# SOUVENIR

ICMPNPR 2014

## International Conference

on

## CURRENT STATUS, OPPORTUNITIES AND CHALLENGES IN MEDICINAL PLANTS AND NATURAL PRODUCT RESEARCH

**September 24 - 26, 2014 | Bardoli (India)**

**Organized by**

C G Bhakta Institute of Biotechnology

UKA TARSADIA UNIVERSITY

India

**In Collaboration with**

University of Illorin, Nigeria

Zandu Foundation For Health Care Ambach, India

**Sponsored by**

Gujarat Medicinal Plants Board,
NMPB, New Delhi

Department of Biotechnology, New Delhi

Science & Engineering Research Board,
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# International Conference

# on

# "Current Status, Opportunities and Challenges in Medicinal Plants and Natural Product Research"


**September 24 – 26, 2014 | Bardoli (India)**

**Organized by:**

**C G Bhakta Institute of Biotechnology**
**UKA TARSADIA UNIVERSITY**
**Bardoli, Gujarat, India**

**In collaboration with:**

**University of Ilorin, Nigeria**
**&**
**Zandu Foundation for Health Care, Gujarat, India**

**Editors:**

Dr. R Krishnamurthy, Prof. Rajashekhar Ingalhalli, Dr. Meonis Pithawala

**Souvenir designed by:**

Ms. Dhruti Mistry

International Conference
on
"Current Status, Opportunities and Challenges in Medicinal Plants and Natural Product Research"
held during September 24 - 26, 2014
at
C G Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli, Gujarat (India)

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## Conference schedule

| Day 1 – 24th September, 2014<br>Venue: Dr. Jatin Desai Auditorium, Engineering college, UTU | | |
|---|---|---|
| 8:30 am | Conference registration | |
| 10:00 – 12:00 noon | Conference Inauguration | |
| | Welcome address | Prof. Dr. R Krishnamurthy<br>**Conference Chairman**<br>Director<br>C G Bhakta Institute of Biotechnology<br>Uka Tarsadia University |
| | About the conference | Prof Rajashekhar Ingalhalli<br>**Organizing Secretary**<br>C G Bhakta Institute of Biotechnology<br>Uka Tarsadia University |
| | Inaugural address | Dr D R Shah<br>**Patron**<br>Provost<br>Uka Tarsadia University |
| | Release of Souvenir | **Chief Guest** |
| | Felicitation | Prof. A G Ambali<br>**Patron**<br>Vice Chancellor<br>University of Ilorin, Nigeria |
| | Plenary address | Dr. Rajendra Gupta<br>Chairman<br>Zandu Foundation For Health Care, Gujarat, India |
| | Vote of Thanks | Dr. Meonis Pithawala<br>C G Bhakta Institute of Biotechnology<br>Uka Tarsadia University |
| **12:00 – 12:15 pm** | **Tea** | |
| **Session I: Biodiversity, Conservation and Remote Sensing** | | |
| CHAIRPERSON | Prof. Dr. Temidayo Oladiji<br>Director<br>Centre for Research Development and In-house Training (CRDT)<br>University of Illorin, Nigeria | |
| CO – CHAIRPERSON | Dr. J M Pathak<br>Member, Scientific Council<br>Zandu Foundation for Health Care | |
| 12:15 – 12:45 pm | Key-note Speaker: **Prof. Veena Sharma**<br>Head<br>Department of Bioscience and Biotechnology,<br>Banasthali University,<br>Rajasthan, India | |
| 12:45 – 1:15 pm | Key-note Speaker: **Dr. Sandhya Kiran**<br>Head<br>Department of Botany (Remote Sensing)<br>Faculty of Science, MSU, India | |
| **1:15 – 2:15 pm** | **Lunch** | |

| | |
|---|---|
| 2:15 – 2:45 pm | Key-note Speaker: **Dr. Puthiyaparambil Josekutty**<br>Manager<br>Tissue Culture Laboratory<br>Clonal Solutions Australia Pvt. Ltd<br>Australia |
| 2:45 – 3:45 pm | Oral Presentation |
| **3:45 – 4:00 pm** | **High Tea** |
| **Session II: Genomics, Proteomics and Bioinformatics** | |
| CHAIRPERSON | Dr. Marcello Iriti<br>Professor<br>Department of Agricultural and Environmental Sciences<br>Faculty of Agricultural and Food Sciences<br>Milan State University<br>Italy |
| CO – CHAIRPERSON | Dr. Minoo Parabia<br>Former Head<br>Department of Bioscience<br>Veer Narmad South Gujarat University<br>Surat, India |
| 4:00 – 4:30 pm | Key-note Speaker: **Dr. N Jeyakumar**<br>Department of Bioinformatics<br>Bharathiar University<br>Coimbatore, India |
| 4:30 – 5:00 pm | Key-note Speaker: **Dr. R Nagaraja Reddy**<br>Scientist<br>Plant Breeding Division<br>DMAPR, Boriavi<br>India |
| 5:00 – 6:00 pm | Oral Presentation |
| **6:00 pm** | **Cultural event** |
| **8:00 pm** | **Conference Dinner** |

| Day 2 – 25th September, 2014<br>Venue: Dr. Jatin Desai Auditorium, Engineering college, UTU | |
|---|---|
| 7:30 am | Registration & Breakfast |
| **Session III: Natural Products Research** | |
| CHAIRPERSON | Prof. Veena Sharma<br>Head<br>Department of Bioscience and Biotechnology,<br>Banasthali University,<br>Rajasthan, India |
| CO – CHAIRPERSON | Dr. H R Raveesha<br>Bangalore University<br>Bangalore, India |
| 9:00 – 9:30 am | Key-note Speaker: **Dr. Alexandre Macuik**<br>Associate Professor<br>University Paris – Sud<br>France |
| 9:30 – 10:00 am | Key-note Speaker: **Dr. Marcello Iriti**<br>Professor<br>Department of Agricultural and Environmental Sciences<br>Faculty of Agricultural and Food Sciences<br>Milan State University<br>Italy |
| 10:00 – 10:30 am | Key-note Speaker: **Dr. K S Laddha**<br>Professor<br>Pharmaceutical Sciences & Technology Division<br>Institute of Chemical Technology<br>Mumbai, India |
| **10:30 – 10:45 am** | **Tea** |
| 10:45 – 1:30 pm | Oral presentation |
| **1:30 – 2:30 pm** | **Lunch** |
| 2:30 – 3:30 pm | Oral presentation |
| **3:30 – 4:00 pm** | **High Tea** |
| 4:00 – 6:00 pm | Oral Presentation |
| **8:00 pm** | **Conference Dinner** |

| Day 2 – 25th September, 2014<br>(Concurrent session)<br>Venue: Shrimad Hall, SRIMCA , UTU | |
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| CHAIRPERSON | Dr. Dileep Kumar<br>Principal Scientist<br>Agro processing & Natural Product Division<br>National Institute for Interdisciplinary Science & Technology (CSIR)<br>Thiruvanathapuram, India |
| CO – CHAIRPERSON | Dr. S T Girisha<br>Professor<br>Bangalore University, Bangalore, India |
| 9:00 – 9:30 am | Key-note Speaker: **Dr. P Manivel**<br>Director (Acting)<br>DMAPR, Boriavi, India |
| 9:30 – 10:00 am | Key-note Speaker: **Prof. Dr. Temidayo Oladiji**<br>Director<br>CRDT, University of Ilorin, Nigeria |
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| 10:45 – 1:30 pm | Oral Presentation |
| **1:30 – 2:30 pm** | **Lunch** |
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| CHAIRPERSON | Dr. Alexandre Macuik<br>Associate Professor<br>University Paris – Sud, France |
| CO – CHAIRPERSON | Dr. Jayaprakash Yadav<br>Professor<br>Department of Genetics, MD University, India |
| 2:30 – 3:00 pm | Key-note Speaker: **Dr. Ravinder Raina**<br>Department of Forest Products<br>Dr. Y S Parmar University of Horticulture & Forestry<br>Solan, India |
| 3:00 – 3:30 pm | Key-note Speaker: **Dr. K Rajamani**<br>Professor & Head<br>Department of Medicinal and Aromatic Crops, TNAU, India |
| 3:30 – 4:00 pm | Key-note Speaker: **Dr. Dileep Kumar**<br>Principal Scientist<br>Agro processing & Natural Product Division<br>National Institute for Interdisciplinary Science & Technology<br>Thiruvanathapuram, India |
| **4:00 – 4:30 pm** | **High Tea** |
| 4:30 – 6:00 pm | Oral Presentation |
| **8:00 pm** | **Conference Dinner** |

## Day 3 – 26th September, 2014

### Venue: Dr. Jatin Desai Auditorium, Engineering college, UTU

| | |
|---|---|
| 7:30 am | Registration & Breakfast |
| **Session VI: Indigenous, Traditional Knowledge and IPR** | |
| CHAIRPERSON | Dr. R C Mishra<br>Principal Scientist<br>National Bureau of Plant Genetic Resources, Cuttack, Odisha<br>India |
| CO – CHAIRPERSON | David Adedayo Animasun<br>University of Illorin<br>Nigeria |
| 9:00 – 9:30 am | Key-note Speaker: **Dr. Jayaprakash Yadav**<br>Professor<br>Department of Genetics<br>MD University, India |
| 9:30 – 10:00 am | Key-note Speaker: **Dr. Bipin Agrawal**<br>Associate Professor<br>Department of Textile Chemistry<br>MSU, India |
| 10:00 – 10:30 am | Key-note Speaker: **Dr. Smitha**<br>Scientist<br>DMPAR<br>Boriavi, India |
| **10:30 – 10:45 am** | **High Tea** |
| 10:45 – 12:00 noon | Oral Presentation |
| 12:00 – 1:30 pm | Poster Presentation |
| **1:30 – 2:30 pm** | **Lunch** |
| 3:00 pm | Valedictory function |

# List of Abstracts for Oral and Poster Presentation

## Session I: Biodiversity Conservation and Remote Sensing

### Oral presentations

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| **OA-049** | Conservation Strategies for RET Medicinal Plants |
| **OA-065** | Utility of Spatial Data and GIS Techniques for Conservation of Biodiversity of Pavagadh Forest Area |
| **OA-066** | Ethnobotanical Study on Medicinal Plants from Satpura Hills of North Maharahtra, India |
| **OA-071** | Herbal Heritage Conservation Education in India: A School's Perspective |

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| **PA-054** | Biodiversity Assessment of Baroda District using Optical Remote Sensinng |
| **PA-060** | A Preliminary Survey of Dang Forest for Finding the Present Status of Orchids |

## Session II: Genomics, Proteomics and Bioinformatics

### Oral presentations

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| **OA-019** | Evaluation of Genetic Variation among Populations of *Acorus calamus* (L.) in Indian Germplasm Based on RAPD Markers |
| **OA-037** | Genetic Improvement of Velvet Bean-an Important Tropical Medicinal Legume |
| **OA-048** | Molecular Docking and *In Vivo* Cardioprotective Evaluation of Solasodine from Fruits of *Solanum xanthocarpum* (Solanaceae) In Rats |
| **OA-056** | Data Mining and Development of EST-SSR Markers for Isabgol (*Plantago ovate* forsk.) using Next Generation Sequencing (NGS) Data |

### Poster presentations

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| **PA-051** | Molecular Docking Study of Isoflavanones from *Uraria picta* |

## Session III : Natural Product Research

### Oral presentations

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| **OA-006** | Efficacy of Aqueous and Acetone Solvent Extracts of different Medicinal Plants against *Aedes albopictus* |
| **OA-007** | Novel Perspective for Quality Control of Herbal Products |
| **OA-012** | Anti-Osteoporotic Effects of *Tinospora cordifolia* (Menispermaceae) in Animal Models of Post Menopausal Osteoporosis |
| **OA-013** | Pharmacognostic and Phytochemical Evaluation of Stem of *Achyranthes aspera* Linn. |
| **OA-016** | Aphrodisiac Activity of Aqueous Extract of *Anthonotha macrophyll*a Leaves in Normal |

| | |
|---|---|
| | Female Rats |
| **OA-018** | Antirepellant and Toxic Properties of Natural Products from *Epipremnum pinnatum* (Araceae) against *Odontotermes obesus* |
| **OA-020** | Isolation and Characterization of Phenolic Compounds from Root Extract of *Decalepis hamiltonii* |
| **OA-021** | Super Critical Fluid Extraction Optimization of Important Medicinal Plants *Andrographis paniculata* and *Cassia angustifolia* |
| **OA-027** | Pharamcognostic Studies on Stem of *Tinsopra malabarica* Miers. |
| **OA-030** | Preclinical Study on UTI Infected Experimental Rats Treated with *Sphaeranthus indicus* L. |
| **OA-031** | Comparative Study of *Heterophragma quadriloculare* and *Heterophragma adenophyllum* |
| **OA-032** | Accumulation of three Important Bioactive Compounds in Different Plant Parts of *Withania somnifera* and Its Determination by LC/ESI-MS/MS – MRM Method |
| **OA-034** | HPLC Estimation of Medicinally Important Xanthone Glycoside from Thirty Varieties of *Mangifera indica* L. (Anacardiaceae) |
| **OA-040** | Cumulative Effects of Herbs on Antioxidant and Anti-Lipid Peroxidation |
| **OA-041** | Efficiency of Various Extraction Techniques Employed in Obtaining Secondary Metabolites from the Bark of *Syzygium cumini* (L.) Skeels |
| **OA-042** | Total Alkaloid Extract and Vasicine Hydrochloride Derived from *Adhatoda vasica* Nees in the Malabar Area of Western Ghats Exhibit Potent Bactericidal Activity |
| **OA-043** | Physical Properties of Isabgol Seed Relevant to Design of Isabgol Dehusker |
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| **OA-054** | Determination of Quality Standards for a Poly Herbal Ayurvedic Formulation - Draksharishta |
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| **PA-007** | Quantitative Estimation of Stigmasterol in Leaf Extracts of *Tecomella undulata* Seem by HPLC |
| **PA-008** | Antibacterial Activities of Iron Nanoparticles Synthesized using Weeds |
| **PA-010** | Cardioprotective Effects of Resveratrol against B-Adrenergic Stimulation in Streptozotocin-Induced Diabetic Rats |
| **PA-011** | Preliminary Phytochemical Studies of *Nyctanthes arbor-tristis* A Valuable Medicinal Plant |
| **PA-012** | Paradoxical Action of Bromelain in Renal Tissue is Figured by Alteration of Endogenous Antioxidants, Oxidative Stress and Cholinesterases |
| **PA-013** | A Review on Phytochemical Profile of *Pseudarthria viscida* (Salaparni): A Valued Medicinal Plant |
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| **PA-015** | Pharmacognostic and Phytochemical Investigation of Stem Bark of *Chloroxylon swietenia* Dc. an Ethnomedicinally Important Medicinal Tree |
| **PA-018** | *In Vitro* Antioxidant Profiling of Hydro-Methanolic Extract of *Indigofera tinctoria* |
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| **PA-024** | Extraction Efficiency and HPLC Method Development for Flavonoid Analysis in *Clitoria ternatea* – A Memory Enhancer Medicinal Plant |
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| **PA-065** | Ascertaining Anti-Inflammatory and Analgesic Activity in Aqueous Leaf Extract of *Anisomeles indica* (L.) Kuntze |
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**Session IV: Plant Breeding, Genetics and Biotechnology**

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| **OA-009** | Antiproliferative Activity of *Ocimum gratissimum*(L.) Leaf Extract on MCF-7 Cell Line and in Sillico Binding Affinity Study of Eugenol, Estradiol with Estrogen Receptor |
| **OA-010** | Antioxidant Activities of *Hemidesmus indicus* (L.) R.Br. Encapsulated Poly Lactide-Co-Glycolide Nanoparticles |
| **OA-028** | Development of a Multi-Residue Method for the Determination of Pesticide Residues in Indian Senna (*Cassia angustifolia*) using Modified QuEChERS Approach |
| **OA-029** | Biochemical Evaluation of Ash Value of Some Medicinal Plants of Genus*Terminalia* (Combretaceae) of Marathwada Region in Maharashtra |
| **OA-035** | Antilipidemic Effect of *Styrax benzoin* on Lipid Profile in hypercholesterolemic Albino Rats |
| **OA-039** | *Tecoma stans*: A Naturalised Multipurpose Plant |
| **OA-046** | Effect of UV-C Radiation on Physiological, Antioxidant and Molecular Properties of *Stevia rebaudiana* |

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| **OA-058** | Assessment of Seedling Growth, Biochemical Characteristics and Protective Enzymes in Safflower Seedlings (Variety HUS-305) under Copper Stress |
| **OA-060** | Creating Performance Textiles via Simultaneous Dyeing and Antimicrobial Finishing of Cotton Substrate with Medicinal Plant Products |
| **OA-069** | HPTLC and Bioautography Evaluation of *Casuarina equisetifolia* Extract |
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**Poster presentation**

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| **PA-004** | Antibacterial Activity and Phytochemical Screening with UV-VIS and FTIR Spectroscopic Analysis from Leaves of Different Accessions of *Acorus calamus* L. |
| **PA-009** | A Comparative Study of Formononetin and Biocahnin-A on Osteoblastogenesis *In Vitro* |
| **PA-016** | Cytoprotective Effects of *Decalepis hamiltonii* Root Extract and its Isolated Compounds against $H_2O_2$ Induced Oxidative Stress in Cardiac H9c2 Cells |
| **PA-020** | Reproductive Biology of *Oenothera biennis* L. |
| **PA-025** | *In Vitro* Antiproliferative and Apoptotic Activity of *Lantana camara* on HeLa Cells |
| **PA-043** | Plantibodies: Unravelling the Mystery |
| **PA-056** | Anti Microbial, Antifungal and Anti Oxidant Activity of Ethanolic Extracts of *Garcinia indica* Fruit |
| **PA-066** | Anti-clastogenic Activity of *Alstonia scholaris* against Bleomycin-Induced damage in Cultured Human Lymphocytes: An *In Vitro* Comparative Assessment |
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| **PA-070** | Production of Ethanol from Fruit Waste for use as alternative Biofuel |
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**Session V : Propagation, Tissue Culture and Cultivation of Medicinal Plants**

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| **OA-003** | *In Vitro* Propagation, Molecular Characterization and Phytochemical analysis of *Saraca asoca* (Roxb.) De Wilde and *Comiphora wightii* (Arn.) Bhandari |
| **OA-011** | Studies on Induction of Callus and Direct Regeneration from Nodal Explants of *Cissampelos pareira* L. |
| **OA-022** | Induction of Multiple Shoots from the Leaf Explant of *Oldenlandia corymbosa* L. : A Hepatoprotective Medicicnal Plant |
| **OA-023** | Effect of $CuSO_4$ on Stevioside Production and ROS System in Callus of *Stevia* |

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|---|---|
| | *rebaudiana* (Bert.) Bertoni (Sweet Leaf) |
| **OA-024** | Collection, Maintenance and Evaluation of Anatto (*Bixa orellana*) Germplasm for Cultivation in Tribal Areas of East Godavari District of Andhra Pradesh |
| **OA-026** | The Effect of Developmental Stages and Harvesting Time on Biosynthesis and Accumulation of Essential Oil, Geraniol and Geranyl Acetate in Palmarosa (*Cymbopogon martinii*, Roxb. Wats. Var. Motia) |
| **OA-033** | Rural Development through Partnership: A Case Study of *Artemisia annua* L. Crop in Anand District- Gujarat |
| **OA-036** | Growth and Yield Performance of Improved Turmeric Varieties in the Agency Areas of East Godavari Dist |
| **OA-038** | *In Vitro* Propagation of *Clerodendrum phlomidis* Linn. |
| **OA-044** | Effect of Field Conditions and Time of Sowing on Germination and Growth Parameters in *Rheum australe* D.Don |
| **OA-067** | *In Vitro* Culture of *Oroxylum indicum* (V.) using Cotyledonary Node and Nodal Explants |
| **OA-068** | *In Vitro* Shoot Regeneration of *Hemidesmus indicus* (L.) R.Br. from Leaf Explant |

**Poster presentation**

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|---|---|
| **PA-019** | Tissue Culture Studies on Mass Multiplication of *Celastrus paniculatus* Willd. - An Important Medicinal Plant |
| **PA-022** | Brassinosteroid mediated Metabolic Changes in Some Groundnut Cultivars during Early Germination |
| **PA-026** | Effect of Foliar Application of Hormones and Nutrients on Chemical Composition of Ardusi (*Adhatoda zeylanica*) |
| **PA-027** | Investigation of Phytochemicals Study of *Centella asiatica* (Mandukaparni) Grown under Different Environmental Condition |
| **PA-028** | Induction of Somatic Embryogenesis in Endangered Medicinal Herb *Curculigoorchioides* Gaertn. (Kali Musli) and Evaluation of its Genetic Fidelity |
| **PA-030** | Studies on *In Vivo* and *In Vitro* Seed Germination of *Pterocarpus marsupium* Roxb |
| **PA-068** | The Effect of Salicylic Acid on Growth Parameter of *Linum usitatissimum* L (Linaceae) |
| **PA-069** | Rapid *In Vitro* Propagation Method in *Pogostemon heyneanus Benth.* on Cocounut Milk Supplemented Medium without Growth Regulators |

**Session VI : Indigenous, Traditional Knowledge and IPR**

**Oral presentation**

| | |
|---|---|
| **OA-008** | Biotechnology as an Intellectual Property |
| **OA-015** | Validation of Tribal Claims through Phytochemical Screening in *Mucuna pruriens* (L.) DC Var. *Pruriens*, A Potential Medicinal Legume |
| **OA-025** | Medicinal Plant Diversity and Ethnomedicinal Studies on Some Plants from Tribal |

| | |
|---|---|
| | Area of Shimla District of Himachal Pradesh |
| **OA-045** | Folk Veterinary Medicines in the Mudigere *Taluk*, Chickmagaluru District of Karnataka, India |
| **OA-050** | Intellectual Property Rights in Medicinal and Aromatic Plants: Opportunities and Threats |
| **OA-051** | Traditional Knowledge of Some Wild Plants for Medicinal Purpose of Banasthali, (Tonk) Rajasthan |
| **OA-061** | Concept of Drug Collection & its Relevance |
| **OA-062** | Aurveda & Scope for Allied Sciences |

**Poster presentation**

| | |
|---|---|
| **PA-005** | Traditional Herbal Remedies from the Shirpur Tehshil of Dhule (M.S.) in the Treatment of Infant Disease |
| **PA-031** | Indian Traditional Medicinal Spices |
| **PA-039** | A Review on Medicinal Plant used in Ayurvedic formulation "Balarishta" |
| **PA-041** | Traditional Knowledge on Medicinal Plants from Shirpur Tahsil, Dist: Dhule, Maharashtra, India |
| **PA-042** | Spine Gourd (*Momordica dioica* roxb. Ex Willd. Potentially Wild Edible Plant from a Tribal District Nandurbar, Maharashtra, India |
| **PA-046** | *Curcuma zedoaria* Rosc. – A Medicinal Plant of Ethnobotanical and Traditional Importance |
| **PA-047** | *Saraca indica* L. – A Traditionally used Multifunctional Medicinal Plant |
| **PA-048** | *Commiphora wightii* (Arn.) Bhandari (= *Commiphora mukul* ) – A Rare Medicinally Important Plant |
| **PA-057** | Ashtavarg – An Ancient Ayurvedic Formulation |
| **PA-058** | Cancer Therapy – Role of Some Indian Plants |
| **PA-062** | *Salvadora persica* L. – A Medicinally Important Plant of Indian Subcontinent |
| **PA-063** | *Opuntia ficus-indica* (L.) Mill.- A Multipurpose Cactus Plant of Therapeutic Importance |
| **PA-064** | *Garcinia indica* (Kokum) - A Multipurpose Medicinal Tree of Western Ghats, India |

# *Message*

## Message

**Dr. Dinesh R Shah**

I am extremely happy to mention that Uka Tarsadia University, in association with University of Ilorin, Nigeria is organizing the **International Conference on Medicinal Plants and Natural Product Research (ICMPNPR)** during 24th to 26th September 2014.

It is a matter of pride and pleasure for me to have hosted such a global event in a University that is still in its juvenile stage. It has always been our motto to provide opportunities and bring together brooding minds which will ultimately serve the humanity.

A number of scientists, ayurvedic doctors, industrialists and research scholars from India and abroad are taking part in the deliberations and will be discussing various aspects of medicinal plant and natural product research. I hope the proceedings of this conference will also energize the young minds to take up product-oriented research for the welfare of mankind.

At this juncture, I would like to welcome all the participants and, at the same time, would also like to thank the sponsors and co-sponsors without whom this event would not have been possible.

I sincerely appreciate the relentless efforts of the members of the organizing committee of C.G. Bhakta Institute of Biotechnology in making this conference a reality.

Wishing you all the success!

( Dr. Dinesh R. Shah )
Provost & CEO
Uka Tarsadia University
Bardoli, Dist Surat. Gujarat (INDIA)

# UNIVERSITY OF ILORIN, ILORIN, NIGERIA

## VICE-CHANCELLOR'S OFFICE

VICE-CHANCELLOR:
PROFESSOR A.G. AMBALI
(DVM, ABU; M.V.Sc. Ph.D, L-Pool, UK
MVCN, MCVSN, MNVMA, FCVSN)

## GOOD WILL MESSAGE

It is my pleasure to welcome you all to this very important International conference, jointly organized by the University of Ilorin in Nigeria and C.G. Bhakta Institute of Biotechnology, Uka Tarsadia University and Zandu Foundation for health care both in India. This is the first of its kind between these Universities.

The theme of this year's conference is: Current Status, Opportunities and Challenges in Medicinal Plants and Natural Products Research.

I have no doubt that all participants present will emerge as leaders of thought, believing that we will all be attentive to the presentations.

Foremost, I must say that University of Ilorin, Ilorin, Nigeria is highly delighted to have a very active collaboration with Uka tarsadia University in India. Our relationship with the Institute of Biotechnology although very young (less than two years), has been quite productive. Both Universities have had exchange of scholars and students, research collaborations and indeed, organization of this joint conference.

Eminent ladies and gentlemen, this conference, themed as stated earlier, marks another watershed in the annals of our commitment to serving community and developing humanity through research, particularly, in the area of medicinal plant, which is a fast developing field of research in Nigeria and India.

Though many people would have heard one or two things about the benefits and challenges of using medicinal plants, an ample opportunity that a conference of this nature offers is to unlock knowledge and provide more information and particularly provide opportunity for research collaboration and networking across the continents.

Realizing the potentially huge economic rewards derivable from medicinal plants, the University of Ilorin is keenly interested in developing research in the area of medicinal plant. Researchers in the University of Ilorin are interested in what is true and untrue about many plants already reported to possess acclaimed medicinal value. It is my hope therefore that this conference will avail researchers the opportunity to disseminate new findings in medicinal plant research. This conference therefore is a step in the right direction.

I welcome you all to this very important conference and wish everyone a pleasant stay.

Professor Abdul Ganiyu Ambali
Vice Chancellor
University of Ilorin, Ilorin
Nigeria.

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aambali.ok@unilorin.edu.ng
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**Dr Jagdish Prasad, IFS**

# Message

Research and Development are of utmost importance to the growth of any sector. They are like two sides of the same coin as Development sets the priorities of research and conversely Research findings set the mile stones of development path. Unfortunately, the link between Research and Development is too weak to carry forward the sectoral growth at the pace it ought to be. Therefore, any attempt that provide a platform for exchanging ideas, collating and collecting information, collaborating and coordinating between executives responsible for Development on one side and Research community on the other, helps enhance sectoral growth. Accordingly, the theme of the conference reveals the participation of wide spectrum of stake holders including researchers associated with ayurvedic medicines.

This international conference on "**Current Status, Opportunities and Challenges in Medicinal Plants and Natural Products Research**" is a step forward in this direction. I, therefore, hope and believe that this conference will come out with the useful recommendations on;

1) *Field applications of research findings.*
2) *Identification of research priorities.*

for ensuring optimum growth of AYUSH (Ayurved, Yoga and naturopathy, Unani, Siddha and Homoeopathy) system of medicines in future.

I heartily pray the Almighty for the grand success and great outcome of the conference.

**With all the best wishes**

**(Dr Jagdish Prasad, IFS)**
Chief Executive Officer
Gujarat Medicinal Plants Board
Gujarat State, Gandhinagar.

FEDERAL MINISTRY OF FINANCE

**Dr.Ona O. Soleye**
Date: 6 September 2014

**Message**

I am delighted to know that C.G Bhakta Institute of Biotechnology,UkaTarsadia University,Bardoli is organizing an International Conference on **"Current Status, Opportunities and Challenges in Medicinal Plants and Natural Product Research"** in collaboration with University of Ilorin,Ilorin,Nigeria and Zandu Foundation for Health Care, Gujarat, India from 24-26 September 2014.

The theme of the conference is very appropriate as it addresses opportunities and challenges in various fields of medicinal plants. I am happy to know that a large number of eminent scientists, academicians, technologists, research scholars and students from all over the world will be participating in the conference to discuss their research. It is hoped that it will lead to fruitful collaborative opportunities among the researchers.

I am particularly delighted that Nigeria, through the University of Ilorin is in collaborationwith this conference. It is hoped that various research findings will translate into visible development in the use of medicinal plant to cure some of the commonest ailments in Nigeria; diabetes, sickle cell anaemia, arthritis, bronchitis, malaria. I wish you successful deliberations.

**Dr.Ona O. Soleye,**
Ex. Finance Minister of Nigeria
Federal Republic of Nigeria and
Friend of UkaTarsadia University

UNIVERSITÀ DEGLI STUDI DI MILANO
DIPARTIMENTO DI SCIENZE AGRARIE E AMBIENTALI
PRODUZIONE, TERRITORIO, AGROENERGIA

**Message**

As Editor-in-Chief of the European Journal of Medicinal Plants, I am honoured to welcome all delegates to attend the International Conference on **'Current Status, Opportunities and Challenges in Medicinal Plants and Natural Product Research'**, organized by C. G. Bhakta Institute of Biotechnology, Uka Tarsadia University (India) in collaboration with the Centre for Research Development and In-house Training, University of Ilorin (Nigeria) and Zandu Foundation for Health Care (India).

One of the principal aims of this Conference is to supply up-to-date information in the field of medicinal plants and natural products, with an inspired selection of topics put together by Organising and Scientific Committees. General topics covered are extremely broad and include nearly major areas of research on medicinal plants and natural products, for what promises to be a very stimulating and high-standard scientific Conference.

I hope that all participants will have stimulating scientific sessions.

We look forward to welcoming you!

Marcello Iriti PhD
Associate Professor
Milan State University

**MONGOLIAN ACADEMY OF SCIENCES**
**INSTITUTE OF BIOLOGY**

**Message**

I have learnt that the International Conference on **"Current Status, Opportunities and Challenges in Medicinal Plants and Natural Product Research"** is going to organized by C.G.Bhakta Institute of Biotechnology, Uka Tarsadia University, India jointly with the Centre for research Development and In-house training, University of Ilorin, Nigeria and Zandu Foundation for Health Care, India during 24-26 September, 2014.

As we know research on natural medicinal plants are attracting very strong interest from the scientific community in the World. Products based on natural plants are well known by their non-toxic nature to human health. India is known for its ancient heritage in use of natural plants for medicinal purpose. I hope this conference will be the forum where the best professionals will meet and deliberate on the challenges and the opportunities in the field of Plant biotechnology and medicinal plants.

I would like to extend very warm welcome to all delegates of this unique scientific event.

Oyunbileg Yungeree (PhD.)
Head of the Plant Biotechnology laboratory, Institute of Biology
Mongolian Academy of Sciences, National correspondent International Association
For Plant Biotechnology

## Message

Dear attendees and colleagues,

The wide scope of the International Conference on **"Current Status, Opportunities and Challenges in Medicinal Plants and Natural Products Research"** will gather a likewise broad community of researchers. The joint effort of C G Bhakta Institute of Biotechnology, University of Ilorin and Zandu Foundation for Health Care to bring us together in such a scientific crucible is a bold invitation for high standards science to be shared. Mixing different cultures, scientific backgrounds, nationalities are keys for a brighter future. Even more so when the shared motivation is to respectfully explore the resources biodiversity has in store for us. From traditional knowledge to omics approaches, the majority of the science developments that will be exposed and discussed in this conference are based on the pace of Nature, on the traditional knowledge or on wise empirical observations. Yet it is not the least of the challenges to make the best use of modern tools to understand and valorise this legacy. Pasteur, an acute observer of Nature, once said: "Chance only favours the prepared mind". Natural product researchers know that chance and even luck are sometimes good muses, but scientific conferences are definitely a way of choice to prepare minds to scientific breakthroughs. So let us share our enthusiasm with younger scientists, let us take the path paved by older ones, and let us enjoy a thrilling, mind-opening conference!

A. MACIUK
Associate Professor
University Paris-Sud
France

# Navsari Agricultural University

Eru Char Rasta, Dandi Road, Navsari - 396 450, (Gujarat) India

**Col (Dr) A R Pathak**
Vice Chancellor

**Ph:** (O) 02637- 283869, 282771-75 (R) 292111 **Fax:** 02637- 282554
**E-mail:** vc@nau.in **Website:** www.nau.in


## MESSAGE

I am very glad to note that the C. G. Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli is organizing International Conference on "Current Status, Opportunities and Challenges in Medicinal Plants and Natural Product Research" in collaboration with University of Ilorin, Ilorin, Nigeria and Zandu Foundation for Health Care, Gujarat, India from 24-26 September, 2014.

Natural Products Research has become a very important instrument for converting botanical material into therapeutically useful products and medicines. A vast plethora of over 18000 medicinal plants in India, nearly 3900 plants used by local tribal communities as medicines and equally rich marine floral diversity is available in India. With all the major systems of medicines practiced in India and over 8000 ISM and H operational units, undertaking research specifically on Natural Product Research along with newer novel plant based molecules of clinical importance assumes special significance.

It a matter of great pleasure for the undersigned to welcome the eminent senior scientists, young budding researchers, academicians, research scholars, graduate students, industrialists from Healthcare Units and IFS officers from all over the country and abroad, who shall be meeting at the Uka Tarsadia University to interact and participate in the International Conference with their research findings. I am sure that the Conference, through the wide range of paper and poster presentations will focus on the interdisciplinary aspects and application of natural product research as well as it may stimulate in depth knowledge on the role of medicinal plants in particular and natural product research and its value addition in general.

I take this opportunity to extend my best wishes to the Organizers, delegates and all other participants of this International Conference for a fruitful discussion. I am sure that good recommendations would be emerged due to deliberation, which will be more useful to Industry in general and users in particular.

(A.R.PATHAK)
VICE-CHANCELLOR

# C.G. Bhakta Institute of Biotechnology

Resolving Double Helix For Life

**Prof.Dr.R.Krishnamurthy**

**Message**

It gives me immense pleasure to welcome all delegates of **ICMPNPR 2014** to UKA TARSADIA UNIVERSITY, Maliba campus, Bardoli, Gujarat, India, organised by C.G. Bhakta Institute of Biotechnology, UkaTarsadia University in collaboration with University of Ilorin, Kwara State, Nigeria and Zandu Foundation for Health Care, Gujarat, India.

Ayurveda, an ancient system of medicine originated in India and is practised across the globe. India is considered as one of the richest source of plant bio-diversity. The main objective of this conference is to provide a common platform for academicians, industrialists, clinical practitioners and research scholars across the globe to interact on various themes of medicinal plants and natural product research. I hope that this conference will further strengthen the bondage between academic institutes, industries and research centres, so that novel products will reach the common man.

On behalf of the organising committee, I heartily welcome all the participants to make this congregation fruitful and successful. I take this opportunity to express my heartfelt gratitude to the sponsors and the co-sponsors for making this event possible.

With the blessings of Shri Bhagubhai Patel (President, BPKM), Shri Shaileshbhai Patel (President, UTU), Shri Kiritbhai Patel (Secretary, BPKM) and all the philanthropic donors of BPKM, I feel you all will enjoy not only the scientific sessions but also the cultural event of this conference along with my team.

I deeply appreciate that the ICMPNPR-2014 committee has recommended "Lifetime Achievement and Appreciation Awards" to the eminent personalities from Academic and Research Institutes who contributed for the Research & Development of Medicinal and Aromatic Plants"

I assure you that your stay with us will be comfortable and memorable.

R. Krishnamurthy

**(Prof.Dr.R.Krishnamurthy)**
Conference Chairman,ICMPNPR 2014
Director,C G Bhakta Institute of Biotechnology
Dean, Faculty of Science
UkaTarsadia University, Maliba campus,
Bardoli (Dist. Surat), Gujarat-394350 (India)
E-mail: krishnamurthy@utu.ac.in

# BIODIVERSITY, CONSERVATION AND REMOTE SENSING

# Invited Talk

(Summary)

**Name:** Dr. Veena Sharma (*M.Sc., Ph.D., FASAW, FIAES*)

**Designation:** Professor

**Address:** Department of Bioscience & Biotechnology
Banasthali University
Rajasthan- 304022, India

**Qualification:** M.Sc. Zoology, Rajasthan University (1988)
Ph.D. Toxicology, Rajasthan University (1992)

**Experience:** Research 27 years
Teaching 24 years

**Publication:** Research articles: 200
Reviews articles: 15
Books/ chapters: 03/02

**Conference:** More than 10

**Research projects handled / ongoing:** 02

**Membership:** 02

**Awards and Honours:**

- Shiksha Ratan Puruskar, IIFS, New Delhi
- Indira Gandhi Excellence Award
- Mahatma Gandhi Samman & Rajiv Gandhi Excellence Award with Certificates by IIFS, New Delhi in 2013
- Glory of India Award, 2013 by IIFS New Delhi

# S-01

## Assessment of *Moringa oleifera* and its Isolated Saponin in Attenuation of 7, 12 Dimethylbenz[A]Anthracene Induced Hepatic Toxicity in Mice

Veena Sharma

Department of Bioscience and Biotechnology, Banasthali University, Banasthali – 304022
**Email:** drvshs@gmail.com

The current investigation was carried out to elucidate antitoxic potential of hydroethanolic extract of *Moringa oleifera* (MOHE) and its isolated saponins (SM) in attenuation of 7, 12-dimethylbenz[a]anthracene (DMBA) induced hepatic toxicity in male mice. Single oral administration of DMBA (15 mg/kg body weight) to mice resulted in elevated levels of xenobiotic enzymes, hepatic malondialdehyde, with reduction in hepatic glutathione content, superoxide dismutase, catalase and phase-II metabolizing enzymes such as glutathione-S-transferase. The status of hepatic biochemical markers and total protein content were also found to be decreased along with increases in total cholesterol in DMBA administered mice. Pretreatment with *Moringa oleifera* and its isolated saponins orally for 21 days offered almost complete protection against DMBA induced hepatic toxicity. The current investigation supports *M. oleifera* and its isolated saponin as a potent chemo-preventive agent and suppresses DMBA-induced hepatic toxicity in mice that might be due to free radical generation.

**Name:** Dr**.** G. Sandhya Kiran

**Designation:** Head and Professor

**Address:** 29, Shri Raj Krupa Ganesh Society,
R.V. Desai Road, Vadodara

**Qualification:** M.Sc. Botany, M.S.University, Baroda
Ph.D. Botany, M.S.University, Baroda

**Experience:** Research years 24
Teaching years 26

**Publication:** Research articles: 52
Reviews articles: 01
Books/ Chapters: 01 /03

**Conference:** Organized:

- National:13

Attended:

- National: 47
- International: 3

**Research projects handled:** 14

**Ongoing projects:** 3

**Membership:** Chairperson Indian Society of Geomatics Vadodara Chapter
Convenor, Indian Women Scientist Association Vadodara Chapter

**Awards and Honours:**

- Hardikar Gold Medal for Standing First in M.Sc.
- UGC teachers research award from UGC
- Boys cast fellowship for postdoctoral training in USA from DST
- ICQMS excellence award.

## S-02

### Geospatial Approach in Natural Resource Management

G. Sandhya Kiran

Department of Botany, Faculty of Science, The M. S. University of Baroda, Vadodara – 390002, Gujarat, India
**Email:** sandhyakiran60@yahoo.com

The natural resources of a country are the most sacred endowment. Management of land resource is of vital importance. In the recent past, with escalating population and the national goals of seeking self-sufficiency in food production, land resource base is slowly decreasing. Certain natural systems once destroyed, can never be restored. The overexploitation of natural resources leads to various environmental consequences such as the climate change, global warming, deforestation, sustainable development, pollution of natural resources, etc. These resources can be managed sustainably by using geospatial approach, which is available and affordable very easily to the users. Geospatial technology includes three different approaches that are all related to mapping features on the surface of Earth: Global Positioning Systems (GPS), Geographical Information Systems (GIS), and Remote Sensing (RS). The applications of these approaches have been discussed in the present talk.

