole	
9	<b>Flora Of Sikkim: A Comprehensive Account Of Angiosperms</b>	Dr. Debabrata Maity	
10	<b>Botanical Investigations Related To Some Archaeological Sites From Maharashtra</b>	Dr. Milind M. Sardesai	

## AWARD SECTION

Code No.	Title of The Abstract	Name of The Authors	Page No
<b>PROF. ROLLA S. RAO AWARD: BIODIVERSITY CONSERVATION (ANGIOSPERMS)</b>			
RSR 01	Informal Community Conservation against Formal Protected Area Network in Conserving Diversity: Insights from Forests of The Northern Western Ghats, India	Bhushan K. Shigwan and Mandar N. Datar	
RSR 02	<i>Neuropeltis malabarica</i> Ooststr. (Convolvulaceae): A Unique Endemic Species in Southern Western Ghats, India	Drisya V.V. , C. Pramod, A.K. Pradeep & T.P. Suresh	
RSR 03	Prediction and Profiling Niches of Threatened Tree Species Contributing to IUCN Status Assessment, Ecosystem Based Conservation and Niche Specific Restoration	Devika M Anilkumar* & Amitha Bachan K.H.	
RSR 04	Why To Conserve Forts?: A Case Study From Kolhapur District.	Akshay Prakash Jangam , Kapil Shinde , Ratan More , Dr. Nilesh V. Pawar	
RSR 05	Diversity and Conservation Assessment of The Genus <i>Leea</i> L. (Leeoideae: Vitaceae) In India	Amrutha A & A.K. Pradeep	
RSR 06	Conservation of Endemic, Rare, Endangered and Threatened Species at Botanical Garden, The Maharaja Sayajirao University of Baroda, Gujarat	Padamnabhi S. Nagar, Snehal Chavda, Kamartaha Saiyed, Gulzar Malek, Ankur Rajwadi, Jaydeep Sharma, Roshan Parmar, Ritesh Pokar, Agradeep Mohanta, Krishna Rajput & Tanmay Rohit	
RSR 07	Unravelling The Diversity of Orchids in Idukki District, Kerala: Their Potential Threats and Recommendations for Conservation	Dani Francis & Santhosh Nampy	
RSR 08	Prediction and Profiling Niches of Threatened Tree Species Contributing to IUCN Status Assessment, Ecosystem Based Conservation and Niche Specific Restoration	Devika M Anilkumar* & Amitha Bachan K.H.	
RSR 09	<i>In Vitro</i> Propagation of <i>Bulbophyllum fuscopurpureum</i> Wight – A Threatened Orchid from Southern Western Ghats	Parthibhan. S, A. Lakshmi Prabha and T. Senthil Kumar	
RSR 10	<i>Ixora</i> L. Section <i>Amphorionbrem</i> . (Rubiaceae): Distribution and Conservation Status Evaluation in India	Harishma K.H & Santhosh Nampy	
RSR 11	Poor In Species, Rich in Endemics: A Study of Vertical Cliffs From The Northern Western Ghats of India	Smrithy Vijayan and Mandar N Datar	
RSR 12	<i>Callitriche</i> L. An Unfamiliar Tiny Endemic Plant in South India-Needs For Their Conservation	Vishnu Mohan & Santhosh Nampy	



**PROF. K. S. MANILAL AWARD: FLORISTICS [KSM]**

KSM 01	Taxonomic Revision of Spathaceous Genera of Anthistiriinae (Poaceae: Andropogoneae) In South India	Drisy V and A.K. Pradeep	
KSM 02	<i>Blumea</i> DC. (Asteraceae) of South Gujarat	Sharma Jaydeep J. and Padamnabhi S. Nagar	
KSM 03	World Revision of The Genus <i>Coix</i> L. (Maydeae: Poaceae)	Nilesh Appaso Madhav, Sharad Suresh Kambale & Kumar Vinod C. Gosav	
KSM 04	Taxonomic and Anatomical Studies on The Genus <i>Bupleurum</i> (Apiaceae) in The Western Ghats, India	Prasanth M.K., Rekha C. & Manudev K.M.	
KSM 05	Taxonomy and Endemism in The Genus <i>Pimpinella</i> (Apiaceae) In Western Ghats, India	Rekha C, Prasanth M.K. & K.M. Manudev	
KSM 06	Present Status of Genus <i>Gynura</i> (Asteraceae) In India	Patil Supriya A. and Vinod B. Shimpale	
KSM 07	Account on Genus <i>Hibiscus</i> (Malvaceae) from Peninsular India	Jagdish V. Dalavi, Vasundhara V. Khot , Nilesh A. Madhav , Ashwini V. Mohite and Shirrang R. Yadav	
KSM 08	Mycoheterotrophic Orchid Diversity of Khokhan Wildlife Sanctuary, Kullu District with a Rediscovery of Rare Endemic <i>Neottiamicroglottis</i> (Duthie) and Two New Additions to the State Flora of Himachal Pradesh	Ashutosh Sharma, Noorunnisa Begum S & K. Ravikumar	
KSM 09	Distribution of Holo-Parasitic Genera of Family Orobanchaceae In India	Arunraj P. T. & V. N. Sanjai	
KSM 10	Taxonomic Revision of Acaulescent Species of <i>Sonerila</i> Roxb. (Melastomataceae) In India	Resmi S. & Santhosh Nampy	
KSM 11	Diversity of tree species and mapping of riparian vegetation of Dudhganga river in Kolhapur District	Sachin Chavan and Rajaram Gurav	
KSM 12	A taxonomic revision of genus <i>Abutilon</i> Mill. (Malvaceae: Malvoideae) in India	Varsha Vilasrao Nimbalkar and Milind Madhav Sardesai	

**PROF. T. R. SAHU AWARD: MEDICINAL PLANTS SYSTEMATICS [TRS]**

TRS 01	Health Perspectives of Thakar Tribe with Respect to Seasonal Wild Vegetable In Northern Western Ghats of, Maharashtra	Kadale Anil S., Rahangdale S.S., Rahangdale S.R.	
TRS 02	Bioprospecting of Ripe and Unripe Fruits of <i>Spondiaspinnata</i> (L.f.) Kurz	Madhuri Suryawanshi and Varsha Jadhav (Rathod)	
TRS 03	Study of Highly Traded Medicinal Plant of <i>Pistacia chinensis</i> Subsp. <i>Integerrima</i> (J.L.Stewart) Rech.f. In Different Markets of India	Patturaj. R, S. Noorunnisa Begum & K. Ravikumar	
TRS 04	Wild Medicinal Plants of Ranebennur Blackbuck Sanctuary (Rbs), Haveri District, Karnataka	Ningaraj S. M. and K. Kotresha	

**FR. ANTHONY MUKKATH – K. S. MANILAL AWARD: MODERN TECHNIQUES IN PLANT TAXONOMY [AM-KSM]**

AM-KSM 01	Biosystematic Studies in <i>Ledebouria revoluta</i> (Asparagaceae) From India	P. V. Deshmukh , S. R. Yadav and M. M. Lekhak	
AM-KSM 02	Analysis of Leaf Shape Variation of Selected <i>Ipomoea</i> L. Species (Convolvulaceae) Using Elliptic Fourier Descriptors	Kavi K. Oza and Vinay M. Raole	
AM-KSM 03	<i>Utricularia</i> Section <i>Phyllaria</i> (Kurz) Kamienski (Lentibulariaceae) In India, with Notes on a Little Known Tuberos Species <i>U. Brachiata</i> Oliv.	Krishnapriya M. P. & Santhosh Nampy	
AM-KSM 04	Quantitative Research Using Biblioshiny Reveals Recent Trends and Breakthroughs in Lamiaceae Research Based on Web of Science Bibliographic Dataset	Alan Thomas S and Sunojkumar P.	
AM-KSM 05	Combining The Morphological and Molecular Tools to Understand The Phylogeny of Indian Musaceae	Rajeesh E.P. & M. Sabu	
AM-KSM 06	Utility of 3-Locus DNA Barcoding For Molecular Identification and Discrimination of Intraspecific Rice Genotypes Found In The Coastal State of Goa, India.	Shaiesh Morajkar, Yogini Shanbagh , and K.K. Manohara	
AM-KSM 07	Evaluating The Monophyly of The Genus <i>Murdannia</i> Royle In India Based On Molecular, Morphological and Cytological Data	Sreekutty T.K & Santhosh Nampy	
AM-KSM 08	Analysis of Chemical Composition and Biological Activities of Leaf, Stem and Bark Extracts of <i>Homonoia riparia</i> Lour.	Smita Shinde, Neeta Arun Jadhav , Shivasharana Chandrabanda Thimmappa	
AM-KSM 09	Phytochemical Characterization, Antioxidant and Larvicidal Efficacy of <i>Holigarna arnottiana</i> Hook.f.	Nayana S, Purushottam R N, Dayanand Dalawai, Hosakatte Niranjana Murthy	
AM-KSM 10	Phylogenetic Signal to identify novel sources of anti-pyretic compound Andrographolide in genus <i>Andrographis</i> Wall. ex Nees based on Metabolomics-approach	Umopathy Senthilkumar Narayanan Kasthuri Bai, Kaliappan Ilango, Madasamy Parani	

**PROF. M. SABU AWARD [MS]: ANGIOSPERM TAXONOMY (FOR TEACHERS AND SCIENTISTS)**

MS 01	Vegetation Profile Diagram of Three Selected Sites of Guna District,	Manoj Kumar Bhiroria	
MS 02	Role of Terpenes Derived from a Member of Lamiaceae <i>Pogostemon benghalensis</i> (Burm.f.) Kuntz,	Sardar P.R. and Manik S.R.	
MS 03	Intraspecific Variations in <i>Curcuma inodora</i> Blatt.	Mangesh Dagawal	
MS 04	Anomalous Transient Secondary Thickening During Developmental Stages in The Stem of <i>Vincetoxicum indicum</i> (Burm.f.) Mabb.	Denni Mammen	
MS 05	Angiospermic Flora of Balaghat Ranges of Maharashtra, India	Ramchandra D. Gore and Sayajirao P. Gaikwad	

MS 06	Character Delimitation for Identifying <i>Dipcadi</i> from Maharashtra and Adjoining Regions	Hensal Rodrigues and Suchandra Dutta	
MS 07	Resolving <i>Grewia oppositifolia</i> (Malvaceae: Grewioideae) Complex in India	Mayur D. Nandikar	
MS 08	Cyanogenesis in Angiosperms	Ramesh Chillawar	
MS 09	<i>Shrirangia</i> : A New Genus of Apiaceae from Lateritic Plateaus of Konkan Region of Maharashtra, India	Kumar Vinod Chhotupuri Gosavi	
MS 10	Ethnomedicinal, Phytochemical and Antimicrobial Studies on Some Medicinal Plants of Visakhapatnam District, Andhra Pradesh, India	Mutyala Naidu L. and Krishna Rao M.	
MS 11	Ethnomedicinal, Phytochemical Screening and Antimicrobial Studies of Upper Forest Area of East Godavari District, Andhra Pradesh, India	M. Krishna Rao and L. Mutyala Naidu	
MS 12	Ethnomedicinal plants of Malvaceae & Apocynaceae used in Ballari district, Karnataka, India	M. Siddeshwari & K. Kotresha	
MS 13	Molecular mechanistic insights of plant-based small molecules on the replication cycle of SARS CoV 2	B. Uma Reddy	
MS 14	Overview of Systematic Composition and Endemism in Herbaceous Flora of Lateritic Plateaus of Goa and South Konkan	Rutuja R. Kolte	
<b>PROF. S. R. YADAV AWARD: POSTER PRESENTATION [SRY]</b>			
SRY 01	The Genus <i>Aeschynanthus</i> Jack (Gesneriaceae) in Northeast India	Akhil M.K. and Santhosh Nampy	
SRY 02	Progressive Approaches for Livelihood Enhancement Through Conservation and Cultivation of Medicinal and Aromatic Plants	M Navas, T K Hrideek, O L Pius and K J Dantas	
SRY 03	Use of Exotic Fruits as an Source of Nutritional Supplement	Nilesh G. Bhide and Ramchandra D. Gore	
SRY 04	Variation in <i>Portulaca tuberosa</i> and Reinstatement of <i>Portulaca badamica</i> as Distinct Species	Jagdish Dalavi, Ramesh Pujar, and Shrirang R. Yadav	
SRY 05	Standardization and Quality Control Parameters of <i>Ocimum kilimandscharicum</i> Guerke Leaves	Ria Mathew, Darshana Patil <sup>2</sup> and Avinash Patil <sup>1</sup>	
SRY 06	Sunlight induced Rapid Synthesis of Silver Nanoparticles Using <i>Terminalia neotaliala</i> Capuron Aqueous Fruit Extract: In Vitro Assessment of Its Antioxidant and Anti-Inflammatory Activities	Nirupa S. Vernekar and Tarikere C. Taranath	
SRY 07	Correlation Between Altitude and The Distribution of Wild Balsams in Southern Western Ghats, India	Reshma Raju & Jomy Augustine	
SRY 08	Diversity and Seed Morphometric Studies of <i>Smithsonia</i> Genus in Karnataka, India	Shreyas B. & K. Kotresha	
SRY 09	Systematics of Indian <i>Rotala</i> L. (Lythraceae) Based on Morphology and Molecular Evidence	Arun Prasanth R. and Milind M. Sardesai	

SRY 10	Review on Wild Edible Plants of India	Apurva P Patil and Rutuja R Kolte	
<b>THEMEs SECTION</b>			
<b>PHYTODIVERSITY AND ITS DOCUMENTATION [PD]</b>			
PD 01	Assessment of Population Size and Regeneration Status of An Endemic and Endangered Tree Species – <i>Kingiodendron pinnatum</i> (Roxb. Ex DC.) Harms In Western Ghats of Karnataka.	Sahana Vishwanath and A. N. Sringeswara	
PD 02	<i>Capparis nanchilnadiana</i> Sp. Nov.(Capparaceae) From Tamil Nadu, Southern India	S. Abdul Kader and B. Parthipan	
PD 03	Phyto-Diversity of Keoladeo National Park, Bharatpur (India): A Review	Ram Pratap Singh	
PD 04	Soil Seed Bank Assessment in Different Vegetations in Buffer Zone of Silent Valley National Park, Kerala , Palakkad	Anju M V, Rekha R Warriar & Kunhikannan C	
PD 05	Hydrophytic Plant Diversity of Davanagere District, Karnataka State, India	Haleshi C., Monesha E, Suchithra Boxi and Vijay Danapur	
PD 06	Phenotypic Plasticity in <i>Ledebouriahyacinthin</i> from Maharashtra and Surrounding Regions	Kiran Chakral, Suchandra Dutta	
PD 07	Medicinal Flora of Oothumalai Hills, Salem District, Tamil Nadu.	. Kannan, T. Senthil Kumar and R. Prabakaran	
PD 08	Floristic Diversity of Nanar and Surrounding Areas of Rajapur Tehsil of Ratnagiri District (Maharashtra)	P. P. Bhalekar · D. B. Borude and A. N. Chandore	
PD 09	Distribution of The Genus <i>Strobilanthes</i> in Karnataka, With Special Reference to Chandradrona Hills of Chikmagalur	R. Parimala	
PD 10	Need of Documenting Extended Distributions: Case Study of Few Endemics of Northern Western Ghats	S. S. Kambale , A. R. Gholave & K. V. C. Gosavi	
PD 11	Diversity of Genus <i>Jurinea</i> Cass. (Asteraceae) In India	Shruti Kasana, P.L. Uniyal <sup>1</sup> & Arun K. Pandey	
-PD 12	Genus <i>Eriocaulon</i> L. on Lateritic Plateaus of Ratnagiri District (Maharashtra) With a New Species	Dr. A. N. Chandore	
PD 13	Diversity and Endemic Status of Wild Orchids in Yellapur Taluk, Uttarakannada District, Karnataka	Shreyas, B. & K. Kotresha	
PD 14	The Phyto-Diversity and Its Documentation of Genus <i>Holigarna</i> . The Endemic and Poisonous Plant Species of Central Western Ghats.	Manjunath. K and Y.L. Krishnamurthy	
PD 15	Endemic and Highly Traded Plant Species of Bannerghatta National Park, Bengaluru, Karnataka	N. Arun Kumar	
PD 16	Angiosperm Diversity of Vita City (Sangli District) Maharashtra	VithaiGurav , Dhanshree Jadhav , Rutuja Pawar, Jagdish Dalavi and Shankar Shendage	

PD 17	Diversity Endemic species in Yadahalli Chinkara Wildlife Sanctuary, Bagalkot, Karnataka, India	Maheshwari Koti and K. Kotresha	
PD 18	Endemic Impatiens L. (Balsaminaceae) of Megamalai Wildlife Sanctuary, southern Western Ghats.	P. Bharath Simha Yadav & S. Karuppusamy	
PD 19	Plant Diversity and Forest Structure of Amrabad Tiger Reserve, Telangana	A. Ramakrishna , G.Ramadevi, B. Suresh Kumar, B. Sadasivaiah and Nirmala Babu Rao	
PD 20	Diversity of Tree Species in Raichuru District Karnataka, India	Savita R and K. Kotresha	
PD 21	Studies on Riparian Vegetation of River Panchganga	Swati A. Gurav, Rajaram V. Gurav and Shankar Shendage	
PD 22	Vegetational diversity and ecosystem services of large cardamom based traditional agroforestry systems of Darjeeling Himalaya, India	Vineeta, Gopal Shukla, Shashina N N, and Sumit Chakravarty	
PD 23	Floral Diversity of Nalgonda Working Plan Forest Division of Telangana State	Honnuri, M. B. and Venkata Reddy. E	
PD 24	Phytodiversity of Siddipet Working Plan Forest Division of Telangana State	Honnuri, M. B. and Venkata Reddy. E	
PD 25	Diversity of Tree species in Kappat Hills, Gadag, Karnataka, India	Nagabhushan S. Harihar and K. Kotresha	
<b>FLORISTICS, NOMENCLATURE, TAXONOMIC REVISIONS AND MONOGRAPHS [FNTRM]</b>			
FNTRM 01	Taxonomic Studies in <i>Aponogeton lakhonensis</i>	Rupali N. Chougule , Shirang R. Yadav, Manoj M. Lekhak	
FNTRM 02	Revision of <i>Gentiana</i> L. Sect. <i>Phyllocalyx</i> (Kusnezow) T. N. Ho (Gentianaceae)	Arup K. Halder and Debabrata Maity	
FNTRM 03	Present Status of Endemic Angiosperms in Sikkim	Jayanata Ghosh and Debabrata Maity	
FNTRM 04	Present Status of <i>Thesium</i> L. (Santalaceae) in India	Mrinmoy Midday, Jayanta Ghosh & Debabrata Maity	
FNTRM 05	Comparative Leaf Anatomy of <i>Debregeasia</i> Gaudich. (Urticaceae) from Sikkim Himalaya	Sourav Naskar and Debabrata Maity	
FNTRM 06	The Genus <i>Lolium</i> L. (Poaceae:Poeae) in Sikkim Himalaya	Suparna Saha and Debabrata Maity	
FNTRM 07	Taxonomy of <i>Lepidagathis hamiltoniana-Collina-Cristata</i> (Barlerieae: Acanthaceae) Complex	A.F.J. King and G. Gnanasekaran	
FNTRM 08	Herbaceous Geophytes of Lateritic Plateaus of Ratnagiri District (Maharashtra)	D. B. Borude, P. P. Bhalekar and A. N. Chandore	
FNTRM 09	Taxonomic Status and Identity of <i>Ziziphus hysudricus</i> (Rhamnaceae).	Avinash R. Gholave, Ramchandra D. Gore & Sayajirao P. Gaikwad	
FNTRM 10	Flora of Sikkim-A Comprehensive Account (Angiosperms)	Debabrata Maity	

FNTRM 11	Identity of <i>Avicennia marina</i> from Maharashtra	Neha Maurya, Pooja Gupta and Suchandra Dutta	
FNTRM 12	Comparative Karyology of Some Dipsacispecies ( <i>Asparagaceae</i> ) in India	Priya E. Shelke , Shirang R. Yadav and Manoj M. Lekhak	
FNTRM 13	Are <i>Ledebouria hyacinthina</i> and <i>Ledebouria revoluta</i> Synonymous?	Suchandra Dutta	
FNTRM 14	Structural Variability of Monopodial Orchid, <i>Cottonia peduncularis</i> (Lindl.) Rchb.f.	Pratiksha V. Kamble, Nootan Kurane and Kiran P. Kolkar.	
FNTRM 15	Diversity of genus <i>Jurinea</i> Cass. ( <i>Asteraceae</i> ) in India	Shruti Kasana , P.L. Uniyal & Arun K. Pandey	
FNTRM 16	A Floristic Study of Koria District in Chhattisgarh (India)	Veenapani Dubey	
FNTRM 17	Flowering Plants of Chikodi Hills, Belagavi District, Karnataka, India	Sidanand V. Kambhar, Rahul R. Patil, Jagdish V. Dalavi, and K. Kotresha	
FNTRM 18	Floristic Diversity of the Seasonal Pools on a Lateritic Plateau of Northern Kerala, South India	Greeshma K.S. & C. Pramod	
FNTRM 19	Chenopodiaceae of Sikkim	Manasi Mandal	
<b>ETHNO-BOTANY, TRADITIONAL KNOWLEDGE ON MEDICINAL PLANTS AND BIOPROSPECTING [ETMPB]</b>			
ETMPB 01	Isolation and Identification of Endophytic Fungi from Leaves of <i>Simarouba glauca</i> DC.	Kundekar P.S. and H.V. Hegde	
ETMPB 02	Pharmacognostic Studies on Leaves of <i>Triumfetta rotundifolia</i> Lam.	Chavhan V. N. and P. Y. Bhogaonkar	
ETMPB 03	Ethnobotanical Study of Wild Edible Fruits in Selected Muthuvan Settlements in Adimali, Idukki Dist., Kerala	Ajinsha J S and Dr. G Rajkumar	
ETMPB 04	Phytochemical Screening, HR-LCMS Analysis and Antimicrobial Activity of Rhizome Extract of <i>Zingiber neesatum</i> (J. Graham) Ramamoorthy	Khade A. B. and Bhuktar A. S.	
ETMPB 05	Ethno-Medicinal Plants of Panchlingeswar Sacred Grove, Nandikurali, Raibag, Belagavi, Karnataka	G. P. Yelavattimath, Sidanand V. Kambhar, Rahul R. Patil and K. Kotresha	
ETMPB 06	Phytochemical Screening, GC-MS Analysis and Antibacterial Activity of <i>Sphagnetocola trilobata</i> (L.) J.F. Pruski	A.V.P. Karthikeyan and A. Ramesh	
ETMPB 07	Investigation of 'African Tulip Tree-Calyx Water' As a Novel Source Water, Food and Medicine.	Khandbahale D. S	
ETMPB 08	Phytochemical Profiling of <i>Orthosiphon thymiflorus</i> (Roth) Sleesen and Its Antioxidant and Antibacterial Activity of Two Different Solvent Extracts of Leaves.	Radhika.R, Rajendran R and A. Lakshmi Prabha	
ETMPB 09	Evaluation of Antioxidant Potential and Anticancer Activity of <i>Rhynchosia hirta</i> : An Underutilized Wild Legume	Vilas T. Patil and Varsha D. Jadhav	
ETMPB 10	Evaluation of Nutritional and Antioxidant Potential of <i>Senna auriculata</i> L. Flower	Marathe Vishal R.	

ETMPB 11	Traditional Knowledge and Diversity of Wild Edible Plants Used As Food Sources in Tumakuru District: An Ethno Botanical Survey.	Nagashree.G and K.Kotresha	
ETMPB 12	Analysis of Market and Garden Samples of Tamal Patra – A Condiment Used in Indian Cuisine	Pooja Gupta, Swayma Chaudhary, Neha Maurya, Arjuman Tanveer Shaikh, Shifa Farooqui, Suchandra Dutta	
ETMPB 13	A Study on Adulteration of Commercial Crude Herbal Drugs	R. Prabakaran and T. Senthil Kumar	
ETMPB 14	Phytochemical Study from Leaf and Stem Parts of Genus <i>Cajanus</i> Adans.	Kolhe, P. H. and Patil, R. P	
ETMPB 15	Phytochemical Evaluation and Antioxidant Activity of <i>Zanonia Indica</i> L. Fruit Extracts	Shrishail.H.C	
ETMPB 16	Ethnobotanical Study from Padel Village, Taluka Devgad, Dist. Sindhudurg, Maharashtra	Vaishali Pingle, Chaitali Pujare, Suchandra Dutta	
ETMPB 17	Extraction of Essential Oil, GC-MS Analysis and Insecticidal Potential of <i>Plectranthus mollis</i> (Aiton.) Spreng.	Rani B. Bhagat	
ETMPB 18	Catalogue and Ethnobotany of Invasive Alien Grasses of Bhagalpur District (Bihar), India	Vani Suman	
ETMPB 19	Wild Medicinal Plants Used by Famous Traditional Practitioner in Chikkasindoghi Village of Koppal District, Karnataka State	Sundar S Mety, Sushma. N. Mathad, Poornima. M. Meharwade, Shilpa. G. Sajjan, and Veena. N. Hiremani	
ETMPB 20	Antimicrobial activity of 'Majoon Najah': A classical Unani Formulation	Saiyed Kamartaha & Raole Vinay M	
ETMPB 21	Phytochemical screening and antibacterial study in rhizome of snap ginger ( <i>Alpinia calcarata</i> Roscoe)	T.K. Mohammed Irfan, V.V. Radhakrishnan and K.V. Mohanan	
ETMPB 22	Ethnobotanical Assessment and Nutritive Potential of <i>Bridelia stipularis</i> (L.) Blume from Various Plant Part	Priyanka S. Patil & Dr. V.D. Jadhav	
ETMPB 23	Ethnomedicinal Plants Used for the Treatment of Snake Bites and Scorpion Sting by Traditional Health Practitioner's in Bagalkot District, Karnataka, India	Vijaymahantesh Gobbi and Kotresha Katrahalli <sup>2</sup>	
ETMPB 24	Survey of Traditional Practitioner Uses of Medicinal Plants in Surrounding Villages of Koppal District, Karnataka State	Sundar S Mety, Sangeeta. K. H, Padmavathi K, Shweta. C. P, and Pratibha. H. Walmiki	
ETMPB 25	Phytochemical Screening of Wild Vegetables Used By Tribes from Bhimashankar Wildlife Sanctuary	Sandhya Patil and Mohan Waman	
ETMPB 26	Repellent Effects and Electrophysiological Response of <i>Elingera fenzi</i> Against <i>Aedes aegypti</i> And <i>Culex quinquefasciatus</i>	Aswathy Anand A, Saravan Kumar P, P D Kamala Jayanthi, Sabu K K, Rajendran R and Radha R K	

ETMPB 27	Quantification of Mangiferin Content in <i>Salacia</i> Species (High Value Antidiabetic Plants) From the Western Ghats.	Shibin Felix P, Anilkumar G S , Udayan P S , Radha R K and Rajasekharan P E	
ETMPB 28	Ethnobotanical Survey of Medicinal Plants Used By Traditional Healers in Rangamali Hills, Karur District, Tamil Nadu.	Vellaiyan, R., Dhineshkumar, S and Eabinezer, S	
ETMPB 29	Morphological and Anatomical investigation on wild Piper betle L. from Andaman Islands in comparison with the popular cultivar from the Southern Western Ghats aiming Bioprospectin	Sathyakrishna P. K., Suja S.R. , Stephan J. and Mathew Dan	
ETMPB 30	Studies on the Ethno-Medicinal Plants of Kolhapur and Sindhudurg District of Maharashtra State	Sharad A. Apate and Ajit A.Kengar	
ETMPB 31	Wild Edible Fruits and Vegetables of Raichuru District Karnataka, India.	Savita R and K. Kotresha	
ETMPB 32	Body Perfume and Mosquito Repellent Solution from Essential Oils of Aromatic Plants	Karishma S Sayyed and Mohan Waman	
ETMPB 33	Ethnobotanical Study on Selected Food and Medicinal Plants of Kani Tribe in Peppara Wildlife Sanctuary, Thiruvananthapuram Dist., Kerala, India	Ajinsha J S and Dr. G Rajkumar	
ETMPB 34	A Survey on Medicinal Plants Used in Thattapparai Village of Gudiyattam Taluk, Vellore District, Tamil Nadu, India	Kishore Kumar C. and Girivasan K.P	
ETMPB 35	Determination of Genetic Diversity in Ligninase producing Wood Rot Fungi Isolated from Western Ghats of Karnataka	Santanu Das, B.D. Ranjitha Kumari, T. Senthil Kumar, Salma Banu A and K. M. Harinikumar	
ETMPB 36	Influence of Physico-Chemical Parameters on the Fabrication of Silver Nanoparticles Using <i>Maranta arundinacea</i> L and Its Anti-Microbial Efficacy	Veena Rokhade'and Taranath T.C.	
ETMPB 37	ಕಚ್ಚಿ ಗೊಳಿಗರ ಪಶುವೈದ್ಯ ಪದ್ಧತಿ	ಪಿ.ಎಲ್. ಪಾಟೀಲ	
ETMPB 38	Synthesis and Characterization of Silver Nanoparticles from Stem Extract of <i>Calotropis Procera</i> and <i>Dalbergia Sissoo</i> and its Antioxidant Activity	Tiwary Mukesh, Shaikh Khalid & Waman Mohan	
ETMPB 39	Ethnobotanical Survey of Medicinal Plants Used by Local Inhabitants of Kaveripattanam Region in Krishnagiri District, Tamilnadu, India	Dhivya Narayanan & Suresh B. Arakera	
ETMPB 40	Distribution and Propagation of <i>Justicia beddomei</i> (Cl.) Bennet a Medicinally Useful Endemic Plant of Pakkamalai Reserve Forest, Gingee, Tamil Nadu	Deepa Rekha A.P., Jayaprakash R.,Srinivas B and Girivasan K.P.	
ETMPB 41	Documentation of Wild Edible Vegetables from Northern Western Regions of Ahmednagar District, Maharashtra (India)	M.B. Gunjal, R.D.Borse A. N.Tambe and S.N Varpe	
ETMPB 42	Standardization of Extraction Protocol and Identification of Primary Metabolites <i>Calotropis Procera</i> : <sup>1</sup> H-NMR Based Approach	Jayalakshmi Kamaiah	



**PHYTOGEOGRAPHY, ENDEMISM AND CONSERVATION [PEC]**

PEC 01	An Appeal to Conserve <i>Heliotropium rottleri</i> Lehm. (Boraginaceae) - A Critically Endangered Endemic Plant of Tamil Nadu	S. Abdul Kader and G. Gopal	
PEC 02	Direct Somatic Embryogenesis of <i>Ceropegiamaculata</i> Bedd. from Stem Explants	Rengasamy Anbazhakan and Thirupathi Senthil Kumar	
PEC 03	Reproductive Biology of <i>Azadirachta indica</i> A. Juss. A Valuable Medicinal Tree	Krishnan.S, Mayavel.A	
PEC 04	Temperature Gradient and Tree Species	Medhavi S. Rahangdale and Sanjaykumar R. Rahangdale	
PEC 05	Ecological Status of Taleran Sacred Grove: Past and Present	Savita S. Rahangdale and Sanjaykumar R. Rahangdale	
PEC 06	Altitudinal Variations In Distribution Of Tree Species In Tumakuru District, Karnataka, India	Mouna S. and K. Kotresha	

**BIOSYSTEMATICS, PHYLOGENY, POLLINATION AND PLANT – ANIMAL INTERACTIONS [BPPI]**

BPPI 01	Untangling the taxonomic identity of <i>Aristolochia indica</i> (Aristolochiaceae) complex inferred with morphology and molecular evidence	Arun Prasanth R., and Milind M. Sardesai	
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**POSTER PRESENTATIONS [PP]**

PP 01	Anatomy and Morphology of The <i>Hoppea dicotoma</i> Willd. (Gentianaceae)	Ajay Avtar, D.S. Khandbahale, Sharad Kambale	
PP 02	Two New Records of Poaceae to The Grasses of Maharashtra, India	Tathod Swati, Deore Ashok and Shaikh Tarbej	
PP 03	A Study on The Floristic Diversity in Different Honey Samples	Kavya H and H.C. Shrishail	
PP 04	Genus <i>Cuscuta</i> L. (Convolvulaceae) In India: Diversity, Distribution and Taxonomy	Rohan M. Bhat and Vinod B. Shimpale	
PP 05	Grasses from Markandeya Hill, Maharashtra, India	Sonali D. Kshirsagar , D S Khandbahale , S S Kambale	
PP 06	Floristic Diversity of Garhwa District, , India	Satya Narain and Tasbeeha Taab Zarrin	
PP 07	Report On Cryptoviviparyin Wild Caper Bush ( <i>Capparis sepiaria</i> L.) Capparaceae	Vasundhara Khot, Jagdish Dalavi1 Shrirang Yadav Jaykumar Chavan, Anil Jagtap & Shankar Shendage	
PP 08	Morphotaxonomic and Palynological Studies in Some Species of Tribe <i>Merremieae</i> Austin (Convolvulaceae) from India	*Patil Sujit B. and Vinod B. Shimpale	
PP 09	Preliminary Phytochemical Screening, Antibacterial and Antioxidant Analysis On The Whole Plant Extract of <i>Endostemon viscosus</i> (Roth) M.R.Ashby	R. Rajendran, R. Kottaimuthu, C. Rajasekar and A. Lakshmi Prabha	
PP 10	Development of Standardization Parameters For Quality Control and Pharmacognostic Evaluation of <i>Abelmoschus Manihot</i> (L.) Medik Root	Mahendra Khyade Deshraj Chumbhale , Mohan Waman	

PP 11	Comparative Pharmacognostic Screening of <i>Tribulus terrestris</i> L. and <i>Tribulus subramanyamii</i> P. Singh, Giri & V, Singh	Snehal N. Dhawale and D. A. Dhale	
PP 12	Pesticidal Effect of Oleo-Gum- Resin from <i>Ferulaasafoetida</i> on The Agriculture Pest <i>Spodoptera litura</i>	Komal Gupta, Parth Pandya, Elizabeth Robin	
PP 13	Understanding The Phylogeny of <i>Ocimum basilicum</i> L.. and <i>Mesosphaerum suaveolens</i> (L.) Kuntze. : A Dna Barcode Approach.	Riddhi Mavani, Parth Pandya, Monisha Kottayi	
PP 14	Exploration of Phyto-Nutrients With Nutraceutical Importance in Tumakuru District, Karnataka, India.	Nagashree.G and K.Kotresha	
PP 15	Riparian Vegetation of River Tungabhadra in Haveri District, Karnataka	Ningaraj S. Makanur and K. Kotresha	
PP 16	Sacred Groves of Western Ghats; Past Relics of Precious Floral Diversity	Haripriya.S , S. Sarath , M. Kiran and S. Gopakumar	
PP 17	Legumes (Fabaceae) of Khanapur Tehsil (Sangli Dist.) Maharashtra.	Dhanshree Jadhav , Rutuja Pawar , Jagdish Dalavi and Shankar Shendage	
PP 18	Pollination Biology of <i>Osbeckia reticulata</i> Bedd. (Melastomataceae) - An Endemic Plant in Southern Western Ghats.	Prashob P.	

## About Dharwad

Situated on a relatively stable geological terrain and spread across seven hills, Dharwad is a gateway between the plains in eastern and Western Ghats. Bearing a rich heritage of history dating back to 12<sup>th</sup> century, Dharwad along with its twin city Hubballi is the second largest urban agglomeration in Karnataka. Serene and salubrious climate has fostered a very conducive environment for creative endeavors in music and literature. A cradle of Hindustani music, Dharwad has nurtured great artists like Gangubhai Hangal, Pt. Bheemsen Joshi, Sawai Gandharav, Basavaraj Rajaguru, Kumar Gandharva, and Mallikarjun Mansur. On the literary front, it was the home to *Jnanapitha* awardee D.R. Bendre and nurtured *Jnanapitha* awardees like Vinayaka Krishna Gokak and Girish Karnad. Owing to its association with music and literature, city and its inhabitants imbibe great reverence for education in their ethos resulting in it being the education hub of North Karnataka. This hub is further bolstered by establishment of institutes of national importance like IIT. Dharwad is known as *Pedha nagari*, owing due to its world famous *Pedhas*, and *Vidya kashi*, for its educational institutions. Kittur Rani Channamma fort is 30 KM away from Dharwad.

## About Karnatak University and College

Karnatak University is a public state university in Dharwad district of Karnataka state, India. The University is recognized by University Grants Commission and accredited by National Assessment and Accreditation Council (NAAC). As of 2014, the University has been awarded 'Grade A' by the NAAC. Karnatak University was granted 'University with potential for Excellence' status by the University Grants Commission. The Bombay legislature of the erstwhile Bombay Presidency established Karnatak University through the Karnatak University Act 1949. It became a statutory University on 1 March 1950. Karnatak University is spread over 888 acres with faculties of Arts, Commerce, Education, Law, Management, Science and Technology and Social Sciences. The University has over 47 Postgraduate Departments, 224 faculty staff and 4500 students and

offers over 42 Doctoral programmes. Karnatak University has 5 constituent colleges offering Undergraduate and Postgraduate courses in science, arts, commerce, fine arts, law, and education. Karnatak University also has more than 182 colleges affiliated to it.

Karnatak Science College is a Constituent College of Karnatak University, Dharwad. The College is located in 55 acres of hill with ever green natural vegetation, bio-diversity, beautiful and spacious class rooms and well equipped laboratories. This College, well known as KCD (now KSCD), has produced many eminent personalities, not only in the field of science and technology but also in law, education, business etc., to name a few: Shri. P.B. Gajendragadakar, Chief Justice of Supreme Court, Dr. D. C. Pavate, Former Governor of Punjab and Padma Bhushan awardee, Dr. M. I. Savadatti, Former Vice-Chancellor of Mangalore University, Padmashri Nandan Nilekani, CEO INFOSYS Bangalore (Provided a good Srujana Auditorium ), Dr. A.M. Pathan, Former Vice-Chancellor of Karnatak University and presently working as Vice-Chancellor, Central University, Gulbarga, Dr. Raman Deshpande, Leading Surgeon in Cancer Research Mumbai, Dr. R.B. Patil, Noted Physican and Padmashree awardee, Dr. K.M. Koliwad, Senior Scientist NASA, USA, Major General Michigan, Indian Army, Shri Jagadeesh Dodamani, IFS, Dr. Ravi Surpur, IAS, Shri Nanjundaswamy, IPS, Lt. Colonel. R.S. Desai.

This is an institution which is known for liberal education in basic Sciences in this part of North Karnataka. In the present world of competition, we must continuously innovate and re-adopt ourselves to the changing world. The College continues to encourage improvement of infrastructural facilities and Human Resource to enhance academic excellence, spirituality, social relevance, and overall personality development of students of all sections of society.

## About Botany Department

Department of Botany is housed in a spacious independent building amid lush green vegetation, which provides a congenial environment for students to study. The Department was earlier housed in the Zoology building and subsequently moved to its independent building in 1951. The Botany subject was introduced at the subsidiary level of the graduate course in science. Prof. D.V. Shinde was the first to teach the subject. Prof. L.K. Gunjekar joined him in 1937. Efforts of Prof. P.W. Gideon to introduce Botany as a principal subject in 1938 were turned down by the Government of Bombay as the Second World War had started. Efforts were resumed in 1946 after the Second World War and the Government gave sanction to teach Botany as a principal subject in 1948. The credit for this must go to Wrangler Dr. D.C. Pavate, then the director of public instructions. Prof. (Ms). E. Gonzalves headed the department in the independent building from 1951. Departmental Herbarium housing more than 10,000 specimens including the type specimen of the extinct *Isoetes dixitii* Shende [Isoetaceae] and a few Fischer Herbarium specimens from Holland.

