

**INDIAN JOURNAL OF NATURAL SCIENCES (IJONS)**  
**BIMONTHLY INTERNATIONAL JOURNAL (PRINT)**

**Editor-in-Chief**  
**Dr.S.Vijikumar**

**Published by**

**TAMILNADU SCIENTIFIC RESEARCH ORGANISATION**

Regd.Off. : NO 46-141, MEENAKSHIPURAM RD, NEAR POST OFFICE,ARIMALAM 622  
201,PUDUKKOTTAI, TAMIL NADU, INDIA



---

Admin. Off. : PLOT NO 39,MURA BHAVAN,KOODAL NAGAR,RAJAGOPALAPURAM POST,  
PUDUKKOTTAI, TAMIL NADU, INDIA.

[ijonstnsro@gmail.com](mailto:ijonstnsro@gmail.com), [editorijons@gmail.com](mailto:editorijons@gmail.com)-[www.tnsroindia.org.in](http://www.tnsroindia.org.in)

**Editor-in-Chief, Editorial Board and Publisher take no responsibility for inaccurate, misleading data, opinion and statements appeared in the articles and advertisements published in this journal. It is the sole responsibility of the contributors and advertisers. No part of this journal can be reproduced without the written permission of the Editor-in-Chief who also holds the copyright © of the "Indian Journal of Natural Sciences (IJONS)".**

## JOURNAL PARTICULARS

Journal Name	INDIAN JOURNAL OF NATURAL SCIENCES (IJONS)
Frequency	Bi-monthly ( Feb, Apr, Jun, Aug, Oct, Dec)
ISSN	0976 – 0997 ( Print)
Publisher	TamilNadu Scientific Research Organisation , Pudukkottai, Tamil Nadu, India
Chief Editor	Dr.S.Vijikumar
Copy right	TamilNadu Scientific Research Organisation (TNSRO) Pudukkottai, Tamil Nadu, India.
Starting Year	2010
Subject	Multi Disciplinary Science Subjects
Review Process	Double Blind Review Process
Language	English
Publication Format	Print
Access	 OPEN ACCESS
License	 Creative Commons Attribution License 4.0
Phone Nos:	04322- 458193, 04322 –261088 (10.00 A.M to 05.00 P.M)
Email	ijons@tnsroindia.org.in & ijonstnsro@gmail.com
Website	<a href="https://www.tnsroindia.org.in/">https://www.tnsroindia.org.in/</a>
Registered office Address	No 46-141, Meenakshipuram Rd, Near Post Office, Arimalam 622 201, Pudukkottai, Tamil Nadu, India.
Admin. Office Address	Plot No 39, Mura Bhavan, Koodal Nagar, Rajagopalapuram Post, Pudukkottai, Tamil Nadu, India.

**Indian Journal of Natural Sciences (IJONS)**  
**Editorial Committee Members (Advisory / Peer Review)**

<b>Editor-in-Chief</b>	
<b>Dr.S.Vijikumar</b> Director, TamilNadu Scientific Research Organisation Pudukkottai-622003, Tamil Nadu. India.	
<b>Editorial Committee Members (Advisory / Peer Review)</b>	
	Specialization
<b>Dr.C.ANANDHARAMAKRISHNAN</b> Director, CSIR – National Institute for Interdisciplinary Science and Technology (NIIST) Council of Scientific and Industrial Research (CSIR), Ministry of Science and Technology, Government of India, Industrial Estate PO, Thiruvananthapuram, India Mail: c.anandharamakrishnan@gmail.com Mobile: +91-97509 68404	Chemical Engineering
<b>Dr.NEELESH SHARMA</b> Professor & Head, Visiting Professor (South Korea and Brazil), ICAR-International Fellow, NAAS Associate, Veterinary Sciences & Animal Husbandry, SKUAST-J, R.S. Pura, Jammu, UT of Jammu & Kashmir-181 102, India. Email: drneeshsharma@gmail.com Mobile: +91-94192 48061	Veterinary Sciences & Animal Husbandry,
<b>Dr.M.KRISHNAN</b> Vice Chancellor, Central University of Tamil Nadu, Thiruvarur, Tamil Nadu. India. Mob: 9443998251, Mail: vc@cutn.ac.in	Biotechnology
<b>Dr. B. VASEEHARAN</b> Professor and Head, Department of Animal Health and Management, Alagappa University, Karaikudi – 630003 Tamil Nadu, India Mail : vaseecharanb@alagappauniversity.ac.in Mobile : +91 9894720893	Animal Health
<b>Dr.PRAKASH.M</b> Professor, Department of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, Annamalai nagar- 608002.Cuddalore District. Mail: geeth_prakash@yahoo.co.in Mobile: 9443405026	Genetics and Plant Breeding
<b>Dr.G.RAMA RAO</b> Registrar, ANGR Agricultural University, Guntur, Andhra Pradesh, India Email ID: rrgutha@yahoo.com Mobile: 0863-2347101	Crop Physiology

<p><b>Dr.C.BALUSAMI</b> Assistant Professor, Department of Livestock Production and Management, College of Veterinary and Animal Sciences, Pookode-673576.Kerala, India.</p>	Veterinary and Animal Sciences
<p><b>Dr.C.RAVINDER SINGH</b> Chief Scientist - Tissue Culture &amp; Hydroponics AAKASH Green Research Private Limited 14B/1, Bryant Nagar, 9th Street East Thoothukudi, Tamil Nadu - 628008, India. E.mail :Ravi@aakash.green Mobile: +91 96004 86256.</p>	Tissue Culture & Hydroponics
<p><b>Dr.M.RAMESH</b> Professor, Department of Biotechnology, Alagappa University, Karaikudi-630003,Sivagangai Dt, TamilNadu, India. Mail : rameshm@alagappauniversity.ac.in Mobile : +91 9442318200 +91 7904270252</p>	Biotechnology
<p><b>Dr.S.YAMINI SUDHA LAKSHMI</b> Assistant Professor, Department of Medical Biochemistry, University of Madras,Taramani Campus, Chennai-600113,TamilNadu,India. Mail: sudha.yasula2000@gmail.com Mobile: 9444153155</p>	Medical Biochemistry
<p><b>Dr. R. SIVARAMAN</b> Associate Professor, Department of Mathematics, Dwaraka Doss Goverdhan Doss Vaishnav College Arumpakkam, Chennai, Tamil Nadu, India Mail: rsivaraman1729@yahoo.co.in Mobile:7845014341</p>	Mathematics
<p><b>Dr.C.THAMARAISELVI</b> Assistant Professor, Department of Biotechnology Mother Teresa Women's University Kodaikanal-624101,TamilNadu,India. Mail: thamaraibiotechnology@gmail.com Mob: +8903403375</p>	Biotechnology
<p><b>Dr.M.BIRUNTHA</b> Assistant Professor, Department of Animal Health and Management, Alagappa University, Karaikudi, TamilNadu,India Mail: biruntha6675@gmail.com Mobile: 9487588765</p>	Zoology
<p><b>Dr. KOMALAVALLI NARAYANASWAMY</b> Associate Professor and Head, PG and Research Department of Botany, Alagappa College of Arts &amp; Science, Karaikudi, Tamil Nadu, India. Mail:nkomalavalli@gmail.com, Mob: +91 94425 16227</p>	Botany
<p><b>Dr. H. SYED JAHANGIR,</b> Associate Professor, Department of Botany, Jamal Mohamed College (Autonomous) Tiruchirappalli- 620 020 Tamil Nadu, India Email: syedsanu@yahoo.co.in Mob: 91 94438 17623</p>	Botany, Microbiology