**Name:** Dr. Puthiyaparambil Chacko Josekutty

**Designation:** Manager, Tissue Culture Laboratory

**Address:** Clonal Solutions Australia Pty Ltd,
5970 Kennedy Highway,Walkamin,
QLD 4872, Australia

**Qualification:** M.Sc. (Botany), University of Calicut, Kerala, India
M.Sc.(Cellular & Molecular Biology), University of Canterbury, New Zealand
Ph.D. (Botany), M S University of Baroda, Gujarat, India

**Experience:** Research 28 years
Industrial 18years
Teaching 18years

**Publication:** Research articles: 52
Reviews articles: 03
Books/ Chapters: 06

**Conference:** Organized:

- National : 06
- International : 02

Attended:

- National : 16
- International: 25

**Research projects handled / ongoing:** 48/ 18

**Memberships:**

- International Society of Horticulture Science (ISHS)
- International Association of Plant Biotechnology (IAPB), Plant Tissue Culture – Australia (IAPTC)
- Society for In Vitro Biology – USA (SIVB)

**Awards and Honours:**

- Editor, Global Science Books, UK: Domain: Floriculture and Ornamental Plant Biotechnology- Since 2007
- Award for best paper presentation, Post Graduate Conference, University of Canterbury, New Zealand (2005)
- International Travel Award from National science Foundation (NSF), USA (2010), International Kava Executive Council (IKEC), Germany (2004), International Network for Improvement of Banana and Plantain (INIBAP), France (2004 and 2002)

# S-03

## Tissue Culture: A Key Technology for Herbal Medicine Industry

Puthiyaparambil Chacko Josekutty

Tissue Culture Laboratory, Clonal Solutions Australia Pty Ltd, Walakamin, QLD 4880, Australia
**Email:** p.josekutty@clonal-solutions.com.au

Tissue culture is a key technology for the herbal medicine industry because of the numerous applications of various methods of tissue culture such as micropropagation, direct and indirect regeneration through callus or somatic embryogenesis and protoplast culture. Different methods of tissue culture propagation assist rapid cloning of desirable medicinal plant germplasm and also their *inter-situ* conservation. Callus, Cell and protoplast cultures are important for selection of improved medicinal plant genotypes. Tissue culture system can also be used for *in vitro* production of valuable medicinal compounds thus saving the wild population from unwarranted exploitation and possible extinction. Genetic engineering of medicinal plants for various applications including biopharming requires a robust tissue culture system.

# Oral Presentation

**OA-017**

## Role of Pollination in Sustainable Utilization of Medicinal Plants

Kamini Gautam and Ravinder Raina*

Department of Forest Products
Dr. Y. S. Parmar University of Horticulture & Forestry, Solan, Himachal Pradesh-173230, India
**Email**: raviraina4@yahoo.co.in

Pollination is a key process occurring in plant kingdom involving transfer of alleles between different individuals. It is vital for completing the life cycle of plants and ensuring production of fruit/ seed in agricultural crops or natural vegetation/flora including medicinal & aromatic crops. Medicinal plants are used as therapeutic agents due to their action on physiology and metabolism of humans/animals when taken by them. Escalating demand for medicinal plants and their indiscriminate exploitation has led to huge loss of their population and has also put some of them on the verge of extinction. Meeting global demand of medicinal herbs on sustainable basis requires their cultivation and enhancing production for which knowledge of pollination behavior of a species is must. Especially in cases where medicinal plants have to be grown with other crops, pollination studies play crucial role in choosing crop combinations as one crop must complement pollination system of the other crop. Further pollination is the key to creation of genetic variation, which is important to conserve and sustainably utilize any species without posing any survival threat. Type of the pollination whether self, cross, open and geitonogamy impacts the yield, vigour and seed production in medicinal plants. Role of controlled selfing to enhance seed yield in *Gloriosa superba* is well established. Self incompatible medicinal plants like *Stevia rebaudiana*, *Aconitum heterophyllum*, *Saussurea costus* etc. require cross pollination to set viable seed and dichogamous species like *Aconitum heterophyllum*, *Gentiana kurroo*, *Podophyllum hexandrum*, *Nardostachys grandiflora*, *Valeriana jatamansi*, *Picrorrhiza kurroa* depends on pollinators for their seed set. The specific pollination requirements of some of the above medicinal plant species shall be discussed in the presentation.

**OA-049**

## Conservation Strategies for RET Medicinal Plants

P. E. Rajasekharan

Division of Plant Genetic Resources, Indian Institute of Horticultural Research,
Hessaraghatta Lake P.O, Bangalore -560 089, India
**Email:** pers@iihr.kar.nic.in

Rich biodiversity of India is under severe threat owing to habitat destruction, degradation, fragmentation and over-exploitation of resources. According to the Red List of Threatened 44 plant species are critically endangered, 113 endangered and 87 vulnerable (IUCN, 2000). Widespread losses of plant species and varieties are eroding the foundation of agricultural productivity and threatening other plant based products used by billions of people worldwide, reports a new study by the World Watch institute, Washington. And worldwide some 3.5 billion people in developing countries rely on plant- based medicine for primary health care. Loss of habitat, pressure from non-active species, and over harvesting have put one out of every eight plant species at risk of extinction, according to the world conservation union. Many medicinal plants are also in trouble from over harvesting and destruction of habitat. Since less than 1 percent of all species have been screened for bioactive compounds, every loss of a unique habitat and it species is potentially a loss of future drugs and medicines. No single conservation technique can adequately conserve the full range of genetic diversity of a target species or genepool. From targeted exploration and collection missions accessions of these species were collected. Species was mapped using the primary data which was obtained from the various exploration and collection missions conducted in south India. The collected species were established in FGB and evaluated for morphological characters using the species specific descriptors in *Alpinia galangal* (18 accessions) *Alpinia calcarata* (8 accessions) *Kaempferia galanga* (26 accessions).Protocols were developed for tissue culture propagation in *Acorus calamus, Alpinia galanga* and *Kaempferia galanga.* Following this *in vitro* conservation protocols will be developed inducing slow growth using various procedures like reduction in media compositions, light and temperature.. Each method has its own advantages and disadvantages and complementary strategies are required for effective sustainable conservation of a maximum range of genetic diversity in these species.

**OA-065**

# Utility of Spatial Data and GIS Techniques for Conservation of Biodiversity of Pavagadh Forest Area

Alpana V Revdandekar and G.Sandhya Kiran*

Ecophysiology & RS-GIS Lab, Department of Botany, Faculty of Science,
The Maharaja Sayajirao University of Baroda, Vadodara -390002, India
**Email**: rs_gis09@rediffmail.com

Conservation of biodiversity is very closely related to other global issues like climate change, global warming, land use and land cover change, and sustainable development and increasing human interventions in natural ecosystems have further accelerated this issue. The conventional species level approach for biodiversity management has major limitations which have resulted in a policy shift from conservation of single species to their habitats. At this point utility of RS-GIS approach proves its potentials for identifying these habitats and prioritizing them for carrying out conservation. IRS-P6 LISS-IV data have proved to be beneficial in present study in identification of such locations in Pavagadh forest. The phytosociological analysis of these sites showed a declining trend in species richness of medicinally and economically important species with increase in altitude. Based on this trend the areas requiring immediate implementation of conservation measure have been highlighted. These identified areas have been further confirmed by generating different themes using GIS.

**OA-066**

# Ethnobotanical Study on Medicinal Plants from Satpura Hills of North Maharahtra, India

H M Patil and V V Bhaskar[1]*

M J P V A C and V K K S College Dhadgaon, Dist: Nandurbar (M. S.), India
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An ethnobotanical study of Satpura hills of the North Maharashtra India reveals some of the important medicinal plants species used by the tribes and local practitioners for their health care practices. This presentation deals with the documentation with respect to botanical name, family, local name, ailment, and preparation of the medicine and its administration of few plant species. The information obtained so far is of immense importance for documenting traditional knowledge in the present scenario.

**OA-071**

## Herbal Heritage Conservation Education in India: A School's Perspective

Bibhuti Narayan Biswal

Principal, Sri Sathya Sai Vidyaniketan, Near Tata Ssl, N.H. No. - 8,
Ganeshvad Sisodra – 396463, Dist: Navsari, Gujarat, India
**Email**: Bibhuti.Nb@Gmail.Com

Since ancient ages people of our country used natural herbs for any kind of illness. Further Charak, Sushruta epitomised the usage of herbs in vedic period which culminated the branch of **Ayurveda, Unani** system of treatment which latter on overtaken by Homeopathy & allopathy. According to the Red List of threatened species 44 plant species are critically endangered, 113 endangered and 87 vulnerable (IUCN, 2000). Growing human greed, consumerism, lopsided exploitation of herbal resources by multinational companies and drug mafia's has evolved unwarranted pressure on our countries vast traditional herbal life. Most people in our society are still unconcerned and ignorant about the Herbal Heritage conservation concepts and every one take it as granted that all natural resources are for them & no bodies permission is need to exploit such valuable resources. This has resulted in depleting reserve of our herbal resources. The present paper unravels the plight of Herbal Heritage conservation education in our country & its present status. *Herbal Heritage* is the art or practice of using herbs and herbal remedies to maintain health and to prevent, alleviate, or cure disease thereby are passing it down through the years, from one generation to the next and *Herbal Heritage Conservation Education (HHCE)* is a way of nourishing a sense of continuity and connectedness with our herbal resources and practice of using herbs and building a strong culture of wide spread herbal use so as to ensure our herbal heritage reaches every lives forever , all corner of our country and the world as well. The objective of the study are *i) To unravel herbal heritage education & its research in our country, ii) To formulate strategy for the promotion of Herbal Heritage Conservation Education, iii)To recommend few workable ways for HHCE from School experience.* In the present paper, the author has suggested nine note worthy approach to promote HHCE in our country through schools namely *1. Organizing Co-curricular Activities for HHCE, 2.Setting up school medicinal Garden3.Restoring Cultural link to conservation efforts, 4. Linking Value education with conservation movements, 5.Integrating the sustainability concept to HHCE, 6. Bringing Class room science to fields, 7.HHCE awareness Campaign & Workshops, 8. Encouraging Publications,9. Using Media for HHCE promotion.* Schools and the teachers are the guardian of our future generations and they are going to be the architects of our society. There is a felt need to bring out awareness among the students, teachers, public in general on HHCE and to find out its interconnectedness how it affects our life, our economic prosperity and health and other welfare, whose time has come.

# Poster Presentation

**PA-017**

# A Report of new Psyllid Pest, *Diaphorina dakariensis* Boselli on Dodi *Leptadenia reticulata* (Retz)

Thania Sara Varghese* and Vipin Chaudhary

DMAPR, Boriavi, Anand, Gujarat, India
**Email:** thaniamanoj@gmail.com

Dodi, *Leptadenia reticulata* (Retz) Wight and Aruott (family: Asclepedaceae) popularly known as Jivanthi is a much branching twinning high value medicinal shrub grows in the sub Himalayan tracts of Punjab, Uttar Pradesh and throughout the Deccan Peninsula up to an altitude of 900 m. It is especially known for its stimulant and restorative properties in Ayurveda and also an important constituent of many well reputed Ayurvedic formulations like Chywanprash, Speman etc. During our routine survey for incidence of pests on Medicinal and Aromatic plants at DMAPR, severe infestation of psyllid bug was observed on dodi shrub. Adult psyllids were 3 to 4 mm in length with transparent and perfectly demarcated black veined wings held roof- like over the body. Adult psyllids were commonly found aggregated on new flushes where they feed and mate. The adult laid yellow colour transparent eggs on the unfolded leaves, leaf margins and leaf buds. Nymphs were yellow with red eyes and visible wing pads in later instars and they secrete waxy filaments. The feeding of the psyllid adults and nymphs causes curling of leaves and the nymphs were seen inside the leaves. In severe cases of infestation, the terminal growing parts get crinkled, fail to develop and get aborted. In later stages the whole plant gets dried up. The infestation was noticed throughout the year. The psyllid was identified as *Diaphorina dakariensis* Boselli (Courtsey: Dr, V.V Ramamurthy, Insect Identification Division, Division of Entomology, IARI, New Delhi).

**PA-054**

## Biodiversity Assessment of Baroda District using Optical Remote Sensing

Jayrajsinh D Jadeja and Sandhya Kiran*

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The Maharaja Sayajirao University of Broda, Vadodara-390002, Gujarat, India
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The need of ecosystem and global approaches to bio-diversity conservation is becoming essential with increase in threat to these resources. Under such circumstances the use of remote sensing tolls to characterize landscapes in biologically meaningful way becomes imperative. This tool proves to be best for looking at the large area of the earth. Remotely sensed estimates of regional variation in bio-diversity can be useful in analyzing diversity patterns. This study has evaluated an accuracy of low resolution vegetation mapping along with the need of high resolution for bio-diversity assessment of the Vadodara situated at province of Gujarat, India. MODIS, LANDSAT 5 TM, Liss IV datasets were used for the characterization of the vegetation Normalized difference vegetation index (NDVI) has been calculated for each datasets. The main aim is to Main aim is to understand how effectively MODIS, LANDSAT-5 TM and LISS IV datasets can be used for vegetation characterization over the large areas based on the NDVI values derived from the different datasets and identify changes taking place at the in different areas of the district. It has been observed that increase in spatial and spectral resolution better characterization of vegetation can take place based on NDVI values. These pairs of contemporary images were used as benchmarks for our test. Temporal analysis of carried out exhibited variations in this areas based on the resolution of the data.

**PA-060**

## A Preliminary Survey of Dang Forest for Recent Assessment of Medicinal Orchids

Rajashekhar S. Ingalhalli and R. Krishnamurthy*

C.G. Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli, Dist: Surat-394350, India
**Email:** krishnamurthy@utu.ac.in

Orchids are one such group of plants which grow in a variety of habitats throughout the globe, but they are very sensitive to habitat change. A number of species are rare known for their medicinal and therapeutic value and threatened throughout the world. Some of the factors responsible for their dwindling numbers are habitat degradation and fragmentation anthropogenic influences such as land development activities, building of dams, constructions of roads, commercial exploitation of the species, overgrazing and frequent forest fires. Some orchid species require unique habitat and microhabitats so they are confined to particular elevations and forest types. Some are naturally rare; others are so because of geographic distribution, narrow habitat requirements, and low-density populations. Several species that have been reported earlier from the region have not been recollected, thus indicating their possible disappearance due to habitat changes. As most of the orchids are insect pollinated, the depletion in the population of insect pollinators may also lead to the depletion in the population of particular orchid species. Dang is a tribal district located in Southern Gujarat shares its border with the State of Maharashtra and is covered with high hills and dense forests. Only sixteen species among seven genera have been reported and no further surveys were conducted. A preliminary survey along the roads of Dang forest was carried out and some earlier reported species in addition to some new ones were located.


# GENOMICS, PROTEOMICS & BIOINFORMATICS

# Invited Talk

(Summary)

**Name:** Dr. N. Jeyakumar

**Designation:** Professor

**Address:** Dept. of Bioinformatics, School of Life Sciences,
BharathiarUniversity Coimbatore.

**Qualification:** M.Sc. Physics from Bharathidasan University, Trichy
PhD Bioinformatics University of Ulster, UK

**Experience:** Research 20years
Teaching 20years

**Publication:** Research articles: 45
Reviews articles: 3
Books/ Chapters: 5

**Conference:** Organized:

- National: 3

Attended:

- National: 50
- International: 10

**Research projects handled / ongoing:** 4

**Awards and Honours:**

- Overseas Research Award (ORS), UK for doing PhD, University of Ulster, UK
- Visiting Post-doctoral fellowship, North-western University, Chicago, USA

# S-04

## Evaluation of Antimicrobial Activity of Selected Medicinal Plants on *Salmonella Typhimurium* Quorum Sensing Transcriptional Regulator *SdiA*

T. S. Gnanendra and N. Jeyakumar*

Data Mining and Text Mining Laboratory, Department of Bioinformatics,
Bharathiar University, Coimbatore-641046, India
Email: n.jeyakumar@yahoo.co.in

The gram negative bacilli, *Salmonella typhimurium* is the most prevalent food borne pathogen causing gastroenteritis in human which is the most persistent health problem in developing countries. It occurs through drinking polluted water or eating food contaminated with animal waste. In this current work, *Salmonella* strains were isolated from the poultry waste and identified as *S. typhimurium* using standard characterization methods. Out of 95 isolated strains, 25 multi drug resistant strains were screened by assessing their antibiogram pattern. Plasmid DNA was isolated by alkaline lysis method and *SdiA* gene was amplified using PCR. *S. typhimurium* employ a cell–cell signalling system referred as quorum sensing (QS) to control the expression of several virulent genes located on plasmid. As *S. typhimurium* continues to develop resistance to the antibiotics, the quorum sensing enhanced transcriptional regulator SdiA from *S. typhimurium* was chosen as a potential drug target as it regulates the genes involved in colonization and virulence factors. In this view and the current growing interests in using natural antimicrobial compounds, antibacterial activity of 12 medicinal plants were screened and the principle compounds of 7 medicinal plants were retrieved from Dr. Duke's Ethno-botanical database and docked with SdiA and evaluated its binding pattern. The results suggested that the principal compounds of 7 medicinal plants might strongly interact with SdiA as antagonist to inhibit the quorum sensing enhanced mechanism in *S. typhimurium.*

**Name:** Dr. R. Nagaraja Reddy

**Designation:** Scientist (Plant Breeding)

**Address:** Directorate of Medicinal and Aromatic Plants Research, Anand, Gujarat, India

**Qualification:** M.Sc. Agricultural Sciences (UAS), Dharawad, Karnataka, India
Ph.D. Osamania University, Hyderabad, Telangana, India

**Experience:** Research 11 years

**Publication:** Research articles: 15
Books/ Chapters: 03

**Conference:** Attended:

- National: 10
- International: 01

**Research projects handled / ongoing:** 05

**Membership:**

- Life member- Medicinal and Aromatic Plants Association of India (MAPAI), Anand, India
- Life member- Indian Society of Genetic and Plant Breeding (ISGPB), New Delhi, India
- Life member-Indian Society of Plant Breeder's (ISPB), Coimbatore, India
- Life member-National Academy of Biological Sciences (NABS), Chennai, India

**Awards and Honours:**

- Jawaharlal Nehru Award for Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences (2011) (National Award) of Indian council of Agricultural Research, New Delhi
- Prof. G. Rangaswami Memorial National Academy of Biological Sciences (NABS)-Best Research Paper Award-2014

## S-05

### Whole Transcriptome Analysis of Medicinal Plants to Identify Potential Genes Involved in the Biosynthesis of Active Principal Compounds

R. Nagaraja Reddy*, Rucha Mehta, Palak Soni and P. Manivel

Directorate of Medicinal and Aromatic Plants Research, Boriavi-387310, Anand, Gujarat, India
**Email:** gpbreddy@gmail.com

Plant based medicines have gained popularity worldwide due to their almost negligible side effects. Various systems of medicine in India, Ayurveda, Unani, Siddha and Homoeopathy, earlier considered as alternate medicines and now considered as the primary medicines, rely mainly on plants for the raw material. Although natural products or active principal compounds derived from plants continue to be a prime source for drug development, they are often limited due to low production levels in plant species. Enhancing the production of natural products in the plant is a well-established target for genetic manipulation; however it presents some severe challenges as well. The current understanding of the production of these natural products in plants at the enzyme, gene and regulatory levels is limited. Initial work basically related to establishing the biosynthetic routes as pinpointed by radio-labeled precursor were highly tedious and time consuming. Recently, genome-wide studies of model plant species have resulted in an increased knowledge of basic biological processes. More specifically, transcriptome analysis has great promise in identification of various genes involved in biosynthesis of medicinal compounds in plants. Identification of genes will aid to understand the fundamental biochemical processes that underlie their biosynthesis. Application of different next generation sequencing (NGS) platforms shows potential use in various genomic applications of medicinal plants. Transcriptome sequence information is being used to identify putative genes and networks involved in secondary metabolite production by medicinal plants. Putative biosynthetic pathways for several active principles in *Artemisia annua, Withania somnifera, Cannabis sativa, Raphanus sativus, Camptotheca acuminate, Panax ginseng, Bupleurum chinense, Valeriana officinalis, Euphorbia fischeriana, Glycyrrhiza uralensis, Lonicera japonica, Picrorhiza kurrooa, Salvia miltiorrhiza, Taxus spp., Hypericum perforatum, Chlorophytum borivilianum, Azadirachta indica, Digitalis purpurea* and others species have been elucidated using transcriptome analysis so far and many more are under process.

# Oral Presentation

**OA-014**

## Molecular Diversity in Advance Breeding Material of Velvet Bean

K. Hima* and Nakrani Kunal Ghanshyambhai[1]

Section of Medicinal Crops, Indian Institute of Horticultural Research, Bangalore-89, India
[1]Department of Biotechnology, Sikar Rajasthan Technical University, Kota, India
**Email**: bindu@iihr.ernet.in

Velvet bean (*Mucuna pruriens*) also known as Kewanch or the Cowhage is a medicinal legume belonging to family Fabaceae (Leguminosae). Its seeds contain non protein amino acid, L –DOPA (L-3, 4-dihydroxy-phenylalanine) that acts as a precursor to the neurotransmitter dopamine, used in the treatment of Parkinson's disease. Though India is one of the natural centers for origin, very few studies are reported on the genetic diversity and genetic improvement of this crop. The information on the diversity of the germplasm and advance breeding lines is very important in genetic improvement studies of this important underutilized medicinal legume. Genetic diversity in 12 advance breeding material with high L-Dopa content (6.0% and above) and 6 elite selections and two wild types (with itchy trichomes) of *Mucuna pruriens* was studied using Inter Simple Sequence Repeats (ISSR) markers. ISSR analysis using eight primers produced a total of 61 bands. All the 8 primers exhibited good amplification with clear, sharp, reproducible bands which were scored as present (1) or absent (0) for all the samples. The number of polymorphic bands was 43 and the percentage of polymorphism was 70.49%. The largest percentage of polymorphic loci was 100% for primer UBC853. The number of bands per primer ranged from 5 to 11 with a mean of 7.625. The number of polymorphic primers ranged from 3 to 8 with an average 5.375 polymorphic bands. Based on an un-weighted pair-group method using arithmetic average (UPGMA) clustering algorithm, dendrogram generated classified 20 genotypes into 2 clusters at 0.62 similarity coefficient and breeding line IIHR PS 13-3 is a single entry in cluster I. Cluster II showed three subclusters at 0.70 similarity coefficient. The subcluster IIa has a single entry IIHR PS 12-2, II b has 6 entries and 12 genotypes were grouped in the cluster II c. The results showed that ISSR markers can be successfully employed in this crop for assessing genetic diversity. The material exhibited 62% of similarity reveling that the breeding pool holds substantial genetic variability. L-dopa content or presence of itchy trichomes had no bearing in the clustering pattern. The current study is the first report on the use of ISSR markers in *Mucuna pruriens.*

**OA-019**

# Evaluation of Genetic Variation among Populations of *Acorus calamus* (L.) in Indian Germplasm Based on RAPD Markers

Avani Kasture, Rajkumar[1] and R. Krishnamurthy[*]

C. G. Bhakta Institute of Biotechnology, Uka Tarsadia University, Maliba Campus, Bardoli-Mahuva Road, Tarsadi, Dist: Surat-394350, Gujarat, India
[1]Main Cotton Research Station, Navsari Agricultural University, Dist: Surat - 395007, Gujarat, India
**Email**: Krishnamurthy@utu.ac.in

The present study was carried out to evaluate the genetic variations among 20 different populations of *Acorus calamus* (L.) plant collected from the different natural terrain by RAPD analysis. Total genomic DNAs from individual accessions were isolated from fresh leaf tissue using DNeasy Plant Mini Kit (QIAGEN, USA), according to the manufacturer's instructions and then amplified by eppendorfs Mastercycler gradient thermal cycler. Amplified DNA products were quantified by Nanodrop (Genaxy, India) and then subjected to Randomly Amplified Polymorphic DNA (RAPD) analysis. RAPD was used to analyze the genetic variation and relationship among 20 populations of *Acorus calamus* collected from different part of India, representing four biogeography zones *viz*., Western Himalaya, Central India, North East India and Eastern Ghats. Twenty five selected RAPD primers produced consistent 235 amplicons ranging in size from 200 bp to 3000 bp; out of which 75 (33.70%) were polymorphic. Similarity indices were calculated using the Dice coefficient of similarity and clustering analysis was performed with the unweighted pair-group method using arithmetic averages (UPGMA) in the SAHN (sequential, agglomerative, hierarchical and nested clustering method) module of NTSYS-PC. The similarity coefficient ranged from 0.91 to 0.98, suggesting that the pronounced low genetic variations exist among populations of *A. calamus* in Indian germplasm. The cluster analysis indicates the presence of two major groups among the 20 populations of *A. calamus* regardless of geographical locations. The RAPD analysis indicates the existence of genetic variations in natural populations all the accessions collected from Indian germplasm and they have an extremely low measure of estimated heterozygosity, genetic diversity and polymorphic loci. Genetic variation within a population is homogenous. The pattern of low genetic diversity within the population of *A. calamus* in Indian germplasm specifies that they are monoclonal.

**OA-037**

## Genetic Improvement of Velvet Bean-an Important Tropical Medicinal Legume

K. Hima Bindu*, Eugene Sebastian, J. Nidiry and T. Vasantha Kumar

Indian Institute of Horticultural Research, Bangalore, India
**Email**: bindu@iihr.ernet.in

Velvet Bean *(Mucuna pruriens* L.,) also known as Kewanch or the Cowhage, is a member of the family Fabaceae and is found worldwide in tropical areas. Velvet bean besides being a medicinal crop, widely used as a soil improving crop, as a rotation crop also as a cover crop. *Mucuna* is extensively used in traditional medicine in treating infertility, cholera, diabetes and worm infection. It is also an important medicinal crop as the seeds possess non protein amino acid L-DOPA a precursor to neurotransmitter dopamine which is used to treat Parkinson's disease. Considering its medicinal importance and growing demand, studies were undertaken at Indian Institute of Horticultural Research (IIHR), Bangalore, to identify and develop superior non irritant lines with high seed yield and L-DOPA content. The results of the studies are presented briefly.

**OA-048**

# Molecular Docking and *In vivo* Cardioprotective Evaluation of Solasodine from Fruits of *Solanum xanthocarpum* (Solanaceae) In Rats

Paras K. Patel, Bhavin A. Vyas*, Shrikant V. Joshi, Ravi Patel and Rutvi Vaidya

Maliba Pharmacy College, Uka Tarsadia University, Bardoli, Dist: Surat-394350, Gujarat, India
**Email**: bhavin.vyas@utu.ac.in

Doxorubicin, an effective antitumor antibiotic in variety of soft and solid human malignancies, is restricted due to its cardiotoxicity generated by free radicals in heart tissue. Solasodine, a steroidal glycoalkaloid from fruits of *Solanum xanthocarpum* possesses antioxidant, anti-accelerating activity in heart, cardiotonic and antiinflammatory activity. With light of above mentioned activity of solasodine present study was design to evaluate cardioprotective activity *ex vivo* and *in vivo* against doxorubicin induced cardiac toxicity. Solasodine structure was modified by Autodock Tool 1.5.6 and studied for induced fit docking against $Na^{+}K^{+}$ATPase, $Ca^{+2}$ATPase and $\beta_1$ receptor by Autodock Vina 1.1.2 to check binding affinity with said proteins. Cardiotoxicity in Wistar rats was induced by doxorubicin. Animals were divided in four different groups viz. normal control (no drug treatment), model control (DOX only), solasodine 30(DOX + 30mg of solasodine) and solasodine (DOX + 60 mg of solasodine). Changes in ECG patterns, heart rate and blood pressure were recorded and studied using Powerlab 4/30. Effects on CKMB release, histopathology of ventricles and cardiac tissue homogenate parameters- lipid peroxidation, catalase, superoxide dismutase, glutathione were evaluated. Molecular docking studies showed higher binding affinity and number of interaction of solasodine compared to respective reference ligands with proteins. Doxorubicin treated rats showed significantly increase in heart rates, CKMB release to serum, ST height elevation, QT, QTc, JT interval prolongation; which was normalized or restored in solasodine pretreated group dose dependently. Non significant decrease in systolic, diastolic and mean blood pressure was observed in both, doxorubicin treated and solasodine pretreated groups. Antioxidant activity of solasodine was reported as reduced lipid peroxidation, increased superoxide dismutase and glutathione levels as compared to doxorubicin treated, projected dose dependent cardioprotective effect of solasodine. Catalase level had no significant difference. Solasodine also prevent the change in cellular architectureagainst doxorubicin induced damage shown in histopathological study of myocardium. As per results, solasodine may be used prophylactically as cardioprotective before doxorubicin therapy.

**OA-056**

# Data Mining and Development of EST-SSR Markers for Isabgol (*Plantago ovate* forsk.) using Next Generation Sequencing (NGS) Data

Palak Soni, R. Nagaraja Reddy and P. Manivel*

Directorate of Medicinal and Aromatic Plants Research, Boriavi -387 310, Anand, Gujarat, India
**Email**: manivelp@gmail.com

Isabgol is an important medicinal plant commercially cultivated in India and supplied to national and international market. Husk obtained from seeds are used as natural fibre and also used for treatment of constipation and gastrointestinal irritations. Lack of genetic markers constrains the Isabgol breeding. Simple sequence repeats (SSRs), also known as microsatellites are highly useful as genetic markers. The high quality transcriptome data of *Plantago ovata* was downloaded from NCBI public domain, assembled and used for bioinformatics analysis to develop SSR markers. A total of 23,586 transcript contigs having more than 200 bp size were obtained after the assembly. The mean transcript length was 835 bp and N50 value was 1075 bases. Analysis using MISA software, identified 16,393 simple sequence repeats (SSRs) having more than 12 bp motif length. The frequency of SSR motifs revealed that, hexamers were more frequent (71.7%) followed by trimers (17.1%), tetramers (6.9%), dimers (2.1%) and pentamers (2.1%). In general, AT-rich motifs were found to be more frequent in all types of repeat motifs. One thousand and forty five EST-SSR primer pairs were successfully designed. Of the 25 markers tested, 18 (72%) markers showed amplification. Three (Xdapoem06, Xdapoem21 and Xdapoem25) markers showed polymorphism. High Inter-specific transferability of these markers was also observed. The markers with high Inter-specific transferability will be highly useful for assessing the functional diversity, comparative mapping and other applications in crops with very limited markers.

# Poster Presentation

**PA-023**

## Plant Phenomics: Bridging the Gap between Plant Physiology and Genetics

Mahant Itee, Desai Divya, Marjadi Darshan*, Maniya Roshniand Pushpsheel Shukla[1]

Shree Ram Krishna Institute of Computer Education and Applied Sciences, MTB Campus, Athwalines, Surat-395001, Gujarat, India
[1] Central Salt and Marine Chemical Reasearch Institute, Bhavanagar, Gujarat, India
**Email:** darshworld @gmail.com

As area of biology concern with measurement of phenomes, the physical and biochemical traits of plants, phenomics allow to perform pharmaceutical research and it also used in functional genomics and in metabolic engineering. The use of molecular marker and mapping populations in combination with the array based identification of gene regulation mechanism has led to the accumulation of an unprecedented amount of genetic data. Basic requirements of an ideal phenomics effort are easy to state but difficult to achieve: genomic information on a large sample of genotypes, which are each exposed to a range of environments; extensive and intensive phenotyping across the full range of spatial and temporal scales modern phenotyping methods are used recently. A major goal of plant phenomics is to develop high throughput phenotyping methods for elucidating changes in the behavior of the root system with changing environmental conditions, Identifying genetic basis of complex traits etc. By identifying phenomics as a discipline in its own right, we can accelerate progress in the parts of plant phenomics and ultimately it provides the opportunity to bring together genetics and physiology to reveal the molecular genetic basis of a wide range of previously intractable plant processes.

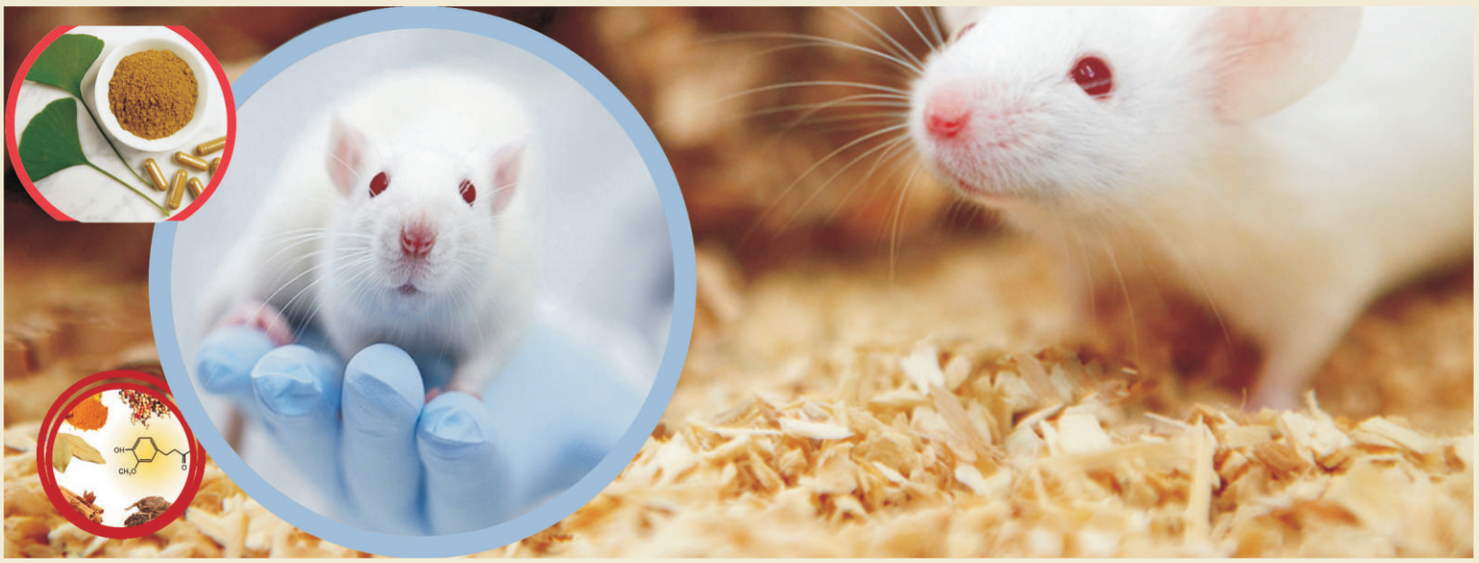
**PA-051**

## Molecular Docking Study of Isoflavanones from *Uraria picta*

Bhrugesh Joshi*and Kunal Naik

C. G. Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli, Gujarat, India
**Email**: bhrugesh.joshi@utu.ac.in

Several studies in last decade reveal that there is increasing incidence of infections of multidrug-resistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA), multi-drug-resistant *Mycobacterium tuberculosis* (MDR-TB) and vancomycin-resistant *Enterococci* (VRE). Flavonoids and related compounds have been shown to possess potent antimicrobial activities. Most of the flavonoids are considered as constitutive antimicrobial substances recently termed as "Phytoanticipins," especially those belonging to prenylated flavonoids and isoflavones. Objective of this *in-silico* study was to use the molecular docking tool to observe effect of isoflavanones from *Uraria picta* and other isoflavones from the different medicinal plants on bacterial type II topoisomerases and to make hypothetical substitution on isoflavone to design potent antimicrobial substance. Docking study reveal significant co-relationships between the presence of certain functional groups (prenyl group, phenolic hydroxyl) at particular position and binding affinity of isoflavone with the enzyme. Overall, the docking studies may help to develop newer lead molecules with potential antibacterial activity.



# NATURAL PRODUCT RESEARCH

# Invited Talk

(Summary)

**Name:** Dr. K.S. Laddha

**Designation:** Professor of Pharmacognosy

**Address:** Institute of Chemical Technology, Matunga (E), MUMBAI 400 019

**Qualification:** M. Pharm. University of Bombay
PhD (Tech.) University of Bombay

**Experience:** Research 15 years
Industrial 4 years
Teaching 25 years

**Publication:** Research articles: 75
Reviews articles: 12
Books/ Chapters: 07

**Conference:** Attended:

- National : 10
- International : 2

**Research projects handled / ongoing:** 18

**Membership:** Life Member of Indian Pharmaceutical Association/Indian Society of Pharmacognosy

**Awards and Honours:**

- Golden Jubilee Research Fund Endowment' of Rs. 15000/- has been awarded from University of Mumbai institute of Chemical Technology, Matunga, Mumbai –19, for the research project entitled "Standardization of Plant Drugs", 1993
- 'Senior Research Fellowship' from University Grants Commission, Ministry Of Education, New Delhi, Nov. 1989
- 'Golden Jubilee Research Fund Endowment' of Rs. 25000/- has been awarded from University of Mumbai institute of Chemical Technology, Matunga, Mumbai –19, for the research project entitled "Evaluation of Herbal Drugs", 1993
- 'Alumnus of the Year', Award in recognition of the achievements attained, from Principal K. M. Kundnani College of Pharmacy, Mumbai – 18, 2003
- 'Indian Drug Best Paper Award 2008' for research paper entitled "A HPTLCdensitometric determination of antioxidant constituents from chyawanprash" IndianDrugs, 45 (7), July 2008, pp. 536-541

# S-06

## Phyto-chemical Reference Substances – Extraction, Isolation and Applications in Herbal Analysis

K S Laddha

Pharmaceutical Science and Technology Division, Institute of Chemical Technology,
Matunga, Mumbai-400019, India
Email:

The development of medicines from plant material involves the utilization of traditional knowledge and modern scientific technology. Herbal medicinal products may vary in composition and properties, and therefore correct identification and quality assurance of the starting material is, essential prerequisite to ensure reproducible quality of which contributes to its safety and efficacy. Phytochemical Reference Substance (PRS) - is a compound reported to be present in the plant material, whose identity and purity has been confirmed. PRS may be one of the important compounds present in the herb, it may or may not be active compound but can be used to track the quality of the raw material as well as finished product. The talk will cover the aspects related to the extraction, isolation and applications of PRS in herbal analysis with case studies.

**Name:** Dr. Marcello Iriti

**Designation:** Professor

**Address:** Department of Agricultural and Environmental Sciences,
Milan State University, Italy

**Qualification:** M.Sc. Milan State University, Italy
PhD. Milan State University, Italy

**Experience:** Research 17 years
Teaching 11 years

**Publication:** Research articles: 85
Reviews articles: 9
Books/ Chapters: 11

**Conference:** Organized:

- National: 2
- International: 3

Attended:

- National: 35
- International: 11 (invited)

**Research projects handled / ongoing:** 5

**Membership:** Italian Society of Human Nutrition; Italian Society of Plant Pathology

**Awards and Honours:**

- Editor-in-Chief of European Journal of Medicinal Plants
- NATO Postdoctoral Fellowship at the Plant Physiology Department, Charles University of Prague, Czech Republic (2005)
- Awarded by the Italian Society of Plant Pathology for the best paper of the year (2003)

## S-07

### Melatonin in Medicinal and Food Plants: New Perspectives in Nutrition and Phyto-therapy

Marcello Iriti

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In vertebrates, the essential amino acid L-tryptophan is the precursor of melatonin (*N*-acetyl-5-methoxytryptamine), through the intermediate serotonin (5-hydroxytryptamine) and the activity of hydroxyindoleamine-*O*-methyltransferase (HIOMT). In mammals, melatonin is synthesized in the pineal gland, predominantly during the night time, though it can be also produced in other organs, such as retina, gastrointestinal tract, lymphocytes and bone marrow cells. Light at night has an inhibitory effect on pineal melatonin biosynthesis which is initiated by the uptake of tryptophan from the circulation into pinealocytes. Once synthesized, melatonin is not stored in the pineal cells, but it is released into the bloodstream with a circadian rhythm, from which it reaches other body fluids, including urine, saliva, cerebrospinal fluid, bile, semen and amniotic fluid. In mammals, melatonin acts in part via membrane and nuclear receptors that control the sleep/wake cycle module reproductive functions and bone metabolism. Melatonin also exerts a series of receptor - independent functions due to antioxidant activity and can directly scavenge free radical species. Melatonin has only been detected in other nonvertebrate organisms (bacteria, fungi and insects). It is also detected in higher plants, including food plants and medicinal herbs, in which the physiological and pathophysiological function of melatonin is still unclear. Melatonin concentration in plants varies usually from pg $g^{-1}$ to μg $g^{-1}$ of tissue. In general, seeds and other reproductive organs present the highest levels of melatonin. Therefore, the possibility of modulating serum melatonin levels in mammals through the ingestion of plant foods represents a novel and fascinating field of research, since dietary melatonin is absorbed from the gastrointestinal tract and transported into the blood stream.

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- Equipment grant, région Ile-de-France and University Paris-Sud (2012): equipment of 400 k€.

# S-08

## Do Natural Products Fit the « Silver Bullet » Pharmaceutical Paradigm? Examples of Ancient Synergies Evidenced by Modern Techniques

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The pharmaceutical industry favours single drugs candidates for many good reasons, and it turned away from natural products several decades ago due to the complex composition of plant extracts. However, multidrug protocols are currently commonly used against many severe diseases like cancer, AIDS, neurodegenerative disorders. Therefore, it is interesting to evaluate whether the concept of synergy in plants may have any relevance for modern pharmacology. The art of Pharmacognosy precisely relies in unravelling active compounds hidden in the biodiversity, sometimes through deciphering traditional uses, in order to substantiate their therapeutic uses. This talk presents examples of the implementation of modern techniques to quickly detect bioactive compounds in natural extracts.