At present, Botany Department hosts the students for B.Sc., M.Sc., M.Phil., and Ph.D. degree programmes. Looking into the needs, an applied subject Genetics was introduced in the Department during the academic year 2000-01.

## MEDAL AND ENDOWMENT LECTURES



**Prof. Y. D. Tyagi**  
**Gold Medal**



**Prof. V. V. Sivarajan**  
**Gold Medal**



**Prof. Kameswara Rao**  
**Endowment Lecture**

## **Y. D. TIAGI MEDAL AWARD LECTURE**

### **MY JOURNEY FROM FLORISTICS TO GENOMICS**

**Prof. Arun K. Pandey**

Department of Botany, University of Delhi &  
Mansarovar Global University, Bhopal  
e-mail: [arunpandey79@gmail.com](mailto:arunpandey79@gmail.com)

After completing my post-graduation from the Department of Botany, University of Lucknow, I joined CSIR- National Botanical Research Institute, Lucknow as Junior Research Fellow in 1973. As I was always interested in sunflower family, I started work on the family Asteraceae. Floristics and ethnobotanical studies started when I joined Bhagalpur University in 1983. This also gave me an opportunity to carry out detailed studies on the flora of Rajmahal Hills, known for Jurassic fossils. Work done on ethnobotany of Santhal Pargana (Jharkhand) and Similipal (Odisha) resulted in publication of two books. During 1987-88, I got the opportunity to work in the Ohio State University. After my return, I selected the genus *Tricholepis* and the revision was published in *Rheedea*, official journal of the IAAT. In 2002 and 2004, I was awarded Bass Fellowship to work in the Field Museum, Chicago. It was a rewarding experience. The outcome of the visit was publication of molecular systematics of *Aralia-Panax* complex. After joining University of Delhi in 2008, we focused our research on Indian legumes (*Crotalaria*, *Indigofera*, *Alysicarpus*), cucurbits (*Dactyliandra*, *Trichosanthes*, *Zehneria*) and sunflower family member (*Inula*, *Duhaldea*, *Saussurea*). Based on both morphological and molecular data, revisionary and phylogenetic studies were carried out. Seven new species were also described.

Checklist of Indian Cucurbitaceae was published. We also collaborated with other researchers in India and abroad to work on molecular systematics of different genera viz., *Cucumis*, *Daphne*, *Jasminum*, *Memecylon*, *Musa* and other taxa. My concluding remarks are in a bit of a philosophical vein. The question can be asked as to how far we have gone in molecular systematics and phylogenomics? The work is still in infancy. We need to reorient ourselves to some extent to introduce new lines of work.

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**PROF. V.V. SIVARAJAN GOLD MEDAL LECTURE**

**THE ANAMALAI HILLS: A FLORISTICALLY UNDERESTIMATED MICRO-ENDEMIC CENTRE OF SOUTHERN WESTERN GHATS, INDIA**

**Dr. W. Arisdason**

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E-mail: dasonaris@gmail.com

The Anamalais or Anamala (Elephant Hills in English) is one of the high ranges in the southern Western Ghats that lies on the western boundaries of Tamil Nadu (Coimbatore and Tiruppur districts) and central part of Kerala (Idukki, Ernakulam, Palakkad and Thrissur districts), with the tallest peak of the Western Ghats, namely Anaimudi (2695 m) in Idukki district. The Anamalais is surrounded by Nelliampathy hills in the west, the High Ranges (Cardamom hills) to the south, Palani hills in the southeast and the Nilgiri hills to the north. Anamalais possesses diverse climatic and vegetation types with enormous species diversity. The hill range supports vegetation ranges from tropical dry evergreen scrub forests in lower elevations to montane sholas and grasslands in higher ranges. There are numerous perennial streams that support some of the major reservoirs in the region. Anamalais is also home for six different tribal groups, namely Eravallar, Kadar, Malasar, Malai Malasar, Muduvar and Pulayar. At present, the Anamalais has 18 notified Protected Areas (three in Tamil Nadu and 15 in Kerala), including two Tiger Reserves, one each in Tamil Nadu and Kerala.

The Anamalais and its forests have about 175 years of written history since 1848, from exploitation forestry to conservation forestry. This picturesque hill range was sporadically explored by some eminent European

botanists/naturalists, Captain J. Michael (1851), Major R.H. Beddome (1857), Dr. H.F.C. Cleghorn (1858), Prof. M.A. Lawson (1860, 1890), Dr. D. Brandis (1882), Dr. C.A. Barber along with K. Rangachariar (1900–06). However, it was C.E.C. Fischer (1874–1950) the then Conservator of the Forests of Coimbatore South Division, who surveyed the flora of the Anamalai hills in the Coimbatore district during 1911–15, and published the Flora of Anamalais in 1921, wherein he reported 1690 flowering plant species in 765 genera belonging to 140 families. Later, a few Indian renowned botanists, namely Narayanaswami (1930–32), Raju and Ratnavelu (1930–42), and after the reorganization of the Botanical Survey of India (BSI) and the establishment of the Southern Circle (now Southern Regional Centre) at Coimbatore, its scientific personnel, namely Joseph (1960–64), Sebastine (1960–64), Sebastine and Ramamurthy (1967), Vajravelu and Joseph (1971), Chandrabose and Chandrasekaran (1978–80) and Arisdason (2001–06) conducted botanical explorations in a few selected areas in Anamalais and reported many plant species as additions to Fischer's Flora of the Anamalais, and also described a few novelties and rediscovered some plants of distributional interest.

The Tamil Nadu Forest Department has published the checklist of flora and fauna of Anamalais (Ganesan, 2019), wherein 2512 species of flowering plants belonging to 155 families have been enumerated from Tamil Nadu part of Anamalais alone. Anamalais is the abode of many endemic and threatened plant species and wild genetic resources of cultivated crops, besides several endemic and threatened animal species that are in need of conservation. Therefore, Nayar (1996) recognised the Anamalais (along with Cardamom hills) as one of the 25 micro-endemic centres of Indian subcontinent. Fabaceae, Poaceae, Asteraceae, Rubiaceae, Euphorbiaceae, Lamiaceae, Cyperaceae, Orchidaceae, Acanthaceae and Lauraceae

are some of the species-rich flowering plant families of Anamalais. Some of the endemic flowering plant species that are exclusively confined to Anamalais are: *Acranthera anamallica* Bedd., *Arisaema sarracenioides* E. Barnes & C.E.C. Fisch., *Begonia anaimalaiensis* Bedd., *Cryptocarya anamalayana* Gamble, *Decalepis salicifolia* (Bedd. ex Hook.f.) Bruyns, *Dendrobium anamalayanum* Chandrab. & al., *Eriocaulon nairii* Chandrab. & V. Chandras., *Exacum anamallayanum* Bedd., *Fimbristylis aggregata* C.E.C. Fisch., *Hedyotis santapau* B.V. Shetty & Vivek., *Helichrysum perlanigerum* Gamble, *Impatiens anaimudica* C.E.C. Fisch., *I. chandrasekharanii* Chandrab., *I. pandata* E. Barnes, *Medinilla anamalaiana* Sasidh. & Sujanapal, *Oberonia anamalayana* J. Joseph, *Peucedanum anamallayense* C.B. Clarke, *Phyllanthus anamalayanus* (Gamble) G.L. Webster, *Pogostemon raghavendranii* R. Murugan & Livingst., *Sonchus jainii* Chandrab. & al., *Sonerila anaimudica* Lundin & B. Nord., *Symplocos anamallayana* Bedd., *Trichosanthes anaimalaiensis* Bedd. and *Vernonia anamallica* Bedd. ex Gamble.

Anamalais is floristically as rich as the Agasthyamalai and the Nilgiris, both located in the southern Western Ghats, but floristically least known and appreciated. The entire flora of this ecologically unique and biodiversity-rich hill range in Tamil Nadu and Kerala has not been documented yet. There are many areas in the hill range still remain unexplored or underexplored. Likewise, many species described as new from the region have not been rediscovered and their status has not been assessed yet. Therefore, the flora of the entire Anamalai hill ranges has to be comprehensively documented.

Furthermore, it is suggested to declare the “Anamalais and High Ranges” that cover an area of about 8000 km<sup>2</sup> as the “*Anamalai Biosphere Reserve*”.

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**PROF. KAMESWARA RAO ENDOWMENT LECTURE**

**CONNECTING THE BRIGHT PATCHES OF FRAGMENTED  
LANDSCAPE OF PLANT SYSTEMATICS IN INDIA**

**Prof. Malapati K Janarthanam**

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The plant systematics in India is undergoing an exciting phase. Hundreds of new species are being described every year, publications related to nomenclature and their authors are increasing in number, increasing number of young taxonomists are involved in revisionary studies, molecular evidences are being used frequently in taxonomic studies, and digitisation of herbaria and literature is boosting the confidence of the workers and making the research cost effective by providing easy access to the specimens and literature. In addition, books with plant photographs, both by professionals and non-professionals, are relieving the pressure of routine identification by plant taxonomists. However, these are happening in patches and the plant systematics landscape appears to be in fragments. While, we have great organisations and institutes of eminence, path breaking publications are rarely coming out, though we see useful compilations. The result is some of the fundamental objectives of plant taxonomy remain unfulfilled. On the other hand social media is helping us to network among peers, but these networks are generally used as information channels rather than the channels for consolidating thoughts and initiating actions. This ultimately pushes the individuals and institutions to continue to work in isolation. Hence, the taxonomic works taken up

are also either individual ability based or local centric with lesser impact on the subject as well as on their own growth. Data, resources, techniques and expertise are seldom shared among the institutions and people thus retarding the growth of all, including the subject. Unequal distribution of resources and expertise also lead to 'rent seeking' behaviour. These approaches are not conducive to achieve taxonomic and national goals. Is there a way out? Fortunately there seem to be a few. The foremost one would be to connect the 'bright patches' through specific, larger common goals that are defined through brain storming of stakeholders. It is always better if the lead is taken by a nodal, resourceful institute or an organisation, by treating these people as partners rather than competitors. Secondly, young workers setting long term goals incorporating collaborations with peers at national and international level also helps. Thirdly, regular workshops on methods, tools, techniques and advancements in taxonomy will facilitate connecting these patches and this will bring everyone at par and put them on equal pedestal. These three broad recommendations amongst scores of them available to us, if followed on priority basis before the 'bright patches' loose their sheen will be remarkable. This shall be done as a collective responsibility to the field that has been nurturing us!

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# LEAD LECTURES

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## FOSSIL HISTORY OF ANGIOSPERMS

**Prof. C Kameswara Rao**

The fossil record is an essential basic tool in deducing the origin and evolution of any plant group. There is extensive fossil record for all the plant groups, though more often it is fragmentary. Nevertheless, study of plant fossils is an essential aspect of botany. Today palaeobotany is as modern as any other area and uses sophisticated tools.

The angiosperms, called 'flowering plants' along with the gymnosperms, are the dominant terrestrial plant life today. They grow in a greater range of environments and display a very wide range of growth habits and morphological variations.

Angiosperms have certain distinctive features and each one of them has exceptions of absence in some angiosperms or presence in some other group of plants. Yet, a combination of traits clearly distinguishes the angiosperms from other plant groups. Reticulate leaf venation, presence of xylem vessels, phloem companion cells derived from sieve tube mother cells, floral whorls without comparable homologous structures elsewhere, monocolpate or tricolpate or triporate pollen, tectate (sexine) pollen, conduplicate carpels, ovules with two integuments, and post-fertilization development of a triploid endosperm in the seeds, are the more important characteristics.

Angiosperms have an abundant fossil record from the early Cretaceous (146 to 66 Million Years Ago) onwards. There is clear evidence that they originated much earlier, in the pre-Cretaceous times. Recognition of angiosperms in the fossil record is very difficult, more so when looking for their ancestors and early evolution.

Botanists are seriously concerned about finding answers in the fossil record to such basic issues as, a) Ancestors of angiosperms, b) Ancient angiosperms, c) Earliest fossil evidence of angiosperms, d) Habit of early angiosperms, e) Places of origin of angiosperms, f) Pre-Cretaceous fossil evidence, g) Basal angiosperm families, h) Families of monocotyledons and dicotyledons in the fossil record.

This talk briefly surveys these aspects.

## THE END OF CLASSICAL PLANT TAXONOMY? CAN BIOLOGICAL SCIENCES SURVIVE WITHOUT CLASSICAL TAXONOMY?

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The current status of plant taxonomy in the country is discussed. It is said that traditional taxonomy being the oldest of all biological sciences is badly neglected by students and teachers in the universities and policy makers and fund giving bodies show apathy towards the subject. It is said that plant taxonomy today is not just confined to identification and classification of taxa but deals with a host of other issues relevant to modern society. Some of these new areas where taxonomy is most essential are discussed briefly and suggested to include the newer aspects in the syllabi of universities so that taxonomy becomes more attractive to students. The author highlights the paramount role of herbaria in the modern context to draw the attention of modern biologists regarding the importance of herbaria. Although several of the offshoot sub disciplines of biology that emerged during the 20<sup>th</sup> century 'attacked' plant taxonomy, yet taxonomy contributed enormously and could with stand these attacks. But the birth of molecular biology during the last few decades has attacked the very foundation of taxonomy, i.e., external morphology. External morphology of plants which formed the central focus of identification and classification during the last 3 centuries is severely criticized by molecular biology so much so the place of morphology is completely neglected. A new classification, namely Angiosperm Phylogeny Group classification (APG) entirely based on DNA gene sequences is proposed based on data of just 20 years to replace all existing classifications produced by classical taxonomists based on the data accumulated over 3 centuries. First Published in 1998 by the APG group, it was replaced by the improved APG II in 2003, APG III system in 2009 and APG IV system in 2016. A system appeared just 22 years ago replaced all traditional classifications (3 centuries) including Cronquist. Again, to understand the evolution of plants an ambitious PAFTOL (Plant & Fungal Tree of Life) project launched at RBG, Kew in 2019 has revealed major differences to Angiosperm Phylogeny Group (APG IV). This could signal a big upheaval for plant taxonomy and challenge our current understanding of plant evolution and questions the authenticity of APG classification. Even Linnaean nomenclature is not spared.



This nomenclature system established and stabilized over a period of 200 years is now being replaced by a new, again molecular based Phylo code. *Today External morphology with which we have worked all through has no place; classifications put forward by efforts of taxonomists for 3 centuries has no place; the nomenclature standardized during last 200 years has no place. Where now and what now for plant taxonomy ?* Therefore, with the total rejection of all earlier classification systems, with the threat posed to Linnaean nomenclature by the proposal of the phylo code and with the consideration of external morphology of taxa for identification and classification as a weak point, taxonomists today are confused as to support 'morphology based taxonomy' or 'molecular based taxonomy' and thus the author feels that taxonomy has come on the cross-roads in the 21<sup>st</sup> century. As a strong advocate of external morphology in taxonomy, the author opines that although taxonomists do not study the genes and gene sequences in a species, the external morphology (phenotype) is the resultant of the interactions of thousands of genes and therefore they cannot go wrong in their identifications. Further, the phenotypes are produced as result of interaction between genotype and the external environment (habitat). Hence, classical taxonomists are doubly justified in using external morphology for identification of taxa. Almost all plant species identified by classical taxonomists during last 2-3 centuries using '*dead plants with a dry lens*' stand valid even today. All that we know about global plants, plant resources, their distribution patterns entirely comes from classical taxonomy and these data are freely used by all biologists in their investigations but yet, taxonomy is badly criticized instead of being thankful to taxonomists. The author is optimistic that the classical method of identification of plants cannot be replaced by any other means; inventories of the vast flora cannot be undertaken by anyone except plant taxonomy and therefore it is more than certain that classical plant taxonomy with added challenges in the 21<sup>st</sup> century will emerge as one of the fascinating areas of biology and regain its past glory As long as the flora and fauna exist on the surface of the earth, taxonomy surely continues to flourish and serve the humanity. The mute message of plant taxonomy is clear. The subject needs no sympathy from its own off shoot disciplines but expects due acknowledgement, appreciation, encouragement and respect for the enormous contribution the subject has made during the last five centuries and further expects hurdle free environment for the subject to contribute much more in the 21<sup>st</sup> century for the overall good of humanity.

## **DELIMITING SPECIES BOUNDARIES IN INDIAN *PANCRATIUM* (AMARYLLIDACEAE): AN UNRESOLVED PROBLEM**

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*Pancratium* species grow sporadically throughout the country and individual plants are usually sparsely distributed. The species are ephemeral bulbous perennials. The emergence of scape and flowering mostly depends on the pre-monsoon rain pattern. Following the first pre-monsoon showers, the species flower only once in a year for a short period (10-15 days). Therefore, catching the species in flowering condition is a difficult task. Consequently, the genus is taxonomically poorly studied. Moreover, most of the Indian species are distinguished on the basis of overlapping quantitative characters which further complicate species identification. Also, the protologues are very brief and the type specimens are either not available or poorly preserved. Therefore, there was a need for serious consideration for standard terminology to describe and circumscribe species of *Pancratium* in India. Accordingly, attempts have been made over the last 20 years to study the species (distributed across ca. 75 accessions from various localities) in the field as well as under cultivation. Here, I provide an account of diagnostic characters and standard terminology that can be used to describe and delimit the *Pancratium* species. Based on morphology, about 12 species have been reported from India, however, the status of recently described *P. bhramarambae* Sadas., *P. telanganense* Sadas and *P. venkaiahii* R. Prameela *et al.* and some other species need to be reassessed. All the Indian species when crossed artificially produce fully fertile hybrids and thus represent a single biological species. The differences in characters (fixed genetically) among the populations of species probably represent ecotypes adapted to local environmental conditions.

**TAXONOMIC REVISION OF THE GENUS *SMITHIA* AITON  
(LEGUMINOSAE: PAPILIONOIDEAE-DALBERGEEAE-  
AESCHYNOMENINAE)**

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The genus *Smithia* established by Aiton in 1789, is characterized mainly by medifixed scarious stipules, generally yellow to rarely purple, blue to faintly blue flowers arranged in secund racemose inflorescences, stamens diadelphous in bundles of 5+5 with uniform anthers and a lomentaceous plicate fruit with 1-seeded reticulate, venose, reticulate-venose or verrucate segments. A taxonomic revision of the genus *Smithia* was carried out based on extensive and intensive field study (in India) and on the analysis of 1450 herbarium specimens, including nomenclatural types of all the binomials included here and digital images represented in 20 Indian, Australian, Chinese, European, Japanese, SE Asian and US herbaria. Field study and collection tours were conducted in most species-rich areas of *Smithia* in Western Ghats, North and NE India, resulting in the sampling of 20 out of the 25 species recognised in this work. Totally there are 107 names including synonyms and 5 new ones described in this work. Lectotypes were designated for 10 accepted names and synonyms, and two neotypes and one epitype were chosen. All species are provided with descriptions, illustrated photo plates, distribution maps, identification key to species and notes on taxonomy and nomenclature where necessary. The present study supports Dewit & P.A.Duvigneud (1954), Hepper (1956), F.White (1962), Wild (1964) and Verdcourt (1970) transfer of 44 binomials of *Smithia* to *Kotschyia* Endl. (Currently with 30 recognised species all restricted to Africa and Madagascar), 2 to *Geissaspis*, one each to *Humbertia* and *Sarcobotrya* (a monotypic genus which is reduced as synonym of *Kotschyia*). two (*Smithia martinicensis* Spreng. and *Smithia oligantha* Blatt.) remain unresolved. Out of the 23 binomials transferred by Kuntze (1891) from *Smithia* to *Damapana* Adans. (now a synonym of *Smithia* Aiton, nom. cons.), presently 3 of them are reduced as synonyms of *Kotschyia*, one each under *Aeschynomene* and *Humularia*, the remaining 18 reinstated in *Smithia*).

## **PLANT DIVERSITY IN INDIA: STATUS, DISTRIBUTION AND CONSERVATION – A REVIEW**

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Biodiversity encompasses the variety of all life on earth. It is defined as the variability among living organisms and the ecological complexes of which they are part, including diversity within and between species and ecosystems. By conserving such varieties, variability between genera, species are assuming paramount importance for their survival and evolution in the long run. Plant diversity provides a host of goods and services essential for subsistence and survival of human and other species on this planet. Plant diversity is, therefore, imperative to ensure global ecological security, sustainable development and to achieve reduction of global carbon footprint which helps to maintain atmospheric temperature and global warming.

India's biogeographical location at the junction of Indo-Malayan, Paleo-Artic and Afro-Tropical realms has contributed to the biological richness of the country. Its wide range of climatic and topographical features has resulted in a high level of ecosystem diversity encompassing forests, wetlands, grasslands, deserts, coastal and marine ecosystems, each with a unique assemblage of species. As a result, India holds about 8 % of global biodiversity including 11.4% of global flora in just 2.4% of world's landmass. Therefore, India has been aptly designated as one of the 17 mega diversity countries of the world. As many as 55,048 plant taxa (Plant Discoveries 2021, BSI) and over 91,000 species of animals of the world have so far been recorded from here. The floral diversity in India is mainly concentrated in the 4 biodiversity hotspots, namely Eastern Himalayas, Western Ghats, North Eastern India and Andaman and Nicobar Islands, out of 36 biodiversity hotspots recognised in the world. These floristically significant areas exhibit exceptional concentration of endemic species and also experiencing loss of habitat with higher occurrence of threatened plant species.

In respect of plant diversity, there are 21,984 flowering taxa occurring in India under 2,775 genera and 268 families in India. Other groups such as Gymnosperms with 82 species followed by Pteridophytes (1,314), Bryophytes (2,800), Lichens (2,989), Fungi (15,602), Algae (9,008) and Microbes (1,269) are recorded respectively. A total of 42 families have more than 100 species each, while 33 families are represented by only one species. There are 236 monotypic genera found, of which 176 are dicotyledonous and remaining 60 are monocotyledons; Poaceae with 32 taxa is the most dominant family, followed by Leguminosae (15), Asteraceae (12), Rubiaceae (11) and Orchidaceae (10).

The genus *Impatiens* with 236 taxa is the largest one in Indian flora, followed by *Primula* (135), *Ficus* (132), *Carex* (117), *Crotalaria* (104), *Dendrobium* (100), *Habenaria* (100), *Pedicularis* (98), *Rhododendron* (97) and *Syzygium* (91). About half of the world's aquatic angiosperms occur in India, and are chiefly distributed in families such as Alismataceae, Hydrocharitaceae, Najadaceae, Nymphaeaceae, Podostemaceae, Lemnaceae, Potamogetonaceae, Ceratophyllaceae, etc. The angiosperm flora of India is further characterised by representing 4,303 endemics distributed in 4 mega centres and 25 microcenters of endemism in Indian subcontinent.

The areas exhibiting exceptional concentration of endemic species are the North Eastern India, the Western Ghats and the North Western Himalaya, with small pockets of local endemism reported from Eastern Ghats. India also represents one of the richest centres of crop plant variability, with landraces and progenitors in the world. As a centre of origin of cultivated plants, India alone has provided nearly 167 economically important plants (Chauhan, 2014), along with 320 species of their wild relatives and landraces (traditional varieties). It is considered to be the primary centre of origin of rice. A wide range of agro-ecological regions and ethnic variations, interlinked with traditional agriculture, has generated enormous landrace diversity in India.

Nevertheless, the loss of biodiversity and the extinction of species in India are alarming. Because of intense population pressure and ill-conceived developmental activities, more and more species are becoming endangered and many are at risk of becoming extinct. As per the IUCN Red List, threatened species of plants in India constitute approximately 2.9% of the World's total number of threatened plants. In the Western Ghats alone, 100 species of flowering plants are

seriously threatened, more than 800 species are facing one or the other of threat categories. The Botanical Survey of India has compiled three volumes of the Red Book of Indian Plants about three decades ago, which identified 622 threatened species, including 132 highly endangered species facing extinction. Another twenty-four species are possibly already extinct, because they are not having been sighted since the turn of the century.

Habitat loss, fragmentation and degradation through conversion of land for agriculture, urbanisation and industrial development, invasion of alien species and overexploitation are amongst the major threats faced by biodiversity in India. Hence revisiting the “Red Listed” species and compilation as per the IUCN guidelines is recommended here as the need of the hour.

There is an urgent need for conserving biodiversity through a realization built up systematically among the people on the importance of biodiversity for the very survival and welfare of the human race, presenting what it means to the present generation and, more importantly, to future generations. India has an extensive body of constitutional provisions, laws and policies to promote conservation and sustainable use of biodiversity and natural resources. The Indian Constitution clearly assigns responsibilities between the Union and State Governments (Part XI and article 246) on various subjects. Further, India is a signatory to various international conventions and treaties relating to biodiversity and environmental protection; and has also taken numerous initiatives towards their implementation. The most relevant among national policies and legislation in India is the enactment of a Biological Diversity Act in 2002 to implement the objectives and provisions of Convention on Biological Diversity (CBD). The Act is implemented through a three-tier structure, National Biodiversity Authority (NBA) at the national level, State Biodiversity Boards (SBBs) at the provisional level, and Biodiversity Management Committees (BMCs) at the local level with overall objectives of conservation, sustainable use of biodiversity components and ensure fair and equitable share of benefits acquired by using the genetic resources.

## THE ROLE OF WILD BALSAMS IN DECORATING THE WESTERN GHATS, INDIA

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Balsams are one of the major components in decorating the flower gardens. Though there are more than 1200 species of balsams belonging to the genus *Impatiens* L. only a few are selected in the horticultural industry. In a well designed garden, if hundreds of species of balsams are growing in competitive manner, it will be an unimaginable event. And this is actually a true event, most probably with regard to the Western Ghats and innumerable species of wild balsams present there. Like the organs of a woman, various hills-valley combinations of this world heritage site are differentially decorated with various species of this handsome genus. Regarding the diversity and distribution of wild balsams Western Ghats can be divided into 5 zones: the Agasthyamala Hills, the Anamalai-High Ranges, the Nilgiris, the Central Western Ghats, and the Northern Western Ghats (Sahyadris). There are more than 130 species of wild balsams distributed unevenly among the five more or less well defined endemic hottest hot spots in the longest eco-tone in the world – the Western Ghats. The species of balsams during the course of adaptive radiation preferentially occupy various forest types and habitats in this 1600 km long mountain. Acute adaptations are found in the species like *I. travancorica*, *I. munronii*, *I. umbellata*, *I. grandis*, *I. disotis*, as exclusives to evergreen hill shola forests. Whereas *I. tangachee*, *I. verticillata* and *I. cordata* prefer to live along the banks and beds of streams. *Impatiens auriculata*, *I. parasitica*, *I. jerdonii*, *I. johnii*, *I. kulamavuensis*, etc. add their beauty to the host tree as a return for the safe place as epiphytes. A large number of species like *I. herbicola*, *I. pallidiflora*, *I. munnarensis*, *I. erevikulamensis*, *I. rupicola*, *I. topmentosa* etc. beautify the grasslands as mosaic with their majestic colours. And thing to add more is nothing but their existence in a variety of habitats. The adaptive radiation makes these handsome species dependent on some special climatic situations. So, by the loss of the particular habitat to which each of these species adapted to, many species of balsams may become rare and threatened of extinction. There is a list of factures happening now in the Western Ghats pave way to these highly susceptible species to extinction.

## ETHNOMEDICINE AND TRADITIONAL KNOWLEDGE

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Traditional medicines are often the first and last line of defense against most common ailments such as headaches, coughs, diarrhoea, wound healing and skin diseases. Use of medicinal plants to treat various diseases has been a part of human culture since ancient times. Botanically derived medicinal plants play a major role in human society. Traditional medicine forms a valuable resource for the development of new pharmaceuticals. One advantage in preferring traditional medicine is that healer's services are more affordable as they only charge negligible fees, highly accessible, are familiar with patients, and operate within the ambit of culture and environment. Any local community may have continuous old knowledge and traditional practices on medicinal plants as a mechanism for survival. Traditional knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with people's cultural values. Traditional knowledge may be defined as knowledge that is unique to a given culture or society, which provides the infrastructure for agriculture, health care, food preparation, training, environmental conservation and other life process on the local level. Today, such knowledge systems are at risk of becoming extinct because of rapidly changing natural environments and fast pacing economic, political and cultural changes on a global scale. Medicine men's are vanishing, as they become inappropriate for new challenges or because they adapt too slowly. However, many practices disappear, only because of the intrusion of foreign technologies or development concepts that promise short-term gains or solutions to problems without being capable of sustaining them. The exploration, utilization and conservation of these ethnobotanic resources are essential for restoration and preservation of traditional and indigenous knowledge. Moreover, in developing countries now, the trend is to incorporate traditional medicines in local healthcare system and interest has increased among the researchers to explore the huge potential of ethnomedicinal knowledge for treating various diseases. Since traditional knowledge on ethnomedicinal plant is being eroded through acculturation and the loss of plant



biodiversity along with indigenous people and their cultural background, hence, promoting research on these plants is crucial in order to safeguard this information for future societies for sustainable use and their conservation.

## ANALYSIS OF LEAF SHAPE VARIATION IN CONVULVULACEAE USING ELLIPTIC FOURIER DESCRIPTORS

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Leaves are one of the most significant organs for plant identification due to their variability across different taxonomic groups. Leaf morphology provides distinguishing features which helps in discernment of plant species. Traditional morphometrics has contributed greatly to reduce the problems of plant identification and morphology-based species delimitation. Image analysis and digital morphometrics have made it easy to detect more characters to complement existing leaf data set in recent years. This study aimed to investigate leaf shape variation between some species of genus *Ipomoea* using geometric morphometric method (GMM). We have examined more than 500 leaves from 21 different species of *Ipomoea* using morphometric technique. We identified different shape variation due to the result of differing length to width ratio, shape, and size changes. The variations were mainly due to changes in leaf blade ratio, size, and shape of the posterior lobes of leaves and anterior lobes differentiation. Obtained results suggest that leaf blade ratio was highly correlated with first principal component (PC-1) of morphometric variation calculated using elliptic Fourier Descriptors (EFDs). Subsequent PCs corresponded to complex shape variation which cannot be captured by traditional linear measurements. ANOVA showed a significant difference ( $p = 0.001159$ ) among the 21 species of the *Ipomoea* genus. Based on the results obtained, we can suggest that geometric morphometric of leaf shape is effective in interspecific discrimination within members of genus *Ipomoea*. Further morphometric studies of leaf shape involving a larger number of samples especially in the study of intergeneric and inter specific variation are suggested.

## FLORA OF SIKKIM: A COMPREHENSIVE ACCOUNT OF ANGIOSPERMS

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Sikkim, with a geographical area of 7096 km<sup>2</sup> (27° 04'–28°07' N and 88°00'–88°55' E) is bordered by Nepal in the West, Bhutan in the East, Tibet in the North and North-East and the Gorkhaland Territorial Administration (GTA) of West Bengal in the South. The elevation ranges from 285 to 8586 m amsl. The Mt. Khanchenjunga, the Guardian Deity of Sikkim, is the third highest peak in the world. The drainage system in the state is formed by two main rivers: the Tista and Rangit. Sikkim receives nearly 500 mm precipitation annually.

Being a part of the Himalaya, a global biodiversity hotspot, Sikkim harbours rich floristic diversity of immense economic and ecological value. Phytogeographically, the flora of Sikkim represents typical Eastern Himalayan elements. Until now, though all comprehensive floristic counts indicate the presence of ~4000 to 5068 species/taxa in Sikkim, however, the present endeavor reveals that around 5900 flowering plant species under 1595 genera and 215 families are growing in this part of the Himalaya. The present tot up indicates that the state shares nearly 32% national flora though it occupies only about 0.2% geographical area of the country.

The forest of the state is broadly divided into three zones, as i) subtropical (up to ±1800 m amsl), ii) temperate (1800 m to 4000 m amsl) and iii) alpine (4000 m to usually 6000 m amsl) depending on the elevation and the characteristic floral components. The temperate forest can be further subdivided into two distinct forest types: i) the lower elevation (1800 m to 3000 m amsl) is with mixed broad-leaved

temperate forest and ii) the higher (3000 m to 4000 m amsl) is of evergreen coniferous forest.

Floristically this area also acts as gateway for migration of flora from the adjacent regions like China, Tibet (TAR), Nepal and Bhutan. Considerable number of species has also been migrated from several far-off lands, viz. Sino-Japanese elements (e.g. species of *Quercus*, *Schima*), Western China (e.g. *Aletris pauciflora*, *Anemone rupicola*, *A. vitifolia*), European and Mediterranean elements (species of *Allium*, *Anemone*, *Artemisia*, *Gentiana*, *Ranunculus*, *Swertia*, etc.). The American elements (e.g. *Eupatorium adenophorum*, *E. odoratum*, *Bidens pilosa*, *B. biternata*, *Cestrum elegans*, *Calceolaria gracilis*) in Sikkim flora are exhibited generally by weeds of agricultural lands, open forest edges and waste places.

Among the presently recorded species, Dicotyledonous (4273 species, 1206 genera and 177 families) members are dominating over Monocotyledons (1628 species, 389 genera and 38 families). The 10 most-diverse plant families in Sikkim are Orchidaceae (561 spp.), Poaceae (414 spp.), Asteraceae (413 spp.), Fabaceae *s.l.* (350 spp.), Cyperaceae (210 spp.), Rosaceae (204 spp.), Rubiaceae (136 spp.), Lamiaceae (125 spp.), Ranunculaceae (121 spp.) and Gentianaceae (109 spp.). On the other hand, the 10 most-diverse plant genera are *Carex* (106 spp.), *Bulbophyllum* (65 spp.), *Primula* (69 spp.), *Pedicularis* (61 spp.), *Saxifraga* (61 spp.), *Gentiana* (50 spp.), *Cyperus* (49 spp.), *Impatiens* (45 spp.), *Dendrobium* (45 spp.) and *Ficus* (43 spp.).

The north east region of India often designated as the “*Cradle of Flowering Plants*” due to presence of many primitive species. Sikkim being a part of this territory also harbours a number of such taxa like *Daphniphyllum himalense*, *Decaisnea insignis*, *Exbucklandia populnea*, *Holboellia latifolia*, *Magnolia* spp., *Schizandra* spp., etc. The entire North-eastern region is a center of active speciation and shelters many endemic taxa. Until now around 87 narrow endemic species/taxa are recorded from Sikkim. Besides, more than 95 Eastern Himalayan endemics are also found in this state. The state is in the eastern part of the Himalaya, a region

designated as a biodiversity hotspot. By definition, this area is both species-rich and highly threatened by human activity. Till date, about 127 RET species are recorded in Sikkim.

The floral panorama of this tiny Himalayan state always attracts global attention. This affection reflects through naming of nearly 150 plants referring Sikkim (or part of Sikkim) where the new species were originally reported

## **BOTANICAL INVESTIGATIONS RELATED TO SOME ARCHAEOLOGICAL SITES FROM MAHARASHTRA**

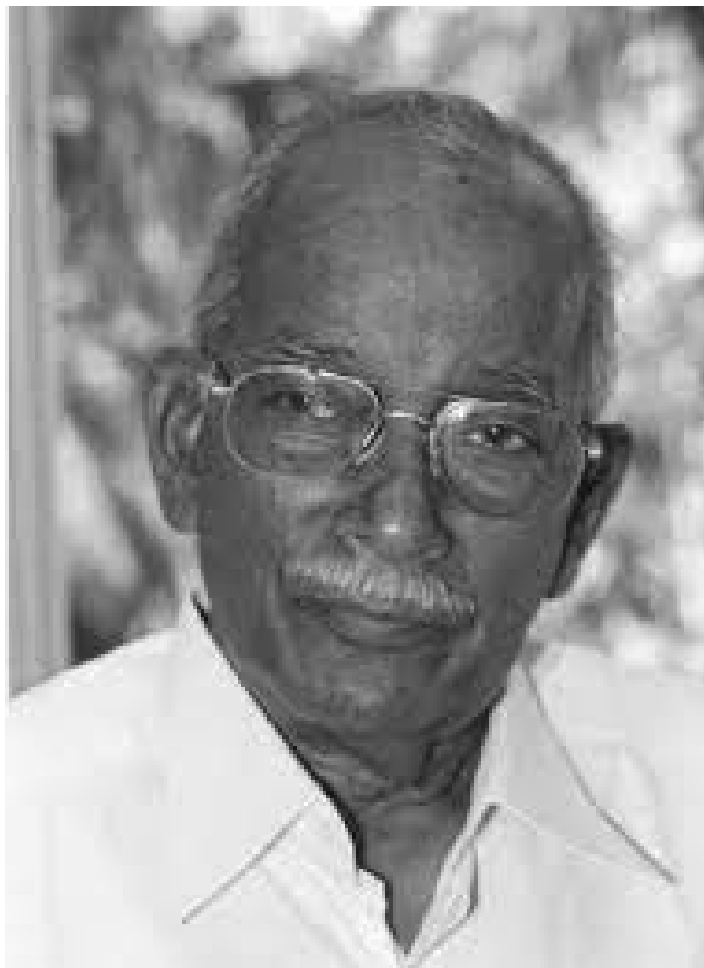
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From the time unknown, plants played an important role in human culture. Archaeobotany or palaeoethnobotany combines botanical knowledge with archaeological materials. It largely involves the study of ancient plant remains from archaeological contexts. It helps to find out how our forefathers utilized plants for food, fuel, medicine, ritual purposes, building etc. Largely, we can say it throws light on human-plant relationships in the past related to past economies, foodways and in some cases environmental change. It also provides evidence for the domestication of plants. The main types of plant remains are macroremains (seeds, grain and fruits, chaff, tubers), charcoal and wood, and microremains (phytoliths, pollen, starch grains).

Archaeobotanical studies have a long history in India and have become more systematic in terms of analytical and interpretative methodologies. Majority of the studies focus mostly on seed and fruit remains and very few include other botanical remains like leaf, bark, roots, tubers etc. Present study deals with archaeobotanical investigations from some archaeological sites from Maharashtra with special emphasis on Ajantha-Ellora cave complex. These caves are a breathtaking example of rock cut architecture that stands testimony to the imagination and artistry of its creators. The samples investigated from different locations depict different use patterns. The remains of hemp, wheat, rice, some grass seeds is an interesting taxonomic investigation in these archaeological sites that tells us about its use and cultivation pattern in ancient times.





**PROF. ROLLA S. RAO AWARD:  
BIODIVERSITY CONSERVATION  
(ANGIOSPERMS)**

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Karnataka - 580 001



## RSR 01

### **Informal Community Conservation against Formal Protected Area Network in Conserving Diversity: Insights from Forests of the Northern Western Ghats, India**

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The forests of Northern Western Ghats (NWG) are fragmented and open landscapes compared to their southern and central counterparts. Two major conservation approaches, such as 'Traditionally Conserved Forest (TCF) through community efforts and 'Protected Area Networks (PAN) through legal protection, are evident in NWG. Though the TCF or sacred groves is an ancient practice, the forests in groves have been exposed to high disturbances owing to the weakening of religious beliefs. On the other hand, PAN has been in action just for a few decades. We hypothesized that the PANs are more significant than TCFs in terms of conservation value owing to the minimal human interference. We sampled tree species at ten sites each in TCFs and PAFs, using a transect-quadrat method. Four quadrats of 20 m × 20 m on one transect were placed, documenting the tree diversity, abundance, and DBH ( $\geq 30$ cm). Based on visual observations, disturbance scores were calculated for each site. The study resulted in the documentation of 69 taxa from 674 individuals in TCF while 75 taxa from 950 individuals from PAF. The t-test analysis showed that the number of individuals ( $p < 0.05 = 0.04$ ) and disturbance ( $p < 0.05 = 0.001$ ) are significantly different; however, Shannon diversity, evergreenness, deciduousness, and endemism were similar in both conservations' approaches. The similarity indices for community composition were similar (Jaccard-0.39, Sorensens-0.56). It can be concluded that TCF and PAN contribute equally to conservation; however, the high disturbance in TCF indicates the need for further conservation planning in the TCF.

