

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

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

**Published by**  
**TAMILNADU SCIENTIFIC RESEARCH ORGANISATION**

39,MURA BHAVAN,KOODAL NAGAR,RAJAGOPALAPURAM POST,  
PUDUKKOTTAI, TAMIL NADU, INDIA.

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)".**

## Indian Journal of Natural Sciences (IJONS)

### Editorial Committee Members (ECM)

|                            |  |
|----------------------------|--|
| <b>Editor-in-Chief</b>     | <p><b>Dr.S.Vijikumar</b><br/> Director<br/> TamilNadu Scientific Research Organisation<br/> Pudukkottai-622003, Tamil Nadu. India.</p>   |
| <b>Editorial Committee</b> |  |
| Honorable Chief Advisor    | <p><b>Prof. Dr.V.Ramaiyan</b> Marine Biologist<br/> Research Advisor<br/> Sri Venkateswara College of Arts &amp; Science.<br/> Peravoorani, Thanjavur. Tamil Nadu. India.</p>  |
| Honorable Chief Advisor    | <p><b>Dr.C.Anandharamakrishnan</b><br/> Director,<br/> Indian Institute of Food Processing Technology (IIFPT)<br/> Ministry of Food Processing Industries (MoFPI), Govt. of India<br/> Pudukkottai Road, Thanjavur - 613005, Tamil Nadu, India</p> |
| Honorable Chief Advisor    | <p><b>Dr. B. Vaseeharan</b><br/> Professor and Head, Department of Animal Health and<br/> Management, Alagappa University, Karaikudi – 630003</p>  |
| Honorable Chief Advisor    | <p><b>Prof.Mahdi Vatan Parast</b><br/> Chancellor &amp; Professor,<br/> Islamic Azad University,<br/> Quchan Branch,Quchan-Khorasan Razavi- Iran.</p>  |
| Honorable Chief Advisor    | <p><b>Prof.Dr.Hamid Saremi</b><br/> Vice- Chancellor,<br/> Islamic Azad University,<br/> Quchan branch, Quchan-Iran.</p>   |
| Honorable Chief Advisor    | <p><b>Dr. Sr.D.Victoriya Amalorpava Mary</b>, FBS<br/> Principal, Bon Secours College for Women,<br/> Vilar bypass road, Thanjavur - 613 006. Tamilnadu, South India.</p>  |
| Honorable Chief Advisor    | <p><b>Prof.Dr. B.A. ASBI</b><br/> Vice President Research,<br/> Management &amp; Science University(MSU),<br/> University drive off persiaran olahraga,<br/> 40100 shah alam selangor , MALAYSIA.</p>  |
| Honorable Member           | <p><b>Dr. N. Jayabalan</b><br/> Professor &amp; Head, Dept. of plant Science, School of life Sciences<br/> Bharathidasan University, Tiruchirappalli. Tamil Nadu. India.</p>   |
| Honorable Member           | <p><b>Dr. T.S. Saravanan</b><br/> Professor of Biotechnology cum Research Co-ordinator<br/> Dr.M.G.R Educational and Research Institute University<br/> Periyar E.V.R High Road, Maduravoyal, Chennai-600095.</p>                                  |
| Honorable Member           | <p><b>Dr.S.P.Subramaniyan</b><br/> Asst.Controller of Patents and Designs (Govt.of India)<br/> Patent Office,IPR Building,GST Road,Guindy,Chennai 600032</p>   |

|                  |   |
|------------------|---|
| Honorable Member | <b>Er. Abdul Samad. M. Kamdod</b><br>Assistant Professor, Department of Civil Engineering<br>Bharat Institute of Science & Technology for Women<br>Mangalpally, Renga Reddy Dist. Andhra Pradesh, India |
| Honorable Member | <b>Dr. Hina kousar</b><br>Assistant Professor,<br>Department of Environmental Sciences,<br>Kuvempu University,<br>Shankaraghatta, Shivamogga – 577 451,<br>Karnataka ,India                             |
| Honorable Member | <b>Mr.B.Rajesh</b><br>Manager (Tech. Services Env.)<br>Grass Roots Research & Creation India (P) Ltd<br>Noida – 201301,Uttar Pradesh,India  |
| Honorable Member | <b>Mr. K.Ramanathan</b><br>Head, Department of Bioinformatics,<br>Thanthai Hans Roever College<br>Perambalur, TamilNadu, India.   |
| Honorable Member | <b>Dr. K.Gurunathan</b><br>Prof & Head, Department of Nano science & Technology,<br>Alagappa University, Karaikudi, TamilNadu, India.   |
| Honorable Member | <b>Dr. Rajashekhar O, Patil</b><br>Assistant Professor, Department of Environmental Management<br>Sant Gadge Maharaj College of Commerce & Economics,<br>Mumbai 400004, India                           |
| Honorable Member | <b>Dr.M.Ravichandran</b><br>Prof.& Head<br>Department of Environmental Management<br>Bharathidasan University, Tiruchirappalli. Tamil Nadu. India.  |
| Honorable Member | <b>Dr.M.Krishnan</b><br>Prof.& Head,Department of Environmental Biotechnology<br>Bharathidasan University, Tiruchirappalli. Tamil Nadu. India   |
| Honorable Member | <b>Dr.K.Kumarasamy</b><br>Prof.& Head,Department of Geography<br>Bharathidasan University, Tiruchirappalli. Tamil Nadu. India   |
| Honorable Member | <b>Dr.A.Sathya,</b><br>Assistant professor – III,<br>School of Civil Engineering, SASTRA University,<br>Thanjavur – 613401, TamilNadu, India.   |
| Honorable Member | <b>Dr.G.G.Hammad Ahmad Shadab</b><br>Senior Assistant Professor, Department of Zoology<br>Aligarh Muslim University,Aligarh-202002,Uttar Pradesh  |
| Honorable Member | <b>Dr.H.Syed Jahangir</b><br>Assistant Professor, P.G. and Research Department of Botany<br>Jamal Mohamed College(Autonomous)<br>Trichirappalli-620020,TamilNadu,India.                                 |

