

**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-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 ,<br>Pudukkottai, Tamil Nadu, India                                               |
| Chief Editor                 | Dr.S.Vijikumar                                                                                                               |
| Copy right                   | TamilNadu Scientific Research Organisation (TNSRO)<br>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<br>Address | No 46-141, Meenakshipuram Rd, Near Post Office,<br>Arimalam 622 201, Pudukkottai, Tamil Nadu, India.                         |
| Admin. Office Address        | Plot No 39, Mura Bhavan, Koodal Nagar,<br>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><br>Director, TamilNadu Scientific Research Organisation<br>Pudukkottai-622003, Tamil Nadu. India.                                                                                                                                                                                                                                           |                                         |
| <b>Editorial Committee Members (Advisory / Peer Review)</b>                                                                                                                                                                                                                                                                                                       |                                         |
|                                                                                                                                                                                                                                                                                                                                                                   | Specialization                          |
| <b>Dr.C.ANANDHARAMAKRISHNAN</b><br>Director,<br>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<br>Mail: c.anandharamakrishnan@gmail.com<br>Mobile: +91-97509 68404 | Chemical Engineering                    |
| <b>Dr.NEELESH SHARMA</b><br>Professor & Head, Visiting Professor (South Korea and Brazil),<br>ICAR-International Fellow, NAAS Associate, Veterinary Sciences & Animal Husbandry, SKUAST-J, R.S. Pura, Jammu, UT of Jammu & Kashmir-181 102, India.<br>Email: drneeshsharma@gmail.com<br>Mobile: +91-94192 48061                                                   | Veterinary Sciences & Animal Husbandry, |
| <b>Dr.M.KRISHNAN</b><br>Vice Chancellor, Central University of Tamil Nadu, Thiruvarur, Tamil Nadu. India.<br>Mob: 9443998251, Mail: vc@cutn.ac.in                                                                                                                                                                                                                 | Biotechnology                           |
| <b>Dr. B. VASEEHARAN</b><br>Professor and Head, Department of Animal Health and Management, Alagappa University, Karaikudi – 630003 Tamil Nadu, India<br>Mail : vaseecharanb@alagappauniversity.ac.in<br>Mobile : +91 9894720893                                                                                                                                  | Animal Health                           |
| <b>Dr.PRAKASH.M</b><br>Professor, Department of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, Annamalai nagar- 608002.Cuddalore District.<br>Mail: geeth_prakash@yahoo.co.in<br>Mobile: 9443405026                                                                                                                                   | Genetics and Plant Breeding             |
| <b>Dr.G.RAMA RAO</b><br>Registrar, ANGR Agricultural University, Guntur, Andhra Pradesh, India<br>Email ID: rrgutha@yahoo.com<br>Mobile: 0863-2347101                                                                                                                                                                                                             | Crop Physiology                         |

|                                                                                                                                                                                                                                                                                 |                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <p><b>Dr.C.BALUSAMI</b><br/>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><br/>Chief Scientist - Tissue Culture &amp; Hydroponics<br/>AAKASH Green Research Private Limited<br/>14B/1, Bryant Nagar, 9th Street East Thoothukudi, Tamil Nadu - 628008, India.<br/>E.mail :Ravi@aakash.green<br/>Mobile: +91 96004 86256.</p> | Tissue Culture & Hydroponics   |
| <p><b>Dr.M.RAMESH</b><br/>Professor, Department of Biotechnology, Alagappa University, Karaikudi-630003,Sivagangai Dt, TamilNadu, India.<br/>Mail : rameshm@alagappauniversity.ac.in<br/>Mobile : +91 9442318200 +91 7904270252</p>                                             | Biotechnology                  |
| <p><b>Dr.S.YAMINI SUDHA LAKSHMI</b><br/>Assistant Professor,<br/>Department of Medical Biochemistry,<br/>University of Madras,Taramani Campus,<br/>Chennai-600113,TamilNadu,India.<br/>Mail: sudha.yasula2000@gmail.com<br/>Mobile: 9444153155</p>                              | Medical Biochemistry           |
| <p><b>Dr. R. SIVARAMAN</b><br/>Associate Professor, Department of Mathematics,<br/>Dwaraka Doss Goverdhan Doss Vaishnav College<br/>Arumpakkam, Chennai, Tamil Nadu, India<br/>Mail: rsivaraman1729@yahoo.co.in<br/>Mobile:7845014341</p>                                       | Mathematics                    |
| <p><b>Dr.C.THAMARASELVI</b><br/>Assistant Professor, Department of Biotechnology<br/>Mother Teresa Women's University<br/>Kodaikanal-624101,TamilNadu,India.<br/>Mail: thamaraibiotechnology@gmail.com<br/>Mob: +8903403375</p>                                                 | Biotechnology                  |
| <p><b>Dr.M.BIRUNTHA</b><br/>Assistant Professor, Department of Animal Health and Management, Alagappa University, Karaikudi, TamilNadu,India<br/>Mail: biruntha6675@gmail.com<br/>Mobile: 9487588765</p>                                                                        | Zoology                        |
| <p><b>Dr. KOMALAVALLI NARAYANASWAMY</b><br/>Associate Professor and Head, PG and Research<br/>Department of Botany, Alagappa College of Arts &amp; Science, Karaikudi, Tamil Nadu, India.<br/>Mail:nkomalavalli@gmail.com, Mob: +91 94425 16227</p>                             | Botany                         |
| <p><b>Dr. K.GURUNATHAN</b><br/>Professor &amp; Head, Department of Nano science &amp; Technology, Alagappa University, Karaikudi, TamilNadu, India. Mail: gurukar50@gmail.com<br/>Mob: +91 9487412949</p>                                                                       | Nano Science & Technology      |