**Keywords:** Forest conservation, traditional forests, protected forests, Tree diversity, Community, Disturbance.

## RSR 02

### ***Neuropeltis malabarica* Ooststr. (Convolvulaceae): A Unique Endemic Species in Southern Western Ghats, India**

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*Neuropeltis malabarica* Ooststr., a large woody climber in the family Convolvulaceae, is endemic to Southern Western Ghats. It is the only representative of the genus *Neuropeltis* Wall. in India and grows primarily in the seasonally dry tropical biomes. As part of a study of wind dispersal mechanism in winged diaspores of South India, the authors noticed the unique winged fruits of this species and their interesting aerodynamic behaviour during wind dispersal. Floral bract of this species develops into a large attractive wing for flight in the air during wind dispersal. These bracts are small, densely tomentose, seen adnate to the pedicel in the flower. After fertilization, the bracts develop into a large, orbicular to broadly elliptical, reticulately veined, membranous structure in fruit for performing gliding movements in a straight or spiral path in the air. The fruit morphology and dispersal adaptations of the species are unique and the characteristic gliding mechanism may give new insights into creative innovation. Despite this type of intriguing dispersal mechanism, its distribution is restricted to two South Indian states, namely Kerala and Karnataka. The distribution status and a description of the plant, fruit dispersal mechanism and the need of the conservation of the species are discussed in this paper.

**Keywords:** Conservation, Convolvulaceae, Dispersal mechanism, Endemism, South India.

## RSR 03

### **Prediction and Profiling Niches of Threatened Tree Species Contributing to IUCN Status Assessment, Ecosystem Based Conservation and Niche Specific Restoration**

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Most of the conservation and management practices unable to accommodate the kaleidoscopic vision of ecological complexity even in species focused planning. Ecorestoration sprouting everywhere but lack minimum protocol to ensure ecological integrity, genetic diversity, factors of Eltonian niche, reduce negative impact on other species niches and most of them lack ecosystem-based approach. An improvised method combining bioclimatic species distribution modelling and niche profiling of threatened tree niches as an inclusive space for its associated flora and fauna is experimented here for the Western Ghats region. Taxonomic and population data of 30 threatened trees species used here. Limitations of bioclimatic prediction of niche modelling covered through developing specific standardized data of terrain, landuse and vegetation of the Western Ghats for the first time. Species associations specific to the niches are profiled to predict suitable niches for effective conservation planning, management and ecorestoration. Taxonomic scrutiny and population data collected were used for reassessment using SIS tool and successfully submitted to IUCN for 24 species of which 9 published in the official red list. Niche models and profiles of 15 trees having differential distribution patterns were used here for niche specific identification potential conservation and restoration sites. The niche-based conservation and restoration plans were integrated to forest conservation plans, biodiversity strategy action plans and plans of the BMC. Species such as *Diospyros crumenata*, *Syzygium occidentale*, *Humboldtia vahliana*, *Aporosa bourdillonii*, *Hopea ponga* and their associates were successfully germinated and used for ecorestoration in the identified potential sites with multi stakeholder participation including MNREGA.

**Keywords:** Threatened, IUCN, MNREGA, Western Ghats, BMC

## RSR 04

### Why to Conserve Forts? : A Case Study From Kolhapur District.

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A fort in Western Ghats shows key characters like unique topography and extreme climate conditions. It result emerg into many number of microhabitats. These microhabitats are either natural or man-made. Some specialised plants grow in these special microhabitats, which led to abundance of many endemic, rare and RED listed plants on fort. Total area of forts present in Kolhapur district is just nearly 4.69 km<sup>2</sup>, but it contains more than 108 endemic plants, out of which 17 plants come under IUCN RED category. Forts work as store house for plant diversity and conserve this natural flora. All these factors make the forts as a Micro-hotspot within the Western Ghats. But many factors like anthropogenic activities, tourism, deforestation, habitat destruction, natural calamities endangered the forts as well as plant diversity within the forts. So, there is urgent need to conserve these forts so as to ultimately conserve the plant wealth within it.

**Keywords:** IUCN, Western Ghats, Kolhapur, Fort.

## RSR 05

### Diversity and Conservation Assessment of the Genus *Leea* L. (Leeoideae: Vitaceae) In India

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*Leea* L. is a small genus of flowering plants that belongs to the family Vitaceae, which includes 38 species worldwide. Prior to being restricted to a subfamily Leeoideae of Vitaceae, it was originally assigned to the monogeneric family Leeaceae, which is quite similar to Vitaceae. The genus is found entirely in the old world tropics, ranging from tropical Africa to Asia and Polynesia. Its distinctive features includes petiolar stipule, well developed floral disc, presence of pearl glands, syngenechious stamens and one ovule in each locule of ovary. The genus is represented by 13 species across India and is found predominantly in Northeast India, Peninsular India, and Andaman & Nicobar Islands. In the current study, the distribution pattern, habitat requirements and threat of each species have been studied by a comprehensive field visit. A distribution map is constructed using information gathered in the field and from various herbaria. Conservation Status of each species is evaluated according to the IUCN criteria, and RET species is recognized. In addition, conservation strategies are recommended for each species. The collected species including the endemic taxa are propagated for *ex-situ* germplasm conservation at Calicut University Botanical Garden.

**Keywords:** *Leea* L., Conservation, Species

## RSR 06

### **Conservation of Endemic, Rare, Endangered and Threatened Species at Botanical Garden, the Maharaja Sayajirao University of Baroda, Gujarath**

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Botanical Garden at The Maharaja Sayajirao University of Baroda was established in 1920 by Prof. S. V. Shevade, HOD, Biology, Baroda College; it harbors around 680 Angiosperms, 11 Gymnosperms, 23 Pteridophytes and 7 Bryophytes, 37 Cactus & 38 Succulents species. It has 281 heritage trees having girth in the range of 230-280cm. Over the period of time endemic species (4), rare species (6), locally endangered species (5), critically endangered species (7), locally near threatened species (1) were acclimatized. and locally extinct in wild – *Polyalthia cerasoides* are propagated in Botanical Garden. Botanical garden is also a site for the conservation of Rare, endangered and threatened plants as stated by IUCN. This includes, endangered species (4), critically endangered species (3), Near threatened species (2), Vulnerable species (2) and Least concern species (7) and Hedge Plant (2) while, some are promoted as a road side plant species (8). The Bank of the Vishwamitri (Bhukikansa) has been eco-restored with the 6 species on slope; *Barleria* species (as an underground species) and *Syzygium salicifolium* (Jal Jamun) along river bank. Further to create interest in common and rare plant species various games like Plant hunt, Jungle ka khana Khajana, Bhujjo to jano, Jungle fashion etc has been introduced from kindle garden to Adult. It is an effort to conserve the Endemics and Threatened species as an integrated part of The Maharaja Sayajirao University of Baroda green campus.

**Keywords:** Conservation, Endemic, Rare, Endangered, Threatened Species, Botanical Garden, Maharaja Sayajirao

## RSR 07

### **Unravelling the Diversity of Orchids in Idukki District, Kerala: Their Potential Threats and Recommendations for Conservation**

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Orchidaceae is one of the two largest families of flowering plants, perhaps second only to Asteraceae (Chase *et al.*, 2015). According to Pal and Nagrare (2006), the family comprises 800 genera and 25000–35000 species worldwide, with 1300 species in 184 genera in India. The family shows a cosmopolitan distribution and grows in a wide range of habitats, mostly in terrestrial, epiphytic, and lithophytic habitats. Idukki is the second largest district of Kerala and is part of the floristically rich Western Ghats. The area is unique in providing an abundance of habitats that attributes rich vegetation and diverse biota with a high level of plant diversity. As a part of the preparation of the inventory of monocotyledons of the Idukki district, 42 genera and 79 species of Orchidaceae were collected, of which 41 species are terrestrial and 38 are epiphytic. The dominating genera include *Habenaria* Willd., *Bulbophyllum* Thouars, *Dendrobium* Sw., *Oberonia* Lindl., *etc.* Natural calamities such as floods, landslides, forest fires, *etc.* made a significant impact on the orchid diversity. Moreover, anthropogenic activities such as construction, road widening, tourism development also causes damage to the habitats of these plants. Ex-Situ and In-Situ conservation measures, as well as various governing policies, are recommended for its protection. The present paper discusses the taxonomy, diversity, threats, and conservation of orchids in Idukki district.

**Keywords:** Diversity, Orchids, Idukki, Kerala, Conservation

## RSR 08

### **Prediction and Profiling Niches of Threatened Tree Species Contributing to IUCN Status Assessment, Ecosystem Based Conservation and Niche Specific Restoration**

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Most of the conservation and management practices unable to accommodate the kaleidoscopic vision of ecological complexity even in species focused planning. Ecorestoration sprouting everywhere but lack minimum protocol to ensure ecological integrity, genetic diversity, factors of Eltonian niche, reduce negative impact on other species niches and most of them lack ecosystem-based approach. An improvised method combining bioclimatic species distribution modelling and niche profiling of threatened tree niches as an inclusive space for its associated flora and fauna is experimented here for the Western Ghats region. Taxonomic and population data of 30 threatened trees species used here. Limitations of bioclimatic prediction of niche modelling covered through developing specific standardized data of terrain, landuse and vegetation of the Western Ghats for the first time. Species associations specific to the niches are profiled to predict suitable niches for effective conservation planning, management and ecorestoration. Taxonomic scrutiny and population data collected were used for reassessment using SIS tool and successfully submitted to IUCN for 24 species of which 9 published in the official red list. Niche models and profiles of 15 trees having differential distribution patterns were used here for niche specific identification potential conservation and restoration sites. The niche-based conservation, restoration plans and biodiversity strategy action plans and plans of the BMC. *Diospyros crumenata*, *Syzygium occidentale*, *Humboldtia vahliana*, *Aporosa bourdillonii*, *Hopea ponga* and their associates were successfully germinated and used for ecorestoration in the identified potential sites with multi stakeholder participation including MNREGA.

**Keywords:** Profiling, Niches, IUCN



## RSR 09

### ***In Vitro* Propagation of *Bulbophyllum fuscopurpureum* Wight: A Threatened Orchid from Southern Western Ghats**

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An efficient *in vitro* propagation protocol has established for an endangered epiphytic orchid, *Bulbophyllum fuscopurpureum* Wight through *in vitro* asymbiotic seed germination and organogenesis. Seed germination was successfully achieved on ½ MS, MS, KC and Mitra medium. Highest response of 95% followed by 91% and 85% germination was recorded on ½ MS, MS and KC medium, respectively. Seeds germinated on Mitra and KC medium turned yellow and failed to respond seedlings. On the other hand, more than 80% seeds germinated on ½ MS and MS medium become seedlings (stage V) in 15 weeks. Protocorms cultured on ½ MS medium fortified with different plant growth regulators (PGRs) such as 6-Benzyladenine (BA), Thidiazuron (TDZ), Meta-Topolin (mT) and 1-Naphthaleneacetic acid (NAA) induced callus followed by protocorm like bodies (PLBs) and plantlet development. Preliminary phytochemical screening of methanolic extracts of pseudobulb reveals the presence of phenolics, and functional groups analysis by FT-IR reports the presence of alkanes, aromatics, 1°, 2° amines, amides, aromatic amines, carboxylic acids, alcohol, etc. GC-MS spectrum revealed above 50 compounds with Benzophenone, 2,4,4'-Trihydroxy-2'-methyl-(2,6,6-Trimethyl-cyclohex-1-enylmethane sulfonyl)-benzene and 9-Octadecenoic acid as the major secondary compounds with diverse bioactive potential. The present study would help in effective conservation measures of this threatened taxa and to develop potential therapeutic compounds in future.

**Keywords:** Epiphyte, Orchid, *Bulbophyllum*, Seed, Callus, Protocorm like bodies.

## RSR 10

### ***Ixora* L. Section *Amphorion* Brem. (Rubiaceae): Distribution and Conservation Status Evaluation in India**

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*Ixora* L., the third largest and most species-rich genus of the family Rubiaceae, comprises 572 species in the world. The genus is represented in India by 52 species under 6 sections in 2 subgenera, and is mostly found in South India (c. 24 species), Andaman Nicobar islands (c. 19 species) and Northeastern India (c. 16 species). Though the genus is widespread, there is a high degree of local endemism at the species level. Twenty three (44%) of the 52 species are endemic to India. The recent phylogenetic analysis of Mouly *et al.* (2009) confirmed the classification of *Ixora* into three subgenera and 20 sections by Bremekamp (1937, 1938, 1940). Section *Amphorion* of subgenus *Pavettoides* comprises seven species, distributed widely in India, Sri Lanka, Burma and Andaman Nicobar Islands. Because of its wide distribution in India, the section is of particular importance. The members of this section are characterized by shortly or moderately pedunculate, sub-paniculate inflorescences, stipulate shorter leaves at the base of peduncle, small flowers with non-bearded corolla throat. As a part of the ongoing revision of *Ixora* in India, here we assessed the conservation status of species in this section in accordance with latest IUCN Criteria. The distributional range of each species is discussed and appropriate conservation strategies are suggested for the threatened categories.

**Keywords:** IUCN Criteria, *Ixora* L, *Amphorion*, *Pavettoides*, conservation

## RSR 11

### **Poor in Species, Rich in Endemics: A Study of Vertical Cliffs from the Northern Western Ghats of India**

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Steep vertical cliffs of the northern Western Ghats (NWG) are a botanically neglected habitat due to their inaccessibility and misconception as geological features than biological entities. Though spread throughout the NWG (natural and man-made roadside cliffs), there are scanty efforts for documentation of plant diversity, distribution, phytogeography, and endemism of cliff-dwelling plants (Chasmophytes). The present work made an effort to fill this lacuna. Extensive monsoon fieldwork during 2017-2022 documented chasmophytic diversity across 39 locations in NWG. Chasmophytes were collected, ecological data was recorded, and species were identified using literature and herbarium specimen comparison (AHMA). The primary data was supplemented with secondary information compiled through herbarium studies and a literature review. A checklist of chasmophytes belongs to 301 species 164 genera and 46 families. Species were further categorised into obligate, mainly, and partial chasmophytes and information on species distribution and phytogeography was appended. Cliff endemics are represented by 129 taxa belonging to 75 genera and 33 families. Forty-five chasmophytes are endemic to NWG, and 40 are obligate chasmophytes. The species-rich genera include *Ceropegia* (11), *Ischaemum* (5), *Chlorophytum* (4), *Impatiens* (4), *Pimpinella* (4) and *Senecio* (4). Lifeform classification showed that geophytes and therophytes dominate cliff habitats. Following the regional and global threat status assessments, 44 species can be grouped under vulnerable (8), endangered (10), critically endangered (17), and rare (10). The study concluded that cliffs (42%) hold more endemism despite poor species diversity compared to other surrounding habitats and hence need serious attention from conservationists.

**Keywords:** Basaltic cliffs, Chasmophytes, Endemism, Life forms, Western Ghats

## RSR 12

### ***Callitriche* L. an Unfamiliar Tiny Endemic Plant in South India-Needs for Their Conservation**

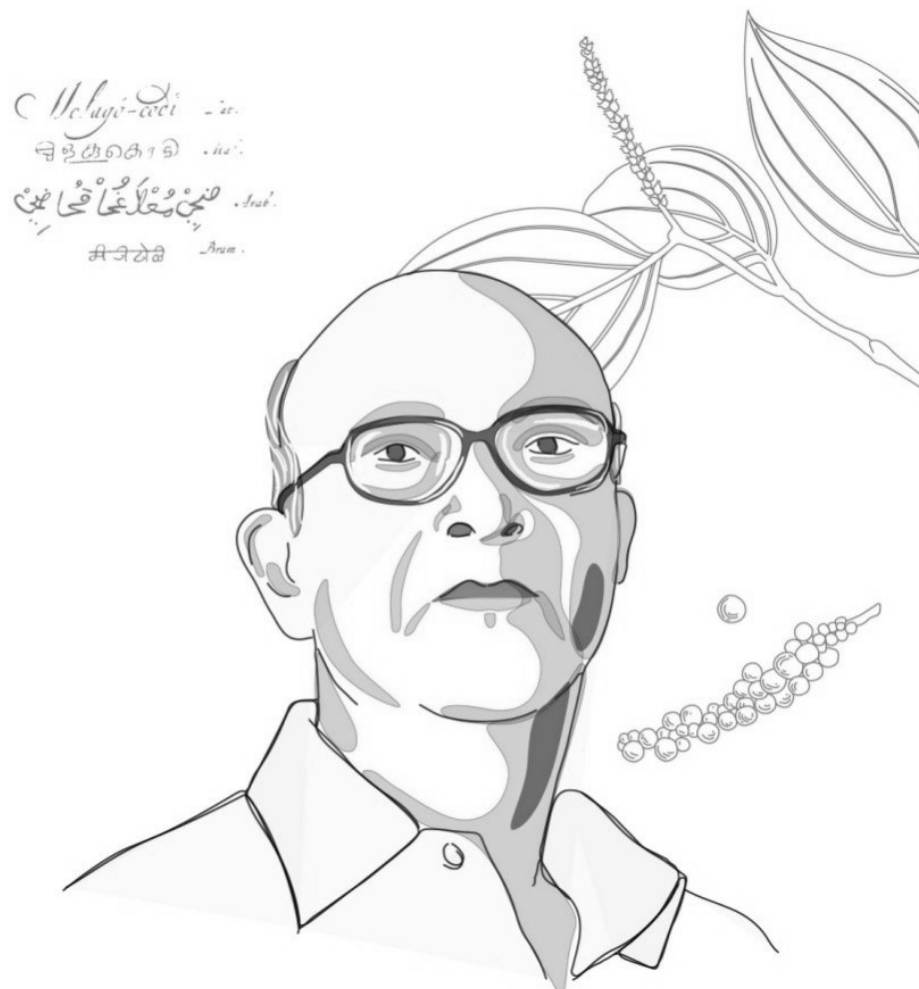
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The genus *Callitriche* L. (Callitrichaceae) consisting of 75 species, is almost cosmopolitan in distribution with most species found in temperate zones of both the hemispheres but mostly in northern hemisphere. They are very delicate herbs, grows in shallow lakes and river margins, wetlands, ditches and temporary pools from freshwater to brackish waters. The genus is mostly monoecious, with axillary naked flowers and schizocarpic fruits which separates into four mericarps. Thirteen species were reported by Landsdown (2007) from Asia. Nine species are found in India, and three species are present in South India including the two new species, *Callitriche idukkiana* sp. nov. and *C. bracteate* sp. nov. described here with the support of morphological, molecular and SEM data. All the three species are strictly endemics with limited distribution and they are growing at the unprotected areas. Hence it is the plant with little attention which highlights the urgent needs for their conservation. In this paper, the diversity, distribution, endemism and status assessment are also discussed.

**Keywords:** Endemic Plant, South India, Conservation



**PROF. K. S. MANILAL AWARD:  
FLORISTICS [KSM]**

Organized by Department of UG, PG and Research in Botany, Karnatak University's, Karnatak Science College, Dharwad,  
Karnataka - 580 001

## KSM 01

### Taxonomic Revision of Spathaceous Genera of Anthistiriinae (Poaceae: Andropogoneae) In South India

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Anthistiriinae is one of the important subtribe in Andropogoneae of Poaceae and is characterized by the presence of pointed callus which is obliquely applied to the internode tip, instead of blunt and sunk into it. This subtribe Anthistiriinae has great importance in Indian scenario by its endemism. It is known to have 12 genera world wide, among them, 5 occurs in south India. These five south Indian genera include *Iseilema*, *Pseudanthistiria*, *Themeda*, *Heteropogon* and *Parahyparrhenia*. *Iseilema*, *Pseudanthistiria* & *Themeda* forms the spathaceous genera within it and is characterized by the presence of false panicle interrupted by prominent spathe and spatheoles. The present paper deals the taxonomic revision of these 3 spathaceous genera in South India. Detailed morphology, illustrations, taxonomic key for identification, nomenclature and notes on distribution are provided. The study recognized 13 species of 3 genera as occurring in South India of which 7 are endemic to India and Sri Lanka.

**Keywords:** Anthistiriinae, Andropogoneae, Poaceae

## KSM 02

### ***Blumea* DC. (Asteraceae) of South Gujarat**

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*Blumea* genus (Inuleae-Asteraceae) worldwide is represented by 89 species of which 29 species are reported from India. Present studies deal with distribution and systematics of seven species of *Blumea* i.e., *B. belangeriana*, *B. eriantha*, *B. lacera*, *B. laciniata*, *B. mollis*, *B. oxydonta* and *B. virens* occurring in southern Gujarat. This also restates the presence of seven species occurring in Western Ghats out of 22 known species. Additionally, it also reviews the critical differences between *Pluchea*, *Lagdera* and *Nanothemnus* along with *Blumea*.

**Keywords:** *Blumea* DC., Asteraceae,

## KSM 03

### World Revision of the Genus *Coix* L. (Maydeae: Poaceae)

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Genus *Coix* is one of the diverse groups of the tribe *Maydeae* (Poaceae). The genus is native to India, Indian sub-continent, Australia and introduced in other parts of the pantropical regions of the world. Taxonomy of the genus *Coix* was poorly understood and confusable due to its enormous phenotypic variations. Therefore, earlier the genus is an assemblage of few species and many varieties. After extensive and intensive collection in India from 2016 to 2022, consulting with experts, relevant literature and detailed study of online (A, B, BM, BO, BR, C, DBN, E, FI, G, GB, GRO, IH, JCB, K, L, LINN, LIV, NY, OXF, P, PH, PNH, SK, U, UC, UPS, W) and offline (ASSAM, BAMU, BSHC, BSI, CAL, CALI, LWG, MH, NBU, NEHU, SUK, TBGT) herbaria globally, it is revealed that the genus *Coix* is represented by only six taxa (three species and three varieties) in the world. Except *C. gasteenii* all taxa are reported from India. Although genus is very distinct, all taxa are very difficult to delimit. Thus, authors have worked on its revision to the world for its taxonomy, nomenclature, synonymy, distribution and cytology. This resulted in lectotypification of twelve binomials. Two interesting taxa have been collected from India. *Coix lacryma-jobi* var. *puellarum* is recollected after 117 years from India and added first time to the flora of Malaysia and Indonesia.

**Key words:** *Coicinae*, *Coix*, lectotype, *Maydeae*, taxonomy.



## KSM 04

### **Taxonomic and Anatomical Studies on the Genus *Bupleurum* (Apiaceae) in the Western Ghats, India**

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*Bupleurum* Linn., commonly called as hare's ear or thorough-wax is a perennial herbaceous genus in the family Apiaceae. It is one of the largest genera in the carrot family with more than 190 species distributed mainly in Eurasia, North Africa and one species each in North America and South Africa. This genus has a representation of 21 species in India, out of which 16 species are distributed in the eastern and western ranges of Himalayas. From Peninsular India 5 species were reported among which 4 species are occurring in the Western Ghats. This genus is distinct from other genera of the family by having simple leaves with an umbel of yellow flowers and conspicuous bracts and bracteoles. Current paper focuses on the diversity, distribution, morphology and anatomical features of the genus *Bupleurum* in the Western Ghats.

**Keywords:** Apiaceae, *Bupleurum*, Distribution, Endemic, Morphology, Western Ghats

**KSM 05**

**Taxonomy and Endemism in the Genus *Pimpinella* L. (Apiaceae)  
In Western Ghats, India**

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*Pimpinella* L. is one of the well-defined and species-rich genera represented in the Old World, with approximately 180 species, distributed in Eurasia, Africa, and North and South America. The genus is represented by 27 species and 3 varieties in India, out of which 16 are endemic to the country. A total of 9 taxa are found in the Western Ghats among which six species (59 %) are endemic. *Pimpinella* is morphologically distinct from other genera by having palmately to pinnately ternate leaves, oil canals in the fruits, lateral compression with a constriction at the commissure and the presence of inconspicuous or filiform or slender ribs on the mericarp. The present paper discusses the taxonomy of the genus *Pimpinella* in the Western Ghats providing details on habitat, phenology, distribution, typification, and other relevant notes.

**Keywords:** Apiaceae, Endemic, *Pimpinella*, India

## KSM 06

### Present Status of Genus *Gynura* (Asteraceae) In India

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Asteraceae Bercht. & J. Presl (Compositae nom. alt.) is one of the largest and diverse families of angiosperms consisting for about 25,000-30,000 species and over 1677 genera (POWO 2022). Asteraceae further subdivided into 12 subfamilies and 43 tribes (Susanna *et al.*, 2020). In India, it is represented by ca. 204 genera and ca. 1314 species predominantly occur in temperate regions of the Himalaya and North-eastern region (Mitra & Mukherjee, 2017). The tribe Senecioneae of family Asteraceae first time recognized by Henri Cassini. Senecioneae is one of the largest tribes in Asteraceae. It has worldwide distribution consisting more than 3000 species in 151 genera (Nordenstam, 2007). *Gynura* Cass. is perennialherbaceous genus of Asteraceae: Senecionaeae characterized by homogenous disciform capitula, usually yellow corollas and long tapering papillose appendage on style arm (Nordenstam 2007). *Gynura* was first described by Cassini (1825) from India. Davies (1979) carried out taxonomic and morphological account in the genus *Gynura* for East Asia and Himalayas and recorded 4 species for India. Later in 1980 Davies subsequently reviewed the genus in India, Sri Lanka, and the Seychelles recorded 5 species including two subspecies of *G. lycopersicifolia* DC. Previous report states that *Gynura* has 10 species in India (Vanijajiva and Kadereit 2011). *Gynuraamplexicaulis* Olive. and Hiern, collected from the Western Ghats of Maharashtra, is reported for the first time for India (Bachulkar and Jagtap 2009). Genus *Gynura* currently comprises 54 species in the world, out of which 11 species are present in India (POWO). In present piece of work authors have studied the distribution pattern, present status along with updated classification. Also the key for the all species that occurs in India is provided in the present communication.

**Keywords:** Asteraceae, *Gynura*, Phytogeography

## KSM 07

### Account on Genus *Hibiscus* L. (Malvaceae) from Peninsular India

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Genus *Hibiscus* is the largest genus in Malvaceae with 430 known species. In India it is represented by 34 species whereas 27 species belonging to 10 sections are present in Indian Peninsula. Out of 27 species, 3 species are endemic to India. Sect. *Furcaria* is the largest section with 7 species whereas Sect. *Hibiscus* and Sect. *Trionum* consists of 4 species each respectively. Sect. *Ketmia* consists of 3 species. Sect. *Azanza*, *Lilibiscus* and *Trichospermum* consist of two species each. Sect. *Spatula*, Sect. *Pterocarpus* and Sect. *Solandra* consists of single species each. The present work will be highlighted on the taxonomic account of genus *Hibiscus* from the Indian Peninsula in relation to morphology, distribution, calyx-epicalyx morphology, seed micromorphology and phylogeny. Apart from these *Hibiscus trionum* complex in Indian population is resolved which resulted in the addition of *H. verdcourtii* to the Asian flora and *H. tridactylites* as a correct name for the population misleadingly kept under *H. trionum*.

**Keywords:** Epicalyx, evolution. *Furcaria*, *Hibisceae*, *Hibiscus*, *Malvaceae*, *Micromorphology*

## KSM 08

### **Mycoheterotrophic Orchid Diversity of Khokhan Wildlife Sanctuary, Kullu District with a Rediscovery of Rare Endemic *Neottiamicroglottis* (Duthie) and Two New Additions to the State Flora of Himachal Pradesh**

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Khokhan Wildlife Sanctuary of Kullu district, Himachal Pradesh is one of the oldest protected areas of Indian Himalayan Region having an area of 14.94 km<sup>2</sup> with an altitude ranging from 1500 – 2800 M asl. Extensive field surveys that were conducted during monsoon season (June – September) in 2022 resulted in findings of four rare mycoheterotrophic orchids viz. *Cyrtosia falconeri* (Hook.f.) Aver., *Gastrodia falconeri* D.L. Jones & M.A.Clem., *Neottia listeroides* Lindl. and *Neottia microglottis* (Duthie) Schltr. Of these, *Neottia microglottis*, a rare orchid endemic to Western Himalaya is rediscovered after a gap of 88 years, which also constitutes a new record to the state flora of Himachal Pradesh. *Cyrtosia falconeri*, a tall handsome golden yellow flowered leafless orchid, which was earlier known from only a couple of localities in Western Himalaya from adjoining Uttarakhand state is reported here as another new addition to the state flora. All these mycoheterotrophic orchid species are illustrated here with updated nomenclature, brief botanical description, photo plates, short notes on habitat and closely associated species.

**Keywords:** Khokhan Wildlife Sanctuary, Kullu district, Himachal Pradesh, protected areas

## KSM 09

### Distribution of Holo-Parasitic Genera of Family Orobanchaceae in India

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Holo-parasitic angiosperms are fascinating due to their highly adapted mode of growth and survival. In India, 7 holo-parasitic genera of family Orobanchaceae are recorded viz. *Aeginetia* L., *Boschniakia* C.A.Mey. ex Bong., *Cistanche* Hoffmanns. & Link, *Christisonia* Gardner, *Gleadovia* Gamble & Prain, *Lathraea* L. and *Orobanche* L. Of these, three genera (*Boschniakia*, *Gleadovia* and *Lathraea*) are seen only in Himalaya (including NE states) in India, *Christisonia* is only in Western Ghats and Himalayas (including NE states), *Aeginetia* with a wide distribution throughout the country, *Cistanche* with localized distribution in arid areas of Western India, and *Orobanche* with main diversity in Himalayas but a few with extending distribution to peninsular India. These observations imply, the distribution holo-parasitic Orobanchaceae in India is primarily correlated to the distribution of hosts. The genus *Strobilanthes* is one of the primary targets of majority of *Christisonia* species, results the diversity of *Christisonia* is very rich in Western Ghats, where the genus *Strobilanthes* is diverse and shows high endemism. The host parasitic pattern of *Boschniakia*, *Gleadovia* and *Lathraea* is also supporting this view, because their hosts are diverse in Himalaya (including NE states). *Cistanche* prefers arid growing plants as hosts. The *Orobanche* species with wild hosts in Himalayas are restricted in distribution, whereas the members which attack cultivating plants show wide and extending distribution. *Aeginetia indica* prefers wide range of monocots and *A. acaulis* prefers commonly available wide distributed grass genera as their hosts, which results wide distribution of the genus *Aeginetia* in India.

**Keywords:** Holo-parasitic, angiosperms, Orobanchaceae

## KSM 10

### **Taxonomic Revision of Acaulescent Species of *Sonerila* Roxb. (Melastomataceae) in India**

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*Sonerila* Roxb., a species-rich, taxonomically complex, tropical Old World genus of the family Melastomataceae (tribe Sonerileae), is represented by around 180 taxa. The genus includes caulescent and acaulescent herbs, and is incredibly diverse, not surprisingly taxonomically difficult. It is distributed mainly across Sri Lanka, India, Nepal, Bhutan, South China, Taiwan, Indo-China and the Malay Archipelago. It occurs in diverse habitats viz., semi-evergreen forests, sholas, forest margins, grasslands, ghats, laterite cuttings, cliffs and rock crevices of mountains or hills and near streams, between 13–2300 m elevations. It is the largest genus in the tribe Sonerileae with 49 species and one variety in India, and exhibits high percentage of endemism. Greater diversity of *Sonerila* occurs in the Western Ghats, where 43 species and one variety are found with 86 % of endemics. Following C.B. Clarke's (1879) treatment in *Flora of British India*, there has been no revision, and the genus remained taxonomically neglected in India. As a part of the ongoing systematic studies, *Sonerila* in India is revisited based on herbarium data and field studies. Out of the 50 taxa in India, 14 are acaulescent, with a basal rosette of leaves and with tubers or rhizomes. The present work highlighted a taxonomic revision of acaulescent species of *Sonerila* in India, discussing its diversity, including key for the identification of taxa, detailed descriptions, notes on infraspecific variations, geographical distribution and conservation assessment. Nomenclatural problems relevant to the taxonomic study were also resolved resulting in subsequent synonymy and typifications.

**Keywords:** *Sonerila* Roxb., Taxonomic Revision, Acaulescent, Melastomataceae

## KSM 11

### **Diversity of Tree Species and Mapping of Riparian Vegetation of Dudhganga River in Kolhapur District**

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Riparian Vegetation is one of the most diverse and complex ecosystems on the planet earth. Which provide resources for a wide variety of species. It delivers a series of ecological services significant for the balancing of the environment. Present work highlights the diversity of tree species in riparian vegetation of the Dudhganga River in Kolhapur District and the importance of monitoring and restoring the biodiversity of riparian vegetation dominated by human activities. Extensive field visits have been conducted from January 2021 to May 2022 in the riparian area of the Dudhganga river. The normalised difference vegetation index is a reliable indicator for temporal changes in the riparian vegetation. LANDSAT 5 and LANDSAT 8 satellite data were used to calculate vegetation indices from USGS Earth Explorer. There are 67 tree species diversity discovered during the field visits and mapping of 52 erosion points and 38 destruction sites in riparian vegetation were done. The NDVI data and extensive field survey shows that the study area is under tremendous pressure due to anthropogenic activity like farming, developmental activity and denudation of riparian trees. The present study suggests that due to the continuous heavy pressure of anthropogenic activities on the riparian vegetation and soil erosion the riparian vegetation of Dudhganga river is in heavy threat and needs to be conserved.

**Keywords:** Dudhganga, Riparian, Vegetation, Tree species



## KSM 12

### A taxonomic revision of genus *Abutilon* Mill. (Malvaceae: Malvoideae) in India

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Present paper encompasses a taxonomic revision of genus *Abutilon* in India supported by seed morphology with the help of scanning electron microscopy. 12 species and two varieties are recognized from India. An artificial key is provided for the identification of species and varieties. Intraspecific taxa viz., *A. bidentatum* var. *major*, *A. fruticosum* var. *chrysocarpa*, *A. hirtum* var. *heterotrichum* are synonymized with their main species for the first time. *A. indicum* subsp. *guineense* is reinstated as distinct species and *A. pakistanicum* is determined as an excluded species. Throughout the study, seed micro-morphology is identified as an important tool to discriminate the taxa at inter-specific level. The previously proposed infraspecific classification of *A. indicum* is not applied in the present study which is corroborated by morphological and distribution features of the taxa.

**Keywords:** *Abutilon* Mill., Malvaceae, Malvoideae, taxonomic revision

**PROF. T. R. SAHU AWARD:  
MEDICINAL PLANTS SYSTEMATICS  
[TRS]**

## TRS 01

### **Health Perspectives of Thakar Tribe with Respect to Seasonal Wild Vegetable in Northern Western Ghats of, Maharashtra**

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Many wild Plants are being used as vegetable since ages by local/ tribal people. A Study was undertaken to find out the perspectives of Thakar Tribe residing within the boundaries of Kalsubai Harishchandragad Wildlife sanctuary in the Northern Western Ghats of Maharashtra. The study revealed that, most of the vegetables are used keeping some health benefits in mind. Total 37 plant species are revealed as wild vegetables used in different seasons. The main health issues are increasing immunity; prevent skin diseases or infection, gastro-intestinal problems, body temperature/fever, joint pain, kidney stone, vision problem, asthma and blood sugar level.

**Keywords:** Thakar Tribe, Western Ghats, Wild Vegetable

## TRS 02

### **Bioprospecting of Ripe and Unripe Fruits of *Spondias pinnata* (L.f.) Kurz**

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*Spondias pinnata* is a member of the Anacardiaceae family. The wild fruits are palatable. It was discovered that the species was indigenous to Bali in the first scientific study on its existence there. The results of current study suggest that, unripe fruits showing highest DPPH ( $84.66 \pm 0.09$ ), Ferrous ion chelating ability ( $75.64 \pm 0.17$ ), Nitrous oxide scavenging activity ( $71.18 \pm 0.11$ ), Super oxide anion scavenging activity ( $75.24 \pm 0.62$ ) than the ripe fruits. Whereas reducing power ( $1853.44 \pm 0.05$ ), ABTS ( $98.07 \pm 0.09$ ), FRAP ( $1076.81 \pm 0.24$ ), DMPD ( $80.05 \pm 0.29$ ) and total antioxidant capacity ( $146.98 \pm 0.45$ ) were higher in ripe fruits. In secondary metabolites ripe fruits had the highest level of alkaloids ( $2094.47 \pm 0.88$ ), while flavonoids ( $490.0 \pm 2.54$ ) and total phenolic ( $1082.89 \pm 0.57$ ) contents were observed in unripe fruits. Nutritional analyses were also performed. Unripe *Spondias pinnata* fruits were tested for their ability to inhibit the growth of human lung (A549), breast (MCF7), and prostrate (PC3) adenocarcinoma cell lines. Unripe fruits displayed more anticancer action than ripe ones.

**Keywords** – Antioxidant, secondary metabolite, nutritional analysis, anticancerous, ripe and unripe fruit and *Spondias pinnata*

## TRS 03

### **Study of Highly Traded Medicinal Plant of *Pistacia chinensis* Subsp. *Integerrima* (J.L.Stewart) Rech.f. in Different Markets of India**

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In India, the genus *Pistacia* is represented by two species viz. *Pistacia chinensis* subsp. *integerrima* (J.L.Stewart) Rech.f. and *Pistacia khinjuk* Stocks. These species are distributed in Himalayan range and Shiwalik hills of India, Afghanistan, Pakistan and Nepal between 600 and 2400 m asl. *Pistacia chinensis* subsp. *integerrima* (Family: Anacardiaceae) is used as Karkatashringi in Ayurveda System of Indian Medicine. The galls formed in the leaves are used and traded across the country. Gall is one of the 58 ingredients of Chyavanparash. Gall, stem, bark and leaves are also used in cough, asthma, dysentery, liver disorders, snake bite, diarrhea and diabetes. Rigorous market studies were undertaken across major markets in the country. The samples were collected and the identities of the botanicals were confirmed. The current research highlights the macroscopic and microscopic characters of five botanicals traded in the name of Karkatashringi in Indian market. This study is vital in the current trade scenario as it is not only helpful in the proper identification of the genuine materials in use but also to distinguish different species of galls, where the galls are often admixed with other species galls in the crude drug markets.

**Keywords:** Medicinal Plant, *Pistacia*, Anacardiaceae

## TRS 04

### **Wild Medicinal Plants of Ranebennur Blackbuck Sanctuary (RBS), Haveri District, Karnataka**

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The present study is focus on medicinal plants used by herbal healers in and around the 'Ranebennur Blackbuck Sanctuary' which is situated in the Ranebennur taluka of Haveri district, Karnataka. The survey was conducted from September 2020 to April 2022. Data about medicinally important plants was collected through interviews, using semi-structured questionnaire and field observation with 25 local herbal healers. It reveals a total of 41 medicinal plant species, belongs 38 genera and 23 families used to treat 37 human and 2 livestock ailments are enumerated. The current trend showed a reduced number in traditional herbal healers, since the younger generation is not interested to continue these traditional practices. Hence, there is an urgent need to document and preserve all available information on plants used by different herbal healers for various purposes before it is being vanished. This preliminary information on medicinal plants of RBS is serves as the baseline data for future conservation, sustainable utilization and management activities.

**Keywords:** Ailments, Blackbuck Sanctuary, Haveri, Karnataka, Medicinal plants, Ranebennur.

**FR. ANTHONY MUKKATH –  
K. S. MANILAL AWARD:  
MODERN TECHNIQUES IN PLANT  
TAXONOMY [AM-KSM]**

## AM-KSM 01

### **Biosystematic Studies in *Ledebouria revolute* (L.f.) Jessop (Asparagaceae) From India**

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The genus *Ledebouria* Roth. comprises more than 78 species and four infraspecific taxa and is distributed throughout the Old World mainly Madagascar and sub-Saharan Africa. *Ledebouria revolute* is widespread from Africa to India and shows great diversity both in morphology and chromosome number. A total 27 populations of *L. revolute* were collected from different regions of India. These exhibited significant variations with reference to shape, size and blotching pattern of leaves. Of the 27 populations, 20 were studied from mitotic and 23 from meiotic point of view. In the present work data on morphology, leaf cuticular parameters, chromosomes and palynology are provided. The size of leaves ranged from  $3.3 - 33.7 \times 0.4 - 4.0$  cm. Leaf shapes such as ovate-obovate, narrowly to broadly lanceolate, linear-lanceolate, oblong, elliptic, etc. were observed. Leaves were amphistomatic and the stomata anomocytic in all the studied populations. Four cytotypes were recorded in the present study, i.e.,  $2n=2x=30$ ,  $2n=3x=45$ ,  $2n=4x=60$  and  $2n=6x=90$ . Pollen grains were monosulcate with reticulate ornamentation. P/E ratio ranged from 0.50–0.69.