# Oral Presentation

**OA-002**

# Identification and Biological Activity of Antifungal Compound from Medicinal Plant *Acorus calamus* (L)

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The great public awareness of environmental and health issues has stimulate an increasing demand to reduced pesticide use and safe agricultural products. In search for environmental friendly control measure for plant diseases, identification and clarification of the antifungal mechanism of the bioactive compounds from traditional medicinal plant *Acorus calamus* (L) was studied. The antifungal activity and minimum inhibitory concentration of methanol extract of *A. calamus* (L) was evaluated against five fungal isolates of significant important in plant diseases by using agar overlay techniques. Isolation and screen of antifungal compounds was carried out by thin layer chromatography (TLC) and bioautographic. Antifungal compounds were elucidated and identified by using nuclear magnetic resonance spectroscopy (NMR).The mode of action of the plant extracts from *A. calamus* was study by Evans blue staining and generation of reactive oxygen species (ROS). The plant extract exhibited different degrees of antifungal activity against all fungal plant pathogens tested; *Fusariu moxysporum, Fusarium solani, Colletotrichum gloesporioides, Botrytis cinerea* and *Alternaria solani*. Methanol extract from leaf and rhizome of *A.calamus* was showed prominent spots on TLC after detection with p-anisaldehyde. In bioautographic clear inhibition zones at same distance of TLC spot was observed against *F.oxysporum* and *C. gloesporioides*. The major antifungal compounds purified were identified as β-asarone (94.3%) and α-asarone (3.4%). Fungal cells treated with different concentration of plant extract showed a rapid production of ROS. The extent of dead cells stained with Evans blue dye seemed to correlate with the level of ROS production. Inoculation experiments showed that extract of *A.calamus* (L) has potential to control plant diseases caused by five different plant pathogens tested.

**OA-006**

# Efficacy of Aqueous and Acetone Solvent Extracts of different Medicinal Plants against *Aedes albopictus*

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*Aedes albopictus* is a well known vector of Dengue in India. Due to increasing resistance of mosquitoes to current commercial insecticides along with numerous health, environmental and ecological hazards, guides to the necessity of an alternative eco-friendly control measures. Hence four medicinal plants namely *Argemone mexicana, Mimosa pudica, Chrysanthemum indicum, Polianthes tuberose* plant extracts were tested against this vector *A.albopictus* at third instar with aqueous as well as acetone solvent extracts. Among this acetone solvent extract of *C. indicum* flower extract has shown highest larvicidal activity 96.66% at 450ppm followed by leaf extract of *M. pudica* 80% larvicidal activity at 350ppm. The larvicidal activity in leaf extract of *M. pudica* may be due to bioactive compounds such as terpenoid, flavonoids, glycosides, alkaloids, quinines, phenols, tannins, saponins, coumarins and the phytochemicals such as mimosine, nor epinephrine, crocetin, dimethyl ether and sitosterol act as larvicide, insect growth regulators, repellents and ovipositor attractant. The flower extracts of *C. indicum* shows highest larval mortality due to the presence of purethrins which work effectively to kill and repell mosquitoes. Therefore the present study provide knowledge about the biopesticides from plant origin may be effective inexpensive and safe methods for mosquito vector control and these new findings may be helpful to be applied in Integrated Pest Management.

**OA-007**

## Novel Perspective for Quality Control of Herbal Products

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Preference of plant based drugs over the conventional medicines in the national and international market is growing and will further grow with the rising global population. According to an Exim bank study the world market of herbal products in 2010 was of nearly 67 billion $ and it is estimated to reach $ 5 trillion by the year 2050. Despite the availability of plenty of resources the Medicinal and Aromatic Plants sector is facing the challenges like; inadequate quality standards for finished products, claim support studies and scientific documentation. To overcome the present problems, regulatory authorities across the globe have taken initiatives. Marker based quality control is in effect now days for many products. But only marker based quality evaluation of herbal product cannot guarantee efficacy of product. In addition to estimation of markers in herbal products we can associate chromatographic fingerprint that contain all possible phytoconstituents present in product. Hence, swift scheme is very much needed for the standardization of the herbal drug. Proposed scheme includes standardization of herbal drugs on the basis of extraction of a group of active compounds commonly present in more than one herb such as Alkaloid content, Glycoside content, Bitter content, and Tannin content. Chromatographic fingerprinting of each above said classes along with quantitative estimation of some of them will strengthen quality control tool for herbal drugs. By developing such type of method we can make quality control of herbal products very precise. Such methods can also be used for investigation of shelf life and stability of herbal products as stated by WHO.

**OA-012**

## Anti-Osteoporotic Effects of *Tinospora cordifolia* (Menispermaceae) in Animal Models of Post Menopausal Osteoporosis

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Osteoporosis is a silently progressing, debilitating metabolic bone disease that is characterized by decreased bone mass coupled with defective mineralization of bone matrix culminating in increased fragility of bones and susceptibility to fractures. In the Indian systems of medicine, many plants have been referred to possess osteoprotective and hence anti-osteoporotic properties. *Tinospora cordifolia (Willd.) Miers* belonging to the family Menispermaceae, commonly known as Guduchi is one of the highly valued herbs in Indian systems of medicine and has been prescribed to treat bone fractures and other bone related diseases. Till date, there are no detailed scientific reports to substantiate this claim. In the current study, an attempt has been taken to understand the anti-osteoporotic effects of *T. cordifolia* in animal models of post menopausal osteoporosis. Post menopausal osteoporotic conditions were induced in Sprague-Dawley rats by bilateral ovariectomy. Several parameters like Bone mineral density (BMD), Bone mineral content (BMC), X-ray radiography analysis of the bone, biochemical markers of bone function and bone histopathology was analyzed in the different groups of animals. Semiquantitative reverse transcription PCR was performed to analyze the influence of *T. cordifolia* on the expression of osteocalcin and Tartarate Resistant acid phosphatase (TRAP) markers for osteoblastic and osteoclastic activity respectively. Results of the study indicated that ovariectomy induced severe bone loss in animals as evidenced by decreased BMD, BMC, decreased cortical thickess, abnormal histopathology and decreased expression of osteocalcin gene. Pretreatment with *T.cordifolia* for 21 days at a dosage of 50mg/kg body wt/day prior to ovariectomy followed by treatment for three months post ovariectomy showed considerable protection against ovariectomy-induced bone loss in animals. Results of the study reveal the anti-osteoporotic effects of *T.cordifolia* in experimental animals.

**OA-013**

## Pharmacognostic and Phytochemical Evaluation of Stem of *Achyranthes aspera* Linn

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*Achyranthes aspera* Linn., Fam. Amranthaceae (Apamarga) is extensively used herb in the Indian systems of medicine. Standardization of this plant is the key factor in regulating the therapeutic efficacy. The current work was undertaken to standardize the stem of *Achyranthes aspera* Linn. using simple pharmacognostic techniques, detailed microscopic evaluation and to develop a HPTLC fingerprint profile of leaf of *Achyranthes aspera* Linn. The present investigation deals with physico-chemical study use of light microscopy and SEM studies of the plant for the establishment of quality parameters. The study revealed important diagnostic features. Various physico-chemical parameters and quantitative microscopic parameters were also established. The present work can serve as a useful tool in the identification, authentication and standardization of the plant material.

**OA-016**

# Aphrodisiac Activity of Aqueous Extract of *Anthonotha macrophylla* Leaves in Normal Female Rats

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Aqueous extract of *Anthonotha macrophylla* leaves was evaluated for aphrodisiac activity in normal female rats. Thirty female Wistar rats (142.40 ± 1.16 g) were assigned into five groups (A-E) of six animals each. Rats in Group A received orally 1 ml of distilled water only while those in Groups B, C, D and E were administered 1 ml corresponding to 5.7 mg/kg body weight of Ginseng (a polyherbal formulation), 25, 50 and 100 mg/kg body weight of the extract respectively. Female sexual behaviour parameters monitored for 30 minutes after 1 hour of exposure to the extract and drugs on days 1, 3 and 7 included proceptive parameters [darting frequency (DF), hopping frequency (HF), darting latency (DL) and hopping latency (HL)], receptive parameters [lordosis frequency (LF) and lordosis latency (LL)] orientation parameters (anogenital grooming (AG), genital grooming (GG) and licking behaviour (LB). Serum luteinizing hormone (LH), follicle stimulating hormone (FSH), estradiol (E) and testosterone (T) were determined 24 hours after their last dose using standard methods. The results revealed that the extract contained alkaloids (13.00 mg/L), flavonoids (6.00 mg/L), phenolics (1.30 mg/L), saponins (4.01 mg/L), tannins (5.20 mg/L) and cardiac glycosides (0.40 mg/L). The 25 and 50 mg/kg body weight of the extract significantly ($P<0.05$) and progressively increased the DF, HF, LF, AG, GG and LB whereas the DL, HL and LL decreased significantly ($P<0.05$) in a manner comparable with the Ginseng. The extract at 25 and 50 mg/kg body weight increased ($P<0.05$) serum concentrations of FSH, LH and E like the ginseng treated rats whereas T decreased significantly ($P<0.05$). The sexual behavior parameters and the serum hormone contents were not significantly different from the distilled water treated animals. The 25 and 50 mg/kg body weight did not distort the histoarchitecture of the ovary like the ginseng treated animals whereas the 100 mg/kg body weight produced moderate degeneration of the ovary. The study concludes that aqueous extract of *Anthonotha macrophylla* leaves at 25 and 50 mg/kg body weight improved the proceptive, receptive and orientation components of sexual behaviour in female rats by elevating the oestrogen contents of the animals. The presence of alkaloids, saponins, phenolics and flavonoids or their combination acting centrally or peripherally might be responsible for the enhanced sexual behavior.

**OA-018**

# Antirepellant and Toxic Properties of Natural Products from *Epipremnum pinnatum* (Araceae) against *Odontotermes obesus*

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*Epipremnum pinnatum*(L.) Engl. (Araceae) commonly known as dragon tail plant is known to possess anticancerous, analgesic, antiinflammatory and lipid peroxidation properties. The present study was carried out to evaluate the antirepelleant and toxic properties of alkaloids isolated from the fresh leaves of *E. pinnatum* and purified by column chromatography. The results showed considerable inhibition of the activity of *Odontotermus obesus* with high mortality rate compared to control in 10 min at 40 times dilution of the purified alkaloid fractions obtained from silica column. Also the aqueous solution of aerial roots and leaf extract has shown high toxic activity against termites as well as pathogenic activity. The methanol extract showed high enzymatic antioxidant activity like catalase, peroxidase and superoxide dismutase while free radical scavenging activity was evaluated using DPPH and FRAP method .The findings of our study have demonstrated that *E. pinnatum* possess potent antitermite, antibacterial and antioxidant activity. Phytochemical constituents of leaf revealed the presence of high amount of alkaloids, flavonoids, polyphenols, tannins and saponins glycosides which may contribute to the antioxidative properties of the plant. All the above result supports the beneficial effects of this plant species and its application in pharmaceutical industry.

**OA-020**

## Isolation and Characterization of Phenolic Compounds from Root Extract of *Decalepis hamiltonii*

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*Decalepis hamiltonii*, a climbing shrub found in Southern India, is traditionally used by the people for its health benefits. The present investigation was aimed to isolate, characterize and to assess their antioxidant activities. Ellagic acid (EA) and 4 hydroxyisophthalic acid (4 HIA) were isolated by using DCM and methanol, by running down the raw extract in chromatography column on silicic acid which yielded 10 fractions. The fractions CC9 and CC10 contained both EA and 4 -HIA. These phenolic compounds were simultaneously determined with gradient method by HPLC. Further, these compounds were characterized by LC-ESI-MS, Semi preparative HPLC, FTIR and NMR spectroscopy. Both the compounds exhibited higher free radical activities compared to Ascorbic acid. This method proves to be the efficient for resolution and quantification of EA and 4 HIA.

**OA-021**

# Super Critical Fluid Extraction Optimization of Important Medicinal Plants *Andrographis paniculata* and *Cassia angustifolia*

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Development of new isolation and fractionation methods from various raw materials as well as optimization of extraction parameters is an important aspect of natural product research. As the biologically active compounds in plants are usually found in low concentration, a great deal of research has been done to develop more effective and selective extraction methods for recovery of these compounds from raw materials. Further, such methods should be technologically efficient, safe and environmental friendly, particularly when the products are intended for the food and pharmaceutical purposes. Conventional solvent extraction methods do not meet these requirements. Super critical fluid extraction (SFE) is a powerful alternative to conventional organic solvent extraction because of its combination of gas like mass transfer and liquid like solvating properties. Since various parameters potentially affect the extraction process, the optimization of the experimental conditions represents a critical step in the development of a SFE method. Pressure and temperature of the fluid, percentage of modifier and the extraction time are generally considered as the most important factors. Analytical scale SFE has been shown to be a rapid and quantitative method for extracting relatively polar components from a variety of sample matrices. For moderately polar compounds SFE can be applied at higher densities or with the addition of organic modifiers. SFE allows a continuous modification of solvent power and selectivity by changing the solvent density. SFE has been widely used in extraction and recovery of high value compounds since the extract is obtained at relatively low temperature without any trace of organic solvent. Diterpenoid compounds andrographolides are the main bioactive phytochemicals present in leaves and herbage of *A. paniculata*. Dianthraquinone glucosides are the main bioactive phytochemicals present in leaves and pods of *C. angustifolia*. The efficiency in terms of extraction yield and composition of the extract for both the conventional (cold percolation at room temperature and refluxing) and non conventional extraction techniques (ultrasound assisted solvent extraction, microwave assisted solvent extraction and super critical fluid extraction) were compared in the present study.

**OA-027**

## Pharamcognostic Studies on Stem of *Tinsopra malabarica* Miers.

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*Tinospora malabarica* Miers. a climber belongs to the family Menispermaceae which is used traditionally by Indians to treat diabetes, neurological disorders, jaundice and used in many Ayurvedic preparations as similar to *Tinospora cordifolia*. In this study we carried out organoleptic, macroscopic, microscopic, fluorescence analysis. This study also includes preliminary phytochemical analysis of successive hot and cold extracts. The powder microscopic study showed the presence of oval or reins form starch grains, pitted and spiral vessels and fibers. The preliminary phytochemical analysis showed steroids, glycosides, proteins, amino acids, carbohydrates, mucilage and oxalic acids in both the extracts and gum in only cold extract.

**OA-030**

# Preclinical Study on UTI Infected Experimental Rats Treated with *Sphaeranthus indicus* L.

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A model of ascending Urinary tract infection (UTI) in rat was developed to study the significance of antibacterial activity of *Sphaeranthus indicus* L. and also compared with standard antibiotic ofloxacin as positive control. This plant is used in folk medicine as remedy for Urinary Tract Infections. Belong to family Asteraceae, commonly known as Gorakhmundi. Outbreed female wistar rats were used throughout the study and *Escherichia coli* used as pathogen which was isolated from the urine of patient suffering from urinary tract infection and identified by conventional method. Methanolic extract (300 mg/ml) and aqueous extract (300 mg/ml) of *Sphaeranthus indicus* L. were administered orally for 15 days. After 15 days of treatment of the infected rats with herbal extract, bacterial count in the urine, levels of immunoglobulin G and M were estimated and histopathological changes of kidney, liver and urinary tract were observed. In the treated group with aqueous extract (300mg/ml) & methanolic extract (300 mg/ml) bacterial count has decreased considerably. There was clear dose response of all the extracts. The rats treated with aqueous and methanolic extracts 300mg/ml of *S.indicus* have shown significant increase in IgG and IgM levels. In histopathological observation the disease control group showed considerable damage in the histology of kidney and urinary bladder. The group of animal treated with aqueous extract of *Sphaeranthus indicus* L. for fifteen days no such pathological damage was observed. The group treated with methanolic extract was however shown some abnormalities in the tissue. This observation is an indication of very effective kidney and urinary bladder protection against bacterial infection by *Sphaeranthus indicus* L.

**OA-031**

## Comparative Study of *Heterophragma quadriloculare* and *Heterophragma adenophyllum*

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Traditional medicine has served as a source of alternative medicine, new pharmaceutical and healthcare products. The World Health Assembly has emphasized the need to ensure quality control of medicinal plants with appropriate techniques. Many traditional claims of *Heterophragma quadriloculare* and *Heterophragma adenophyllum* are similar but activity of importance is reported to be different in both species so it is required to establish quality control parameters for crude drug as per WHO guidelines which can be able to differentiate between both species. Were we have selected leaves as a morphological part for study. We have compared all WHO parameter, phytochemical profile and some of the biological activities using reported methods. Morphological characters are totally different from each other. Microscopic examination unrevealed the presence of actinocytic stomata and double layered palisade cells in *Heterophragma quadriloculare* while anomocytic stomata and single layered palisade cells in *Heterophragma adenopyllum*. There was also difference in quantitative microscopy, extractive value and ash value etc. Qualitative chemical test shown almost similar result but there was difference in TLC profiling and some estimated constituents. In AchE-inhibition study hydro-alcoholic extract of *Heterophragma quadriloculare* shows major activity while in *Heterophragma adenophyllum* total Methanolic extract shows major activity. There was presence of steroids, terpenoids, alkaloids and flavonoids in both the species of Heterophragma leaf. Although there is difference in morphology and in microscopy, similarity in their overall chemical content suggest that they may become biological substitute for each other; as pharmacological effect base on quality and quantity of active constituents present in plant.

**OA-032**

## Accumulation of three Important Bioactive Compounds in Different Plant Parts of *Withania somnifera* and Its Determination by LC/ESI-MS/MS – MRM Method

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A comprehensive experiment was conducted to study accumulation pattern of three important bioactive compounds namely withaferin-A, 12 deoxy withastramonolide and withanolides-A and its determination by LC/ESI-MS/MS method in root, stem, fruits and leaves of *Withania somnifera*. A rapid and sensitive liquid chromatography /electrospray ionization/ tandem mass spectrometry (LC/ESI-MS/MS) method was developed for the three important bioactive compounds having same molecular weight, the MRM method was established by two transitions for each molecule. The unique transition was used for identification and intense transition was used for quantification. The separation of the three analytes was achieved within five minute on a RP-18 column using a mixture of mobile phase consists of acetonitrile, water and acetic acid. The method was validated as per the ICH guide line. The method was validated in terms of linearity, accuracy and precision for three days. The developed method was found to be very useful for identification and quantification of withaferin-A, 12 deoxy withastramonolide and withanolide A in plants parts like root, stem, fruit and leaves of *Withania somnifera*. The quantitative accumulation of withaferin-A was recorded highest in leaves sample, followed by fruit, stem and root respectively. The 12 deoxy withastramonolide and withanolides-A content were recorded highest in root of the plant.

**OA-034**

# HPLC Estimation of Medicinally Important Xanthone Glycoside from Thirty Varieties of *Mangifera indica* L. (Anacardiaceae)

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*Mangifera indica* L. contains various classes of polyphenols, carotenoids and ascorbic acid, which demonstrate different health promoting properties, mainly from their antioxidant activities. Mango is rich source of biologically active compound, mangiferin that is a C-glycosyl xanthone compound. In the present study, mangiferin was isolated from leaves of thirty different varieties of mango cultivated in Gujarat. Mangiferin content ranged from 3.46 to 47.02 mg/g of leaf powder, where varieties Kaju (3.46 mg/g) Aambadi (4.79 mg/g), Khodi (7.15 mg/g), had comparatively lesser values. Amongst all the varieties Ladoo (47.02 mg/g), Jahangir (38.71 mg/g) and Jhamrukhiyo (35.27 mg/g) had highest amount of mangiferin content.

**OA-040**

## Cumulative Effects of Herbs on Antioxidant and Anti-Lipid Peroxidation

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In present herbal formulation, eight different herbs viz *Tinospora cordifolia*, *Adathoda vasaka*, *Stevia rebaudiana*, *Pterocarpus marsupium*, *Withania somnifera*, *Tridax procumbens*, *Boerhaavia diffusa* and *Syzygium cumini* were used. The mixture of herbal powders was extracted in distilled water and used for testing its antioxidant and lipid peroxidation potential with in-vitro models. The antioxidant potential was checked with DPPH assay, reducing power assay, hydroxyl radical scavenging assay and hydrogen peroxide scavenging assay methods. Antilipid peroxidation was tested with goat liver tissues. The results are encouraging and herbal formulation is showing good performance towards antioxidant and anti-lipid peroxidation. The enhanced activities of aforesaid formulation can be attributed to extraction of phytoconstituents from different herbs and presence multi antioxidants like polyphenols and flavonoids.

**OA-041**

# Efficiency of Various Extraction Techniques Employed in Obtaining Secondary Metabolites from the Bark of *Syzygium cumini* (L.) Skeels

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Extraction, bioactivity guided Isolation and Identification of the active molecules is the three essential steps in the quest for discovery of novel molecules with medicinal properties and also for the validation of ethnomedicinal practices. Extraction is an essential step in this process, as both the variety and quantity of the molecules identified in the later stages, depend on the mode of extraction. An efficient extraction procedure minimizes the amount of time and consumables and maximizes the variety and yield of the compounds. *Syzygium cumini* (L.) Skeels also known as Indian blackberry or Jambolan is well known for its medicinal properties. It is reported to have, anti-diabetic, anorexigenic, antibacterial, antifungal, antileishmanial, anti-dysentric, gastroprotective, anti-ulcerogenic, antioxidant, diuretic, and antifertility properties. In the present study, various extraction techniques are employed to obtain extracts from the bark of *Syzygium cumini* (L). Skeels. Total Polyphenolic content, total flavonoid content and total antioxidant content of the extracts are estimated using the 96-well microplate method. The results thus obtained are used as a measure to determine the efficiency of various extraction techniques.

**OA-042**

# Total Alkaloid Extract and Vasicine Hydrochloride Derived from *Adhatoda vasica* Nees in the Malabar Area of Western Ghats Exhibit Potent Bactericidal Activity

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Natural products in their purified form or as standardized extracts offer unlimited opportunities for discovering new drug leads against bacteria. Microdilution procedure was used to determine the half maximal Inhibitory Concentration ($IC_{50}$) and Minimum Inhibitory Concentration (MIC) for purified vasicine hydrochloride (active compound) and Total Alkaloid Extract (TAE) from *Adhatoda vasica. Adhatoda vasica* Nees (Malabar Nut) is a perennial shrub of the Indian subcontinent that is routinely used in codified and non codified systems of medicine. Accessions of *A. vasica* were collected from the Malabar area of Western Ghats. The leaf material was subjected to methonolic extraction and subsequently the residue was selectively extracted for alkaloids. Antibacterial studies were carried out with laboratory strains of *Klebsiella pneumonia* (ATCC 13883), *Staphylococcus aureus* (ATCC 700699), *Escherichia coli* (ATCC 10536) and *Proteus aureus* (MTTC 3310). Bacterial growth inhibition was obtained as a function of increasing concentrations of purified vasicine hydrochloride or TAE. Vasicine hydrochloride and TAE exhibited significant $IC_{50}$ and MIC values for *Klebsiella pneumonia* compared to rest of the bacteria screened. The antibacterial activity of vasicine and total alkaloid extract (TAE) described here would set the stage for development of next generation antimicrobials from this traditional medicinal plant.

**OA-043**

## Physical Properties of Isabgol Seed Relevant to Design of Isabgol Dehusker

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The experiment was conducted for determination of engineering properties of two varieties of isabgol seed i.e GI-2 and Niharika. The properties were determined like size, shape, bulk density, true density and porosity. The average length, width, thickness and geometrical mean diameter of the isabgol seed variety GI-2 and Niharika at 5.38 and 5.40 per cent moisture content (d.b.) were 2.62 and 2.51 mm, 1.37 and 1.33 mm, 0.77 and 0.71 mm and 1.40 and 1.33 mm, respectively. The sphericity of isabgol seed variety GI-2 and Niharika ranged from 35.39 to 64.38 and 46.02 to 61.83 per cent, respectively. The roundness of isabgol seed variety GI-2 and Niharika ranged from 38.54 to 79.75 and 40.47 to 96.42 per cent, respectively. The coefficient of variation of seed size was less than 15 per cent for all the size and shape parameters. The bulk density of seed variety GI-2 and Niharika at 11.81 and 10.37 per cent moisture content (d.b) were found 0.57 and 0.573 g/cc, respectively. The true density of seed variety GI-2 and Niharika was found 0.98 and 1.12 g/cc, respectively; the porosity of seed variety GI-2 and Niharika 41.68 and 48.70 per cent, respectively.

**OA-047**

# Assessment of Anticancer Activity: A Comparison of Dose Response Effect of Ethyl Acetate and Methanol Extracts of *Pergularia daemia (Forsk)*

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Oral cancer is the fifth most common malignancy worldwide and the disease is an important cause of death and morbidity. Many of newly discovered drugs were utilized for treating oral cancer and well proven. Although nutritionists and health experts are highly recommended the naturally occurring phytochemicals to treat various types of cancer. This is because of its more biodiversity and less toxicity. The well known anticancer drug paclitaxol is firstly discovered from higher plants in 1964. Likewise, more than 20,000 plants having variety of medicinal properties. *Pergularia daemia* is a well established Indian herb. It is distributed all over India and has been used many ways in medicine. Phytochemically the plant has been investigated for cardenolides, alkaloids, saponins, terpenoids and steroidal compounds. The plant is highly consider for its anti inflammatory, anti diabetic, anthelmintic, laxative, antipyretic properties and also this plant is used to treat infantile diarrhoea and malarial intermittent fevers. Very few of the pharmacological properties were evaluated by using this plant. The present study was mainly designed to determine the dose response effect of *Pergularia daemia* on experimental oral carcinogenesis. The anticancer effect was evaluated by assessing the body weight changes, tumor incidence, changes in oxidant and antioxidant levels in experimental animals. For this study ethyl acetate (PDEAE) and methanol (PDME) extracts from whole plant of *Pergularia daemia* were taken. Male golden Syrian hamsters were used as experimental models. Total numbers of 84 animals were split into 14 groups. To induce oral cancer 0.5% DMBA in liquid paraffin was painted on buccal pouch of hamsters, this was done three times a week for 14 weeks. The cancer induced hamsters were treated with three different doses (100,200,300 mg/kg.bwt) of PDEAE &PDME. The toxic doses of the both extracts were previously determined with toxicological assessment studies in our laboratory ($LD_{50}$ value is 2500 mg/kg.bwt). The results showed that among the three doses were used, high dose (300 mg/kg.bwt) exert well anticancer activity when compared to other two doses. Moreover our results suggest that methanolic extract exposed significantly higher anti cancer effect than ethyl acetate extract. Thus it could be concluded that *Pergularia daemia* can be used as easily accessible source of natural antioxidant and the active principle compounds from the plant extract can be used to treat various malignancies.

**OA-053**

# Pharmacognostic Evaluation and HPTLC Fingerprint Profile of *Plaso monosperma* Bark

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*Butea monosperma* (Family: Fabaceae) commonly known as palas. Bark is acrid, bitter, appetizer, aphrodisiac, laxative, anthelmintic, useful in fractures of the bones, diseases of the anus, dysentery, piles, hydrocele, cures ulcers and tumors. In view of its medicinal importance and taxonomic confusion, pharmacognostic studies, microscopical structure, morphological characters and chemical analysis were carried out to supplement the necessary information for the systematic identification and authentication of this plant, as per WHO guidelines. In addition, HPTLC is also performed to detect the presence of quercetin as the marker compound. The anatomical markers observed were idioblasts, parenchyma cells of various shapes and size filled with dark, amorphous tanninin substance, druse or sphaero crystal type calcium oxalate crystals, and tabular phellem cells. Preliminary phytochemical analysis showed tannins, flavonoids, steroids, terpenoids, alkaloids and phenolic compounds. Phytochemical analysis using HPTLC showed presence of quercetin.

**OA-054**

# Determination of Quality Standards for a Poly Herbal Ayurvedic Formulation - Draksharishta

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Standardisation of herbal formulation is essential in order to access the quality of the drugs and to maintain batch to batch consistency. The aim of the present study was to standardize a polyherbal Ayurvedic formulation- Draksharishta. It is mainly used for digestive impairment, respiratory disorders and weakness. Draksharishta was prepared as per Ayurvedic Pharmacopoeia of India. The herbs used for the preparation of the in-house formulation are based upon the marketed formulations. Draksharishta has been standardised vis a vis herbs used in the formulation. The parameters such as organoleptic and physicochemical methods were employed. Preliminary phytochemical analysis was performed as per the standard methods. TLC profile was developed for each herb and marketed formulations with different marker compounds. The set parameters were found to be adequate to evaluate the arishta and can be used as reference standards for the quality control of Draksharishta.

**OA-055**

## Pharmacognostic and Phytochemical Standardization of *Enicostemma littorale* blume

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The plant *Enicostemmalittoraleblume*is a promising anti-diabetic plant which also has other properties like, anti plasmodial, anti-inflammatory, anti-hyperlipidaemic, hypolipidaemic, antitumor and anti-inflammatory etc. The aim of the present study is to perform pharmacognostic, phytochemical standardization of *Enicostemmalittoraleblume*. The physico-chemical parameters like, Ash value, alcoholic extractive value, water extractive value and Loss on drying were studied. The extraction of plant was performed by Soxhletand cold maceration by using ethanol as a solvent. Further, the qualitative phytochemical tests and HPTLC profile was developed for all four extracts. Also,the total phenolic and total flavonoid content were determined by Folin-ciocalteu and Aluminium chloride assay respectively which showed that the alcoholic extract of cold macerated sample has high phenolic and flavonoid content than the other extracts. The 2, 2-diphenyl-1-picryl hydrazyl (DPPH) radical scavenging effect of all plant extracts was measured spectrophotometrically indicating its good antioxidant property.

**OA-059**

# Phytochemical and Antioxidant Studies of Two Rare Moss Taxa: *Anoectangium clarum* Mitt. and *Timmiella anomala* (Bruch,Schimp.& Gumb.) Limpr

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Bryophytes are the second biggest group of land plants after flowering plants. Despite their abundance, the number of studies on their chemical composition is amazingly low especially in India. Bryophytes would be a valuable resource for the isolation of novel bioactive molecules such as antioxidants and other phytochemical to combat various diseases and for maintaining human health. Many oxidative stresses related diseases are due to the accumulation of free radicals in the body and antioxidants protect the cells from oxidative damage. Hence, a lot of research is going on worldwide. In present study two moss taxa *Anoectangium clarum* and *Timmiella anomala* have been assessed for their natural antioxidants. The aim of this study was to evaluate antioxidants potential and to screen them for phytochemical constituents. Phytochemical constituents of crude methanolic extract and assessment of antioxidant potential were determined by following their standard protocols. Preliminary phytochemical analysis revealed the presence of steroids, terpenoids and cardiac glycosides in both mosses but flavonoids are present in *Timmiella anomala* but not in *Anoectangium clarum*. FTIR analysis confirms the presence of flavonoid in *Timmiella anomala* as peak (2844 $cm^{-1}$) comes in same range as comes in standard (quercetin). In both moss taxa antioxidants were present. Catalase, ascorbate peroxidase, glutathione reductase, peroxidase contents were maximum in *Timmiella anomala* whereas, Superoxide dismutase, lipid peroxidation were maximum in *Anoectangium clarum* which shows they have ability to inhibit free radicals. It can be concluded that enzyme extract had antioxidant enzymes which will be expected to protect against peroxidative damage in living systems by the additive roles of natural antioxidants like flavonoids, terpenoids, steroids and cardiac glycosides.

**OA-063**

## *In vitro* Antioxidative Property of Water Soluble Bacterial Melanin and Evaluation on Novel Model System

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Melanin is important because it's the most primitive and universal pigment in living organisms. The present study reports antioxidant activity of melanin pigment from EP83 a Gram negative bacterial strain isolated from garden soil, of Gujarat University Campus, Gujarat, India. The purified melanin fraction showed promising free radical scavenging activity in DPPH, Superoxide Radical Scavenging Activity, Lipid Peroxidation Inhibition Assay, $ABTS^{+}$ scavenging capacity assay methods and also onto its evaluation of fish mince model system. Further purification of melanin pigment from strain EP 83 will lead to a development of pharmaceutically valuable antioxidant. The colored DPPH solution faded reducibly to half during the course of incubation of 54, 41, 16 hours for 14.9, 29.8 and 44.7µg/mL of melanin concentrations respectively and ABTS+ scavenging capacity of the extract was 26.49 ± 2.34%, 37.24 ± 2.96% and 43.88 ± 2.92% of control for the melanin extract at the concentration of 10, 15 and 20% (v/v), of melanin respectively. The superoxide anion radical scavenging assayed by both PMS-NADH system and fish mince system reveled dose dependent scavenging activity of the n-butanol extract. Melanin extract also scavenges ABTS+ free radical significantly in a dose as well as time dependent manner. The antioxidative property of melanin could be made used for pharmaceutical potential applications of the targeted natural melanin in approaches including cosmetic elegance and therapeutic approaches.

**OA-064**

# Formulation and Development of Oral Disintegrating Tablet using Modified Polysaccharides

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The aim of present work was to formulate Orally Disintegrating tablet of ondansetron HCl using modified polysaccharides. Gums are naturally occurring components in plants, which are essentially cheap and plentiful. Most of the gums in their putative form are required in very high concentrations to successfully function as drug release modifiers in dosage forms due to their high swellability/solubility at acidic pH. Hence, gums need to be modified to alter their physicochemical properties. Gums and mucilages are widely used natural materials for conventional and novel dosage forms. These natural materials have advantages over synthetic ones since they are chemically inert, nontoxic, less expensive, biodegradable and widely available. They can be modified in different ways to obtain tailor-made materials for drug delivery systems and thus can compete with the available synthetic excipients. Modified polysaccharides were prepared by modification technique using natural gums/polymers like Agar gum, Guar gum and Tragacanth gum. This Modified polysaccharides were used as superdisintegrant in formulation. Tablets were prepared by direct compression method using four modified polysaccharides (T-Agar+Guar gum, T-Agar, T-Tragacanth, T-Agar+Tragacanth) and other excipients like starch, lactose, talc, magnesium stearate were used. The prepared tablets were evaluated for parameter like weight variation, size, hardness, friability, assay, *in-vitro* disintegration time, wetting time and *in-vitro* dissolution. The Optimized batch F11 was compared with marketed orally disintegrating tablet zofran containing 8mg of ondansetron HCl. The disintegration time of optimized formulation (batch F11) was 16 seconds, Wetting time was 28 seconds and In-vitro release of ondansetron HCl was 99.70±0.80 % in 12 minutes. Further the optimized formulation was subjected to accelerated stability testing for three months at $40^{o}$C/75%RH results revealed that no appreciable change was observed in formulation. Thus the approach of using modified polysaccharides as fast disintegrating excipient can be used to formulate a stable orodispersible formulation.

# Poster Presentation

**PA-001**

## Screening, Antioxidant and Antibacterial Efficacy of *Achyranthes aspera* Linn. Inflorescence Extracts

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Present study concerned with screening, quantitative, antioxidant and antimicrobial aspect of inflorescence part of an important medicinal plant *Achyranthes aspera* Linn. Various extracts were prepared using Petroleum ether, Benzene, Chloroform, Etshyl acetate, Ethanol and Aqueous. Antibacterial activity was determined by using Disc Diffusion method by taking 3 different concentrations of all extracts (10, 12.5 and 25 mg/ml) against 5 pathogenic strains. Screening results the presence of highly important phytoconstituents like alkaloids, tannins, flavonoids, phenols but absence of proteins. Phenols, tannins and proantocyanidins were quantitatively higher in ethyl acetate extract whereas flavonoids and flavonols were much higher in benzene extract in comparison to others. Chloroform extract showed higher free radical scavenging activity i.e. DPPH activity (84.8 %), Aqueous extract showed more $Fe^{++}$ reducing antioxidant activity (FRAP) and Total antioxidant capacity (TAC) was highly appreciable by ethanol extract when compared to other extracts. Ethanol extract (25 mg/ml) showed best inhibition against ***Escherichia coli***, for ***Bacillus cereus*** aqueous extract (12.5 mg/ml), for ***Staphylococcus epidermidis*** aqueous and ethyl acetate extract showed equal inhibition (12.5 mg/ml), for ***Pseudomonas aeruginosa*** chloroform extract (12.5 mg/ml) and for ***Shigella flexineri*** aqueous extract at 25 mg/ml showed maximum inhibition (zone of inhibitions) that represents the high antibacterial efficacy of inflorescence part of *Achyranthes aspera*. Above stated results clearly illustrate the high antioxidant, antimicrobial potential of inflorescence part of *A. aspera* and also revealed the presence of several bioactive compounds. These overall results clearly stated the future prospects of *A. aspera* inflorescence extracts in medical and pharmacological field for further research to get some novel compounds that would possess biological activity and may be used to cure several health problems.

**PA-002**

## Efficacy of Different Medicinal Plant Extracts against Larvicidal Activity of *Aedes aegypti*

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*Aedes aegypti* is a yellow fever mosquito and also an important vector of Dengue fever in India. The only effective approach to minimize the incidence of mosquito vectors is mainly by applying insecticides to larval habitats. Because of the known hazardous effect of chemical insecticides, the use of plant based products as a larvicide which provide alternative to synthetic chemicals. Therefore, four different medicinal plants extracts such as *Argemone mexicana, Mimosa pudica, Chrysanthemum indicum, Polianthes tuberosa* were utilized to control *Aedes aegypti*. As compared to all other flower and leaf acetone solvent extracts *M. pudica* showed highest mortality 86.66% at 500ppm followed by *C. indicum* flower extract 85% mortality at 500ppm. The bioactive components in *M. pudica* such as terpenoids, flavonoids, glycosidases, alkaloids, quinines, phenols, tannins, saponins act as toxic to insects. The Chemical pyrethrin acts on the nervous system of insects which act as insecticide. Therefore, *M. pudica* and *C. indicum* acetone solvent extracts were utilized as biopesticides and it can also be developed as eco-friendly larvicide to control the vector *Aedes aegypti*.

**PA-003**

# Antifungal Activity and Phytochemical Screening of Essential Oils from Rhizome of *Acorus calamus* L. using Various Accessions

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The study was carried out with an objective to check the antifungal activity and Phytochemical screening of the essential oil obtained from the various accessions of *Acorus calamus* L. rhizome. Plants from different states of India were collected and maintained at Greenhouse in Maliba Campus. Fresh rhizomes were collected, washed, shade dried and powdered. The powdered rhizome was used to obtain essential oil using hydrodistillation (for 3 h) in a Clevenger-type apparatus**.** The essential oil obtained was used for phytochemical screening and antifungal assay. The phytochemical study of the rhizome of *Acorus calamus* revealed the presence of Steroids, Alkaloids, Tannins, Phenols, Flavanoids, Fatty acid, Cardiac Glycosides, Carbohydrate, Amino acid and Proteins. This test reveals the presence of phenols which constitute the structure of Asarone. FTIR analysis and UV-VIS analysis of *Acorus calamus* essential oil from rhizome showed that the presence of phenolic compound. As the result UV-VIS profile showed the peaks at 205nm and 363nm for Phenols and FTIR spectra showed the peak peaks in the range of 587.72- 2996.41 $cm^{-1}$which could be the OH group of phenolic compound present in the samples. The paper disk-diffusion method was used for the assessment of inhibitory effect of the essential oil. The antifungal assay was carried out against *Aspergillus niger, Aspergillus flavus, Penicillum chrysogenum, Rhizopus oryzae, Trichoderma koningii. Acorus calamus* antifungal activity was recorded against all test organisms, and was strongest at 0.35% against concentration *Aspergillus flavus.* All different accessions from different states showed inhibition but the plants obtained from North India showed maximum Percentage of Inhibition. The analysis carried out on this plant shows that the plant could be explored as a potential drug in phytomedicine.

**PA-006**

# Study of Phytochemical Properties and Antimutagenic Activity of Medicinal Plant Extracts

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Traditional remedies involve crude plant extracts consisting of multiple chemical constitutes, which very in potecy from being highly active to a very weak potency. A number of compounds present in medicinal plants possessing therapeutical properties can be easily identified by phytochemical analysis. Such phytochemical include: alkaloids, flavonoids, steroids, tannins and saponins. These phytochemicals essentially help to identify new structurally novel products with newer mode of action and exhibiting antimutagenic activity. The plants used in study were: *Oscimum sanctum, Tinospora cordifolia, Asparagus rasemoscus* and *withania somnifera.* Medicinal plants are an important source of substances claimed to induce antimutagenic effect. Ames test is used for study of antimutagenic effect of different plant extract when used against sodium azine, 2 nitro fluorine and mitocyamin C in absence of metabolic inhibitor (Sq). combination of varying concentrations were checked and the percentage of inhibition was determined using the formula:[(a-b)/(a-b)×100. The combination showed a gradual respective decrease in the number of relevant colonies against tester strains *Salmonella typhemurium* TA 100, TA 1535, TA 98 and TA.

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**PA-007**

# Quantitative Estimation of Stigmasterol in Leaf Extracts of *Tecomella undulata* Seem by HPLC

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The present work deals with quantitative determination of stigmasterol by using reverse phase-high performance layer chromatography (RP-HPLC) with Uv-visible detector. Stigmasterol is an unsaturated plant sterol which is used as a precursor in the manufacture of semi synthetic progesterone. It is also useful in prevention of certain cancers. A reversed phase HPLC analysis was performed by using Zorbax -C18 (5µm 4.6×150mm) column by using isocritical flow with the constituted mixture of methanol and water (95: 5) with the flow rate of 1ml/min. Detection was carried out at 202 nm. The linear regression data for the calibration plots showed a good liner relationship with r= 0.99. Comparative study of methanolic and ethanolic Extract of leaf has been done. Stigmasterol detected in a good amount from methanolic extract (202.12µg/ml) and comparatively less in ethanolic extract (130.33µg/ml). The result of present study supports the view that the leaf of *Tecomella undulata* (seem) could be a potential source of anti-hypercholestrolemic, anticarcinogenic, anti-osteoarthritic activity and other important medicinal drugs.