|                                                                                                                                                                                                                                                                                                             |                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <p><b>Dr. H. SYED JAHANGIR,</b><br/>Associate Professor, Department of Botany,<br/>Jamal Mohamed College (Autonomous) Tiruchirappalli-<br/>620 020 Tamil Nadu, India Email: syedsanu@yahoo.co.in<br/>Mob: 91 94438 17623</p>                                                                                | Botany, Microbiology                                       |
| <p><b>Dr. SUJATHA ILANGO VAN,</b><br/>Assistant Professor and Head,<br/>PG &amp; Research Department of Zoology<br/>Holy Cross College (Autonomous)<br/>Tiruchirappalli- 620002, Tamil Nadu, India<br/>Mail: sujaram03@yahoo.com<br/>Mobile No:-87603 50460, 86670 30469</p>                                | Zoology                                                    |
| <p><b>Dr. K. KUMARASWAMY</b><br/>Emeritus Professor, ICSSR-Senior Fellow Department of<br/>Geography, School of Earth Sciences Bharathidasan<br/>University Tiruchirappalli - 620 024, TN, INDIA<br/>Mail: kkumargeo@gmail.com, editorigs1926@gmail.com<br/>Mob : 91 9442157347 ; Office : 0431 2407079</p> | Geography                                                  |
| <p><b>Dr. S. BALASUBRAMANIAN</b><br/>Assistant Professor, Department of Mathematics,<br/>Government Arts College (A), Karur – 639 005,<br/>Tamil Nadu, India, Mail: mani5568215@gmail.com<br/>Mobile: 9788430724; (0)9440249972</p>                                                                         | Mathematics                                                |
| <p><b>Prof. K.RAMANATHAN</b><br/>Assistant Professor, Department of Microbiology,<br/>Maruthupandiyar College, Thanjavur,<br/>TamilNadu, India.<br/>Mob: +91 81100 27313, Mail: ramanathanbio@gmail.com</p>                                                                                                 | Bioinformatics                                             |
| <p><b>Dr.SUBBIAH POOPATHI</b><br/>Scientist-G/ Director Grade<br/>ICMR-Vector control Research Centre, Medical complex,<br/>Indira Nagar,Pondicherry-605006,India<br/>Contact: +91-9443957479,<br/>Email: Subbiahpoopathi@rediffmail.com</p>                                                                | Medical Entomology, Molecular<br>Biology and Biotechnology |
| <p><b>Dr.P.GOVINDARAJ</b><br/>Head &amp; Associate Professor in Chemistry<br/>Department of Chemistry, SBK College,<br/>Aruppukottai - 626 101, TamilNadu, India<br/>Mob: 9487264394, Mail : govindsbk@gmail.com<br/>govindchem@sbkcollegeapk.in</p>                                                        | Chemistry                                                  |
| <p><b>Dr.SINDHU. K</b><br/>Assistant Professor, Department of Veterinary<br/>Pharmacology and Toxicology , Veterinary College,<br/>Gadag – 582101, Karnataka, India.<br/>Mobile : 9148130207, Email : drsindhu.vet@gmail.com</p>                                                                            | Veterinary Pharmacology and<br>Toxicology                  |
| <p><b>Dr. S. UMAMAHESWARI</b><br/>Assistant Professor, Department of Environmental<br/>Biotechnology, School of Environmental Sciences<br/>Bharathidasan University,<br/>Tiruchirappalli – 620 024, Tamil Nadu, India<br/>Mobile: +91 -9487254294<br/>M-mail: umamaheswari@bdu.ac.in</p>                    | Environmental Biotechnology                                |

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

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

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

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

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

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

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

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

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

|                                                                                                                                                                                                                                                                                                    |                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <p><b>Dr.P.SIVAKUMAR,</b><br/>Associate Professor (Biotechnology)<br/>Dr. M. S. Swaminathan Agricultural College and<br/>Research Institute, Tamil Nadu Agricultural University,<br/>Eachangkottai, Thanjavur, Tamil Nadu, India<br/>Mail: ponsivakumar@gmail.com, Mob: 9585871780</p>             | <p>Biotechnology</p>               |
| <p><b>Dr. M. PANDIYAN</b><br/>Professor (PBG), Genetics and Plant Breeding<br/>Dr. M. S. Swaminathan Agricultural College and<br/>Research Institute, Tamil Nadu Agricultural University,<br/>Eachangkottai, Thanjavur, Tamil Nadu, India<br/>Mail: mpandiyan8@yahoo.co.in<br/>Mob: 9865173633</p> | <p>Genetics and Plant Breeding</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 XVI (16)</b>          |                 | <b>AUG 2025</b>          |
| <b>CODEN: IJONS (91) (2025)</b> | <b>ISSUE 91</b> | <b>ISSN: 0976 - 0997</b> |

| S. No. | CONTENTS                                                                                                                                                                                      | Page No.    |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 001    | Diversion of Muddy Juice A Promising Route for Ethanol Production<br>Ananthalakshmi Ranganathan, Sukhvinder Jit Singh, Seema Paroha and Shivam Pandey                                         | 97218-97223 |
| 002    | Characterization of Hemolymph and Hepatopancreas Agglutinins of the Marine Crab <i>Tumidodromia dormia</i><br>Benicka Prakash, S. Mary Mettilda Bai, J. Jovila and J. Vinoliya Josephine Mary | 97224-97236 |
| 003    | A Brief Discussion on Human-Wildlife Coexistence<br>Chandrik Malakar                                                                                                                          | 97237-97241 |
| 004    | Bioburden on our Day-to-Day Makeup Products<br>Hania Ashraf, Anqua Zahid, Lubna Ali, M. Divya Gnaneswari and Chaitali Ghosh                                                                   | 97242-97249 |
| 005    | Phytoconstituents and Antimicrobial Properties of <i>Senna alata</i> and <i>Sida acuta</i> Leaf from Assam, India<br>Bishali Gogoi, Nibedita Das and Selim Mehmud                             | 97250-97256 |
| 006    | Microbial Adaption: Exploring Gut Microbes in Extreme Environment and Space Travel<br>K.Amala, S. Yusra Khanam, D.Magesh, R.Premalatha, P.Meenambigai and M.Suresh                            | 97257-97264 |
| 007    | Formulation and Evaluation of Strawberry Flavored Cotton Seed Milk<br>Shobana.C, Usharani B, Rohini D, Inbatamilan S, Lavanya Devi M, Logeshwari M and Shobana V                              | 97265-97270 |
| 008    | Role of Residents Awareness and TEK for Restoration of Sparrows - a Case Study of Saran Division<br>Deepshikha and Reeta Kumari                                                               | 97271-97276 |
| 009    | Production of Bioethanol from Groundnut Shells and Peels using Bacterium Consortium<br>N. Uma Maheswari, P. Shalini <sup>2</sup> and S.Poovizhi                                               | 97277-97286 |
| 010    | GC-MS Analysis of Seeds of <i>Syzygium cumini</i> (L.) Skeels.<br>Maria Sumathi.B and Preeciya.C                                                                                              | 97287-97297 |
| 011    | Floristic Diversity of Pattanam, Rasipuram, Namakkal District, Tamil Nadu, India<br>M. Bhuvaneshwari, C.Chitra Vadivu, C.Ravinder Singh, K.Raja and P.Vijayashalini                           | 97298-97307 |
| 012    | Forensic Science and Judicial Outcomes: Correlation, Challenges, and the Path Forward in India<br>Abitha N.V and Rahul Kailas Bharati                                                         | 97308-97320 |
| 013    | Formulation and Optimization Design of Composite Sponge of <i>Rosa bourboniana</i> by Box Behnken Statistical Design<br>Sonam Pal and Souravh Bais                                            | 97321-97329 |
| 014    | Phytochemical Diversity and GABAergic Modulation in <i>Piper betle</i> Varieties for Anxiety and Depression : A Systematic Review<br>Gaanappriya Mohan and Amala Kesavan                      | 97330-97347 |