**Keywords:** Biosystematic, *Ledebouria revolute*, Asparagaceae, India



## AM-KSM 02

### **Analysis of Leaf Shape Variation of Selected *Ipomoea* L. Species (Convolvulaceae) Using Elliptic Fourier Descriptors**

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Leaves are one of the most significant organs for plants identification due to their variability across different taxonomic groups. Leaf morphology provides distinguishing features which helps in discernment of plant species. Traditional morphometrics has contributed greatly to reduce the problems of plant identification and morphology-based species delimitation. Image analysis and digital morphometrics have made it easy to detect more characters to complement existing leaf data set in recent years. This study aimed to investigate leaf shape variation between some species of genus *Ipomoea* using geometric morphometric method (GMM). We have examined more than 500 leaves from 21 different species of *Ipomoea* using morphometric technique. We identified different shape variation due to the result of differing length to width ratio, shape, and size changes. The variations were mainly due to changes in leaf blade ratio, size, and shape of the posterior lobes of leaves and anterior lobes differentiation. Obtained results suggest that leaf blade ratio was highly correlated with first principal component (PC-1) of morphometric variation calculated using elliptic Fourier Descriptors (EFDs). Subsequent PCs corresponded to complex shape variation which cannot be captured by traditional linear measurements. ANOVA showed a significant difference ( $p = 0.001159$ ) among the 21 species of the *Ipomoea* genus. Based on the results obtained, we can suggest that geometric morphometric of leaf shape is effective in interspecific discrimination within members of genus *Ipomoea*. Further morphometric studies of leaf shape involving a larger number of samples especially in the study of intergeneric and inter specific variation are suggested.

**Keywords:** Leaf Shape, Variation, Convolvulaceae, Elliptic Fourier Descriptors

### AM-KSM 03

## ***Utricularia* L. Section *Phyllaria* (Kurz) Kamienski (Lentibulariaceae) in India, with Notes on a Little Known Tuberos Species *U. brachiata* Oliv.**

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*Utricularia* L., the largest genus in the carnivorous family Lentibulariaceae, comprises about 250 taxa in the world (Miranda *et al.*, 2021). It is represented by 42 species under eight sections in India, with a sizable percentage (36%) of endemism. *Utricularia* section *Phyllaria* (Kurz) Kamienski, is a very distinct group comprising of 15 species, of which five species occur in India. This section includes small lithophytic or epiphytic herbs, characterized by obovate to reniform leaves on stolon base, traps with laterally positioned mouth, very unequal calyx lobes and seeds with varied testal outgrowths. *Utricularia brachiata* Oliv. is a unique species in this section, having tuber at the peduncle base and stolon tip. It was described from Alpine Himalaya by Oliver (1859) and has been overlooked for past several decades. Only a few reports and collections are there in different herbaria. The species is confined to an elevation of 3500–4200 m, and is incredibly adapted to overcome the harsh environments with its perennating tubers. During our recent field trips to North Sikkim, we collected *U. brachiata* from its type locality, and the morphology and anatomy of this species is discussed here in detail. The present study also reveals the diversity and distribution of *Utricularia* sect. *Phyllaria* in India and the importance of seed micromorphology in species delimitation using scanning electron microscopy.

**Keywords:** *Utricularia*, *Phyllaria*, Lentibulariaceae, India, *U. brachiata*

## AM-KSM 04

### **Quantitative Research Using Biblioshiny Reveals Recent Trends and Breakthroughs in Lamiaceae Research Based on Web of Science Bibliographic Dataset**

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The present study aims to provide recent trends and breakthroughs in lamiaceae research. We employed biblioshiny, a web-based app of bibliometrix, an R package, and VOSviewer for comprehensive science mapping analysis by using the metadata downloaded from the web of science (WOS) Core Collection database using the search string “lamiaceae” (All fields) or “labiatae” (All fields). A total of about 9144 documents included only research articles and proceedings papers published in English language during the period from 1989 to 2021 were retrieved from the web of science. Before the analysis, the downloaded data was subjected to further filtering removed articles published in 2022. The remaining 9091 documents from 1144 different sources by 24,588 authors representing 131 countries were used for current study. The analysis revealed increase as well as minor decreases in annual scientific production over the period with 11.75 % average growth rate and the most relevant author, journal, country, and institution were Baser KHC of Near East University, Turkey (108 articles), Phytochemistry (550 articles), Turkey (2332 articles) and University of Belgrade, Serbia (320 articles) respectively. The results also revealed the nature of collaboration network and the trend-topics in lamiaceae research. This study will definitely provide valuable information to the researchers who are interested in lamiaceae research in the future.

**Keywords:** Package, Bibliometrix, Biblioshiny, Lamiaceae, Labiatae, Scientometrics.

## AM-KSM 05

### Combining the Morphological and Molecular Tools to Understand the Phylogeny of Indian Musaceae

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Musaceae are small, ancient monophyletic family in the order Zingiberales consisting of three genera viz. *Ensete*, *Musa* and *Musella*, mainly distributed in Tropical Asia to northern Australia. Earlier classification of *Musa* based on chromosome number and morphological characters recognized four sections viz. *Australimusa* (2n=20), *Callimusa* (2n=20), *Eumusa* (2n=22) and *Rhodochlamys* (2n=22). But recent molecular study recognizes only two sections in the family. India is well known for the genetic diversity of Musaceae members and represented by two genera, *Ensete* and *Musa*, with two and 32 taxa respectively. However, there is still some disputes in the actual identity of Indian Musaceae members, particularly with regard to *Musabalbisiana* collected from various parts of India and the molecular identity of recently described taxa from India. In this study we checked the morphology based classification by using the molecular signals from nuclear ITS (Internal transcribed spacer) and plastidialtrnL-F, rps16 sequences. Both Maximum likelihood and Bayesian analysis were performed for phylogenetic tree construction. Our results show the incongruence with traditional morphology based classification. So, a revised infra specific level classification of Indian Musaceae is proposed here. The study also helps to solve the complex problems in *M. balbisiana*. In addition, the novelty of recently described taxa from India was resolved.

**Keywords:** Morphological, Molecular Tools, Phylogeny, Musaceae

## AM-KSM 06

### Utility of 3-Locus DNA Barcoding for Molecular Identification and Discrimination of Intraspecific Rice Genotypes Found In the Coastal State of Goa, India.

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Rice (*Oryza*) is one of the most important crops, supporting half of the world's population. Breeding of high-yielding and quality cultivars relies on genetic resources from both cultivated and wild local species. Diverse landraces and wild rice in the coastal areas, has been known for a better adaptation to the local stress conditions, such as salinity, and submergence. The genetic diversity among and between these genotypes, brings a potential for future crop improvement. But to accomplish this, correct identification and maintenance of purity of these rice genotypes is essential. Utility of DNA barcoding which makes use of short sequences from a standardized region of a genome to provide quick and reliable identification, to complement traditional taxonomic expertise for species identification and biodiversity inventories has been suggested. Although there still exists an argument on the best standard loci that may be utilised. Hence, in this study we evaluated the performance of three plant DNA barcoding loci (*matK*, *rbcL*, and *psbA-trnH*) to aid in the identification, discrimination and inventorization of 30 local rice genotypes that included 20 landraces, 4 local rice varieties, 3 wild rice and 3 rice varieties cultivated throughout the southern parts of the country. The performance results of the three DNA barcoding loci i.e., *matK*, *rbcL*, and *psbA-trnH* to identify and discriminate the rice genotypes, individually and in combination will be discussed in the study.

**Keywords:** PCR, SNPs, Genetic Diversity, Polymorphism, Bioinformatics,

## AM-KSM 07

### Evaluating the Monophyly of the Genus *Murdannia* Royle in India Based on Molecular, Morphological and Cytological Data

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*Murdannia* Royle, one of the largest genera of Commelinaceae (subfamily Commelinoideae, tribe Commelineae) comprising about 60 species, is distributed in the neotropics and paleotropics. The genus is much more diverse in Asia, where more than half of the recognized species and a wide range of morphological diversity are known to occur (Pellegrini *et al.*, 2016). India is the major center of diversity with *c.* 38% of endemism. In the present study, *rbcL* sequences were used to conduct monophyly analyses of Indian *Murdannia* as well as the individuals from other genera belonging to the tribe Commelineae. Both ML and Bayesian analyses were performed. Besides, nuclear ITS and *rps16* intron regions were used for analyzing intrageneric relationships. In this analysis, the genus was resolved into two major clades. *Murdannia semiteres*, *M. sahyadrica*, *M. clarkeana*, and *Anthericopsis sepalosa* (= *Murdannia sepalosa*) form the one clade having a basic chromosome number of  $x=6$  and have many interesting features apart from all others except for *M. sepalosa* having  $x=7$ . The remaining species form the other clade having basic chromosome numbers of  $x=10$  and  $9$ , with  $x=10$  as the dominant line. Including *Anthericopsis sepalosa* the genus is confirmed as monophyletic. For five species, the newly discovered chromosome number is included while three other species underwent cytological examination to support earlier findings. In this paper, the monophyly of the genus is discussed based on molecular, morphological and cytological evidence.

**Keywords:** Monophyly, *Murdannia*, Molecular, Morphological, Cytological data

## AM-KSM 08

### Analysis of Chemical Composition and Biological Activities of Leaf, Stem and Bark Extracts of *Homonoia riparia* Lour.

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*Homonoia riparia* Lour. (Euphorbiaceae) is shrub distributed throughout the South and Southeast Asian countries and well known for its medicinal properties. Hence, the present study was planned to carry out comparative phytochemical analysis and antioxidant, antibacterial and cytotoxic activities of methanolic extracts of leaf, stem and bark of *H. riparia*. Qualitative phytochemical analysis indicated the presence of phenolics, flavonoids, saponins and alkaloids. Further, with GC-MS screening, from leaf, stem and bark extracts, a total of 33 major phytochemicals were identified. The major compounds of leaf, stem and bark were found to be Cycloecalenol, 7,9-Ditert-butyl-1-oxaspiro(4,5) deca-6-9-diene-2,8-dione and Methyl isopalmitate, respectively. DPPH radical scavenging activity of leaf, stem and bark extracts were found to be  $3.18 \pm 0.87$ ,  $2.54 \pm 1.09$  and  $4.82 \pm 0.59$  mg GAE/g, respectively. Antibacterial activity of the extracts against two Gram-positive bacteria, *Staphylococcus aureus* and *Bacillus subtilis* and two Gram-negative bacteria, *Escherichia coli* and *Pseudomonas aeruginosa* proves the impressive activity of the extracts. Among the extracts tested, the leaf extract showed highest activity. All the extract showed significant cytotoxicity against HEK 293 cell line with the IC<sub>50</sub> values comparable with that of standard. Thus, with the presence of wide array of phytochemicals, leaf, stem and bark extracts of *H. riparia* showed impressive biological activities and hence they can be considered for their medicinal properties.

**Keywords:** Chemical Composition, Biological Activities, Leaf, Stem, Bark Extracts

## AM-KSM 09

### **Phytochemical Characterization, Antioxidant and Larvicidal Efficacy of *Holigarna arnottiana* Hook.f.**

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Genus *Holigarna* is a group of tree species belonging to the family Anacardiaceae and most of them are endemic to the Western ghats of India. Species of this genus are known for their traditional uses to treat various maladies such as dysentery, arthritis, skin diseases haemorrhoids and wound infections. *H. arnottiana* Hook. f. is a well-known species in native communities due to its medicinal uses and their contiguous latex is responsible for irreversible skin damages. Different parts of *H. arnottiana* proved to exhibit antioxidant, anti-inflammatory, and anticancer properties which are attributed to bioactive compounds present in them. The present study was intended to explore the phytochemical composition and larvicidal potential of bark and latex of *H. arnottiana*. The methanolic extract of bark possessed 13.72 mg/g of flavonoids and 9.32 mg/g of phenolics along with other phytochemicals. Acetone treated latex also composed 12.40 mg/g of flavonoids and 7.27 mg/g of tannins. Antioxidant activity was carried out by DPPH, FRAP and TAC assay. TAC assay of latex demonstrated highest antioxidant activity (386.82 of AAE  $\mu\text{g/ml}$ ) compared to methanol (217.83 of AAE  $\mu\text{g/ml}$ ) and water extracts (183.23 of AAE  $\mu\text{g/ml}$ ) of bark. All the samples were checked for larvicidal activity and they demonstrated better activity after 24hours. Latex unveiled highest larvicidal activity with promising  $\text{LC}_{50}$  (0.815 mg/mL) and  $\text{LC}_{90}$  values (2.897 mg/mL).

**Keywords:** Anacardiaceae, *Holigarna*, Antioxidants, Larvicidal, Phytochemicals



## AM-KSM 10

### **Phylogenetic Signal to identify novel sources of anti-pyretic compound Andrographolide in genus *Andrographis* Wall. ex Nees based on Metabolomics-approach**

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Plants are a major source of therapeutic compounds in the form of herbal preparations and purified compounds. *Andrographis paniculata* (Burm.f.) Wall. ex Nees, which contains andrographolide as the major bioactive compound, is widely used for fever treatment and hepatoprotection. However, overexploitation of this species necessitates the need for effective alternatives. We analyzed the phylogenetic relationships and phytochemical distribution to explore new sources of andrographolides. Fifty accessions from 12 species of *Andrographis* were collected and their phylogenetic relationships established using *rbcL* and *trnL-trnF* DNA barcode markers. The observed phylogeny was largely concordant with existing taxonomic classification. High-performance thin layer chromatography was used to determine the andrographolide content of aerial plant parts. In addition to *A. paniculata*, *A. gracilis* Nees, *A. affinis* Nees, and *A. ovate* (T. Anderson ex Bedd.) Benth. & Hook.f. were found to have a significant quantity of andrographolide. Mapping of andrographolide content on the phylogeny based on metabolomics-approach showed significant phylogenetic signal in selection of species allies for chemical screening, which were clustered with the high content plant source i.e. *Andrographis paniculata*.

**Keywords:** *Andrographis*, *trnL-trnF*, HPTLC, Andrographolide, Phylogenetic signal, APE, Phytools



**PROF. M. SABU AWARD [MS]:  
ANGIOSPERM TAXONOMY  
(FOR TEACHERS AND SCIENTISTS)**

Organized by Department of UG, PG and Research in Botany, Karnatak University's, Karnatak Science College, Dharwad, Karnataka - 580 001

**MS 01**

## **Vegetation Profile Diagram of Three Selected Sites of Guna District, Madhya Pradesh**

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Profile diagram is a pictorial representation of the structure and vertical stratification of the vegetation, is used in illustrate detail in vertical spacing of species, which are not representable in layer diagram. These profile are based on the measurement of the trees within the suitable plot, usually (61×7.5 m) and (122×7.5 m) in a size and select as representation of vegetation.in present study profile diagram were prepared in three selected sites i.e.Gader, Garha and Kedarnath of Guna district Madhya Pradesh.by taking 30 m long and 5 m deep in all three study sites mainly all woody plants were include in the profile diagram in present study we follow profile diagram methods used by Beard (1946), David-Richard (1933) and Knight method.

**Keywords:** Profile diagram, pictorial, vegetation, stip, measurement, woody.

**MS 02**

**Role of Terpenes Derived from a Member of Lamiaceae  
*Pogostemon benghalensis* (Burm.f.) Kuntz,**

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*Lamiaceae* (Labiatae) is commonly known as mint family of flowering plants particularly valued for aromatic herbs with potential application in flavorings, cosmetics, perfumery as well as medicinal preparation. For the last four-five decades, the conventional use of medicinal plants has been strengthened through the isolation of active compounds. *Pogostemon benghalensis* (Burm.f.) Kuntz, is a member of Lamiaceae family and it occurs in open riverine forest and cultivated in almost all parts of India, Bangladesh, Sri-Lanka, Nepal (Burma), Myanmar, Thailand, China, Indonesia, Malaysia, Mauritius, Philippines, West Africa and Vietnam. It is commonly called Patchouli and this species of the genus *Pogostemon* is a bushy herb of the mint family. In all living organisms terpenoids play a role in respiration chain electron transport, plants are one of the major sources of terpenoids. Other known functions of plant terpenoids include important roles in stress response or in defense mechanisms. Terpenoids occur mostly in higher plants. The present investigation revealed presence of some important terpenoids in leaves of *Pogostemon benghalensis* oil such as Bornylene, N-Phenylpiperidine,  $\alpha$ -Cuprenene, Seychellene,  $\alpha$ -Muurolene,  $\beta$ -Santalolm, Molinate, 4-Octylaniline,  $\alpha$ -Caryophyllene alcohol, Salvene.

**Keywords:** *Lamiaceae*, *Pogostemon benghalensis*, Terpenoids,

## MS 03

### Intraspecific Variations in *Curcuma inodora* Blatt.

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Genus *Curcuma* L. (Zingiberaceae) comprising of 120 species is distributed South and South-East Asia, with few species to China, Australia and South Pacific.; 40 species from India . Four species of *Curcuma* are reported from Melghat, Amravati, Maharashtra. *C. longa* is cultivated, while *C. inodora*, *C. pseudomontana* and *C. decipiens* are wild. *Curcuma inodora* is known as 'Jangali Halad' at higher elevations. In *C. inodora* species is shown high variations in aerial as well as underground characters. 12 distinct variants of *C. inodora* and one accession each of *C. pseudomontana* and *C. longa* were collected. *C. decipiens* could not be collected. For *Curcuma* species position of spike is considered as key character, length of leaf stalk and shape of root tubers. Cluster analysis of 50 morphological characters done by UPGMA using PAST software placed 12 variants in to two clusters as per Peldjis method A and in three clusters as per the method D. Molecular genetic fingerprint of three *Curcuma* species and twelve variants of one species were developed using ISSR and RAPD marker to elucidate the genetic diversity and relatedness among the species and within the species. Five primers of ISSR and RAPD were used. ISSR and RAPD primers produced bands of which many were polymorphic. Dendrogram was constructed based on UPGMA by using MEGA software. Cluster analysis of ISSR and RAPD data placed *C. pseudomontana* and *C. longa* in one cluster and twelve variants of *C. indora* in single cluster showing distinct subclusters indicating the relatedness and also the genetic distance pointing out clear polymorphism within the species. *C. pseudomontana* and *C. longa* stand distinct. Genetic polymorphism is leads to evolutionary changes within and among species and to genetic diversity. This indicates the adaptive and evolutionary potential of *C. inodora* populations. It is therefore suggested that these populations growing in Melghat should be conserved with utmost care to save the future evolutionary lines.

**Key words:** - *Curcuma inodora*, *C. pseudomontan*, *C. longa*, UPGMA, PAST

**MS 04**

**Anomalous Transient Secondary Thickening During Developmental Stages in the Stem of *Vincetoxicum indicum* (Burm.f.) Mabb.**

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To facilitate the twining of stem around a support, *Vincetoxicum indicum* (Burm.f.) Mabb., was observed to exhibit phenomenal modifications showing transient anomalous secondary thickening during to facilitate the twisting of stem around a support. The very young stem showed a continuous cylindrical shaped primary xylem, with the protoxylem differentiated into two large bundles on the opposing sides, interspersed with numerous smaller bundles in between. During the initial stages of maturation, the cambium outside the two large protoxylem groups showed abnormal behaviour by producing more phloem outwards and little or no secondary xylem inwards. This leads to formation two wedge shaped phloem bundles on opposite sides. The formation of crescent shaped secondary xylem on the other two sides in perpendicular direction resulted in bulging of these sides away from the anomalous cambium to create a rectangular stem having two broad sides. These broad sides were used as the facing sides of stem against a support. This anomaly was reversed as soon as the twisting nature was established, and the anomalous cambial patches started to grow normally in order to produce a complete ring of secondary xylem. Since this abnormal behaviour occurred only during the initial twisting of stem, this is considered as an anomalous secondary thickening as an adaptation. The tender primary xylem, with non-lignified xylem tracheids, allows the flexibility and immediately the abnormality get started by stopping the production of hard lignified xylem tracheids and vessels at the region of contact so that the stem outline becomes rectangular to facilitate more area on the surface of contact.

**Key Words:** *Vincetoxicum indicum*, Transient Anomaly, Anomalous Secondary Thickening, Phloem Wedges.

## MS 05

### Angiospermic Flora of Balaghat Ranges of Maharashtra, India

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The floristic survey has been carried out to enumerate floristic diversity of Balaghat Ranges. Balaghat Mountain range is an eastward spur of Western Ghats of India (Sahyadri Mountain). The vegetation of Balaghat Ranges is quite varied and interesting. The terrain supports unique tropical dry deciduous forest and open scrub vegetation with vast grasslands. The grasslands of Balaghat Ranges are unique and popularly known as Indian Savannas, they provide habitat to more than 100 bird species, which include the critically endangered Great Indian Bustard. In the present work, 1585 species including infraspecific taxa belonging to 710 genera and 129 families of flowering plants have been recorded from Balaghat Ranges of Maharashtra. Out of 1585 taxa, two are belonging to Ana Grade, 11 to Magnoliids, 354 to Monocots, 1 to sister of Eudicots, 10 to Eudicots and 1207 are belonging to CoreEudicots of APG IV system of classification. The present work includes new discoveries like *Curculigo janarthanamii*, *C. sabui*, *Crotalaria kanchiana*, *Crinum solapurensense*, *Vigna pandeyana* and *Vigna yadavii*, while *Astraea lobata* and *Crypsis aculeata* have recorded for the first time to India. About 353 species including infraspecific taxa have reported for the first time from Balaghat Ranges of which 27 taxa form new record to Marathwada region. About 286 medicinal plants and 75 endemic plant species have been recorded from the study area of which *Indigofera deccanensis* critically endangered Red listed species and *Crotalaria decasperma* are known only from the study area. About 100 line drawings and good quality photographs are included in the present work. The present floristic studies of Balaghat Ranges of Maharashtra have revealed that the region demonstrates ample range of species diversity and growth forms.

**Key words:** Angiosperm Flora, Balaghat Ranges, Maharashtra, India, Taxonomy.

**MS 06**

**Character Delimitation for Identifying *Dipcadi* Medik.  
from Maharashtra and Adjoining Regions**

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In India there are 14 species and 2 varieties of the genus *Dipcadi* Medik. of which 8 species and 1 variety are found in Maharashtra. Overlapping of morphological characters makes identification of members from this genus troublesome. This paper is an attempt to delimit species boundaries and boot out unreliable characters to aid in correct identification. Supplementary parameters like, geographical distribution, elevation pattern, cuticular studies, etc. are used in combination to draw conclusions on the relatedness and identity of these species.

**Keywords:** Characters, Cuticular Studies, Delimitation, *Dipcadi*, Morphology.



**MS 07**

**Resolving *Grewia oppositifolia* (Malvaceae: Grewioideae) Complex in India**

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The name '*Grewia oppositifolia*' first appeared in William Roxburgh's *Hortus Bengalensis* (1814) based on the collection from Francis Buchanan-Hamilton. But in the absence of a description the name was not validated. The name had been validated by A.P. de Candolle (1824) published *Grewia oppositifolia* Buch.-Ham. ex DC., and David Don (1825) *Grewia oppositifolia* Buch.-Ham. ex D.Don. The latter is an illegitimate later homonym. Drummond (1911) noted that Buchanan-Hamilton applied the name '*Grewia oppositifolia*' to at least one specimen from Mysore in Southern India, as well as Nepal. Drummond considered Buchanan-Hamilton's Mysore plant, as represented by a specimen in BM, to be the same as *Grewia emarginata* Wight & Arn. (1834). The Nepal plant, upon which Don's and Roxburgh's names were based, was a different species, known by the Hindi name 'bhimal'. Drummond, without explaining why, considered de Candolle's name to be based on Buchanan-Hamilton's Mysore collection. Burret (1926) was clearly influenced by Drummond, and published *Grewia optiva* J.R.Drumm. ex Burret as a replacement name for *Grewia oppositifolia* Buch.-Ham ex D.Don, in the belief that *Grewia oppositifolia* Buch.-Ham. ex DC. is the correct name for the South Indian species. Herewith, based on the protologue, original material, field and herbarium studies it is concluded that to maintain nomenclatural stability and highlight the current taxonomic complex. The use of small tree called 'Bhimal' viz. *Grewia optiva* over *G. oppositifolia* should be continued for the elements from NE India and Himalaya. Whereas, an endemic peninsular Indian *G. emarginata* should be used for straggling, shrubby element over the *G. oppositifolia*. This work cum proposal and taxonomic note will effectively suppress the use of '*Grewia oppositifolia*' and send out the simple message to the users of plant names that '*Grewia oppositifolia*' is no longer to be employed.

**Keywords:** *Grewia oppositifolia*, Malvaceae, Grewioideae, Complex

**MS 08**

## **Cyanogenesis in Angiosperms**

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Cyanide exists various forms in nature as salts of Sodium, Potassium and Calcium beside these, hydrogen cyanide or hydrocyanic acid or prussic acid is produced by number of plants of the World flora. In plants Cyanogenesis is a biochemical defence mechanism to protect themselves from microbes as well as from herbivore. Amygdalin, Dhurrin, Prunasin Linamarin, Lotaustaralin Cardioispermin etc. are the cyanogenic glycosides present in plants. On hydrolysis these glycosides release hydrogen cyanide. Poisoning of prussic acid is not only to the animals that eat cyanogenic plant but also to the plants themselves. To prevent poisoning themselves the plants store cyanogenic glycosides in a vacuole of the cell and the enzyme that act to produce hydrogen cyanide in a separate compartment. When a cell is damaged the compartments walls are beaked and the reaction takes place. In this way hydrocyanic acid is produced by plants only when they needed. Many Agriculturally and Horticulturally important plants known to contain quite a good amount of hydrocyanic acid in them Cassava (*Manihot esculenta* Crenz.-Euphorbiaceae) and ii) Sorghum (*Sorghum vulgare* Pers.- Poaceae ) are the staple food of millions of people in the World. Cassava root is a staple food of Australian and African peoples. Consumption of insufficiently processed cassava roots implicated neurotoxic effects which is a havock in African Countries. In the present study detection of hydrogen cyanide in some of the members of different families of angiosperms has been reported.

**Keywords:** Cyanogenesis, Cyanogenic glycosides, Prussic acid, Toxicity

**MS 09**

***Shrirangia*: A New Genus of Apiaceae from Lateritic Plateaus of Konkan Region of Maharashtra, India**

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*Shrirangia*, a new monotypic genus of the family Apiaceae from low elevated lateritic plateaus of south Konkan region of Maharashtra, India, is described with a new species, *Shrirangia concanensis*. The new genus is related to Himalayan genus *Chamaesium* Wolff by the carpological characters and also shares some common characters with the Indian endemic genera, Karnataka and Polyzygus such as white brilliant flowers and tuberous habit. But its carpological characters are very distinct from those genera viz: many (c. 10) ribbed fruit, primary and secondary types of ribs present, commissure plain undulate with 6–7 secondary ribs and vallecular and second types of vittae at dorsal face. Carpological characters are highly applicable for generic and species hierarchy in the family Apiaceae. Thus, in present communication also elaborate comparative carpological characters of Polyzygus, Karnataka and *Shrirangia*.

**Keywords:** Angiosperms, Eudicots, gen. nov., low elevation, *Shrirangia concanensis*, Apiaceae.

**MS 10**

**Ethnomedicinal, Phytochemical and Antimicrobial Studies on Some Medicinal Plants of Visakhapatnam District, Andhra Pradesh, India**

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A detailed investigation on medicinal plant taxa associated with the local tribes is taken up with the objectives of an intensive field exploration studies in the areas of tribal inhabitations, and to screen the selected medicinal plants for their ethnomedicinal uses, phytochemical and their antimicrobial properties. Traditional uses of 181 plant species belonging to 154 genera representing 81 families have been used for 136 different diseases. Crude extracts from 26 plant species were found to possess an activity against microorganisms. Methanol extracts possessed strong antimicrobial activity and mode of mechanism of action of the plant materials call for further investigation.

**Keywords:** Ethnomedicine, Phytochemicals, Antimicrobials, Visakhapatnam

## MS 11

### **Ethnomedicinal, Phytochemical Screening and Antimicrobial Studies of Upper Forest Area of East Godavari District, Andhra Pradesh, India**

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A detailed investigation on medicinal plant taxa associated with the local tribes is taken up with the objectives of an intensive field exploration studies in the areas of tribal inhabitations, and to screen the selected medicinal plants for their ethnomedicinal uses, photochemical and their antimicrobial properties. The traditional uses of 186 plant species belonging to 135 genera of 60 families have been recorded. Among them, two are Pteridophyte, 162 Magnoliopsida (Dicotyledonae) and 22 Liliopsida (Monocotyledonae) of Magnoliophyta (Angiospermae). Crude extracts from 15 plant species were found to possess an activity against microorganisms. Methanol extracts possessed strong antimicrobial activity and mode of mechanism of action of the plant materials call for further investigation.

**Keywords:** Ethnomedicine, Phytochemicals, Antimicrobials, East Godavari

**MS 12**

**Ethnomedicinal plants of Malvaceae & Apocynaceae used in Ballari district, Karnataka, India**

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The district Ballari is one of the districts of Hyderabad Karnataka. The district is rich in plant resources. An ethnomedicinal study of some villages in the Ballari district, Karnataka resulted in the documentation of therapeutic uses of locally available medicinal plant resources. The present study deals with the ethnobotanical interpretation of 41 medicinal plant species belonging to Malvaceae and Apocynaceae families used by local people for their primary health care in rural areas of Ballari district.

**Keywords:** Ethnomedicinal plants, Hyderabad Karnataka, Traditional knowledge. Ballari district.

## MS 13

### **Molecular Mechanistic Insights of Plant-based small Molecules on the Replication Cycle of SARS CoV 2**

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Coronavirus disease 2019 (COVID-19) is an illness caused by the new coronavirus severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2). It has affected public health and the economy globally. However, no specific antivirals are available, although several are in development. Currently approved vaccines and other drug candidates could be associated with several drawbacks which urge to development of alternative therapeutic approaches. Aim: The use of safer plant-derived compounds could be a fast-track strategy to control SARS-CoV-2 infection. Methods: This study provides a comprehensive review of anti-SARS-COV-2 activities of plants and their bioactive compounds through *in-silico*, *in-vitro* and *in-vivo* studies of scientific research collected from the diverse bibliographic platforms such as PubMed, Google scholar, web of science. Results: The present study highlights the potential roles of plant-derived small molecules in inhibiting SARS-CoV-2 infection by targeting viral or host factors essential for viral entry, polyprotein processing, replication, assembly, and release. Conclusion: This knowledge could further help identify novel natural chemical entities as lead compounds in the near future to mitigate the COVID-19 pandemic.

**Keywords:** Molecular, small molecules, replication, SARS CoV 2

MS 14

## Overview of Systematic Composition and Endemism in Herbaceous Flora of Lateritic Plateaus of Goa and South Konkan

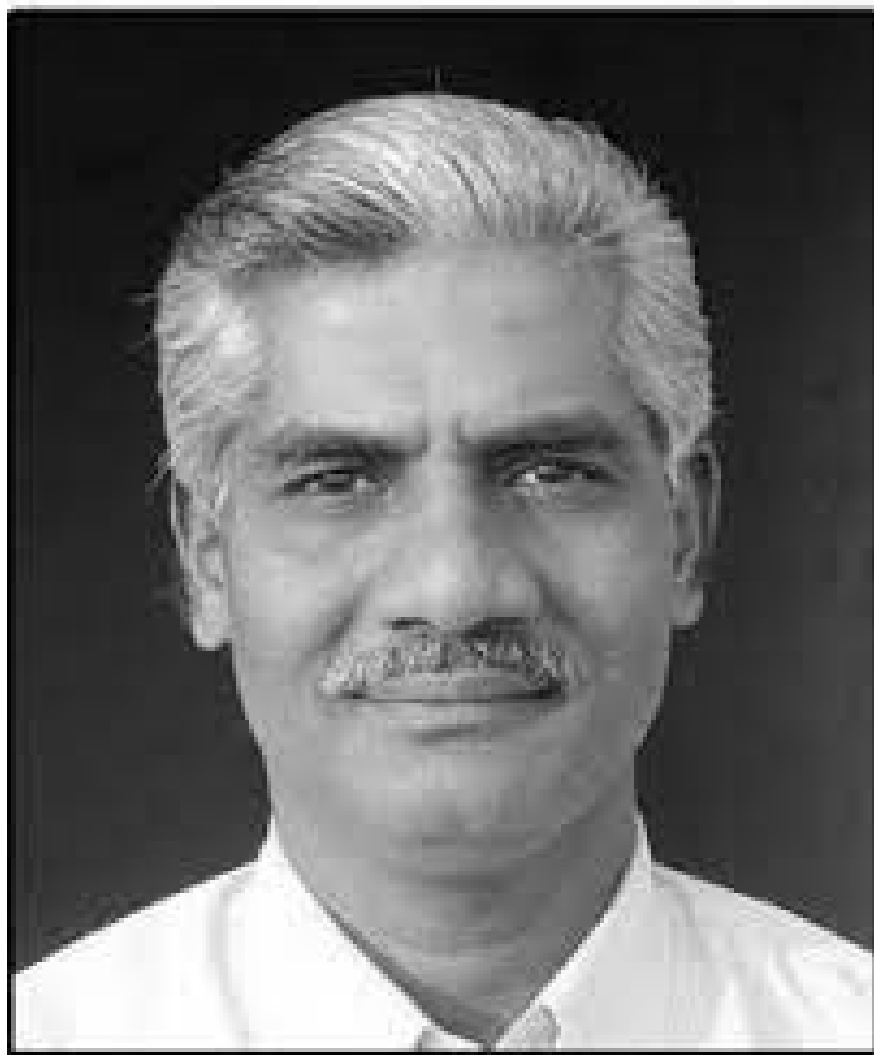
**Rutuja R. Kolte**

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'Endemic taxa' is the term used to denote the restricted distribution of taxon at any rank. Rocky plateaus are one of the endemic species rich habitats in the Western Ghats. Studies have shown, these habitats are dominated by herbaceous endemic flora; which is the important and prominent life form in Indian endemic flora. However, no studies are available to understand systematic composition of endemics at different taxonomic level and altitudinal factor in distribution of endemics. Hence study was carried out to understand systematic composition of herbaceous endemics of lateritic plateaus of Goa and South Konkan. Extensive field surveys were carried out during 2015 – 2020, to collect the herbaceous endemics from the study area. Herbaria were prepared; specimens were identified using local and regional floras. Data was analysed according to APG IV classification. Study has resulted in documenting 387 taxa of herbaceous angiosperms including 106 endemics. Out of 106 endemics, 41 are restricted at high altitude in study area, 42 are restricted at low altitude of study area and remaining 23 are common at both the altitudes. Monocots constitute 67% and eudicots about 32% of total herbaceous endemics in the study area. The order Poales is top ranking with maximum number of genera, total taxa and endemic taxa. Present study shows that, conditions on lateritic plateaus are unique and favourable for monocots for endemism. These lateritic plateaus are acting as refugia for *Eriocaulon* and *Glyphochloa* at generic level, for Poaceae and Eriocaulaceae at family level and for Poales at order level.

**Keywords:** Systematic, Endemism, Lateritic, Plateaus, Konkan





**PROF. S. R. YADAV AWARD:  
POSTER PRESENTATION [SRY]**

Organized by Department of UG, PG and Research in Botany, Karnatak University's, Karnatak Science College, Dharwad,  
Karnataka - 580 001

## SRY 01

### The Genus *Aeschynanthus* Jack (Gesneriaceae) in Northeast India

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Northeast India is nestled in one of the most biodiversity-rich regions of the world, and the two biodiversity hotspots, the Himalayas and the Indo-Burma transverse through this region. The eight north-eastern states contribute 23.75% of the total forest cover of the country. The different, climatic and physiographic conditions of the region, varying from tropical to alpine zones support the growth of large varieties of plant groups including gesneriads. About 75% of the Indian gesneriads are particularly distributed in this region. *Aeschynanthus* Jack the largest epiphytic genus in the family Gesneriaceae, is positioned third among species richness in India. It is distributed from India in the west to the Solomon Islands in the east by crossing Wallace's Line and makes great biogeographical significance. The genus is mainly characterized by its fleshy leaves, scarlet (occasionally green or yellow) tubular corolla, bird-pollinated protandrous flowers, and long appendaged seeds. Among the 28 Indian species, 23 are particularly distributed in Northeast India, of which three are endemic to the country. A taxonomic revision of *Aeschynanthus* in Northeast India with colour photographs, distribution pattern, conservation assessment and updated nomenclature is presented in this study.

**Keywords:** Genus, *Aeschynanthus*, Gesneriaceae, Northeast India

## **SRY 02**

### **Progressive Approaches for Livelihood Enhancement through Conservation and Cultivation of Medicinal and Aromatic Plants.**

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Medicinal and Aromatic Plants (MAP) play a vital role in the health care system as well as their livelihood augmentation for long time. Appropriate use of those resources will help in employment generation and economic progress of the rural people. By constant and increasing demand of natural products such as herbal medicine, pharmaceuticals, nutraceuticals, cosmeceuticals and dyes, cultivation of MAP species has now become a popular and economically viable commodity. State Medicinal Plants Board (SMPB) is promoting conservation and cultivation of MAP with people's participation. In the present paper, a few case studies are presented to highlight the efforts taken by SMPB in these areas. The Flagship programme named "Grameenam" was implemented in selected Gramapanchayaths of Kerala. This five year long project resulted in the development of "Mattathur Model" and produced 400 tons of raw drug from 400 acres in Mattathur Gramapanchayath of Thrissur district. Through this programme, Rs.3 crores worth medicinal plants were sold and generated 20000 man days employment. "Grihachaithanyam", a project for cultivation and conservation of Neem and Curry leaf in each house of Kerala was implemented in 2017-2020. 19 lakhs Neem and 10 lakhs Curry leaf plant seedlings were produced and distributed throughout Kerala by generating around 25000 employment days. To Conserve MAP, enriched 120 acres of land under 79 Sacred Groves with medicinal plants, established a herbal garden with around 200 medicinal Plants in Kerala Rajbhavan, 8 herbagardens in Governmental as well as Non-Governmental institutions and for the production of quality planting materials established 5 model nurseries, 7 small nurseries and 2 seed centres. Thus SMPB is channelizing the medicinal plant resources in various ways for the upliftment and livelihood enhancement of the rural and tribal/marginalised people of Kerala. Details will be covered in the presentation.

**Keywords:** Grameenam, Mattathur model, Medicinal and Aromatic Plants, SMPB,

## **SRY 03**

### **Use of Exotic Fruits as a Source of Nutritional Supplement**

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Now a day's most of the challenging diseases like cardio-vascular disorders, kidney stone, diabetes, neurological disorders, cancer etc. are growing on and create serious problems in human wellbeing. Treatment of these disorders are high costly to layman, hence proper alternative is needed to overcome these major diseases. Most of the ethenobotanical literature reveals the benefits of wild and native species and its benefits for healthy life, but due to the urbanization, poor knowledge about wild flora most of the peoples not showing interest to consume the natural resources like fruits, bulbs, tubers, corms, and grains from wild species of plants. Various exotic fruits are the good source of minerals, alkaloids and amino acids; hence they are the best alternatives in patho-physiology of metabolic diseases/disorders. During the investigation of floristic wealth of Solapur and adjoining region we seen some of the interesting fruits available in the markets and also cultivated by the civilians most of the fruits are exotic. The present paper deals the detailed information on 30 exotic fruits with their botanical names, geographical information, uses and its nutritional value.