|                  |  |
|------------------|--|
| Honorable Member | <b>Mrs.A.Indumathi</b><br>Asst.Professor,Department of Biotechnology,<br>Bon Secours College for Women,Vilar bypass road,<br>Thanjavur Tamilnadu, South India                                    |
| Honorable Member | <b>Dr. P. Santhanam</b><br>Assistant Professor,<br>Department of Marine Science, School of Marine<br>Sciences,Bharathidasan University, Tiruchirappalli.<br>Tamil Nadu. India                    |
| Honorable Member | <b>Dr.B.Parimala Devi</b><br>Additional Director,<br>Veeramani Mohana Centre for Quality Life Engineering Research,<br>Periyar Maniyammai University, Vallam,Thanjavur ,TN. India.               |
| Honorable Member | <b>Dr. M. Lekeshmanaswamy</b><br>Associate professor<br>PG and Research Department of Zoology<br>Kongunadu Arts and Science College<br>G.N. mills (PO), Coimbatore-641 029,<br>TamilNadu, India. |
| Honorable Member | <b>Dr. P.Udaya Kumar</b><br>Principal<br>D.K.T College of Education,<br>1/341, Near Amaravathipalayam,<br>Peruntholuvu (PO), Tirupur - 641 665,TamilNadu,India.                                  |
| Honorable Member | <b>Dr.Syed Mohamed</b><br>Asst. Prof. Dept. of Zoology,Jamal Mohamed College<br>Tiruchirappalli, TamilNadu, India  |
| Honorable Member | <b>Dr. Komalavalli Narayanaswamy</b><br>Associate Professor, PG and Research Department of Botany<br>H.H. The Rajah's College (Autonomous)<br>Pudukkottai – 622 001, Tamil Nadu, India.          |
| Honorable Member | <b>Mis.S.Muthu Bharathi</b><br>Asst.Professor,Department of Chemistry,<br>Bon Secours College for Women,Vilar bypass road, Thanjavur<br>Tamilnadu, South India                                   |
| Honorable Member | <b>Mrs.Sujatha Ilangovan</b><br>Assistant Professor,<br>Department of Biochemistry<br>Holy Cross College, Tiruchirapalli-620002.<br>TamilNadu, India.  |
| Honorable Member | <b>Dr.C.Kathirvelan</b><br>Assistant Professor,<br>Department of Animal Nutrition<br>Veterinary College and Research Institute (TANUVAS)<br>Namakkal -637002. TamilNadu, India.                  |
| Honorable Member | <b>Professor.G.Ganesan</b><br>Professor, Department of Mathematics<br>Adikavi Nannaya University,Rajahmundry-533105<br>Andhra Pradesh, India.  |