|     |                                                                                                                                                                                                                             |             |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 015 | A Literature Research on Diwaswapna: An Ayurvedic Perspective<br>Lekhika Rathore , Akshar Ashok Kulkarni and Veena P.V                                                                                                      | 97348-97355 |
| 016 | Comprehensive Nutrient analysis and LCMS Sugar Profiling of Coorg Honey for Quality Assessment and Authenticity Validation<br>Kavya Hanumanthaiah and Shrishail                                                             | 97356-97363 |
| 017 | Molecular Docking Study of Squalene as a Potential Drug Candidate for Human Ovarian Cancer<br>Manikandan Muthukumarasamy and Jayachitra Ayyavo                                                                              | 97364-97374 |
| 018 | Non-Syndromic Microdontia in a Young Female with Skeletal Class III Malocclusion – Surgical and Dental Correction of a Case with “Ghosty Smile<br>Satheesh.G, Vijaykumar Jain, Sakthi.S, Ajay Kumar Jagdish and Selva Kumar | 97375-97378 |
| 019 | Antibiotic Resistance in <i>Escherichia coli</i> Isolated from Fecal Samples of Poultry Chicken in Mysore, India<br>Sahana Nagarakere Chandranna , Shyni Daniel and Bharath M                                               | 97379-97385 |
| 020 | Investigating the Role of AMA in Systemic Inflammation: Insights from CRP Levels<br>Twinkal Soni and Mrunal Bhoir                                                                                                           | 97386-97392 |
| 021 | Circular Economy in Agriculture: Reducing Waste, Enhancing Sustainability<br>Krupa S, Anupama Nagaraj, Krishnamurthi A V, Lakshmikanth N and Vandana C D                                                                    | 97393-97400 |
| 022 | Report of the Clouded Ground Gecko <i>Geckoella nebulosus</i> from Chikhaldara, Melghat Tiger Reserve, Maharashtra<br>Abhishek Dhande and Meghraj Chude                                                                     | 97401-97404 |
| 023 | Isolation of Microorganism from Textile Effluent, Solid State Fermentation using Agricultural Waste for Decolorization<br>S.K.Nimbal, Manjunath S. Kullolimath and AHMV Swamy                                               | 97405-97412 |
| 024 | Chemometric-Assisted UV Method Development and Validation of Lamivudine and Zidovudine in Bulk and Tablet Formulation<br>P.Rajavel, S.Lavanya and V.Manojkumar                                                              | 97413-97421 |
| 025 | Formulation and Evaluation of Fast-Dissolving Oral Films of Nifedipine<br>V.Anilkumar, V.D.Sundar, M.D.Dhanaraju, B.Jagadeeswari and Y.Prathyusha                                                                           | 97422-97429 |
| 026 | Dominant Isopods in Plantation and Forest Area of Central Travancore in Relation to Soil Factors<br>M. Harikrishnan, M.G.Sanal Kumar and S. Santhosh                                                                        | 97430-97438 |
| 027 | Evaluation of Microbial Efficacy of Cow Breed Dependent Amritjal: A Sustainable Approach to Natural Farming<br>Parth Desai, Himanshu A Pandya and Hiteshkumar Solanki                                                       | 97439-97443 |
| 028 | Regulatory Landscape for Phytopharmaceuticals in India, Japan, South Africa, Europe, Canada and USA<br>Dipa R. Mehta and Niranjana S. Kanaki                                                                                | 97444-97458 |
| 029 | A Comparative Study on Diabetes in Delhi NCR Region among Adults<br>Ankit Kumar, Anshu Kumar Singh and Ramgopal Dhakar                                                                                                      | 97459-97469 |
| 030 | Effectiveness of Proprioceptive Neuromuscular Facilitation versus Myofascial Release on Trigger Points in Patients with Upper Cross Syndrome: An Experimental Study<br>Krishna Reddy Vajrala                                | 97470-97474 |