**Key words:** Exotic fruits, Nutritional supplements, Diseases, Ethenobotany.

## SRY 04

### Variation in *Portulaca tuberosa* and Reinstatement of *Portulaca badamica* as Distinct Species

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Portulacaceae is a monogeneric family with only a genus *Portulaca* comprising more than 150 species worldwide. In India, it is represented by 11 taxa of which three species are endemic. *Portulaca tuberosa* is a polymorphic species distributed in the Indian subcontinent to North Australia. During revisionary studies of the genus collected different populations of *Portulaca tuberosa* from India with different morphotypes. Detailed studies carried out on variation of *Portulaca tuberosa* with the pictorial presentation. Furthermore, *P. badamica* is a much distinct species in Clade -Pilosa but, misleadingly some workers kept this species under *P. tuberosa*. However, morphological, molecular and SEM studies on *P. badamica* shows *P. badamica* and *P. tuberosa* are unrelated and distinct species. Present work will highlight the variation in *P. tuberosa* which will avoid further confusion while describing new taxon as well as distinctness of *P. badamica* from *P. tuberosa*.

**Keywords:** *Portulaca*, Peninsular India, Micromorphology, Variation

## SRY 05

### Standardization and Quality Control Parameters of *Ocimum kilimandscharicum* Guerke Leaves

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*Ocimum kilimandscharicum* Guerke, commonly known as 'KapooriTulsi' in Hindi and 'Camphor Basil' in English is a traditional medicinal plant belonging to family Lamiaceae. The leaves of this plant are aromatic and are being traditionally used for the treatment of several ailments like cold and cough, abdominal pains, measles, diarrhoea etc. It is also found to have insecticidal, antiviral, antimalarial, insecticidal, antioxidant and wound healing properties. The rise in the use of plants like *Ocimumkilimandscharicum*Guerkein herbal products has also given rise to various forms of abuse and adulteration of the products. Therefore, it is essential to assess their quality and purity. This study is an attempt to establish quality control parameters for *Ocimum kilimandscharicum* Guerke. Pharmacognostic studies include the examination ofmacroscopic and microscopic characters. The physicochemical parameters such as moisture content, total ash value, acid insoluble ash value, water soluble ash value and extractive values of the leaves were also studied. Preliminary phytochemical analysis indicated presence of various phytoconstituents like acid compounds, aleurone grains, amino acids, carbohydrates, flavonoids, glycosides, mucilage, resins and tannins. TLC fingerprinting profile was also carried out. The results of the present study could be useful in setting some diagnostic parameters for the correct identification, standardization andpreparation of monograph of *Ocimum kilimandscharicum* Guerke.

**Keywords:** *Ocimum kilimandscharicum* leaves, pharmacognosy, physicochemical parameters, phytoconstituents, fingerprint profile.

## SRY 06

### **Sunlight induced Rapid Synthesis of Silver Nanoparticles Using *Terminalia neotaliala* Capuron Aqueous Fruit Extract: In Vitro Assessment of its Antioxidant and Anti-Inflammatory Activities**

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*Terminalia neotaliala* Capuron is an evergreen tree endemic to Madagascar. In the present study, aqueous fruit extract of this plant was used for the synthesis of silver nanoparticles (AgNPs) under the influence of direct sunlight. Fruit extract as reducing agent and sunlight as catalyst in the formation of AgNPs makes the process cost-effective, renewable and environmentally benign. UV-Vis Spectroscopy, Fourier-Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), Particle size and Zeta potential, High-Resolution Transmission Electron Microscopy (HR-TEM) with Selected Area Electron Diffraction (SAED) techniques were employed for the characterization of AgNPs. The formation of *T. neotaliala* fruit extract mediated silver nanoparticles (TnF-AgNPs) was visualized as a colour change from colourless to reddish-brown within 5 mins of sunlight exposure with a maximum absorption peak at 412 nm. The FTIR spectra of TnF-AgNPs revealed the possible functional groups such as O-H, N-H, C-H, C=O, C-N, C-O groups associated with the polyphenols and proteins present in the fruit extract. XRD studies confirmed the crystalline nature of AgNPs with FCC structure and an average crystallite size of 20.86 nm. Z-average particle size was found to be 61.4 nm with a zeta potential value of -41.7 mV. HR-TEM studies depict spherical shape with average particle size of 29.04 nm and lattice planar spacing of 0.24 nm. TnF-AgNPs showed % scavenging of 63.08 % (100 µg/mL) for antioxidant activity via DPPH assay and % inhibition of 73.68 % (500 µg/mL) for anti-inflammatory by BSA antidenaturation assay. This represents a rapid approach in producing small, spherical, stable and crystalline AgNPs with its potentiality in biomedical applications.

**Keywords:** Rapid Synthesis, Silver Nanoparticle, Antioxidant, Anti-Inflammatory.

## SRY 07

### Correlation between Altitude and the Distribution of Wild Balsams in Southern Western Ghats, India

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The genus *Impatiens* L. shows an amazing pattern of distribution in southern Western Ghats, with very high endemism. The in-depth studies on the factors, which regulate this peculiar distribution, are not yet done. The present study on the correlation between altitude and the distribution of this genus in southern Western Ghats shows that, both are directly connected. The sect. Scapigerae is distributed in altitude range between 300 to 1500 meter, sect. Annua in 5 to 1800 meter, sect. Epiphyticae in 900 to 2000+ meter, sect. Microsepalae in 10 to 1800 meter, sect. Tomentosae in 1200 to 2000+ meter, sect. Racemosae in 1200 to 2000 meter, and sect. Sub-umbellatae in 1000 to 2000+ meter. Some species of *Impatiens* show adaptation in wide range of elevation (eg. *I. scapiflora*, *I. tomentosa*, *I. diversifolia* etc.), whereas some other species show acute restricted distribution to particular altitude range (eg. *I. uncinata*, *I. denisonii*, *I. platydena* etc.). Such species, which are adapted to the wide range of elevation show high degree of morphological variations also. The highest diversity of wild balsams in southern Western Ghats is in the altitude range 800 – 2000 meter.

**Keywords:** Correlation, Distribution, Wild Balsams, Western Ghats



**SRY 08**

## **Diversity and Seed Morphometric Studies of *Smithsonia* Genus in Karnataka, India**

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Orchidaceae is one of the diverse families with variety of species which are cosmopolitan in distribution. It is the second largest family in the plant kingdom comprising of about 28,000 species belonging to 736 genera across the globe. *Smithsonia* is one of the endemic genus to Western Ghats of India comprising of three species in the World. These species are generally found in higher elevation in the study region. The work includes their diversity and seed morphometric studies of three species distributed in Karnataka. A dichotomous key is provided for easy identification of these species. The conservation status of these species has been 'Not Evaluated' and needs further assessment. This three species are endemic to small regions which is to be conserved.

**Keywords:** Endemic orchids, Epiphytic, Capsule, Uttarkannada district

## SRY 09

### **Systematics of Indian *Rotala* L. (Lythraceae) Based on Morphology and Molecular Evidence**

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Genus *Rotala* L. is one of the most diverse amphiphyte groups of the family Lythraceae with about 55 species distributed in tropical and sub-tropical regions of the world. South Asia is considered to be the centre of diversity of the genus representing more than 70 percent of total *Rotala* species in the world. The genus comprises of both annual and perennial species with a diverse range of aquatic habitats, i.e., submerged, emergent, and reophytes. It is represented by 36 species in India with nearly 75 percent endemics, among which 30 species are known from the Indian Peninsula with 80 percent endemism. High phenotypic plasticity and gap in the taxonomic knowledge of the genus makes its species delimitation challenging and give rise to several taxonomic complexes. Hence, our study aims at resolving these complexes with the support of morphological and molecular data. To resolve these complexes, the micro- and macro-morphological character matrix and nrITS, psbA-trnH-based phylogenetics using Bayesian inference is employed.

Keywords: *Rotala* L., amphiphyte, endemics, phylogenetics

## SRY 10

### Review on Wild Edible Plants of India

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Having four biodiversity hotspots, India shows the rich diversity of Flora and Fauna. Some of the wild plants provide food resources in the form of raw/cooked vegetables or fruits and source of income to the tribal communities and nearby people present in that area. Many of these plant species are used as medicine, for fuel wood and also for other purposes. The current review paper is to gather the work done for past years about the wild edible plants in different geographical regions of India. This will help us to find out the underworked regions in India so that further field studies can be conducted to explore the rich diversity and availability of wild edible plants. This will also help to overcome the vanishing of traditional knowledge about these plants due to the changing life style.

**Keywords:** Wild edible plants, Tribal, traditional knowledge

# THEMEs SECTION

# PHYTODIVERSITY AND ITS DOCUMENTATION [PD]

## OP-PD 01

### **Assessment of Population Size and Regeneration Status of An Endemic and Endangered Tree Species: *Kingiodendron pinnatum* (Roxb. ex DC.) Harms in Western Ghats of Karnataka.**

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Population structure and regeneration patterns are a prerequisite in order to predict future growth or decline of populations and to help in the selection of appropriate management strategies for species conservation and recovery programmes. *Kingiodendron pinnatum* (Roxb. ex DC.) Harms (Fabaceae) an endemic and endangered resin yielding tree of southern Western Ghats. It is overexploited from the natural habitat for its medicinally and commercially important oleo-resin obtained by boring the heartwood, which ultimately results in the population decline. Population size and regeneration status of *K. pinnatum* in its natural habitats were studied in the Western Ghats of Karnataka, India by using quadrat sampling method. A total of 89 adult individuals were recorded in the study area. *K. pinnatum* found to be co-dominant species along with *Vateria indica* L. though with fewer number of individuals because of higher girth size of the individuals. Correlation studies revealed its close specificity with ecological parameters including percentage of evergreenness, elevation and disturbance regimes. In most of the populations studies regeneration was very poor and density of saplings are positively linked to the adult density. Species reintroduction in suitable habitats, protection to the habitat and restriction to the resin extraction is the appropriate measure to conserve the species from further decline in the region.

**Keywords:** Population Size, Regeneration Status, Endemic and Endangered, Tree Species, *Kingiodendron pinnatum*, Western Ghats of Karnataka

**OP- PD 02**

***Capparis nanchilnadiana* Sp. Nov. (Capparaceae) from  
Tamil Nadu, Southern India**

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The genus *Capparis* L. (Capparaceae) comprises of about 142 species (139 POWO, 2019; *C. kbangensis* Sy & D. V. Hai, 2020; *C. danielii* Murugan *et al.*, 2020; *C. cuneifolia* Abdul Kader & Gopal, 2022) distributed in the tropical and sub-tropical regions of the world. In India, it is represented by 36 species and one subspecies (Abdul Kader and Gopal, 2022). It was in May 2017, we collected an interesting *Capparis* specimen from Nanchilnadu in Kanniyakumari District. Herbarium prepared and identified with the relevant literatures (Gamble,1921; Jacobs,1965; Raghavan,1993; Viswanathan,2000; Maurya *et al.*, 2020 and Murugan *et al.*, 2020) besides consulting the Madras Herbarium at Botanical Survey of India Southern Regional Circle, Coimbatore. This new specimen belongs to Busbeckeesection of *Capparis* genus but did not match with any of the earlier reported species in India and the world. Hence, it is described as a new species. This new taxon,named as *Capparis nanchilnadiana* sp. nov. is a multi-stemmed small crooked armed to unarmed deciduous xerophyte, much branched from the base, c. height 3 m. It is allied to *C. divaricata*, *C. danielii*, and *C. cuneifolia* in its flower but can easily be distinguished by its white indumentum both on young twigs and flower buds, deciduous minute straight spines, semi-succulent ovate to elliptic mucronate leaves with acrodromous basal perfect venation, and large sweet scented solitary (sometimes two) axillary white flowers tinged with yellow inside in the morning but turning to reddish at the centre in the evening. However, no fruit set was seen during the last 5 years. Flowering period is from January to May. The specific epithet '*nanchilnadiana*' was given for type locality. An indented dichotomous key is prepared for easy identification of Indian *Capparis* species under Busbeckea section.

**Keywords:** *Capparis nanchilnadiana*, Capparaceae, Southern India

## OP-PD 03

### **Phyto-Diversity of Keoladeo National Park, Bharatpur (India): A Review**

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Keoladeo National Park is one of the famous 'Ramsar site' which is flooded by Ajan bandh and is reserved for its high level of biodiversity. Due to its global ecological, faunal and floral significance, it was declared a world heritage site in 1985. The total area i.e. 28.7 square km presents a variety of habitats i.e. marshy/wetlands, woodlands and grasslands etc. Wetlands maintain a variety of flora and fauna and have maximum biodiversity because of plenty of nutrients. However, wetlands may exhibit salinity due to the upwelling of salts and that makes it a different site from the routine one. The soil of Keoladeo National Park is predominantly alluvial with some clay as a result of periodic inundation. A center depression of about 11 square km is found which is divided by dykes into a number of blocks. The blocks are interconnected by gates. In some of the blocks, small mounds have been constructed and planted with *Acacia nilotica* to provide nesting and breeding site of the birds. In the Park, 223 species of angiosperms belonging to 171 genera have been recorded during study. Four species found during the survey are new to this National Park not reported earlier viz. *Ranunculus scleratus*, *Bombax ceiba*, *Croton bonplandianum* and *Jatropha gossypifolia*. Results will be discussed in the presentation.

**Keywords:** Keoladeo National Park, Bharatpur Rajasthan, Phyto-diversity; Wetland; Ramsar site.



## OP-PD 04

### **Soil Seed Bank Assessment in Different Vegetations in Buffer Zone of Silent Valley National Park, Kerala, Palakkad**

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Soil seed bank refers to the viable seeds that are present in the soil and related litter layer and are able to replace adult plants. Overuse of soil over the years appears to have put most ecosystems' individuality and biodiversity at risk. Studies on the seeds found in soil reveal information about species cover, supporting the restoration of damaged areas. The fact that species found in seed banks don't always represent the standing vegetation is an intriguing observation made in the majority of sources; this is because various species have distinct dispersal mechanisms. In all agro-ecosystems around the world, soil seed banks are essential to the long-term survival of specific species and plant groups. Because they act as a reservoir with capacity for regeneration in many plant assemblages, soil seed banks are crucial to the stability of ecosystems. Following soil disturbances like wildfire, harvesting, and/or logging, these banks are crucial for determining the composition and spatial organisation of understorey plant communities in degraded forests. The impact of invasive alien species and the associated soil seed banks on vegetation dynamics is poorly researched. Maintaining existing vegetation becomes crucial as landscape restoration gains importance in the current decade. When Silent Valley's seed banks were analysed, it was discovered that many alien species had emerged instead of the region's original vegetation. India has pledged to repair 26 mha of degraded and deforested land by 2030 under international agreements. This study highlights the significance of soil seed banks and their function in the long-term preservation of forest cover.

**Keywords:** Soil Seed Bank, Vegetations Buffer Zone, Silent Valley National Park

## OP-PD 05

### Hydrophytic Plant Diversity of Davanagere District, Karnataka State, India

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The present study emphasize that the diversity of hydrophyte species of Davanagere district. The study had recorded occurrence of total 123 species of hydrophytes that included 9 species of Amhibious, 13 species of fixed floating, 6 species of free floating, 82 species of Marshy, 8 species of Near stream, and 5 species of Submerged. Relatively higher diversity of hydrophytic plant species was recorded in Davanagere taluk. Wetland/marshy lands followed by Harihara and Channagiri taluks. These 123 species belongs to 73 genera, 41 families. Dominant genus like *Cyperus* (13), *Fimbristylis* (7), *Limnophila*, *Polygonum*, *Pycreus* and *Schoenoplectiella* has 4 species each. Sedges are the dominant species about 38 species belongs to Cyperaceae followed by Poaceae and Scrophulariaceae have 8 species each, Hydrocharitaceae and Lythraceae have 5 species each, Asteraceae, Fabaceae and Polygonaceae have 4 species each. Marshy habit species are the dominant, followed by amphibious species found in both habitats. Few *Ipomoea* species and *Oxystelma* are the representatives of climbers.

**Keywords:** Hydrophytic, Diversity, Davanagere, Karnataka

**OP-PD 06**

**Phenotypic Plasticity in *Ledebouria hyacinthina* Roth from Maharashtra and Surrounding Regions**

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*Ledebouria hyacinthina* is described by Roth from India (1821). It grows on open lands, forest floors, slopes and low and high-altitude plateaus. The species exhibits a great deal of variation in its leaf morphology and structure of ovary. Present study deals with the morphometric and anatomical studies of *Ledebouria hyacinthina* Roth from 11 locations in Maharashtra and adjoining regions. It is found that ovary structure, leaf shape, leaf apex and bulbil formation and shape of the ovary are good and stable characters for classification of said plant. An attempt has been made to classify this species from the study area into two clades and thus these plants are identified and named accordingly.

**Keywords:** Morphometry, Anatomy, Phenotypic variation, stable characters, identification, *Ledebouria hyacinthina* Roth

## OP-PD 07

### Medicinal Flora of Oothumalai Hills, Salem District, Tamil Nadu.

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A survey was carried out on medicinal plants of Oothumalai hills, Salem District, Tamil Nadu, India. Through periodical field surveys in the study area, about 218 plant species were documented and are alphabetically arranged with binomial name, vernacular name, family, parts of the plants used and medicinal values along with their dosage forms. Of these documented plant species, Bryophytes and Pteridophytes are 2 species in each and Angiosperms are 214 species. Among the enumerated Angiosperms species, 184 species are dicotyledons and 30 species are monocotyledons under 63 families and 162 genera. Among the 63 families, Euphorbiaceae was found to be dominating with 17 species and among the 162 genera, *Cassiadominate* with 8 species. Survey revealed that out of 214 species surveyed, 192 species are therapeutically valued and are used to cure about 54 ailments. Among the ailments, for the treatment of rheumatism about 30 species are used. *Abutilon indicum* holds top utility value with 18.51%. When compared to the various plant parts used for the medicinal purpose, the use of entire plants was high with 33.3% and about 71 species are comes under this category. Around 17 species belonging to the Red data list according to IUCN data.

**Keywords:** Medicinal Flora, Oothumalai Hills, Tamil Nadu

## OP-PD 08

### Floristic Diversity of Nanar and Surrounding Areas of Rajapur Tehsil of Ratnagiri District (Maharashtra)

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The regional floristic studies are very important and it can be achieved by exploration of smaller areas. This is useful in the revision of existing flora. Nanar village situated 37 km from Rajapur tehsil towards costal region of Ratnagiri district of Maharashtra. The study area is 1592.88 hectares and average height of study areas is 41 meters from mean sea level. The present investigation reveled about 350 species of flowering plants of Nanar village and surrounding areas of Rajapur Tehsil. Out of 350 species 210 species are herbaceous (60%), 70 species are trees (20%), 35 species are shrubs (10%) and remaining 35 taxa are covered with climbing plants (10%). Six dominant families of study areas are Fabaceae (38 spp.), Apocynaceae (22 spp.), Malvaceae (22 spp.), Asteraceae (19 spp.), Poaceae (19 spp.) and Rubiaceae (19 spp.) covered about 40% diversity. In study area the genus *Eriocaulon* L. is dominant with seven species.

**Key words:** Angiosperm, Konkan, Nanar, Floristic diversity.

## OP-PD 09

### **Distribution of the Genus *Strobilanthes* in Karnataka, With Special Reference to Chandradrona Hills of Chikmagalur**

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The genus *Strobilanthes* Bl. has more than 400 species distributed along South and South east Asia. The Indian sub-continent has nearly 170 species. Nearly 40 species of *Strobilanthes* are reported from Karnataka state. Chikmagalur, Coorg, Uttara Kannada, Dakshina Kannada, Udupi, Hassan, Shimoga, Mysore, Chamarajnar, Belgaum and Bellary districts which are adjoining Western Ghats harbour the genus *Strobilanthes*. The characteristic feature of *Strobilanthes* is its monocarpic nature, flowering only once after a long period of vegetative growth ranging from 1-16 years. Most of the species of *Strobilanthes* are neoendemics. The mass flowering within the restricted geographical region remain a mystery yet to be solved. Chandradrona hills are a range of mountains surrounding Chikmagalur district. It includes the highest peak of Karnataka, Mullayyanagiri (1925 meters above MSL), Bababudangiri (1895 meters above MSL), Seetalayyanagiri (1524 meters above MSL) and other ranges. The mountains turned blue due to the mass bloom of *Strobilanthes* which was observed from August till November, 2022. The species was monopolized by *S. sessilis* Nees which bear blue flowers. There are three varieties of *S. sessilis* namely, var. *ritchiei*, var. *sessilis* and var. *sessiloides*.

**Key Words:** *Strobilanthes*, Karnataka, Chandradrona Hills, Chikmagalur, Mass blooming

## OP-PD 10

### Need of Documenting Extended Distributions: Case Study of few Endemics of Northern Western Ghats

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Recently few endemic species viz. *Ceropegia anjanerica*, *Ceropegia mahabalei*, *Crinum woodrowii*, *Dicliptera leonotis*, *Diclipteranashikensis*, *Flemingia rollae* and *Indigofera santapau* have been reported outside their localities and rediscovered after long gap. Of these, *Ceropegia mahabalei*, *Crinum woodrowii* and *Indigofera santapau* have been reported from the state of Gujarat. This clearly indicates the need of extensive field explorations in all the probable habitats wherein the possibilities are there of occurrence of these endemics. In larger floristic works these species usually get overlooked being ephemeral or due to their short life cycle. Usually this kind of extended distribution articles are not given priority by the mainstream journals which are publishing papers in taxonomy. Therefore, sometime they get published in journals which are not that popular. This is the largest obstacle in IUCN assessments. Therefore, serious surveys are really needed to locate the unique resources.

**Keywords:** Documentation, Endemics, Northern Western Ghats

## OP-PD 11

### Diversity of Genus *Jurinea* Cass. (Asteraceae) In India

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*Jurinea* Cass. (Asteraceae) is one of the largest genera of the tribe Cardueae. It comprises of ca. 200 species in the world. In India, the genus is represented by approximately 20 species distributed in the alpine regions of the Himalayas. *Jurinea* is adapted to xerophytic as well as chasmophytic habitats. Morphologically, it is quite complex due to high phenotypic plasticity. The genus includes various medicinally important taxa such as *Jurinea auriculata* (often used as antisyphilitic), *J. albescens* (used to relieve bronchitis and as a diuretic) and *J. heteromalla* (used to treat wounds, as a carminative, as antipyretic). *Jurinea* species are collected from the wild for herbal drug preparations, due to which populations are vanishing from their natural habitats. Being an alpine genus with restricted habitat and a narrow flowering time, only a few taxonomic studies on *Jurinea* have been done at global level. In the present communication, the diversity of the genus *Jurinea* in India has been documented with details about their taxonomic and nomenclatural status.

**Keywords:** *Jurinea*, Asteraceae, Taxonomy, Threatened taxa



## OP-PD 12

### **Genus *Eriocaulon* L. on Lateritic Plateaus of Ratnagiri District (Maharashtra) with a New Species**

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The genus *Eriocaulon* Linnaeus belongs to the family Eriocaulaceae and with about 479 species New World, Europe, Tropical & Subtropical Old World to Russian Far East, America (POWO 2022). In India the genus *Eriocaulon* was studied by several workers and reported about 85 species by Ansari & Balakrishnan in 2009 and about 30 new species have been described from India in 13 last years by different workers bringing the number of recognized species of *Eriocaulon* in India to 115 and most of species are described from lateritic plateaus. During our floristic studies on lateritic plateaus of Ratnagiri district (Maharashtra) from year 2020 to 2022, total 15 species of genus *Eriocaulon* including one new species were collected from lateritic plateaus of Ratnagiri district. Out of 15 species of *Eriocaulon* 11 species are endemic to India.

**Keywords:** *Eriocaulon*, sp. nov., Lateritic plateaus, Monocots, South Konkan, Taxonomy.

## OP-PD 13

### **Diversity and Endemic Status of Wild Orchids in Yellapur Taluk, Uttarakannada District, Karnataka**

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Yellapur taluk is located in Uttara Kannada district and is one of the richest biodiversity in the Western Ghats region and includes many flora and fauna. The present survey includes 60 wild orchids, which are not listed or recorded till earlier in literature survey. This orchid diversity is found in grassland region, near the streams and in Ghats. This article is the documentation of the distribution status, locations of 27 endemic wild orchids in Yellapur taluk, Uttara Kannada district, Karnataka India. These endemic orchids are mainly diversified in Western Ghats region only. Highest number of species was reported by genus *Dendrobium* Swartz (8), *Habenaria* Willdenow (7), *Nervilia* Gaudich (4), *Persitylus* Blume (3) and *Porpax* Lindl. (3). Highest diversity of wild orchids is in Angoda, Arbail Ghat and Kaiga Ghat region which includes evergreen and semi-evergreen forests.

**Keywords:** Epiphytic orchids, Endemic, Terrestrial, Yellapura taluq, Terrestrial orchids, Uttara Kannada district.

## OP-PD 14

### **The Phytodiversity and its Documentation of Genus *Holigarna* Buch.-Ham. ex Roxb. the Endemic and Poisonous Plant Species of Central Western Ghats**

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The Western Ghats, being one of the hotspots of biodiversity, support an enormous plant wealth. The genus *Holigarna* (poisonous tree plant or varnish tree) is dioecious and endemic an important component of the flora of the Western Ghats and is well known for their toxic nature (causes skin allergies) and medicinal properties. The present chapter elaborates the structural introduction, distribution, diversity of floral morphology, leaf morphology and fruit morphology of *Holigarna* species in the Central Western Ghats. Herbarium examinations and literature references revealed that there are 7 species distributed and reported from the Western Ghats; out of 7 species about 5 are distributed and reported from the Central Western Ghats. The field survey was confirmed the distribution status of taxon *Holigarna* in Central Western Ghats, the diversity of flower, leaf, and fruit morphology were resolved the conspicuous characters within the genera, and it helps in the species separation and identification.

**Keywords:** Phyto-Diversity, *Holigarna*, Endemic, Poisonous Plant Species

## OP-PD 15

### **Endemic and Highly Traded Plant Species of Bannerghatta National Park, Bengaluru, Karnataka**

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Bannerghatta National Park is situated 25 km south of Bangalore, on its outskirts. The area was declared as a National Park by the Government of Karnataka in 1974. The total area of the park is 260.51 km<sup>2</sup>. The park area has been divided into four wildlife ranges, viz. Anekal, Bannerghatta, Harohalli, Kodihalli. Bannerghatta National Park lies between 12° 34' - 12° 50' N and 77° 31' - 77° 38' E, with an area of 104.27 sq. km. in the Bengaluru district. Altitude varies from 740 to 1034 msl. Bannerghatta National Park is a unique region of biological and ecological importance, sandwiched between two fast-growing cities, Bengaluru to the north and Hosur to the east. Bengaluru is one of the few metropolitan cities in the world that has such a large forest region, rich in biodiversity, so close to its urban limits, alongside Cape Town, Mumbai, Toronto, Nairobi and Rio de Janeiro. Endemic species from the study conducted till date, 24 endemic species of plants have been documented. Out of the 24 species, 11 are herbs, 3 are climbers, 6 are shrubs and 4 are trees. Highly traded plant species (High volume trade species). There are also 19 Highly traded plant species i.e., >100MT/year, of which there are 2 herbs, 5 climbers, 2 shrubs and 10 trees.

**Keywords:** Endemic, National Park, Bannerghatta

## OP-PD 16

### Angiosperm Diversity of Vita City (Sangli District) Maharashtra

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Mahadev ranges are one of the important hills in Maharashtra in which the study area falls. According to the 'Swachh Sarvekshan' skim of the Government of India, Vita city has been ranked in the top three cleanest and green cities with less than one lakh population in India, due to awareness of people towards cleanliness and biodiversity. The city is blessed with hillocks around it having rich arid floristic composition. A total of 627 angiosperms have been recorded belonging to 95 families comprised of 8 clades. ANA grade and Super-Rosids are the smallest clades represented by the lowest taxa whereas Rosids and Asterids are the largest clades represented by the highest number of taxa. The region is the house of 25 endemic species. Fabaceae, Poaceae, Asteraceae, and Apocynaceae are dominant families with the highest number of species. The present work deals with accounting the flora of Vita city with respect to the complete checklist of Angiosperms and notes on vegetation, habitat diversity, classification, dominant genera, endemism, ethnobotany, and threat to natural vegetation. Present work will form the baseline for applied studies, to make people's biodiversity register, understanding indigenous flora, and sustainable utilization of local flora.

**Keywords:** Biodiversity, Clades, Deccan, Mahadev ranges, Vita

## OP-PD 17

### **Diversity Endemic species in Yadahalli Chinkara Wildlife Sanctuary, Bagalkot, Karnataka, India**

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Endemic species have always gained the attention of the botanists and conservationists because of their restricted geographical distribution. In addition, many endemic species reported with their new distributional reports other than their type locality keep them in everyday discussion. In Yadahalli Chinkara Wildlife Sanctuary 26 endemic plant species were collected. These belong to 26 genera and 14 families. This makes the small scrub forest of the sanctuary valuable ecologically. The species here in the sanctuary are in regular anthropogenic threat. Results of the phytosociological study conducted in the sanctuary alarms to hasten the well-built conservation tasks in the area. This paper focuses the details of the same in brief.

**Key words:** Endemism, Endemic species, Wildlife Sanctuary, Bagalkot

## OP-PD 18

### **Endemic *Impatiens* L. (Balsaminaceae) of Megamalai Wildlife Sanctuary, Southern Western Ghats.**

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*Impatiens* L. (Balsaminaceae) is one of the largest and interesting genera in India with maximum endemism of ca.280 species with disjunct distribution in Himalaya and Western Ghats which altogether constitute the major centers of diversity. The Western Ghats is home for 130 species, of which 124 species are endemic, especially many numbers of species concentrated over the southern Western Ghats that have been categorized under seven sections (Bhaskar, 2012). Megmalai Wildlife Sanctuary (Now the part of Megamalai- Sri Villiputhur Tiger Reserve), is lying in Theni district of Tamil Nadu, southern Western Ghats. The altitude ranges from 300 to 2000 (msl) with varied forest types. The forested area is home for 114 endemic flowering plants belonging to 31 families and 57 genera (Ravichandran, 2016). A total of 27 species of *Impatiens* belonging to five sections *i.e.* Scapigerae (4 species), Epiphyticae (3 species), Annue (7 species), Racemosa (1 species), Microsepalae (12 species). Very recently two more new species described from the Ghats area such as *Impatiens megamalayana* (Ramasubbu, 2017) and *Impatiens flavescens* (Karuppusamy, 2019). The present study revealed that the distribution, endemism, variations in population, reproductive characteristics of selected *Impatiens* would be discussed.

**Key words:** Endemic, *Impatiens* L. (Balsaminaceae) of Megamalai Wildlife Sanctuary, southern Western Ghats

## OP-PD 19

### Plant Diversity and Forest Structure of Amrabad Tiger Reserve, Telangana

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The present study was carried out in Amrabad Tiger Reserve to know the plant diversity and forest structure. Amrabad Tiger Reserve is situated in Nagar Kurnool and Nalgonda districts of Telangana. The study area is about 2800km<sup>2</sup>. The area is with steep hills, comprising of dry deciduous, scrub forests and the patches of moist deciduous forests. Through lying of quadrates with a size of 20x20m, the structure of forest and the quantitative characters of the plants were studied. In each quadrate all the trees with above 10cm gbh were recorded and within each plot nested quadrates of 5x5m and 1x1m were laid for shrubs, climber and for herbs. Through this data the quantitative characters and the diversity indices were calculated. A total of 876 taxa belonging to 101 families were enumerated in 325 sampled quadrates. Of these, 522 are herbs, 76 are shrubs, 116 are climbers and 162 are trees. According to quantification studies *Heteropogon contortus*, *Grewia hirsuta*, *Asparagus racemosus* and *Anogeissus latifolia* are the dominant species in herbs, shrubs, climbers and trees respectively. The top story of forest occupied with *Terminalia alata*-*Anogeissus latifolia* association; middle story with *Chloroxylon swietenia*-*Boswellia serrata* association and the lower story with *Diospyros chloroxylon*-*Albizia amara* association. The ground flora also differs from story to story. The present paper deals with the diversity of plants, the structure of forest and also quantitative characters of plants in the study area.

**Key words:** Plant Diversity, Forest Structure, Amrabad Tiger Reserve,



## OP-PD 20

### Diversity of Tree Species in Raichuru District, Karnataka, India

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Raichuru is one of the floristically mixed dry deciduous forests and open scrub jungle which supports unique vegetation. The forest has variable geographical features such as rocky slopes, open grasslands, scrub forest, seasonal minor waterfalls. The present work provides tree species of Raichuru district, Karnataka, which comprises 92 tree species belonging to 33 families and 76 genera. The family Fabaceae is most dominant with 16 genera and 29 species followed by bignoniaceae (5 genera 5 species) Myrtaceae (4 genera 4 species) Malvaceae (3 genera 3 species) Rutaceae (2 genera 2 species) among the total number of the species medicinal 17, edible fruits 23, dye yielding 2, sacred plant 4, timber 30, NTFP's 7, ornamental 5, 1 species is vulnerable (VU), 11 species are least concern (LC), 1 species is near threatened (NT), 79 are not evaluated (NE) species have been documented. Habitat, vegetation type, date of collection and collector name is given for each tree species. Hence present work was undertaken to generate baseline data. Which become essential to gain more knowledge on species richness as their geographical distribution in Raichuru.

**Key words:** IUCN status, Tree diversity, Raichuru district.

## OP-PD 21

### Studies on Riparian Vegetation of River Panchganga

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Riparian vegetation grows along the bank of river including emergent aquatic plants growing at the edge of waterway channel and ground cover plants. Riparian ecosystem has special status because it serves as connecting ecosystem between aquatic and terrestrial habitats. To survive in the dynamic and complex habitat riparian flora and fauna have multiple peculiar characteristics. In the present investigation extensive field exploration has been carried out since January 2021 to July 2022 in riparian region of Panchganga river from Kolhapur district of Maharashtra, India. GPS coordinates have been documented for each tree individual during field explorations with the help of GPS device and GPS waypoints. Erosion points and soil extraction sites were recorded from the riparian zone. Total 26 tree species and multiple destruction patches were recorded. Besides, the present study includes collection of plant material, making herbarium specimens, documentation and study of floristic wealth of river Panchganga. The numbers of tree species are decreasing day by day as per current situations and they will disappear from riparian zone within few years. Flood disaster, anthropogenic activities like industrial waste, sewage waste, deforestation, urbanization, sand and soil extraction from river are the major factors responsible for the severe degradation of riparian vegetation of Panchganga river. Present paper deals with the detailed mapping of trees along both the banks of the river Panchganga along with study of destruction sites.

**Key words:** Riparian Vegetation, River Panchganga

**PD 22**

**Vegetational diversity and ecosystem services of large cardamom based traditional agroforestry systems of Darjeeling Himalaya, India**

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Managing soil and biomass carbon in the traditional farming systems will be both an avoided emission and net addition of carbon and conserving these systems will not only improve livelihood but will also improve the carbon footprint of a region. The study was conducted in Darjeeling Himalayas from January 2019 to April 2021. The carbon stock of the systems adopting stratified random nested quadrat sampling method along with perception of the growers on ecosystem service and performance of the below canopy forest based traditional large cardamom-based agroforestry farming systems. The soil parameters and available organic carbon (SOC) but influence of altitude on biomass and carbon stock was non-significant though it decreased gradually with increasing altitude. Overall 130 plant species were documented, of which 37 were trees, 25 shrubs, 46 herbs; eight ferns, 11 climbers and three orchids. The list included ICUN red listed species which signifies the conservation worth of the system. The floristic elements of the system were less similar with lower Sorensen's similarity index. The tree biomass, tree biomass carbon, SOC and ecosystem carbon stock estimated was 447.67, 210.40, 84.62 & 295.02 Mg ha<sup>-1</sup>, respectively. The contribution by the tree biomass carbon to the ecosystem carbon stock of the system at low-, mid- and high-altitude class was 81.57 %, 68.59 % and 59.39 %. The study recommends bailing out this dying tradition by supporting the growers in their effort to preserve their traditionality through institutional, extension and policy interventions which will not only improve the livelihood of the growers but will also fulfil the global 4 per mille initiative.

**Keywords** Traditional agroforestry, *Amomum*, Ecosystem, Darjeeling Himalaya

**PD 23**

**Floral Diversity of Nalgonda Working Plan Forest Division of  
Telangana State**

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The Nalgonda forest division is located in the Southern part of Telangana. It is having a 21416.82 ha of forest cover and spread over in three ranges namely, Miryalaguda, Munugode, Nalgonda. Phyto-sociological study was conducted by applying quadrat method. 31.62m x 31.62m size quadrat was laid out for trees (Central plot). Nested quadrats of size 3x3m (for shrubs & saplings) and 1m x 1m (for herbs & seedlings) were laid out at a distance of 30m from the centre of central plot in the two directions (NE & SW).

**A) Herbs and Seedlings:** Within 78 inventory points a total of about 18 species belonging to 18 genera under 10 angiospermous families were found under Herbs/Seedlings category.

**B) Shrubs and saplings:** Within 78 inventory points a total of about 19 species belonging to 17 genera under 13 angiospermous families were found under Shrubs/Saplings category.

**C) Trees:** Within 78 inventory points a total of about 21 species belonging to 17 genera under 11 angiospermous families were found under trees category.

Miryalaguda range was having 1, 1, 6 species under herbs & seedlings, shrubs & saplings, trees category, Munugode range was having 6, 10, 8 species, Nalgonda range was having 13, 11, 18 species respectively.

**Keywords:** Working Plan, Inventory points, Phyto-sociological study, Families

**PD 24**

**Phytodiversity of Siddipet Working Plan Forest Division of  
Telangana State**

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Working plan is the most important document prepared for scientifically managing the forest resources of a forest division & it is prepared as per National working plan code-2014. Siddipet forest division is located in the Central part of Telangana. It is having an extent of 25749.94 ha of forest area is spread over four Ranges namely Dubbak Gajwel, Husnabad, Siddipet. Phyto-sociological study was conducted by applying quadrat method during 2017-18. 31.62m x 31.62m size quadrat was laid out for trees (Central plot). Nested quadrats of size 3m x 3m (for shrubs & saplings) and 1m x 1m (for herbs & seedlings) were laid out at a distance of 30m from the centre of central plot in the two directions (NE & SW).

**A) Herbs and Seedlings:** Within 102 inventory points a total of about 39 species belonging to 38 genera under 19 angiospermous families were found under Herbs/Seedlings category.

**B) Shrubs and saplings:** Within 102 inventory points a total of about 56 species belonging to 48 genera under 28 angiospermous families were found under this category.

**C) Trees:** Within 102 inventory points a total of about 49 species belonging to 42 genera under 27 angiospermous families were found under trees category. Dubbak range was having 13, 30, 33 species under herbs & seedlings, shrubs & saplings, trees category, Gajwel range was having 34, 45, 32 species, Husnabad range was having 7, 15,16, Siddipet range was having 11, 20, 29 species respectively.