**PA-008**

## Antibacterial Activities of Iron Nanoparticles Synthesized using Weeds

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In the present investigation attempts were made to synthesize Iron nano particles (Fe NPs) by green route using extracts of stem, leaf and flower of two common weeds *Calotropis procera* and *Datura innoxia*. The antibacterial activities of the nanoparticles were tested against *Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, E cloacae* and *Proteus vulgaris* by broth dilution method. Nano particles were characterized by UV-Vis absorption spectroscopy, transmission electron microscopy (TEM) and dynamic light scattering (DLS). Dispersion destabilization of nanoparticles was detected by turbiscan. Size and size distribution of nanoparticles were studied by varying pH, reaction time, temperature, ferric ion concentration in feed solution and concentration of plant extract. The flower extract of *Calotropis procera* produced the nanoparticles of the least (58-91nm) size. In *Datura innoxia,* Fe NPs could be produced from the stem extract only. The leaf and flower extract did not produce any Fe NPs. The Fe NPs of *Calotropis procera* flower showed highest antibacterial activity against *B.subtilis* and *P.aeruginosa* followed by *E.coli, S.aureus, P. vulgaris* and *E. cloacae*. Fe NPs of *Datura innoxia* stem showed the highest antibacterial activity against *S.aureus* followed by *E.coli, B. subtilis, E. cloacae* and *P.aeruginosa* and showed no activity against *P. vulgaris*.

**PA-010**

## Cardioprotective Effects of Resveratrol against B-Adrenergic Stimulation in Streptozotocin-Induced Diabetic Rats

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Diabetes superimposed with macrovascular cardiac complications is the leading cause of morbidity and mortality worldwide and is more common especially in the Indian population. Currently, several research attempts are initiated with a focus on identifying therapeutic lead molecules from natural sources to prevent and manage the cardiovascular complications that arise from diabetes. The aim of this study is to investigate the effect of resveratrol (3, 4, 5 trihydroxy stilbbene), a phytoalexin produed by plants in response to infection by pathogenic microorganisms like fungi. Resveratrol has been reported to posses antidiabetic and cardioprotective properties in several animal models. The present investigation was carried out to study the effect of resveratrol supplementation (5mg/kg body wt/day orally for 21 days) to combat myocardial stress induced by isoproterenol (150 mg/kg body wt/day i.p for 2 days in streptozotocin induced (50 mg/kg body wt with single i.p) in diabetic rats. The levels of Ischemia modified albumin (IMA), activities of membrane bound phosphatases (Sodium potassium ATPase, Calcium ATPase and total ATPases) and myeloperoxidase (MPO) were analysed in the control and experimental group of rats. Myocardial stress induced diabetic rats showed an increase in IMA levels, pathologic alterations in the activities of ATPases and myeloperoxidases. Rats pretreated with resveratrol(RSV) prior to the induction of diabetes and myocardial challenge showed considerable decrease in the levels of IMA in serum and indicated an amelioration of the changes in the activities of ATPases and myeloperoxidase thereby indicating a beneficial effect. Results of the study reveal the cardioprotective effects of RSV against isoproterenol-induced myocardial stress in diabetic rat.

**PA-011**

# Preliminary Phytochemical Studies of *Nyctanthes arbor-tristis*: A Valuable Medicinal Plant

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*Nyctanthes arbor-tristis,* (Fam. Oleaceae) commonly known as "Night Jasmine" is a well known medicinal plant. The leaves of this plant are used for controlling fever, diabetes as diaphoretic, antihelmintic and as cholagogue. In the present study leaves has been investigated for the presence of important phytochemicals. The dried leaves of the plant were subjected to successive soxhlet extraction by continuous hot percolation method using organic solvents of increasing polarity such as petroleum ether, chloroform, acetone, ethanol and hydroalcohol. The aqueous extract was prepared by hot extraction technique. Cold maceration technique was also adopted using ethanol as solvent. All the extracts were subjected to qualitative phytochemical screening using standard procedures. Results showed that terpenoids, triterpenoids, tannin, steroids and saponins were present in all the extracts. Alkaloids, flavonoids and cardiac glycosides were absent in the acetone extracts. Anthraquinone was found to be present in petroleum ether, chloroform, and acetone extracts. The antimicrobial activity was evaluated against *Bacillus subtilis*, *Bacillus cerus*, *Bacillus magatorium*, *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The zone of inhibition and Minimum Inhibitory Concentration (MIC) of the extracts were determined and compared with the standard drugs Tetracycline. Thin layer chromatography (TLC) was also performed using solvent system Toluene: Ethyl Acetate: Diethylamine (7:2:1) for the analysis of alkaloids present in plant extract.

**PA-012**

# Paradoxical Action of Bromelain in Renal Tissue is Figured by Alteration of Endogenous Antioxidants, Oxidative Stress and Cholinesterases

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Renal health is a very important parameter which affects the daily life of persons. Besides being a natural filter of the blood, kidneys perform many homeostatic functions such as the regulation of electrolytes and blood pressure. Kidneys aid in get rid of wastes therefore any alteration in them may lead to deterioration in the quality of blood which may subsequently lead to many pathological changes in the body. Therefore, the present study was carried out to investigate the benefits of bromelain on renal tissue of mice. Experimental design included two groups of mice: first group received dose of saline as vehicle and second group was administered bromelain (p.o. 70 mg/kg bw) for 21 days consecutively. Bromelain is a protein digesting enzyme that has been isolated from *Ananas comosus*. In renal tissues, endogenous antioxidants like CAT, SOD and GSH were recorded to be elevated while reduction in the activity of GST after exposure of bromelain was observed when compared with control group. Bromelain treated group showed raised TBARS and PCC levels compared to the control subjects. However, activity of AChE and BChE elevated in experimental mice as compared to the control group. Finding of the research conclude that bromelain improves levels of AChE, BChE and some antioxidants whereas on other hand it increases the level of oxidative stress thereby suggesting paradoxical role of bromelain in kidneys.

**PA-013**

# A Review on Phytochemical Profile of *Pseudarthria viscida* (Salaparni): A Valued Medicinal Plant

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The development of rapid and accurate methods of screening the plants for particular chemicals has immensely speeded up the phytochemical Investigation. Plants have potent phytochemicals with medicinal importance since time immortal. India is a rich bio resource of well-known medicinal plants practiced traditionally for use of herbal Medicine. It is generally estimated that over 6000 plants in India are in use in traditional, folk and herbal, medicine representing about 75% of the medicinal needs of the third world Countries. One such medicinal herb used in Indian Ayurvedic systems of medicine is *Pseudarthria viscida* (Salaparni). A review of phytochemical profile of *Pseudarthria viscida* has been presented considering its ethno-medicinal Importance.

**PA-014**

# Biochemical and Molecular Screening for Evaluation of Antioxidant Properties of Bacoside A in Mice Brain

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Present study evaluates bacoside A in mice brain as an efficient as a neuroprotective agent. Disproportion between radical-generating and radical scavenging systems may cause an increase in free radical production or reduced activity of antioxidant defence which causes oxidative stress in organs. Bacoside A is an active principle of *Bacopa monnieri* which is known for improvement of memory and intelligence. Bacoside A is traditionally used to treat epilepsy, insanity and has antipyretic and laxative properties. Bacoside A administration (5mg/kg bw, ip) decreased activities of TBARS, PCC, GPx, CAT, GSH and BChE where as tissue levels of SOD, GST and AChE were elevated in mice brain. Findings of the research conclude that bacoside A have potential to diminish the oxidative stress and to augment the impaired cholinergic system in the brain. Since bacoside A relives the oxidative stress but some endogenous antioxidant decreases except SOD and GST. Therefore it may be due to the mediation of SOD, GST and AChE in scavenging free radicals.

**PA-015**

## Pharmacognostic and Phytochemical Investigation of Stem Bark of *Chloroxylon swietenia* Dc. an Ethnomedicinally Important Medicinal Tree

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*Chloroxylon swietenia* DC. belongs to the family Rutaceae / Meliaceae / Chloroxylaceae, is a medicinal and aromatic tree of dry deciduous forests. It is popularly known as Yellow wood, East Indian satin wood and Ceylon satin wood. The stem bark is credited for its effectiveness in the treatment of common cough and cold, it is also used as an astringent. Its pharmacognostic data for authentication of the crude drug is not available; hence, in the present study, macroscopical, microscopical, and preliminary phytochemical investigations of stem bark is undertaken. Powder microscopy revealed that Cork cells, Calcium oxalate crystals, Phloem parenchyma, medullary rays and thick walled phloem fibers were abundant. Anatomical studies showed the presence of phellem, phellogen, and phelloderm with abundant secondary phloem. The qualitative chemical tests of petroleum ether, chloroform, acetone, ethanol and water extracts of stem bark revealed the presence of carbohydrates, alkaloids, glycosides, flavonoids, phenolic compounds and tannins.

**PA-018**

## *In Vitro* Antioxidant Profiling of Hydro-Methanolic Extract of *Indigofera tinctoria*

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Free radicals or reactive oxygen indices give rise to oxidative injury which is a fundamental mechanism underlying a number of disease like diabetes, cancer, neurodegenerative disorders etc. Deleterious effects of ROS can be nullified by using different natural antioxidants derived from medicinal plants which are highly conventional and one of the foremost sources of novel medicinal therapeutics due to the presence of various bioactive components or phytochemicals. *Indigofera tinctoria* is such plant. This study was planned in order to trace and determine the antioxidant capability of *I. tinctoria*. All the reagents and chemicals used in this study were obtained from reliable firms. The plant extract was subjected to quantitative assays and antioxidant profiling. The results suggested that plant extracts contained all pharmacologically important phytoconstituents in appreciable amounts and having excellent antioxidant capabilities.

**PA-021**

## Estimation of Chlorophyll Content of Some Medicinal Plants of Genus *Terminalia* of Marathwada Region in Maharashtra

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The seasonal variation (Summer, Monsoon and Winter) of chlorophyll a, chlorophyll b and carotenoid have been investigated in leaves of *Terminaliacuneata* Roth., *Terminaliabellirica* Roxb., *Terminaliachebula* Retz. and *Terminaliacatappa* Linn. are important medicinal plants of family Combretaceae ofMarathwada region in Maharashtra. Comparative account of chlorophyll a, chlorophyll b and carotenoid content of leaves of four medicinal plants revealed that, the highest amount of chlorophyll a, chlorophyll b and carotenoid content in the leaves of *Terminaliacuneata* (4.97 mg/g fresh wt.), (3.51 mg/g fresh wt.) and (1.83 mg/g fresh wt.) in summer seasons and comparative lower amount of chlorophyll a, chlorophyll b and carotenoid content in the leaves of *Terminaliacatappa* (3.46 mg/g fresh wt.), ( 2.43 mg/g fresh wt.) and (1.27 mg/g fresh wt.) in monsoon seasons.

**PA-024**

# Extraction Efficiency and HPLC Method Development for Flavonoid Analysis in *Clitoria ternatea* – A Memory Enhancer Medicinal Plant

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*Clitoria ternatea* (Hindi:Aparajita, Family:Fabaceae) is a very well-known medicinal plant in Ayurveda used as a brain tonic. *Clitoria ternatea* is very good source of raw drug due to the presence of flavonoids. Flavonoids have been reported to exert wide range of biological activities. Flavonoids are natural products widely distributed in plant kingdom and currently consumed in large amounts in the daily diet. In this present study, a simple, rapid and reliable HPLC method was developed for simultaneous determination of six flavonoid aglycone *viz.* rutin, myricetin, luteolin, quercetin, kaempferol and apigenin in *Clitoria ternatea.* The developed method achieved the separation of six flavonoid aglycone using RP-18 column (250 **X** 4.6mm, 5um), and mobile phase consist of methanol and 0.1% Formic acid in water in gradient elution mode. All the six aglycone eluted within 18 min. The method was validated in terms of precision, accuracy and reproducibility as per ICH guidelines. It can be also used for quality control of herbal formulations containing flavonoids. The extraction efficiency for flavonoid was standardized by different extraction solvents, solid to liquid ratios, extraction time, extraction temperature, hydro-alcoholic concentrations and hydrolysis parameters. The most efficient extraction conditions were optimized for maximum recovery of flavonoids. These studies clearly indicated that the developed method could improve extraction yields of flavonoids from *Clitoria ternatea*.

**PA-029**

## A Review of Phytochemistry, Metabolite Changes, and Medicinal uses of *Vigna* Spp.

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World's large population use plants as therapeutic agents to improve health status as they are exclusive source of drugs. Several clinical evidences suggest that plants derived foods possess various potential health benefits. There is a need to provide efficient, safe and cheap medications, especially for underdeveloped and developing countries. Medicinal plants always have increasing demand due to their medicinal properties and widely distributed in various part of India. In the present work attention is focused on *Vigna* spp. *Vigna* genus uses as neutraceutical in all over world, includes tropical plants possess economic characteristics as able to grow under high temperatures, low rainfall and poor soils etc. that make them more valuable than other crop plants. The genus *Vigna* comprises around 200 species and is closely related to *Phaseolus*. Blackgram/ urdbean (*V. mungo* (L.) Hepper), cowpea (*Vigna unguiculata* (L.) Walp.), mungbean (*V. radiata* (L.) R. Wilczek) and azukibean (*V. angularis* (Willd.) Ohwi & Ohashi) are the most widely cultivated crops of the genus *Vigna*. They work as antioxidant and also useful to cure liver diseases, cancer, diabetes, paralysis, rheumatism, coughs, fevers, microbial infections, kidney disorders, hormonal disorders and for weight reduction. Hence there is a need of further research to find out pharmacognostic importance of individual components of these species.

**PA-032**

## *In Vitro* Antifungal Activity of Crude Phytoextract against Sugarcane Red Rot Pathogen – *Colletotrichum falcatum*

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Red rot disease of sugarcane caused by *Colletotrichum falcatum* is one of the most devastating diseases of sugarcane worldwide. The crude extracts of five medicinal plants viz, *Withania somnifera*, *Alpinia galangal*, *Morinda citrifolia*, *Centella asiatica*, *Datura metel* and three vegetable plants *viz, Coccinia grandis Solanum melongena Brassica oleracea* were assessed *in vitro* for activity against sugarcane red rot pathogen, *Colletotrichum falcatum*. The evaluation of fungitoxicity was carried out on potato dextrose agar by poisoned food technique using 10% water based phytoextract. Assessment was carried out in terms of percentage of mycelial growth inhibition after seven days of incubation at 30±1 °C. The extracts of all the plant species were found to be effective in controlling the mycelial growth. The extract of *Withania somnifera* showed 51.47% mean mycelial growth inhibition for all nine *C. falcatum* isolates and was found to be very effective as compared to other phytoextract. *C. asiatica* extracts show minimum efficacy (28.19%) in controlling mycelial growth. Surprisingly vegetable crops leaf extract were as significantly effective as medicinal plant extracts. Among vegetable crops, aqueous extracts of *B. oleracea* extract could effectively control the growth of fungal mycelium (42.1%); followed by *Solanum melongena* extraxt (38.4%) *and Coccinia grandis* extract (37.8%). These results suggest that intercropping of given vegetable crops and medicinal plants can be effective for the management of red rod disease.

**PA-033**

## Production and Characterization of Vanillin from Microbial Origin and Applications in Food Based Industries

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The rapid development of Biotechnology and release of new food additives and microbial flavors for food based Industries have provided many economic benefits. Food-processing operations, from premature harvesting to extended storage and physical treatments, may cause a loss of aroma that calls for subsequent supplementation. The conventional routes of chemical synthesis or isolation from plants are still viable, but the biotechnological generation of aroma compounds is becoming increasingly attractive. Natural "vanilla extract" is a mixture of several different compounds in addition to vanillin. In the present work, an attempt has been made to discuss various aspects such as physicochemical properties and chemical properties of vanillin from microbial origin. The present study highlights the synthesis of vanillin. Taking into consideration the worldwide demand for natural vanillin and its limited supply, alternative routes for its production including biotransformation are being constantly explored. In this regard, a novel soil bacterium capable of converting Eugenol to vanillin was isolated by conventional enrichment process from soil and was screened further. Bacterial strain “prc”, was found to produce vanillin when grown in the presence of eugenol, and was also capable of growing on eugenol as the sole carbon source. Strain “prc” was identified as a Bacillus species from its microscopic and biochemical characteristics. Vanillin formation was analyzed using UV-spectrophotometer at 347 nm. Under the optimized medium conditions, Bacillus species produced 0.162 mg/l vanillin from 0.0128 mMeugenol, at 37 °C after 72 hours of incubation in the presence of 0.2% (v/v) dimethyl sulfoxide.

**PA-034**

# Phytochemical Screening and Antimicrobial Profile of *Calotropis procera* Linn and *Calotropis gigantea* Linn

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*Calotropis spp* (Asclepiadaceae) is a traditional herbal plant used mostly for treating cough, eczema and its medicinal properties that have been widely studied such as antimicrobial and antiovicidal, commonly known as “Aak” in India. Present studies investigate the various bioactive constitutes present in roots and flowers of *Calotropis* by preparing their crude aqueous and organic extracts such as ethanol (95%), water and water: ethanol(1:1) extracts along with its antimicrobial activity and phytochemical screening. The investigation of bioactive constituents was performed using maceration of fresh roots and flowers for 24 hours. Antibacterial activity executed by agar well diffusion methods against the pathogenic bacteria *Staphylococcus aureus, Escherichia coli, Bacillus subtilis, Pseudomonas aureginosa, Vibrio mimicus*. The result obtained revealed that Phytochemical analysis of roots and flowers of all extract showed the presence of alkaloids, tannins, terpenoids, quinons, flavanoids, steroids. Extract prepared from roots were shown to have a better efficiency than flower extract. Organic extract provided potent antibacterial activity as compare to aqueous extract, ethanolic extract was found most active against all most all bacterial species tested. *E.coli* (20mm) and *V.mimicus* (17mm) were significantly inhibited by ethanol extract even at very low MIC. The study promises and interesting future potential for designing active antibacterial agent from calotropis species.

**PA-035**

## Anti-Angiogenic Property of Alcoholic Extract from Thorns of *Bombax ceiba* L.

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*Bombax ceiba* L. is used in Ayurvedic medicine system to treat various health problems. The present study was initiated to rule out the possibility of treatment of *Bombax ceiba* L. alcoholic thorn extract on *in vitro* shell less culture of chicken embryo. Anti- angiogenic investigation showed that number of capillary sprouts remained same at 72 hours, 75hours and 78 hours after addition of extract of different concentrations 25µg/ml, 50µg/ml, 100µg/ml, 150µg/ml as compared with capillary sprouts in non treated chicken embryos. It has been shown that extract inhibited angiogenesis at varying concentration as compared with capillary sprouts in non treated chicken embryos. This implicates the ability of *Bombax ceiba* L. alcoholic thorn extract to inhibit angiogenesis and its promise in being developed as anti-cancer agent as well as its ability to stop, halt or reverse the onset of certain cancers.

**PA-036**

## Anti-Cancer Compounds from Medicinal Plants

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Cancer is a complex disease occurring as a result of a progressive accumulation of genetic aberrations and epigenetic changes that enable escape from normal cellular and environmental controls (Weinberg, R.A., 1996). Neoplastic cells may have numerous acquired genetic abnormalities including aneuploidy, chromosomal rearrangements, amplifications, deletions, gene rearrangements, and loss-of-function or gain-of-function mutations. Recent studies have also highlighted the importance of epigenetic alterations of certain genes that result in the inactivation of their functions in some human cancers. These aberrations lead to the abnormal behavior common to all neoplastic cells:dysregulated growth, lack of contact inhibition, genomic instability, and propensity for metastasis. The treatments of many diseases owe much to the important medicines that have been derived from plants, and the treatment of cancer is no exception. Unique classes of anticancer drugs with natural origin have been derived from plants. As distinct from those agents derived from bacterial and fungal sources, the plant products, represented by the *Vinca* and *Colchicum* alkaloids, as well as other plant derived products such as paclitaxel (Taxol) and podophyllotoxin, do not target DNA. Rather, they either interact with intact microtubules, integral components of the cytoskeleton of the cell, or with their subunit molecules, the tubulins. Plants have proved to be an important natural source of anti-cancer therapy for several years. About 30 plant derived compounds have been isolated so far and are currently under clinical trials. These anti-cancer compounds have been found to be clinically active against various types of cancer cells. The present review focuses on various plant resources contributing for the development of anti-cancer drugs.

**PA-037**

# Effect of Substrate and Spawn Rate on the Growth Parameter, Yield and Biological Efficiency of *Pleurotus sajor*-Caju

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The oyster mushroom, *Pleurotus sajor*-caju was cultivated on paddy straw with different amount of weight substrate weight using wheat grain spawn at different rates. The spawning was done by sterilization of substrate. The bags were kept in mushroom growing room with the maintenance of temperature and humidity 20 c-30 c and 60-95 % respectively. The minimum days requires for completion of spawn run (14.33 days), primordial formation (17.33) and pinhead formation (20.33) was first observed on spawn rate of 150 gm with substrate of 3 kg on wet weight basis. This was followed by spawn run (15.67 days), primordial formation (18.33 days) and pinhead formation (20.67 days) in treatment with 150 gm spawn and 4 kg of substrate. Maximum Stem length and cap diameter was also higher in treatment with spawn rate of 150 gm with 3 kg of substrate. The maximum yield on fresh weight basis and biological efficiency was also found to be as the same treatment of 3 kg of substrate and 150 gm of spawn. Total soluble protein (16.5 %) and crude fiber (11.9 %) was also in considerable amount in *Pleurotus sajor*-caju when cultivated on paddy straw as substrate.

**PA-038**

# Utilization of *Luffa cylindrical* Linn (*Luffa aegyptica Linn.*) in Therapeutics: A short Review

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*Luffa cylindrical* L. otherwise known as sponge gourd or bath sponge is a fibrous plant with fruits containing black or white seeds. It is originating in tropical and subtropical regions like, Asia, Brazil, and USA. Luffa plant is a cucurbit with other members including snake gourd, pumpkins and cucumbers. It grows as a flowering annual vine producing cylindrical green fruits filled with seeds in a system of many intertwined cellulose fibres. The fruit is edible especially when young and it contains group of compounds such as phenolics, lavonoids, oleanolic acid, ascorbic acid, a-tocopherol, carotenoids, chlorophylls, triterpenoids and ribosome-inactivating proteins, which makes it highly effective when used for medicinal purpose. Fruits are used in treatment of fever, syphillis, tumors, bronchitis, splenopathy, leprosy, jaundice, ascites, biliary & intestinal colitis, enlarged spleen & liver. Juice extracted from the stem has been used in the treatment of respiratory disorders and the seed has emetic action. The leaf extract has been used for treating snakebites and it also shows anthelmintic activity. Oil extracted from seeds is used in industry and intreating skin infections in the form of tincture. Seeds have also been used in the treatment of asthma, sinusitis, dysentery and fever and effective against growth of parasites, protozoa, insects, fungi and HIV and in the treatment of asthama, sinuisitis, AIDS, cancer (leukaemia).

**PA-040**

## Screening of some Traditional Indian Medicinal Plants for its Analgesic Potential

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Three different plants are screened for its analgesic activity on wistar albino rats. At 180 min, an aqueous extract of *Lagenaria siceraria* shows a highly significant analgesic activity (5.88 sec.) while methanolic extract of *Lagenaria siceraria* shows a moderately significant analgesic activity (4.12 sec.) when compared to standard drug (5.72 sec.), while at 180 min aqueous extract of *Ocimum gratissimum* shows moderate analgesic activity (3.97 sec.) while methanolic extract showed highly significant analgesic activity (5.81 sec.). At 180 min both aqueous extract (5.91 sec.) and methanolic extract (5.40 sec.) of *Moringa oleifera* shows significant analgesic activity when compared to standard drug (5.72 sec.), ($p<0.05$).

**PA-044**

## *In Vitro* Antibacterial Activity of Certain Indian Medicinal Plants against some Human Pathogens

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The evolution and spread of antibiotic resistance, as well as the evolution of new strains of disease causing agents, is of great concern to the global health community. Our ability to effectively treat disease is dependent on the development of new pharmaceuticals, and one potential source of novel drugs is traditional medicine. This study explores the antibacterial properties of plants used in Indian traditional medicine. We tested the hypothesis that extracts from five common Indian medicinal plants used to treat symptoms often caused by bacterial infection would show antibacterial properties in laboratory assays, and that these extracts would be more effective against moderately virulent bacteria than less virulent bacteria. In this study, we used five medicinal plants namely ***Abutilon indicum, Adathodavisca, Daturastramonium, Lantanacamara*** and ***Tridaxprocumbens.*** The aim of the study is to assess the antibacterial activity and to determine the zone of inhibition of extracts on some bacterial strains. In the present study the methanol, ethanol and aqueous extracts of five medicinal plants were evaluated for a activity against medically important two gram-positive bacteria such as *Staphylococcus aureus, Bacillus subtilis* and one gram-negative bacteria *Escherichia coli*. The in vitro antibacterial activity was performed by disc diffusion method by different concentration (2, 4, 6, 8,10µg/ml) of five medicinal plants. The ethanolic and aqueous extracts showed theminimum antimicrobial activity when compared to methanolic extracts. The methanolic extract of *Daturastramonium* and *Lantana camara*showed the maximum activity against *Staphylococcus species* in alkaloids fraction compare to the flavonoids and saponin fractions. The *Daturastramonium* showed the moderate zone of inhibition against the *Escherichia coli* and Bacillus species. The flavonoid extract of the *Lantana camara* and *Daturastramonium* showed the moderate zone of inhibition and the saponin showed the minimum zone of inhibition. The use of plant extracts with known antimicrobial properties can be of great significance in therapeutic treatments.

**PA-045**

# Chromatographic Fingerprint Analysis of Alkaloids of *Abrus precatorius* Linn by HPTLC

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Fingerprint analysis approach using HPTLC profile has become the most potent tools for quality control of herbal medicines because of its simplicity and reliability. It can serve as a tool for identification, authentication and quality control of herbal drugs. The aim of the present study is to determine the chemical profile and alkaloid composition of the medicinally important plant *Abrus precatorius* Linn. Leaves of plant under study, exhibit antifertility activity and is used in preparation of herbal medicine. Hence to prove its authenticity and diversity in Alkaloid composition, the development of chemical fingerprint is need of the hour. The study was planned to develop a fingerprint profile of leaf extract of *Abrus precatorius* Linn. Alkaloid fraction from the leaves of this plant was developed in the mobile phase - Toluene: Ethyl acetate: Diethyl amine (7:2:1) and scanned under visible light at 540 nm and UV at 254 nm & 366 nm. Chromatogram was then derivatized with Dragendroff's reagent followed by heating at 105 $^{0}$C. The plant showed specific fingerprints at 254 nm and 366 nm. HPTLC fingerprints of alkaloidal fraction were obtained and Rf values were recorded. The chromatographic fingerprint developed for this plant represents a comprehensive qualitative approach for the purpose of authentication, evaluation of quality and ensuring the consistency and stability of leaves of *Abrus precatorius* Linn. in herbal drugs and their related products. The alkaloidal bands can be used to discover bioactive products that may serves leads for the development of the new pharmaceuticals that address hither to unmet therapeutic needs.

**PA-049**

## Antioxidant Potential of Polyherbal Formulation-Khadirarishta

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Khadirarishta, a fermented polyherbal biomedicine, is being used for thousands of years in Ayurveda, the traditional health care system of India. It is useful for skin diseases like acne, eczema, scabies, purities, pustules, leucoderma etc. The present study was designed to investigate antioxidant biochemicals and antioxidant activity of khadirarishta. Biochemicals like total phenol, total flavonoids, tannic acid and gallic acid were estimated from fermented samples. Antioxidant potential was assessed by in-vitro free radical scavenging activity by DPPH, reducing power by $FeCl_3$, Hydroxyl radical scavenging activity, and Hydrogen peroxide radical scavenging activity. The result indicate that khadirarishta have substantial amounts of total phenols, flavoniods and gallic acid and showed good antioxidant property with respect to radical scavenging by DPPH and also has a reducing power as indicated by $FeCl_3$ assay results.

**PA-050**

## Nootropic Activity of *Vitex negundo* in Rats*:* Influence of Serotonergic System

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The objective of the present work is to study effects of *Vitex Negundo* on learning and memory & its modification by serotonergic agents. The alkaloid rich extract of *Vitex negundo* (VN) was prepared by cold maceration process ofplant leaves. *V. negundo* extract was examined for its nootropic activity through serotonergic systemby employing Elevated Plus Maze (EPM) as an animal model. At the dose of 200 mg/kg*V. negundo* extract was evaluated for its activity. To verify the effectiveness of this extract throughserotonergic system, VN extract is combined with various serotonergic agents. The brain level of serotonin was also estimated to correlate the behavior with neurotransmitter level. VN extract increased the Inflexion Ration significantly compare to control group rodents. pCPA, a 5-HTdepletor impairs the memory by reducing 5-HT levels in brain, which were not restored backby co administration of VN extract. Buspirone, 5-HT1A partial agonist produced memory deficits and these effects are not recovered by VN extract treatment. m-CPP, a 5-$HT_{2c}$agonist also shows increase in IR which indicates no active participation of 5-$HT_{2c}$ receptorsin cognitive enhancing effects of VN extract. 1-PBG, 5-$HT_3$ agonist also impairs the memoryin rodents significantly and in combination with VN extract it potentiates the memoryenhancing activity. Ondensetron, 5-$HT_3$ antagonist increases the IR alone and in combinationwith VN extract it gives additive effect. The present study suggests that alkaloids rich VN extract has significant nootropic activitymay be due to modulation of serotonergic system through 5-$HT_3$ receptors.

**PA-052**

# Inhibitory Activity of Methanolic Extract of Bark of *Pseudarthria viscida* against Microorganisms

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*Pseudarthria viscida* had been widely used for its reported biological activities in field of medicine for the treatment of wound healing, tuberculosis, asthma, diabetes mellitus. The present work is carry out to determine presence of valuable phytochemicals and antimicrobial efficiency of *Pseudarthria viscida*. The antimicrobial activity was evaluated by agar well diffusion assay against the four different bacteria, namely *Pseudomonas aeruginosa, Vibrio minicus Escherichia coli, Bacillus Subtilis, Staphylococcus aureus* using the methanolic extract of bark of *Pseudarthria viscida.* Antimicrobial activity of *pseudarthria viscida* extract was measured in terms of clear zone of inhibition. Phytochemical screening displayed the presence of flavonoids, protein and tannins in bark of pseudarthria. Methanolic extract of bark of *Pseudarthria viscida* shows maximum inhibitory activity against *Vibrio minicus* and *Bacillus subtilis* among the tested bacteria. As this phyto-extract shows significant inhibitory activity, comparing to that chemically synthesized antibiotics, it can be the alternative for chemically synthesized antibiotic.

**PA-053**

## Commercial and Medicinal Application of Microalgae

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Microalgae are microscopic photosynthetic organisms that are found in both marine and freshwater environments. Microalgae find uses as food and as live feed in aquaculture for production of bivalve molluscs, for juvenile stages of abalone, crustaceans and some fish species and for zooplankton used in aquaculture food chains. Therapeutic supplements from micro-algae comprise an important market in which compounds such as β-carotene, astaxanthin, polyunsaturated fatty acid (PUFA) such as DHA and EPA and polysaccharides such as β-glucan. In the present review it has been focused on the utility of microalgae (freshwater, marine and other such habitats) in commercial and medicinal sector to harness the growing demands of such unexplored natural resources.

**PA-055**

# Characterization of Essential Oils from Mexican Sunflower (*Tithonia diversifolia* (Hemsl.) A. Gray)

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Essential oils are complex mixtures of biologically active substances that have long gained commercial importance. In view of the multiple applications of essential oils, their characterization based on their chemical profiles is of great importance. The study extracted essential oils from the flowers of *Tithonia diversifolia* (Hemsl) A. Gray (Mexican sunflower) and characterized the constituent compounds. The oils were extracted by hydro-distillation in an all-glass Clevenger-type apparatus and characterized using GC-MS. Of the forty-five compounds characterized, α-Pinene (34.42%), β-Caryophyllene (22.34%), β-Pinene (11.14%), Germacrene-D (11.13%), and 1, 8-Cineole (8.76%) were the major constituents. Generally, moneterpenes accounted for 44.44%, sesquiterpenes were 26.67% and other compounds including alcohols and aldehydes accounted for 28.89%. The study concluded that *T. diversifolia* flowers offer great potentials for commercial production of essential oils, especially monoterpenoids which are present in large amount.

**PA-059**

## Tobacco ( *Nicotiana* spp. ) – A Boon or Bane for Mankind

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Tobacco has been declared by WHO as a villain who is responsible for causing cancer of various kinds and resulting in millions of deaths throughout the world. It is estimated by recent studies that tobacco when smoked would release about 4000 chemicals out of which 80 have been declared as carcinogens. At the same time, tobacco is being cultivated as a cash crop in various parts of the world and its products are earning a considerable foreign exchange. Like any other medicinal plant, tobacco was found by traditional medical practitioners and folk healers to be a wondrous plant which could treat various ailments and disorders. For this reason, its popularity spread faster than any other medicinal plant. Anything used in excess is poison whether it is food or medicine, which very much applies to tobacco. Research findings have shown that tobacco, though responsible for causing cancer, it has an equal potential to effectively treat serious disorders. Here, an effort has been made to assess the possible injuries and therapeutic value of different species of tobacco by collecting information from various sources.

**PA-061**

## Possible Angiogenic Property of Aqueous Leaf Extracts of *Blumea balsamifera (L.)*

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*Blumea balsamifera* L. is used in Ayurvedic medicine system to treat various health problems. Angiogenesis is the physiological process involving the growth of new blood vessels from pre-existing vessels. The present study was initiated to observe the possibility of angiogenesis in *in vitro* shell less culture of chicken embryo after treatment with aqueous extract of *Blumea balsamifera* L. leaves. The angiogenic property was tested with different concentration (0µg/ml, 50µg/ml, 100µg/ml, 150µg/ml and 200µg/ml) of leaf extract for the period of 3h, 6h and 9 h. There was a gradual increase in angiogenic property (number of capillary sprouts) proportionally with increase in concentration. Maximum capillary sprouts were observed after 9 hrs of treatment period for each concentrations tested. The present study shows that *Blumea balsamifera* L. leaves can be utilized in formulating drugs for healing wounds.

**PA-065**

# Ascertaining Anti-Inflammatory and Analgesic Activity in Aqueous Leaf Extract of *Anisomeles indica* (L.) Kuntze

R Parmar, S Yadav, S Chakraborty[1], R S Ingalhalli and M Pithawala*

C G Bhakta Institute of Biotechnology, Uka Tarsadia University, Tarsadi, Dist: Surat-394350, Gujarat, India
[1]SSR College of Arts, Commerce and Science College, Syali Road, Silvassa, india
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The anti-inflammatory and analgesic properties of aqueous extract of *Anisomeles indica* leaves were studied. Anti-inflammatory effect was studied in rat model using carageenan induced paw edema in which aspirin 100mg/kg as standard drug and aqueous extract of *Anisomeles indica* leaves at 250mg/kg were administered orally to rats 1 shr before induction of carageenan and compared with a negative control group given 10ml/kg distilled water. Using the similar dose of plant extract the analgesic activity of the aqueous extract of *Anisomeles indica* leaves were also studied by tail immersion method in which 100mg/kg diclofenac as standard drug and 10ml/kg distilled water was used for negative control group. The results showed maximum anti-inflammatory effect and analgesic effect after 4 hr. The results indicate that *Anisomeles indica* has potential in phytomedicine.

**PA-072**

## Antibacterial Activity of Extracted Bio-Pigments from Natural Sources

Mehta Mansi and Shah Gaurav*

Department of Biotechnology Course, V.N.S.G.U., Surat, India
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Among natural pigments, pigments from microbial sources are potentially alternative ones to synthetic pigments. Naturally isolated micro-organisms M1 & M2 were used for the production of green & red pigments respectively. The optimum conditions for the pigment production were determined. It was observed that selected micro-organisms gave higher production of pigments at 25 °C under aeration at 150 rpm for 72 h using specified media. The pigments were extracted using ethyl acetate and were confirmed by Thin Layer Chromatography. M1 have shown the antibacterial activity against *Staphylococcus aureus* and *Salmonella paratyphi B.* with 9 mm & 15 mm diameter inhibitory zone respectively. M2 pigment gave 10 mm & 13 mm diameter inhibitory zone against *Escherichia coli* and *Staphylococcus aureus* respectively. Results suggest the possibility of using extracted pigments, from respective microbial source, to be used as very effective bio-control agent.

# PLANT BREEDING, GENETICS & BIOTECHNOLOGY

# Invited Talk

(Summary)

**Name:** Dr. P. Manivel

**Designation:** Principal Scientist & Director (Acting)

**Address:** Directorate of Medicinal and Aromatic Plant Research, Boriavi, Anand, Gujarat 387 310

**Qualification:** M.Sc. Plant Breeding and Genetics,
Tamil Nadu Agricultural University, Coimbatore
Ph.D. Plant Breeding and Genetics,
Tamil Nadu Agricultural University, Coimbatore

**Experience:** Research 22 years

**Publication:** Research articles: 96
Reviews articles: 10
Books/ Chapters: 10

**Conference:** Organized:
- National: 3

Attended:
- National: 20
- International: 6

**Research projects handled / ongoing:** 9

**Membership:** Life member: 14

**Awards and Honours:**

- **Fellow**: National Academy of Biological Science (NABS), Chennai; Indian Society of Genetics and Plant Breeding, New Delhi. (Professional Society); National Academy of Science, India (NASI), Allahabad
- **Gold medal** for the best research paper: Indian Potato Association awarded the best research paper medal for the year 2004
- Best Citizen of India award: International Publishing House, New Delhi during 2011
- Leading Scientist of the World 2011 award: The International Biographical Centre, Cambridge, England
- Editorial Member: Electronic journal of Plant Breeding and Legume Research-An international Journal
- Referee (Honorary): Agricultural Research Communication Centre, Hisar
- Secretary, QRT for DMAPR, Anand: Indian Council of Agricultural Research (ICAR)
- Reviewer of more than 10 journals
- Best Poster Award: 3

# S-09

## Medicinal Plants Breeding: Status and Future

P Manivel* and R Nagaraja Reddy

Directorate of Medicinal and Aromatic Plants Research, Boriavi-387310, Anand, Gujarat, India
**Email:** manivelp@yahoo.com

Medicinal plant cultivation has received an impetus in the recent years due to revival of interests and increasing demand in herbal medicines. Most of the medicinal plants are harvested from the wild unsustainably which is causing erosion of genetic diversity and habitat destruction. Apart from ensuring income to the cultivators, cultivation of medicinal plants (MP) offers opportunities to overcome the problems that are inherent in the herbal extracts such as misidentification, genetic and phenotypic variability, extract variability and instability, toxic components and contaminants. Lack of novel plant varieties of high yield, quality as well as resilience to changing climatic conditions is one of the challenges in MP cultivation. High yielding varieties have been developed for a few number of high value MP through conventional breeding methods viz., selection and pedigree breeding. This number is less, when compared to food crops. Future breeding programmes need to focus on, i) collection and *ex-situ* conservation of medicinal and aromatic plants from fields/botanical garden & generating gene banks, ii) characterization, evaluation and utilization of germplasm for various traits of interest, iii) enhancement of germplasm for traits of importance, iv) breeding for high yielding chemotypes, resistant to pests and diseases, adaptable to the changing climate possessing any other novel traits, and v) standardization of quality seed and planting material production technologies for different MPs. Application of biotechnological tools will expedite the development of varieties and facilitate plant variety protection in the IPR regime.

**Name:** Dr. Oladiji, Adenike Temidayo

**Designation:** Professor

**Qualification:** M.Sc. - University of Ilorin, Nigeria
PhD - University of Ilorin, Nigeria

**Experience:** Research 23 Years
Industrial 2 Years
Teaching 22 Years

**Publication:** Research articles: 75
Reviews articles: 5
Books/ Chapters: 2

**Conference:** Organized:

- National: 6
- International :4

Attended:

- National:16
- International:10

**Research projects handled / ongoing:** 6

**Membership:**

- Organisation for Women in Science for the Developing World
- Nigeria Society for Biochemistry and Molecular Biology
- Nigeria Society for Experimental Biology
- Science Association of Nigeria
- International Society for the Study of Fatty Acids and Lipids
- Awards and Honours: Israeli Agency for International Development Cooperation, MASHAV, 2011
- University of Ilorin Staff Development Award, 1995
- Federal Government Scholarship, Nigeria, 1990

**S-10**

## Nigerian Medicinal Plants: Prospects and Challenges

Adenike T. Oladiji

Centre for Research Development and in House Training, University of Illorin, P.M.B 1515, Illorin, Nigeria
**Email:** temidayooladiji@yahoo.com

Medicinal plants contain substances that are of therapeutic purpose or precursors for synthetic drugs. They have been found useful in several ways. Their use in Nigeria goes far back to the times of our ancestors in their attempt to treat disease and relieve physical sufferings. The first act of healing was practiced in the Yoruba speaking part of Nigeria by Orunmila. Knowledge of medicinal plants has continued to be useful in the production of drugs, food, spice, perfume and preparation of surgical dressings. The beneficial medicinal effects typically result from the combination of secondary products present in the plant. That the medicinal actions of plants are unique to particular plant species or groups is consistent with this concept as the combinations of secondary products in a particular plant are often taxonomically distinct. During the past decade, there has been a revival of interest and use of medicinal plant products in Nigeria. Several publications have reported pharmacological activities of Nigerian medicinal plants in model diseases. The current explosion in the production of sophisticated equipment has made the discovery and development of drugs from bioactive compounds in medicinal plants relatively easier. Thus, the isolated compounds provide basis for the rational design of chemical compounds targeted to specific molecules. However, this product of technology is yet to be fully explored in Nigeria because of high cost of purchase and maintenance as well as lack of regular funding of research. This talk therefore intends to provide available information on the current state of medicinal plants in Nigeria, its prospects and challenges.