<p><b>Dr. SUJATHA ILANGOVAN,</b> Assistant Professor and Head, PG &amp; Research Department of Zoology Holy Cross College (Autonomous) Tiruchirappalli- 620002, Tamil Nadu, India Mail: sujasram03@yahoo.com Mobile No:-87603 50460, 86670 30469</p>	Zoology
<p><b>Dr. K. KUMARASWAMY</b> Emeritus Professor, ICSSR-Senior Fellow Department of Geography, School of Earth Sciences Bharathidasan University Tiruchirappalli - 620 024, TN, INDIA Mail: kkumargeo@gmail.com, editorigs1926@gmail.com Mob : 91 9442157347 ; Office : 0431 2407079</p>	Geography
<p><b>Dr. S. BALASUBRAMANIAN</b> Assistant Professor, Department of Mathematics, Government Arts College (A), Karur – 639 005, Tamil Nadu, India, Mail: mani5568215@gmail.com Mobile: 9788430724; (0)9440249972</p>	Mathematics
<p><b>Prof. K.RAMANATHAN</b> Assistant Professor, Department of Microbiology, Maruthupandiyar College, Thanjavur, TamilNadu, India. Mob: +91 81100 27313, Mail: ramanathanbio@gmail.com</p>	Bioinformatics
<p><b>Dr.SUBBIAH POOPATHI</b> Scientist-G/ Director Grade ICMR-Vector control Research Centre, Medical complex, Indira Nagar, Pondicherry-605006, India Contact: +91-9443957479, Email: Subbiahpoopathi@rediffmail.com</p>	Medical Entomology, Molecular Biology and Biotechnology
<p><b>Dr.P.GOVINDARAJ</b> Head &amp; Associate Professor in Chemistry Department of Chemistry, SBK College, Aruppukottai - 626 101, TamilNadu, India Mob: 9487264394, Mail : govindsbk@gmail.com govindchem@sbkcollegeapk.in</p>	Chemistry
<p><b>Dr.SINDHU. K</b> Assistant Professor, Department of Veterinary Pharmacology and Toxicology , Veterinary College, Gadag – 582101, Karnataka, India. Mobile : 9148130207, Email : drsindhu.vet@gmail.com</p>	Veterinary Pharmacology and Toxicology
<p><b>Dr. S. UMAMAHESWARI</b> Assistant Professor, Department of Environmental Biotechnology, School of Environmental Sciences Bharathidasan University, Tiruchirappalli – 620 024, Tamil Nadu, India Mobile: +91 -9487254294 M-mail: umamaheswari@bdu.ac.in</p>	Environmental Biotechnology

<p><b>Dr. P. SANTHANAM</b> Associate Professor, Department of Marine Science, School of Marine Sciences, Bharathidasan University, Tiruchirappalli, Tamil Nadu. India Mobile : +91 9894223482 E-mail: santhanam@bdu.ac.in</p>	Marine Science,
<p><b>Dr. S. JAYACHANDRAN</b> Professor &amp; Head, Dept. of Oral Medicine and Radiology, Tamil Nadu Govt. Dental College and Hospital, Chennai -600003, Tamil Nadu, India. Mobile No: 94441 85662. Email : drsjayachandranmds@yahoo.com</p>	Oral Medicine and Radiology,
<p><b>Dr.V.M. SRINIVASAN</b> Assistant Professor (Plant Pathology), Department of Crop Protection, Thanthai Roever Institute of Agriculture and Rural Development, Valikandapuram Post, Perambalur - 621115., Tamil Nadu. Mob: 8870638155 Mail : vmagri@rediffmail.com</p>	Plant Pathology
<p><b>Dr. RINA POONIA</b> Associate Professor &amp; Head, Department of Physical Education , Sports and Yoga, Faculty of Arts &amp; Law, Manipal University, Jaipur, India email: rina.poonia@jaipur.manipal.edu Mobile: 8560097932</p>	Physical Education , Sports and Yoga
<p><b>Dr. M. LEKESHMANASWAMY</b> Associate Professor, Head and Principal, PG and Research Department of Zoology, Kongunadu Arts and Science College G.N. mills (PO), Coimbatore-641 029, TamilNadu, India.</p>	Zoology
<p><b>Dr. N. BALAKRISHNAN</b> Professor (Agrl. Entomology), Directorate of Research, Tamil Nadu Agricultural University, Lawley Road, Coimbatore, Tamil Nadu, India - 641003. Mail: balakrishnan.n@tnau.ac.in Mob: 8778947536</p>	Agrl. Entomology
<p><b>Dr. H. E. SYED MOHAMED</b> Assistant Professor, P.G. Department of Zoology, Jamal Mohamed College (Autonomous), Tiruchirappalli – 620 020, Tamilnadu, India E.mail : syedmdjmc@gmail.com Mobile : +91 97901 12105</p>	Radiation Ecology & Thermal Ecology
<p><b>Dr.N.RAMAN</b> Head and Associate Professor of Chemistry, VHNSN College (Autonomous), Virudhunagar-626 001, Tamil Nadu, India. Mob: 9245165958, Mail: raman@vhnsnc.edu.in</p>	Bio-Inorganic Chemistry
<p><b>Dr.A.DINAKARA RAO</b> Professor, Center for Bioinformatics, School of Life Sciences, Pondicherry University, Puducherry, India Mob: +91-413-2654946 Mail: ampasaladr@bicpu.edu.in</p>	Bioinformatics

<p><b>Dr.K.SIVAKUMAR</b>  Professor, Department of Botany, Annamalai University,  Annamalai Nagar, TamilNadu, India  Mob: 9894801529, Mail: kshivam69@gmail.com</p>	<p>Water Algae, Taxonomy, Ecology  and Biochemistry of Marine  Macro Algae."(Seaweeds)</p>
<p><b>Dr.A.KALYANA SUNDARAM</b>  Associate Professor(Entomology), Tamil Nadu  Agricultural University, Lawley Road  Coimbatore, Tamil Nadu, - 641003.</p>	<p>Agri. Entomology</p>
<p><b>Dr.S.SENTHIL MURUGAN</b>  Associate Professor, Department of Animal Nutrition,  College of Veterinary and Animal Sciences, Pookode,  Wayanad, Kerala, India  Mobile: - 9446233030  Email: - senthil@kvasu.ac.in</p>	<p>Animal Nutrition</p>
<p><b>Dr.V.VIOLET DHAYABARAN</b>  Associate Professor, Department of Chemistry,  Bishop Heber College (Autonomous),  Puthur, Tiruchirappalli, Tamil Nadu, India.  E-mail : violetdhaya@gmail.com  Mob : 9994291637</p>	<p>Chemistry</p>
<p><b>Dr.ANANTH NAG B</b>  Lecturer, Department of Environmental Science,  Kuvempu University,Shivamogga, Karnataka, India.  Mob: 9742617839  E-Mail: ananth_acc@rediffmail.com</p>	<p>Environmental Science</p>
<p><b>Dr.G. RUBALAKSHMI</b>  Scientist &amp; Director, GRD Bio Research Centre  #3/41, Nanbargal Nagar, Muthukalipatty,  Rasipuram TK, Namakkal DT- 37401  Tamil Nadu ,India.  Mob: 09994953165  E-mail:rubalakshmi@yahoo.com</p>	<p>Biotechnology</p>
<p><b>Dr. S. EZHIL VENDAN</b>  Scientist, Food Protectants &amp; Infestation Control Dept.,  CSIR-Central Food Technological Research Institute,  Mysore – 570 020, Karnataka,  Mobile: 9591714567  Mail: ezilvendan@cftri.res.in / geneezil@yahoo.co.in</p>	<p>Entomology</p>
<p><b>Dr.T.SHANMUGASUNDARAM</b>  Research Associate (Horticulture), Department of  Vegetable Crops, Horticultural College and Research  Institute, Tamil Nadu Agricultural University,  Coimbatore-641 003, Tamil Nadu, India.  Mob: 8903694612  Mail: drshanhort@gmail.com</p>	<p>Fruits, Vegetable Science and  Hydroponics</p>
<p><b>Dr.C.KATHIRVELAN</b>  Assistant Professor, Department of Animal Nutrition  Veterinary College and Research Institute,  Tamil Nadu Veterinary and Animal Sciences University,  Namakkal -637002. Tamil Nadu, India.  Mob: +91-91762 17887  Mail: kadhirc@gmail.com</p>	<p>Animal Nutrition</p>