**Keywords:** Working Plan, Families, Phyto-sociological study, Inventory points.

## OP-PD 25

### Diversity of Tree species in Kappat Hills, Gadag, Karnataka, India

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The scrub forest of Kappath hills have rich in herbaceous vegetation. The vegetation is confined mostly to the chains of hillocks favouring rich growth of trees occurring mostly on the hill slopes. Hilltops are generally barren with a few shrubs, trees and grasses. A detailed phytosociological survey has been conducted since 2008 to 2013. A total 118 tree species belonging to 45 families were recorded during the study. The phytosociological data shows that, the species of *Terminalia alata* (D=9.26, A=27.23) tree having the highest density and abundance followed by *Acacia chundra* (D=8.85, A=17.35) and *Grewia orbiculata* (D=8.13, A=12.13). *Grewia orbiculata* (F=67), *Acacia chundra* (F=51) and *Terminalia alata* (F=34) trees are having the highest frequency. Analysis of IVI of a species can be used to recognize the pattern of association of dominant species in a community. Based on their higher IVI value, the ten dominant and ecologically most significant trees of Kappath forest are *Grewia orbiculata*, *Acacia chundra*, *Dolichandronea trovirens*, *Grewia tiliifolia*, *Terminalia alata*, *Soymida febrifuga*, *Gardenia gummifera*, *Anogeissus latifolia*, *Morinda pubescens*, and *Cassia fistula*. These species might also be the most successful species in regeneration. The diversity of the woody species in the forest was generally high. Shannon-Wiener's index for dominance shows that  $H=1.39$ , the floristic diversity index of Simpson 1-D shows 0.068 and species richness of Margalef's index is 67.74.

**Keywords:** Kappat hills, Gadag, Diversity index

**FLORISTICS, NOMENCLATURE,  
TAXONOMIC REVISIONS AND  
MONOGRAPHS [FNTRM]**

## OP-FNTRM 01

### Taxonomic Studies in *Aponogeton lakhonensis* A.Camus

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*Aponogeton* (Aponogetonaceae) is an aquatic genus comprising about 60 species that are distributed in tropical and subtropical regions of the Old World. In India, 10 species are reported. *Aponogeton lakhonensis* (Aponogetonaceae) is a rare species and is known only from Assam, Meghalaya and Nagaland. The flowers were yellow with each carpel having 4–8 ovules. Fruit was a beaked follicle. Seeds were small with double testa. Outer testa was loose, membranous and reticulately veined and the inner one smooth and closely fitting. Embryo was cylindrical and lacked plumule. Mitotic studies revealed that the somatic chromosome count of the species was  $2n = 40$ . Meiosis was normal with  $n = 20$  bivalents.

**Keywords:** *Aponogeton*, Aponogetonaceae, Mitotic studies, bivalents.



## OP-FNTRM 02

### Revision of *Gentiana* L. Sect. *Phyllocalyx* (Kusnezow) T. N. Ho (Gentianaceae)

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*Gentiana* L. is the most species rich genus of the family Gentianaceae and being a sub-cosmopolitan member it is distributed in both the New and Old World with more than 365 species. *Gentiana* L. Sect. *Phyllocalyx* (Kusnezow) T.N. Ho is chiefly confined to the Himalayan habitat. The section was based on *G. sect. Frigida*  $\beta$  *Phyllocalyx* Kusnezow and was established based on a single species *G. phyllocalyx* C. B. Clarke. Recently the second species *G. springateana* D. Maity has been added to this section, collected from Sikkim Himalaya. Although the former species is distributed widely from Nepal, Bhutan, China, India to Myanmar, until now, the later is considered as endemic to Sikkim. The section is characterized by perennial plant habit, membranous calyx which is almost concealed by upper pair of leaves, contiguous, discoid (-funnel form), expanded stigma lobes at anthesis and winged seeds. Recently both the species are revisited and studied in the field, herbaria and laboratory. Morphological and molecular evidences are used to circumscribe the section. Moreover, SEM and anatomical data have also been explored. In recent phylogenetic analysis molecular information of *G. phyllocalyx* has been used to define *G. Sect. Phyllocalyx*. In this study both the species of this section are targeted and sequences (plastid marker and nuclear spacer marker) for the recently described *G. springateana*, a species endemic to Sikkim, India has been generated for the first time. We confirmed the systematic relationship of the narrow endemic species *G. springateana* and finally phylogeny of *G. Sect. Phyllocalyx* revisited based on Indian as well as Chinese and Nepalese specimens.

**Keywords:** *Gentiana* L., *Phyllocalyx*, phylogeny, Gentianaceae

## OP-FNTRM 03

### Present Status of Endemic Angiosperms in Sikkim

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Endemism is considered to be one of the most appropriate ways to define the uniqueness of flora of a region, state or of a country which ultimately leads in prioritizing different sites for conservation. Further it helps to understand the biogeography, evolution of species, speciation, extinction, etc. in a more meaningful way. Sikkim being a part of North-eastern region appears as a center of active speciation and harbours a quite large number of endemic taxa. Endemic species are mainly confined to Chungthang, Dzungri, Gurudongmar, Lachen, Lhonak, Zemu and Yumthang valleys. However, the count of endemic species (angiosperms) of the state has been presented differently, from only 14 species to 133 species in recent literatures. The present effort involving extensive literature search and herbaria scrutiny reveals that 71 species (plus 16 infraspecific taxa) are restricted to the present political boundary of Sikkim. Among the recorded endemic taxa 67 species (taxa) belong to the dicotyledons and 20 species (taxa) are under monocotyledons.

**Keywords:** Endemism, Angiosperms, Sikkim, Endemic species

## OP-FNTRM 04

### Present Status of *Thesium* L. (Santalaceae) in India

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*Thesium* L. of the Sandalwood family (Santalaceae) comprises more than 240 species globally, chiefly concentrated in Africa, though several members are also found in Asia, Australia and Europe with a few representatives in the tropical and temperate South America. To date, the genus counts seven species in India, of which four, *T. emodi* Hendrych, *T. himalense* Royle, *T. hookeri* Hendrych and *T. rupestre* Ledeb. occur in the Himalayas and rest two, viz. *T. unicaule* Haines grows in Chota Nagpur hills and *T. wightianum* Wall. ex Hook.f. is restricted to the Western Ghats. *Thesium jarmilae*, a root hemi-parasitic member, has recently been recorded in India from Sikkim. *Thesium* is decumbent (-erect), herbaceous root-parasite with well developed or scale-like leaves. Flowers are axillary, bisexual, both bracteate and bracteolate. Fruit surface is with  $\pm$  prominent reticulate or parallel venation. Attachment of bract on pedicel is notable, either basal (*T. emodi*), suprabasal and inserted differently at lower half of pedicel (*T. jarmilae*) or bract is positioned at tip of pedicel (*T. himalense* and *T. rupestre*). Detailed information on Indian species and a dichotomous key are provided to facilitate easy and correct recognition.

**Keywords:** *Thesium* L., Santalaceae, Western Ghats

## OP-FNTRM 05

### Comparative Leaf Anatomy of *Debregeasia* Gaudich. (Urticaceae) from Sikkim Himalaya

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With about six species, *Debregeasia* Gaudich. (Urticaceae) is distributed mainly in tropics and subtropics of East Asia, one species in North Africa and one in East Australia. India counts five species of this genus while Sikkim shelters three, viz. *D. longifolia* (Burm.f.) Wedd., *D. squamata* King ex Hook.f. and *D. wallichiana* Wedd. Among these only *D. longifolia* extends to temperate forest, whereas other two are usually subtropical inhabitant. Most of the species are economically important as fibers obtained from the stems are used to make ropes and fishing nets, and the edible fruits are often been used to make wine. In this study all the three Sikkim Himalayan species are considered to investigate leaf anatomical details including foliar architecture towards understanding their taxonomic significance. Nodes are typically trilacunar three-traced and the major venation pattern is either craspedodromous or 'semi-craspedodromous'. Moreover, cell inclusions are also evaluated to examine systematic importance. Materials from other phytogeographical regions of India are also examined to explore the ecological impact on anatomical features, if any. The characters with diagnostic importance have been recognized and are utilized in recognition of species.

**Keywords:** *Debregeasia* Gaudich., Urticaceae, Leaf Anatomy

## OP-FNTRM 06

### The Genus *Lolium* L. (Poaceae: Poeae) in Sikkim Himalaya

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The genus *Lolium* L. (Poaceae: Poeae), commonly known as 'Ryegrass' comprises about 26 species globally and is primarily growing in the temperate forests. Many members of the genus are valuable fodder and also used as lawn-grass. In India, there are 6 species of *Lolium* recorded till date and all are found in the Himalaya. In addition to Himalayan habitats, *L. multiflorum* Lam. is recorded from Meghalaya and Tamil Nadu and *L. perene* L. from Bihar and Tamil Nadu. Importantly the widest distribution is noticed in *L. temulentum* L. which is reported from Bihar, Delhi, Haryana, Odisha, Punjab, Rajasthan, Tamil Nadu and West Bengal. Until now Sikkim shelters only species of the genus *Lolium*, i.e. *L. perene*. Three species, viz. *L. multiflorum*, *L. perene* and *L. temulentum* are reported from North Eastern states of the country, though *L. multiflorum* occurs only in Meghalaya. In a recent plant exploration trip *L. multiflorum* has been collected from North Sikkim. The plants were growing on open rocky slopes along with other grasses and herbs. This species can readily be identified by its mostly biennial habit, 4-6.5 mm wide flat culm leaf blades, glume shorter than spikelet and lowest lemma mostly unawned. Moreover, spikelets are 8-22-flowered in *L. multiflorum*, whereas in other species spikelets are with 2-10 (-14) flowers. It is native to Macaronesia, Sahara, Mediterranean to Central Asia and Himalaya and introduced to several parts of the globe for the improvement of productivity of the grasslands. However, this species has often been escaped and maintained its populations in the wild without human intervention. Recent record of *L. multiflorum* brings the number of Sikkimese species to two. At present in India *L. multiflorum* is distributed in Himachal Pradesh, Meghalaya, Tamil Nadu, Uttarakhand, West Bengal and Sikkim.

**Keywords:** *Lolium* L., Poaceae, Poeae,

**OP-FNTRM 07**

**Taxonomy of *Lepidagathis hamiltoniana* – *Collina* - *Cristata*  
(Barlerieae: Acanthaceae) Complex**

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*Lepidagathis* Willd. (Barlerieae: Acanthaceae) is distributed mainly in the tropical and subtropical regions of the world with 147 species (POWO, 2022). The genus is represented by 30 species and seven varieties in India (Arisdason *et al.*, 2020; Biju *et al.*, 2020; Chandore *et al.*, 2020; Prasad & Reddy, 2020; More *et al.*, 2022), of which 18 species and one variety are endemic. Nees (1832) validated *L. hamiltoniana* Wall. ex Nees with a detailed description based on a specimen collected from West Bengal, India and distinguished it from *L. cristata* Willd. Later Morton (1988) relegated the eastern African form of *L. collina* (Endl.) Milne-Redh. as a sub species (*L. hamiltoniana* subsp. *Collina* (Endl.) J.K. Morton) of *L. hamiltoniana*, besides, treating the latter as conspecific to the western African form of *L. collina* (*L. hamiltoniana* subsp. *hamiltoniana*). Darbyshire (2010) reassessed this complex and considered the western and eastern African forms of *L. collina* are identical. Thus, he reinstated it as a distinct species, besides, emphasizing the need for a thorough study on *L. hamiltoniana* in India. During the present study on the systematics of *Lepidagathis* in India, we have thoroughly examined fresh and herbarium specimens of *L. cristata* and *L. hamiltoniana* collected from different localities. The results of the detailed revision of this complex show that *L. hamiltoniana* is distinct from *L. collina*, endemic to Africa and *L. cristata*, endemic to India. The taxonomy, distribution and diagnostic characters of all the species belonging to this complex will be discussed.

**Keywords:** *Lepidagathis* Willd., *Collina*, *Cristata*, Barlerieae, Acanthaceae, Complex

## OP-FNTRM 08

### Herbaceous Geophytes of Lateritic Plateaus of Ratnagiri District (Maharashtra)

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Geophytes are plants typically with underground storage organs, where the plants hold energy and water. Herbaceous plants collectively known as geophytes, which regrow from belowground buds i.e., bulbs, corms, rhizomes, tubers, and tuberous roots. During our floristic studies on lateritic plateaus of Ratnagiri district (Maharashtra) from year 2020 to 2022, total 53 herbaceous geophytes belong to 15 families and 31 genera were collected from lateritic plateaus of Ratnagiri district. Among 53 geophytes, 23 species are tuberous, nine species are bulbous, eight species are cormatous, eight species are rhizomatous and remaining five species are tuberous roots. Out of 53 geophytes, 25 species are endemic to India.

**Keywords:** Geophytes, Herbaceous, Lateritic plateaus, Ratnagiri district, Konkan.

## OP-FNTRM 09

### **Taxonomic Status and Identity of *Ziziphus hysudricus* (Edgew.) Hole (Rhamnaceae)**

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On the basis of literature survey, field observations and collected specimens rediscover the species and confirmed the identity of *Ziziphus hysudricus*. The *Ziziphus hysudricus* morphologically resembles to *Z. jujuba* and *Z. mauritiana* but differs in the branches not drooping, leaves are roundish ovate, a slightly pubescence in young specimens, but they are almost glabrous when old, the fruit is globular and dark greenish purple coloured. This paper clearly delimits these three species with unambiguous morphological characters to facilitate authentic identification.

**Keywords:** *Ziziphus hysudricus*, morphological characters, Rhamnaceae



## OP-FNTRM 10

### Flora of Sikkim-A Comprehensive Account (Angiosperms)

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With its huge floral diversity, Sikkim practically appears as 'Botanical Wonder'. It shelters nearly 5901 species of angiosperms in its 7096 km<sup>2</sup> land mass. Sikkim shares nearly 32% national flora in spite of its small occupancy of 0.2% of the total geographical area of the country. Until now all floristic counts indicate the presence of nearly 4000 to 5068 species/or taxa in Sikkim. However, the present study added nearly 800 species to this part of Himalaya. Major difficulties in recognition of species/taxa under Sikkim flora is the difference in interpretation/opinion and largely for absence of a 'Flora' that compiled through revisionary approach. Many close publications contradict each other in acknowledging the occurrence of a particular species in Sikkim. The recent account illustrates nearly 4273 species under 1206 genera and 177 families of dicotyledons and about 1628 species belonging to 38 families under 389 genera of monocotyledons. The endemic species count is also revised and 71 species are recorded as narrow endemic to this Himalayan state. This initiative will definitely enhances the primary database on the flora of Sikkim.

**Keywords:** Sikkim, Comprehensive Account, Angiosperms

## OP-FNTRM 11

### Identity of *Avicennia marina* from Maharashtra

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*Avicennia marina* is known by five taxa from Maharashtra. These are *Avicennia alba*, *Avicennia marina* var. *marina*, *Avicennia marina* var. *acutissima*, *Avicennia marina* var. *resinifera*, *Avicennia marina* forma *pumila*. This paper discusses the status of these taxa of *Avicennia* with reference to their morphometry, Anatomy, Molecular study and establishes their identity from Maharashtra

**Key words:** *A vicennia*, Identity, Maharashtra, Characters

## OP-FNTRM 12

### Comparative Karyology of Some *Dipcadi* Medik. species (Asparagaceae) in India

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Indian *Dipcadi* species have different chromosome counts such as  $2n = 8, 12, 20,$  and  $22$ . In the present investigation, karyological features of species with somatic chromosome counts  $2n = 12$  (*D. concanense*, *D. goaense*, *D. janae-shrirangii*, *D. reidii*, and *D. saxorum*) were studied. The karyotypes of *D. concanense*, *D. goaense*, *D. janae-shrirangii*, and *D. reidii* were composed of three pairs of large chromosomes and three pairs of short chromosomes. On the other hand, the karyotype of *D. saxorum* comprised three pairs of large chromosomes, two pairs of short chromosomes, and one pair of very short chromosomes. The chromosomes of *D. concanense*, *D. goaense*, *D. janae-shrirangii*, and *D. saxorum* had sub median region and sub terminal region centromeres whereas in *D. reidii* chromosomes were with the median region, submedian region, and sub terminal region centromeres.

**Keywords:** *Dipcadi*, Asparagaceae, Karyology

## OP-FNTRM 13

### **Are *Ledebouria hyacinthina* and *Ledebouria revoluta* Synonymous?**

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*Ledebouria revoluta* is described from South Africa by Jessop (1970) based on *Hyacinthus revolutus* L.f.(1782) . The species *L. hyacinthina* is named by Roth from India in 1821. In India, the genus *Ledebouria* is found in Central and Peninsular India. The genus *Hyacinthus* L. differs from that of *Ledebouria* Roth by the absence of stipe in ovary. The specimens of *L. hyacinthina* Roth is characterised by single bulb as opposed to the presence of bulblets in African *Ledebouria revoluta* (L.f.) Jessop; absence of basal lobes in ovary in Indian specimens unlike African *Ledebouria revoluta*. Morphological data is supported by molecular evidences. Present paper deals with the identity of Indian species of *Ledebouria* Roth.

**Key words:** *Ledebouria*, Identity, *revoluta*, *hyacinthina*, India, Africa

## OP-FNTRM 14

### **Structural Variability of Monopodial Orchid, *Cottonia peduncularis* (Lindl.) Rchb.f.**

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Orchidaceae is one of the largest families of the flowering plants. Some of the members of this family are endangered in nature. Greater range of variation in the size, shape, colour, fragrance and vase- life of orchid flowers is seen. Monopodial character is also one of the features of this plant. This character was comparative advantage over sympodial such as easier maintenance, longer vase-life, numerous colour combinations etc. Very little information is available on this group of orchids with single apical meristem. Considering this important monopodial character of the present study has been undertaken on monopodial orchid of *Cottonia peduncularis* which belongs to monotypic genus having good cut flowers. Observations on vegetative as well as floral traits were recorded. The collected data were subjected to the analysis of variance to test for significant difference in other members. Genetic parameters have also been examined. The vegetative characters such as thickness of leaf, leaf area and number of aerial roots among the floral traits number of flowers per spike inflorescence, and vase- life showed highest variance. Due to the wide variability and peculiarity in growth habits, orchids are the most exploited groups of plants in an ecosystem. They are important natural resources for modern floriculture industry. Many of them are having medicinal properties also. Considering all these facts efforts have been made for the conservation of these valuable plants through *in-situ* and *ex-situ* methodologies.

**Keywords:** *Cottonia*, Monopodial, Sympodial, Conservation.

## OP-FNTRM 15

### Diversity of genus *Jurinea* Cass. (Asteraceae) in India

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*Jurinea* Cass. (Asteraceae) is one of the largest genera of the tribe Cardueae. It comprises of ca. 200 species in the world. In India, the genus is represented by approximately 20 species distributed in the alpine regions of the Himalayas. *Jurinea* is adapted to xerophytic as well as chasmophytic habitats. Morphologically, it is quite complex due to high phenotypic plasticity. The genus includes various medicinally important taxa such as *Jurinea auriculata* (often used as antisyphilitic), *J. albescens* (used to relieve bronchitis and as a diuretic) and *J. Heteromalla* (used to treat wounds, as a carminative, as antipyretic). *Jurinea* species are collected from the wild for herbal drug preparations, due to which populations are vanishing from their natural habitats. Being an alpine genus with restricted habitat and a narrow flowering time, only a few taxonomic studies on *Jurinea* have been done at global level. In the present communication, the diversity of the genus *Jurinea* in India has been documented with details about their taxonomic and nomenclatural status.

**Keywords:** *Jurinea*, Asteraceae, Taxonomy, Threatened taxa

## OP-FNTRM 16

### A Floristic Study of Korla District in Chhattisgarh (India)

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Korla District of Chhattisgarh state has a very rich flora exhibiting diversity of flowering plants. There is no comprehensive description of the flora as well as vascular cryptogams of the district. Some plant species are on the verge of extinction. Keeping these points in view, the present investigation was planned. Present paper deals with floristic account of flowering plants and provides a preliminary analysis of the flowering plants of Korla district. The district harbours 657 species under 439 genera and 119 families of Seed plants (Angiosperms). Of these, 364 species are wild and 293 species are cultivated/ planted. D: M (Dicot /: Monocot) ratio was found to be 6.00 family-wise, 4.85 genera-wise and 5.19 species-wise. Generic coefficient was found to be 66.81. The Genera: Species ratio was 1:1.496.

**Keywords:-** Floristic study , Korla district, Generic coefficient, Chhattisgarh

## OP-FNTRM 17

### Flowering Plants of Chikodi Hills, Belagavi District, Karnataka, India

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A Chikodi hill is located in North Western part of Belagavi District of Karnataka state, India, maintaining great plant diversity. Little attention to plant diversity studies has been made to it in the past years. Here, we present a checklist of the flowering plants of this region obtained through intensive field investigations and matching of herbarium specimens. In total, 584 species, including 24 endemic species are documented, belonging to 95 families and 383 genera. The native ranges, habit, habitat, flowering and fruiting and voucher specimens of taxon have been recorded in this checklist. It is the first exhaustive inventory of the flowering plants in Chikodi hills which is a significant regional centre for plant diversity.

**Key words:** Checklist, Chikodi hills, diversity, endemism



## OP-FNTRM 18

### **Floristic Diversity of the Seasonal Pools on a Lateritic Plateau of Northern Kerala, South India**

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Northern Kerala is characterized by midland low altitude lateritic hillocks situated in between Arabian Sea and Western Ghats; spreads mainly over Kasaragode, Kannur, Kozhikode and Malappuram districts. They exhibit alternating wet phase during monsoon season and dry phase during pre monsoon and post monsoon seasons. With the onset of monsoon, these dry, golden brown hillocks turn into greenish. Monsoon rain results in the formation of water logged areas such as ephemeral pools and seasonal pools of varying extensions, in addition to the perennial ponds of the plateaus. Seasonal pools which are highly variable with respect to their area extension, depth, soil cover and longevity, serve as the habitat for many plant species including endemic, rare and threatened species. Present study was undertaken to document the floristic diversity of the seasonal pools of Kalliad lateritic plateau in Kannur district of Kerala, South India. Intensive floristic surveys conducted in the seasonal pools of the study area have resulted in the documentation of about 60 flowering plant species of which 25% are endemics. These highly fragile, biodiversity rich micro ecosystems are under threat due to various anthropogenic disturbances in the area.

**Keywords:** Biodiversity conservation, Ephemeral pools, Micro ecosystems, Endemism, Threatened species.

## OP-FNTRM 19

### Chenopodiaceae of Sikkim

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The family Chenopodiaceae is dominated in Africa, Asia, Australia, Europe, and America with about 1400 species under 100 genera. Members of the family preferably grow in arid areas, deserts and coastal habitats. Many species are used as vegetables throughout the world and some of them are used as important source of as animal forage. Importantly, a few species are of great ecological values, as sometimes they used in reconditioning the deserts. In India, the family is credited with around 73 species under 22 genera. This important plant family has never been revised for the state Sikkim and the total genus and species counts are interpreted variously as three to five and four to eight respectively in different literature. In this study the family is revisited both in the field and laboratory. All major herbaria in India and abroad are scrutinized in search of Sikkimese specimens. It leads to consider 10 species under 5 genera in Sikkim. Most of the members are inhabitants of tropical and subtropical forests, although few are found in temperate habitat. Notably, *Dysphania botrys* (L.) Mosyakin & Clemants and *Microgynoecium tibeticum* Hook.f. are recorded as highest altitudinal residents of the family, extend their occurrence up to 5500 m amsl. Present communication deals with the diversity of the family in the Himalayan state Sikkim. An artificial key to the genera and key to the species under each genus are provided.

**Keywords:** Chenopodiaceae, Sikkim,

# **ETHNO-BOTANY, TRADITIONAL KNOWLEDGE ON MEDICINAL PLANTS AND BIOPROSPECTING [ETMPB]**

Organized by Department of UG, PG and Research in Botany, Karnatak University's, Karnatak Science College, Dharwad,  
Karnataka - 580 001

## OP-ETMPB 01

### Isolation and Identification of Endophytic Fungi from Leaves of *Simarouba glauca* DC.

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*Simarouba glauca* DC. (Simaroubaceae), commonly known as paradise tree, is a medium-sized evergreen tree. The plant has a long history in traditional and herbal medicines and is being used for various conditions, including cancers. It is a known fact that, most of the plants have microbial communities within their tissues such as stems, roots, leaves, and seeds, known as Endophytes. They live in harmony with the plants, without interfering with physiological activities of the plant and without creating any disease symptoms to the host plant tissues. Instead, sometimes they also benefit their host plants by producing bioactive substances. Therefore, there is a renewed interest in endophytes for their capacity to synthesize specific bioactive compounds. In the similar lines, the present work is an effort to isolate and identify endophytic fungal species from the leaves of *S. glauca* collected from various locations of Western Ghats. In the process, two species of endophytic fungi have been isolated from the leaf tissues and have been subjected for morphological identification and molecular identification through rDNA ITS sequence fingerprinting. The species were identified as *Papiliotrema siamensis* and *Neopestalotiopsis dendrobii*.

**Key words:** *Papiliotrema siamensis*, *Neopestalotiopsis dendrobii*, Endophytic fungi.

## OP-ETMPB 02

### Pharmacognostic Studies on Leaves of *Triumfetta rotundifolia* Lam.

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*Triumfetta rotundifolia* Lam. is annual, erect, woody and hairy, under shrubs found on gravely soil and on wasteland. *Triumfetta rotundifolia* Lam. leaves was found to be medicinally used. Leaves are commonly used on eye infection, typhoid and in post delivery problems. The anatomical and phytochemical studies were done with respect to plant leaves. Phytochemical analysis was done to test 16 types of bioactive molecules. Present investigation showed the presence of  $\beta$  naphthol, flavanol, flavones, leucoanthocyanin, tannin, steroids, triterpenoids, cardiac glycosides and digitoxose. Ash analysis was also done to study the mineral content. Analysis was carried out to test the minerals like Sodium, Potassium, Calcium, Iron, Magnesium, Aluminum, Manganese, Copper, Nickel, Chromium and Zinc.

**Keywords:** Pharmacognosy, *Triumfetta rotundifolia*, Phytochemical Analysis, Mineral Profile.

## OP-ETMPB 03

### **Ethnobotanical Study of Wild Edible Fruits in Selected Muthuvan Settlements in Adimali, Idukki Dist., Kerala**

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A fruit is the ripened ovary of a flower, which can be either fleshy or nut-like. The Wild edible fruits are one of the most significant Non-Wood Forest Products that greatly contribute to the socio-economic development both of rural and tribal communities. Both cultivated and wild fruits are prevalent; cultivated fruits are grown by farmers for commercial gain, whereas wild fruits are only found in their natural habitats. Through trial and error, human's greater intellect enables him to discern between edible and toxic plant components. This study focuses on the ethnobotanical documentation of wild edible fruit species used by the Muthuvan tribes of Valara forest range Adimali. According to a detailed ethnobotanical survey, five Muthuvan settlements in Adimaligramapanchayathu of Idukki district, utilize thirty fruit species falling under 23 genera in eighteen families. These fruit plants consisted of 14 trees, 10 shrubs, 2 herbs, 3 climbers and 1 liana. Among these 46.6 % are trees and Moraceae occupies the highest number of species used. Apart from the edible use, 8 species have therapeutic uses and also functioned as vitamins' complements. The fruit plants used by Muthuvan are listed in alphabetical order, followed by their family names, local names, used parts, production methods and therapeutic uses.

**Keywords:** Ethnobotany, Edible Fruits, Muthuvan Settlements, Adimali, Idukki, Kerala

## OP-ETMPB 04

### **Phytochemical Screening, HR-LCMS Analysis and Antimicrobial Activity of Rhizome Extract of *Zingiber neesatum* (J. Graham) Ramamoorthy**

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The plant and plant based products are the basis of many of the modern pharmaceuticals we use today for our various ailments. Plant shows medicinal properties as it contains phytochemical constituent. These are non nutritive plant chemical that have disease preventive properties. The present investigation was aimed to evaluate the phytochemical screening, HR-LCMS analysis and antimicrobial activity of Methanolic crude rhizome extract of *Zingiber neesatum* (J. Graham) Ramamoorthy, which belongs to the family Zingiberaceae. The plant samples were shade-dried and subjected to solvent extract as methanol. The preliminary phytochemical screening revealed the presence of alkaloids, glycosides, flavonoids, phenols, tannins, saponins, phytosterols and triterpenoids. Subsequently, the solvent extract was subjected for HR-LCMS analysis and the results pertaining to HR-MS analysis led to the identification of number of compounds from the HR fractions. The efficiency of methanolic rhizome extract was tested against five human pathogenic bacteria i.e. *Staphylococcus aureas* (NCIM-5021), *Salmonella typhimurium* (NCIM-2501), *Pseudomonas aeruginosa* (NCIM-5029), *Shigella flexneri* (NCIM-5265) and *Escherichia coli* (NCIM-2931). It is evident from the results that, maximum inhibition was noticed with methanol extract of *Z. neesatum* against gram positive bacteria. The presence of phytochemical constituents shows the protective and disease preventive properties of plant. These results confirmed that, the tested plant material may be effective and potential source of natural antimicrobials to develop new compounds for better health benefits.

**Keywords:** *Zingiber neesatum*, HR-LCMS, pharmacognosy, phytochemistry, antimicrobial activity.

## OP-ETMPB 05

### **Ethno-Medicinal Plants of Panchlingeshwar Sacred Grove, Nandikurali, Raibag, Belagavi, Karnataka**

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Sacred groves are the places, where numbers of medicinal plants are conserved and preserved for providing traditional health care for local people. This traditional information is being documented before it is lose forever. Hence, an ethanobotanical survey was carried out in June 2020-May 2021 to document traditional medicinal information from Panchlingeshwar sacred grove. A total 54 species belonging to 48 genera under 28 families were used to treat 21 human disorders. Most of the medicinal plant species are distributed under the family Anacardiaceae, followed by Apiaceae, Lauraceae and Moraceae. The information about plant species local names, parts used, mode of preparation, dosage also been documented.

**Keywords:** Medicinal plants, Nandikurali, Raibag, Sacred groves,



## OP-ETMPB 06

### Phytochemical Screening, GC-MS Analysis and Antibacterial Activity of *Sphagneticola trilobata* (L.) J.F. Pruski

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*Sphagneticolatrilobata* (L.) J.F. Pruski has long been used as traditional herbal medicine in South America, China, Japan and India. It belongs to family Asteraceae. The presences of phytochemical compounds in the leaves of *S. trilobata* were evaluated in methanol, acetone, ethanol and water extracts. Results showed the presence of 10 out of 10 phytochemicals in methanol leaf extracts of *S. trilobata*. Methanolic leaf extract of *S. trilobata* were analyzed for the presence of different volatile compounds by Gas chromatography-Mass spectroscopy (GC-MS) technique. The most prevailing major compounds of methanol extracts were 1-Tetradecanol (14.41 %), Tetradecanol (10.33 %), 2,4-Ditert-Butylphenyl (3.59 %), 1-Heptadecene (5.29%), Neophytadiene (8.86%), 6-Octen-1-Oil (2.42%), 1-Heptadecene (3.88%), Phenanthere (5.99%), Squalene (6.51%), Octadecamethyl- (3.94%), Beta-Amyrin (7.70%), Cyclononasiloxane (16.92%). Most of the component has biological activity. The methanolic extract from *S. trilobata* leaves with the concentrations of 50, 75, and 100  $\mu$ M were assessed for their potentiating affects against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Vibrio cholera*, *Escherichia coli* positive control and negative control. Both gram positive and negative bacteria produced their zone of inhibition at moderate level against *S. trilobata* methanolic leaf extracts.

**Key Words:** *Sphagneticola trilobata*, Phytochemistry, GC-MS, Biological activity, Antibacterial activity.

## OP-ETMPB 07

### Investigation of 'African Tulip Tree-Calyx Water' As a Novel Source Water, Food and Medicine.

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It's very interesting to observe the birds sucking the water from flower bud of a particular plant. Actually these observations lead us for Pharmacognostical and Physiochemical standardization of Water Calyx Fluid in the African tulip tree i.e. *Spathodea campanulata* P. Beauv. The healthy buds were selected and grouped into small, medium and large sizes based on the size cum weight of intact flower buds. For physicochemical study, calyx fluid from all the bud sizes were collected freshly, mixed and analyzed qualitatively and quantitatively for pharmacognostical and physiochemical standardization with well defined methods. Calyx fluid of *S. campanulata* shows high in the concentration of reducing sugar, phenol, protein and amino acids which indicate its absolute necessity for the floral development. The concentrations of all the analyzed biomolecules were found to be decreasing with bud maturity. The contents of water calyx fluid are obligatory for the development of floral whorls. It can be said that, there is good potential in high nutritive calyx fluid can be used a nutritional supplement and novel food source. Presence of phytohormones like IAA, IBA and Siderophore in the calyx fluid in bud maturity suggests that the calyx fluid has a vital role in the exponential development of corolla. Presence of antimicrobial activity indicates the role of calyx fluid in immunological defense mechanism of *S. campanulata*.

**Keywords:** Floral development, Phytohormones, Calyx fluid, Antimicrobial activity.

## OP-ETMPB 08

### **Phytochemical Profiling of *Orthosiphon thymiflorus* (Roth) Sleesen and Its Antioxidant and Antibacterial Activity of Two Different Solvent Extracts of Leaves.**

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The present study reports the qualitative and quantitative phytochemical profiling in Petroleum ether and Methanol solvent extract of *Orthosiphon thymiflorus* (Roth) Sleesen leaves. Dried leaves sample were extracted with different solvents using the Soxhlet apparatus. Preliminary phytochemical screening revealed the presence of triterpenoids, steroids, reducing sugar, sugar, phenolic compounds, flavonoids, and amino acid. The highest total phenolic content was observed in methanol extract was 5.83 µg/ml and the highest total flavonoid content was observed in petroleum ether extract was 1.65 µg/ml. The crude extracts were further subjected to FTIR spectra revealed the presence of major functional groups such as phenols, alkanes, aldehyde, and ketones; Numerous bioactive compounds were shown in the GC-MS analysis of various solvent extracts of *O. thymiflorus*. DPPH scavenging activity of *O. thymiflorus*, which showed promising results. Antibacterial activity was carried out using petroleum ether and methanol extracts. In all leaf samples showed maximum zone of inhibition than the standard antibiotic disc used. Hence the present study, which focuses on profiling of phytochemicals of *O. thymiflorus*, will be useful in the synthesis and preparation of new drugs of pharmaceutical importance. The present study offers an alternate way to overcome the side effects of synthetic drugs and makes use of medicinal plants for the discovery of drugs that cures various harmful diseases which are safe, cost effective and ecofriendly.

**Keywords:** *Orthosiphon thymiflorus*, Extraction, FTIR, GCMS, DPPH, Antibacterial activity.

## OP-ETMPB 09

### **Evaluation of Antioxidant Potential and Anticancer Activity of *Rhynchosia hirta*: An Underutilized Wild Legume**

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The main objective of present research work is to determine antioxidant potential of immature and mature seeds of *Rhynchosia hirta* in different solvent extract and to evaluate anticancer activity. For the analysis of antioxidant potential plant samples were prepared in four different solvent such as methanol, ethanol, acetone and aqueous with four different concentrations i.e., 1mg, 2 mg, 3 mg and 4 mg/ml. A unique standard approach was used to assess the antioxidant potential of all levels in terms of DPPH free radical scavenging potential, ferric ion reducing antioxidant power, reducing potential, total antioxidant capacity, ABTS free radical scavenging potential, ferrous ion chelating ability. In contrast to the other four solvents, acetone plant extract showed the highest antioxidant activities. In analysis of anticancer activity plant sample were prepared in acetone and tested against three various cell lines such as MCF-7, PC-3 and A-549. MTT assays were used to determine the effect of RHSE on the viability of human breast cancer cell line (MCF-7), human lung adenocarcinoma cell line (A549), and prostate cancer cell line (PC-3) cell lines, and IC50 values were calculated from dose-dependent response studies assessed 24 hours after treatment. MCF-7, A549, and PC-3 cells were all inhibited in a dose-dependent manner by RHSE, with IC50 values of 14.5 mg/ml, 14.7 mg/ml, and 15.8 mg/ml, respectively.

**Key words:** Antioxidant potential, anticancer activities, *Rhynchosia hirta*, Immature and mature seeds.

## OP-ETMPB 10

### Evaluation of Nutritional and Antioxidant Potential of *Senna auriculata* L. Flower

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Nature provides many medicinal plants with promising nutritional and health benefits. *Senna auriculata* L. belonging to Fabaceae family is an important medicinal plant with antidiabetic, antiperoxidative, antihyperglycemic, antipyretic and hepatoprotective activity. It is also proved for its antiviral, microbicidal and anti-spasmodic activity. The leaves, flowers, root, stem and unripe fruit are used for treatment, especially in Ayurvedic medicine. It is used for eye infections, diabetes, liver disease, joint and muscle pain (rheumatism), constipation, jaundice and urinary tract problems. Flowers are used as wild vegetable in various parts of Maharashtra and Andhra Pradesh of India. The present research paper deals with the evaluation of the nutritional, phytochemical and antioxidant potential of flowers of *Senna auriculata*. The qualitative phytochemical screening of flowers shows the presence of bioactive compounds like Iridoids, Alkaloids, Cardenolides Flavonoids, Simple Phenolics, Leucoanthocyanin, Steroids, Saponins proves its medicinal value. Nutritional analysis of flowers of *Cassia auriculata* shows the good concentration of carbohydrates, total fat, crude fibres which proves its dietary value. Radical scavenging activity of various extracts has good results and presence of lycopene and chlorophyll pigments also supports its antioxidant properties.

**Keywords:** *Senna auriculata*, Wild vegetable, nutritional, phytochemical analysis, Antioxidant

## OP-ETMPB 11

### **Traditional Knowledge and Diversity of Wild Edible Plants Used As Food Sources in Tumakuru District: An Ethno Botanical Survey.**

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The survey was undertaken to investigate the wild edible plants as food source in Tumakuru district; it is located in south western part of Karnataka state. The rural communities of this region depend on wild resources for additional food supplement during the food crisis. The modern life style has witnessed the change in healthy lifestyle, the fast foods have created nutritional gap. Population explosion has increased the demand for food which is depleting forest land for agriculture. Food from wild is emerging as a new concept of utilizing the wild plants as food such a potential edible plant resources are repository of plant based culinary skills and it is limited to the communities. Such valuable inexpensive traditional knowledge was collected from the field visit during 2020 to 2022 in rural areas to obtain primary information on, traditional cuisine, cooking method, food safety, wide range of plant products used in preparing dish. Information on dietary uses on wild plants was gathered through interview, questionnaire and discussion. The present study is first to explore the wild edible plants of Tumakuru district The present study documents 114 wild edible plant species used in their regular diet; the study indicates the diversity in traditional knowledge used in utilizing wild edible plants as food by rural communities of Tumakuru district. They consume (2) rhizome, (32) leaves, (6) tubers, (3) roots, (8) Flowers, (7) seeds, (6) stem, (43) fruits and (2) gum.

**Keywords:** Food source, Traditional knowledge, Tumakuru, Wild edible plants.

## OP-ETMPB 12

### **Analysis of Market and Garden Samples of Tamal Patra – A Condiment Used in Indian Cuisine**

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Tamal Patra- the leaf of *Cinnamomum tamala* (Buch.- Ham.) Nees et Eburn is commonly available in grocery shop in Maharashtra. The external morphology and the aroma of the leaf vary from shop to shop. The present paper deals with the Morphometry, Anatomy and Phytochemical analysis of the market and garden samples of Tamal patra – a common condiment used in Indian cuisine. The result obtained from the market sample is compared with the authentic sample.

**Keywords:** *Cinnamomum tamala*, Market sample, Garden sample, Analysis, Authentication

## OP-ETMPB 13

### A Study on Adulteration of Commercial Crude Herbal Drugs

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Adulteration is a practice of substituting original crude drug partially or whole with other similar drug. Adulteration involves different conditions such as deterioration, admixture, sophistication, substitution, inferiority and spoilage. Standardization is an important tool for herbal crude drugs to establish their identity, purity and quality. Pharmacognostical studies is still more reliable, accurate and inexpensive means and to be carried out before any test were under taken. In this perspective the survey was conducted in commercial herbal drugs sold in Siddha shops at Salem district, Tamil Nadu. The survey enlisted 82 commercial herbal drugs sold in Siddha shops. Herbal drugs used to cure various ailments, prepared from various plant parts. The species belongs to herbal drugs have been arranged alphabetical, binomial, vernacular name, plant parts used, ailments cured and also listed family wise and habit wise. Disease wise classification also enumerated. In order to find out adulteration of commercial herbal drugs sold in Siddha shops 15 commercial crude herbal drug was selected based on plant parts used. To evaluate the adulteration following physio-chemical parameters such as moisture content, extractive value, ash value, powder characters, fluorescence character, qualitative and quantitative estimation were analyzed. As per WHO guideline similar fresh plant materials were collected and crude herbal drugs were standardized to compare with selected commercial crude herbal drugs and found that most of the drugs were adulterated.