|                  |   |
|------------------|---|
| Honorable Member | <b>Mis D.Kalpana</b><br>Asst.Professor,Department of Chemistry,<br>Bon Secours College for Women,Vilar bypass road,<br>Thanjavur TamilNadu, South India                         |
| Honorable Member | <b>Dr.C.Balusami</b><br>Assistant Professor,<br>Department of Livestock Production and Management<br>College of Veterinary and Animal Sciences<br>Pookode-673576.Kerala, India. |
| Honorable Member | <b>Dr.P.Kavitha</b><br>Assistant Professor,<br>Department of Zoology and Biotechnology<br>AVVM Sri Pushpam College (Autonomous)<br>Poondi,Thanjavur, TamilNadu, India.          |
| Honorable Member | <b>Dr.Vasudevan Ayyappan</b><br>Department of Biology,<br>Delaware State University, Dover, Delaware - 19901  |
| Honorable Member | <b>Mrs.A.Amargeetha</b><br>Asst.Professor,Department of Chemistry,<br>Bon Secours College for Women,Vilar bypass road, Thanjavur<br>TamilNadu, South India                      |
| Honorable Member | <b>Mrs.N.Rajarajeswari</b><br>Asst.Professor,Department of Physics,<br>Bon Secours College for Women,Vilar bypass road, Thanjavur<br>TamilNadu, South India                     |
| Honorable Member | <b>Dr.V. Rajendran</b><br>Dean i/c<br>Vanavarayar Institute of Agriculture<br>Manakkadavu – 642 103.<br>Pollachi Taluk, TamilNadu,India.  |
| Honorable Member | <b>Dr.C.Thamaraiselvi</b><br>Assistant Professor, Dept. of Biotechnology<br>Mother Teresa Women’s University<br>Kodaikanal-624101,TamilNadu,India.                              |
| Honorable Member | <b>Dr. K.Madhava Chetty</b><br>Plant Taxonomist, Assistant Professor,Department of Botany,<br>SVUCS,S.V. University,Tirupati-517 502,Andhra Pradesh, India.                     |
| Honorable Member | <b>Dr.S.Ramesh Kumar</b><br>Assistant Professor,<br>Department of Horticulture,<br>Vanavarayar Institute of Agriculture,<br>Manakkadavu-642103,Pollachi,TamilNadu,India.        |
| Honorable Member | <b>Dr. S. Balasubramanian</b><br>Assistant Professor<br>Department of Mathematics, Government Arts College (A),<br>Karur – 639 005,Tamilnadu,India.                             |

|                  |   |
|------------------|---|
| Honorable Member | <b>Dr.G. Rubalakshmi</b><br>D/o V.P. Govindaraj,<br>#3/41, Nanbargal Nagar,Muthukalipatty, Rasipuram TK,<br>Namakkal DT-637401.Tamilnadu,India.   |
| Honorable Member | <b>Mr.Sridhar Ramachandran</b><br>Assistant Professor,<br>Department of Biological Science,<br>Gojan College of Teacher Education ,<br>Chennai-600 052, TamilNadu, India                            |
| Honorable Member | <b>Dr. H. Krishna Ram</b><br>#11, 1st Main, Opp. to SBM,<br>Gnanaganaganagar,Bangalore- 560 056,<br>Karnataka, India.   |
| Honorable Member | <b>Dr.S.Senthil Murugan</b><br>Assistant Professor,<br>Department of Animal Nutrition,<br>College of Veterinary and Animal Sciences,<br>Pookode, Wayanad, Kerala, India.                            |
| Honorable Member | <b>R.Muthukrishnan</b><br>Assistant Professor<br>Department of Soil Science and Agricultural Chemistry<br>Vanavarayar Institute of Agricultural<br>Manakkadavu, Pollachi-642- 103, TamilNadu, India |
| Honorable Member | <b>K.Ashokkumar</b><br>Senior Research Fellow<br>Dept of Agricultural Microbiology,<br>Tamil Nadu Agricultural University,<br>Coimbutore-3, TamilNadu, India  |
| Honorable Member | <b>Dr.Subbiah poopathi</b><br>Scientist-F/Deputy-Director<br>Vector control Research Centre, Medical complex,<br>Indira Nagar,Pondicherry-605006,India  |
| Honorable Member | <b>Dr. Sivalingam Elayabalan</b><br>Assistant professor<br>3/33,Eachampatti village<br>Attur(Tk),Salem(Dt)-636107, TamilNadu, India   |
| Honorable Member | <b>Dr. Horne Iona Averal</b><br>Associate professor of Head<br>Holy cross college (Autonomous),<br>Trichy. TamilNadu, India   |
| Honorable Member | <b>Dr.G.Singaravelu</b><br>Professor &Head<br>Department of Education<br>Bharathiar University<br>Coimbatore-46 TamilNadu, India  |
| Honorable Member | <b>Dr.Ga.Bakavathiappan</b><br>Associate Professor in Zoology<br>SBK College, Aruppukottai - 626 101, TamilNadu, India.   |