**Name:** Dr.MLM ChandrikaDissanayake

**Designation:** Senior Lecturer

**Address:** Faculty of Agriculture,
Sabaragamuwa University of Sri Lanka,
Belihuloya, Sri Lanka

**Qualification:** M.Phil. (Plant Protection), University of Peradeniya, Sri Lanka
PhD (Molecular Plant Pathology), Tottori University Japan

**Experience:** Research 17 years
Teaching 15 years

**Publication:** Research articles: 20
Books/ Chapters: 01

**Conference:** Organized:

- National:02
- International: 01

Attended:

- National : 03
- International:06

**Research projects handled / on-going:** 03

**Awards and Honours:**

- JASSO follow-up Research fellowship 2013. Laboratory of Molecular Plant pathology Department of Biological & Environmental Sciences, Faculty of Agriculture, Yamaguchi University, Japan. From September 2$^{nd}$ to November 30$^{th}$ 2013
- Research excellence Award in plant Pathology Sabaragamuwa University of Sri Lanka, 2011
- Japanese Government (Monbukagakusho) Postgraduate Scholarship on merits from Japanese government, Japan, 2005
- International Accreditation as a Teacher in Higher Education by Staff and Educational Development Association (SEDA) of Oxford University, United Kingdom, 2003
- Short term award to training in Insect pests and disease of Strawberry Conducted by Hort Research institute New Zealand in New Zealand 2000 (26$^{th}$ October to 20$^{th}$ November)

# S-11

## Development and Feasibility of Medicinal Plants as Plant Protectants in Sri Lanka

MLM Chandrika Dissanayake

Department of Export Agriculture, Faculty of Agricultural Sciences,
Sabaragamuwa University of SriLanka, Belihuloya, SriLanka
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Medicinal plants are the richest bio-resource for drugs of traditional systems in medicine, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs. The great public awareness of environmental and health issues has stimulated an increasing demand to shift away from the reliance on conventional pesticides to control pest and diseases of crops. In this regard, medicinal plants provide an enormous bioresource of potential use in crop protection form pests and diseases due to their antimicrobial activity, insecticidal activity, systemicity as well as biodegradability. The use of botanical pesticides is now emerging as one of the prime means to protect crops and their products and for mitigating many of the side effects of synthetic pesticides. The plant species used by the farmer as botanical pesticides include *Gliricidia* spp, *Adathoda* spp, Neem or *Margosa* spp, *Lantana* spp, *Calotropis* spp, *Datura* spp, Marigold, Garlic, *Pongamia* spp, *Anona* spp etc. However, a few plant species have been thoroughly tested in the laboratory to indicate their potential usefulness as crop protectants. Over the last two decades intensive effort has been made by Sri Lankan scientist to discover chemically useful antibacterial or antifungal compounds of medicinal plants against plant pathogenic microbes. They have studied more than 100 medicinal plant species for their antifungal and antibacterial against plant pathogenic microbes. Medicinal plant based biopesticides have antiseptic action, disintegration of cytoplasmic membrane, destabilization of the proton motive force (PMF), electron flow, active transport and coagulation of the cell content and retard or accelerate development or interfere with the life cycle. Future research on medicinal plants as crop protectants in Sri Lanka should focus on optimal methods of using plant protectants on durable products at the farm level, development of the most cost-effective procedures for application, as well as identifying the active components, safety standards and the development of commercial products at a reasonable cost.

**Name:** Prof. Dr. R. Krishnamurthy

**Designation:** Director, CGBIBT, Uka Tarsadia University
Dean, Faculty of Science, UkaTarsadia University

**Address:** C.G. Bhakta Institute of Biotechnology
Uka Tarsadia University
Dist: Surat, Bardoli-394 350
Gujarat, India

**Qualification:** M.Sc. Botany from University of Madras
PhD Botany from M.S. University of Baroda

**Experience:** Research 14 years with Zandu group
Teaching 14 years

**Publication:** Research articles: 83
Reviews articles: 15
Patent: 2 Patent filed; 1 Patent sanctioned; 1 European patent already sent

**Conference:** Organized:

- National: 4
- International: 1

Attended:

- National :15
- International : more than 5

Farmers and Entrepreneur training programme: 16

**Research projects handled:** 6 (Govt of India sponsored)
3 (international company sponsored) completed

**Ongoing:** 1

**Membership:** 5

**Awards / Honours and Scholarship:**

- Transfer of technology to industry best project award by Department of Biotechnology in 2002
- Scholarship by UGC-JRF; CSIR-SRF; CSIR-RA; CSIR-scientist pool officer
- Visiting professor to the University of Ilorin, Nigeria
- Collaborative joint project on establishing commercial Tissue culture Laboratory with University of Ilorin

## S-12

### Field Trials on Large Scale Cultivation of Some Important Medicinal Plants

R. Krishnamurthy*, M.S. Chandorkar[1], J.M. Pathak[1], Rajendra Gupta[1] and R.S. Ingalhalli

C G Bhakta Institute of Biotechnology, Uka Tarsadia University, Maliba Campus, Bardoli, Di. Surat-394350, India
[1]Zandu Foundation For Health Care, Ambach, Valsad-396145, Gujarat, India
**Email:** Krishnamurthy@utu.ac.in; krishnashanti@gmail.com

Zandu Foundation for Healthcare (ZFHC) is a non-profit organization established to conserve and commercialize important medicinal plants. A number of medicinal plants collected from various places in India are maintained for further studies. ZHFC, Ambach is located in Valsad district of Gujarat. The place has rich clayey loam soil. A lot of seasonal variation in environmental conditions with respect to rainfall, light intensity, average temperature and relative humidity is observed. Nine different species of important medicinal plants which have been widely utilized in the manufacture of various ayurvedic products have been selected for field trials. The field trials have shown the feasibility of growing these plants on a commercial scale by the farmer as a means of livelihood. The average yield of each one of these crops under irrigated and non-irrigated conditions was noted.

# Oral Presentation

**OA-004**

## Standardization of Avarttani (*Helicteres isora* Linn Stem Bark)-An Ayurvedic Drug

J. Shashikanth and P. Ramachandra Reddy*

Plant Anatomy and Taxonomy Laboratory, Department of Botany,
Osmania University, Hyderabad-500007, India
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*Helicteres isora* L. popularly known as 'Avarttani' belongs to Sterculiaceae family. The stem bark is extensively used in Indian system of medicine. The stem bark is useful in skin diseases, dysentery, piles and diabetes. Standardization and quality control of herbal drugs used in Ayurveda is essential for their acceptance in the international as well as local markets. Thus, there is urgent need of standardized drugs having consistent quality for reliable beneficial therapeutic purpose. Physicochemical parameters, qualitative analysis, histochemical studies, powder treating with different chemical reagents, Hptlc profile and fluorescence analysis were used for standardization and quality evaluation of 'Avarttani'. Preliminary phytochemical screening reveals presence of alkaloids, phenolic compounds and tannins, saponins, flavanoids and carbohydrates.

**OA-009**

# Antiproliferative Activity of *Ocimum gratissimum(*L.) Leaf Extract on MCF-7 Cell Line and in Sillico Binding Affinity Study of Eugenol, Estradiol with Estrogen Receptor

MG Sumantha, BM Harish, KS Devaraju[1] and ST Girisha *

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The *Ocimum gratissimum* is widely used in traditional system of medicine. Aim of the study was to investigate possible antiproliferative activity of *O. gratissimum* leaf extract in MCF-7 cells. Eugenol found to be a major compound in the extract, further influence of this extract in cyclohexane (10µg/ml) on cell viability and toxicity were evaluated. Cyclohexane crude extract inhibits nearly 50 % of cell proliferation. In addition, possible mechanism of eugenol was interpreted by docking studies to check the binding affinity of Eugenol, Estradiol with Estrogen Receptor. Results shows that Eugenol has similar binding affinity (-1.54/Kcal/mol) compared with Estradiol (-1.768/Kcal/mol). Docking complex of both ligands with Estrogen Receptor share common binding site and some common amino acid residues. This study reveals that Eugenol can act as potent Breast Cancer Inhibitor. Further research is under way to investigate the effect on apoptosis pathways and further characterization of Eugenol compound.

**OA-010**

# Antioxidant Activities of *Hemidesmus indicus* (L.) R.Br. Encapsulated Poly Lactide-Co-Glycolide Nanoparticles

HC Shobha, C Shilpa, N Praveen Kumar, B Jansi Sheela and T Ravi Kiran*

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*Hemidesmus indicus* (HI) belonging to the family Asclepediaceae has been used in Indian system of traditional medicine. The study was aimed to synthesize and characterize the aqueous root extract of HI encapsulated PLGA Poly lactide-co-glycolide nanoparticles and further evaluate its antioxidant properties. The root extract was encapsulated on PLGA by solid-in-oil-water solvent evaporation method to improve the solubility, permeability and stability of the compounds in the extract. Physicochemical properties were characterized by Scanning Electron Microscope, X-ray diffraction and Fourier Transform Infrared techniques. The antioxidant properties of free and encapsulated root extract were determined by DPPH, Superoxide and Hydroxyl radical scavenging assays. The PLGA encapsulated nanoparticles showed reduction in their IC50 values in all the assays. The information obtained for this study facilitates the design and fabrication of polymeric nanoparticles as possible drug delivery system and therapeutic applications.

**OA-028**

# Development of a Multi-Residue Method for the Determination of Pesticide Residues in Indian Senna (*Cassia angustifolia*) using Modified QuEChERS Approach

Vandana Tripathy* and Dilipkumar Patel[1]

Directorate of Medicinal and Aromatic Plants Research, Anand, India
[1]Pesticide Residue Laborator, Anand Agricultural University, Anand, India
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Senna (*Cassia angustifolia*) is a popular medicinal plant of India widely used for its antiinflammatory, laxative properties. India is also the highest producer and exporter of a Senna leaves and pods in the world. Pesticides, which are mainly applied for the protection of plants against pests, may accumulate as residues in medicinal plants also due to agricultural practices and from other contaminated environmental sources such as soil or water. But so far no studies had been conducted to standardize the methodology for the determination of pesticide residues in this popular medicinal plant of India and analyze the samples available in different markets available for the consumers of raw herbal drugs. A simple multi residue was established for the determination of 17 Organochlorine (OC), 16 Organophosphorous (OP) and 7 Synthetic Pyrethroid pesticides in Senna (*Cassia angustifolia*). The control samples of senna leaves were spiked with the pesticide mixtures at the fortification level of 0.01 and 0.1 mg $Kg^{-1}$. The extraction and clean up procedure method based on QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) approach was used for the sample preparation follwed by the analysis on Gas Chromatograph (GC) coupled with Electron Capture Detector (ECD) and Flame Thermionic detector (FTD). The method gave very good recoveries for most of the pesticides (80-120%). The proposed method was successfully applied to determine pesticide residues in 12 commercial market samples obtained from different areas in Gujarat, Rajasthan and Madhya Pradesh. None of the samples were found to contain any pesticide residue.

**OA-029**

# Biochemical Evaluation of Ash Value of Some Medicinal Plants of Genus *Terminalia* (Combretaceae) of Marathwada Region in Maharashtra

Kadam V.B.*, Salve Sunanda B. and Wadikar M.S.[1]

P. G. Department of Botany & Research Centre, K.T.H.M.College, Nasik – 422002, India
[1]Dept. of Botany, Vinayakrao Patil Science College, Vaijapur, Aurangabad, India
**Email:** drvbkadam@yahoo.com

The seasonal variation of total ash, acid soluble ash and acid insoluble ash have been investigated leave, wood and bark of *Terminaliacuneata* Roth., *Terminaliabellirica* Roxb., *Terminaliachebula* Retz. and *Terminaliacatappa* Linn., which are medicinally important. Comparative account of total ash, acid soluble ash and acid insoluble ash content of wood of *Terminaliachebula* showed high level of total ash in summer (12.75%) and low level of total ash of leaves in winter of *Terminaliacuneata*(6.3%). The acid soluble ash showed higher level of wood in summer of *Terminaliachebula*(6.57%) and lower in leaves of *Terminaliacuneata in winter* (3.25%). Comparative account of acid insoluble ash of wood of *Terminaliabellirica in summer* showed higher (6.15 %) and lower in the wood of *Terminaliacuneata* in winter (3.05 %).

**OA-035**

# Antilipidemic Effect of *Styrax benzoin* on Lipid Profile in hypercholesterolemic Albino Rats

Nikhil R. Joshi* and Maya Joshi

Maitree Clinic, Bardoli, Dist- Surat, Gujarat, India
**Email**:drnikhilmaya@yahoo.com

**Objective:**

This study was designed to investigate the effect of *Styrax benzoin* on lipid profile in hypercholesterolemic albino rats. Hyperlipidemia is a condition with the elevated lipid level in blood. The increased lipid level creates compliance to the body such as atherosclerosis. In atherosclerosis, the deposition of cholesterol occurs in the blood vessels this leads to the occulusion of the blood supplied. The well known tropical herb *Styrax benzoin* has been found to be a good hypolipidemic agent for the testimonial of this herb an comparision of effect of *Styrax benzoin* with standard dyslipidemic agent Atorvastatin study is observed has similar hypolipidemic effect.

**Material and Methods:**

Became a Hypercholesterolemia in albino rats by atherogenic diet for 2 weeks. Experimental rats were dividedin to different groups, Normal,control and treated ( 500mg/kg body weight doses for 45 days). After the treatment period of 45$^{th}$ days triglyceride, cholesterol, HDL, LDL to compared with control group.

**Results:**

The aqueous extract of *Styrax benzoin* (500mg/kg) significant reduction in triglyceride, VLDL, total cholesterol, LDL, and increased HDL, in atherogenic diet- induced hypercholesterolemic rats at end of treatment period. Reduction in above parameters was comparable with control group. So that it is effective in controlling Tc, lipid, lipidemic animals.

**Conclusion:**

The results suggest the aqueous extract can be preventing of atherosclerosis in hyperlipidemic patients.

**OA-039**

## *Tecoma stans*: A Naturalised Multipurpose Plant

Mukul Anand* and R. Basavaraju

Department of Biosciences, Sri Sathya Sai Institute of Higher Learning,
Puttaparthi -515134, Andhra Pradesh, India
**Email**: mukulanand@sssihl.edu.in

*Tecoma stans (L.) Juss* is a medium sized tree which has become naturalized in India, though its place of origin is USA. It belongs to the Class – Magnoliopsida, Order – Lamiales and Family – Bignoniaceae. Biotechnological studies on this plant have revealed great potential against diseases such as diabetes, hyperlipidaemia, cancer, liver, ulcers and kidney disorders. Further, very few studies have shown that the plant has good nutritive value and bioactive components with therapeutic potentials. Therefore, there is a pressing need to study this plant which has immense importance to both humans as well as animals. Morphological Data of plant samples collected showed variation in the leaf size, leaf colour and leaf pattern. The qualitative and quantitative data for phytochemicals was also generated for the collected leaf samples. Among the five extracts viz., aqueous, methanol, ethanol, chloroform and hexane, the sample was qualitatively screened and was found to be more extractable in methanol and aqueous extracts and showed the presence of alkaloid, polyphenols, flavanoid, anthocyanins, tanins and saponin, whereas the chloroform and hexane extracts exhibited the presence of terpenoids and steroids. Quantitative phytochemical screening of leaf sample showed high level of polyphenol, flavonoid, tanins and saponins.

**OA-046**

# Effect of UV-C Radiation on Physiological, Antioxidant and Molecular Properties of *Stevia rebaudiana*

Shailja Dwivedi and Afroz Alam*

Department of Bioscience and Biotechnology, Banasthali Vidyapith, Tonk-304 022 (Rajasthan), India
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Increases in UV radiation at the Earth's surface due to the depletion of the stratospheric ozone layer have recently fuelled interest in the mechanisms of various effects it might have on organisms. In our experiment, effect of UV-C (most hazardous for organism) was observed in the *in-vitro* regenerated antidiabetic sweetener plant *Stevia rebaudiana* on the basis of physiological, biochemical and molecular level. Although previous researchers have revealed germicidal and hermetic effect of UV-C but in present research it was found that a number of poles apart outcomes in *in-vitro* regenerated plants of *Stevia rebaudiana* after total time duration of exposure (in min) of 1.3 $kJm^{-2}$ for 1.75 min, 2.4 $kJm^{-2}$ for 3.23 min, 3.6 $kJm^{-2}$ for 4.83 min, 4.8 $kJm^{-2}$ for 6.45 min, and 7.5 $kJm^{-2}$for 10.10 min. and non-radiated control (0 $kJm^{-2}$). Maximum number of shoots (11-14) were found in the culture treated for 3.6 $kJm^{-2}$ for 4.83 min while the maximum shoot length (19.5 cm) were obtained in the non treated plants after 15 days. All the antioxidant enzymes increased in the plant treated with 3.6 $kJm^{-2}$ for 4.83 min of radiation but the amount of GR and the amount of stevioside (diterpene glycoside) shows continues decrease in proportion of increasing treatment of UV-C. Several polymorphic bands were found within 3 out of 15 RAPD primer used. On the basis of these observations it can be concluded that the UV-C affects the physiological as well as molecular characters of *Stevia rebaudiana* and shows dwarfism in plant, with decrease amount of stevioside quantity as increasing the time of UV-C exposure.

**OA-057**

# *De Novo* Transcriptome Analysis of Senna (*Cassia angustifolia* Vahl.) to Identify Genes Involved in the Biosysnthesis of Sennosides

Rucha Mehta, P. Manivel and R. Nagaraja Reddy*

Directorate of Medicinal and Aromatic Plants Research, Boriavi-387310, Anand, Gujarat, India
**Email**: gpbreddy@gmail.com

Senna (*Cassia angustifolia* Vahl.) is an important medicinal plant cultivated in India. Leaves and pods are widely used as a laxative in Ayurveda, Sidda and Unani systems of medicine. The laxative property of senna is attributed to the presence of sennosides. Sennosides are the anthraquinone glycosides present in the leaves and pods of senna. To identify genes involved in the biosynthesis of sennosides, the transcriptome of young and mature leaves were sequenced using illumina MiSeq platform. A total of 91,28,985 and 1,28,97,344 reads were obtained from young and mature leaves, respectively. The mean read length was 143 bp in young and 144 bp in matured leaves respectively. The reads were assembled and a total of 42,230 and 37,174 transcript contigs, respectively were obtained from young and matured leaves transcriptome. The assembled transcript contigs were validated by mapping high quality reads back to the assembled transcript contigs. The average transcript contig length was 1,119 and 1,467 bases, respectively in young and mature leaves transcriptome. Blast hits of 40,138 and 36,349 CDS in young and matured leaves, respectively were obtained. From the Gene ontology (GO) analysis, 25,337 CDS from young and 22,975 CDS from matured leaves transcriptome were annotated with Gene ontology terms. A total number of 53,278 and 48,466 GO terms were enriched for the annotated CDS in young and matured leaves transcriptome, respectively. Maximum numbers of CDS were allocated to molecular functions in both the samples. The WEGO plots plotted based on CDS were categorized into 45 functional groups. A total of 7,504 and 7,618 CDS were enriched in 24 different functional KASS pathway categories in young and mature leaves transcriptomes, respectively. Several genes such as *MenF, MenD, MenH, MenC, MenB, DXR, ISPD, DXPS1, CDPMEK, ISPF, HDS, HDR* involved in anthraquinone biosynthesis were identified. Unravelling the genes underlying biosynthetic pathways will expedite the development of cultivars with high sennoside content.

**OA-058**

# Assessment of Seedling Growth, Biochemical Characteristics and Protective Enzymes in Safflower Seedlings (Variety HUS-305) under Copper Stress

Sanskriti Gautam and Nidhi Srivastava*

Department of Bioscience and Biotechnology, Banasthali University, Rajasthan-304022, India
**Email**: nidhiscientist@gmail.com

Our work was conducted to examine the effect of increased concentration of copper on safflower (*Carthamus tinctorius* L.) seedlings in hydroponic medium. This experiment used nutrient solution with different concentrations (0, 50, 100µM) of copper sulphate ($CuSO_4$) as heavy metal stress. The plant samples were harvested after every $10^{th}$ and $20^{th}$ days. Results indicate that root length was found to be increased at low concentration of copper while the shoot length was found to be decreased at both concentrations. Also it leads to decrease in fresh and dry weight of plant followed by decline in total chlorophyll and carbohydrate content. The copper treatment resulted in hyper accumulation of proline and polyphenol content in safflower seedlings. Also, the flavonoid content was found to be increased in response to copper stress. At high concentration of copper, an increase in Phenylalanine ammonia-lyase (PAL) activity was observed. These results suggested that copper has dose-dependent effect on chlorophyll, proline, flavonoid, PAL activity, polyphenol content in Safflower (*Carthamus tinctorius* L.). Our assumption is in line with the previous studies.

**OA-060**

# Creating Performance Textiles via Simultaneous Dyeing and Antimicrobial Finishing of Cotton Substrate with Medicinal Plant Products

Bhavik D. Sarvaiya and Bipin J Agrawal*

Department of Textile Chemistry, Faculty of Technology and Engineering,
The M. S. University of Baroda, Vadodara 390 001, India
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Wellness is by long more than just a buzzword for wellbeing, vitality and fitness. In today's world, people are very much conscious about their hygiene and they want to protect their body with diseases and harmful effect of the environment. Clothing is considered to be our second skin. Therefore designing of wellness hygienic textile would be more advisable in today's scenario. Use of natural herbal dyes, derived from various herbal and medicinal plants, and other natural herbal products could be more advantageous to design hygienic wellness textile, which can protect the human's body from various diseases. Textile dyeing and functional finishing are two necessary and traditional separated processes employed in textile wet processing. Both these processes not only consume large quantities of water and energy, but they also add to the pollution load because of varieties of dyes, chemicals and auxiliaries used for performing them. Therefore, simultaneous dyeing and finishing in one bath could probably reduce both the cost of production and consumption of valuable resources. Natural herbal products, derived from plants having medicinal values, have been utilized for dyeing and finishing of cotton fabrics. Natural dyes used in this research work is Madder (*Rubia Cordifolia*) while the natural finishing agents used is aloevera; both products possess extraordinary antimicrobial properties. The application onto cotton substrate has been done by pad-dry-cure dyeing technique. The colour strength of the dyed samples was evaluated in terms of *K/S* values, measured spectrophotometrically. Various fastness characteristics of the dyed samples as well as wear comfort properties of the finished samples have been assessed using standard techniques. Clinical examination is also performed under the supervision of Ayurvedic practitioner for six weeks to visualize the impact of created fabric on patients suffering from skin diseases. This approach of designing hygienic wellness textile could be of great help to the humanity.

**OA-069**

# HPTLC and Bioautography Evaluation of *Casuarina equisetifolia* Extracts

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*Casuarina equisetifolia* L. (Casuarinaceae), a tree with drooping branches and needle-like branchlets, is a widespread tree. Being a source of biologically active phytoconstituents, it strongly dispalys antimicrobial properties. However, there are not many reports about its activity against Salmonellosis. Thus, in the present investigation, the screening of the antimicrobial activity of extracts of *Casuarina equisetifolia* was conducted by an agar well diffusion test against identified *Salmonella* spp. The most active extracts (inhibition diameter 16 mm) were assayed for the minimum inhibitory concentration and submitted to phytochemical screening by high performance thin-layer chromatography and bioautography. The results obtained indicate that the methanol extract possesses the most efficient antimicrobial compounds and the activity was more pronounced against *Salmonella typhi*. Further, bioautography evaluation showed that the antimicrobial activity was probably due to tannins. One of the tannins, Casuarine, was also checked for its drug-likeliness using Lipinski's rule of five and can be considered as an active pharmacological molecule. To the best of our knowledge, this is one of the rare reports that document the antimicrobial activity of tannins from *Casuarina equisetifolia* against *Salmonella* spp.

**OA-070**

## Antimicrobial Activity and Nutritional Value of Biofertilizer Treated Medicinal Plants

H Patel, R.Krishnamurthy* and P. Naidu

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The antimicrobial activities of biofertilizer treated three medicinal plants extracts were evaluated by comparing minimal inhibitory concentrations (MICs) against *Serratia marcescens,* multidrug resistant *Staphylococcus aureus, E.coli* and *Bacillus cereus.* The present study is aimed to confirm increased bioactive phytochemical component of biofertilizer treated medicinal plants is responsible to show antimicrobial activity against pathogenic microorganisms. The nutritional value of three medicinal plants were also evaluated by testing carbohydrate and protein content of the plant after giving treatments of various biofertilizers. Different treatments showed varying results in the concentration of carbohydrates and proteins

# Poster Presentation

**PA-004**

## Antibacterial Activity and Phytochemical Screening with UV-VIS and FTIR Spectroscopic Analysis from Leaves of Different Accessions of *Acorus calamus* L.

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*Acorus calamus* L. (Sweet flag belongs to family Araceae) is a wetland perennial monocot medicinal plant known for various medicinal properties, perfume and cosmetic industries. The present study aims to investigate leaves of twelve accessions of *A.calamus* for phytochemical screening and antimicrobial activity against five different bacteria. The presence of bioactive compound in essential oil was confirmed by UV-VIS and FTIR spectroscopic analysis, which is considered as responsible for antibacterial activity against tested organisms. UV-VIS Spectral analysis data for essential oil of *A. calamus* L. showed maximum absorbance peak ranges between 207 - 303nm in all accessions. FTIR Spectra of all the accessions showed peaks in the range of 587.72- 2996.41 $cm^{-1}$ which could be the OH group of phenolic compound present in the samples, FTIR peaks of essential oils almost resemble to the fingerprint region in a spectrum profile of standard β-Asarone(Sigma-Aldrich). The essential oil of various accessions of *A.calamus* was studied for its antibacterial activity against *Staphylococcus aureus, Escherichia coli, Bacillus subtilis, Bacillus megaterium* and *Enterobacter aerogenes.* Antibacterial activity was performed by disc diffusion method in MH agar. The oil extract showed significant effect on the tested organisms. The oil extract showed maximum zone of inhibition against *B. subtilis* (12.0±8.0), whereas, lowest against *E. coli* (10.0±7.0). It had shown no activity against *E. aerogenes*. The oil extract of DHW sample showed maximum relative percentage inhibition against *B. subtilis* (56.50 %) and SHI sample showed lowest relative percentage inhibition against *E. coli* (7.75 %). Minimum Inhibitory Concentration (MIC) was measured by disc diffusion method. Oil extract of all accessions showed 8.0µg/µl MIC values for *S. aureus, E.coli, B.subtilis* and *B.megaterium*.

**PA-009**

## A Comparative Study of Formononetin and Biocahnin-A on Osteoblastogenesis *In Vitro*

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Osteoporosis is a major debilitating disease that affects mainly the women population in the post menopausal age. Bone tissue in the adult is continuously being remodelled and overall bone mass is maintained a constant by the balance between osteoblastic bone formation and osteoclastic resorption Ovarian hormone deficiency is the major risk factor for decreased bone mass and increased bone fragility in osteoporosis. HRT (Hormone replacement therapy) is considered as the mainstay treatment for osteoporosis but this is reported to increase the risk of breast cancer incidence. Other antiosteporotic drugs available in the market also cause an array of painful side effects. This has stimulated the interest in the clinical development of SERMs (Selective Estrogen Recptor Modulators) as antiosteoporotic agents. The aim of the present investigation is to study the effect of Formononetin and Biochanin-A on the proliferation of human osteoblast-like cells MG 63. Cell growth was assessed by MTT, Sulforhodamine B, Crystal violet, Neutral red dye uptake, NBT reduction and Trypan blue dye exclusion tests and cell proliferation by Brdu incorporation test, Cell morphology by phase contrast microscopy analysis. Results indicate the prostimulatory effects of formononetin at 2.75 µg and biochanin A 1.75 µg on MG 63 cells. Further studies are ongoing in the laboratory to support the hypothesis.

**PA-016**

# Cytoprotective Effects of *Decalepis hamiltonii* Root Extract and its Isolated Compounds against $H_2O_2$ Induced Oxidative Stress in Cardiac H9c2 Cells

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*Decalepis hamiltonii* (*D. hamiltonii*) popularly known as swallow root belongs to the family Asclepiadaceae. The roots are used in Indian traditional medicine for their alleged health benefits are rich in polyphenols such as Ellagic acid (EA) and 4 Hydroxy isopthalic acid (4HIA). The present study was aimed to investigate the protective effects of aqueous root extract of *D. hamiltonii* and its compounds on $H_2O_2$ induced oxidative stress in H9c2 cardiomyocytes. The H9c2 cells were incubated with different concentration and time intervals with *D. hamiltonii* extract, EA and 4 HIA respectively. The MTT assay, LDH activity and caspase 3 activity were performed to evaluate cell viability and cell apoptosis. The $IC_{50}$ value was found to be 200µM. Our studies revealed that the pretreatment of *D. hamiltonii*, EA and 4 HIA showed protection against $H_2O_2$ induced oxidative stress in dose dependent manner. Preincubation with extract and its compounds decreased the release of LDH by enhancing the protection mechanism. The activity of caspase 3 when measured colorimetrically, the pretreated cells with compounds prior to the addition of $H_2O_2$ inhibited caspase 3 activation significantly. Therefore, our study demonstrated that *D. hamiltonii* and its compounds have high antioxidant capacity and protects the cells effectively against $H_2O_2$ induced cytotoxicity

**PA-020**

## Reproductive Biology of *Oenothera biennis* L.

Usha Thakur, Bhupender Dutt*, S S Sharma and K R Sharma

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*Oenotherabiennis* L., is commonly known as 'Evening Primrose' as flowers open in the evening. Evening primrose is important because of its seeds contains an oil i.e. Evening Primrose Oil (EPO). The EPO is characterized by its content of gamma linolenic acid (7-10%) (GLA), the precursor of prostaglandin E1 and its derivatives. The oil is used in preparation of medicines, nutrients dietary supplement, health products and cosmetics. It has also been used for a wide range of conditions including premenstrual syndrome (PMS), mastalgia, atopic eczema, rheumatoid arthritis. It is an annual herbhaving adventitious type of root system and a reduced stem with rosette of simple radicle leaves and after about 1 month growth, emergence of branched, single flowering shoot bearing cauline leaves.Inflorescence is racemose type (spike) and flowering continues for about 3 months.Pollen dehiscence occurs in the morning in closed condition and the stigmatic lobes remain compact above the anthers till anthesis. Stigma radiates and turns receptive at the time of anthesis on the same day in the evening and remains so till next day afternoon i.e. the flower is protandrous. The species is mostly cross pollinated and is carried out by insects during both day and night. It is both cross as well as self-compatible.

**PA-025**

## *In Vitro* Antiproliferative and Apoptotic Activity of *Lantana camara* on HeLa Cells

Khanjan Vaishnav and Linz-Buoy George*

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Thousands of herbal and traditional compounds are being screened worldwide to validate their use as anti-cancer drugs. Natural compounds have got the capacity to prevent, inhibit or reverse carcinogenesis or prevent the development of invasive cancer. Our present study holds special significance in aiming to develop new and cost effective anticarcinogenic drug against cancer cell lines *in vitro. Lantana camara* has been used since centuries in Ayurvedic system of medicine for treating various ailments. In the present investigation, we showed that *Lantana* extracts significantly inhibited the proliferation and reduced the viability of HeLa cells. HeLa cells were treated with the hydroalcoholic extract of *Lantana camara* in a dose dependant manner and its effect on the proliferative capacity of the cells was determined using MTT assay. The viability was evaluated by trypan blue exclusion assay after treatment with the extract along with the untreated cells. Quantitation of DNA fragmentation was carried out by diphenylamine colorimetric method. Cells were treated with the $IC_{50}$ value *Lantana* extract and DNA was isolated and the fragmentation was examined on the Agarose gel along with the DNA of untreated control cells. The extract inhibited growth and proliferation of HeLa cells through cell death, which was dose and time dependant. The dose dependent increase in the percentage of DNA fragmentation and fragmentation pattern observed on the agarose gel suggests that apoptosis was involved in *Lantana* extract induced cell death and apoptosis might have played a role in cancer chemopreventive action of the extract. Although we need further study of chemotherapeutic effect of this plant extract, these results raise the possibility that hydroalcoholic extract of the plant *Lantana camara* might be a suitable chemotherapeutic agent for treatment of various cancers.

**PA-043**

## Plantibodies: Unravelling the Mystery

Payal Chaudhary, Persis Thomas, Sabila Shaikh and Preethi Naidu*

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**Plantibodies**- the emerging concept in the field of controlling diseases comprises of two parts – Plants + Antibody. The high level histological organization of animals limits the expression of antibody producing genes. Antibodies can be used for human use without any interaction of any types so we explore plant proteins for formation of antibodies for human purpose. These plantibodies are formed by various methods like conventional method, cell tissue culture method, breeding and sexual crossing etc. These are further purified by various methods like RIA (Radioimmunoassay), ELISA (Enzyme linked immunosorbant assay), immunofluorescence, blotting analysis etc. Recently, a recombinant monoclonal antibody for Rabies prophylaxis and Ebola virus was produced in transgenic plants - tobacco and research is still going on. In near future, plantibodies have major thrust to control diseases through optimized gene isolation and expression especially in sub cellular environment and would turn immunomodulation as a powerful tool for gene inactivation, complementary-classical antisense and co-suppression approaches.

**PA-056**

# Anti Microbial, Antifungal and Anti Oxidant Activity of Ethanolic Extracts of *Garcinia indica* Fruit

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The intention of the present research was to evaluate the *in vitro* anti microbial, anti fungal and antioxidant activity of the methanolic extract from fruit of *Garcinia indica* collected. They were examine for the *in vitro* antibacterial activity against 2 Gram-positive *Bacillus subtilis* and *Staphylococcus aureus* and 2 Gram-negative bacteria *Pseudomonas aeruginosa* and *Escherichia coli*, using agar well diffusion method and antifungal activity for *Aspergillus niger* and *Candida albicans* was estimated, using agar well diffusion method. The antioxidant activity was determined by DPPH assay. The minimum inhibition concentration of the *Garcinia Indica* methanolic extracts was 0.5 mg/mL for *Escherichia coli*. The growth of *Bacillus subtilis* with the maximum zone of inhibition of 2.6mm the slightest zone of inhibition of 0.7mm on *Staphylococcus aureus* and in fungal 12.0 mm in *Candida albicans* and nil in *Aspergillus niger*. The methanolic fruit extract of Garcinia indica demonstrated antioxidant potential dose dependently with best activity at 100 μg/ml. The results obtained from this study specify that fruit of *Garcinia indica* extract has both antifungal and antibacterial properties and has a potential for use as a biopreservative in food applications and can be used as therapeutic agent and antioxidant thus could prevent many radical diseases and could be used as neutraceuticals.

**PA-066**

# Anti-clastogenic Activity of *Alstonia scholaris* against Bleomycin-Induced Damage in Cultured Human Lymphocytes: An *In Vitro* Comparative Assessment

Dhruti Mistry and Meonis Pithawala*

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Radiation has been considered a mystery and its use for therapeutic and other purposes till date, is linked with some skepticism. Development of radio-protective agents has been a subject of intensive research in recent years and certain plant products could bridge the gap for radio-protectors. Protection against radiation-induced DNA breaks is an important aspect in designing and developing radio-protectors. In the present study, comparative possible ameliorative efficacy of aqueous extracts of *Alstonia scholaris* bark, stem and leaves was studied against radiomimetic drug - Bleomycin induced cytogenetic alterations in cultured human lymphocytes *in vitro*. The results revealed that aqueous extract of *A. scholaris* bark (50µg/ml) showed radio-protective effects on cytogenetic alterations induced by Bleomycin (15µg/ml). In comparison, the aqueous extracts of stem and leaf at the same concentrations failed to show any such radio protection. Therefore, bark of *A. scholaris* could be further exploited to identify and bring out front line radio protective agents in the market with effective formulations.

**PA-067**

# Biosorption of Lead (II) Ions from Aqueous Solution by Dried Leaf of ARDUSI (*Adhatoda vasica)*

Manuel Christi and Sandhya Kiran*

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*Adhatoda vasica* is very important medicinal plant used in treatment of bronchitis, asthma and dental ailment and various other diseases besides its medicinal use it can also be used for cleaning up environment like removal of lead from water by dried leaves of *Adhatoda vasica*. The biosorption percent of Lead (II) ions onto dried leaves was measured at different pH and different contact time. It was found that the 99.8% of biosorption took place at neutral pH and as the contact time increased it was found that biosorption was also increased. However after certain time the treatment of leaves using alkali resulted in an increase in the biosorption. The treated leaves were found to be suitable and potential for removal of Lead from aqueous solution.

**PA-070**

## Production of Ethanol from Fruit Waste for use as alternative Biofuel

Tamakuwala Tanvi and Shah Gaurav*

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Fruit processing industries produce large amount of waste materials which possess considerable disposable problems leading to pollution. Various substances used for the study were peels and pulp of banana, mango and papaya to produce ethanol using *Saccharomyces cerevisae.* Dextrose was replaced by various substrates (fruit wastes) in Yeast Peptone Dextrose medium. Ethanol production after 48 h of incubation in case was mango pulp was found to be 275 mg/mL and in case of banana production was found to be 225 mg/mL and highest ethanol production was found to be 300 mg/mL from papaya pulp indicating it's potential to be used as either biofuel or industrial solvent.

**PA-071**

## Biofuel Production from Waste Material using Chemical and Enzymatic Treatment

More Bhikhu and Shah Gaurav*

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Due to over use of traditional fossil fuels and the increasing price of petroleum together with environmental concerns, the search for alternative renewable fuel has attracted great attention in recent year. Our study includes utilization of saw dust to produce an ethanol. Saw dust was treated using chemicals like NaOH and $H_2SO_4$, crude Cellulase enzyme as well as hot water in various combinations. After treatment for 2 h, liberated sugar was measured by 3, 5-Dinitro Salicyclic Acid method. Highest saccharification was observed in case of 0.1% NaOH along with crude Cellulase enzyme. After neutralizing, broth was used as a fermentation medium. After 48 h ethanol production was found to be 46.5 mg/mL from saw dust using 0.1% NaOH along with crude Cellulase enzyme.

**PA-073**

## Antifungal Activity of *Guizotia abyssinica* Plant Extract against Economically Important Fungi

Poonam Yadav and Nagesh Chirumamilla

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The antifungal activity of the methanol extracts of six genotypes of *Guizotia abyssinica* (L.F) cass. belonging to Asteraceae family is reported. Plant extracts were screened for their fungistatic, fungicidal activities and minimum inhibitory dilution (MID) against two economically important fungi (*Fusarium oxysporum and Trichoderma spp.*). The media was amended with methanol and a recommended fungicide for the respective fungal strains as negative and positive control. Results showed that radial growth in the tested organisms was significantly impaired by the addition of extracts in the culture medium used. The test fungi differed in their susceptibility to the different extracts. The results showed minimal inhibitory concentration (MIC) was 5% (v/v) for plant crude extracts. After six hour immersion, some of the plant extracts showed more than 80% fungal inhibition. The present study revealed that the methanol crude extract of *Guizotia abyssinica* (L.F) cass. exhibit a strong fungistatic and fungicidal activity against tested fungi. These results support the potential use of plant extracts in the management of diseases caused by tested plant pathogenic fungi.

# PROPAGATION, TISSUE CULTURE & CULTIVATION OF MEDICINAL PLANTS

# Invited Talk

(Summary)

**Name:** Dr. Ravinder Raina

**Designation**: Professor (Medicinal Plants)

**Address:** Department of Forest Products,
Dr. Y S Parmar University of Horticulture and Forestry,
Solan, Himachal Pradesh – 173230, India

**Qualification**: M.Sc. Botany; University: University of Kashmir, India
Ph.D.: Botany; University: University of Kashmir, India

**Experience:** Research 34 years
Teaching 28 years

**Publication**: Research articles: 85
Reviews articles:5
Books/ Chapters: 3 books and 8 book chapters

**Conference: Organized:**

- International : 1

**Attended:**

- National : 35
- International : 5

**Research projects handled**: 8 completed

**Ongoing projects:** 4

**Membership:** Life member of more than 5 associations

**Awards and Honours**:

- Member of the sub group on, "Ornamentals, medicinal and aromatic plants" (Chairman: Dr. AL Chaudhary, Horticulture Commissioner, GOI; Co-Chairman: Dr SPS Khanuja Director CIMAP) for formulating XI (2007 – 2012) plan proposals of Planning Commission, GOI
- Member committee constituted by Secretary DARE and Director General ICAR to work out the minimum standards of higher education ( MSHAE) in terms of infrastructure, laboratories/field facilities, faculty, manpower and other support so as to firm up the guidelines for establishing a college in the SAUs/DUs/CAUs (2013-2014)
- Member of DBT TASK FORCE on "Basic Plant Biology, Agriculture and Frontier Areas" constituted by Secretary, DBT, and New Delhi-for a period of three years (2014-17)
- Scientific referee in several journals
- Vice President, Medicinal and Aromatic Plants association of India (MAPAI)
- Enlisted as outside BSI expert on Medicinal Plants

# S-13

## Conservation Concerns about High Value Temperate Medicinal Plants

Ravinder Raina

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India, one of the mega biological diversity centers in the world, harbors about 15000 plant species, of which about 3000 species have medicinal value. About 1700 plant species have been documented in Ayurveda and modern treatises. The Indian Himalayan region is known for its enormous biological diversity, endemism, rarity and uniqueness of flora. The varying soil type, topography and climate of Himalaya offers favor diversity of medicinal plants, most of which are perennial herbs with short period of growth and remain underground during winter just to sprout again after snow melting. Globally, 4000-10,000 medicinal plants are endangered due to over exploitation and habitat destructions. Almost 120 medicinal plants of Indian Himalayan region are threatened as per the IUCN criteria. Lack of cultivation, specific habitat requirement, narrow/inaccessible distribution and many other inherent limitations like poor seed set/germination, self incompatibility, dioecism, dichogamy etc, have added to their endangered status. The various concerns about the conservation of temperate Himalayan medicinal plant wealth have been discussed so that a sustainable cultivation of these plants is possible.