**Keywords:** Adulteration, Crude Herbal Drugs, Pharmacognosy



## OP-ETMPB 14

### Phytochemical Study from Leaf and Stem Parts of Genus *Cajanus* Adans.

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The leaf and stem samples of the plant *Cajanus cajan* (L.) Mill., *Cajanus platycarpus* (Benth.), *Cajanuslineatus* (W & A) Van der Maesen, and *Cajanus sericeus* (Benth. Ex Bak.) Van der Maesen., were selected for the investigation of phytochemical present in the plant specimens of the above said species from the genus *Cajanus* Adans. The results procured showed the presence of compounds viz., total moisture content, total ash, water soluble ash and acid insoluble ash from leaf and stem powder samples respectively. In the investigation of phytochemical present The bioactive chemical compounds viz., phytochemicals studied and this includes the determination and estimation of these phytochemical i.e. proximate compounds, saponin, alkaloids, flavonoids, crude protein etc. It was observed that the variations occurred in the concentrations of total moisture content, total ash, water soluble ash and acid insoluble ash from leaf and stem powder samples prepared from plant specimen.

**Keywords:** *Cajanus*, Phytochemicals, Moisture content, Water soluble ash, Acid insoluble ash.

## OP-ETMPB 15

### **Phytochemical Evaluation and Antioxidant Activity of *Zanonia indica* L. Fruit Extracts**

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Traditional practice for curing diseases using locally available medicinal plants is a culture adopted by Indians from prehistoric period. Cucurbitaceae members are also used as medicine for various sickness, one among them is *Zanonia indica* L. which is selected for the study. The aim of the investigation was to extract the phytochemicals and to examine the antioxidant property of the selected plant. Powder of dried fruit of *Z. indica* was subjected to Soxhlet extraction using different solvents to obtain crude extracts. Hexane, chloroform, acetone, methanol and distilled water was used for extraction. Crude extracts of these solvents showed the presence of phenols, alkaloids, Terpenoids, flavonoids, steroids, carbohydrates, tannins, saponins, glycosides Quinone's, resins, and proteins in preliminary analysis. Quantitative analysis of crude extracts using HPLC showed that the acetone and methanol extract was rich in total alkaloids, total phenols, total flavonoids and total terpenes. Antioxidant activity of fruit extracts of using DPPH assay, ABTS radical scavenging assay and FRAP assay revealed the presence of antioxidant property. Methanol and acetone extract of fruit was rich in antioxidants. This study evidenced the presence of bioactive compounds as well as its antioxidant properties and hence proves the traditional practice of the selected plant was appropriate.

**Keywords:** Quantitative, High Performance liquid chromatography, Cucurbitaceae, liana phenols, percentage yield, antioxidant, methanol

## OP-ETMPB 16

### **Ethnobotanical Study from Padel Village, Taluka Devgad, Dist. Sindhudurg, Maharashtra**

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Padel (1314.55 hectares) in Devgad taluka, Sindhudurg district of Maharashtra is a small village. There are 15 wadis with a total population of 3500 inhabitants belonging to Hindu-Kunbi. Mangrove vegetation, cultivation field, Plateaus (sadas) and Sacred Groves and forest land have been observed in study area. India has a rich ethnobotanical knowledge which is inherited from generation to generation among tribal people since ancient time. But the traditional knowledge amongst younger generation is becoming poor as more and more people are settling in cities for better life style. Thus, we felt the need of recording the ethnobotanical information from local people, before they completely lost. The present work deals with the ethno-botanical survey carried out in some part of Padel village, Devgad district, Maharashtra. The information thus collected are analyzed and some points with respect to conservation of the habitat and species are discussed.

**Keywords:** Padel, Ethnobotany, Medicine, Fuel wood, Food, beverages, Religious use

## OP-ETMPB 17

### Extraction of Essential Oil, GC-MS Analysis and Insecticidal Potential of *Plectranthus mollis* (Aiton.) Spreng.

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The creation of alternative methods, such as the employment of venerable, conventional botanical insect pest control agents, is of growing interest on a global scale. Higherplants have a variety of 'secondary plant compounds,' or biochemicals with defenseproperties.They consist of diverse organic acids, essential oils, alkaloids, flavonoids, phenolics,saponins,and other substances. Due to environmental concerns and an increase in insectpopulations thatare resistant to traditional pesticides over the past 15 years, interest in botanical insecticides hasgrown. Insecticides that are produced spontaneously from plants are known as biopesticides.Secondary plant metabolites have a variety of potential effects, including adulticidal, larvicidal,and stimulants or inhibitors of feeding and oviposition deterrent activity against *Callosobruchuschinensis*. Botanical insecticides can have a wide range of applications, be safe to use, have adifferent mechanism of action. In present investigation GC-MS analysis showed total 51compounds. Total 85 percent chemical constituents was identified. *Plectranthusmollis* belongsto family Lamiaceae essential oil was evaluated for its properties. It showed potent adulticidaland oviposition deterrent property against *Callosobruchus*.

**Keywords:** Essential oil; TLC; GC-MS; Insecticidal

## OP-ETMPB 18

### Catalogue and Ethnobotany of Invasive Alien Grasses of Bhagalpur District (Bihar), India

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This paper deals with cataloging of 12 invasive alien grasses of Bhagalpur district (Bihar), India and documentation of ethnobotanical uses of these grasses in the life and economy of native people. These grasses occur as weeds (*Echinochloa colona*, *Echinochloa crusgalli*), cultivated plants (*Avena sativa*, *Dendrocalamus giganteus*, *Dendrocalamus membranaceus*, *Dendrocalamus strictus*), wild plants (*Cenchrus purpureus*, *Chloris barbata*, *Imperata cylindrica*, *Paspalum dilatatum*) and wild plants or weeds (*Cynodon dactylon*, *Saccharum spontaneum*) in varying frequencies throughout the geographical area of district. *Cynodon dactylon* and *Saccharum spontaneum* grow profusely round the year as dominant grasses in the entire region. All these invasive alien grasses act as the valuable resources for the native people. Their utilization as fodder, medicine, fiber, etc. seems to be crucial for the livelihood of rural people. *Cynodon dactylon* is lavishly used as an excellent fodder and as an effective medicine to cure anaemia, constipation, indigestion, menstrual disorders, poor urination, etc. *Dendrocalamus* spp. are utilized in building construction, basketry and weaving, *Saccharum spontaneum* is useful in thatching roofs of huts. *Cynodon dactylon* and *Saccharum spontaneum* are essentially put to use in religious ceremonies of Hindus. Commercial exploitation of *Dendrocalamus* spp. and *Saccharum spontaneum* may boost the economy of rural folk after adopting proper strategy for their efficient exploitation.

**Keywords:** Alien, Catalogue, Ethnobotany, Invasive, Grasses

## OP-ETMPB 19

### Wild Medicinal Plants Used by Famous Traditional Practitioner in Chikkasindoghi Village of Koppal District, Karnataka State

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The current study looked into how a well-known traditional healer from Chikkasindoghi Village in Koppal region used medicinal plants. 25 medicinal plants were identified as being used by traditional healers or humans to treat various illnesses during the course of the current investigation. Twenty families and 25 genera of the collected therapeutic plants were recorded for a variety of human diseases. Cucurbitaceae, Euphorbiaceae, Asclepidaceae, Amaranthaceae, Solanaceae, Acanthaceae, Lamiaceae, and Apocynaceae are a few of the prominent families. The majority of herbs' leaves were a major component of the plant parts employed in the creation of doses by seeds, roots, leaves, stems, whole plants, and fruits. Our research focussed mainly on the treatment of tumour in combination with leaves of *Adhatodavesika*, *Acalypha indica*, pepper, garlic paste in ginger juice daily. This report provides information on diseases, the botanical name of the plant, the local name, the plant's family, the portion used, and usage-related information.

**Keywords:** Traditional Medicinal Plants, Chikkasindoghi Village, Revenasiddaya Practitioners, Specially Tumours

## OP-ETMPB 20

### **Antimicrobial activity of 'Majoon Najah': A classical Unani Formulation**

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One of the best polyherbal formulations from the Unani System of medicine is selected for its activity as it has not been tested earlier by researchers in a modern scientific way. Majoon Najah (MN) is one of the polyherbal Unani preparations and it has been traditionally used for Neurological disorders such as melancholia, epilepsy, hysteria, insanity, colitis and for black bile diseases since last few centuries. However, this formulation has not been scientifically evaluated for its claimed antimicrobial uses. Most of the plants present in MN have been pharmacologically and experimentally reported significant antimicrobial activity individually. But, no experimental studies have been carried out on the classical formulation MN for its antimicrobial activity. Hence, in the present study we tried an attempt to check the antibacterial and antifungal activity on selected microorganisms. MN formulation is a preparation which is made from the qiwan of white sugar or honey and a medicinal safoof (powder) having the mentioned plant ingredients as per National Formulary of Unani Medicine. In vitro analysis of Three extracts (Aqueous, Alcoholic & hydro alcoholic) of MN formulation were used on Agar well diffusion method. Results of the study look promising and depicted the antimicrobial activity against the selected microbes. The formulation has been found to possess strong antimicrobial activity, on the basis of our studies we can succulently validate the classical claims about this drug in case of various infective conditions and further detailed studies with different aliquots are mandated.

**Keywords:** Antimicrobe, Majoon Najah, Unani Formulation

## OP-ETMPB 21

### Phytochemical screening and antibacterial study in rhizome of Snap ginger (*Alpinia calcarata* Roscoe)

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*Alpinia calcarata* Roscoe (Zingiberaceae) is a rhizomatous perennial herb commonly known as 'snap ginger', belonging to the family Zingiberaceae. *A. calcarata* is cultivated in tropical countries including Sri Lanka, India, and Malaysia. Different parts of this plant are traditionally claimed to be used for the treatment of cough, bronchitis, respiratory ailments, asthma, arthritis, diabetes, disease of heart, rheumatic pains, dyspepsia and fever. The dried rhizomes form a major ingredient of several ayurvedic drug formulations such as *Rasnadikashayam*, *Rasnadichoornam*, *Rasnadithailam* and *Ashwagandharishtam*. Anti bacterial activities of methanol extract of *A. calcarata* rhizomes against three strains of bacteria such as *Escherichia coli*, *Proteus mirabilis* and *Staphylococcus aureus* showed very potential results. The GC-MS analysis carried out revealed that the rhizome contains major bioactive phyto-constituents like 3-Nitro-4-phenyl-2-butanol, Carotol, trans-3,5-Dimethoxystilbene, beta.-Gurjunene, 1-Pentene, 1,5-Diphenyl etc.

**Keywords:** *Alpinia calcarata*, Snap ginger, Antibacterial activity, Phytochemical screening



## OP-ETMPB 22

### **Ethnobotanical Assessment and Nutritive Potential of *Bridelia stipularis* (L.) Blume from Various Plant Part**

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*Bridelia stipularis* (L.) Blume is a climbing shrub belongs to the family Phyllanthaceae. The unripened fruit of *B. stipularis* eaten raw will lose the sensation of the tongue for a few seconds. Leaves with the rhizome of *Curcuma longa* in cow's milk was used to treat Jaundice. Stem bark decoction was used to treat cough and fever whereas root was used to treat inflammation and scabies. Proximate analysis revealed that the presence of a high percentage of ash (40%), crude fat (65.4%) and crude fiber (59%) in stem and crude protein (14.5%) and moisture (68%) in leaves, dry matter (78%) in stem bark as compare to other part. Minerals such as nitrogen ( $2.32 \pm 0.03$ g/100g) and magnesium ( $0.57 \pm 0.07$ g/100g) was high in leaves, potassium ( $1.65 \pm 0.001$ g/100g) and calcium ( $1.97 \pm 0.01$ g/100g) in stem bark and phosphorus ( $0.32 \pm 0.001$ g/100g) in ripened fruit. Microelements like sodium ( $0.14 \pm 0.02$ mg/100g) in stem, iron ( $16.038 \pm 0.01$ mg/100g) in unripened fruit, manganese ( $39.759 \pm 0.02$ mg/100g), zinc ( $9.899 \pm 0.01$ mg/100g) and copper ( $10.315 \pm 0.01$ mg/100g) in stem bark was showing maximum amount. Nutritional value of the medicinal plant reveals the edible potential of that plant. Ethanobotanical study was useful in pharmacological aspects.

**Key words:** *B. stipularis*, Ethnobotany, Nutritional analysis, Minerals content.

## OP-ETMPB 23

### **Ethnomedicinal Plants Used for the Treatment of Snake Bites and Scorpion Sting by Traditional Health Practitioner's in Bagalkot District, Karnataka, India**

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An ethno-botanical survey was undertaken to collect information on medicinal plants used in the treatment of snake bites and scorpion stings in Bagalkot District, Karnataka. The field survey was conducted during January 2021-October 2022. The indigenous knowledge of local traditional healers about the native species used for medicinal purposes was collected using a questionnaire through personal interviews during field visits. In the present investigation, 14 plant species, belonging to 14 genera and 12 families used by the 14 Traditional Health Practitioners against snake bites and scorpion stings were documented. Among the collected species 8 are used for snake bites and 4 for scorpion stings. *Ruellia patula* Jacq., *Strychnos nux-vomica* L, was used for both treatments. The most popular preparations are powder, juice, and paste. Different plant parts viz., leaf (5), root (3), seed (2), whole plant (2), bark (1), and stems (1) were utilized in the medicine preparation. The details of the name of the species, family, local name, ailment/disease, parts used, mode of preparation, and dosage are provided in the table.

**Keywords:** Medicinal plants, Snake bite, Scorpion bite, Bagalkot district.

## OP-ETMPB 24

### Survey of Traditional Practitioner Uses of Medicinal Plants in Surrounding Villages of Koppal District, Karnataka State

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The administration of folk medicine since human civilisation can benefit greatly by understanding traditional knowledge on medicinal plants. Maintaining the diversity of medicinal plant knowledge that can benefit human health society through knowledge transfer from one generation to the next. Elderly people's wisdom was used to compile a list of medicinal plants and examine their potential medical applications in the Koppal region's neighbouring communities. The popular therapeutic herbs that local healers utilise were the main subject of this study's scientific documentation of traditional knowledge. The preservation of traditional knowledge on medicinal plants that has been collected by questionnaire and personal interviews may benefit from the direct interview record of elders' knowledge. In this study, a number of 12 species of plants from 12 families that are employed by traditional healers for a variety of purposes have been documented, and their therapeutic properties may now be officially recognised by science. For basic diseases, the local population relies on the local healers' expertise. This information may therefore be more useful to the locals in the Koppal region's neighbouring settlements. As a result, we conducted a survey of medicinal plants in the Koppal district's neighbouring communities in order to record traditional knowledge. Thus, it would be crucial to preserve the traditional knowledge of medicinal plants in order to use them for future medical purposes.

**Keywords:** Ethnomedicine, folk knowledge, herbal plants, medical plants, Koppal district

## OP-ETMPB 25

### **Phytochemical Screening of Wild Vegetables Used By Tribes from Bhimashankar Wildlife Sanctuary**

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Bhimashankar Wildlife Sanctuary has an area of 131 km<sup>2</sup> (51 sq m) and is a part of the Western Ghats. The sanctuary includes nine tribal villages. Wild vegetables are used for discovering and screening of the phytochemical constituents which are very helpful for the manufacturing of new drugs. Wild edibles are nutritionally rich and can supplement nutritional requirements, especially vitamins and micronutrient. Nutritional analysis of wild vegetable demonstrates that the nutritional quality of wild vegetable is comparable and in some cases they are superiors to domesticated varieties. Many medicinal values of certain vegetables yet to be documented, so there is need of explore, analyze and document the wild vegetables which possess medicinal values. Tribes are part of nature; they fulfill their need through wild resources. Their knowledge based upon traditional source. Consuming wild edible is food habits of people. Phytochemical are naturally present in the plants and shows biological significance by playing an essential role in the plants to defend themselves against various pathogenic microbes by showing the antimicrobial activity by inhibition or killing mechanisms. Phytochemical screening is very important in identifying new sources of therapeutically and industrially important compounds. This research work and relevant publication would be helpful for environmentalist, ecologist, scientist, pharmaceutical industrialist and tribal people. It also describes recommended actions for biodiversity conservation and cultivation of wild vegetables by tribes which enhance the economy of tribes rehabilitated in Bhimashankar Wildlife Sanctuary.

**Keywords:** Bhimashankar Wildlife Sanctuary, Phytochemical, Antimicrobial

## OP-ETMPB 26

### Repellent Effects and Electrophysiological Response of *Elingera fenzlii* Against *Aedes aegypti* And *Culex quinquefasciatus*

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Mosquito-borne diseases are on the rise all across the world despite centuries of prevention attempts. These illnesses have a disproportionately negative impact on children and adolescents and are responsible for a significant amount of morbidity and mortality worldwide. Finding a safe repellent that comes from a safe source is crucial for reducing these effects. The Shompen tribes in this territory employ the Zingiberaceae plant *Etingera fenzlii*, which has been shown to have insecticidal properties, to gather honey. It is possible to speculate on the likelihood that the plant exhibits mosquitocidal activity using the traditional knowledge learned from them that indicates the plant is a honey bee repellent. Major mosquito-repelling compounds like dodecanol, deodecanal,  $\alpha$ -pinene, dodecanoic acid, and others can be found in both the leaf and flower essential oils, according to a GC/MS investigation of the plant. The mosquito antennae's GC/EAD analysis revealed significant elicitations of Linalool, dodecanol,  $\alpha$ -terpeniol,  $\beta$ -citronellol, caryophyllene oxide, aromadendrene oxide-(2), among other compounds. These findings opened the door for more investigation into the various mosquito life stages, including larvae, pupae, and adults, as well as the mosquito species *E. fenzlii*, which demonstrated up to 100% oviposition prevention in the presence of the plant's essential oil. In comparison to the control chamber, mosquito orienting toward the choice chamber using the plant/standard semiochemicals is higher. This plant can be used to develop a product that can fend off these pests and be used to make a label for an effective mosquito repellent owing to its resistant qualities.

**Keywords:** Zingiberaceae, *Etingera fenzlii*, Mosquito, Repellent

## OP-ETMPB 27

### Quantification of Mangiferin Content in *Salacia* Species (High Value Antidiabetic Plants) From the Western Ghats.

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*Salacia* (Celastraceae/Hippocrateaceae) is an important source of chemicals of immense medicinal and pharmaceutical importance such as salacinol, mangiferin and kotanalol which are effective as antidiabetic, antiobese, hepatoprotective, hypolipidemic and antioxidant agent. They are woody climbers commonly known as Saptarangi or Saptachakra or Ekanayakam or Ponkoranti. Root is the medicinally useful part of *Salacia* species and it has traditionally been employed in Ayurveda and Unani systems to treat diabetes. Mangiferin is a potent anti-diabetic molecule; it can decrease level of blood sugar by decreasing insulin resistance or increasing insulin sensitivity. The present investigation pertains to the estimation of mangiferin content in different *Salacia* species like *S.chinensis*, *S. oblonga*, *S. oblonga* variety kakkayamana, *S. fruticosa*, *S. vellaniana*, *S. beddomei*, *S. malabarica* and *S. macrosperma* which are collected from Kerala regions of the Western Ghats using HPLC analysis. The presence of mangiferin content was observed in all the collected *Salacia* species with varying concentrations from the range of 0.26 mg/g to 3.71 mg/g. The highest mangiferin content was observed in *S.mala barica* accession collected from Cheenikkala region of Trivandrum District with a concentration of 3.71 mg/g followed by *S.chinensis* accession collected from Sreenivasapuram region of Trivandrum District with a concentration of 2.32 mg/g. *S.oblonga* accession collected from Kakkayam region of Kozhikode District contains the lowest (0.26 mg/g) mangiferin content.

**Key words:** *Salacia*, Celastraceae/Hippocrateaceae, Mangiferin

## OP-ETMPB 28

### **Ethnobotanical Survey of Medicinal Plants Used By Traditional Healers in Rangamali Hills, Karur District, Tamil Nadu.**

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The present study is an attempt to document the normal and medicinally important floral diversity and traditional knowledge of medicinal plant form Traditional healers in Rangamalai hills of Karur district. From this survey to enumerating 54 valuable plant species belongs to the 30 families of Angiosperms. Among these plant species only about 9 genera comes under monocotyledons and 45 species belongs to Dicotyledons. Similarly 41 plant species were used various ailments to cure different types of human diseases. The Rangamalai hills possess a luxuriant growth of vegetation with 3 rare plant species namely *Impatiens balsamina*, *Strychnos potatorum* and *Hugonia mystax* and two endangered species *Pterospermum reticulatum* and *Didymocarpus tomentosus* were observed during the period of study.

**Keywords:** Ethnobotany, Traditional healers, Endangered species

## OP-ETMPB 29

### **Morphological and Anatomical investigation on wild *Piper betle* L. from Andaman Islands in comparison with the popular cultivar from the Southern Western Ghats aiming Bioprospectin**

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*Piper betle* L. (Piperaceae) is a widely used medicinal plant in South-east Asia. The *P. betle* is so far not reported as wild anywhere from the Western Ghats, it is widely cultivated and has been a vital part of culture and also traditional medicine with several references. The less investigated *P. betle*, naturally occurring in Andaman Islands is an important component in the ethnomedicinal knowledge among Karens people of Andaman & Nicobar Islands. The present study compares the anatomy of the leaf, petiole and stem of the specimens from the *P. betle* introduced from the Andaman Islands and the *P. betle* cultivated in Kerala. The leaves of both plants are morphologically comparable yet different and have similar medicinal uses. The present study revealed that the leaves of both the species possess almost similar anatomical features with some differences; whereas, the microscopic features of the petiole and stem of the two accessions are distinctive. The plant collected from Andaman has significantly larger biomass and exhibits a more aggressive and robust growth compared to the cultivar collected from the Western Ghats. Thus, bioprospecting of the former will be of great significance. Our results of pharmacognostical, pharmacological and phytochemical investigations also support the need for its bioprospecting. The study also emphasises the relevance of conserving the wild germplasm of *Piper betle*.

**Keywords:** Ethnomedicine, *Piper betle*, Traditional knowledge, Biomass, Conservation



## OP-ETMPB 30

### **Studies on the Ethno-Medicinal Plants of Kolhapur and Sindhudurg District of Maharashtra State**

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Kolhapur and Sindhudurg are two adjacent districts from Maharashtra state known for the rich floral diversity. Kolhapur is one of the district from the Western Maharashtra while Sindhudurg is a coastal district and lying in the Konkan region of Maharashtra state. The Western Ghats Ranges passing from both districts harbors the tropical moist semi-evergreen forests. The populations of Kolhapur and Sindhudurg district residing in the forest and adjoining area as well as the rural populations are using different plants and their parts to meet various needs. Present studies regarding Kolhapur and Sindhudurg district deals with the ethno-medicinal plants used in the treatment of certain diseases and ailments.

**Keywords:** Kolhapur , Sindhudurg district, ethno-medicinal plants

## OP-ETMPB 31

### Wild Edible Fruits and Vegetables of Raichuru District, Karnataka, India

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Wild edible plants refer to edible species that are not cultivated or domesticated. The versatile geographical features of the scrub forest area are harbour great variety of flora. The present paper gives a list of wild edible fruits and vegetables. There were 39 species of 35 genera belonging to 26 families which contributed to the list of wild edible fruits and vegetables. Out of them 32 species are fruits and 13 are vegetables. Among the identified wild edible fruit and vegetables plants 17 were trees, 7 were shrubs, 6 herbs and 9 were climbers. Most of the fruits were eaten raw, some cooked and medicinally. Among these families Cucurbitaceae is dominant with 6 species followed by Fabaceae with 4 species, Amaranthaceae and Asteraceae two species remaining 22 families were represented by a single species each. These fruits were used by the local people for their ethno-medicinal potential. This knowledge about dual application of wild edible fruits and vegetables should be preserve and utilize for the benefit of mankind.

**Keywords:** Wild edible plants, Raichuru district.

## OP-ETMPB 32

### Body Perfume and Mosquito Repellent Solution from Essential Oils of Aromatic Plants

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After a drastic drop in cases of vector borne diseases such as dengue in the first year of the pandemic, their incidence increased nearly three times in 2021. For instance, Maharashtra reported 3.356 dengue cases and 10 deaths in 2020, which rose to 12,720 cases and 42 deaths in 2021. In 2021, number of malaria cases was 10,726. In large doses, the chemicals can cause serious illnesses, cough, wheezing, asthma, nausea etc. If the coils are kept near babies or small children, they can also lead to serious burns. The essential oils of *Lantana camara* Linn. (Verbenaceae), *Ageratum houstonianum* Mill. (Asteraceae) and *Eupatorium adenophorum* Spreng. (Asteraceae) were analyzed by Gas chromatography-mass spectrometry (GCMS). In *L. camara* oil, of the total identified (83.916) volatile constituents, five constituents 3,7,11-trimethyl-1,6,10-dodecatriene (28.866), beta-caryophyllene (12.28%), zingiberene (7.63%), gamma-curcumene (7.50%) and alpha-humulene (5.99%) represented the major ones. In *A. houstonianum* oil, among the total identified volatile constituents (94.51%), three [precocene-II (52.64%), precocene-I (22.45%) and beta-caryophyllene (9.66%)] represented the major ones. In *A. houstonianum* oil, among the total identified volatile constituents (94.51%), three [precocene-II (52.64%), precocene-I (22.45%) and beta-caryophyllene] represented the major ones. In *Eupatorium adenophorum* oil, of the total identified volatile constituents (84.95%), six [1-naphthalenol (17.50%), alpha-bisabolol (9.53%), bornyl acetate (8.989%), beta-bisabolene (6.16%), germacrene-D (5.74%) and alpha-phellandrene (3.85%)] represented the major ones. multicentre questionnaire-based study revealed that repellents are harmful to human health, and their use should be avoided and discouraged. The prepared body perfume, which plays a role of perfume as well as mosquito repellent which is not harmful to human health. In this we are using *Lantana camara* alcohol, coal, tars, kapur, etc.

**Keywords:** Medicinal plants, Aromatic Plant, Essential Oils, *Lantana camara*.

## OP-ETMPB 33

### **Ethnobotanical Study on Selected Food and Medicinal Plants of Kani Tribe in Peppara Wildlife Sanctuary, Thiruvananthapuram Dist., Kerala, India**

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The Kani tribal communities of have very good knowledge of food and medicinal plants. An exhaustive ethnobotanical study was conducted in the 5 settlements of Kani tribes in Peppara Wildlife Sanctuary. The study area was frequently visited and collected ethnobotanical data (Local name, useful part, uses, mode of preparation etc.) through semi-structured questionnaires in their local language and discussion with the help of village heads (MoottuKani), local villagers, and tribal practitioners around the settlement area. Of the 95 informants consulted, between the ages of 22 and 78, informations were gathered. In the present study, the tribes are using a total of 58 species as food and medicine belonging to 31 families. These included herbs (18), shrubs (12), small trees (13), large trees (6) and climbers (9). The herbalist treated snake bites, jaundice, piles, ulcers, swellings, weight loss, diabetics, coughs and colds, body pain, diarrhoea, as anti-inflammatory and anti-cancerous. Detailed information on the list of plants and their therapeutic uses among the Kani tribal people was gathered. The number of wild plants used by the Kanicommunity and the knowledge of these plants used in the local folk traditional system is of great importance, especially as a lead discovery of novel nutritionally rich food and other medicinal products.

**Keywords:** Ethnobotany, Kani Tribe, Peppara Wildlife Sanctuary, Kerala

## OP-ETMPB 34

### **A Survey on Medicinal Plants Used in Thattapparai Village of Gudiyattam Taluk, Vellore District, Tamil Nadu, India**

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The present study highlights some important medicinal plants used in Thattapparai village of Gudiyattam Taluk, Vellore district, Tamil Nadu, India. Medicinal plants have been extensively used to cure various ailments of human beings and animals (Veterinary) in the proposed village. Extensive field surveys were conducted in and around Thattapparai village and data's were collected from the traditional users, herbal practitioners, elders, farmers and women. The information on medicinal plants is collected using a standard questionnaire. Information on medicinal plants with their local names, parts used, mode of preparation and mode of administration are carefully recorded. A total number of 25 informants are selected and interviewed based on their knowledge of medicinal plants and practice of herbal medicine either for self-medication or for treating others. The present study shows that the informants in Thattapparai village have very good knowledge on the medicinal plants used for various ailments.

**Keywords:** Medicinal plants, Herbal practitioners, Veterinary, Thattapparai

## OP-ETMPB 35

### **Determination of Genetic Diversity in Ligninase producing Wood Rot Fungi Isolated from Western Ghats of Karnataka**

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The complex and undefined arrangement of the structure of lignin makes it recalcitrant against degradation by most of the organisms in nature. Fungal degradation of lignin is given importance because they can be used as renewable sources in production of chemicals, fuels and feeds. There are several bio-molecular techniques that have been developed for detecting and identifying fungi in recent times. Random Amplification of Polymorphic DNA (RAPD) analysis and Amplified Fragment Length Polymorphism (AFLP) analysis are the two methods that have been reported for production of genome DNA fingerprints for individual diversity. In this current study, 10 wood rot fungi were subjected to molecular characterization with the help of RAPD molecular markers using 5 random primers OPD 8, OPD 20, OPU 10, OPU1 and OPW 2. The amplified PCR products were then analyzed by Agarose Gel Electrophoresis. The analysis of base pairs of the bands obtained was done by Bio-Rad Gel Doc system. Dendrogram analysis of the gels revealed DNA samples 123, 76, 124 and 86 with the maximum similarity between them. **Keywords:** Lignin degradation, White rot fungi, bio-molecular techniques, RAPD-PCR.

**Keywords:** Genetic Diversity, Ligninase, PCR

## OP-ETMPB 36

### **Influence of Physico-Chemical Parameters on the Fabrication of Silver Nanoparticles Using *Maranta arundinacea* L and Its Anti-Microbial Efficacy**

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The leaf extract of *Maranta arundinacea* L. was used for synthesis of silver nanoparticles which was confirmed by changing the colour of reaction mixture from colourless to brown. Synthesized silver nanoparticles were characterized by UV-vis spectroscopy, FTIR, XRD, EDX, AFM, HR-TEM and testing the antibacterial activity against *E. coli*, *S. typhi*, *S. aureus* and *B. polymyxa* following well diffusion method. Silver nanoparticles shows characteristic UV-Vis absorption peak at 406 nm. The influence of physico-chemical parameters was studied and optimized to obtain nanoparticles of diverse sizes. The size of silver nanoparticles ranges from 30 to 90 nm and were found to be spherical in shape with crystalline nature. The synthesized silver nanoparticles showed good antimicrobial activity against multi-drug resistant *S. aureus*, *B. polymyxa*, *E. coli* and *Salmonella typhi*. Silver nanoparticles show that higher antibacterial activity was observed in Gram negative bacteria than the Gram-positive bacteria. The highest zone of inhibition  $7.033 \pm 0.033$  mm was observed in *S. typhi* at 250  $\mu$ L and lowest zone of inhibition  $4.100 \pm 0.066$  mm was seen in *B. polymyxa* at 250  $\mu$ L. Silver nanoparticles synthesized using leaf extract of *Maranta arundinacea* L. may exhibit reasonable testing antimicrobial activity against some pathogenic microbes.

**Keywords:** Silver nanoparticles, *Maranta arundinacea* L, Physico-chemical parameters, Antimicrobial activity

## OP-ETMPB 37

### ಕಚ್ಚಿ ಗೌಳಿಗರ ಪಶುವೈದ್ಯ ಪದ್ಧತಿ

ಡಾ. ಫ್ಲಿಎಲ್. ಪಾಟೀಲ

ಪ್ರಾಧ್ಯಾಪಕರು, ಜಾನಪದ ಅಧ್ಯಯನ ವಿಭಾಗ  
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ

ಕಚ್ಚಿ ಗೌಳಿಗರು ಸಸ್ಯ-ಪ್ರಾಣಿ ವರ್ಗಗಳನ್ನು ಅವಲಂಬಿಸಿಕೊಂಡು ನಿಸರ್ಗದಲ್ಲಿ ಬದುಕುತ್ತಿದ್ದಾರೆ. ಅವರು ತಮ್ಮ ಪ್ರಾಣಿಗಳನ್ನು ರಕ್ಷಿಸಲು ಪ್ರಕೃತಿಯಲ್ಲಿ ಸಹಜವಾಗಿ ದೊರೆಯುವ ನಾರು-ಬೇರು, ಹಸಿರು, ಗಿಡ-ಗಂಟೆ, ಎಲೆ-ಹೂವುಗಳು, ಕಲ್ಲು-ಮಣ್ಣು ಇತ್ಯಾದಿಗಳನ್ನು ಬಳಸುವುದುಂಟು. ತಮ್ಮ ಪಾರಂಪರಿಕ ಜ್ಞಾನದಿಂದ ಅವರು ತಮ್ಮ ಪ್ರಾಣಿಗಳಿಗೆ ಬರುವ ರೋಗವನ್ನು ಗುರುತಿಸಿ ಸಹಜವಾಗಿ ಅವುಗಳನ್ನು ನಿವಾರಿಸುತ್ತಲೇ ಬಂದಿದ್ದಾರೆ. ಆಧುನಿಕ ವೈದ್ಯಪದ್ಧತಿ ಆಕ್ರಮಣದಿಂದ ದೇಸಿ ವೈದ್ಯಪದ್ಧತಿ ನಾಶವಾಗುತ್ತಿರುವ ಈ ಕಾಲದಲ್ಲೂ ಅವರು ತಮ್ಮದೇ ಆದ ನಾಟ ಪದ್ಧತಿಗಳಿಂದ ತಮ್ಮ ಪಶುಸಂಪತ್ತನ್ನು ರಕ್ಷಿಸಿಕೊಳ್ಳುತ್ತಿರುವುದನ್ನು ಕಾಣಬಹುದಾಗಿದೆ. ಹಸು ಹಾಲನ್ನು ಕರೆಯದಿದ್ದಾಗ ಚುರ್ಚಿ ಗಿಡವನ್ನು ಬಳಸುವುದು, ಹಸುವಿನ ಮಾಂಸ ಬಿಳಿದಿದ್ದಾಗ ಮುಟ್ಟಿದರೆ ಮುನಿ ಸಸ್ಯ ತಿನಿಸುವುದು, ಮೈ ಹೊರಹಾಕಿದಾಗ ಮುಟ್ಟಿದರೆ ಮುನಿಯ ರಸವನ್ನು ನೆಣಕೆ ಹಚ್ಚುವುದು, ಹಾಗೆಯೇ ಹಸು ಗರ್ಭ ಧರಿಸಲು ಕರೆಬೇವು ಸೋಪನ್ನು ತಿನಿಸುವ, ಕೆಚ್ಚಲು ಬಾವುಗೆ ಲೋಳಿಸರ ಬಳಸುವ, ಹಸುವಿಗೆ ಭೇದಿಯಾದಾಗ ಅತಿಭಲ ಸಸ್ಯ ಬಳಸುವ ಕ್ರಮಗಳನ್ನು ಇಂದಿಗೂ ಕಚ್ಚಿ ಗೌಳಿಗರು ಬಳಸುವುದುಂಟು. ಇಂತಹ ವಿಷಯಗಳು ಕಾಲಗರ್ಭದಲ್ಲಿ ಮರೆಯಾಗುವ ಮುನ್ನವೇ ದಾಖಲಿಸುವ ಕಾರ್ಯ ಆಗಬೇಕಾಗಿದೆ.



## OP-ETMPB 38

### **Synthesis and Characterization of Silver Nanoparticles from Stem Extract of *Calotropis Procera* and *Dalbergia Sissoo* and its Antioxidant Activity**

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Bio-nanotechnology has emerged as integration between biotechnology and nanotechnology for developing biosynthetic and environment-friendly technology for synthesis of nanomaterials. Different types of nanomaterials like copper, zinc, titanium, magnesium, gold, alginate and silver have been identified but silver nanoparticles have proved to be most effective as it has good antimicrobial efficacy against bacteria, viruses and other micro-organisms. Conventionally silver nanoparticles were synthesized by chemical methods using chemicals as reducing agents which later on become accountable for various biological risks due to their general toxicity; engendering the serious concern to develop eco- friendly processes. *Calotropis procera* and *Dalbergia sissoo* were found highly efficient, they were incubated with silver nitrate solution showed gradual change in colour from colourless to dark brown with increasing intensity. The characteristic absorption peaks of synthesized AgNPs recorded between 350 nm and 450 nm indicated the formation of AgNPs. Scanning Electron Microscopy analysis showed aggregates silver nanoparticles and these were spherical in shape. The antioxidant property was determined using DPPH (2,2-diphenyl-1-picrylhydrazyl) assay. The antioxidant properties were found to be better for the aqueous stem extract and the extract containing the silver nanoparticles.

**Keywords:** Silver nanoparticles (AgNPs), Scanning Electron Microscopy, Antioxidant activity, DPPH (2,2-diphenyl-1-picrylhydrazyl).

## OP-ETMPB 39

### **Ethnobotanical Survey of Medicinal Plants Used by Local Inhabitants of Kaveripattanam Region in Krishnagiri District, Tamilnadu, India**

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Phytotherapeutic plants still essential for utilization in primary healthcare system, especially for people living near the protected area. Even though medicinal plant knowledge is rich in the indigenous people and traditional healers, not sharing the usage of the plants will poor the knowledge of medicinal plants usage in future. This study aimed at documenting the wild ethnomedicinal plants and to evaluate their importance in the healthcare in Kaveripattanam of Krishnagiri district of Tamil Nadu, India. There was 35 important ethnomedicinal plant species belonging to 26 families were recorded from the study area, important ethnomedicinal plant like *Solanum trilobatum*, *Phyllanthus niruri*, *Hemidesmus indicus* (L.) R.Br. and *Andrographis peniculata* (Burm.f) Nees were found. Many therapeutic plants were not only useful to cure single disease but also help to cure many diseases. An ethnomedicinal plant was too useful to cure diseases without causing side effect. It is an urgent need to preserve ethnobotanical information before they get vanished. Continuous efforts should be made to collect the information from the traditional healer before diminishing.

**Keywords:** Phytotherapeutic, Ethnomedicinal, Medicinal plant

## OP-ETMPB 40

### **Distribution and Propagation of *Justicia beddomei* (CL.) Bennet a Medicinally Useful Endemic Plant of Pakkamalai Reserve Forest, Gingee, Tamil Nadu**

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*Justicia beddomei* (CL.) Bennet is a shrub belonging to the family Acanthaceae. It is reported as endemic and also a critically endangered in wild by IUCN Red list. The plant contains Vasicine and Vasicinone as active principle and has been used in Ayurveda for treating irritable cough, fever, diarrhoeal bleeding and tuberculosis. A survey was conducted in Pakkamalai Reserve forest from February 2021 to April 2022 to study the distribution of this plant. The distribution pattern was recorded using GPS-GARMIN and data was analyzed using soft ware Arc GIS 10.4 version. In addition, different methods were used to propagate this medicinal plant in both college campus and State forest Research Institute, Tamil Nadu Forest Department, Kolappakkam, Chennai. We found that the stem cutting would be the most ideal method for propagating this plant in large scale.