|                  |  |
|------------------|--|
| Honorable Member | <b>Dr.P.Govindaraj</b><br>Head & Associate Professor in Chemistry<br>Department of Chemistry<br>SBK College, Aruppukottai - 626 101, TamilNadu, India  |
| Honorable Member | <b>Dr.M.Gopikannan</b><br>Senior Research Fellow,<br>15-B3 Paramathi Main Road,<br>S.P.Pudhur, Namakkal(Dt)-637 001, TamilNadu, India  |
| Honorable Member | <b>Dr.K.Samiayyan</b><br>Dean<br>Agricultural College and Research Institute, TNAU,<br>Eachangkottai, Thanjavur-614902, T.N,India.   |
| Honorable Member | <b>Dr.M.Vasanthi</b><br>Assistant professor<br>Periyar Illam,(upstairs), No,4,Vayalur Road,<br>Kumaran Nagar, Ramalinga nagar south Extension,<br>Trichy-620017, Tamil Nadu, India   |
| Honorable Member | <b>Dr.N.Vijayakumar</b><br>Assistant Professor<br>Dept.of Biochemistry & Biotechnology<br>Annamalai University, Annamalainagar-608 002,<br>Tamilnadu, India.   |
| Honorable Member | <b>Dr. S. Umamaheswari</b><br>Assistant Professor<br>Department of Environmental Biotechnology<br>School of Environmental Sciences<br>Bharathidasan University<br>Tiruchirappalli – 620 024, Tamil Nadu                          |
| Honorable Member | <b>Dr. Jai Shanker Pillai H.P.</b><br>H.D. Ponna swamy Pillai<br># 644, Ganesh Temple Street<br>Hunsur taluk, Mysore district – 571105,<br>Karnataka, India  |
| Honorable Member | <b>Mr. Nesarajan. J</b><br>Assitant Professor,<br>Department of Zoology, Bishop Heber College,<br>Trichy-17, Tamil Nadu. India   |
| Honorable Member | <b>Dr. John Abraham</b><br>Assistant Professor,<br>Department of L.P.M.,College of Veterinary and Animal Sciences<br>Pookode, Wayanad. 673576, Kerala.   |
| Honorable Member | <b>Dr. S. Jayachandran</b><br>Professor &Head,Dept. of Oral Medicine and Radiology,<br>Tamil Nadu Govt. Dental College and Hospital,<br>Chennai -600003,Tamil Nadu,India.  |
| Honorable Member | <b>Dr.V.M. Srinivasan</b><br>Assistant Professor (Plant Pathology)<br>Department of Crop Protection<br>Thanthai Roever Institute of Agriculture and Rural Development,<br>Valikandapuram Post, Perambalur - 621115., Tamil Nadu. |

|                  |   |
|------------------|---|
| Honorable Member | <b>Dr.Ranjith.D</b><br>Assistant Professor,<br>Department of Veterinary Pharmacology and Toxicology,<br>College of Veterinary and Animal Sciences,<br>Pookode, Wayanad – 673576. Kerala,India |
| Honorable Member | <b>Daniel Jebaraj,M.</b><br>C/o Joshua<br>No.14A, Thendral Nagar<br>New Thillai Nagar, Vadavalli,<br>Coimbatore-641041,TamilNadu,India  |
| Honorable Member | <b>Dr.Sindhu. K</b><br>Veterinary Officer<br>Department of AH and VS<br>Karnataka, India.   |
| Honorable Member | <b>Dr.Rajesh R</b><br>Young Scientist,<br>Department of Agricultural Microbiology,<br>Tamil Nadu Agricultural University,<br>Coimbatore 641 003,TamilNadu,India.                              |
| Honorable Member | <b>Dr.Jaivel N</b><br>Post Doctoral Fellow,<br>Department of Agricultural Microbiology,<br>Tamil Nadu Agricultural University,<br>Coimbatore - 641 003,TamilNadu,India.                       |
| Honorable Member | <b>Dr.R.Prabhu</b><br>Research Associate,<br>NADP Cell,CARDS,<br>TamilNadu Agricultural University,<br>Coimbatore - 641 003,Tamil Nadu, India.  |
| Honorable Member | <b>Dr.M.Uma Gowri</b><br>Research Associate,<br>NADP Cell,CARDS,<br>TamilNadu Agricultural University,<br>Coimbatore - 641 003,Tamil Nadu, India.   |
| Honorable Member | <b>S.Jegan Karuppiah</b><br>Assistant Professor,<br>Department of Rural Development Science,<br>Arul Anandar College,<br>Karmathur - 625 514, Madurai. Tamilnadu, India                       |
| Honorable Member | <b>Dr. Rina Poonia</b><br>Associate Professor,<br>Department of Physical Education, Faculty of Arts & Law,<br>Manipal University,Jaipur,India.  |
| Honorable Member | <b>Dr.S.Ezhil Vendan</b><br>Scientist Fellow,<br>Food Protectants & Infestation Control Department,<br>CSIR-Central Food Technological Research Institute,<br>Mysore-570 020,Karnataka,India. |