|     |                                                                                                                                                                                                                                                                                                  |             |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 031 | Review on Ayurvedic Concept of <i>Nidra Viparyaya</i> (Improper Sleep) and its Effect on Emotional Intelligence<br>Atul P Ambadi and Vaibhav A Biradar                                                                                                                                           | 97475-97482 |
| 032 | Solutions of Pell's Equation Involving Fermat Primes and Jarasandha Numbers<br>C.Saranya and A.Swetha Shree                                                                                                                                                                                      | 97483-97486 |
| 033 | Study on Effectiveness of <i>In silico</i> Techniques in Biology Teaching among Rural Undergraduate Students<br>Rahul Kumar and Suchitra Behera                                                                                                                                                  | 97487-97496 |
| 034 | Mast Cell Degranulation and Anti Allergic Activity of Uthamathali Girutham – A Poly Herbal Formulation in the Management of Sinusitis<br>I.Karthika and T. R. Siddique Ali                                                                                                                       | 97497-97501 |
| 035 | Economic Assessment of Dialysis Treatment: Medical and Non-Medical Costs Incurred by Patients at SGT University<br>Vishnu, Tanmay Dhankhar, Ritu Mishra, Sanjay Sharma, Komal Yadav and Pulkit Ramavat                                                                                           | 97502-97515 |
| 036 | Advances in Forest Product Utilization: Sustainable Approaches and Emerging Technologies<br>Raman Chaudhary, Rajesh Kumar, Bhuvan Singh and Chetna Sahu                                                                                                                                          | 97516-97523 |
| 037 | Integrating Ayurvedic Prognostic Signs into Contemporary Diagnostic Practices: A Study of Indriya Sthana<br>Chitranjan Sharma and Vijay Bhagat                                                                                                                                                   | 97524-97531 |
| 038 | Unseen Impacts of Artificial Night Lighting on Insects and Ecosystem<br>Lavina Soni and Sunil Dutt Shukla                                                                                                                                                                                        | 97532-97546 |
| 039 | Defending AI: Strategies to Enhance Security in AI Systems<br>T.Premalatha and A.S.Nithya                                                                                                                                                                                                        | 97547-97553 |
| 040 | Integrating Flickering Light Based Bee Colony Optimization for Network Attack Avoidance in Wireless Sensor Network<br>J.Gnana Mano Sheebha and D.Maheswari                                                                                                                                       | 97554-97562 |
| 041 | Liveability Evaluation Model for Residents in Green High Rise Housing Complex – A Case of National Capital Region, India<br>Khurram Ashraf, Subhrajit Banerjee and Zeba Nisar                                                                                                                    | 97563-97570 |
| 042 | Standardization of <i>In vitro</i> Explant Sterilization and bud Proliferation of the Medicinal Plant <i>Mesua ferrea</i> L.: A Vulnerable Medicinal Plant<br>Kuna Kabasi and Sunil Kumar Senapati                                                                                               | 97571-97574 |
| 043 | A Review on the Diagnostic Role of Imaging in Ductal Carcinoma<br>Laxmi Singh, Neha Singh, Rishabh Gupta and Elina Dewanjisen                                                                                                                                                                    | 97575-97579 |
| 044 | Green Synthesis of Silver Nanoparticles in Conjunction with <i>Nigella sativa</i> and <i>Salvadora persica</i> Herbal Mouthwash Formulation and its Cytotoxicity, Antibacterial and Anti Inflammatory Activity against Oral Pathogens<br>Akshai Senthilkumar, Abirami Arthanari and Rajesh Kumar | 97580-97587 |
| 045 | <i>Priyangu</i> (Foxtail Millet) Review on Nutritional Profile, Therapeutic Benefits and Culinary Applications<br>R.A.Jadhav                                                                                                                                                                     | 97588-97595 |
| 046 | Management of Post Fracture Stiffness by <i>Murivenna Marma Abhyanga</i> with Rehabilitation Exercise – A Case Report<br>Riddhi K Thacker and Rekha Parmar                                                                                                                                       | 97596-97601 |
| 047 | Factors Influencing Gen Z Postgraduates' Engagement with MOOCs in Northeast India<br>R.D. Padmavathy                                                                                                                                                                                             | 97602-97613 |

|     |                                                                                                                                                                                                                                                                                                         |             |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 048 | Takra: A Divine Elixir in Ayurveda for Holistic Health<br>Dharmesh Pandey and Vijay Vitthal Bhagat                                                                                                                                                                                                      | 97614-97616 |
| 049 | Cybersecurity Redefined: Advanced Deep Learning Techniques for Secure Data Management<br>M.Uma Shankari and S.Rethinavalli                                                                                                                                                                              | 97617-97623 |
| 050 | Formulation and Evaluation of Oral Telmisartan Microemulsion<br>Nimmagadda Srinivas, Devaraju Lakshmi Koumudi, Chamakuri Divya, Donthula Sumana, Nallaguntla Lavanya and Balusu Haarika                                                                                                                 | 97624-97634 |
| 051 | Effectiveness of Dry Needling Versus Cupping Therapy along with Conventional Physiotherapy for Reducing Elbow Flexor Spasticity in Sub-Acute Stroke Patients – A Comparative Study<br>Chanreisem Kasar, Sonia Lakhota, Somyata Satpathy Sarma and Madhumita Das                                         | 97635-97643 |
| 052 | Enhanced Facial Emotion Recognition using CNN with Class Imbalance Handling and Advanced Data Augmentation Techniques<br>Komil Vora, Dishita Mashru and Vira Bhalodiya                                                                                                                                  | 97644-97651 |
| 053 | Performance Analysis of Deep Learning Architectures for Thyroid Nodule Classification in Ultrasound Data<br>S. Subha Indu and P. Radha                                                                                                                                                                  | 97652-97664 |
| 054 | A Rare Case Report of Polycythemia Vera Presenting with Non-Cirrhotic Portal Hypertension Secondary to Extrahepatic Portal Vein Obstruction<br>Jhansi Rani Gandamala, Meenakshi Addula, Aliyangattuvageri Rajeez, Ramarao Tadikonda <sup>2</sup> and Samudrala Lahari                                   | 97665-97668 |
| 055 | Impact of Yoga on Maternal Healthcare during COVID-19 in India<br>Ramananda Roy                                                                                                                                                                                                                         | 97669-97674 |
| 056 | The Effect of Prolonged Sitting in Altering Thoracic Curvature and Core Muscle Strength among Adult Population<br>Shahitha Fareen M, Prathap Suganthirababu and Priyadharshini                                                                                                                          | 97675-97681 |
| 057 | Attitude of Undergraduate and Postgraduate Physical Therapy Students towards Persons with Disability<br>Jahanvi Dave, Rittu Sharma and Vaishali Rai                                                                                                                                                     | 97682-97687 |
| 058 | Smart Mine Suit: A Smart Suite for Frontline Mine Workers<br>Prabavathy Balasundaram, M. Saritha, K.R.Sarath Chandran, Harshini M, Loganathan Sri Shalini and Ramyalakshmi G                                                                                                                            | 97688-97695 |
| 059 | Review on Green Synthesis, Characterization and Antimicrobial Studies of Zinc Oxide Nanoparticles using Various Medicinal Plants<br>T.Sindhu and K.R.Sheeja                                                                                                                                             | 97696-97699 |
| 060 | Exploring the Correlation Between Care Burden and Sleep Quality in Primary Caregivers of Pediatric Cancer Patients<br>Ravi Rai Dangi, Anil Sharma, Dhyey Bhavsar, Vedanshu Patel, Sandhya Parmar, Aneri Kristi, Shruti Bhalala, Shreya Chaudhari, Dharma Patel, Hetal Limbad, Ami Patel and Shina Patel | 97700-97708 |
| 061 | A Study to Assess the Effectiveness of Structure Teaching Program on Knowledge Regarding Newer Contraceptive Method Among ASHA Workers in Selected PHC of Vadodara District<br>Shilpa Rathwa and Renuka Prajapati                                                                                       | 97709-97714 |
| 062 | Smart Kitchen Automation and Monitoring System using IoT<br>Subhadip Nandi, Jayashree Bhunia and Gunjan Mukherjee                                                                                                                                                                                       | 97715-97729 |
| 063 | Synthetic Data Generation for E-Commerce<br>Shruti Ketanbhai Dhingani and Dharmesh Purani                                                                                                                                                                                                               | 97730-97733 |