<p><b>Dr. JOHN ABRAHAM</b>  Professor, Livestock Production &amp; Management  College of Veterinary and Animal Sciences, Pookode,  Wayanad. 673576, Kerala, India.  Mob: - 9447617194  E.mail: john@kvasu.ac.in</p>	<p>Livestock Production &amp;  Management</p>
<p><b>Dr.P.KAVITHA</b>  Assistant Professor, Department of Zoology and  Biotechnology, AVVM Sri Pushpam College  (Autonomous), Poondi,Thanjavur, TamilNadu, India.  Mob: 9443451776  Mail: rameshkavi.dharaka@gmail.com</p>	<p>Zoology and Biotechnology</p>
<p><b>Dr. GOPAL MUTHU</b>  Scientist -'C', DHR-Model Rural Health Research Unit  ICMR-National Institute of Epidemiology  Government of India, Primary Health Centre Campus  Kallur-627 010, Tirunelveli District, Tamil Nadu, India  Mobile- +91 9884304202  Mail: gopalmuthukrishnan@gmail.com</p>	<p>Microbiology</p>
<p><b>Dr.RANJITH.D</b>  Assistant Professor, Department of Veterinary  Pharmacology and Toxicology, College of Veterinary  and Animal Sciences, Pookode, Wayanad – 673576.  Kerala, India  Mail: ranjithd@kvasu.ac.in</p>	<p>Veterinary Pharmacology and  Toxicology</p>
<p><b>Dr. AJAY ANIL GURJAR</b>  Professor &amp; Dean Academics,  Sipna College of Engineering &amp; Technology,  Amravati(M.S)- 444606,India.  Mail: prof_gurjar1928@rediffmail.com</p>	<p>-Electronics &amp;  Telecommunication  Engineering</p>
<p><b>Dr.N.MAHESH</b>  Sr.Assistant Professor, Department of Chemistry &amp;  Biosciences, SASTRA University Srinivasa Ramanujan  Centre, Kumbakonam,Thanjavur Dist, Tamil nadu, India  Mail: magi.mbbt.src.sastra.edu</p>	<p>Chemistry &amp; Biosciences</p>
<p><b>Dr. SUMIT KUMAR GUPTA</b>  Dean of Science, Department of Physics, Parishkar  College of Global Excellence , Jaipur, Rajasthan, India</p>	<p>Physics</p>
<p><b>Dr.M.N.HARISHA</b>  Guest Lecturer, Department of Wildlife and  Management, Kuvempu University, Jnanasahyadri,  Shankaraghatta - 577451. Shimoga, Karnataka, India  Mob: 9986143991  E.Mail: harishwild@gmail.com</p>	<p>Wildlife Management,</p>
<p><b>Dr.P.JEYASEELAN</b>  Department of Agricultural Extension, Faculty of  Agriculture, Annamalai University, Annamalai Nagar –  608 002, Cuddalore, Tamil Nadu, India  Mob: 9894870355  Mail : jeyachris@rediffmail.com</p>	<p>Agricultural Extension</p>

<p><b>Dr. ARUNACHALAM MUTHURAMAN</b> Associate Professor, Faculty Coordinator AIMST University, 08100 Bedong, Kedah, Malaysia. Mob: +60 - 0174509806 Mail: muthuraman.a@aimst.edu.my</p>	Pharmacology, Toxicology, and Basic Health Sciences
<p><b>Dr.Y.V. KRISHNA REDDY</b> Asst.Professor, Department of Agricultural Engineering, Aditya Engineering College, Surampalem- 533437, East –Godavari, Andhra Pradesh, India Mob: 8978157071 Mail: krishnareddy029@gmail.com</p>	Water System Technolog
<p><b>Dr. PUSHPA S MURTHY</b> Senior Principal scientist &amp; Head Department of Plantation Products, Spices and Flavour Technology, Professor, Academy of Scientific and Innovative Research, CSIR-Central Food Technological Research Institute, Mysuru-570020,Karnataka,India Mob: 91-821-2514990 , E-mail: pushpa@cftri.res.in</p>	Biotechnology
<p><b>Dr.MATHEWS PLAMOOTTIL</b> Principal, EKNM Government College Elerithattu Elerithattu P.O. Nileshwar Via. Kasaragod Dist. Kerala - 671314 mail: mathewsplamoottil@gmail.com Mob: 9447059690</p>	Zoology
<p><b>Dr.N.VIJAYAKUMAR</b> Assistant Professor, Dept.of Biochemistry &amp; Biotechnology, Annamalai University, Annamalai Nagar -608 002, Tamil Nadu, India. Mob: 9842574258, Mail: nvkbiochem@yahoo.co.in</p>	Biochemistry & Biotechnology
<p><b>Dr. E.EMIMAL VICTORIA</b> Assistant Professor, Department of Zoology Sri Meenakshi Govt. Arts College for Women, Madurai, TamilNadu, India</p>	Zoology
<p><b>Dr.C.KANDEEPAN</b> Asst.Professor and Head, PG Department of Zoology, A.P.A College of Arts and Culture, Palani-624601, Dindigul Dt. Tamil Nadu, India. Mail: kansbiotech@gmail.com</p>	Zoology
<p><b>Dr.A.RADHA</b> Assistant Professor, Department of Zoology Kunthavai Naacchiyar Govt Arts College for Women, Thanjavur-7, Tamil Nadu, India. Mobile : 8825858679 Mail: radhanov1969@gmail.com</p>	Zoology
<p><b>Dr.B.KALEESWARAN</b> Assistant Professor, Dept. of Zoology &amp; Biotechnology, A.V.V.M.Sri Pushpam College, Poondi, Thanjavur, TamilNadu, India. Mob: 9894542489 Mzookaleesh@gmail.com</p>	Zoology and Biotechnology

<p><b>Dr.K.NAGARAJAN</b> Associate Professor &amp; Head PG &amp; Research Department of Zoology, VHN Senthikumara Nadar College (Autonomous) Virudhunagar TamilNadu, India. Mob: 9486746215 Mail: gurunagan@gmail.com</p>	Zoology
<p><b>Dr.S.LINGATHURAI</b> Assistant Professor, Department of Zoology and Research Centre, at Aditanar College of Arts &amp; Science, Virapandianpattinam, Tiruchendur - 628 216 Thoothukudi District Mob: 986576062 Mail: lings02@gmail.com</p>	Zoology
<p><b>Dr.D.SIVARAMAN</b> Scientist-C, Department of Pharmacology, Sathyabama University, Jeppiaar Nagar, Rajiv Gandhi road, Chennai- 600 119. TamilNadu, India. Mob: 9841575334 Mail: sivaramand83@gmail.com</p>	Pharmacology
<p><b>Dr.S.V.SAI PRASAD</b> Principal Scientist &amp; Head ICAR-IARI, Regional Station, Near Agriculture College, Indore – 452 001, Madhya Pradesh, India Mail: sprasad98@gmail.com Mob: 9425957920</p>	Genetics
<p><b>SUBBURAJ. M</b> Authorised Officer, Kolkata Seaport, Kolkata International Airport and Haldia port Food Safety and Standards Authority of India Ministry of Health and Family welfare, Govt. of India Benfish Tower, 31 GN Block, Sector V, Salt lake city Kolkata -700091, India Mob: (+91)- 9400128781 Mail: subuchem@gmail.com</p>	Material Science
<p><b>Dr.Ga.BAKAVATHIAPPAN</b> Associate Professor &amp; HOD (Retd.,) Department of Zoology SBK College, Aruppukottai - 626 101, TamilNadu, India Mob: 94876 13732 E.Mail: ga.bakavathiappan@gmail.com</p>	Zoology
<p><b>Dr.OMKAR PRASAD BAIDYA</b> Assistant Professor, ESI-PGIMSR and ESIC Medical College, Joka, Kolkata, West Bengal, India Mail: omkarprasadbaidya@gmail.com</p>	