|                  |   |
|------------------|---|
| Honorable Member | <b>Dr.K.Shameem Rani</b><br>Associate Professor and Head,<br>Dept. of Zoology,M.S.S Wakf Board College,<br>Madurai-625020,TamilNadu,India.  |
| Honorable Member | <b>Dr.B.Nagarathnam</b><br>No.2, New Agraharam,<br>Erode-638001,<br>TamilNadu,India.  |
| Honorable Member | <b>Dr.P.Balaji</b><br>Assistant Professor (Agricultural and Rural Management),<br>Centre of Excellence in Biofuels,<br>Forest College and Research Institute,<br>Tamil Nadu Agricultural University(TNAU),<br>Mettupalayam- 641 301,<br>Coimbatore Dt., Tamil Nadu. |
| Honorable Member | <b>Dr.M.Shanthasheela</b><br>Assistant Professor (Agricultural Extension),<br>Department of Sericulture, Forest College and Research Institute,<br>Tamil Nadu Agricultural University(TNAU),<br>Mettupalayam- 641 301,<br>Coimbatore Dt. Tamil Nadu.                |
| Honorable Member | <b>Dr. N. Balakrishnan</b><br>Young Scientist,<br>Department of Nano Science &Technology,<br>Tamil Nadu Agricultural University,<br>Coimbatore – 641003,<br>TamilNadu,India.  |
| Honorable Member | <b>Dr.N.Raman</b><br>Associate Professor,<br>Department of Chemistry,<br>VHNSN College,<br>Virudhunagar-626 001,<br>TamilNadu,India.  |
| Honorable Member | <b>M.Thenmozhi</b><br>Assistant Professor (Agrl. Engg.),<br>Imayam Institute of Agriculture and Technology,<br>Kannanur, Trichy - 621206,<br>TamilNadu,India.   |
| Honorable Member | <b>K.Kalidas</b><br>Assistant Professor & Head,<br>Dept. of Social Science, Vanavarayar Institute of Agriculture,<br>Manakkadavu, Pollachi,<br>TamilNadu,India.   |

|                  |  |
|------------------|--|
| Honorable Member | <b>Dr.M.Kumar</b><br>Assistant Professor(Horticulture),<br>Vanavarayar Institute of Agriculture,<br>Manakkadavu,Pollachi,<br>Coimbatore-642103,<br>TamilNadu,India.  |
| Honorable Member | <b>Dr.T.Pradeesh Kumar</b><br>Assistant Professor (Agronomy),<br>Vanavarayar Institute of Agriculture,TNAU,Pollachi,<br>Coimbatore-642103,TamilNadu,India.   |
| Honorable Member | <b>Dr.M.R.Nandhakumar</b><br>Assistant Professor (Agronomy),<br>Kumaraguru Institute of Agriculture (Affiliated to TNAU),<br>Appakoodal,Erode-638315,<br>TamilNadu,India.  |
| Honorable Member | <b>Dr.R.Govindan</b><br>Assistant Professor (Agronomy),<br>Kumaraguru Institute of Agriculture (Affiliated to TNAU),<br>Appakoodal,Erode-638315,<br>TamilNadu,India.   |
| Honorable Member | <b>Dr.K.Vinoth Kumar</b><br>Research Associate, Department of Agronomy,<br>Agricultural College and Research Institute,<br>TNAU, Madurai – 625104,<br>TamilNadu,India.   |
| Honorable Member | <b>Dr.S.Sandhya</b><br>Professor and Head of Department,<br>Department of Pharmacognosy,<br>St.James College of Pharmaceutical Sciences,<br>Chalakkudy, Thrissur,Kerala,India.   |
| Honorable Member | <b>Dr.P.Anbarasan</b><br>Assistant Professor (Agricultural Extension),<br>Kumaraguru Institute of Agriculture,Tamil Nadu Agricultural<br>University,Sakthi Nagar, Erode-638315,<br>Tamil Nadu, India.                    |
| Honorable Member | <b>Dr.N.Muthuselvan</b><br>Principal,<br>Saiva Bhanu Kshatriya College,<br>Aruppukottai, Virudhunagar, TamilNadu, India.   |
| Honorable Member | <b>Dr.M.Rajasekar</b><br>Research Associate,<br>Precision Farming Development Center,<br>Agricultural Engineering College and Research Institute,<br>Tamil Nadu Agricultural University, Coimbatore,<br>TamilNadu,India. |

|                  |   |
|------------------|---|
| Honorable Member | <b>Dr.A.Dinakara Rao</b><br>Associate Professor,<br>Center for Bioinformatics, School of Life Sciences,<br>Pondicherry university,Puducherry,India  |
| Honorable Member | <b>Dr.K.Sivakumar</b><br>Associate Professor,<br>Department of Botony,Annamalai University,<br>Annamalai Nagar,TamilNadu,India  |
| Honorable Member | <b>Dr.S.Moghana Lavanya</b><br>Assistant Professor, Department of Agricultural Economics,<br>Agricultural College and Research Institute,<br>TamilNadu Agricultural University,<br>Madurai,TamilNadu,India. |
| Honorable Member | <b>Dr.M.Biruntha</b><br>Assistant Professor,<br>Department of Animal Health and Management,<br>Alagappa University,Karaikudi,TamilNadu,India  |
| Honorable Member | <b>Dr.K.Saravanan</b><br>Assistant Professor ,PG & Research Dept. of Zoology,<br>Nehru Memorial College (Autonomous),<br>Puthanampatti,Tiruchirappalli<br>TamilNadu,India.                                  |
| Honorable Member | <b>Dr.A.Kalyana Sundaram</b><br>Assistant Professor(Entomology),<br>Agricultural College and Research Institute,<br>Tamil Nadu Agricultural University,<br>Eachangkottai,Thanjavur,TamilNadu,India.         |
| Honorable Member | <b>Sirajuddin M.Horaginamani</b><br>Principal,<br>Sayyid Akbar Husayni Degree College of Arts,Commerce and<br>Science,Kalaburagi,Karnataka,India.   |
| Honorable Member | <b>Dr.P.Ramachandran</b><br>Director & Head,<br>Trichy Institute of Regenerative Medicine,<br>Thillai Nagar West,Trichy,TamilNadu,India.  |
| Honorable Member | <b>Dr.S.Lingathurai</b><br>Assistant Professor, Department of Biotechnology,<br>The Madura College, Madurai,<br>TamilNadu,India.  |
| Honorable Member | <b>Dr.P.Manonmani</b><br>Assistant Professor,Department of Life Sciences,<br>Centre for Research and Development,<br>PRIST University, Vallam, Thanjavur<br>TamilNadu,India.                                |