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**Qualification:** M.Sc. Horticulture, TNAU
Ph.D. Horticulture, TNAU

**Experience:** Research 26 years
Teaching 26 years

**Publication:** Research articles: 120
Reviews articles: 6
Books/ Chapters: 9

**Conference:** Organized:

- National: 5
- International : 1

Attended:

- National: 27
- International:12

**Research projects handled: 16/ ongoing:** 2

**Membership:** 6

**Awards and Honours:** 12

## S-14

### *Gloriosa superba* Cultivation in Tamil Nadu- A Case Study on Technological Intervention Under Participatory Approach

K Rajamani

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Glory lily (*Gloriosa superba*) is a high value medicinal plant cultivated in Tamil Nadu since 1990's with an estimated area of 8000 ha spread over seven districts. About 1000 metric tons (MT) of its seeds are produced in the state every year earning Rs.120 crores. Glory lily is a climber, propagated by tubers and is seasonal (from August - January). Farmers obtain variable yield (ranging from 100 kg to 300 kg of dry seed/acre/year) which is dependent on optimized use of planting material (tuber), soil nutrition, pollination, plant protection and post harvest management. The Tamil Nadu Agricultural University intervened by taking up research in this species. The University prioritized its research based on specific needs of farmers viz., i) germplasm and crop improvement, ii) rapid multiplication of tubers, iii) cost effective pollination methods, iv) fertigation, v) management of pest and diseases, and vi) post harvest techniques. Through these research interventions, farmers realized better income with optimized inputs. Through this participatory approach, the farmers and industry are benefitted.

**Name:** Dr. Dileep Kumar. B. S.

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Council of Scientific and Industrial Research (CSIR),
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**Qualification:** M.Sc. Botany with Plant Pathology
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Ph.D. Botany (Plant-microbe interaction)
Bhavnagar University, India

**Experience:** Research 28years
Teaching 2years

**Publication:** Research articles: 55 Patents 10, Technology 1 to 10 parties

**Conference:** Organized:

- National:1

Attended:

- National : 50
- International:10

**Research projects handled / ongoing:** 20

**Membership:**

- Fellowofmore than six societies
- Life Member ofmore than 10 reputed associations
- Full Member - Association of Food Scientists and Technologists (India), Mysore

**Awards and Honours:**

- H. C. Dube Outstanding Young Scientist Award (2007) - Udaipur, India
- Selected as a participant in the NATO-Advanced Study Institute sponsored 12 day workshop on Novel biotechnologies for biocontrol agent enhancement and management held at Borgo Hotel Le Terre del Verde, Gualdo Tadino (Perugia) – Italy (2006)
- Dr. Biraj Mohan Das Memorial Award (Life Sciences, 2005) -, Guwahati, India
- Researcher Award (2004) -Japan
- SJFR visiting fellowship from Swedish Council of Forestry and Agriculture, Sweden (1997)
- DBT Overseas Associateship (long-term) from Department of Biotechnology, Government of India, New Delhi (1996-1997)

# S-15

## Plant Growth Promoting Rhizobacteria: A Modern Biotechnological Tool to Improve Agricultural Products

Dileep Kumar B. S

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Agricultural land reduction, soil pollution, environmental degradation and diseases are among the many factors hindering agriculture productivity across the globe. Use of naturally occurring free-living rhizobacterial strains, named plant growth-promoting rhizobacteria (PGPR), which can protect and promote plant growth by colonizing and multiplying along the surface or cortex of the root of the introduced plant is found to be safe and a viable alternative choice for crop improvement and disease control. The species belonging to *Bacillus* and *Pseudomonas* are reported to be promising and their exploitation has been in the recent years. These organisms induce systemic resistance in host plants against many agriculturally important diseases. Antibiosis, parasitism, predation, competition and scavenging nutrients and elements, particularly iron, production of hormones and enhancement of defense system are some of the mechanisms these organisms directly or indirectly employ to achieve the targets. In the present work, a number of bacterial strains were isolated from different crop cultivating lands. The isolated strains were selected based on their *in vitro* antagonism against common plant pathogens. Those strains that exhibited antagonism were screened for their ability to promote plant growth and/or disease suppression in tea and pigeon pea under gnotobiotic and nursery condition. The findings encourage the utilization of these strains and/or their bioactive metabolites for growth promotion and induction of systemic resistance against these major root diseases in tea and pigeon pea under field conditions. The results also confirmed the use of PGPR strains as a biotechnological tool for improvement of productivity in modern agricultural practices.

**Name:** Dr. Oyunbileg Yungeree

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**Qualification:** M.Sc., National University of Mongolia
Ph.D., National University of Mongolia

**Experience:** Research 26 years
Teaching 12years

**Publication:** Research articles: 52
Books/ Chapters: 2/1

**Conference:** Organized:

- National:2
- International:1

Attended:

- National- 15
- International- 10

**Research projects handled / ongoing:** - 7/ 2

**Membership:**

National correspondent International Association for Plant Biotechnology, member of the AFOB

**Awards and Honours:**

Leading scientist in Mongolia

# S-16

## Micropropagation of Endangered *Lilium martagon* L. in Mongolia

Oyunbileg Yungeree* and Khongorzul Odgerel

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Email:

*Lilium martagon* L. is an endangered medicinal plant, registered in the Red Book (1997) of Mongolia. The aim of this study is to establish a protocol for *in vitro* plantlet regeneration of *Lilium martagon* L. We used seed and zygotic embryos as the starting materials for the initiation of *in vitro* cultures. After 2 weeks, 91% of zygotic embryos of *Lilium martagon* L. germinated on Linsmaier and Skoog (LS,1965) basal medium supplemented with 0.29µM gibberellic acid. By using bulb explants, adventitious shoots were regenerated after 4 weeks from one scale explants on LS basal medium supplemented with various concentrations of BAP (4.44, 8.88, 13.32µM), NAA (0.54µM) and IAA (0.57µM). The most efficient medium for shoot multiplication was LS medium supplemented with 8.88µM BAP and 0.54µM NAA. Roots were developed after 3 weeks on LS basal medium supplemented with IAA (0.57 µM), IBA (0.49 µM) and NAA (0.54µM). Most of the shoots that were rooted on medium with NAA (0.54µM) displayed short and thick roots. Hence, *in vitro* propagation of this endangered plant species is of great importance for germplasm conservation in Mongolia.

# Oral Presentation

**OA-003**

## *In Vitro* Propagation, Molecular Characterization and Phytochemical analysis of *Saraca asoca* (Roxb.) De Wilde and *Comiphora wightii* (Arn.) Bhandari

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As part of DST-PURSE project, *in vitro* culture, phytochemical analysis and molecular charecterzation studies have been taken up in two valuable medicinal plant viz. *Saraca asoca* (Roxb.) De wilde and *Commiphora wightii* (Arn.) Bhandari. Several ecotypes of both the plants have been collected from private and government nurseries as well as from botanical gardens. Tissue culture has been taken up with nodal explants by using different concentrations and combinations of growth regulators and micropropagation protocol have been developed. More efficient root induction media and acclimatization method are being developed.The genetic diversity studies of the ecotypes have been taken up through RAPD. The HPLC analysis of plant extract has been carried out for the estimation of different secondary metabolites namely (+)-Catechin and Quercetin in *Saraca asoca* and E-Guggulsterone and Z-Guggulsterone *Commiphora wightii*.

**OA-011**

# Studies on Induction of Callus and Direct Regeneration from Nodal Explants of *Cissampelos pareira* L.

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*Cissampelos pareira* L. is a pantropical, woody, herbaceous climber commonly known as the midwives herb. The plants contain a group of plant chemicals called Isoquinoline alkaloids. The nodal explants were inoculated on Murashige and Skoog's (MS) medium supplemented with different concentration of hormones to study morphogenetic potential. The response of the nodal explants with different Auxins indicated that the initiation of callus and its further growth was found to be very good (80%) on the MS medium Containing NAA at 2-4 mg/l or combination of auxin and cytokinin (NAA at 2 mg/l + kinetin at 0.25 mg/l). Direct regeneration of shoot and root were observed on MS + IBA (2mg/l). Presence of BAP (2-4 mg/l) in the medium induced the initiation of shoot from the nodal cultures. Thus the obtained plantlets through organogenesis were sequentially hardened by transferring them to soilrite then manure, soil and sand (1:1:1). After acclimatization, 20 days old seedlings were transferred to pots, maintained in green house condition and transferred to field. The present investigation examines the potentiality of *In vitro* micropropagation as an alternative method for conservation of the medicinally valuable plants by employing modern scientific approaches.

**OA-022**

# Induction of Multiple Shoots from the Leaf Explant of *Oldenlandia corymbosa* L. : A Hepatoprotective Medicicnal Plant

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The present investigation aims at developing rapid micropropagation protocol which is used for mass multiplication and conservation of *Oldenlandia corymbosa* to meet out the pharmaceutical demand. Leaf explants obtained from field grown plants tested on MS medium supplemented with different concentration and combinations of auxins and cytokinins. Maximum numbers of multiple shoots (51.2±0.23) were obtained on MS medium supplemented with 2.0mg/l BAP and 0.5mg/l IBA. Further elongation and profuse rooting were achieved on MS medium supplemented with 1.0mg/l IBA. The regenerated plantlets were hardened and established (82.3%) of survival rate in pots.

**OA-023**

## Effect of $CuSO_4$ on Stevioside Production and ROS System in Callus of *Stevia rebaudiana* (Bert.) Bertoni (Sweet Leaf)

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*Stevia rebaudiana*(Bert.) Bertoni is member of family Asteraceae which is an industrially and medicinally important plant due to the presence of steveioside (a glycoside) in its leaves. Being non-carbohydrate in nature it is used as important antidiabetic sweetener and also used in low calorie diet. Now days, due to the enormous anthropogenic activities like mining, combustion of fossil fuels, metal industries etc., concentration of heavy metals in ecosystem is increasing. Hence, to understand the effect of metal toxicity on physiological parameter, ROS system and glycoside content of callus culture of *Stevia rebaudiana* were exposed to different concentration of $CuSO_4$. The callus of Stevia was developed from leaves on MS media containing BAP (3mg/l) and NAA (4mg/l) and subjected to 0, 50, 100, 150, 200, 250, 300 and 350mM $CuSO_4$. Physiological changes, chlorophyll content, antioxidant enzyme activity and stevioside content were determined in metal stressed callus after 15 days. The result showed that the maximum decrease in size and colour occur in the callus treated with 300 and 350 mM $CuSO_4$, while the 250mM of $CuSO_4$ were found best assessment of chlorophyll of Stevia. Significant changes were observed in ROS system of treated callus which shows maximum increase of SOD, CAT and APX activity in 300mM $CuSO_4$ while lipid peroxidation increased in the callus treated with 50mM $CuSO_4$. The major secondary metabolite stevioside showed a gradual decrease in quantity with increasing amount of $CuSO_4$ after 100mM. Based on above observations it can be concluded that a very little amount of $CuSO_4$ can facilitate to elevate stevioside content.

**OA-024**

# Collection, Maintenance and Evaluation of Anatto (*Bixa orellana*) Germplasm for Cultivation in Tribal Areas of East Godavari District of Andhra Pradesh

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*Bixa orellana*, commonly referred to as annatto, is a shrub that is native to South and Central America, as well as the Caribbean. Annatto grows branches and prickly, reddish-orange, heart-shaped pods; each pod contains approximately 35-40 seeds. Rainforest tribes have used annatto seeds and leaves for a variety of medicinal purposes for centuries. In Colombia, people with low income and less access to modern medicine resources use annatto leaves and seed as folk medicine for the treatment of microbial infections, to treat burns. Modern research reveals that Annatto is a rich, natural source of pure tocotrienols, antioxidants that are similar in structure and function to vitamin E. These compounds are thought to prevent cancer. Norbixin isomers found in annatto extracts are responsible for the antimicrobial activity specific for Gram positive bacteria. It is believed to cure diabetes, diarrhea, fever fluid retention heart burn, malaria and hepatitis. The annatto dye is extracted from seeds is nontoxic and is mainly used for colouring edible materials like butter, ghee, other milk products, margarine, cheese, vanaspati, chocolates, cosmetics etc. It neither affects the colour nor the aroma of these products. The dye is also used in colouring citrus juice, concentrates, drinks etc. Annatto dye is also used in floor polishes, shoe polish, hair oil and to coat medicines. Tribal people collect annatto seeds from trees grown in forest and sell to the Girijan corporation (GCC). Its cultivation is not in practice. The price offered by GCC for one kg seed varies from Rs.45-50/-. So this is a good income generating crop for the tribal people with assured market. Moreover it is easily cultivated and adaptable to tropical climate. Keeping all these in view an experiment was conducted at Horticultural Research Station, Pandirimamidi to evaluate the performance of three Anatto germplasm lines collected from forests of Rampachodavaram division, East Godavari district, Andhrapradesh, India from 2007 to 2013 to find out suitable annatto germplasm line for cultivation in the state. Among the three accessions ACC-2 recorded the highest plant height (5.7m), plant spread (E-W 8.4m, N-S 8.6m), 100 seed weight (3.8g) where as ACC-3 recorded the highest no. of pods per bunch (28), pods per plant (3800), no. of seeds per pod (38), and Seed yield per plant (5kg). Hence ACC-3 may be multiplied and may be introduced to the farmers for cultivation after standardising the cultural practices for the variety.

**OA-026**

# The Effect of Developmental Stages and Harvesting Time on Biosynthesis and Accumulation of Essential Oil, Geraniol and Geranyl Acetate in Palmarosa (*Cymbopogon martinii*, Roxb. Wats. Var. Motia)

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Palmarosa (*Cymbopogon martinii* var. motia, Poaceae), an essential oil bearing grass of Indian origin, is highly valued by the flavour, fragrance and perfumery industries for its sweet-smelling essential oil. The present study was undertaken to establish the relationship between different stages of inflorescence development (unopened spikelets, fully opened spikelets with yellow anthers fully visible, partially mature spikelets with brown and yellow anthers, and fully mature spikelets showing fully brown inflorescence) and essential oil (%), geraniol and geranyl acetate contents. Essential oil was extracted from leaves and inflorescence using hydro-distillation during two seasons (April-May and September October) followed by analyses using gas chromatography/ mass spectrometry (GC/MS). Results revealed that the biosynthesis and accumulation of essential oil and geraniol increased with maturity, while geranyl acetate showed a reverse trend, in both the plant parts studied. Though, the amount of essential oil was higher in inflorescence, the geraniol content was observed to be higher in leaves. Thus, harvesting the fully matured spikelets with brown inflorescence could be recommended as optimum stage for harvesting palmarosa in order to obtain maximum essential oil with high geraniol content. Further, better quality oil could be obtained by harvesting in the month of September-October, as optimum ratio of geraniol: geranyl acetate was noticed during this period.

**OA-033**

# Rural Development through Partnership: A Case Study of *Artemisia annua* L. Crop in Anand District- Gujarat

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Medicinal and aromatic plants occupy an important economic position because of the continuous and increased demand for their products in local and foreign markets. *Artemisia annua* L. is one of the most important medicinal crop in this area, as a very important source of an anti-malarial drug. This could be both as an alternative crop for large commercial farms and for small –scale farmers. The data was collected from the 60 farmer's field cultivating *Artemisia* crop in the district during 2011-2012. The total variable cost was found to be Rs.24, 900 per hectare. The input utilization pattern in cultivation of crop showed that the major cost was on human labour comparative to other input cost. The total return was Rs.90, 560 per hectare (maximum). The net return over variable cost was Rs.65, 660 per hectare. However, the benefit: cost ratio was 4:0. The estimated resource –use efficiency in this crop calculated as $R^2$ value was 0.905, which indicates that 90 percent of variations in *Artemisia annua* were influenced by the explanatory variables included in the model. Hence, the explanatory variables affecting the value productivity of *Artemisia annua* crop were: expenses on raising of nursery, human labour, manure, fertilizer and water etc. It was observed during study, that cultivation of *Artemisia annua* is profitable venture in short period of four months, and farmers in this area can be encouraged to diversify their existing cropping pattern towards this crop.

**OA-036**

# Growth and Yield Performance of Improved Turmeric Varieties in the Agency Areas of East Godavari Dist

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A study is conducted on the growth and yield performance of improved varieties of turmeric in the agency area, East Godavari Dist, Andhra Pradesh. Among the improved varieties plant height was height in (1.53m) in CLS-369 followed by Roshmi. Plant height is lowest in Roma (1.13m). In CLS-369 highest number of leaves (15.2) and, followed by CLI 317 and lowest (11.7) in KTS-7. Highest yield per plant (0.99kg) recorded in CLI-317 followed by TCP-2 and KTS-3 and lowest (0.58kg) in KTS-8.Yield per hectare is highest in CLI-317 (21.7t) followed by TCP-2(20.9t) followed by Roma and Roshmi.

**OA-038**

## *In Vitro* Propagation of *Clerodendrum phlomidis* Linn. F

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*Clerodendrum phlomidis* is a common shrub distributed in India, Sri Lanka and South East Asia. It is belongs to the Verbenaceae, and is mentioned under the common name of Arni or Agnimantha in Ayurveda. It is an important medicinal plant extensively used in Ayurveda, Unani and Siddha medicines for the treatment of various types of diseases. The objective of present investigation is standardization of the protocol for axillary shoot proliferation and rooting of a *C. phlomidis* for its conservation. Nodal explants of *C. phlomidis* were inoculated on MS medium, supplemented with cytokinins (BAP, Kn, TDZ, 2-iP, Zeatin and Mt) in concentration ranges from (0.50 to 2.50 mg/l). In maximum possible concentrations of all cytokinin formation of excessive amount of callus at the base of nodal explants which hinders the rate of multiplication and shoots length significantly. To avoid callus formation we have tried combinations of 2.50 mg/l of six cytokinin (BAP, Kn, TDZ, 2-ip, Zeatin and Mt) in combinations with 2.00 mg/l TIBA alone or TIBA and $ADSO_4$. Ms medium supplemented with 2.50 mg/l Zeatin and 2.00 mg/l TIBA+50 mg/l $ADSO_4$ gave significantly more number of shoots and shoot length is comparatively increased significantly. MS medium supplemented with 2.00 mg/l gave best result for root formation. *In vitro* rooted plantlets were successfully acclimatized in natural condition.

**OA-044**

# Effect of Field Conditions and Time of Sowing on Germination and Growth Parameters in *Rheum australe* D.Don

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*Rheum australe* D.Don is a high altitude endangered medicinal plant commonly known as Revandchini belongs to family Polygonaceae. The genus Rheum includes perennial, stout herbs, distributed in the temperate and sub tropical regions of the world, chiefly in Asia. It is distributed in the Himalayas from Kashmir to Sikkim at altitudes of 3,300-5,200m. In Himachal Pradesh, it is found growing in Chhota Bhangal and Bara Bhangal of Kangra ,Pangi Barmour of Chamba, Parvati valley of Kullu, Dodrakwar, Khashadhar and Rohru ranges of Shimla District ,Kinnaur, Lahaul and Spiti districts. Emodin, rutin,chrysophanol and chrysophenic acid are the four chief active constituents of rhubarb. Among these chrysophanol is found in a higher concentration. Indian rhubarb is used as purgative and astringent tonic. Powdered roots are sprinkled over ulcer for healing and also used for cleaning teeth. Rhizomes roots are purgative, astringent, tonic and stomachic. Powdered roots in action are aperient, astringent, diuretic, emmenagouge, and expectorant, purgative stomachic and tonic. It is of special use for infant's stomach problems. Root is regarded as a panacea in local home remedies and is used in stomach problems, cuts, wound and muscular swellings, tonsillitis and mumps. It has been found as a potent anti- inflammatory drug**.** It is used in preparation of lavangabhaskar - churna, Ghuttis, Gripe water and several anti-diarrhoeal and anti-dysentric preparations**.** Due to its multifarious uses and properties the species has excessive demand, which leads to illegal over exploitation from natural habitat, resulting in habitat destruction. It has been identified as top priority species for conservation and cultivation by threatened plant species committee of the IUCN .Information on taxonomy, distribution, analysis of active contents and uses of *Rheum australe* is readily available for the Himalayan region however information is still lacking regarding effect of growing media, manure treatment on germinability under natural, glass house and shade net house conditions during different months. The experiment on *Rheum australe* was conducted at Y.S. Parmar U.H.F, Nauni, Solan Himachal Pradesh. The present study describes seed germination behavior of *Rheum australe* under different field conditions i.e. Glass house conditions, shade net house and open conditions. Seeds were sown immediately after harvesting in pots for different months from November to July with Soil + Cocopeat + Vermicompost (1:1:1) as a growing media. Observations were recorded on germination percentage, initiation of germination (days), seedling shoot length (cm) and seedling root length (cm). Maximum germination percentage (83.32 %), seedling shoots length (29.46 cm), seedling root length (32.33 cm) was recorded during November month under shade net house conditions and these values are statistically superior to all other treatments. However minimum time taken for initiation of germination was recorded during July (8.14 days) under Shade net house condition. Minimum germination percentage, Seedling shoots and root length was observed during July under open conditions.

**OA-067**

## *In Vitro* Culture of *Oroxylum indicum* (V.) using Cotyledonary Node and Nodal Explants

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*Oroxylumindicum* is a deciduous forest tree belonging to family Bignoniaceae. The plant is well known for its medicinal properties and is used in preparation of Dashmoola and Chywanprash. This plant is indiscriminately harvested for its roots, reducing the population from wild. Tissue culture is one of the techniques for rapid multiplication of plants and therefore in the present studies in vitro cultures were established using cotyledonary node and nodal explants. These explants were placed on WPM medium containing 30 g/L sucrose, supplemented with different concentrations of BAP/ Kn/TDZ individually and in combination. It was observed that out of all the concentrations of individual cytokinin tried for both the explants, the optimum percent response for shoot formation was in BAPat 16µM.To enhance the morphogenic response in both the explants a combination of BAP (16µM) with the other cytokinins (Kn/TDZ) and auxin (IAA/NAA/IBA) was also evaluated. Observation after four weeks revealed that only nodal explants resulted into a 100% proliferation response with 2 ± 0.3shoots in BAP (16µM) and Kn (4µM) as compared to cotyledonary node explants. A combination of optimum BAP (16µM) concentration with IBA (0.1µM) slightly improved the number of shoots to 2.2 ± 0.3. Elongated shoots were rooted in full and half strength WPM fortified with IBA and NAA.

**OA-068**

## *In Vitro* Shoot Regeneration of *Hemidesmus indicus* (L.) R.Br. from Leaf Explant

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*Hemidesmus indicus* is an important woody climber belonging to the family Asclepiadaceae. In the present study, leaf explant was utilized for establishing culture in MS medium fortified with BA/Kn (5-30 µM) individually and in combination with IAA/NAA (0.1-2 µM). Observations revealed that in almost all the different combinations tried, the leaf explants could only differentiate callus up to eight weeks. A combination of BA (20 µM) and IAA (0.1-2 µM) had a synergistic effect in inducing nodular callus within three weeks. This callus when transferred on medium supplemented with BA (20 µM) and IAA (1 µM), proliferated further and simultaneously differentiated shoot buds. These adventitious buds elongated into shoots on the same medium and reached to an optimum number (19.54±0.33) with 80% frequency within eight weeks. Microshoots were rooted in different strengths of liquid MS (full, half and quarter) medium fortified with sucrose (1%) and IBA/NAA (1-25 µM). ¼MS supplemented with IBA (20 µM) formed optimum number of roots (2.20±0.72) within four weeks with 60% response.

# Poster Presentation

**PA-019**

## Tissue Culture Studies on Mass Multiplication of *Celastrus paniculatus* Willd. – An Important Medicinal Plant

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*Celastrus paniculatus* Willd. is an important medicinal plant belongs to family Celastraceae. It is commonly known as "Malkangani". Traditionally, Seeds of this plant are used for medicinal purpose. Seed oil is used as memory enhancer. Due to excessive harvesting of seeds, population of this plant is now being less. So, the present study was aimed to develop a successful protocol of mass multiplication of this valuable plant. Different explants like Leaf, Nodes and Shoot apexes were cultured on Murashige and Skoog's medium supplemented with different concentration of BAP, Kin., 2,4-D and NAA either alone or with combination. Most of all the explants were shows 80-95% growth frequency in callus formation. Shoot formation and multiplication was achieved through the pathways, direct organogenesis and indirect organogenesis. Best results of shoot formation were obtained in 1.0 mg/l BAP alone and in 1.0 mg/l BAP+0.5 mg/l IAA from leaf/Node callus culture, whereas in nodal explants, best results of multiple shoot formation were obtained in 2 mg/l BAP+ 0.5 mg/l IAA. *In vitro* developed plantlets were transferred to MS medium supplemented with various concentration of IBA/NAA for root formation.

**PA-022**

## Brassinosteroid mediated Metabolic Changes in Some Groundnut Cultivars during Early Germination

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Groundnut (*Arachis hypogaea* L.) is an important oil seed and emerging food crop of India. It is grown on 19.3 million hector of land area in about 82 countries More than half of the production area is in arid and semi-arid regions. Brasssinosteroid are novel type of phytohormones that influence varies physiological process like growth, germination of seed rhizogenesis and confer resistances to plant against various stress.. The laboratory experiment was conducted by selecting four groundnut cultivars *viz.*GG2, GG4, TMV13, Girnar 2. Uniform seeds of all cultivars were kept for germination in various concentrations of EBR and HBR ($10^{-6}$M, $10^{-7}$M, $10^{-8}$ M) with distilled water as control at room temperature.Germination and growth parameters viz. germination percentage, seed vigour index, shoot length, root+hypocotyl length and dry weight were measured. The seedling metabolite content at early sprouting stage was measured as changes in reducing sugar, total protein, amino acid and proline content in the seedling. Increase in total germination percentage was recorded under all BRs treatment over control. A significant increase in Total protein content was also recorded in seedlings treated with EBR. Thus Brassinosteroids play a very crucial role in growth and development in groundnut during germination.

**PA-026**

## Effect of Foliar Application of Hormones and Nutrients on Chemical Composition of Ardusi (*Adhatoda zeylanica*)

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*Adhatoda zeylanica* is a well-known plant drug in Ayurvedic and Unani medicine. In this study *A. zeylanica* plant leaves were used which were given the foliar application of hormones and nutrients. The trial was laid-out with 5 treatments and 4 replication each in a RBD design with spacing 1x 1m. The 5 treatments were labeled along with first as control Water spray ($T_1$), 0.1% urea + 100 ppm kinetin ($T_2$), 0.1 % urea + 100 ppm BA ($T_3$), 0.2 % Urea + 100 ppm kinetin ($T_4$) and 0.2 % urea + 100 pm BA ($T_5$). Hence a thorough seasonal survey was taken up for *A. zeylanica* to estimate the variation in the quality and quantity of the drug grown. The fresh leaves of *A. zeylanica* were harvested and used to prepare powdered extract. Methanolic extract was prepared from the powdered drug and used for further study. The study includes macroscopical evaluation along with estimation of its physicochemical parameters such as loss on drying, ash and extractive values and pH values and also the preliminary photochemical screening. It also includes quantification of some of the active constituents like alkaloids mainly Vasicine. Thin Layer Chromatography (TLC) and HPTLC were used to investigate the bioactive compounds.

**PA-027**

## Investigation of Phytochemicals Study of *Centella asiatica* (Mandukaparni) Grown under Different Environmental Condition

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In response of its versatile medicinal properties, the requirements of *C. asiatica* in pharmaceutical industries has been sharply increasing, thus leading to the over exploitation of this herb. It has already been listed as threatened species by the International Union for Conservation of Nature and Natural Resources (IUCN) and an endangered species. Therefore application of tissue culture approaches for rapid multiplication of elite clones and germplasm conservation is of vital importance .In recent years, *C. asiatica* regeneration has been achieved by using leaf derived callus, stem segments and nodal segments as explants shoot tip and suspension cultures, providing a prerequisite for the generation of bioactive secondary products from this species. However, further studies are still needed to be done for the evaluation of the genetic resources of the plant for variation in morphological, growth, and herb and yield related characters to identify high herb and made cassol yielding populations suitable for use in agronomical and plant breeding programs. A great progress has been made over the past decades in study of biologically active components and bioactivities of *C. asiatica*, but the results are still unsatisfactory. Even though this highly precious herb is surrounded with multifarious claims, the underlying mechanisms involved in its physiological effects are lacking. More scientific data are required before recommendation for increase in its utilization can be given with confidence.

**PA-028**

# Induction of Somatic Embryogenesis in Endangered Medicinal Herb *Curculigo orchioides* Gaertn.(Kali Musli) and Evaluation of its Genetic Fidelity

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*Curculigo orchioides* is commonly known as "kali musli" is an endangered medicinal herb, an efficient regeneration system has been developed by culturing its leaf explants on 8 - 15µM BA. Highest embryogenic calli observed in terms of 8 embryos per calli on MS media supplemented with 8µM BA. Somatic embryos were encapsulated by sodium alginate and regenerated plantlets were transferred to autoclaved mixture of soil: sand: compost (1:1:1; v/v/v) for hardening. Genetic fidelity of regenerated plants was assessed by Random Amplified Polymorphic DNA (RAPD).

**PA-030**

## Studies on *In Vivo* and *In Vitro* Seed Germination of *Pterocarpus marsupium* Roxb

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In present study *in vivo* and *in vito* seed germination methods were developed for optimization of germination performance and early seedling growth of medicinally important plant, *Pterocarpus marsupium* Roxb. *In vivo* seed germination is not conventional method and seeds of this plant are facing so many problems due to its hard seed coat and poor viability. Application of PGRs is also not much affective in *in vivo* condition but during *in vitro* germination condition, the seeds were inoculated in different orientation in different media types Viz. MS media, 1/2 MS, Nitsch media and white media and the best media type was selected and used further with different hormones and with different dosages and. Horizontal direction of seeds, Nitsch and 1 mg/l GA hormones concentration were found significant for the germination of *Pterocarpus* seeds. So, it is concluded that media type, strength, PGRs concentration have tremendous effect on seed germination *Pterocarpus* plant which will help in increasing population of the plant.

**PA-068**

## The Effect of Salicylic Acid on Growth Parameter of *Linum usitatissimum* L (Linaceae)

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Salicylic acid is a potential endogenous plant hormone that plays an important role in plant growth and development. Since plants and its yield are adversely affected by salinity, in this study the role of SA in modulating salt (NaCl)-induced effects on the yield was investigated inflax (***Linumusitatissimum* L.**). For this purpose a greenhouse experiment comprising flax, four NaCl levels (0, 10, 100 and 150 mmol L−1) and two SA levels (0, and 50 mM L−1, 100 mM L−1) was conducted. Effects of SA on salt tolerance of flax were determined by measuring the growth parameters: germination rate, shoot and root lengths, shoot and root fresh and dry weights and biomass. The activities of photosynthetic pigments (chlorophylls a, b and carotenoids) content, and carotenoids were investigated in response to the interactive effects of SA and NaCl treatment. NaCl significantly reduced all growth parameters measured, carotenoids, photosynthetic efficiency and pigments. A comparison of growth parameters of 15 day-old-seedlings showed that root growth was decreased by SA more than the shoot growth. Plants grown from seeds imbibed in aqueous solutions of SA displayed enhanced tolerance to salt stress. The fact that seed imbibition with SA confers stress tolerance in plants is more consistent with a signalling role of these molecules, leading to thee xpression of tolerance rather than a direct effect. Exogenous application of plant growth regulator like SA is one of the important strategies that has been employed to improve tolerance to salinity has yielded significant results in terms of growth parameters.

**PA-069**

# Rapid *In Vitro* Propagation Method in *Pogostemon heyneanus Benth*. on Cocounut Milk Supplemented Medium without Growth Regulators

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In vitro studies were carried out in *Pogostemon heyneanus Benth.* a highly aromatic herb used in perfumery and medicine. Plant regeneration of *P. heyneanus* was established using leaf and nodal stem explants on coconut milk (CM) supplemented medium. Murashige and skoog's medium (MS) supplemented with CM (10 to 30 %) were compared with 2, 4-D (0.5 to 2mg/l) supplemented medium. The callus growth and regeneration of plants although were noted in both CM added medium as well as 2, 4-D added medium, the planlets regenerated from the callus were more vigorous and more in number. In the present study, the growth promoting effect of CM is studied and it could be because of the presence of highly active natural cytokinin and other growth substances present in it. The CM was also noted to exhibit auxin activity which would increase by autoclaving, getting released by hydrolysis. The present study deals with a rapid *in vitro* propagation technique used for of *P. heyneanus* with production of plants having aromatic and medicinal properties which can be further utilized in industries.

# INDIGENOUS, TRADITIONAL KNOWLEDGE & IPR

# Invited Talk

(Summary)

**Name:** Dr. Jayaparkash Yadav

**Designation:** Professor

**Address:** Department of Genetics,
M. D. University, Rohtak-124001, Haryana

**Qualification:** M.Sc., M. D. University, Rohtak
Ph.D., M. D. University, Rohtak

**Experience:** Research 24 years
Teaching 23 years

**Publication:** Research articles: 115
Reviews articles: 03
Books/ Chapters: 07

**Conference:** Organized:

- National: 05

Attended:

- National: 37
- International: 10

**Research projects handled / ongoing:** 05

**Membership:**

Indian Science Congress,
Society of Cytologists and Geneticists, India
Association of Microbiologist, India

**Awards and Honours:**

- Awarded University Grants Commission NET JRF in1987, SRF in 1989, Research Associateship by CSIR, New Delhi in 1991
- Prof. R.P. Roy Young Scientist Award by Society of Cytology and Genetics, India
- Member of Advisory Committee of National Society of Ethanopharmacology
- Member Executive Council of M.D. University, Rohtak
- In Editorial Board of Plant Archives Journal, Journal of Plant Sciences and Bioresearch Bulletin
- Awarded UGC fellowship under education Cultural Exchange Programme to visit South Africa in 2008
- Member UGC Expert Committee for MRP in the subject of Genetics( 20$^{th}$ October, 2010 & 22$^{nd}$ March 2011) and Botany (23-24$^{th}$ October, 2010 & 23$^{rd}$ March, 2011), 2010-11
- Awarded International Travel Grant from CSIR, New Delhi & CCSTDS, and Chennai to attend SEGH 2010 at Ireland from 27$^{th}$ June to 2$^{nd}$ July, 2010
- Member of Evaluation of Major Research Project of National Medicinal Plant Board, Department of Ayush, Ministry of Health and Family Member, New Delhi
- Reviewer of Research proposal of International Grants Unit, National Research Foundation, South Africa, 2013

# S-17

## Ethnobotanical Survey of Medicinal Plants from Haryana

J. P. Yadav

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**Email:** yadav1964@rediffmail.com

India has a tremendous repository of cultural heritage with varied ethnic groups and has a rich tradition of folk practices in utilization of wild plants. Plants have traditionally been used as a source of medicine in India by indigenous people of different ethnic groups inhabiting various terrains. Present study was designed with the sole purpose of eliciting the first hand precious wealth of information on traditional uses of medicinal plants practiced by the people of Haryana, India. Haryana lies between 74°28' and 77°36' E Longitude and 27°37' and 30°35' N Latitude, extends over an area of about 44212 sq. km in North-western part of India. The information about the folk medicinal uses of plants was collected from traditional healers, vaidhyas, hakims, tribes and older rural people. The information about local name, parts used, and their medicinal importance were collected. A total of 235 medicinal plant species have been reported to be used by people in the traditional health care system to cure more than 35 major ailments of human beings as well as veterinary diseases. Traditional knowledge of medicinal plants and their use by indigenous healers and drug development in present is not only useful for conservation of cultural tradition and biodiversity but also for community health care and drug development in the local people.

**Name:** Dr. Bipin J. Agrawal

**Designation:** Associate Professor

**Address:** Department of Textile Chemistry,
Faculty of Technology & Engineering,
The M. S. University of Baroda, Vadodara, Gujarat

**Qualification:** M.Tech., The M. S. University of Baroda
Ph.D., The M. S. University of Baroda

**Experience:** Research 15years (included during Teaching period)
Industrial 11.5 years
Teaching 21.5years

**Publication:** Research articles: 38
Reviews articles: 23
Books/ Chapters: 5

**Conference:** Attended:

- National : 18
- International: 29

**Research projects handled:** 3

**Membership:**

- Member of the Expert Committee appointed by The National Board of Accreditation (NBA) of AICTE for the NBA Accreditation of Textile Departments of various Institutes/Universities
- Fellow Member of Six Reputed Associations
- Life Member & Patron Member of Textile Association – India (TAI), Indian Society for Technical Education (I.S.T.E.), International Association of Academicians and Researchers (INAAR) ,Indian Membrane Society (IMS), The International Society for Krishna Consciousness (ISKCON), Baroda University Teachers' Association (BUTA), Indo Global Chamber of Commerce Industries and Agriculture (IGCCIA)
- Chairman of Board of Studies of Department of Textile Chemistry (2011 – 2014)
- President of the Alumni Association of Textile Chemistry Department

**Editorial membership**

- Selected as Editor-in-Chief (from 01-01-2014; for International Journal of Research in Sciences for International Association for Science & Technology Education and Research
- Member of Editorial Team for more than 13 reputed Journals

**Awards and Honours:**

Received more than 8 prestigious awards

# S-18

## *Ayurvastra* – The Traditional Art of Dyeing Fabrics with Medicinal Plants

Bipin J. Agrawal

Department of Textile Chemistry, Faculty of Technology & Engineering,
The Maharaja Sayajirao University of Baroda, Vadodara-390 001, Gujarat, India
Email: bjagarwal@yahoo.com

*Ayurvastra* technology is beneficial to the mankind in curing diseases with the help of the medicinal characteristics associated with various herbs. It is environmental-friendly process and the usage of the cloth is based on the principle of touch. By coming in contact with *Ayurvastra*, the body loses toxins and its metabolism is enhanced. The technology is helpful to cure diabetes, skin infections, eczema, psoriasis, hypertension and high blood pressure, asthma, arthritis, rheumatism, and even some forms of cancer. Today, the revival of this ancient technology is gaining importance all over the world. Other cultures and regions of the world are expressing their growing interest in more traditional and natural healthcare systems that are based upon restoring balance and health through natural methods rather than through Western medicines.

**Name:** Dr. Smitha G. R.

**Designation:** Scientist (Horticulture)

**Address:** Directorate of Medicinal and Aromatic Plants Research
Boriavi, Anand -387 310, Gujarat, India

**Qualification:** M.Sc. in Horticulture, University of Agricultural Sciences, GKVK, Bengaluru
PhD in Horticulture, University of Agricultural Sciences, GKVK, Bengaluru

**Experience:** Research 8 years
Industrial 1 year

**Publication:** Research articles: 13

**Conference:** Organized:

- National conferences: 3

Attended:

- National : 3
- International: 1

**Research projects handled / ongoing**: 3

**Membership:**

- Member of Indian Society of Horticulture
- Member of Medicinal and Aromatic Plants Association of India
- Member of National Academy of Biological Sciences

**Awards and Honours:**

- Received University merit gold medal for best M.Sc. Horticulture student in Horticulture – From UAS, GKVK, Bangalore – 65
- Received – Shama Bhat Memorial Gold medal for overall performance in M.Sc. Horticulture from UAS, GKVK, Bangalore – 65
- Acted as FAO Consultant on Good Agricultural and Collection Practices on Medicinal and Aromatic crops in Medicinal Aromatic Dye yielding Plants project
- Treasurer – Medicinal and Aromatic Plants Association of India
- Reviewer of Journal of Tropical Agriculture
- Reviewer of National Academy of Biological Sciences (Springer Journal)

# S-19

## Harnessing the Potential of Medicinal and Aromatic Plants through Improved Pre and Post Harvest Management in India

Smitha G R

Directorate of Medicinal and Aromatic Plants Research, Boriavi-387310, Anand, Gujarat, India
**Email:** smithagingade@gmail.com

Plants have been used as a source of medicine for human beings and animals from ancient times. According to an estimate of WHO, approximately 80% of the people in developing countries rely chiefly on traditional medicines for their primary healthcare. There is a growing demand for herbal medicines, health products, pharmaceuticals, nutraceuticals, food supplements, cosmetics, perfumes *etc*. in the national and international market. More than 80% of medicinal and aromatic plants (MAPs) are collected from its natural habitats. However, due to over-exploitation, many of these have become rare, threatened, and endangered. The rapid genetic loss of medicinal plants necessitates the need for conservation of medicinal plants to ensure its availability for future generations. Thus, commercial cultivation of MAPs gives ample scope to improve the quantity and quality of the drugs by adopting improved pre and post harvest practices like site selection, use of quality planting materials, good agro-technological practices, nutrients and water management, integrated pest management, harvesting management and implementation of suitable post harvesting techniques to preserve the end product till smart and effective marketing arrangements are made. The standardization of agro-technologies and good agricultural practices for important MAPs with special emphasis on pre and post harvest management is the need of the hour for production of cost effective, quality raw material with less microbial contamination to harness the national and international demands.