<p><b>Dr. HORNE IONA AVERAL</b>  IQAC Coordinator, Associate Professor  PG Research Department of Zoology, Holy Cross  College (Autonomous), Trichy, Tamil Nadu, India.  Mobile: 9443644858, E.Mail: profionahorne@gmail.com</p>	Zoology
<p><b>Dr. S. SUGANYA KANNA</b>  Professor &amp; Head (Agrl. Entomology)  Department of Plant Protection Technology,  Horticultural College and Research Institute,  Periyakulam-625 604, Tamil Nadu, India.  Phone: 9486257636 , Email: muthiah2007@yahoo.co.in</p>	Agrl. Entomology
<p><b>Dr.K.SARAVANAN</b>  Assistant Professor , PG &amp; Research Dept. of Zoology,  Nehru Memorial College (Autonomous),  Puthanampatti, Tiruchirappalli,  TamilNadu,India, Mob: 9360313909  EMail: kaliyaperumalsaravanan72@gmail.com</p>	Zoology
<p><b>Dr.S.SASIKALA</b>  Head &amp; Associate Professor,  Department of Computer Applications,  Hindusthan College of Arts and Science,  Coimbatore - 641 028, Tamilnadu, India.  Mail: iamsasikalamohit@gmail.com  Mob: +0-91-9942333764</p>	Computer Science
<p><b>Dr. (Mrs.) MANIGOPA CHAKRABORTY</b>  Chief Scientist-cum-University Professor  Maize Research Project (A.I.C.R.P.)  Dept. of Plant Breeding and Genetics  &amp; Head, Dept. of Statistics &amp; Computer Application  Birsra Agricultural University, Kanke, Ranchi  Jharkhand – 834006,  Mob: +91-98357-66845 (M)  Mail: drmanigopa@gmail.com</p>	Genetics & Plant Breeding
<p><b>Dr.ARVIND PRASAD DWIVEDI</b>  Lecturer, Department of Biochemistry,  Govt. Sanjay Gandhi Smriti College,  Sidhi, Madhya Pradesh, India.  Mob: 7869822746, Mail: adarvindchitrakoot@gmail.com</p>	Biochemistry
<p><b>Dr.A.SUGANYA</b>  Associate Professor (SS&amp;AC),  Soil Science &amp; Agricultural Chemistry  Department of Agricultural Science,  Tamil Nadu Agricultural University,  Coimbatore, Tamil Nadu, India.  Mob: 9442319028, Mail: suganssac2010@tnau.ac.in</p>	Soil Science & Agricultural Chemistry
<p><b>Dr.M.KARTHIKEYAN</b>  Assistant Professor (Plant Pathology)  Department of Vegetable Crops ,HC&amp;RI  Tamil Nadu Agricultural University ,Coimbatore  TamilNadu,India, Mob: 9788231129  Mail: karthikeyan.m@tnau.ac.in</p>	Plant Pathology

<p><b>Dr. VIJAYA BHASKARA REDDY.MUTHA</b> Lecturer Faculty of Public Health, St Theresa International University, 1 Moo 6 Rangsit-Nakhon Nayok Road (Klong 14), Bungsan,Ongkharak – 26120 Nakhon Nayok, Thailand Mail: vijaybhaskar24@gmail.com</p>	Public Health Research Biotechnology
<p><b>Dr.THIRUMAL KUMAR D</b> Assistant Professor(Jr), Department of Integrative Biology, School of Bio Sciences and Technology Vellore Institute of Technology Vellore – 632014, Tamilnadu, India. Mail: thirumalkumar.d@gmail.com Mob: +91- 86562 95915</p>	Biotechnology, Bioinformatics, Computational Biology
<p><b>Dr. SAIKAT SEN</b> Professor, Dean of Faculty, Faculty of Pharmaceutical Sciences, Assam down town University, Panikhaiti, Guwahati, Assam - 781026, India Mob: +91-8638603899/ +91-9678210021 Email: saikat.pharm@rediffmail.com</p>	Pharmacology
<p><b>Dr. P. CHANDRAMANI</b> Professor and Head, (Agricultural Entomology), Department of Entomology, Agricultural College and Research Institute, Madurai Agriculture College Tamil Nadu Agricultural University Madurai., Tamil Nadu, India Mail: pcento12@gmail.com, Mob: 9789557307</p>	Agricultural Entomology
<p><b>Dr.S.PREMA</b> Assistant Professor and Head Department of Computer Applications, Arulmigu arthanareeswarar arts and science college, Tiruchengode, Tamil Nadu, India Mail: premashanmuga11@gmail.com Mob: 9842979939</p>	Computer Science
<p><b>Dr. T.S.POORNAPPRIYA</b> 12/29, Keela Kallukara Street, Eda Street, Tiruchirappalli – 620 001, Tamil Nadu, India. Mail: Poorna230priya@gmail.com Mob: 7010973534</p>	Computer Science
<p><b>Prof. G.GANESAN</b> Professor, Department of Mathematics, Adikavi Nannaya University,Rajahmundry-533105, Andhra Pradesh, India, Mail: prof.ganesan@yahoo.com</p>	Mathematics
<p><b>Dr. T.S. SARAVANAN</b> Sr.Professor of Biotechnology, Dr.M.G.R Educational and Research Institute University, Periyar E.V.R High Road, Maduravoyal, Chennai-600095.</p>	Zoology.
<p><b>Dr. RAJASHEKHAR O, PATIL</b> Assistant Professor, Department of Environmental Management, Sant Gadge Maharaj College of Commerce &amp; Economics, Mumbai 400004, India</p>	Environmental Management

<p><b>Dr.R.MUTHUKRISHNAN</b> Associate Professor (SS &amp; AC) &amp; HOD (Crop Management) Department of Soil Science and Agricultural Chemistry, Vanavarayar Institute of Agricultural Manakkadavu, Pollachi-642- 103, TamilNadu, India</p>	Soil Science and Agricultural Chemistry
<p><b>Dr.K.KANIMOZHI</b> Assistant Professor, Department of Chemistry UCE – BIT Campus, Tiruchirappalli 620 024 Contact no: 9841004769 Mail. ID: kanirams47@gmail.com</p>	Chemistry
<p><b>Dr.J.NESARAJAN</b> Assistant Professor, Department of Zoology, Bishop Heber College, Tiruchirappalli – 17, Tamil Nadu, India E-mail : nesarajan.zy@bhc.edu.in Phone : 9080986713</p>	Zoology
<p><b>Dr. S.JEGAN KARUPPIAH</b> Assistant Professor, Department of Rural Development Science, Arul Anandar College, Karmathur - 625 514, Madurai. Tamil Nadu, India E.Mail: jegan@aactni.edu.in</p>	Rural Development Science
<p><b>Dr.S.MARAGATHAM</b> Professor (SS&amp;AC) , Soil Science &amp; Agricultural Chemistry, Tamil Nadu Agricultural University, Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India. Mail: maragatham.s@tnau.ac.in Mob: 9843214101</p>	Soil Science & Agricultural Chemistry
<p><b>Dr.PRANTOSH K. PAUL</b> Assistant Professor And Coordinator, Department of Computer &amp; Information Science, Raiganj University, Raiganj, West Bengal-733 134, India.</p>	Computer Science
<p><b>Dr.R.RAJKUMAR</b> Senior Scientist (Retd.), Village Resource Centre M S Swaminathan Research Foundation Pudukkottai, TamilNadu, India.® Mail: rajkumar@mssrf.res.in</p>	Agricultural Economics
<p><b>Dr.N.SHRUTHI</b> Scientist Division of Animal Biochemistry, ICAR- IVRI, Izatnagar, Bareilly, Uttar Pradesh – 243 122. India. Mail: shruti.shruti@icar.gov.in</p>	Animal Biochemistry
<p><b>Dr. N. JEYAPANDIYAN,</b> Assistant Professor, Department Agriculture, School of Agriculture and Biosciences Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu-641114 .Mail: jeyapandiyan@karunya.edu; jp.agmet@gmail.com</p>	Agricultural Microbiology