|                  |   |
|------------------|---|
| Honorable Member | <b>Dr. Syed Abrar</b><br>Research Associate,<br>Department of P.G. Studies & Research in Applied Botany,<br>Kuvempu University, Shivamogga,<br>Karnataka, India.                        |
| Honorable Member | <b>Dr.V.Violet Dhayabaran</b><br>Associate Professor, Department of Chemistry,<br>Bishop Heber College (Autonomous),<br>Puthur, Tiruchirappalli, TamilNadu, India.                      |
| Honorable Member | <b>Dr.H.T.Raghavendra Gowda</b><br>Haluvalli, Opposite Bus stand,<br>Mallalur, Chikamagalore, Karnataka, India.   |
| Honorable Member | <b>Dr. Goverdhan Rathla K. S</b><br>Assistant Professor, Department of Physics,<br>Government First Grade College, Birur,<br>Kadur Talluk, Chickmagalore District.<br>Karnataka, India. |
| Honorable Member | <b>Dr. Ananthnag B</b><br>Lecturer,<br>Department of Environmental Science,<br>Kuvempu University, Shivamogga,<br>Karnataka, India.   |
| Honorable Member | <b>Dr.M.Ramesh</b><br>Associate Professor,<br>Department of Biotechnology, Alagappa University,<br>Karaikudi-630003, Sivagangai Dt,<br>TamilNadu, India.                                |
| Honorable Member | <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.          |
| Honorable Member | <b>Dr. SA. Ramyabharathi</b><br>253/ A37, TNHB Colony, Kollapatti,<br>Animur (PO), Tiruchengode (TK),<br>Namakkal District- 637214,<br>TamilNadu, India.                                |
| Honorable Member | <b>Dr.B.Kaleeswaran</b><br>Assistant Professor,<br>Dept. of Zoology & Biotechnology,<br>A.V.V.M.Sri Pushpam College,<br>Poondi, Thanjavur, T.N.India.                                   |
| Honorable Member | <b>Dr.A.Radha</b><br>Assistant Professor, Dept. of Zoology<br>Kunthavai Naacchiyar Govt Arts College for Women,<br>Thanjavur-7, T.N.India.  |

|                  |  |
|------------------|--|
| Honorable Member | <b>Dr.V.L.Madhu Prasad</b><br>Directorate of Extension,<br>University of Agricultural Science,<br>Hebbal,Bangaluru-560024.<br>Karnataka,India.   |
| Honorable Member | <b>Dr.T.Shanmugasundaram</b><br>Research Associate,<br>Department of Vegetable Crops,<br>Horticultural College and Research Institute,<br>Tamil Nadu Agricultural University, Coimbatore-641 003<br>Tamil Nadu,India.    |
| Honorable Member | <b>Dr.V.Sakthirama</b><br>3/8,P Block,Sree Dakshaa-Vhiridhaa<br>Bharthiyar University Post,Coimbatore-641046<br>TamilNadu,India.   |
| Honorable Member | <b>Dr.M.Kiruba</b><br>261B/5 Anna Nagar, Kulithalai-639104,<br>Karur(Dt), Tamil Nadu   |
| Honorable Member | <b>Dr.Karpagavalli B</b><br>Assistant Professor (FSN), RVS Agricultural College,<br>Usilampatti Village,Sengipatti Via,<br>Thanjavur-613402,Tamil Nadu,India.  |
| Honorable Member | <b>Dr.D.Leninraja,</b><br>Assistant Professor (Soil Science & Agricultural Chemistry)<br>Agricultural College and Research Institute,<br>Tamil Nadu Agricultural University,<br>Kudumiyanmalai,Pudukottai- 622 104,T.N   |
| Honorable Member | <b>Dr.S.Maragatham,</b><br>Associate Professor (Soil Science & Agricultural Chemistry)<br>Agricultural College and Research Institute,<br>Tamil Nadu Agricultural University,<br>Kudumiyanmalai,Pudukottai- 622 104,T.N. |
| Honorable Member | <b>Dr.D.Balamurugan</b><br>Assistant Professor (Soil Science & Agricultural Chemistry)<br>JKK Munirajah College of Agricultural Science,<br>T. N. Palayam, Erode- 638 506,T.N  |
| Honorable Member | <b>Dr.N.Rajesh Nallaiah</b><br>Assistant Professor (Agronomy)<br>RVS Agricultural College,<br>Usilampatti Village,Sengipatti via,<br>Thanjavur-613402,Tamil Nadu,India.  |
| Honorable Member | <b>Dr.C.N.Hari Prasath</b><br>Senior Research Fellow<br>D3 Quarters, Forest College and Research Institute,<br>Kothagiri Road, Mettupalayam (Tk),<br>Coimbatore (Dt),Tamil Nadu – 641 301,India.                         |