**Name:** Dr.ParabiaMinooHiraji

**Designation:** Retd. Professor of Biosciences
Dean, Faculty of Science.

**Address:** 12/1768a, Vakil Street,
Shahpore, Surat - 395 003

**Qualification:** M.Sc., South Gujarat University
Ph.D., S.P University

**Experience:** Research 35 years
Teaching 42 years

**Publication:** Research articles: 70
Popular articles/ review articles: more than 550
Books/ Chapters: 23

**Conference:** Organized:

- National: 7

Attended:

- National: 23
- International: 5

**Research projects handled / ongoing:** 25 / 2

**Membership:** 5

**Fellow:** 8

**Awards and Honours:**

- U.G.C.Research scholar at S. P. University, VallabhVidya Nagar
- U. G. C. National award as a visiting teacher to visit and work at N.B.R.I.,Lucknow
- Awarded AyurvedJyotirdhar by Gujarat AyurvedVikas Mandal (1997)
- Awarded Millennium Award for lifetime contributions in Medicinal Plants, by the World conference on MedicinaAlternativa held at Bombay in January 2000
- Awarded 'AyurvedAnuragi' to Prof.MinooParabia and Dr.DinazParabia, for their contribution towards popularization of Herbal Science by Ayu Trust, Ahmedabad

# S-20

## Role of Medicinal and Aromatic Plants (MAP) in Rural Development and Prosperity

Minoo Parabia, Farzin Parabia[1], Falguni Sheth

RMD Ayurveda College and research center, Waghaldhara, Valsad, Gujarat
[1]Ashok & Rita Institute of Biological and Applied Sciences, New Vallabh Vidyanagar, Anand, India
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About 70% of India's population is living in rural areas. More than fifty percent of this population remains poor due to socio-economic reasons. They are deprived of modern medical facilities and suffer from various health disorders. They depend on the local herbs and traditional folk healers for the treatment. Gujarat is no exception. India is a rich source of herbs and most of them collected from the wild and traded. Gujarat harbors about 1800 species of flowering plants of which 1275 have been reported to be of medicinal value. An effort has been made assess and to utilize these herbs in a sustainable manner. The Gujarat State Forest Development Corporation (GSFDC) has taken initiative in utilizing such herbs scientific and commercial way. The state government and the forest department have established botanical and herbal gardens to create awareness about these plants among the public and tribal people. They are planning to develop a strategy of improving the rural economy by sustainable cultivation of these medicinal and aromatic plants. Some points in this regard have been discussed in this paper.

# Oral Presentation

## OA-008

# Biotechnology as an Intellectual Property

Shatruhan Sharma* and G. S. Rajpurohit[1]

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Intellectual Property Right is the subtle product of the minds work. The four routes for protecting intellectual property are copyright, trademark, trade secret and patent. These routes are non exclusive; one may obtain multiple forms of protection through intellectual property rights (IPR). Intellectual property has the attribute of personal property. Thus it may be purchased, assigned, licensed, pledged or transferred in the same manner as other forms of personal property. In recent years, advances in Biotechnology lead to the development of various economically and commercially important inventions. Intellectual Property Protection (IPP) for such inventions is an immensely important topic of concern. Even minimal accessory changes to IPP application would create a heightened system of awareness as to the activities being conducted behind the veil of the protectant application. Hopefully, the countries can start to move towards a more active role in curbing ethically- questionable protectant applications, so that not "anything under the sun that is made by man" is protected, especially when it involves the sacred genetic elements that many indigenous groups believe make up them.

**OA-015**

# Validation of Tribal Claims through Phytochemical Screening in *Mucuna pruriens* (L.) DC Var. *Pruriens* : A Potential Medicinal Legume

R C Misra*, M. Parida and D R Pani

National Bureau of Plant Genetic Resources (ICAR), Exploration Base Centre,
CRRI Campus, Cuttack, Odisha- 753006, India
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The practice of treating various diseases using plants can be traced back to pre-historic times. The cumulative knowledge of tribal practitioners and millions of old-age people from generation to generation accumulated together has emerged as traditional medicine system. However, the modern scientific mind does not come into conclusion unless the tribal wisdom is experimentally substantiated. The curative properties of medicinal plants are due to the presence of certain bioactive compounds produced by the plants. The present investigation highlights the indigenous use of seeds of *Mucuna pruriens* (L.) DC var. *pruriens* by tribal inhabitants of odisha and justifies the rationale behind their medicinal claims to validate through phyto-chemical screening. *Mucuna pruriens* (L.) DC var. *pruriens*, a wild legume of high medicinal potential, has been used by tribal people for medicinal purposes to cure various ailments and its documentation is scanty and incomplete. Phyto-chemical studies were made by different workers however; they did not deal with ethno-botanical aspects vis-a vis correlation with bioactive compounds. The exploration and germplasm collection missions were undertaken in different agro-ecological zones of Odisha and 35 acc of *Mucuna pruriens* germplasm with different seed variabilities were assembled. The botanical survey, focus group discussions and structured interview were conducted in 25 villages interacting with 55 key informants of 5 major tribal groups much familiar with this plant. Complete ethno-botanical information on indigenous use of seeds of *Mucuna pruriens* was collected and further authenticated by cross verification through repeated queries. The medicinal uses were compared with major published literature and the novel uses were documented. The collected seeds were conserved in National Gene Bank, NBPGR, New Delhi; multiplied and characterized, and plant samples were preserved in the herbarium of NBPGR Base Centre, Cuttack. Phyto-chemical screening was carried out on aqueous, methanol and n-hexane extracts of selected seeds (10 acc) of 5 colour variabilities and 10 bio-active constituents were detected. The medicinal uses along with mode of administration of seeds in their ethnic practice were compared and further correlated with properties of causal bioactive compounds and supported published literature. The results of the study divulges that these bioactive compounds harbored in the seeds acting as curative agents scientifically substantiate the rationale behind their traditional use by different tribes of odisha to treat various ailments. However, there are plenty of scopes for phyto-chemical investigation of secondary metabolites at component level which will unravel the potentiality of indigenous medicines.

**OA-025**

# Medicinal Plant Diversity and Ethnomedicinal Studies on Some Plants from Tribal Area of Shimla District of Himachal Pradesh

Bhupender Dutt

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Himalayan herbs are getting unprecedented attention all over the world as it harbours most fascinating and life rejuvenating drug resources. The present investigations, diversity of medicinal and aromatic plants of tribal area of Dodra-Kawar in Shimla district of Himachal Pradesh revealed the occurrence of 263 species belonging to 183 genera and 83 families collected from the different locations of the proposed study area. Out of the total documented species, 237 belong to dicots, 13 to monocots, 05 to gymnosperms and 08 to ferns. Species were classified on the basis of their economic utility as 9 timber, 42 fodder, 8 fiber and flosses, 25 tans and dyes, 2 gums and resins, 37 fuel wood, 45 edible plants, 193 medicinal and aromatic plants and 10 as bee flora. The ethno-botanical information on 71 species of medicinal and aromatic plants belonging to 61 genera from 32 families was also recorded from the study area. Ethno medicinal iinformation and other medicinal uses of plants were collected by interviews through a questionnaire and also through frequent visits conducted to collect ethno medicinal data from the elderly people, local practioners and other knowledgeable people of the area. The present work emphasises on the diversity of medicinal and aromatic plants in the area along with their traditional uses.

**OA-045**

# Folk Veterinary Medicines in the Mudigere Taluk, Chickmagaluru District of Karnataka, India

Raviraja Shetty*, G, Sunanda B. B, Poojitha K. G, Hemanth C V and Pranay Kumar

Dept. of Plantation, Spices, Medicinal & Aromatic Crops, College of Horticulture, Mudigere, Karnataka
(University of Agricultural & Horticultural Sciences, Shimoga)
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An ethno-medico-botanical field survey was conducted during 2013-14 to document the veterinary healthcare practices followed by local people residing in Mudigere *taluk* of Chikmagaluru district of Karnataka, India. The information on plant species and their local name, plant parts used preparation of drug, dosage and duration was obtained from the traditional herbal healers by the semi-structured interview technique. A total of 28 veterinary diseases and disorders of the study area include Foot and mouth disease, broken horn, bone broken, increase milk production, acidity, mastitis, galactogogue, paralysis, inflammation, snake and scorpion bite, impaction, infertility etc. were identified along with the use of Medicinal plants to cure them. The most utilized plant part for the preparation of drug was the leaf followed by bark, underground parts (root, rhizome and bulb), seed, fruit, and stem and in some cases, latex. The present study pointed out that the people in Mudigere *taluk* have traditional knowledge to treat veterinary ailments.

**OA-050**

# Intellectual Property Rights in Medicinal and Aromatic Plants: Opportunities and Threats

P. E. Rajasekharan

Division of Plant Genetic Resources, Indian Institute of Horticultural Research, Bangalore -560 089, India
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**Medicinal plants** are those plants that provide medicines - to prevent disease, maintain health or cure sickness. Agriculture has become subject to IPR only after the creation of World Trade Organization (WTO) as a result of the General Agreement on Tariffs and Trade (GATT) Uruguay Round agreement. It was thought that Agreement on Agriculture (AoA) is the central focus of WTO negotiations, since agriculture is lifeline of development of most countries in the world. It plays a pivotal role in ensuring food security, providing livelihoods, generating foreign exchange and determining the allocation of natural resources. As the legal instruments available to invoke IPR are inadequate to protect the vast intellectual resources (IR) available in the country with the indigenous people, we need to be agile and alert in watching the IPR infringement by others and claiming the benefit sharing in proportion to the commercialization of our ITK as well as IR of MAPS. Some of the laws enacted in India for IPR protection in agriculture are Protection of Plant Varieties and Farmers' Right Act (2001), Protection through the Biological Diversity Act (2002) and Geographical Indication of Goods (Registration and Protection) Act (1999). Traditional knowledge digital library (TKDL) is prepared by CSIR to protect biopiracy.

**OA-051**

# Traditional Knowledge of Some Wild Plants for Medicinal Purpose of Banasthali, (Tonk) Rajasthan

Sweta Sain, BN Tripathi[1] and Nilima Kumari*

Dept of Bioscience and Biotechnology Banasthali University, Banasthali- 304022, Tonk, Rajasthan, India
[1]Dept of Botany, Guru Ghasidas Vishwavidyalaya, Bilaspur- 495009, Chhattisgarh, India
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India, known for its rich heritage of biological diversity, has so far documented over 91,200 species of animals and 45,500 species of plants in its ten bio-geographic regions. Traditional knowledge (TK) of medicine continues to play an important role in health care. In many parts of the world, it is the preferred form of health care. India is also a vast repository of Traditional Knowledge (TK) associated with biological resources. Likewise, Rajasthan has a very rich flora and a great knowledge of traditional medicines. Banasthali harbours a variety of plants species and located in Tonk District of Rajasthan. Traditional Knowledge benefits human societies in a numerous ways by providing wide range of ecological, economic, social, cultural, educational, scientific and aesthetic services. Extensive anthropogenic activities in the natural ecosystems in recent times have been resulting in loss of this knowledge. There is an urgent need for document this fascinating knowledge before become lost forever. A total of 31 plants species belonging to 29 genera of 21 families was undertaken in this study. Accordingly, each species in this study has been dealt regarding its botanical name, vernacular name, habit and aliments. These plants are mostly uses for dysentery, contraceptive, leucorrhoea, menstrual disorders, diarrhoea, eye diseases, wounds, cough and skin problems. Hence present work attempts to discover the potential of some wild medicinal plants for their future sustainable utilization.

**OA-061**

## Concept of Drug Collection & its Relevance

Bipin Sawant and A.R.V. Murthy*

Dept. of Dravyaguna, G.J.Patel Institute of Ayurvedic Studies & Research, Anand, Gujarat, India
**Email**: drbipinsawant@gmail.com

Ayurveda the ancient system of medicine has a comprehensive understanding of managing the ailments. Acharya Charaka considers *Bhishak* (Physician), *Dravya* (Medicine), *Upasthata* (Attender) and *Rogi* (Patient) as a part of essential quadraple for the success of treatment. In context of *Dravya* (medicine) Ayurveda text have enlisted the essential qualities which are – *Bahuta* – availability in abundance; *Yogyatva* – suitability in particular conditions; *Anekavidhakalpana* – utility in preparing multiple formulations; *Sampat* – full of desired qualities. For the drug to be *Sampat*(full of desired qualities) it needs to be grown in proper land and harvested properly and for this principles of drug collection have been propounded by ancient Ayurveda scholars. As per the theory of *Panchamahabhoota*, universe is made up of *panchabhootas* (Five protoelements). Our body is also *panchbhoutic* by nature and any imbalance in its *panchabhoutic* composition leads to disease. Taking this into account treatment can be defined as substituting bodily *panchamahabhootas* (Five protoelements) with external *panchamahabootas* (Five protoelements) so that they regain their balance. Keeping this as a central idea the concept of drug collection is designed. *Prithvi* (Earthprotoelement) is considered as base for existence of our life, but its only plant kingdom which directly receives the nutrition from earth as compared to animals and humans. The qualities present in the earth are transferred to humans via the medium of plants or animals as a source of diet or medication. To get clear understanding of *Bhoomi* (Land) it is classified into 5 on the bases of *Panchamahabhootas* (Five protoelements) that is *Parthiva*, *Aapya*, *Tejasa*, *Vayavya*, *Aakashiya* along with their characteristics.

**OA-062**

## Ayurveda & Scope for Allied Sciences

A. R. V. Murthy* and Bipin Sawant

Dept. of Dravyaguna, G. J. Patel Institute of Ayurvedic Studies & Research, New V. V. Nagar Anand, Gujarat **Email**: vasutpt1@gmail.com

Ayurveda, an ancient system of medicine, is an age old treasure need to be fully understood for its application in health care system. Ayurveda is correctly called as science of life due to its holistic approach, which also reflects in its judicial usage of natural drugs without adversely affecting the nature. Ayurveda believes that balance between the nature and humans is utmost important for the maintenance of the health of people living in that particular region. Ayurveda uses a single drug in different conditions by altering adjuvant, time of administration, route of administration, part used, administration technique, etc. Based on these methods we can judiciously use the drugs with less harm to ecosystem. In the current scenario routinely prescribed Ayurvedic medicinal herbs are getting over exploited making them vulnerable for extinction. Hence researcher should concentrate in adding newer drugs to Ayurvedic pharmacopeia without compromising on the principles of Ayurveda. Hence in a quest to understand the efficacy of Ayurvedic drugs through modern parameters Ayurvedic principles should be given prime importance. Ayurvedic texts have documented various medicinal plants along with their morphology in Sanskrit which needs to be identified botanically; this can be a grey area for research. We also find the documentation of Horticultural marvels in traditional texted which can be recreated for their efficacy as a part of research.

# Poster Presentation

**PA-005**

# Traditional Herbal Remedies from the Shirpur Tehshil of Dhule (M.S.) in the Treatment of Infant Disease

D. R. Patil* and Pawara C. M[1]

R. C. Patel College, Shirpur, Dist Dhule, India
[1]P. D. M. College, Shirpur, Dist: Dhule-425405, Maharashtra, India
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Dhule district is a tribal district of Maharashtra state. The district is inhabited by 40% of tribal population, often with their distinct way of life, traditions, dialects and cultural heritage. The tribal's have learnt to utilize local food and vegetable plant for different ailments of diseases in infant after centuries of tribal's, often at the risk of loss of human life. Women's specifically know the ethno medicinal values in traditionally used plants. Much of this wealth is preserved as an unwritten material medico of the tribal folk. Many tribal beliefs forbid them to unravel the virtues of the plants to outside world. But, it is also true that till recent little concerted efforts had been made to document this knowledge by detailed ethnobotanical surveys. The uses of 18 plants employed for curing infant diseases among the tribes of Shirpur Tahsil of Dhule district is reported.

**PA-031**

# Indian Traditional Medicinal Spices

Ami Naik, Pooja Patel and J.M. Pathak*[1]

C G Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli-394350, India
[1]Zandu Healthcare Vapi, Gujarat, India
**Email**: bjpathk@hotmail.com

Spices are defined as "a strongly flavored or aromatic substance of vegetable origin, obtained from tropical plants." Most of the spices are native of our country and hence India is known as the 'Land of Spices', because from the ancient times India has been a hub of spice cultivation, processing and export. They are used whole, ground, paste or liquid from, mainly for flavoring. Right from the kitchen and medicinal uses in homes spices have an important role to play in different places. Apart from adding color, flavor and taste, consumption of spices provide infinite health benefits. For instance, spices intensify salivary flow. They cleanse the oral cavity from food adhesion and bacteria, they help to check infection and caries and protect the mucous membrane. Spices act as stimulant to the digestive system and helps digestion in many ways. Stroke frequency and blood pressure can be diminished or augmented by means of spices. Some may even be a substitute for beauty products, preservatives and even medicines. Here, the review is carry out to introduce Indian medicinal spices, which can be categorized into three main categories the basic spices like cumin seeds, coriander seeds, asafetida and black mustard seeds, complimentary spices like fennel seeds, fenugreek seeds, nigella seeds and carom seeds and aromatic or secondary spices like green cardamom seeds, cinnamon, cloves and black pepper. The main purpose of this review is to understand the role of above spices in Indian kitchen for its flavor and significance of spices in ayurvedic medicine.

**PA-039**

## A Review on Medicinal Plant used in Ayurvedic formulation "Balarishta"

Jaimini Patel, Hemishi Patel and R. Krishnamurthy*

C G Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli-394350
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*Sida cordifolia L.* is commonly known as "Indian Ephedra", Bala (Sanskrit), Hetthuti-gida (Kannada) and Country Mallow (English) is an important medicinal herb belongs to the family Malvaceae. It is also known as the "Bala" The plant name Bala is coined on the name of 'Parvati' (goddess of strength and beauty). It grows as wasteland weed. The whole plant of *Sida cordifolia* is used as medicinal herb. Because leaves contain small quantities of both ephedrine and pseudoephidrine, roots and seeds contain alkaloid ephedrine, vasicinol, vasicinone, and N-methyl tryptophan and is extensively used as a common herbal drug. Ephedrine is known to stimulate the central nervous system (CNS), and as such can enhance weight loss. It is useful in blood, throat, urinary system related troubles, piles, phthisis, insanity etc. The plant is analgesic, anti-inflammatory and tonic. It provides relief from anxiety and it has also been reported to improve sexual strength.

**PA-041**

# Traditional Knowledge on Medicinal Plants from Shirpur Tahsil, Dist: Dhule, Maharashtra, India

S J Patil[1], H M Patil[2] and V V Bhaskar[3]*

[1]R C Patel MadhaymikVidyalaya, Zende-Anjan,Shirpur, Dist: Dhule Maharashtra, India
[2]M J P V A C and V K K S College, Dhadgaon, Dist: Nandurbar (M. S.) India
[3]A S C College Jamner Dist: Jalgaon (M.S.) India
**Email**:v_bhskar_v@yahoo.com

Tribalsare in intimate association with the forests, the sustainable use of plants for healing and curing their diseases along with the other needs reveals that they are the custodians of forests and traditional knowledge. The prominent tribes in the area are Pawra, Barela, Bhils, Tadvi, etc. In the present report 16 plant species of angiosperms are discussed with respect to their botanical name, family in parenthesis, local name, traditional use of the species from the Shirpurtahsil Dhule district, Maharashtra, India.

**PA-042**

# Spine Gourd (*Momordica dioica* roxb. Ex Willd. Potentially Wild Edible Plant from a Tribal District Nandurbar, Maharashtra, India

H M Patil

Department of Botany, Maharaj J.P.Valvi A.C.& Shri.V.K.Kulkarni Science College,
Dhadgao, Dist- Nandurbar. M.S, India
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The ethno botanical explorations were undertaken in a tribal district Nandurbar for recording the observations on *Momordica dioica* Roxb. ExWilld (Spine gourd) is a potentially wild edible plant. In the present communication ethnomedicinal and economical aspects of the species regarding the tribals of the area are discussed.

**PA-046**

# *Curcuma zedoaria* Rosc. – A Medicinal Plant of Ethnobotanical and Traditional Importance

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*Curcuma zedoaria* Rosc., also known as Zedoary, is an herb that belongs to the Zingiberaceae family. It grows up to 1.2 m in height. *Curcuma zedoaria* is a perennial herb found in tropical countries, such as India, Japan and Thailand. It is widely cultivated in China, Japan, Brazil, Nepal and Thailand. It has become naturalized (existing outside of cultivation) in India and throughout Southeast Asia. *C. zedoaria* is a well known ethnomedicinal plant that is also used in Ayurveda and other folk and tribal systems of medicine in India for treating various diseases and skin care. It's traditional uses have also been reported in various Chinese and Asian medicines. The Zingiberaceae plants contain a number of volatile and essential oils, which have shown antitumor activity. As plants of Zingiberaceae family are considered safe for human consumption, these species are excellent candidates for development of novel chemotherapeutics. This study is an attempt to compile an up-to-date and comprehensive information about *C. zedoaria*.

**PA-047**

## *Saraca indica* L. – A Traditionally used Multifunctional Medicinal Plant

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S*araca indica* L. belonging to the Caesalpiniaceae (Fabaceae) family is a plant with traditional importance and long history. It is found in India (the central and in the eastern Himalayas and Khasi, Garo and Lushai hills, wild in Chittagong, Bihar, Orissa, Konkan, Deccan, Mysore), China, Ceylon, Bangladesh, Sri Lanka and Malaysia. *Saraca indica* is a small to medium sized evergreen tree. Different parts of the plant like flower, bark, leaves, seeds, have number of medicinal uses such as antimicrobial activity, anticancer activity, antihemorrhagic activity, antioxytocic activity, antidiabetic activity, CNS depressant activity, antiulcer activity, anti-inflammatory activity, uterine tonic activity, analgesic activity and larvicidal activity. The main contents are β-sitosterol, flavonoids, flavone glycosides, anthocyanins, catechols, sterols, tannins, flavonoids, glycosides, leucopelargonidin, leucocyanidin, oleic, linoleic, palmitic, stearic acids, catechol, epicatechol, leucocyanidin, quercetin, quercetin-3-O-α-L- rhamnoside, kaempferol 3-O- α-L- rhamnoside, amyrin, cetyl alcohol and β- sitosterol.

**PA-048**

# *Commiphora wightii* (Arn.) Bhandari (= *Commiphora mukul* ) – A Rare Medicinally Important Plant

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*Commiphora wightii* is a flowering plant belonging to the family Burseraceae. It is commonly known as guggul, guggul gum resin, devadhupa, Indian bdellium. *C. wightii* is a deciduous bushy shrub/small tree. It is distributed in India (Rajasthan, Gujarat, Maharashtra, M.P, & Karnataka), Pakistan, Africa & Arabia. It has been used for centuries in ayurveda to treat number of disorders such as atherosclerosis, rheumatism, liver disorder, obesity & digestive problems. The active components of plant are guggulsterones. These compounds have shown to possess lowering action of cholesterol & triglyceride. Apart from these useful properties the plant also exhibits interesting anti-inflammatory, anti-oxidant, anti-arthritic, anti-schistomal, anti-malarial, hepatoprotective and larvicidal properties. Because of its tremendous medicinal properties guggul has been extensively harvested from its habitat and has been listed in the IUCN Red list of threatened species. The natural distribution of *C. wightii* is getting reduced due to cutting of matured trees, soil erosion, encroachment & human inhabitation, There is an urgent need to ban its exploitation and develop cultivation practices.

**PA-057**

## Ashtavarg – An Ancient Ayurvedic Formulation

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Ayurveda is a rich source of Indian traditional knowledge governing the rules and regulations of living a healthy and long life. It preaches a disciplined way of good eating habits, physical activities and following their regular routine. Any indiscipline in observing these practices would lead to various health disorders and exhibit symptoms accordingly. In ancient times, Rishis and traditional healers/ vaidyas thought about some plants as gifts of God which possessed divine power in their various parts and could treat any type of symptomatic disorders. Ashtavarg is a formulation developed from eight different plants to treat the frail and emaciated body of Rishi Chyavan. This formulation created the magic of rejuvenating Chyavan and since then is referred to as still famous Chyavanprash. These eight plants were selected from different ecological niches of Himalayas. Over a period of time, the availability and correct identification of these eight plants have put a question mark on the efficacy of this formulation. An effort has been made to gather information from different sources about these plants and establish their current status.

**PA-058**

## Cancer Therapy – Role of Some Indian Plants

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The significance of plants as a source of drugs has been realized long ago by man. He has been trying relentlessly to identify the plants whose various parts might possess medicinal properties and can be utilized in the treatment of a particular ailment. Cancer with all its various manifestations has posed a challenge to physicians and scientists all over the world. The modern allopathic and surgical treatment has led to complications and other side effects. Ayurvedic and traditional way of treating cancer with the help of plant products and a lot of research is being directed on this line globally. Thousands of plants have been screened for their active ingredients which could make cancer therapy effective.An effort has been made to collect information about such plants belonging to different families which have shown signs of potential in treating various types of cancer.

**PA-062**

## *Salvadora persica* L. – A Medicinally Important Plant of Indian Subcontinent

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Plant-derived medicines have been a part of our traditional health care system, and the antimicrobial properties of plant derived compounds are well documented. Herbal medicines are more effective and less harmful, as they have negligible side effects. They exhibit low mammalian toxicity and can be handled easily. *Salvadora persica* L. of the family S*alvadoraceae* is an evergreen shrub, 4-6 m tall with a short trunk, white bark and smooth green leaves. In Indian subcontinent this family is represented by only one genus with two species viz. *S. persica a*nd *S. oleoides.* The popular chewing stick commonly known as 'miswak' is prepared from younger branches *S. persica* and has been used for teeth cleaning since ancient times. Further, it is also considered as one of the most popular medicinal plants throughout the Indian subcontinent, as well as the wider Muslim worldand in Ayurvedic system of medicines. In addition to its well known oral health properties, the different parts of the plant exhibit different contents and treat other ailments. We have tried here to collect and compile as much information as possible from reliable sources

**PA-063**

## *Opuntia ficus-indica* (L.) Mill.- A Multipurpose Cactus Plant of Therapeutic Importance

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*Opuntia ficus-indica(L.)Mill.* is one of the 1500 species belonging to the family cactaceae. This plant is native of Mexico and it is widely distributed in Mexico and in all American hemispheres as well as in Africa and in the Mediterranean basin. It has been used in traditional folk medicine because of its role in treating a number of diseases and conditions, including anti-inflammatory effects hypoglycemic effects inhibition of stomach ulceration, neuroprotective effects Through antioxidant actions and also used for treating diabetes, burns, bronchial, asthma and indigestion in many countries over the world. The quality of cactus stems (*Opuntia ficus-indica*) during storage at low temperature was evaluated. Ascorbic acid content decreased during storage. Main quality changes that affected storage life of cactus stems were weight loss and chilling injury. It is also used in Pharma industry as a pharmaceutical agent. It also has several medicinal and industrial uses. Potassium was very high in the three fractions of the fruit compared to other minerals. The seed does not contain any trace of sugars. Its seeds can be used as flavouring agents. An effort has been made to find out its multipurpose utilization from available literature and to further suggest taking up research developing pharmaceutical products.

**PA-064**

## *Garcinia indica* (Kokum) - A Multipurpose Medicinal Tree of Western Ghats, India

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*Garcinia indica* (Family:Clusiaceae) is indigenous to the Western Ghats region of India located along the western coast of the country. It is a tropical evergreen tree of moderate to large size. It is found at an altitude of about 800 meters from sea level. It is a slender tree with drooping branches. It grows to a height of 15-20m. The fruits are the main source of various phytochemicals of which garcinol is unique. The fruit rind is a rich source of Hydroxy Citric Acid (HCA) that prevents fat accumulation in body cells, and thereby functions as the main natural source for production of anti-obesity drugs. The seeds are a rich source of kokum butter, which is nutritive, demulcent, agent for smoothening, softening etc. and used for cosmetic, confectionary and culinary purposes. Raw fruits, young leaves and bark are also used as medications against several disorders.. The pericarp contains the highest level of xanthones and the pulp is known for being one of the tastiest in the world. The fruit can also be used for the manufacture of wine and liquor and could be a good substitute of grapes in the wine industry. The anthocyanin pigments obtained from it are used as natural colouring agents for food preservation. The oil extracted from root, bark, fruit and seed is used to treat various digestive disorders. An attempt has been made to document the multipurpose utility of *Garcinia indica* for the well being of man. Since the plant is not affected by serious diseases commercial cultivation can not be overlooked.

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# AIM & INTRODUCTION

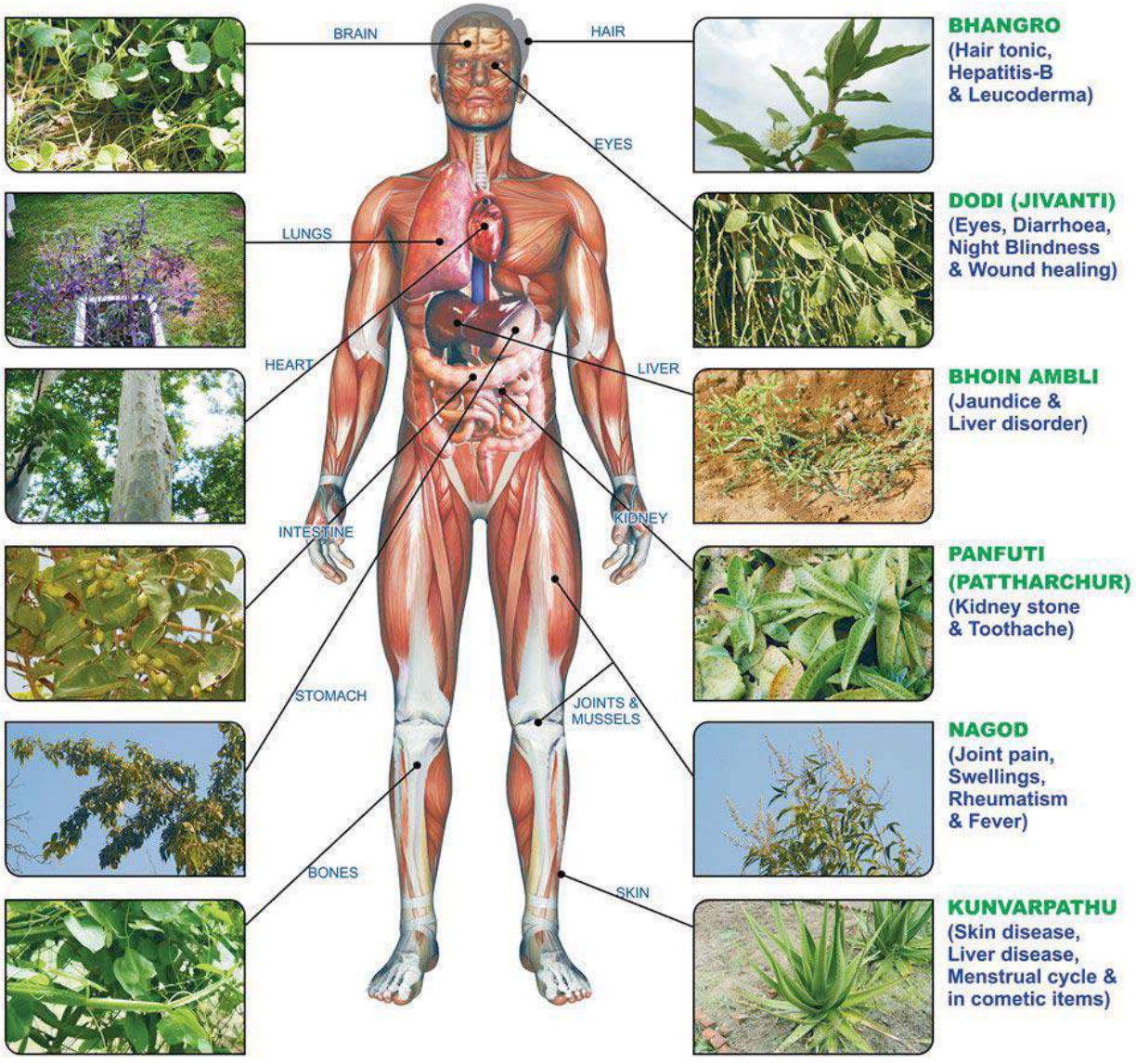
**With emergence of interest in herbal health care, there is an increase in the demand of medicinal plants and herbal drugs. But the unsustainable collection of medicinal plants from wild has put many important plants to serious threat. It is therefore, conservation and sustainable development of such highly useful plants is urgent for welfare of mankind. Cultivation of such rare plants is also an option to conserve such useful species.**

**Establishment of Gujarat Medicinal Plants Board, Gandhinagar in 2002 under the Chairmanship of Minister of Health & Family Welfare is a step to promote medicinal plants and to emphasize on the issues related to the conservation and sustainable use of such plants along with strengthening, co-ordination and linkages among all concerned.**

The board aims at the following:

- Promotion of ex-situ/in-situ cultivation and conservation.
- Promotion of co-operative efforts among collectors and growers and assisting them to store, transport and market their produce effectively.
- Identification, inventorization and quantification.
- Assessment of demand/supply position.
- Provide guidance in the formulation of proposals, schemes and programmes.
- Development of protocols for cultivations and quality control.
- Encouraging protection of patent rights and IPR.

# Medicinal Plants for Common Disease




GUJARAT MEDICINAL PLANTS BOARD, GANDHINAGAR

# TRIPHALA


| | |
|---|---|
| **Botanical name** | : *Emblica officinalis* |
| **Family** | : *Euphorbiaceae* |
| **Hindi Name** | : आँवला |
| **Gujarati / Sanskrit name** | : આમળા, આમલકી |
| **English name** | : Emblic myrobalan |
| **Part used** | : Fruit pulp |

| | |
|---|---|
| **Botanical name** | : *Terminalia bellirica* |
| **Family** | : *combretaceae* |
| **Hindi Name** | : बहेड़ा |
| **Gujarati / Sanskrit name** | : બહેડા, બિભિતક |
| **English name** | : belliric myrobalan |
| **Part used** | : Fruit pulp |

| | |
|---|---|
| **Botanical name** | : *Terminalia chebula* |
| **Family** | : *combretaceae* |
| **Hindi Name** | : हर्रे, हरड़, पीलीहर |
| **Gujarati / Sanskrit name** | : હરડે, હરિતકી |
| **English name** | : Chebulic myrobalan |
| **Part used** | : Fruit pulp |

**Use :** Tridosh-har, Kapha-pitta shamak, Eye diseases, Blood impurities, Fevers, Diabetes, Leucoderma & in indigetion. It also improves mood.

# RASAYANA


**Local / Sanskrit Name** : ગળો, ગુડૂચિ
**Botanical Name** : *Tinospora cordifolia*
**Family** : *Menispermaceae*
**Part Used** : Stem

**Local / Sanskrit Name** : ગોખરૂ, ગોક્ષુર
**Botanical Name** : *Tribulus terrestris*
**Family** : *Zygophyllaceae*
**Part Used** : Fruits

**Local / Sanskrit Name** : આમળા, આમલકી
**Botanical Name** : *Emblica officinalis*
**Family** : *Euphorbiaceae*
**Part Used** : Fruit pulp

**Use :** Anti-aging, Rejuvenative & in all kinds of Fever.

GUJARAT MEDICINAL PLANTS BOARD, GANDHINAGAR

# DASHMOOL
## BRIHAT PANCHMOOL

**Local / Sanskrit name** : સીવન, શ્રીપર્ણી
**Botanical name** : *Gmelina arborea*
**Family** : *Verbenaceae*

**Local / Sanskrit name** : પાટલા, પટોલ
**Botanical name** : *Stereospermum personatum*
**Family** : *Bignoniaceae*

**Local / Sanskrit name** : શ્યોનાક, ટેટુ
**Botanical name** : *Oroxylum indicum*
**Family** : *Bignoniaceae*

**Local / Sanskrit name** : બીલી, બિલ્વ, બેલ
**Botanical name** : *Aegle marmelos*
**Family** : *Rutaceae*

**Local / Sanskrit name** : અરણી, અગ્નિમંથ
**Botanical name** : *Clerodendrum multiforum*
**Family** : *Verbenaceae*

**Use of dashmoola** : Tridosh-har, Indigetion, Acidity, Asthama, Headache, Insanity, Internal / External Swellings, Fevers & Improves mood.

GUJARAT MEDICINAL PLANTS BOARD, GANDHINAGAR

# DASHMOOL
## LAGHU PANCHMOOL

**Local / Sanskrit name** : સાલપર્ણી, સાલવણ
**Botanical name** : *Desmodium gangeticum*
**Family** : *Leguminoceae*

**Local / Sanskrit name** : પીઠવણ, પૃષ્ણીપર્ણી, સફેદ સારીવા, કોઢ સેપ્પુ
**Botanical name** : *Uraria picta*
**Family** : *Leguminoceae*

**Local / Sanskrit name** : ઉભી ભોંયરીંગણી, બૃહત કંટકારી
**Botanical name** : *Solanum khasianum*
**Family** : *Solanaceae*

**Local / Sanskrit name** : બેઠી ભોંયરીંગણી, લઘુ કંટકારી
**Botanical name** : *Solanum xanthocarpum*
**Family** : *Solanaceae*

**Local / Sanskrit name** : ગોખરૂ, ગોક્ષુર
**Botanical name** : *Tribulus terrestris*
**Family** : *Zygophyllaceae*

**Use of dashmoola** : Tridosh-har, Indigetion, Acidity, Asthama, Headache, Insanity, Internal / External Swellings, Fevers & Improves mood.

GUJARAT MEDICINAL PLANTS BOARD, GANDHINAGAR

# TRIKATU



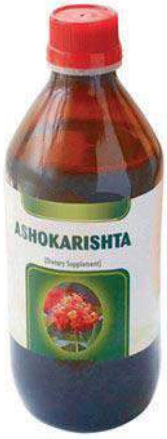


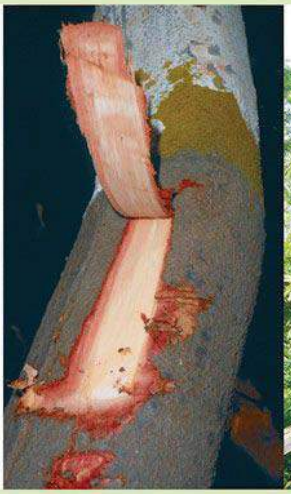
**"TRIKATU"** is one of the 37 Gana of Sushruta. It contains 3 medicinal herbs in equal quantity.

1. **સૂંઠ** (Dry ginger) *Zingiber officinale*
2. **મરી** *Piper nigrum*
3. **લીંડી પીપર** *Piper longum*

**Uses:** Cough, Rheumatic pain, higher stages of Constipation, Asthama, Diarrhoea, Obesity & in Skin diseases.

# ASHOKARISHTA



**Ashokarishta** is made from the bark of Ashok tree (*Saraca asoca)* and is best medicine for Menopause.

Useful in conditions like :

**Asrigdhara** – Heavy Menstrual bleeding

**Ruja** – Useful in Dysmenorrhoea – Painful periods

**Jwara** – Fever

**Mandagni** – Low digestion power

**Aruchi** – Anorexia, Lack of taste in food, Lack of mood.

# PANCHARISHTA


**"PANCHARISHTA"** is a combination of five arishta.

## What is Arishta ?

**The decoction of the herbal material is fermented. Some of it gets converted into alcohol (Madya) ; the end product thus produced is called Arishta.**

**Material :** For 250 gms. plant material, 10 gms. Sugar, 100 gms. Jaggery and 50 gms. Honey

**Method of preparation :** Convert the plant materials into quath, add 16 times water i.e. for 250 gms. of material, 4 liters of water plus 10 gms. sugar, 100 gms. Jaggery and 50 gms. honey & fill in an earthern / wooden pot, seal & keep undisturbed for one month. During the storage, due to fermentation alcohol is produced in the medium. The end product is called Arishta.

**Uses** : Appetizer, stimulates digestion and as a tonic.

**Dose** : 25-50 ml. / day with equal quantity of water, after meal.

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# CHYAVANPRASH

As per the Ayurvedic book "Charaksamhita" "Chyavanprash" is a rejuvenative, revitaliser and tonic medicine. It is a formula developed 4000 years ago by "Chyavan Rishi". He had converted his old age into young age by taking this chyavanprash. Today it is famous among all men as a tonic-medicine. It is exported to many countries like Germany, Japan, Australia, China, Italy, America, Brazil and Arabian countries and is readily accepted by all as a strengthening tonic, immunity developer, rejuvenator and as food supplement.


The number of herbs added in Chyavanprash depends on the Ayurvedic industry ; manufacturing it for definite purpose like : immunity increaser, general tonic, sexual tonic or food supplement. However the method of preparation of Chyavanprash and the herbs / herb-parts utilized in it's preparation are not standardized.

The herbs used in preparing Chyavanprash are as under :

**Materials Required**

| | |
|---|---|
| (1) Fresh Amla fruits | 6.00 kg |
| (2) Dry Black grapes | 0.75 kg |
| (3) Sugar / Sakar | 6.25 kg |
| (4) Honey | 0.65 kg |
| (5) Kesar (Saffron) | 5 gms |

(6) Other ingredients in small quantity as per Annexure I : 20 gms. each in powder or quath form.