**Keywords :** *Justicia beddomei*, Vasicine, Vasicinone, Pakkamalai Reserve Forest.

## OP-ETMPB 41

### **Documentation of Wild Edible Vegetables from Northern Western Regions of Ahmednagar District, Maharashtra (India)**

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The present study deals with the documentation and investigation of wild edible vegetables of Northern Western regions of Ahmednagar. The Northern Western regions of Ahmednagar include Sangamner and Akole tehsil. The documentation was carried out in different villages of Northern Western regions of Ahmednagar. The villages and the market places of Akole Tehsil were visited during documentation and data was collected. During the present investigation different villages were visited and interactions with villagers were done. The kind of interaction was informal discussion and questionnaires. Through documentation it was observed that 62 species of 59 genus belonging to 32 families were found to be edible.

**Keywords:** Wild edible vegetable, documentation.

## OP-ETMPB 42

### Standardization of Extraction Protocol and Identification of Primary Metabolites *Calotropis Procera*: <sup>1</sup>H-NMR Based Approach

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<sup>1</sup>H-NMR spectroscopy is emerging as powerful analytical tool in identification and quantification of small molecular metabolites in living cells. In recent years <sup>1</sup>H-NMR has been found to be robust technique in understanding plant metabolomics as it does not require pre and post processing of samples. In the present study, <sup>1</sup>H-NMR been adopted for qualitative and quantitative analysis of primary metabolites of *Calotropis procera*. The matured leaves of *Calotropis procera* were collected from the botanical garden, Karnatak University, Dharwad. The leaves were shade dried until its weight becomes constant. The dried leaves were subjected for non-polar, semi-polar and polar metabolites extraction respectively using Soxhlet extraction method. The polar extraction was lyophilized and known weight of sample was subjected for <sup>1</sup>H-NMR analysis. The polar extraction reveals the presence of many branched chain amino acids and mixture of carbohydrates. The identified biomolecules been quantified using the area under the curve of respective signals. The <sup>1</sup>H-NMR spectrum shows the presence of larger amount of free fatty acids. The TAG was found to be very insignificant.

**Keywords:** *Calotropis procera*, <sup>1</sup>H-NMR spectroscopy, metabolomics

# **PHYTOGEOGRAPHY, ENDEMISM AND CONSERVATION [PEC]**

Organized by Department of UG, PG and Research in Botany, Karnatak University's, Karnatak Science College, Dharwad,  
Karnataka - 580 001

## OP-PEC 01

### An Appeal to Conserve *Heliotropium rottleri* Lehm. (Boraginaceae) - A Critically Endangered Endemic Plant of Tamil Nadu

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*Heliotropium rottleri* Lehm. (Boraginaceae) is an endemic (to Coimbatore) perennial woody plant with divaricate branches and appressed white strigose hairs, subsessile small ovate-lanceolate leaves with revolute margins, stiff curved racemes on 4.6–8.4 cm long peduncle with distant leaves, 2 mm diameter white flower with yellow centre, and 4-lobed depressed fruit with accrescent calyx (Wight, 1850; Hooker, 1885; Gamble and Fischer, 1935; Matthew, 1983). Yet, its taxonomic status is ambiguous and unresolved because of mistaken identity of *H. marifolium* J. Koenig ex Retz. (= *H. scabrum* Retz.) as *H. rottleri* by later Botanists. For example, Sankara Rao *et al.*, (2019) have wrongly documented it from Andhra Pradesh, Telangana and Kerala besides Tamil Nadu in 'Flora of Peninsular India'. In fact, these three species are distinct and found in Tamil Nadu. Once *H. rottleri* was frequent in Coimbatore (Wight, 1850). In 1964, M. Chandrabose collected this species from R.S. Puram and subsequent workers have collected it from the foot hills of Kuridimalai and Thadagam but now it is not found in Coimbatore city and rare in Kuridimalai and Thadagam. According to Ahmedullah and Nayar (1987), it is endangered in Southern Deccan in Coimbatore, not assessed for the IUCN Red List. It suggest that, *in situ* conservation for this species Also, it is reintroduction into IFGTB campus (*ex situ* conservation) is recommended where similar habitat conditions prevails.

**Keywords:** *Heliotropium rottleri*, conservation, Endangered, Endemic, Coimbatore

## OP-PEC 02

### **Direct Somatic Embryogenesis of *Ceropegia maculata* Bedd. from Stem Explants**

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An efficient system was established for rapid direct somatic embryogenesis from stem explants of *Ceropegia maculata*, an endemic plant of Southern Western Ghats in Tamil Nadu. Direct somatic embryogenesis was obtained from stem explants on Murashige and Skoog (MS) medium containing different concentration and combinations of plant growth regulators. The highest frequencies of 94.66% and 82.33% somatic embryogenesis were obtained from 1.0 mg/l 2,4-dichlorophenoxyacetic acid (2,4-D) and 0.7 mg/l of thidiazuron (TDZ), respectively. The maturation and germination frequency were highest on MS medium containing NAA 0.5 mg/l (50.33%). These embryos ranged in developmental stage from globular to cotyledonary stage. Following transfer of SEs to MS medium augmented with 50 mg/l abscisic acid, the rate of embryo maturation, germination, and plant formation was increased up to 67.33%. The somatic embryo derived plantlets were successfully hardened and acclimatized in the culture room conditions and then established in the greenhouse with the survival rate of 80%. This is the first report on direct somatic embryogenesis in *Ceropegia maculata*. This protocol ensures germplasm conservation by offering controlled production of plants and alleviating extinction threats.

**Keywords:** Endemic plant, *Ceropegia maculata*, stem explant, somatic embryos, thidiazuron



## OP-PEC 03

### Reproductive Biology of *Azadirachta indica* A. Juss. A Valuable Medicinal Tree

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In this study, we looked at the main reproductive system and pollinator diversity of the medicinal plant *Azadirachta indica* A. Juss. This species's anthesis occurs in the evening between 8.00 and 9.00 p.m. The complete viability loss occurs 13 days after anthesis, and the viability percentage is 62.144 percent respectively 96 hours after anthesis. Neem reaches its peak stigma receptivity 14 hours after anthesis. Ambophily is indicated by the presence of natural pollination by both wind and insects. Insect pollinators were dominated by *Hymenoptera* and *Lepidoptera*, with *Apis* spp. being the most effective pollinators. Each flower produces an average of 22500 pollen grains, with each ovule producing an average of 625 pollen grains. The best staining method for pollen viability test is Aniline blue lacto phenol. 30% sucrose and polyethylene glycol is the ideal medium for pollen *in-vitro* germination and healthy pollen tube development. Neem is self-incompatible, and cross pollen grains reach the ovary base faster than self-pollen grains do. The observations of reproductive biology indicated cross-pollination behaviour, which limited the production of selfed seeds and would help to maintain sustainable levels of heterozygosity among various populations.

**Keywords:** *Azadirachta indica* A. Juss., Medicinal plant, Reproductive

## OP-PEC 04

### Temperature Gradient and Tree Species

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The immediate observable effect of global warming is observed in the form of increased diurnal temperatures. To overcome this different measures are being suggested by different Government as well as non-government agencies. To validate the claims of trees as effective temperature control agents, a study was undertaken to find out the temperature gradients associated with the tree species in central and Western India. The observations are recorded in summer months of 2022. The temperature of soil / surface exposed to direct sunlight, soil / surface temperature under shade, air temperature in direct sunlight and shade, approximate wind velocity and relative humidity, tree species, GBH of tree and locations were recorded. About 265 observations are recorded across two states viz., Maharashtra and Madhya Pradesh. Total 51 tree taxa and the temperature around them are recorded. The results revealed that, generally the surface area below the trees comprises different types of soils, cement tiles / concrete roads / tar roads / greets. Depending upon the type the exposed surface temperature range from 42°C to 71°C; while the temperature of surface under shade varied from 30°C to 47°C. The range of air temperature was from 33.0°C to 43.3°C. It is evident that, the temperature regimes are higher where surface is of cement or tar as compared to the natural soil. The values of air temperature remain very close under direct sunlight as well as under shade. The heat felt by us is not because of the air temperature but because of the higher temperatures of exposed soil surface.

**Keywords:** Diurnal temperatures, soil, Tree species

## OP-PEC 05

### Ecological Status of Taleran Sacred Grove: Past and Present

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Sacred groves are communally-protected forest fragments with significant religious connotations. Community lands attain significance due to biodiversity conservation and provide ecological local landscapes. In the recent years some developmental activities taken place like development of temple, construction of steps and tourism which have affected landscape and diversity of many sacred groves. The ecological status of taxa in the sacred grove was quantified in context of developmental activity in Taleran sacred grove, Pune District. As a result of development, the status of sacred grove in terms of diversity remained nearly same but the ecological status (population structure) has changed to some extent. This effect is more significant in case of herbaceous taxa which are ecologically very sensitive. It is also found that the extent of invasive species is also increased.

**Keywords:** Sacred groves, conservation

## OP-PEC 06

### Altitudinal Variations in Distribution of Tree Species in Tumakuru District, Karnataka, India

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Tumakuru belongs to the group of districts called the *maidan* (plains) districts. It is situated between  $12^{\circ} 45^1$  and  $14^{\circ} 20^1$  north latitude and between  $76^{\circ} 20^1$  and  $77^{\circ} 31^1$  east longitudes. It is located at an altitude of 835 m (2739.5 ft). The flora of the district is of the dry deciduous type of two orders, viz., higher, and lower. It account of 136 tree species, belonging to 39 families and 93 genera. Among the documented tree species Fabaceae is the dominant family with 25 species followed by Rubiaceae with 12 species which is followed by Moraceae with 10 species, Malvaceae with 8 species and Lamiaceae with 7 species being the top five dominant families. *Shorea roxburghii* G. Don, *Dalbergia latifolia* Roxb., *Pterocarpus marsupium* Roxb., *Chloroxylon swietenia* DC., and *Santalum album* L. are 'Vulnerable' species according to IUCN Red List. 8 species are endemic to Indian subcontinent and most of the trees have human utilization and serve as food source for both localists and animal/birds. These trees are distributed from plains as low as 300m, foothills and hills up to 1500m elevations. Among recorded species most of them are distributed on hills above 1000m. The present study correlates between the distribution of trees in different altitudes and variations in their canopy spread, crown structure, and stand structure.

**Keywords:** Tumakuru, Trees, Vulnerable, Altitude, Canopy

**BIOSYSTEMATICS, PHYLOGENY,  
POLLINATION AND PLANT –  
ANIMAL INTERACTIONS [BPPI]**

Organized by Department of UG, PG and Research in Botany, Karnatak University's, Karnatak Science College, Dharwad,  
Karnataka - 580 001

## OP-BPPI 01

### Untangling the Taxonomic Identity of *Aristolochia Indica* (Aristolochiaceae) Complex Inferred With Morphology and Molecular Evidence

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Linnaeus in 1753 described genus *Aristolochia* with 13 species, of which he described *Aristolochia indica* citing Paul Hermann (1747) *Flora Zeylanica* work. Paul Hermann's illustration no. 323 housed at BM was later designated as type of the name by Neinhuis (2007). Centuries later, on the basis of Wallich and Joseph Hooker's collection from Rangoon (Myanmar) and Bengalia (Bengal) respectively, Duchartre (1864) proposed an infraspecific taxon *Aristolochia indica* var. *oxyphylla*. The undistinguishable description provided by the author and the phenotypic plasticity of *A. indica* created the complex in distinguishing the taxa and lead to synonymizing the infraspecific taxon with the species by the later workers from Indian subcontinent. To understand and disentangle this taxonomic complex, we studied morphology and molecular data of *Aristolochia indica* from throughout its range of distribution with support of both direct and indirect data. As a conclusion of the study, with the support of morphology, phylogenetics and geographic distribution we found both the taxa are distinct.

**Keywords:** *Aristolochia indica*, phylogenetics, Molecular Evidence

## **POSTER PRESENTATIONS [PP]**

**PP 01**

**Anatomy and Morphology of the *Hoppea dicotoma* Willd.  
(Gentianaceae)**

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*Hoppea* (Gentianaceae) is represented by two species in the world, both occur in India. Since very low information is available about this genus, detailed morphology and anatomy is carried out for the *Hoppea dicotoma*. It is erect, annual herb about 1 to 8 cm in high. Stem is dichotomously branched, quadrangular. Flowers inconspicuous, yellow, corolla shorter than calyx. Leaf anatomy shows single layered epidermis and chlorenchymatous hypodermis. The mesophyll cells include palisade and spongy parenchyma. Vascular bundles are conjoint, collateral and open. Minor leaf veins are present. The stomatal characters of the two species are more or less similar having anisocytic stomata with 3 subsidiary cells, distributed more on the abaxial surface than the adaxial surface.

**Keywords:** Stomata, Gentianaceae, *Hoppea dicotoma*, Leaf anatomy



**PP 02**

**Two New Records of Poaceae to the Grasses  
of Maharashtra, India**

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The present communication deals with addition of two grass species to the flora of Maharashtra from Vidarbha. *Eragrostis zeylanica* Nees *et* Meyen and *Saccharum griffithii* Munro ex Boissare reported here for the first time from Maharashtra state. Detailed taxonomic description, photographs and field notes are also provided to facilitate easy identification of species.

**Keywords:** *Eragrostis zeylanica*, *Saccharum griffithii*, Maharashtra, New Record, Poaceae

## PP 03

### A Study on the Floristic Diversity in Different Honey Samples

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Honey is the natural sweetener produced by honey bees belong to the phylum Arthropoda and class Insecta are very crucial in terms of pollinating wild and cultivated plants. Melissopalynology is an applied branch of palynology deals with the microscopic study of pollen in honey used to determine the geographical origin and floral sources upon which the bees foraged to produce honey. The pollen grain from honey can be used for the taxonomic identification of honey yielding plants and assessment of honey bee pollen act as a bio indicator of the environment may throw more light on floral diversity. In the present study five honey samples were investigated to identify its honey plant resources. Pollen analysis is one of the main tool to differentiate the Botanical origin of honey as unifloral or multifloral. The total of 16 pollen morphotypes are documented belonging to different families namely Arecaceae – 2 pollen types, (*Areca* sp.) Fabaceae – 4 pollen types (*Acacia* sp.) Poaceae-3 pollen types, Asteraceae- 5 pollen types (*Dandelion* sp.), Boraginaceae- 1 type (*Borage* sp.) Myrtaceae- 1 pollen type (*Eucalyptus* sp.). Difference in honey pollen composition makes natural link to honey characteristics. With this we can conclude that the Melissopalynological analysis gave the possibility to assign a characteristic fingerprint to a given honey, which refers to botanical origin, quality and identity.

**Keywords:** Pollination, Melissopalynology, Floral diversity, Unifloral Multifloral and Asteraceae

**PP 04**

**Genus *Cuscuta* L. (Convolvulaceae) in India: Diversity, Distribution and Taxonomy**

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Family Convolvulaceae is one of the diverse and dominant families of angiosperm, at world level it is represented with 59 genera and 1950 species (Staples, 2018). In India, there are 20 genera and 180 species are reported. *Cuscuta* is a genus of the family Convolvulaceae and commonly known as 'Dodder'. At global level it is reported with *ca.* 200 species. The genus is characterized by its parasitic stem, embryos lack cotyledons. Another distinctive characteristic of this parasitic lineage is the diversity of photosynthetic capabilities and plastome reductions at clade and at species levels. Taxonomically the different species of the genus *Cuscuta* are grouped into 3 subgenera viz., *Cuscuta* L., *Grammica* (Lour.) Peter and *Monogynella* Des Moul. Subgenus *Cuscuta*, with two distinct free styles and conical to elongated and linear stigmas, is the most diverse with account of 130 species. Subgenus *Grammica* is most diverse subgenus among three subgenera characterized by two distinct styles with short and capitate stigma. Subgenus *Monogyna* has a single style, partially to completely undivided, with a variety of stigma shapes. These sub-genera are further divided into 8 sections and 28 subsections. In India there are 15 species of the genus and distributed in the different phytogeographical regions of India, out of these 7 species are reported in Western Ghats. Out of these 15 species 7 species are of subgenus *Cuscuta*, 4 species are of *Grammica* and 4 species are of *Monogyna*. So, the subgenus *Cuscuta* is with a greater number of species in India. In the present piece of work authors have given preliminary distribution, classification, key for identification for all the species of the genus *Cuscuta* that are reported from India.

**Keywords:** Convolvulaceae, *Cuscuta*, *Monogyna*, *Grammica*.

## PP 05

### Grasses from Markandeya Hill, Maharashtra, India

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Grasses exhibit huge taxonomic diversity and wide range of tolerance against the environmental factors. Grasses are also considered as pioneers of an ecological community. So, keeping in view the role of grasses, the study is conducted at Markandeya hill grassland area of Nashik district in Maharashtra state, India. This grassland occupies considerable area of Markandeya hill and adjoining villages and village forest area. From the study area 30 species of grasses belonging to 27 genera were recorded. The grasses play an important role in economy of the people of the area. Mainly, grasses were used as fodder in the area; some grasses are also used for thatching and for medicinal purpose.

**Keywords:** Grasses, Poaceae, Grassland,

## PP 06

### Floristic Diversity of Garhwa District, Jharkhand, India

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The present work is based on the exploration and study on the angiospermic plants of Garhwa district, Jharkhand. It lies between the 23<sup>0</sup> 60' and 24<sup>0</sup> 39' N latitude and 83<sup>0</sup> 22' and 84<sup>0</sup> 00' E longitudes. Total area of the district is about 4044 square km. The main rivers are Danro, Kanhar, Koyal and Sone. The common soils are alluvium, red and black soil. During floristic investigation, we have collected 250 species of angiosperms belonging to 198 genera of 60 families in three collection trips. The dicotyledonous plants are 209 species of 168 genera and 49 families while monocotyledonous plants are 41 species of 30 genera and 10 families. The dominant families of dicot are Fabaceae (50 species), Asteraceae (20), Malvaceae (15) while in monocot are Poaceae (20 species) and Cyperaceae (10 species). All collected and identified plant specimens were deposited in Duthie herbarium (DUTHIE), Department of Botany, University of Allahabad, Prayagraj. Paper includes up to date citation, brief description, phenology and ecology of each taxon.

**Keywords:** Angiospermic plants, Garhwa district, Jharkhand, Floristic Diversity

PP 07

## Report On Cryptovivipary in Wild Caper Bush (*Capparis sepiaria* L.) Capparaceae

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Vivipary is an uncommon phenomenon in plants in which the plant directly produces offspring inside fruits or vegetative branches when they are attached to the mother plant. It occurs not only because of its rarity in flowering plants but also because of the complex ecophysiological processes and adaptations involved in seed germination. Further more, it is a special feature of evolutionary and biological importance that provides new ways of survival and mechanisms to protect the embryo from adverse conditions. According to position and mechanism of formation of seedlings in vivipary it is subdivided into true vivipary and pseudovivipary. Cryptovivipary is a subtype of true vivipary in which seeds start to germinate inside the fruit but the seedling never comes outside the fruit still fruit is attached to the mother plant. According to the best of our knowledge, this is the first report of cryptovivipary in the wild caper bush (*C. sepiaria*). Present work deals with detailed study of mechanism of cryprovivipary in wild caper bush with neat diagrams and stages.

**Key words:** Adaptation, Caper, Cryptovivipary, Germination, Mechanism, Vivipary

**PP 08**

**Morphotaxonomic and Palynological Studies in Some Species of Tribe *Merremieae* Austin (Convolvulaceae) from India**

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The fascinating world of 'Morning glories' systematically treated as family Convolvulaceae. The family Convolvulaceae is one of the largest and diverse families of angiosperms consists *ca* 59 genera and *ca* 1950 species. Hallier (1893) proposed a comprehensive classification of Convolvulaceae, beginning by using pollen exine characters to divide the family into two main informal groups: 'Echinoconiae', with echinate pollen (with spine), and 'Psiloconiae', with psilate pollen (without spines). Convolvulaceae is grouped into 12 tribes, among these tribes. Merremieae is one of the diverse tribes. Austin (1982) was the first who formally recognized the tribe Merremieae on the basis of spiral dehiscence of anthers during anthesis, pollen 3-Colpate or Penta-Colpate with smooth exine. Simoes and Staple (2017) have split genus *Merremia* into four genera. At present the tribe, Merremieae possess genera like *Camonea*, *Daustinia*, *Decalobanthus*, *Distimake*, *Hewittia*, *Hyalocystis*, *Operculina*, *Remirema* and *Xenostegia*. In India all genera of tribe Merremieae is reported except *Daustinia*, *Hyalocystis* and *Remirema*. India the tribe Merremieae is having 27 species. Total 13 species are collected and all species are documented. For pollen studies pollens are collected and stored in Glacial Acetic acid and further Acetolysis is carried out by using acetolysis protocol (Erdtman, 1952 in mixture of Acetic Anhydride and Conc. Sulphuric Acid at 9:1 ratio) and observed under SEM. The present work on morphotaxonomy studies of 12 species and pollen diversity in 8 species of tribe Merremieae. Studies were also concentrated on role of pollen morphology in the identification of the species.

**Keywords:** Diversity, pollen morphology, Tribe Merremieae, Convolvulaceae.

PP 09

**Preliminary Phytochemical Screening, Antibacterial and Antioxidant Analysis on The Whole Plant Extract of *Endostemon viscosus* (Roth) M.R.Ashby**

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This study focused on unveiling the presence of phytochemicals in the methanolic extract of *Endostemon viscosus*, a shrub that belongs to the family Lamiaceae. The presence of reducing sugar, sugar, phenolic compound, flavonoids, saponins, tannins, and amino acids were detected. FT-IR was performed to identify the functional groups, indicating the presence of O-H Stretching, N-H Stretching, C-H Stretching, C-O Stretching, O-H Bending, C-H Bending, and C=C Bending. And identify the presence of volatile compounds, GC-MS was carried out the presence of 35 compounds was confirmed. HPLC showed bioactive compounds with retention times of 1.365, 2.190, 2.367, 6.503, and 8.918, respectively. The antibacterial activity was done by disc diffusion using gram-positive and gram-negative pathogenic bacteria like *Staphylococcus aureus*, *Enterococcus faecalis*, *Bacillus megaterium*, *Escherichia coli*, *Proteus mirabilis*, and *Pseudomonas* spp, and the antiradical activity was evaluated by DPPH assay. The present study describes the phytochemical profile and antibacterial and antioxidant activity of *Endostemon viscosus* which will be further used for medicinal applications.

**Keywords:** *Endostemon viscosus*, FT-IR, GC-MS, HPLC, Antibacterial activity, DPPH assay



## PP 10

### Development of Standardization Parameters for Quality Control and Pharmacognostic Evaluation of *Abelmoschus manihot* (L.) Medik Root

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The traditional medicine, from *Abelmoschus manihot* (L.) Medik (Malvaceae), plant is use for many ailments. The purpose is to identification and quality control of this medicinal plant, by evaluating macro and micromorphology, physicochemical and phytochemical properties. The root is yellowish-brown to yellowish-white and has a distinctive odour, bitter taste, wavy shape, and smooth texture. Microscopically, the periderm was four to five thin-walled cells. Secondary phloem is dilated rays and broad pyramid-shaped that are densely packed with mucilage, while phloem rays have thin walls and are radially elongated. The fibres are narrow with thin walls and the secondary xylem is a compact circular cylinder which is with eight to eight radial lines of vessel chains. Microscopy of powdered samples revealed prismatic calcium oxalate crystals, lignified long, narrow, thick-walled fibres, lignified cork cells, and cylindrical vessel elements. Moisture content, ash values, extractive values, and crude fibre were all analyzed physicochemically. The fluorescence analysis and UV fingerprinting were also developed. Methanolic extract's preliminary phytochemical analysis revealed the presence of carbohydrates, glycosides, saponins, flavonoids, tannins, steroids, and proteins. GC-MS and HPTLC are also used to characterize lipid and phenolic molecules. These findings will aid in the identification and quality control of *A. manihot* as reference standards in the future.

**Keywords:** *Abelmoschus manihot*, Pharmacognosy, Phytochemistry

**PP 11**

**Comparative Pharmacognostic Screening of *Tribulus terrestris* L. and *Tribulus subramanyamii* P. Singh, Giri & V, Singh**

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The genus *Tribulus* belongs to the family Zygophyllaceae comprises approximately 25 species that grow as prostrate. This study will collect *Tribulus terrestris* L. and *Tribulus subramanyamii* P. Singh, Giri & V, Singh. and analyse their macroscopic, microscopic and phytochemical properties. Selected plant species were collected from three geographical locations in Maharashtra State, India. To confirm the quality and authenticity of plants, standard pharmacognostic procedures described in standard reference books were used to conduct a comparative analysis of *Tribulus* spp. The current study examines pharmacognostic studies on its numerous parts, such as the stem, leaf, flower and fruit. The Study shows the presences of unicellular trichomes on leaf section are substantially less dense in *T. subramanyamii* P. Singh, Giri & V, Singh. Than *T. terrestris*. In numerous tests for qualitative analysis of distinct *Tribulus* spp. Phytochemical substances such as alkaloids, starch, carbohydrates, tannin, saponins, glycosides, phenol, flavonoids, and proteins were found to be present.

**Keywords:** *Tribulus*, Phytochemical, Pharmacognostic, trichomes

## PP 12

### **Pesticidal Effect of Oleo-Gum- Resin from *Ferula asafoetida* on the Agriculture Pest *Spodoptera litura***

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The genus *Ferula* (Apiaceae) which encompasses about 170 species distributed in Central Asia, Mediterranean countries and Northern Africa. These species produces a sort of milky latex or translucent oleo-gum-resin which turns to yellowish-brown when exposed to air. This exudate is made up of three fractions comprising of volatile oils, gums and resins. These products which exude spontaneously from the duct channels occurring in the plant tap roots can also be obtained by incision. The exudate has a very strong odour due to sulphurous and balsamic compounds present in them which is used in traditional medicine, food stuffs, perfumery and cosmetics. In some parts of Iran and India, these oleo-gum-resins have widely been used as an insect or pest repellent. *Ferula asafoetida* has also been used for fumigation purposes. *Spodoptera litura* is a highly polyphagous species that feeds on hosts from at least 40 different plant families such as Cucurbitaceae, Fabaceae, Malvaceae, and Solanaceae which contain economically significant crops. Larvae feed primarily on leaves and then completely defoliate the area and gradually almost all the other parts are then consumed at high population densities. This study was undertaken to test the toxicity of *Ferula asafoetida* on *Spodoptera litura*. The adult insects were divided into groups thereafter, the compound was applied and the insects were monitored. The tested compound showed positive effective outcome results in the LC50. This study could be a pioneer research for the formulation of bio pesticides, a healthy alternative approach for sustainable agriculture.

**Keywords:** *Ferulaasa foetida*, *Spodoptera litura*, Pesticidal Activity, Sustainable Agriculture

PP 13

**Understanding the Phylogeny of *Ocimum basilicum* L. and *Mesosphaerum suaveolens* (L.) Kuntze.:  
A DNA Barcode Approach**

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Lamiaceae, the mint family is known for its aromatic characteristics. It includes various culinary herbs such as mint, basil, sage, thyme, oregano, savory, marjoram etc. *Ocimum basilicum* L. and *Mesosphaerum suaveolens* (L.) Kuntze. are used in various industries such as foods and beverages, pharmaceuticals, cosmetics, dyes liquor and confectionery. These plants are identified by a diversity of secondary products particularly the volatile essential oils (EOs) or aromatic oils. Though lots of studies are available on the taxonomic and phytochemical profile of these plants, however molecular characterization remains elusive. In this regard DNA barcoding serves as an important tool for supporting species identification. DNA barcoding has been done of various species of Lamiaceae such as *Thymus*, *Mentha*, *Lavandula dentata* L. and many more. This study was undertaken to decipher the DNA sequences of *Ocimum basilicum* L. and *Mesosphaerum suaveolens* (L.) Kuntze. by DNA barcoding method and was further evaluated to understand the phylogeny of the selected plants in relation to other members of the Lamiaceae family. The two barcode loci matK and rbcL were used for PCR amplification and sequencing for examining the species recognition and their molecular characterization. In this study, NCBI, BLAST and MEGA-X bioinformatic softwares were employed to understand the phylogeny and pair-wise distance among the plants. This study would help us in creating the DNA sequence for these two species and it could be a pioneer research for further comparative studies in regards to the other members of Lamiaceae.

**Keywords:** Lamiaceae, DNA Barcoding, Phylogeny, BLAST, Mega-X, NCBI

## PP 14

### Exploration of Phyto-Nutrients with Nutraceutical Importance in Tumakuru District, Karnataka, India.

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The wild food plants play an important role in tribal diet. The Tribes of Tumakuru district depend on plant resources for food and medicine. The tribal community has knowledge of utilizing wild plants as food reflects relationship between health and nutrition. The present study is first to explore the tribal diets of Tumakuru district. The investigation documented about 12 wild food plants which are of Nutraceutical importance. The most widely used seasonal edible plants are *Maduca logifolia*, *Crotalaria juncea*, *Bambusa bambos*, *Ipomoea aquatic*, *Hemidesmus indicus*, *Decalepis hamiltoni*, *Cannabis sativa*, *Santalum album*, *Delonix regia*, *Parkia speciosa*, *Mucana pruriens* and *Holoptelea interifolia*. They belong to 8 families and 12 genera. The parts used are flower, stem, root, leaves, fruits and seeds. They are consumed either by raw or cooking to remove bitterness and anti-nutrients. The common mode of consumption was using them in raw form like fruits, chutney, pickles, salads, juice etc. They were also preserved, processed and fermented for texture, flavor and taste. Wild food plants are rich in proteins, carbohydrates minerals, dietary fibers, phytonutrients and phytochemicals. It is most promising, valuable, cost effective safe diet. It helps in boosting immunity, solves health issues and malnutrition. The goal of this article is to give information on wild food plants which add nutritional supplement to the modern diet. All plants are arranged alphabetically in the tabular form followed by families, local name, plant part(s) used, mode of consumption and traditional methods to enhance nutritional value.

**Key words:** Wild food plants, Tribe, Nutrition, phytonutrients, Malnutrition.

## PP 15

### **Riparian Vegetation of River Tungabhadra in Haveri District, Karnataka**

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The rivers Tunga and Bhadra are originating in the Western Ghats and flowing towards north-east both join together near Kudli (16 km away from Shimoga) from there the river is called with the name Tungabhadra. The river enters the Haveri district at Shankaranahalli (14°19'53.7"N 75°37'33.1"E) of Hirekerur taluka, it flows upto Mevundi (14°56'33.1"N 75°41'00.6"E) of Haveri taluka. The river traverses a distance of about 98 km in Haveri district. The river Varada and Kumadwati are the major tributaries of Tungabhadra. The present study was carried out to document the diversity of angiosperms along the riparian vegetation of Tungabhadra. A total of 220 species belongs to 168 genera of 60 families were documented, of which 195 dicots and 25 monocots. Family Fabaceae is represented the highest number with 28 species and 22 genera, followed by Asteraceae (18), Poaceae (12) and Euphorbiaceae (12). According to Johnson, *et al.*, (1984) riparian vegetation classified further into Hydroriparian zone, Mesoriparian zone and Xeroriparian zone. Encroachment for agriculture, overgrazing, sand mining, invasive species and tourism are the major threats to the riparian vegetations.

**Keywords:** Diversity, Haveri, Riparian, Rivers, Tungabhadra.

**PP 16**

**Sacred Groves of Western Ghats:  
Past Relics of Precious Floral Diversity**

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The sacred groves in Western Ghats are small patches of forest that are severely endangered but communally protected as most have a profound religious significance to the community guarding them. The Western Ghats is home to more than 7500 sacred groves which many rare, endemic and endangered plant forms like *Myristica malabarica*, *Calophyllum calaba*, *Casearia rubescens*, *Vateria indica*, *Syzygium travancoricum*, *Madhuca bourdillonii*, *Madhuca diplostemon*, *Kunstleria keralensis*, *Adiantum philippense*, *Nephrolepis undulata*, *Thelypteris dentata* etc. But this precious ecosystem is yet to be considered appropriately in state ecosystem reports. The crucial role of indigenous people associated with the groves in conserving these priceless locations is unequivocal. But many religious and cultural beliefs, which are the basis of their conservation, are slowly degrading with time. So, it is imperative to preserve this ecosystem by developing and enforcing strict management measures along with proper documentation and corporation of indigenous and technical knowledge associated with it. It will also help in creating a knowledge base for the future.

**Keywords:** Sacred groves, Western Ghats, floral diversity, conservation

## PP 17

### **Legumes (Fabaceae) of Khanapur Tehsil (Sangli Dist.) Maharashtra**

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Legumes are one of the topmost components of the Angiosperm flora of any region of India. Apart from diversity legumes play distinct roles in an ecological, economic, and social point of view. During floristic studies of Khanapur Tehsil from Sangli district of Maharashtra, authors have recorded a total of 100 legumes belonging to 53 genera covering four subfamilies. Fabaceae is the dominant family of flora due to its adaptation to various habitats. Papilionoideae is the largest sub-family and Detarioideae is the smallest subfamily as far as a number of taxa are considered. *Alysicarpus*, *Crotalaria*, *Indigofera*, *Senna*, *Vachellia* and *Vigna* are the dominant genera of the region and are represented by a higher number of species. Present work deals with the documentation of legumes of Khanapur tehsil according to the latest LPWG, 2017 system of classification of legumes and notes on legumes of the region in the view of ecology, endemism, economy, ethnobotany, and invasiveness. Present work will be helpful to understand legume diversity from the Khanapur region and its sustainable utilization.

**Key words:** Fabaceae, LPWG, Detarioideae, Papilionoideae



**PP 18**

**Pollination Biology of *Osbeckia reticulata* Bedd. (Melastomataceae)  
- An Endemic Plant in Southern Western Ghats**

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*Osbeckia reticulata* Bedd. is a rare endemic large shrub restricted to Munnar hill stations of Southern Western Ghats. The present study on pollination biology of *O. reticulata*, and was conducted at Eravikulam National Park-Idukki district, Kerala, for a period between 2014 to 2018. Flowering between November to March with peak in the middle of December. Anthesis takes place between 06.00 - 09:30 am accompanied with anther dehiscence. The lifespan of single flower is one day. Because the flower's anthers are poricidal, pollen removal requires an outside source. Insect visits the flowers included *Xylocopa pubescence*, *X. latipes*, *Amegilla zonata*, *Ceratina* spp., and *Andrena* spp. Buzz pollination was seen in *O. reticulata*. Compared to naturally pollinated flowers, hand-pollinated flowers have a higher rate of fruit setting. About 25-30 days were taken for fruit development until maturation. Capsules loculicidal. The dissemination of seeds lacked any unique mechanisms. Seed viability was 5.6% 2.3 whereas seed germination was 1.8% 0.7%. Only water-soaked soil will support seed germination. Its limited range and endemism appear to be caused by human activity, inbreeding depression, poor seed germination and viability, low seedling sustainability, a lack of pollinators in humid circumstances, and a short seed dispersal distance. The findings of this study are beneficial for the conservation of natural population.

**Keywords:** Pollination Biology, *Osbeckia reticulata*, Melastomataceae, Endemic Plant, Western Ghats

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5. DECORATION / STAGE COMMITTEE			6. CATERING COMMITTEE	
1.	Prof. Ranganath	Chairman	Dr. Kolkar K.P.	Chairman
2.	Dr. Reshma Nesargi	Co-Chairman	Dr. Dhumwad S. D.	Co-Chairman
3.	Smt. Lalita R. Naik	Member	Dr. Kummur G.N	Member
4.	Dr. Rajashekhar Bariker	Member	Sri. Govindappa D. B.	Member
5.	Ms. Sudha S.	Member	Mr. Arun A. Naik	Member
6.	Sri. Vijayamahantesh Gobbi	Member	Mr. Rahul Belagaonkar	Member
7.	Ms. Suman Salimath	Member	Ms. Vanaja G. Patgar	Member
8.	Ms. Meheboob Bi S. Mysore	Member	Ms. Chaitra	Member

9	Mr. Praveen F Madar	Member	Mr. Kambi B.K	Member
<b>7. TECHNICAL / COMPUTER OPERATING COMMITTEE</b>			<b>8. ENTERTAINMENT PROGRAMME COMMITTEE</b>	
1.	Dr.(Smt) Sanakal R.D.	Chairman	Dr.(Smt) M.S.Salunke	Chairman
2.	Dr. Manjunath S.	Co-Chairman	Dr.G.H.Malimath	Co-Chairman
3.	Sri Harsha Neelgund	Member	Dr.(Smt) Savirmath V.B	Member
4.	Smt. Joyti Doddmani	Member	Dr. Motebennur S.S.	Member
5.	Ms. Komal R.C	Member	Ms. Shubha K.,	Member
6.	Smt. Savita R.	Member	Smt. Naghashree G.	Member
7.	Ms. Shweta	Member	Ms. Haseena S Nadaf	Member
8.	Ms. Tanuja Metagudd	Member	Ms. Laxmi Pyarasabadi	Member
9.	Ms. Madhu Shabannavar	Member	Ms. Swati P. Deshpande	Member
10.	Mr.Hanamanth B. Konaraddi	Member	Ms. Megha R. Hiremath	Member
11	Mr. Chikrasali S. Kumbar	Member	Mr. Angadi M.I.	Member
<b>9. CERTIFICATE DISTRIBUTION/ PHOTOGRAPHY COMMITTEE</b>			<b>10. ACCOMODATION / TRANSPORTATION COMMITTEE</b>	
1.	Dr. (Smt.) Doris M. Singh	Chairman	Dr. Nayak L.T.	Chairman
2.	Dr. Nagaraja S	Co-Chairman	Dr. Mangalwede	Co-Chairman
3.	Dr. Rajappa S K	Member	Dr.S.P.Masti	Member
4.	Dr. Nirupama J M	Member	Sri. Ningaraj S. Moganur	Member
5.	Dr. (Miss) Veena Rokhade	Member	Shri Shreyas Batageri	Member
6.	Ms. Seema Rajpure	Member	Shri Omkar Kosti	Member
7.	Ms. Chairta Phandri	Member	Shri Adarsha P.	Member
8.	Ms. Sahana M. Kukunoor	Member	Mr. Shivayogi Haveri	Member
9.	Ms. Shakuntala G. Murashilli	Member	Mr. Vinayak Ilager	Member
10	Ms. Vijayalaxmi R. M.	Member	Mr. Jajjuri Jagannatha	Member
11	Ms. Nageena P.H.	Member	Mr.Vijayamahantesh Gobbi	Member





. breakfast, lunch, dinner  
. Free wifi  
. Evening high tea, snack  
. 6 activities  
. Free parking  
For one extra bed - 2500/-  
[maximum 3 person for 1 cottage]



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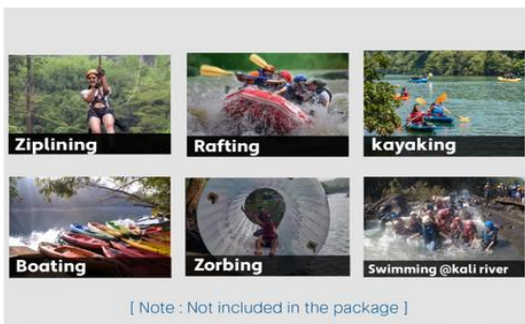
[ Note : Taxes Applicable ] For child below 6YR - charges not applicable

## 6 Activities Included

[ Prior booking is recommended ]



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## Exclusives Experiences of WILD KASARWADI



**JUNGLE SAFARI!**  
watching the animals and birds in their natural habitats is always pleasant and mesmerizing sight to behold



**ROMANTIC/BUSH DINNER**  
when you wish to impress your partner, this place in Kasarwadican also be counted as a great destination for newly married couple.



**BOAT SAFARI!**  
Boat safere give tourists a wonderful opportunity to witness the flora and fauna that are inaccessible through land.



**WILD TREK TO WATERFALL**  
Beautiful trek along with an experienced guide who will help you discover forest leading to beautiful unexplored waterfall!