|     |                                                                                                                                                                                                                                                                                                                    |             |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 064 | IoT Driven Smart Automated Teller Machine (ATM) Security<br>Niteesh Kumar N, Mirunalini P, Priyadharsini R, Praveen RJ and Mohammed Uvais                                                                                                                                                                          | 97734-97743 |
| 065 | Influence of NAA and IBA Foliar Application on Growth Attributes of Strawberry ( <i>Fragaria x ananassa</i> Duch.) cv. Chandler Grown under Open Ventilated Polyhouse<br>Suneeta Singh, Abhay Kumar and Sandeep Chauhan                                                                                            | 97744-97753 |
| 066 | Anticancer Potential of Zeatin in HepG Liver Cancer Cell Line<br>Harini Srinivasan, Usharani Boopathy, Shobana Chandrasekar and Rohini Durairaj                                                                                                                                                                    | 97754-97762 |
| 067 | Psychological Counselling Needs and Academic Achievement of Students of 9th Class<br>Pooja Shukla and Hariom Chauhan                                                                                                                                                                                               | 97763-97769 |
| 068 | Anesthetic Efficacy of Mepivacaine vs. Articaine Administered as Supplementary Buccal Infiltration after a Failed Primary Inferior Alveolar Nerve Block in Patients with Symptomatic Irreversible Pulpitis - A Systematic Review<br>Mamta Singla, Shruti Sharma, Purva Narang, Ankita Sharma and Drishti Palwankar | 97770-97774 |
| 069 | Correlation of Eye - Hand Coordination, Power and Agility with Basketball Lay-Up Skills in College Students<br>Mallika N Rajput and Mehul Panchal                                                                                                                                                                  | 97775-97780 |
| 070 | Formulation and Characterization of Polyherbal Granule-based Anti Dandruff Shampoo<br>Ravina Patidar, Mughisa Nagori and S.C.Mahajan                                                                                                                                                                               | 97781-97791 |
| 071 | Applications of Nanobiomaterials in Dentistry : A Review<br>Mukund V Singh, Rutuja Dhole, Aparna Palekar and Basawaraj Biradar                                                                                                                                                                                     | 97792-97799 |
| 072 | Emergence of Extreme Events via Parametric Excitation in Microelectromechanical Systems (MEMS)<br>R. Venkatesh and A. Venkatesan                                                                                                                                                                                   | 97800-97803 |
| 073 | Effect of Symptoms Limited Exercise Training on Quality of Life in Patients with Non-Operated Stable Coronary Artery Disease- Randomized Controlled Trial<br>Brijesh Acharya and R. Harihara Prakash                                                                                                               | 97804-97813 |
| 074 | Safe Ride Sentinel - Pioneering Safety in Smart Helmets<br>R.Rajesh Kanna, C.Daxayani, Akshiya A. J, Geetha C, Preethi P and Ragul P                                                                                                                                                                               | 97814-97819 |
| 075 | Effect of Mobile Device Usage on Mobile Learning (M-Learning) on Cognitive Abilities among University Students with Different Cultural Context<br>Chanbeni Ezung and Meenakshi Verma                                                                                                                               | 97820-97828 |
| 076 | The Role of Agni in the Pathogenesis of Lifestyle Disorders : A Dravya Guna Perspective on Digestive Health<br>Mihir H. Patel and Hardik P. Prajapati                                                                                                                                                              | 97829-97845 |
| 077 | Artificial Intelligence in Agriculture: Early Plant Disease Detection using ANN Models for Indian Crop Management<br>Shikha Singh, Rahul Kumar Mishra and Arvind Kumar Shukla                                                                                                                                      | 97846-97852 |
| 078 | Mathematical Approaches to Climate Modeling: Challenges and Advances<br>Tushar Mandanaka and Mansi Nadiyadara                                                                                                                                                                                                      | 97853-97858 |