<p><b>Dr. V. JANAHIRAMAN</b>  Assistant Professor ( Agricultural Microbiology) Krishna  College of Agriculture and Technology, Srirengapuram -  625532, Usilampatti, Madurai-Dt Affiliated by Tamil  Nadu Agricultural University. Tamil Nadu, India.  E.mail: greenramanhorti@gmail.com,  Mobile: 91-9488362087</p>	Agricultural Microbiology
<p><b>Dr. R.MARY SUJA</b>  Director, Williams Research Centre,  Nagarcoil – 1 Kanyakumari Dist, Tamil Nadu, India  Mob: +91 87605 09942  Mail; rmsuja.83@gmail.com</p>	Botany
<p><b>Dr.S.ALAGUMANIAN</b>  Head &amp; Assistant Professor, PG &amp;Research Dept. of  Botany, H.H. The Rajash’s Collage, Pudukkottai,  Tamilnadu, India, Mobile No. 9788211945  E.Mail: salagumanian@yahoo.co.in</p>	Botany
<p><b>Dr.N.VASANTHAKUMAR</b>  Librarian, The American College,  Madurai – 625 002, Tamilnadu, India  Mob: 9486026488  Mail: nvasanth74@gmail.com</p>	Library and Information Science
<p><b>Dr.R.JAYAPANDI</b>  Assistant Professor, Department of Bio Chemistry,  The American College, Madurai – 625 002, Tamilnadu,  IndiaMobile : 8489030173  Email : jeyapandi@americancollege.edu.in</p>	Biochemistry-Zoology
<p><b>Dr.K.F.BHARATI</b>  Assistant Professor, Department of Computer Science  and Engineering, JNTUA College of Engineering,  Ananthapuramu - 515002, Andhra Pradesh, India.  Mob: 9441377789  email id: kfbharathi@gmail.com</p>	Computer Science and Engineering
<p><b>Dr. VIKAS SHARMA</b>  Chief Scientist , Agronomy (Crop Production)  Regional Agricultural Research Station SKUAST-  JAMMU, Tandwal-Rajouri, Teh. And District Rajouri,  State Jammu and Kashmir, India  Mail: vsagron@gmail.com, Mob: 09419135427</p>	Agronomy
<p><b>Dr.E.SELVARAJAN</b>  Assistant Professor Department of Genetic Engineering  School of Bioengineering SRM Institute of Science and  Technology Kattankulathur-603203,  Chennai,Tamilnadu, India, Mob: 9843430425  Mail: selvarae@srmist.edu.in</p>	Environmental Biotechnology
<p><b>Dr.R.PARIMALAN</b>  Scientist (Agri. Biotech) &amp; Hon. Faculty (QAAFI, UQ),  Division of Genomic Resources, ICAR-National Bureau  of Plant, Genetic Resources, PUSA Campus,  New Delhi-110012, Mail: parimalan.r@gmail.com  Phone: 011-25802889</p>	Biotechnology

<p><b>Dr.P.SIVAKUMAR,</b> Associate Professor (Biotechnology) Dr. M. S. Swaminathan Agricultural College and Research Institute, Tamil Nadu Agricultural University, Eachangkottai, Thanjavur, Tamil Nadu, India Mail: ponsivakumar@gmail.com, Mob: 9585871780</p>	<p>Biotechnology</p>
<p><b>Dr. M. PANDIYAN</b> Professor (PBG), Genetics and Plant Breeding Dr. M. S. Swaminathan Agricultural College and Research Institute, Tamil Nadu Agricultural University, Eachangkottai, Thanjavur, Tamil Nadu, India Mail: mpandiyan8@yahoo.co.in Mob: 9865173633</p>	<p>Genetics and Plant Breeding</p>
<p><b>Dr. SANTHEEP S.</b> Principal cum Director, KMCT College of Allied Health Sciences, Mukkam, Manassery, Kozhikode – 673 602, India. Mail: santheepsankar@yahoo.co.in Mob : 9895048180</p>	<p>Microbiology</p>
<p><b>Dr. GLADIES KAMALAM S.</b> Professor cum HOD Department of Physiotherapy, KMCT College of Allied Health Sciences, Mukkam, Manassery, Kozhikode – 673 602, India. Mob: 9447127613 Mail: mail2drsgk@gmail.com</p>	<p>Physiotherapy</p>
<p><b>Dr.A.PALANISAMY</b> Professor and Head Department of Physical Education and Yoga Coordinator, Centre for spirituality and yogic science Bharathidasan University, Tiruchirappalli- 620 024 Mobile No: 98420 53777 E-mail ID: draps1972@yahoo.com palanisamy.a@bdu.ac.in</p>	<p>Physical Education</p>

**INDIAN JOURNAL OF NATUREL SCIENCES (IJONS)**  
**(BI-MONTHLY - PRINT)**

**POLICIES**

**OPEN ACCESS AND LICENSING**

Indian Journal of Natural Sciences is loyal to open access for academic/research work. All the original articles and review papers published in this journal are free to access immediately from the date of publication. We don't charge any fees for any reader to download articles and reviews for their own scholarly use. The Indian Journal of Natural Sciences also operates under the Creative Commons Licence CCBY- NC-ND 3.0 (Creative Commons Attribution-Non Commercial - No Derivs 3.0 Unported). This allows for the reproduction of articles, free of charge, for non-commercial use only and with the appropriate citation information. All authors publishing with the IJONS accept these as the terms of publication.

The full terms of the CC BY-NC-ND licence are incorporated below and may also be accessed here: [https://creativecommons.org/licenses/by-nc-nd/3.0/deed.en\\_US](https://creativecommons.org/licenses/by-nc-nd/3.0/deed.en_US)

**ETHICS**

**Policies on Ethics, Conflict of Interest, Human and Animal Rights, and Informed Consent**

**Ethics**

The publication of an article in a peer-reviewed journal is an essential building block in the development of a coherent and respected network of knowledge. It is a direct reflection of the quality of the work of the authors and the institutions that support them. Peer-reviewed articles support and embody the scientific method. It is therefore important to agree upon standards of expected ethical behaviour for all parties involved in the act of publishing: the author, the journal editor, the peer reviewer, the publisher and the society of society-owned or sponsored journals.

**Conflict of Interest**

Authors are required to disclose all sources of institutional, private and corporate financial support for their study. Donors of materials (for free or at a discount from current rates) should be named in the source of funding and their location (town, state/county, country) included. Other donors will be identified in the text. If no funding has been available other than that of the author's institution, this should be specified upon submission. Authors are also required to disclose any potential conflict of interest. These include financial interests (for example patent, ownership, stock ownership, consultancies, speaker's fee,) or provision of study materials by their manufacturer for free or at a discount from current rates. Author's conflict of interest (or information specifying the absence of conflicts of interest) and the sources of funding for the research will be published under a separate heading entitled "Conflict of Interest and Sources of Funding Statement". Any experiments involving animals must be demonstrated to be ethically acceptable and where relevant conform to national guidelines for animal usage in research.

**Human and Animal Rights**

Medicine, Radiology, Pathology and Surgery encourages authors submitting manuscripts reporting from a clinical trial to register the trials registries & bear a clinical trial registration number and name of the trial. Authors must state that the protocol for the research project has been approved by a suitably constituted Ethics Committee of the institution within which the work was undertaken and that it

conforms to the provisions of the Declaration of Helsinki. The Journal retains the right to reject any manuscript on the basis of unethical conduct of either human or animal studies. All investigations on human subjects must include a statement that the subject gave informed consent. Patient anonymity should be preserved. Photographs need to be cropped sufficiently to prevent human subjects being recognized or an eye bar should be used.

Reports of randomized clinical trials should present information on all major study elements, including the protocol, assignment of interventions (methods of randomization, concealment of allocation to treatment groups), and the method of masking (blinding), based on the CONSORT statement (Moher D, Schulz KF, Altman DG: The CONSORT Statement: Revised Recommendations for Improving the Quality of Reports of Parallel- Group Randomized Trials. Consent for Identifying Information if any identifying information is included in any part of the manuscript, you must obtain a written, informed consent from the patient and submit a copy of the document to the concerned Journal's Editorial Office.

### **PEER REVIEW (DOUBLE BLIND) POLICY**

We are committed to prompt evaluation and publication of fully accepted papers in IJONS. To maintain a high-quality publication, all submissions undergo a rigorous review process. Characteristics of the peer review process are as follows:

- Simultaneous submissions of the same manuscript to different journals will not be tolerated.
- Manuscripts with contents outside the scope will not be considered for review.
- Papers will be refereed by at least 2 experts as suggested by the editorial board.
- In addition, Editor(s) will have the option of seeking additional reviews when needed.  
Authors will be informed when Editor(s) decide further review is required.
- All publication decisions are made by the journal's Editor-in-Chief on the basis of the referees' reports.  
Authors of papers that are not accepted are notified promptly.
- All submitted manuscripts are treated as confidential documents. We expect our Board of Reviewing Editor(s) and reviewers to treat manuscripts as confidential material as well.
- Editor(s) and reviewers involved in the review process should disclose conflicts of interest resulting from direct competitive, collaborative, or other relationships with any of the authors, and remove oneself from cases in which such conflicts preclude an objective evaluation. Privileged information or ideas that are obtained through peer review must not be used for competitive gain.
- Our peer review process is confidential and identities of reviewers cannot be revealed.

### **PUBLICATION ETHICS AND MALPRACTICE STATEMENT**

#### **Section A: Publication and authorship**

All submitted papers are subject to strict peer-review process by at least two international reviewers that are experts in the area of the particular paper. Reviewers are being selected by Editor in Chief or the committee formed by Editor. Author also can propose reviewers for some journals and article types.