|                  |   |
|------------------|---|
| Honorable Member | <b>Dr.Prantosh K. Paul</b><br>Department of Computer & Information Science,<br>Raiganj University, Raiganj,<br>West Bengal-733 134, India.  |
| Honorable Member | <b>Dr. Ajay Anil Gurjar</b><br>Professor & Dean Academics,<br>Sipna College of Engineering & Technology,<br>Amravati(M.S)- 444606,India.  |
| Honorable Member | <b>Dr.Mathews Plamoottil</b><br>Asst. Professor in Zoology,<br>Govt. College Chavara, Kollam,<br>Kerala,India.  |
| Honorable Member | <b>Dr.Mrs.E.Emimal Victoria</b><br>Assistant Professor, Department of Zoology<br>Sri Meenakshi Govt. Arts College for Women, Madurai<br>TamilNadu,India                                   |
| Honorable Member | <b>Dr.C.Kandeepan</b><br>Asst.Professor and Head,<br>PG Department of Zoology,<br>A.P.A College of Arts and Culture,<br>Palani-624601,Dindigul Dt.T.N.,India.                             |
| Honorable Member | <b>Dr.V.E.Nethaji Mariappan</b><br>Scientist"F"<br>Centre for Remote Sensing and Geoinformatics<br>Sathyabama University,Rajiv Gandhi Road,<br>Sholinganallur,Chennai – 600119,Tamil Nadu |
| Honorable Member | <b>Dr.K.Nagarajan</b><br>Associate Professor,<br>Department of Zoology<br>VHN Senthikumara Nadar College,<br>Virudhunagar,TamilNadu,India.  |
| Honorable Member | <b>Dr.D.Sivaraman</b><br>Scientist-C<br>Department of Pharmacology,<br>Sathyabama University,<br>Jeppiaar Nagar, Rajiv Gandhi road, Chennai- 600 119.                                     |
| Honorable Member | <b>Dr.N.Mahesh</b><br>Assistant Professor – III<br>Department of Chemistry & Biosciences<br>SASTRA University Srinivasa Ramanujan Centre,<br>Kumbakonam,Thanjavur Dist,Tamilnadu,INDIA    |
| Honorable Member | <b>Dr.Sumit Kumar Gupta</b><br>Dean of Science,<br>Department of Physics,<br>Parishkar College of Global Excellence , Jaipur,<br>Rajasthan,India  |

|                  |  |
|------------------|--|
| Honorable Member | <b>Dr.Prakash.M</b><br>Professor, Department of Genetics and Plant Breeding,<br>Faculty of Agriculture, Annamalai University,<br>Annamalai nagar- 608002.<br>Cuddalore District.   |
| Honorable Member | <b>Dr.B.A.Asbi</b><br>Prof., Vice President Research,<br>Management & Science University(MSU),<br>University drive off persiaran olahraga,<br>40100 shah alam selangor. MALAYSIA.  |
| Honorable Member | <b>S.M.Prasad</b><br>Assistant Professor,<br>Department of Nutrition and Dietetics,<br>Sadakathullah Appa College,<br>Rahmath Nagar,Tirunelveli-627011. T.N.India  |
| Honorable Member | <b>K.Rajendran</b><br>Research Associate<br>Directorate of CARDS,<br>TNAU,Coimbatore-3   |
| Honorable Member | <b>Dr.Kayalvizhi.K</b><br>Senior Research Fellow<br>Institute of Agriculture,<br>Kumulur-621712,Lalgude(TK)<br>Trichy. TamilNadu   |
| Honorable Member | <b>Dr.P.Jeyaseelan</b><br>Associate Prof., Department of Agricultural Extension,<br>Faculty of Agriculture,<br>Annamalai University, Annamalai Nagar – 608 002<br>Cuddalore  |
| Honorable Member | <b>Dr.Suja George</b><br>Principal Scientist, Department of Biotechnology,<br>M.S. Swaminathan Research Foundation,<br>Taramani, Chennai 600113.   |
| Honorable Member | <b>Dr.Neelesh Sharma</b><br>ICAR-International Fellow & NAAS Associate<br>Division of Veterinary Medicine,<br>Faculty of Veterinary Science and Animal Husbandry,<br>Sher-e-Kashmir University of Agri. Sciences & Technology,<br>R.S. Pura, Jammu-181102 (J & K) INDIA. |
| Honorable Member | <b>Dr.Tapas Ranjan Das</b><br>Head (Acting),<br>IARI Regional Station, Pusa<br>Samastipur -848125,Bihar, India   |
| Honorable Member | <b>Dr.Muthuraman A.,</b><br>Assistant Professor,<br>JSS College of Pharmacy,<br>JSS University, Mysuru -570 015.<br>Karnataka,India..  |