|     |                                                                                                                                                                                                                                              |             |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 079 | Block Chain based Multi Objective Multi Item Transshipment Problem with Multi Choice Parameter under Fermatean Fuzzy Environment<br>U. Johns Praveena and J. Merline Vinotha                                                                 | 97859-97872 |
| 080 | Protective Effect of the Bark of <i>Thespesia Populnea</i> on Gentamicin Induced Nephrotoxic Rats<br>K.P.Manjunath, S.P.Hiremath, M. Pradeep Kumar, Pranav Patil, Rohan Latwade, Smarth Santosh Londhe, Suraj Ram Mashale and M.Mahesh Yadav | 97873-97881 |
| 081 | Autoimmune Disorders in Humans: An Overview of Concepts, Classification<br>N.Pravalika, Neha Kouser and R. Prasanthi                                                                                                                         | 97882-97889 |
| 082 | IFTAK-A Modified Technique of <i>Ksharasutra</i> Therapy in the Management of <i>Bhagandar</i> (Fistula in-Ano) - A Case Study<br>Poonam H. Borate, Shailesh R. Jaiswal and Gajiram D. Banothe                                               | 97890-87893 |
| 083 | A Broad Overview on Process Validation<br>S.Kowsalya and S.Kanmani                                                                                                                                                                           | 97894-97902 |
| 084 | The Intersection of Religious Dogmatism and Healthcare: Does it Reinforce Gender Bias?<br>Ashwin Radhakrishnan, Meenakshmi Balasubramaniam and Durga Ranagaswamy Pandian                                                                     | 97903-97910 |
| 085 | Assessing Awareness towards Environment and Sustainability among Pre-Service Teachers<br>Sangeeta Chauhan and Michael Tarance Suraj                                                                                                          | 97911-97921 |
| 086 | Dynamics of Crop Diversification in Himachal Pradesh : A Review<br>Jyoti Thaakur                                                                                                                                                             | 97922-97928 |
| 087 | Effect of Sun Drying on the Physiochemical and Bioactive Attributes of <i>Beta vulgaris</i> L. (Beet Greens)<br>Rosalin Nikitha R and Priya A                                                                                                | 97929-97936 |
| 088 | Digital Currencies: The Rise and user Awareness in Theni District<br>N.Lavanyalakshmi                                                                                                                                                        | 97937-97942 |
| 089 | On $\#gp$ Irresolute Function and $\#gp$ Homeomorphism in Topological Spaces<br>V. Kokilavani and K. Karpagam                                                                                                                                | 97943-97952 |
| 090 | The Impact of the COVID-9 Pandemic in 0 on the Comparison of Abdominal and Shoulder Strength among Football and Cricket Players<br>Mohanasundaram S, Karthikeyan N, Kumar P and Ajithkumar L                                                 | 97953-97957 |
| 091 | Subcutaneous Hydatid Cyst of the Abdominal Wall: A Rare Case Report and Comprehensive Management Review<br>Dixit Donga, Hemant Toshikhane, Axay Sutaria, Rahul Damor, Shantanu Nilak Rao and Jay Naik                                        | 97958-97963 |
| 092 | Neuroscience of Nonverbal Cues: Assessing the Impact of Communication and Body Language on Guest Satisfaction in Indian Hospitality<br>Pritesh Chatterjee and Sujit Kumar Mahapatra                                                          | 97964-97977 |
| 093 | Predictive Analytics for Student Performance Deep Learning<br>Khushi M. Vaishnav and Sneha Saini                                                                                                                                             | 97978-97984 |
| 094 | Artificial Intelligence in Education: Ethical Challenges and Transformative Potentials of ChatGPT<br>Sudipta Adhikary and Paramita Bhattacharyya                                                                                             | 97985-97990 |

|     |                                                                                                                                                                                                                               |             |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 095 | Effect of Panchakarma Treatment for Post - Chikungunya Complications – A Case Report<br>Vedangi Patel, Akshar Kulkarni and Mahesh M. P                                                                                        | 97991-97997 |
| 096 | Blockchain - based Authentication and Security Framework for Healthcare - IoT using BD-DSA and PTC<br>S.Kanagasankari                                                                                                         | 97998-98019 |
| 097 | Detection of Imitation in Essay - based E-Examination Systems through Machine Learning Methods<br>Samarendra Das, Indranil Sarkar, Ahona Ghosh, Ananjan Maiti, Rajesh Bose and Sandip Roy                                     | 98020-98025 |
| 098 | Introduction to Cryptography, Importance of Cryptography and Different Types of Algorithms<br>Ravi Dhandhukiya and Reema Sorathiya                                                                                            | 98026-98029 |
| 099 | Lu-Liu and Guo-Liu Criteria for Glass Stability in Ge <sub>9</sub> Te <sub>7</sub> In <sub>5</sub> Chalcogenide Glass<br>Nirupma Saxena and Saurabh Kumar Tiwari                                                              | 98030-98033 |
| 100 | A Comparative Study of Happiness and Aggression in Meditation Practitioners versus Non-Practitioners<br>Ram Kumar Gupta and Abhishek Kumar Bhardwaj                                                                           | 98034-98041 |
| 101 | Relationship of Inversion and Eversion Angle with Dynamic Balance using Y Balance Test: an Observational Study<br>Shuaib.B, Senthil Kumar E, Shashwath P Naidu and Saravanan. J                                               | 98042-98049 |
| 102 | To Compare the Effectiveness of Valgus Instruction Exercise Versus Isotonic Exercise in Female Basketball Players With Patellofemoral Pain Syndrome<br>Shashank Mishra, Sonal Thakkar and Gaurav Patel                        | 98050-98058 |
| 103 | A Multiple Linear Regression Approach to Select Next Generation Football Players for Indian Team<br>J.Jeyaboopathi Raja, P. Jayasree, S.S.Saravana Kumar and C. Daniel Nesa Kumar                                             | 98059-98066 |
| 104 | Optimizing Multi-Class Cloud Attack Classification using Adaboost with Performance-Weighted Weak Learners<br>B. Menaka and S. Arulselvarani                                                                                   | 98067-98074 |
| 105 | Understanding of Grahani with Its Modern Parlance<br>Anusha. N and Sathish.G.I                                                                                                                                                | 98075-98090 |
| 106 | Exploring TSH Modulation by Metformin and Thyroid Function in Diabetes<br>Saritha Medapati, Bhujanga Rao Jamma, Reshma Matcha , Vinod Kumar Mugada, B V M Kishore Boddeda, Krishna Mannem and R Vasantha Medapati             | 98091-98101 |
| 107 | CBCT: A Godsend to Dentistry<br>Lingaraj Harihar, Prashant Viragi, Chandana Vishwanath and Chaitra K Patil                                                                                                                    | 98102-98109 |
| 108 | GC-MS Analysis, Molecular docking and Pharmacological Effect of Bioactive Compounds from <i>Calotropis gigantea</i> against Lung Cancer<br>K. Jahnavi, P. Navyasree, R. Karthike, E. Devasagaya Daisy and L. Jeyanthi Rebecca | 98110-98118 |