**Annexure-I :** Vidari kand, Gokhru, Beeli, Harade, Baheda, Jatamasi, Nagarmoth, Long peeper, Sunth, Kakda singhi, Dash-moola, Jivanti, Punarnava, Anjir, Ashwagandha, Shatavari, Guduchi, Tulsi and Jethimadh, Vans kapoor, Tamalpatra, White peepar, Bala, Kauncha & Chitrak.

Safed musli, Kali musli, Khajoor, Dadam etc. may also be added

# VARIOUS DISEASES & BEST HERB for its cure

**Cold**
**Ginger (Sunthi) -** *Zingiber officinale*

**Cough**
**Ardusi -** *Adhatoda vasica*

**Painful muscular swellings**
**Haldi -** *Curcuma longa*

**Asthma**
**Dam-vel -** *Tylophora indica*

**Acidity**
**Amala -** *Emblica officinalis*

**Constipation / Indigestion**
**Harde -** *Terminalia chebula*

**Ulcer**
**Shatavari -**
*Asparagus racemosus*

**Jaundice**
**Bhoin Amli -**
*Phyllanthus fraternus*

**Diabetes**
**Jambu -** *Syzygium cumini*

**Intestinal Worms**
**Vavding -**
*Embelia tsjeriamcottam*

**Fever**
**Kalmegh -**
*Andrographis paniculata*

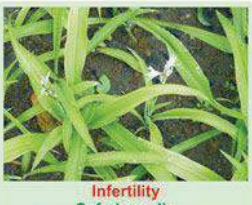
**Flue (Influenza)**
**Tulsi -** *Ocimum sanctum*

**Heart problem**
**Arjun Sadad -**
*Terminalia arjuna*

**Cholera**
**Fudino -** *Mentha spicata*

**Malaria**
**Cinchona -** *Cinchona officinalis*

**Menorrhaegia**
**Ashoka -** *Saraca asoca*



**Infertility**
**Safed musli -**
*Chlorophytum borivillianum*

**Anaemia**
**Upalsari -** *Hemidesmus indicus*

**Piles**
**Erando -** *Ricinus communis*

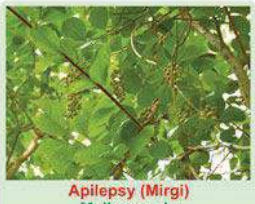
**Gout**
**Saragvo -**
*Moringa oleifera*

**Rheumatism**
**Nagod -** *Vitex negundo*

**Skin diseases**
**Chandan -** *Santalum album*

**Scurvy**
**Lemon -** *Citrus limon*

**Leucoderma**
**Kher -** *Acacia catechu*



**Apilepsy (Mirgi)**
**Malkangani -**
*Celastrus paniculata*

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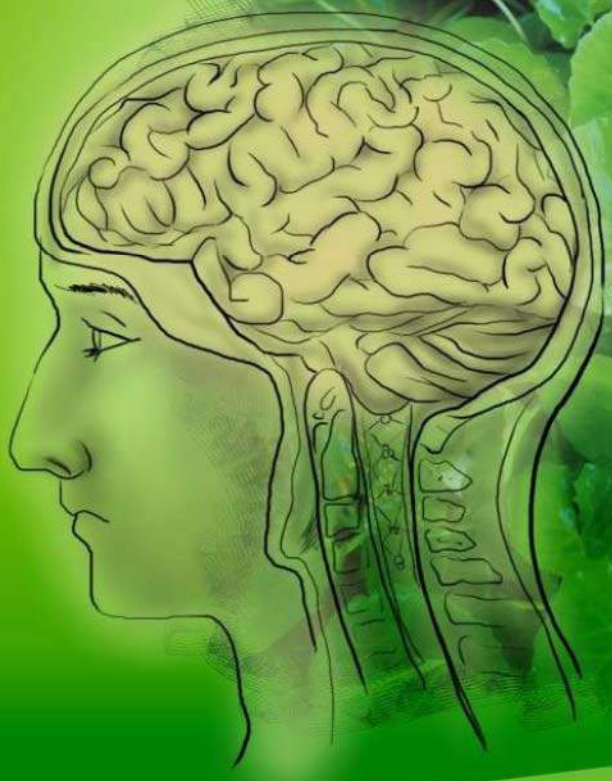
Medicinal Plants for Common Disease

# BRAIN



## Brahmi

(Brain tonic,
Anti ageing, Rasayana)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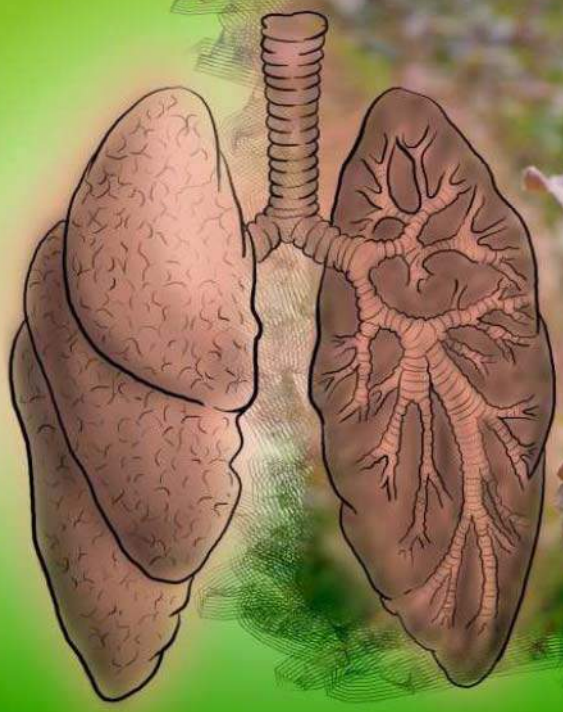
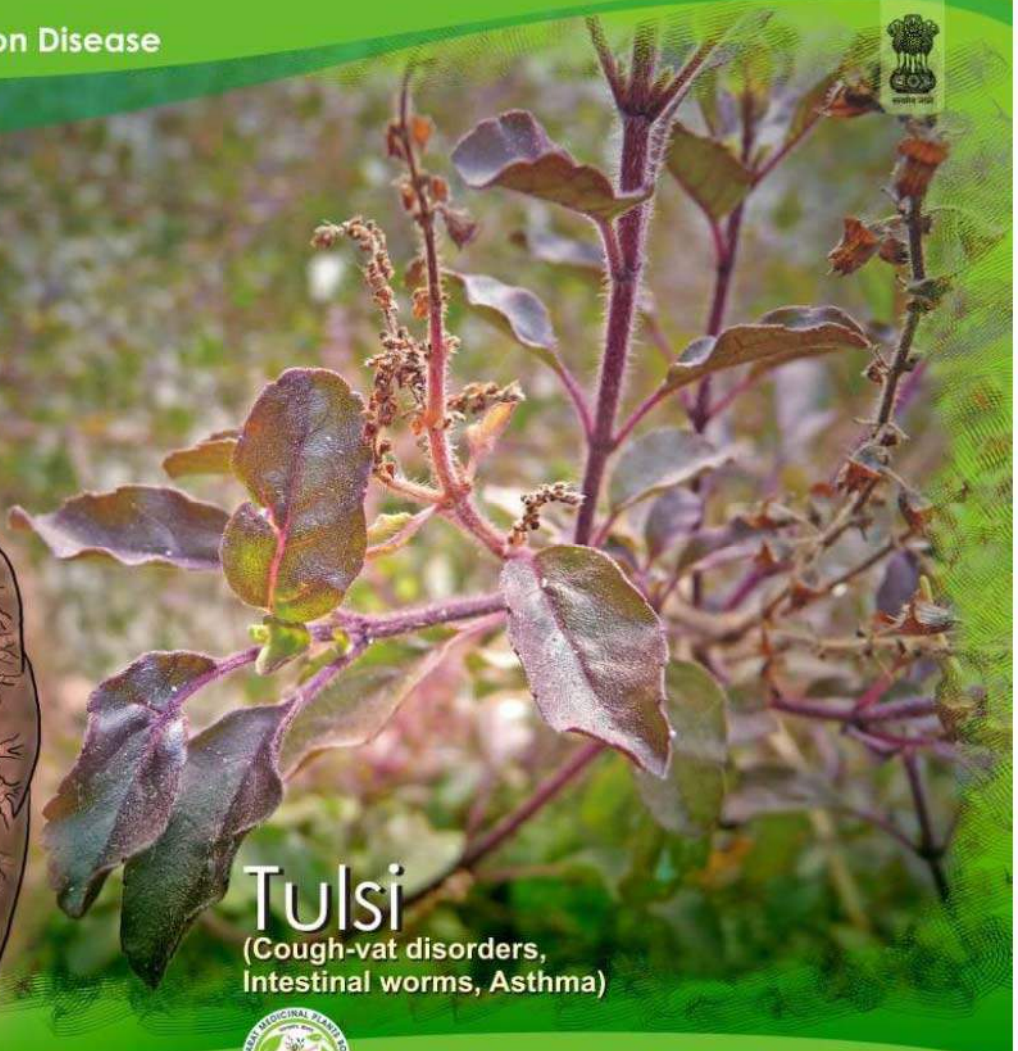
# LUNGS





## Tulsi

(Cough-vat disorders,
Intestinal worms, Asthma)

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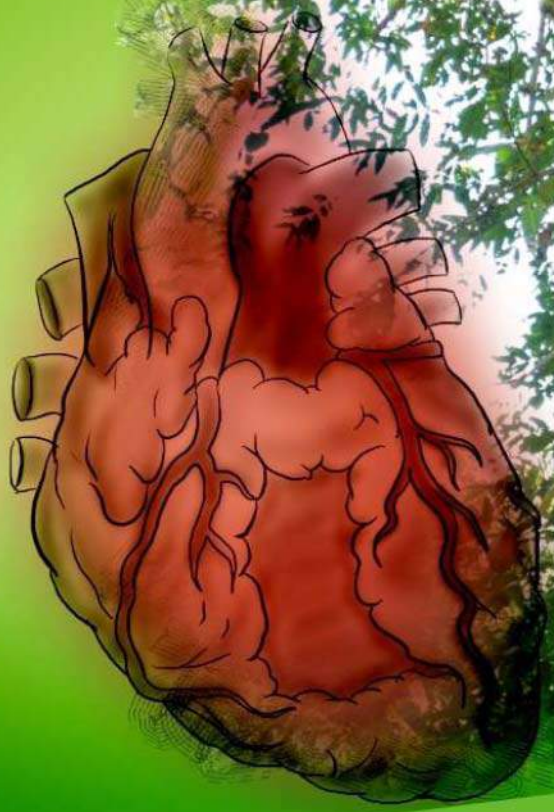
# HEART



## Arjun Sadad

(Heart, Rakta-Pitta, Diabetes, Bone fractures & Fevers)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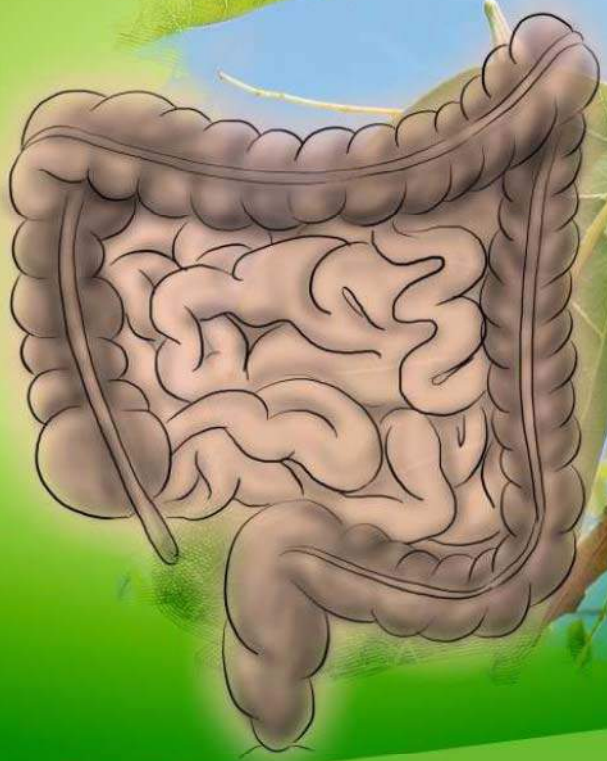
# INTESTINE



## Harde

(Nervous disorder, Indigetion,
Weakness of Sensory organs, Diabetes & tonic)

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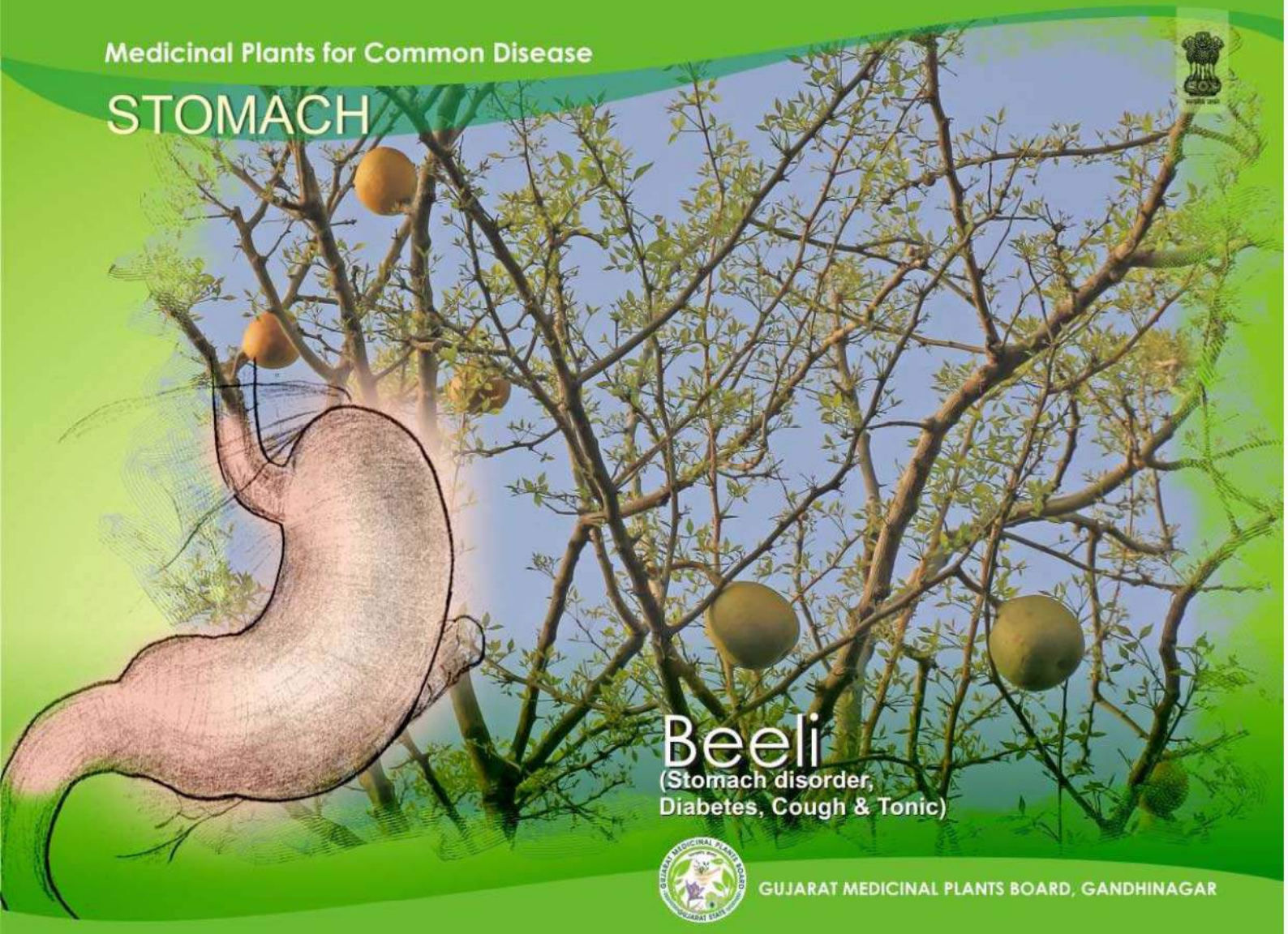
# STOMACH



## Beeli

(Stomach disorder,
Diabetes, Cough & Tonic)

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# BONES



## Had Shankal

(Bone fractures & Vat-shamak)

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# HAIR

## Bhangro

(Hair tonic, Hepatitis-B, Leucoderma)

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# EYES

## Dodi (jivanti)

**(Eyes, Diarrhoea, Night blindness, Wound healing)**

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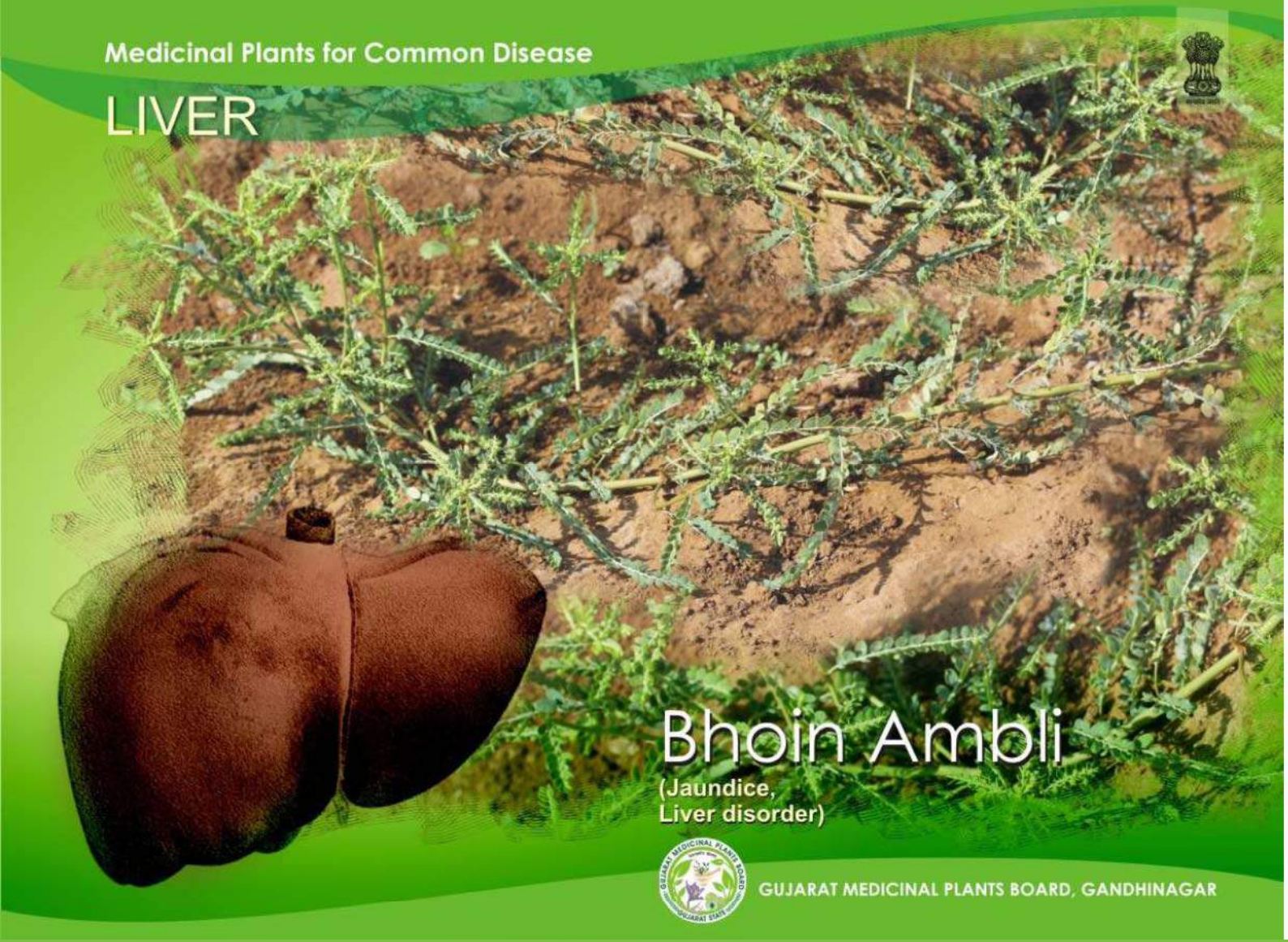
# LIVER



## Bhoin Ambli

(Jaundice,
Liver disorder)

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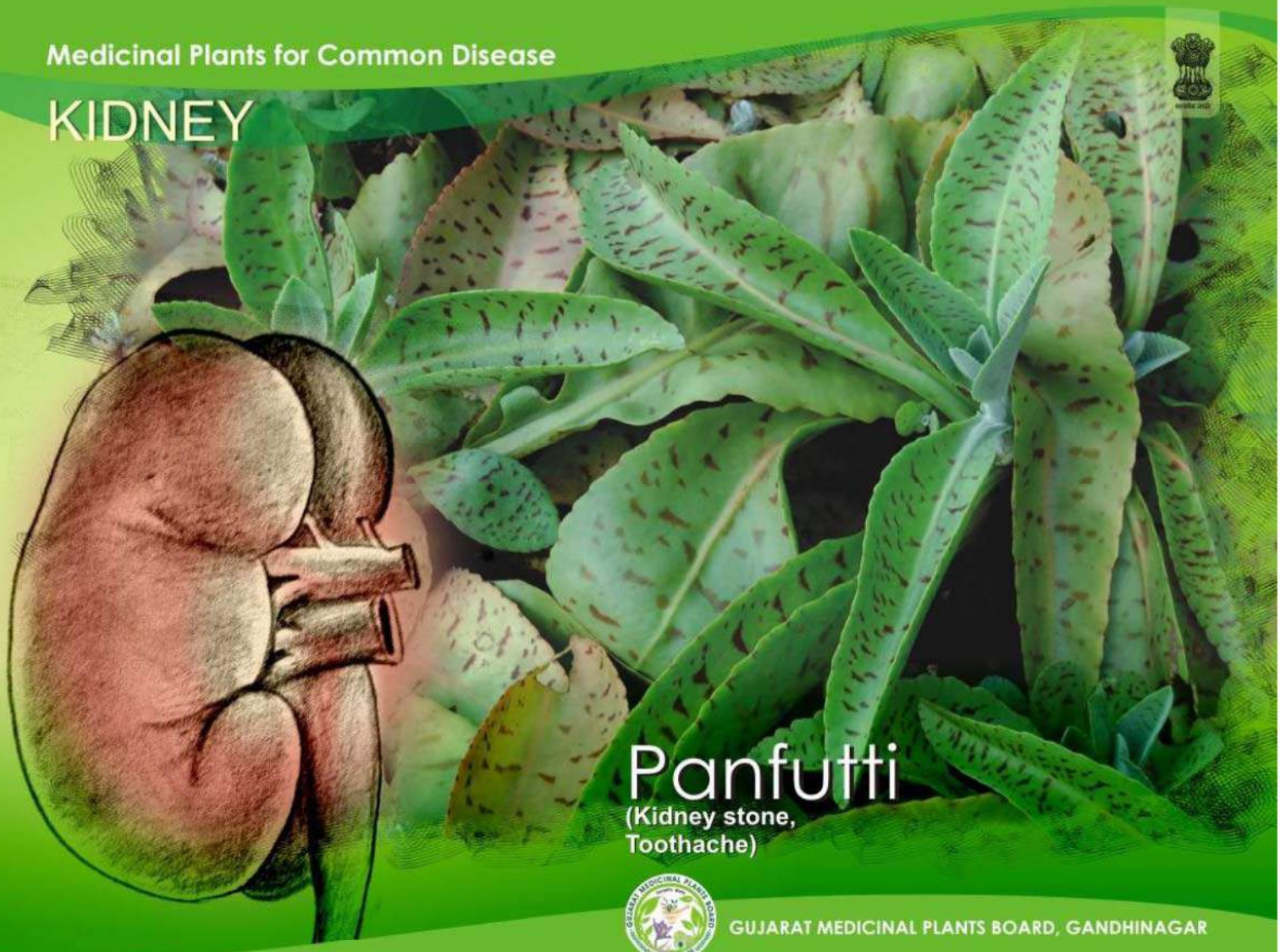
# KIDNEY



## Panfutti

(Kidney stone,
Toothache)

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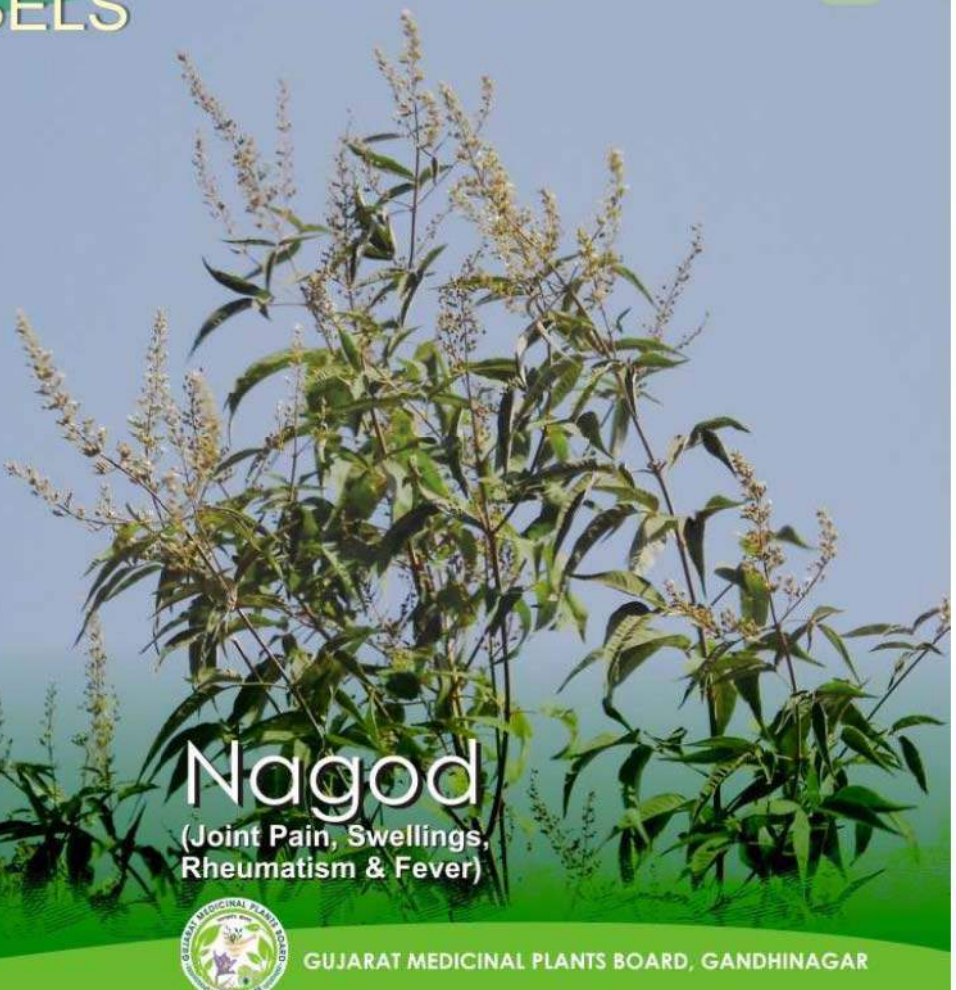
# JOINTS & MUSSELS



## Nagod

(Joint Pain, Swellings, Rheumatism & Fever)

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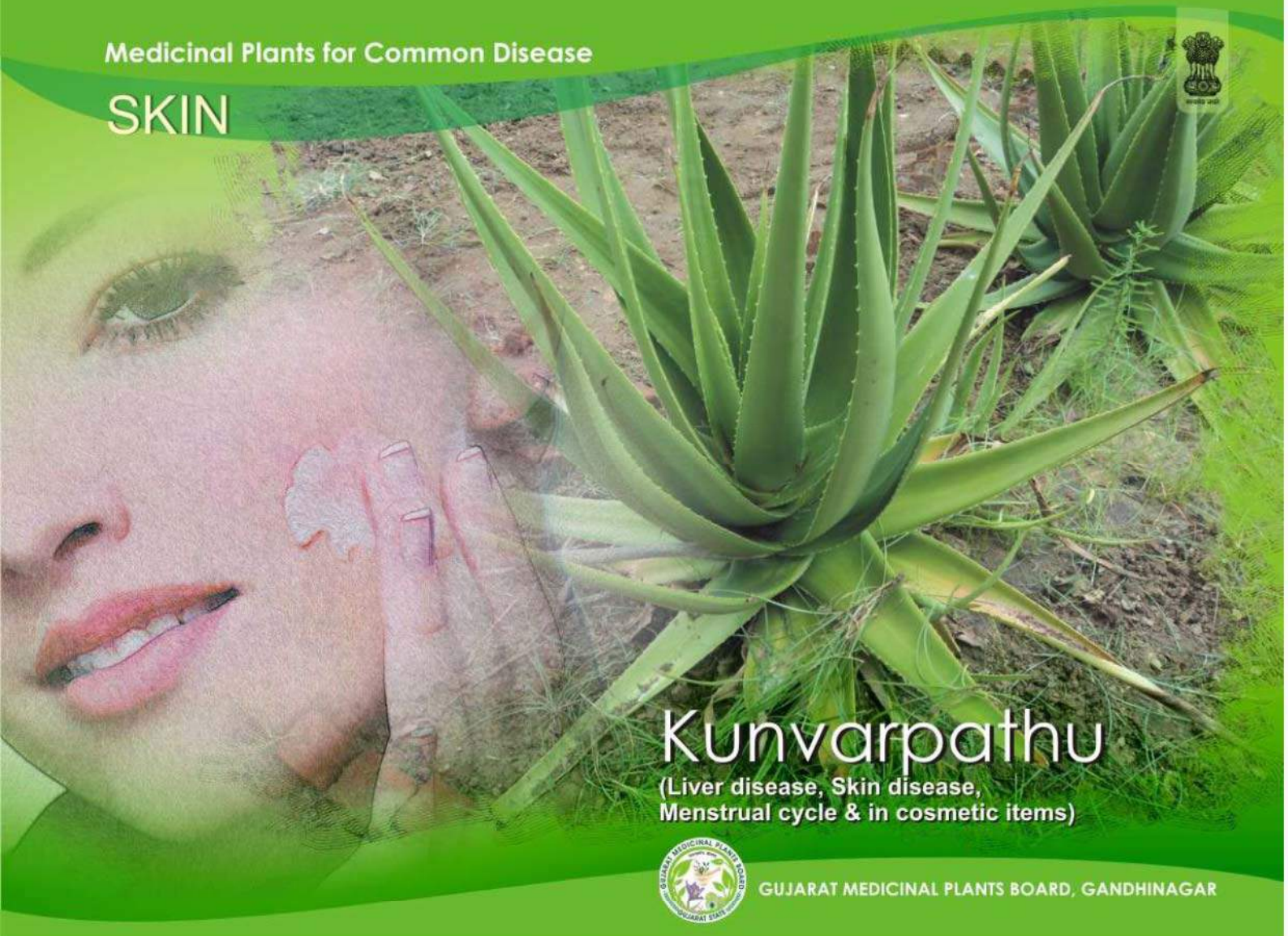
# SKIN



## Kunvarpathu

(Liver disease, Skin disease,
Menstrual cycle & in cosmetic items)

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| 2011-2012 | 4,65,134 | 4,93,460 | 10.58 % |
| 2012-2013 | 6,08,330 | 6,49,620 | 10.64 % |
| 2013-2014 | 6,28,369 | 7,08,265 | 11.25 % |

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| i. | Registration Number | : | G - 265 |
| ii | Year of Establishment | : | 1955 |
| iii | Year of Production started | : | 1956-57 |
| iv | Total No. of Members | : | 5683 |
| v | Share Capital | : | ₹ 294.90 Lakh |

**:: CRUSHING SEASON: 2013-2014 ::**

| | | | |
|---|---|---|---|
| a. | Present Crushing Capacity | : | 10,000 TCD |
| b. | Cane Crushing including – Stoppages | : | 10354.66 MT/day |
| c. | Cane Crushed excluding - Stoppages | : | 11307.12 MT/day |
| d. | Total Cane Crushed | : | 1617807 MT |
| e. | Total Sugar Production | : | 1901200 Quintals |
| f. | Average Recovery | : | 11.62 % |

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**Manufacturers & Exporters of full range of**

**Quality Bacteriological Culture Media & Bacteriological Ingredients**

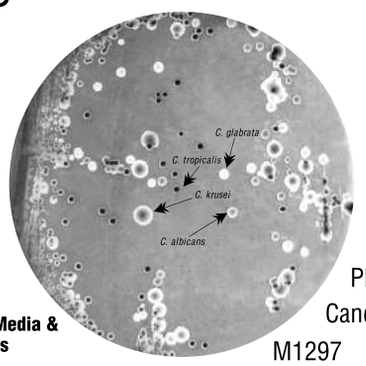
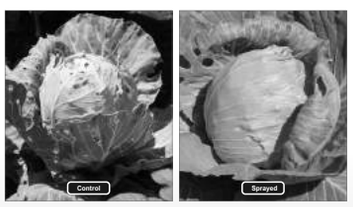



Plate of HiCrome Candida Agar - M1297

**Comprehensive Range of Chromogenic Media**

RM9184
**HiFoliar™**
PLANT NUTRIENT
*Blossoming Everywhere*




Effect of HiFoliar Nutrient™ and HiAdjv™ on Cauliflower

## Widest Range of Plant Tissue Culture Dehydrated Media and Chemicals

Potato Tuberization

### Customized Media - Bulk Media Order

### Classical Media

- Murashige & Skoog Medium
- Gamborg B5 Medium
- CHU (N6) Medium
- Nitsch Medium
- Woody Plant Medium

Gerbera Micropropagation

### Orchid Media

- Kundson Medium
- Vacin & Went Medium
- Lindemann Medium

### Specialized Media for Economical Important Plants

- Banana Medium
- Gerbera Medium
- Rose medium
- Potato Medium
- Carrot Medium

### Balanced Salt Stock Solutions

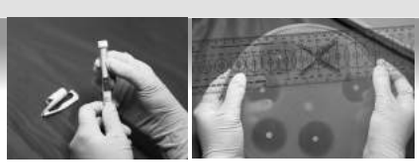
### Hydroponics Media

### Other Products

- Plant Tissue Culture Teaching/Hobby Kit
- Plant Pathology Media
- Labware and Plastic Ware
- Plant DNA Extraction Kits

## Product Range from HiMedia

Supported by Global Technical Services



- Ready Prepared Media
- Dehydrated Culture Media, Bases & Supplements
- Culture Media Bases
- Bacteriological Differentiation Aids
- Antimicrobial Susceptibility Systems
- Animal / Cell Culture Media

- Plant Tissue Culture
- Molecular Biology kits, Chemicals & Reagents
- Density Gradient Separation Media
- X-Pert Teaching Kits
- Latex Agglutination Kits

## Custom Made Antibiotic Discs

And suppliers of standardised

| Laboratory Aids | Lab Chemicals & Biochemicals |
|---|---|
| Loop Sterilizer | High Purity Biochemicals |
| Anaerobic System | Laboratory Chemicals |
| Antibiotic Disc Dispensers | Biological Stains & Indicators |
| Plastic wares | |
| Disposable / Autoclavable Plastic Petri Dishes | **Professional Care Products** |
| Swabs (sterile & non sterile) | Instant Hand Disinfectant Gel & Wash |
| Air Sampler / Air Purifier | Surface Sanitary Germicidal Concentrate & Spray |
| Air Petri Sampler / HiAirflow | Air Purifier Disinfectant Spray |
| | Herbal Insect Repellant Wipe |

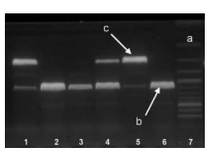
## PCR & Real-time PCR Kits

MolBio™ HIMEDIA

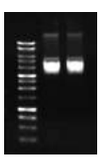
- *Semi-quantitative kits :*
  - Mycoplasma Detection Kit
  - Mycobacterium Detection Kit

## Isolation & Purification of Nucleic Acids

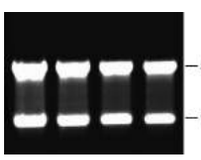
- Miniprep
- Midiprep
- Maxiprep
- 96 well formats
- Agarose Gel DNA Purification Kit
- PCR Product Purification Spin Kit
- Endotoxin Free Plasmid DNA Purification Spin Kit
- Bacterial and Yeast Genomic DNA Purification Spin Kit




Mycobacteria PCR



Pure, High quality Plasmid DNA obtained using HiPurA™ Plasmid DNA Miniprep Purification Spin kit (MB508)



RNA isolated using RNA-XPress™ Kit-MB601 from Jurkat cells

HiMediaLaboratories™

**HiMedia Laboratories Pvt. Limited**

A-516, Swastik Disha Business Park, Via Vadhani Indl. Est. LBS Marg, Mumbai - 400 086, India
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NJP Healthcare Private Limited

## INTRODUCTION

**NJP HEALTHCARE PRIVATE LIMITED** came in existence with the new concept of vertical integration of herbal cultivation, processing and making Ayurvedic classical and proprietary medicine and following ancient Ayurveda principles by using modern technology and produces water based herbal extracts ,whereas it increase the efficacy of the product and definite results in human body.

**NJP HEALTHCARE PRIVATE LIMITED** has their own manufacturing facility on the name of Leopard Investment Limited in1991 with all required licenses , situated in the biggest industrial zone in western India zone and in the region of south Gujarat. Our philosophy and belief have overwhelming faith in superb curing power of natural herbs, which led him to start extract in different form like dry powder, cosmetic extracts and all classical product in pure form.

**NJP HEALTHCARE PRIVATE LIMITED** has a pioneer in the standard herbal raw material supply with all types of certificates of chemical, microbial and heavy metals.

## ABOUT AYURVEDA

Ayurveda is an ancient Indian science of healthcare and has been describe as art of living in harmony with nature. Ayurveda has addressed itself to the fundamental principle of good health and longativity. It has develop a system in human body to rejuvenate to heal and restore its natural balance.

- According to principle of Ayurveda, health is synonymous with the harmony of mind, body and spirit. It is the complete system of Indian medicine which deals with practically in the entire diseases and ailments.

## ABOUT US

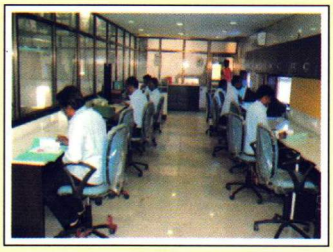
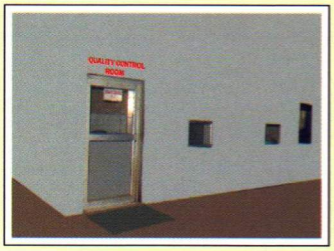
**NJP HEALTHCARE PRIVATE LIMITED** is a marketing company with a certified and approved unit of the name of Leopard Investment Limited, which has a definite name in leading company in India offering herbal extract in different forms.

Our basic faith in research and development and produce a product in innovative way and execute in a wide range in extracts in natural origin.

**NJP HEALTHCARE PRIVATE LIMITED** is adheres to best quality standards that are assured through the state of art technology and best infrastructure at R & D and manufacturing unit.

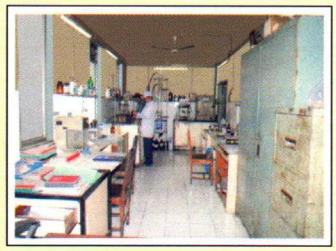
## OBJECTIVE

**NJP HEALTHCARE PRIVATE LIMITED** has a objective to cater all pharma and health care industries with pure and finest form of extracts and neutraceuticals products.





International Conference
on
"Current Status, Opportunities and Challenges in Medicinal Plants and Natural Product Research"
held during September 24 - 26, 2014
at
C G Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli, Gujarat (India)

# FEEDBACK FORM

*"Your evaluation, your ideas and your voice are significant"*

**Name:** _____

**Designation:** _____ **Institute/University:** _____

**Mobile:** _____ **E-mail:** _____

1. **How did you come to know about this conference?**
   - ☐ Circulated Brochure
   - ☐ Journal advertisement
   - ☐ Friends and colleagues
   - ☐ Any other _____

2. **How do you perceive the conference?**
   - ☐ Adding newer dimensions to hitherto research strategies
   - ☐ Quite inspiring and thought provoking
   - ☐ Knowledgeable and informative
   - ☐ Providing relevant information for project/research work
   - ☐ Disappointing

3. **Do you have any suggestions about the themes for future conferences?**

   _____
   _____
   _____

4. **If you have any other comments, please specify:**

   _____
   _____
   _____

**5. Please tick (√) the responses that most closely represent your opinion**

| No. | Conference services and organisation | Excellent | Good | Average |
|---|---|---|---|---|
| 1 | Accommodation | | | |
| 2 | Venue | | | |
| 3 | Food and refreshments | | | |
| 4 | Accessibility | | | |
| 5 | Planning prior to the event | | | |
| 6 | Planning during the event | | | |
| 7 | Conference brochure | | | |
| 8 | Conference souvenir | | | |
| 9 | Conference schedule | | | |
| 10 | Conference hall and arrangements | | | |
| 11 | Conference kit | | | |
| 12 | Organizers and volunteers' conduct | | | |
| 13 | Overall | | | |

*Thank you for sparing time to give us your valuable feedback about the conference*

**Date:**_____ **Signature:**_____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