1. The factors that are taken into account in review are relevance, originality, readability, statistical validity and language.
2. The possible decisions include acceptance, minor revisions, major revision or rejection.

3. If authors are encouraged to revise and resubmit a submission, there is no guarantee that the revised submission will be accepted.
4. Rejected articles will not be re-reviewed.
5. The paper acceptance is constrained by such legal requirements as shall then be in force regarding libel, copyright infringement and plagiarism.
6. No research can be included in more than one publication, whether within the same journal or in another journal.

### **Section B: Authors' responsibilities**

1. Authors must certify that their manuscript is their original work.
2. Authors must certify that the manuscript has not previously been published elsewhere, or even submitted and been in reviewed in another journal.
3. Authors must participate in the peer review process and follow the comments.
4. Authors are obliged to provide retractions or corrections of mistakes.
5. All Authors mentioned in the paper must have significantly contributed to the research.
6. Level of their contribution also must be defined in the "Authors' Contributions" section of the article.
7. Authors must state that all data in the paper are real and authentic.
8. Authors must notify the Editors of any conflicts of interest.
9. Authors must identify all sources used in the creation of their manuscript.
10. Authors must report any errors they discover in their published paper to the Editors.
11. Authors must not use irrelevant sources that may help other researches/journals.
12. Authors cannot withdraw their articles within the review process or after submission, or they must pay the penalty defined by the publisher.

### **Section C: Peer review/responsibility for the reviewers**

1. Reviewers should keep all information regarding papers confidential and treat them as privileged information.
2. Reviews should be conducted objectively, with no personal criticism of the author. No self-knowledge of the author(s) must affect their comments and decision.
3. Reviewers should express their views clearly with supporting arguments in 500 to 1000 words.
4. Reviewers may identify relevant published work that has not been cited by the authors.
5. Reviewers should also call to the Editor in Chief's attention any substantial similarity or overlap between the manuscript under consideration and any other published paper of which they have personal knowledge.
6. Reviewers should not review manuscripts in which they have conflicts of interest
7. resulting from competitive, collaborative, or other relationships or connections with
8. any of the authors, companies, or institutions connected to the papers.

### **Section D: Editorial responsibilities**

1. Editors (Associate Editors or Editor in Chief) have complete responsibility and authority to reject/accept an article.
2. Editors are responsible for the contents and overall quality of the publication.
3. Editors should always consider the needs of the authors and the readers when attempting to improve the publication.
4. Editors should guarantee the quality of the papers and the integrity of the academic record.
5. Editors should publish errata pages or make corrections when needed.
6. Editors should have a clear picture of a research's funding sources.
7. Editors should base their decisions solely on the papers' importance, originality, clarity and relevance to publication's scope.
8. Editors should not reverse their decisions nor overturn the ones of previous editors without serious reason.

9. Editors should preserve the anonymity of reviewers (in half blind peer review journals). Editors should ensure that all research material they publish conforms to international accepted ethical guidelines.
10. Editors should only accept a paper when reasonably certain.
11. Editors should act if they suspect misconduct, whether a paper is published or
12. unpublished, and make all reasonable attempts to persist in obtaining a resolution to the problem.
13. Editors should not reject papers based on suspicions; they should have proof of misconduct.
14. Editors should not allow any conflicts of interest between staff, authors, reviewers and board members.
15. Editors must not change their decision after submitting a decision (especially after reject or accept) unless they have a serious reason.

### **Section E: Publishing Ethics Issues**

1. All editorial members, reviewers and authors must confirm and obey rules defined by COPE.
2. Corresponding author is the main owner of the article so she/he can withdraw the article when it is incomplete (before entering the review process or when a revision is asked for).
3. Authors cannot make major changes in the article after acceptance without a serious reason.
4. All editorial members and authors must will to publish any kind of corrections honestly and completely.
5. Any notes of plagiarism, fraudulent data or any other kinds of fraud must be reported completely to COPE.

## **ANTI-PLAGIARISM POLICY**

**Indian Journal of Natural Sciences (IJONS)** regards plagiarism as a very serious offence. It is an illegal form of copying. Plagiarism is defined as the unacknowledged use of the work of others as if this were your own original work.

### **Examples of plagiarism**

- Copying and pasting from the Internet and posting somewhere else without proper citation
- Putting your name on another person's essay or project
- Copying exact wording from another person's text
- Using another person's photo, diagram, tables, sounds, or ideas without proper Citation
- Presenting research in your own words without providing references
- Purchasing another person's text and using it as your own
- Presenting ideas in the same format and order as your research source

### **By submitting paper for publication to the journal, Author(s) certify that:**

- I/We are fully aware that plagiarism is wrong
- I/We know that plagiarism is the use of another person's idea or published work and to pretend that it is one's own.
- I/ We declare that each contribution to your project from the work(s) of other peoples published works or unpublished sources have been acknowledged and source of information have been referenced.
- I/We certify that you are solely responsible for any incomplete reference that may remain in my/our work.

### **Anti-plagiarism declaration**

I have read and understood the IJONS rules on plagiarism. I hereby declare that this piece of written work is the result of my own independent scholarly work, and that in all cases material from the work of others (in books, articles, essays, dissertations, and on the internet) is acknowledged, and quotations and

paraphrases are clearly indicated. No material other than that listed has been used. This written work has not previously or not yet been published.

### **Tips for Avoiding Plagiarism**

- Learn the citation expectations for each course.
- When you take notes for a paper, be sure to cite sources so you don't get mixed up later.
- When you research online, be sure to find the original source of the information (Many Websites Plagiarize).
- If you are really worried, ask your prof. if you can submit a rough draft so she /he can check your citations.
- When in doubt, cite! It is better to have too many citations than few.

### **AI GENERATED CONTENT POLICY**

Indian Journal of Natural Sciences (IJONS) has an exacting policy on AI generated content in research manuscripts. Authors are instructed to ensure that the research manuscript which would submit for the publication should be unique and innovative. The publishers and editors are not responsible for any abuse and it is clearly announced that authors are fully responsible for their manuscript.

Authors are insisted to disclose the use of artificial intelligence (AI) tools in the preparation of manuscript. It should not be in the form of AI generated and assisted text, images, tables, graphs, data interpretation and language modifications. Failure to disclose AI assisted content will be deemed a violation of research ethics and your manuscript will not be considered for publication. The Journal does not validate the usage of AI contents in the manuscript and if the AI content would be identified in the manuscript, the authors are sole responsibility. It is informed that the AI tool will not be accepted as an author and it is clearly stated that authorship must be given only to the human contributors. All authors in the manuscript are insisted to acknowledge their involvement in the preparation of manuscript. The corresponding author must ensure that no AI generated contents in the manuscript and it is not represented for human work.

It is clearly instructed that the publisher and editorial board are not responsible for AI generated content in submitted manuscripts. The full responsibility of the corresponding author is to ensure that AI generated content does not include in factual inaccuracies, Biases, Plagiarism and data manipulation. Authors are sole responsible for any errors or misinformation arising from AI assistance. Indian Journal of Natural Sciences will not accept AI errors and it will be considered as an ethical violations.

#### **Immediate withdrawal**

If the manuscript is detected to hold undisclosed or unethical AI generated content, it will be immediately removed from the journal website, without any reconsideration.

#### **Author Suspension**

The authors are strictly instructed that if the violation of AI content will be found in the manuscript and it would be barred from publishing in the journal for one year. During this period, they will not be permitted to submit any manuscripts.

#### **Permanent Black listing of authors**

Repeated violations will results in permanent blacklisting for the authors from submitting manuscripts to IJONS.