|     |                                                                                                                                                                                                                                                                          |             |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 109 | Antioxidant and Anticoagulant Activity of Pineapple <i>Ananas comosus</i> (L.) Merr. Extract<br>Sipra Banerjee, Dhruvo Jyoti Sen, Sudip Kumar Mandal, Anindya Bose <sup>4</sup> and Beduin Mohanty                                                                       | 98119-98123 |
| 110 | A Review of <i>Coptis teeta</i> and its Bioactive Alkaloids: Pharmacological Properties and Future Prospects<br>Wearank Terang, Firuza Begum, Abdul Hadi Umam, Longne Bagang, Bhairab Chabukdhara, Rubert Leriak Tamin, Ahsanul Islam, Injamul Mondal and Rekibur Rahman | 98124-98132 |
| 111 | Reliability and Validity of Dual Weighing Scale Biofeedback System (DWSBS), A New Apparatus for Assessment and Training of Weight Bearing Asymmetry (WBA)<br>Ravi Jyotikant Shah and Saravanan M                                                                         | 98133-98138 |
| 112 | Does Exercise with Diet Restriction Really Influence the Weight Loss on Obesity among Older Adults : A Literature Review<br>Sedhunivas R, Manjunatha P Talawar and Jeyakumar S                                                                                           | 98139-98147 |
| 113 | AI Driven Total Quality Management Model for Enhancing Organizational Performance and Continuous Improvement<br>Tushar Ranjan Barik , Chandra Bhooshan Singh and Rakshak Bharti                                                                                          | 98148-98159 |
| 114 | Improved Strength and Waste Reductivity for Industrial Use: A Sustainable Method for Partially Replacing Fine Aggregates in Concrete with Crushed PVC Plastic<br>Harish Kumar Dwivedi, Diwakar Singh , Pallavi Gupta and Parakh Dongre                                   | 98160-98166 |
| 115 | Building Climate Resilience through Organic Farming: Case Studies from Coastal Tamil Nadu<br>M. Santhiya and D. Murugan                                                                                                                                                  | 98167-98179 |
| 116 | Optimization of Anti-Cancer Activities of Chitosan-derived Nanoparticles with Hemolymph (Prawn Blood) in <i>Drosophila Melanogaster</i> (Fruit Fly)<br>Sudipta Roy                                                                                                       | 98180-98191 |
| 117 | An Overview of Researchers on Tropospheric Instabilities and its Effects<br>Priyadarshini Ghosh , Abhijit Banerjee, Amitlal Bhattacharya and Rina Bhattacharya                                                                                                           | 98192-98198 |
| 118 | Regularized Robust Weighted Liu Regression Approach and its Applications in Medical Image Denoising<br>R. Muthukrishnan and Karthika Ramakrishnan                                                                                                                        | 98199-98205 |
| 119 | Review on the use of Polymerase Chain Reaction in Antimicrobial Resistance Detection in Clinical Microbiology<br>Girlie Tambirai Mapere, Anshu Kumar Singh, Navdeep Singh and Pankaj Kishor Mishra                                                                       | 98206-98218 |
| 120 | Synthesis and Characterization of Cellulose Acetate and Surface Morphology Evaluation of Cellulose Acetate Membrane<br>M. Sreetha and G.R. Bella                                                                                                                         | 98219-98228 |
| 121 | Enhancing Live Virtual Machine Migration in Cloud Computing: A Scalable, Secure, and Energy-Efficient Approach Integrating Advanced AI and Blockchain<br>Akashbhai Ashokbhai Dave                                                                                        | 98229-98244 |
| 122 | Software-Defined Networking : A Survey on Security Challenges and Routing Techniques<br>J.Delshi Julie and R. Beulah                                                                                                                                                     | 98245-98261 |

|     |                                                                                                                                                                                                       |             |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 123 | Blockchain and AI for Cybersecurity: A Sustainable Digital Shield by 2047<br>Manu Bharadwaj V, Zoya Khan and Patcha Bhujanga Rao                                                                      | 98262-98278 |
| 124 | Do Not Belong to the Past Dawns, But to the Noons of Future':<br>Incorporating Sri Aurobindo's Insights to Minimize the Expansion of<br>Shadow Education<br>Sachin Kumar, Poonam Pandita and Kiran    | 98279-98299 |
| 125 | Gender, Spirituality and Work - Life Balance: A Scriptural Perspective for<br>Dual-Career Couples<br>Hetal Sunil and Subair Kalathil                                                                  | 98300-98312 |
| 126 | Global Warming and Heatwave Vulnerability: A Comparative Legal<br>Analysis from India and Abroad<br>Pradipta Nayak and Sushil Dhakal                                                                  | 98313-98323 |
| 127 | Modeling Population Dynamics in Agricultural Ecosystems: A Three-<br>Species Approach with Holling Type II response for Crop, Pest, and<br>Biological Control Interaction<br>S.Vijaya and V. Bharathi | 98324-98333 |
| 128 | Mesalamine: A Promising Treatment for Inflammatory Bowel Disease<br>(Ulcerative Colitis and Crohn's Disease)<br>Divya S. Chatur, Harsha H. Tarare, Laxmikant B.Borse and Sarika M.<br>Kamble          | 98334-98348 |
| 129 | Exploring Indole and Schiff Base Derivatives as Promising Therapeutics for<br>Alzheimer's Disease<br>Gayathri Thanika Vayal Kunnath , Deepika P and Shadiya C K                                       | 98349-98371 |
| 130 | Pharmaceutical Documentation on preparation of the Tamra Garbha Pottali<br>Rasa<br>Bharadwaj Pancholi and Anitha Hosur                                                                                | 98372-98382 |
| 131 | AI and ML: Revolutionizing Marketing in a Data - Driven World<br>Anushree Banerjee , Arijit Roy and K.Deepika Rani                                                                                    | 98383-98387 |
| 132 | Evaluation of the Maximum Time Required for the Extraction of<br>Polyphenols from Tender Coconut Shell and its Antifungal and Antibiofilm<br>Activity<br>Anie T. Uthup and T R Satyakeerthy           | 98388-98392 |
| 133 | Regenerative Medicine: Unlocking the Potential of Tissue Repair and<br>Regeneration<br>Vigneshwaran M, Sathya Prabha B, Karthi Raja A S, V. Prabhakar and<br>Dinesh K S                               | 98393-98404 |
| 134 | A Commentary on Bridging the Gap: Challenges and Solutions in Mental<br>Health, Diagnosis and Treatment<br>Hetal Jitendrabhai Shah and Doli Deori                                                     | 98405-98414 |
| 135 | Evaluating Efficient Circulation Typology for Community Health Centre: A<br>Space Syntax and user - Centric Analysis<br>Tauseef Rahi and Farheen Bano                                                 | 98415-98427 |
| 136 | Energy of Complete Complex Fuzzy Graph<br>A.Arokia Mary and V.Avineshraj                                                                                                                              | 98428-98434 |
| 137 | Ayurvedic Approach in the Management of Scalp Psoriasis - A Single Case<br>Study<br>Gourav Biswas and Richa Raj                                                                                       | 98435-98442 |
| 138 | Effect of Ayurvedic Interventions to Improve the Nutritional Status in<br>Children – A Systematic Review<br>Sandesh Kumar , Kavita M B and Nakshatra Shetty                                           | 98443-98451 |