**Indian Journal of Natural Sciences (IJONS)**  
(Bi- Monthly – Print)

<b>Volume XVII (17)</b>		<b>JUNE 2026</b>
<b>CODEN: IJONS (96) (2026)</b>	<b>ISSUE 96</b>	<b>ISSN: 0976 - 0997</b>

S. No	CONTENTS	Page No.
001	Floral Fingerprints in Kerala Honey : A Melissopalynological Approach to Quality and Medicinal Value Alga Mathew, V Nandana and M Ramyashree	113449-113454
002	Exploring the Eco-Friendly Inhibitor <i>Murraya paniculata</i> and <i>Hopea odorata</i> for Mild Steel Corrosion in Acid Medium K C Snehasree, Pooja Suresh, S.Anuraisha , Shanfiya Sherin M , Saniha S and S. Valli	113455-113466
003	Prebiotic Potential of Edible Leafy Plant Extracts : <i>In vitro</i> Assessment for Gut Microbiota Modulation Dhivyadharshini Balasundaram, Veeramurugan Veerasamy, Magdalin Sylvia Singarayar, Vivek Neethirajan, Dinesh Kumar Lakshmanan, Arul Ananth Devanesan, and Sivasudha Thilagar	113467-113475
004	Nutritional Analysis of Soup Preparation from Palmyra Spouts ( <i>Borassus flabellifer</i> ) and Study of its Antidiabetic Properties V. Sindhu, G.Thilagavathi, Anuha K Guru, P.Amaljith and Y.Sivaani	113476-113481
005	Depth - Wise Assessment of Soil Fertility and Nutrient Status in Irrigated Agricultural Soils using Integrated Indices Ruth VL Tleipuii, Lalzirzeli, Irene Lalnipari Sellate, Lalthansiamama and Lahnuntluanga	113482-113488
006	Integrated Pharmacognostic Characterization and Chemical Fingerprinting of <i>Helicteres isora</i> L. for Authentication and Quality Standardization Hiral N. Khunti, Pooja J. Sutreja, Megha R. Chovatia	113489-113496
007	From Vedic Tradition to Medical Scrutiny : The Dual Facets of Legacy of Ear Piercing and its Pervasive Health Implications in the Modern Era PV Veena, Satvik Nikam and Greeshma Mohan	113497-113504
008	Nomenclature and Botanical Identity of <i>Hemidesmus indicus</i> Br. (Sariva): An Interrelation with Ayurvedic Synonyms Iram Wadhwa, Suwarna A. Meshram and Smita rai	113505-113513
009	European Union: Regulatory Integration of Tirzepatide under Regulation (EU) No 536 / 2014 and the Clinical Trials Information System (CTIS) Shumyal and Pratima Patel	113514-113522
010	An Analytical Study on Manasa Prakruthi : Concept, Classification, and Clinical Implications in Ayurveda N Arjun and M S Anushree	113523-113533
011	Monic Polynomial Factorisation using Vedic Mathematics Sutras and Vieta's formulas in a Hybrid Algebraic Framework using MATLAB Approach Ashishkumar Thakkar, Jishan K Shaikh, Moksha Satia	113534-113540
012	Case Report: Successful Ayurvedic Management of Grahani W.S.R Ulcerative Colitis Flare-Up Prafulkumar Suryavanshi, Hrishita Dahilekar, Manjusha and Vineet Kumar	113541-113547
013	A Parametric Assessment of Fertility Dynamics in North-East India Chayanika Baruah, Ruma Talukdar and Saurav Sarma	113548-113558

014	Exploring the Gut Microbiota - Cardiovascular Axis : Mechanisms, Clinical Implications, and Therapeutic Perspectives Rishabh Singh Rathore, Sai Kanojia, Shiva Singh and Bharat Mishra	113559-113572
015	School Libraries as Catalysts for Student Reading Habits Sara.C and S. Lakshmi	113573-113576
016	Earthquakes of Mizoram from 1977 to 2011 of Northeast India Malsawmtluanga and Lalfakawma	113577-113583
017	A Novel Decision - Making Framework for International Student Migration using Fermat's Fuzzy Graph Model Nishad T M, Mohamed Harif B and Suganthi Mariyappan	113584-113591
018	Patterns of Psychological Resilience Following Adverse Experiences: A Thematic Analysis of Trauma Survivors Vanshika Sharma and Swati Saxena	113592-113597
019	Eat Well, Smile Well: Nutrition and Periodontal Health Revisited Heena, Vidushi Sheokand and Amit Bhardwaj	113598-113605
020	Hindi Translation, Validation and Test-Retest Reliability Testing of the Telematic Fugl Meyer Assessment Scale- Upper Extremity in Stroke Patients - Study Protocol Muskan, Subhasish Chatterjee, Mousumi Saha, Prashant Kumar, Rohan Sood and Pragya Arya	113606-113612
021	Fibroepithelial Hyperplasia Triggered by Orthodontic Mini- Implant : A Rare Clinical Case Himani, Anurag Bhatnagar and Vidushi Sheokand	113613-113618
022	Assessing the Therapeutic Role of <i>Vrikshamla-Eranda Taila</i> Varti in Functional Constipation: A Pilot Clinical Study Yash Mishra <sup>1</sup> , GR Arun Raj <sup>2</sup> and Prasanna Mathad <sup>3</sup>	113619-113625
023	Closure - Based Key Agreement in Finite Closure Spaces : A Computational Framework using Interior and Closure Operators S.Jackson and I. Anto Snow Sherine	113626-113633
024	Prosthetic Rehabilitation of a Completely Edentulous Patient with Flabby Maxillary Ridge using Window Impression Technique : A Clinical Case Report Udita Choudhry <sup>1</sup> , Pankaj Kumar Ritwal <sup>2</sup> and Bhupender Kumar Yadav <sup>3</sup>	113634-113639
025	Effect of Jumping Rope Exercise on Anthropometric Measures in an Adult Female With Polycystic Ovarian Syndrome : A Longitudinal Case Study Samhitha Morigadi, Mubarak Habibulla, Maruru Sujeer Basha and Mubeena Banu.N	113640-113646
026	Knowledge about Optometry Profession in Intermediate, Allied Health Sciences and Newly Enrolled Optometry Students Akram Ali, Ayush Wilson, Preeti Gurawalia and Madhuri	113647-113653
027	Synergistic Homoeopathic Management DF Chronic Tinea Cruris : A Case Report Integrating Constitutional and Intercurrent Therapy Jeet Soham Dave, Disha Thakkar Mitra and Devang Modha	113654-113664
028	Temperature Trends in Puducherry (2015 – 2024 ): A Statistical Analysis G. Sudha, S.Nageswari and C. Jayabharathi	113665-113670
029	Stress and Anxiety Related to AI-Driven Job Replacement Among Undergraduate Technical Students: A Correlational Study Deepak Krishnamurthy, Vijyalaxmi Makwana, Heli Patel, Isha Patel, Khushi B Patel, Khushi R Patel, Rudra Patel, Sanjana H. Patel, Shaleeni S. Patel, Shivani M.Patel and Aashvi Prajapati	113671-113678

030	Evaluating the Effectiveness of Neuromuscular Taping as a Treatment Method for Individuals with Bell's Palsy: A Pre-Test Post Test Pilot Study Protocol Sarita Pandey and Kanika	113679-113685
031	An Insight into Post Graduates Perception for the Management of Endodontically Involved Tooth - A Questionnaire Based Study Gunjan Aggarwal, Anurag Bhatnagar and Amit Bhardwaj	113686-113691
032	An Analysis and Prediction of Prices of the Essential Commodities using Machine Learning Partha Pratim Paul, Subhadip Upadhyay, Rahul Maitra, Souvik Saha, Koushik Karmakar, Soumya Bhattacharyya, Karobi Sarkar and Pritusna Banik	113692-113705
033	Information Integrity and Digital Protection in Academic Libraries: A Cyber-Security Perspective Rikta Turul and Mohammad Nasir	113706-113719
034	Comparison of Logistic Regression, Cox Regression, and Machine Learning Models in Medical Outcome Prediction N Sriram, P Arumugam and Manimannan G	113720-113731
035	Real Time Precision Farming using Edge - Cloud Computing, IoT Sensors and Artificial Intelligence Bhargav Vyas and Mittal Desai	113732-113740
036	Medicinal Herbs as Guardians of Gut Health: Bridging Ancient Wisdom with Modern Science for Holistic Human Wellness K. Lalitha, K. Archana , P. Kavya and M. Ruchitha	113741-113750
037	Evaluation of Cerebral Vasculature in Aging Brain using FMRI : A Systematic Review Vaishali Rawat and Umesh Kumar and Pankaj Kishor Mishra	113751-113760
038	Detour Domination Number on Topological Spaces S. Merina and S. Yahya Mohamed	113761-113765
039	Comparative Evaluation of Equilibrium-Based Balance Tests for Fall Prediction in Older Adults: A Clinical Perspective on Diagnostic Utility and Limitations Himanshu Jaiswal, Mandeep Jangra and Akanksha Saxena	113766-113778
040	A Bibliometric Mapping of Research Productivity in Mechatronics During the period of 1989-2017 M.Manjulaa Kumar and R.Jawahar Babu	113779-113784
041	A Randomised Clinical Study to Evaluate the Effectiveness of Homoeopathy Medicines Sulphur , Phosphorus and <i>Thuja occidentalis</i> in the Management of Diabetes Mellitus Katari Lavanya Sai, E. Rathna Sabapathi, R. Kothai and Vivek Sakthidharan	113785-113793
042	IoT – AI Driven Smart Sensor Fusion for Industrial Hazard Monitoring Vikram R. Nevhal and Pradeep Dahikar	113794-113801
043	A Scoping Review of Instrument - Assisted Nadi Pariksha : Mapping the Evidence on Reliability and Validity Rijin Mohan, Saranya S Kumar and Sumant Pande	113802-113807
044	AI- Based Solar Power Forecasting for Smart Cities Arnab Maity	113808-113813