|     |                                                                                                                                                                                                                                |             |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 139 | A Comprehensive Analysis on Brain Tumor Diagnosis using Brain Image Segmentation<br>C.K. Sangeetha and M.Jaikumar                                                                                                              | 98452-98461 |
| 140 | Inverse Non-Split Majority Domination in Graphs<br>Vignesh Subramanian                                                                                                                                                         | 98462-98465 |
| 141 | <i>Indigofera tinctoria</i> Linn. Root Bark Paste: A Potent Antidote in Treating Various Toxicity<br>Abarna Balasubramani Suresh Ramasamy and Karthic Vedhachalam Mani                                                         | 98466-98470 |
| 142 | Navigating the Digital Campus: Unpacking the MOOC Experiences in Modern Academia<br>Neha Mehra, Sonia Dogra and Jyoti Narayan Baliya                                                                                           | 98471-98480 |
| 143 | Immediate Effect of Mulligan Bent Leg Raise vs Non-Ballistic Active Knee Extension in Neural Slump Position on Hamstring Flexibility in Young Adults<br>Payal J. Gajjar and Gaurav J. Patel                                    | 98481-98486 |
| 144 | Operational Efficiency during Peak and Off-Peak Hours: A Case Study of Fuel Stations in Mysore District<br>Thilak Kumar P and Shyam B R                                                                                        | 98487-98497 |
| 145 | Range Extension and New Distributional Record of <i>Lepidagathis trinervis</i> Nees (Acanthaceae)<br>Balasaheb Shantilal Kale and Ramakant Keshavrao Patil                                                                     | 98498-98502 |
| 146 | A Study to Evaluate the Effectiveness of Respiratory Muscle Stretch Gymnastics on Respiratory Rate and Psychological Status of Housewives of Surat City<br>Komal S. Modi, Madhavan Iyenger, Prijal Gulhane and Vansita Raiyane | 98503-98507 |
| 147 | A Retrospective Analysis of Blood Transfusion Reactions in a Tertiary Care Hospital<br>Shivani, Rahul, Navdeep Singh and Akash Kumar                                                                                           | 98508-98513 |
| 148 | Formulation and Evaluation of Herbal Emulgel of <i>Mentha piperita</i> Leaves Extract for Wound Healing<br>Divya Shree M B, Ashvini H.M and Rashmi H.R                                                                         | 98514-98528 |
| 149 | A Comprehensive Review on Human Metapneumovirus (HMPV)<br>Zeba Naj, Navdeep Singh and Anshu Kumar Singh                                                                                                                        | 98529-98534 |
| 150 | Problems Faced by Generation X and Y in Retention of Faculty at Self-Financing Engineering Institutions<br>M.S.Kamalaveni, Ramesh S and S.Manimaran                                                                            | 98535-98543 |
| 151 | Genetic Algorithms for Smart City Battery Selection Optimization: A Reliability-Centered Method<br>Chandrashekhar Chauhan, Neha Deshpande, R.K. Sharma and Vaibhav Modak                                                       | 98544-98550 |
| 152 | Applications of Graph Theory in Google Map<br>A. Kalaiselvi and Srinidhisaranya S                                                                                                                                              | 98551-98556 |
| 153 | The Effect of Heat Stress (THI) on the Milk Production Process of Native Indian Cows<br>Hassan Afkari Idehlu and Salma Ahmed                                                                                                   | 98557-98572 |

## Editorial...



The elephant is our favorite animal. It is also the largest land animal in the world. The elephant is loved and respected by people and cultures around the world. Yet it is a sad fact that we are on the verge of seeing the last of this magnificent creature. From young to old, there is no one who does not enjoy seeing an elephant. There are two species in the world:

African elephants (*Elephas africana*) and Asian elephants (*Elephas maximus indicus*). In parts of India, Sri Lanka, Thailand, Nepal, Myanmar and Indonesia, elephants, which are smaller than their African cousins and are in danger of extinction, are struggling for space and survival. Rapid city development, road construction, deforestation, industrial and modern agriculture have destroyed much of the elephant's habitat. In India alone, elephants have lost more than 80% of their historical range. Migration is blocked by roads, railways, plantations and cities. Elephants are forced into human settlements in search of food and water. The resulting human-elephant conflict is severe. Elephants can live up to 65 years. Females reach puberty at 11 years of age, give birth after a 22-month gestation period, and remain fertile until their late 40s. Under ideal conditions, elephant populations can increase by up to 7% per year. What is needed to protect them is a truly long-term solution – coexistence. But this requires a paradigm shift in how we deliver conservation. A century ago, elephants roamed freely across East Africa. People lived on islands in a sea of elephants. Today, those islands have expanded and merged into a sea of people – while elephants have shrunk and been reduced to fragmented habitats. Poaching has contributed to their decline. The invisible conflict between farmers and elephants has farmers taking revenge on elephants with spears or poison. "We are not against elephants. We are against hunger," says a Tanzanian farmer. Many elephant conservation organizations around the world are focusing intensively on goals such as improving enforcement policies to prevent illegal poaching and the ivory trade, protecting elephant habitats, providing better treatment for captive elephants, and reintroducing them into natural, protected sanctuaries where appropriate. Elephants have very sophisticated intelligence. It is our primary duty to convey knowledge about elephants, information about their characteristics, and conservation awareness to the public. The first World Elephant Day was launched on August 12, 2012, to draw attention to the urgent plight of Asian and African elephants. In India, elephants are protected under Schedule 1 of the Wildlife Protection Act, 1972. Further, social-based conservation studies on elephants should be conducted. This World Elephant Day 2025, let's stand with the mothers who keep the memory of the forest. The future of elephants depends on what we do now. Let's join the movement to protect elephants today – donate, share their stories, and create lasting change. IJONS is asking you to help protect elephants from the many threats they face.

Editor in Chief, IJONS

Cover Image : *Varanus bengalensis* – (Bengal monitor or Indian monitor ),  
Family : Varanidae, IUCN Near Threatened Species

Cover Image Credit : Vijikumar Sahadevan