045	A Comparative Pharmaceutico - Analytical Study of Shalmali Kantaka ( <i>Salmalia malabarica</i> ) Arka and its Modified Gel Formulation Indira.V , Upendra U Zala, Ganga R Hadimani and Reju Krishnan	113814-113820
046	Artificial Intelligence – Driven Biomarkers Discovery and Early Diagnosis in Cardiovascular Diseases Yash Parkhi and Muskan Tomar	113821-113832
047	Seasonal Variations in Water Quality Parameters of Veeranam Lake, Cuddalore District, Tamil Nadu, India T. Saminathan and S.Pazhanisamy	113833-113850
048	Detection of Adulterants in Locally Available Turmeric Powders and Their Implications for Public Health Rajan Samuel and V. Neetha	113851-113861
049	Efficacy of Ayurvedic Formulations in the Management of <i>Dadru</i> (Tinea Faciei): A Case Report Prasenjit K.More, Suwarna A.Meshramand Sariput Bhosikar	113862-113866
050	Exploring Sugammadex's Potential Role in Coagulation Dynamics Nidhi , Pulkit Ramavat and Komal Yadav	113867-113877
051	Designing, Construction and Calibration of Unmanned Railway Crossing Using ZigBee with Complete Automation Arun Kumar Gangwar	113878-113887
052	Performance Evaluation of a Finite-Source Retrial Queueing Model with Impatience and Balking in Wireless Sensor Networks K.Sathya and S.Shunmugapriya	113888-113896
053	A Study on the Awareness about Various Disabilities among the Women's in Pachamalai Hills, Thuraiyur Taluk, Tiruchirappalli District, Tamil Nadu, India P.Karthik and Lourdu Mary.A	113897-113905
054	Linear Undirected Graph Representation of Genome Sequences and Their Dyadic Intersection with Graph Inverses A. Reigana Begum and V. Krishnan	113906-113920
055	Effect of Magneto Therapy on Pain, Range of Motion, and Function in Individuals with Shoulder Adhesive Capsulitis : A Study Protocol Sahil Kumar, Aarunee Srivastava, Prashant Kumar and Sandeep Pattnaik	113921-113928
056	Evaluating a Digital Detox Challenge in Effects of Smartphone use Addiction and well-being Muskan, Asif, Muhammad Zubair, Pankaj Kishor Mishra and Sanyyam Thakur	113929-113934
057	Green Nanotechnology Approach for the Preparation of Nickel Oxide Nanoparticles and Their Wastewater Treatment Efficiency K. Selvam, A. Kasthuri, P. Ramesh and P. Pandian	113935-113943
058	Global Trends and Citation Analysis of Synthetic Intelligence (SI) Research Annu, B Jeyapragash, T Rajkumar and S Madhu Bala	113944-113957
059	Effects of High -Intensity Interval Training on Health Outcomes in Sedentary Individuals : A Narrative Review Mohd Sartaz and Sandeep Kumar	113958-113971
060	From Nootropics to Antiepileptics: Expanding the Therapeutic Potential of Piracetam Derivatives Tanu Chaudhary, Nidhi Dhama, Shivangi Sangal, Aadesh Kumar and Rohan Solanki	113972-113985

061	Digital Knowledge in Practice: Evaluating E-Resource usage Among Teaching Faculty and Administrators at Kuwait University Amsaveni N, Parameswari P L and Veeramani Marimuthu	113986-113999
062	Physical and Mental Health of Migrant Workers : How Social Integration, Loneliness and Living Arrangements Shape Well – being Shinu and Munavver Azeem Mullappally Kayamkulath	114000-114007

## **Editorial .....**

Dear Readers,

*In the 21st century, a nation's strength is no longer measured solely by its military capabilities; it is increasingly defined by its scientific, technological, and innovative capacity. In this context, India stands at a crucial turning point in its scientific and technological journey. Significant progress has been made in areas such as space exploration, artificial intelligence, biotechnology, quantum computing, semiconductor manufacturing, and renewable energy. However, transforming scientific advancements into sustainable economic growth and social development remains a formidable challenge.*

*Over the past few years, India has achieved remarkable milestones that have enhanced its global scientific reputation. The successful landing of Chandrayaan-3 near the Moon's south pole made India the first country to achieve this feat. Similarly, missions such as Aditya-L1, India's first dedicated solar observatory, the Gaganyaan human spaceflight programme, and the National Quantum Mission demonstrate the country's growing scientific capabilities. India has also significantly improved its position in the Global Innovation Index published by the World Intellectual Property Organization (WIPO). Furthermore, India has emerged as the world's third-largest startup ecosystem, reflecting its growing culture of innovation and entrepreneurship.*

*Despite these achievements, several structural challenges continue to hinder scientific progress. India's expenditure on Research and Development (R&D) remains around 0.65–0.70 percent of its Gross Domestic Product (GDP), considerably lower than countries such as South Korea, which invests over 4 percent, and the United States and Germany, which invest close to 3 percent of their GDP in R&D. This relatively low investment limits the development of fundamental scientific research, world-class laboratories, and breakthrough technologies. To accelerate scientific advancement, India must substantially increase public and private sector investment in research and innovation, with a long-term goal of raising R&D expenditure to at least 2 percent of GDP.*

*Another persistent challenge lies in the prevailing gap between academia and industry. Despite the thousands of research projects and scientific discoveries generated annually within Indian universities and research institutions, only a limited number successfully translate into commercial products or deliver tangible societal benefits. It is imperative to identify and address the structural, financial, and regulatory barriers that hinder the effective transfer of knowledge from research laboratories to the marketplace. The practical feasibility and scalability of many promising innovations must be carefully evaluated to ensure their successful commercialization. Strengthening university-industry collaborations, establishing dedicated technology transfer centers, expanding research parks, and fostering robust startup incubation ecosystems are essential measures to bridge this divide. Scientific discoveries must transcend the confines of laboratories and evolve into practical solutions that drive economic growth, address societal challenges, and improve the quality of life for citizens.*

*The healthcare and biotechnology sectors also hold immense potential for India's future growth. During the COVID-19 pandemic, India established itself as one of the world's leading vaccine manufacturers. Nevertheless, significant improvements are still needed in rural healthcare*

*infrastructure, genomics research, bioinformatics, personalized medicine, and AI-driven healthcare technologies. As the global market for AI-based healthcare solutions expands rapidly, India has a unique opportunity to position itself as a global hub for medical innovation and biotechnology.*

*In this context, the Fifth Science, Technology and Innovation Policy (STIP) is expected to play a pivotal role in shaping the nation's scientific future. The policy emphasizes open science, public participation, inclusion of women and youth in scientific activities, socially responsible research, and innovation-driven economic development. By democratizing access to scientific knowledge and fostering collaboration across sectors, the policy seeks to ensure that scientific discoveries are translated into tangible societal benefits.*

*At a time when global technological competition is becoming increasingly intense, India must evolve from being primarily a consumer of technology to becoming a creator of technology. Achieving this transformation will require robust investment in research, skilled human resources, strong industry partnerships, and evidence-based policy decisions. Ultimately, India's scientific future will not be determined solely by achievements in laboratories or space missions, but by its ability to convert scientific knowledge into solutions that enhance the quality of life for its people. A nation that successfully harnesses science for public welfare will emerge as a true scientific powerhouse.*

**— Editor in Chief**

**IJONS**

*Cover page image : Acraea terpsicore, commonly known as the Tawny Coster, female*

*Family :Nymphalidae*

*Image Credit : Priyadharshini V,*