|                  |  |
|------------------|--|
| Honorable Member | <b>Dr.G.Rama Rao</b><br>Principal Scientist &Head,<br>Dept.of Crop Physiology,<br>RARS Lam, Guntur-522034,<br>ANGR Agricultural University,<br>Andhra Pradesh,India.                                   |
| Honorable Member | <b>Dr.A.S.Kanagalakshmi</b><br>Professor, Dept. of Civil Engineering,<br>Panimalar Engineering College<br>Chennai 600123. Tamilnadu,India.   |
| Honorable Member | <b>Dr.M.Ramarao</b><br>Associate Professor, Department of Mechanical Engineering,<br>Holy Mary Institute of Technology & Science<br>Hyderabad,Telangana 501301, Telangana, India.                      |
| Honorable Member | <b>Dr.Y.V. Krishna Reddy</b><br>Department of Agricultural Engineering,<br>Aditya Engineering College,<br>Surampalem- 533437, East –Godavari, A.P., India  |
| Honorable Member | <b>Dr.Komal Kumar Javarappa</b><br>Institute of Molecular Medicine Finland,<br>University of Helsinki, Finland,<br>Biomedicum Helsinki 2U, G315b,<br>Finland- 00014.                                   |
| Honorable Member | <b>Dr.Easwari.S</b><br>Asst.Professor,<br>J.K.K. Munirajah College of Agricultural Science,<br>T.N.Palayam, Erode Dist.,TamilNadu, India.  |
| Honorable Member | <b>Dr.Manigopa Chakraborty</b><br>Chief Scientist cum University Professor<br>Department of Genetics & Plant Breeding,<br>Birsa Agricultural University,<br>Kanke, Ranchi, Jharkhand – 834006., India. |
| Honorable Member | <b>Dr.Arvind Prasad Dwivedi</b><br>Lecturer,<br>Department of Chemistry,<br>Govt. Sanjay Gandhi Smriti College,<br>Sidhi, Madhya Pradesh, India.   |
| Honorable Member | <b>Dr.M.N.Harisha</b><br>Guest Lecturer,<br>Department of Wildlife and Management,<br>Kuvempu University,<br>Jnanasahyadri, Shankaraghatta - 577451. Shimoga   |
| Honorable Member | <b>Dr.R.Rajkumar</b><br>Senior Scientist,<br>Village Resource Centre<br>M S Swaminathan Research Foundation<br>Pudukkottai,TamilNadu,India.  |
| Honorable Member | <b>Dr.Vidyalakshmi G M</b><br>Division of Veterinary Physiology ,<br>CSM Lab, ICAR- IVRI, Izatnagar,<br>Bareilly, Uttar Pradesh – 243 122. India.  |



|                  |   |
|------------------|---|
| Honorable Member | <b>Dr.N.Shruthi</b><br>Division of Animal Biochemistry,<br>ICAR- IVRI, Izatnagar, Bareilly,<br>Uttar Pradesh – 243 122. India.  |
| Honorable Member | <b>Dr.S.Deepa</b><br>PGT Biology,<br>G.K.Shetty Vivekananda Vidyalaya Junior College, Ambattur,<br>Chennai – 600053. Tamil Nadu, India  |
| Honorable Member | <b>Dr.A.Suganya</b><br>Research Scholar, Department of Agricultural Science,<br>Tamil Nadu Agricultural University,<br>Coimbatore   |
| Honorable Member | <b>Dr. N. Jeyapandiyan</b><br>Research Associate, Department of Agricultural Microbiology,<br>Tamil Nadu Agricultural University,<br>Coimbatore.  |
| Honorable Member | <b>Dr.R.Selvaraj</b><br>Associate Professor, Department of Veterinary<br>Physiology, Centre for Laboratory Animal Technology & Research<br>(CPCSEA approved),<br>Sathyabama University, Chennai – 600 119.  |
| Honorable Member | <b>Dr.V.Karthika</b><br>Senior Research Fellow, Department of Environmental Science,<br>Water Technology Centre,<br>Tamil Nadu Agricultural University,<br>Coimbatore – 641 003.  |
| Honorable Member | <b>Dr.M.Karthikeyan</b><br>Assistant Professor (Plant Pathology)<br>Department of Vegetable Crops ,HC&RI<br>Tamil Nadu Agricultural University ,Coimbatore<br>TamilNadu,India   |
| Honorable Member | <b>Dr.K.Rajendran,</b><br>Research Associate,<br>Directorate of CARDS,<br>Tamil Nadu Agricultural University,<br>Coimbatore, Tamil Nadu,India.  |
| Honorable Member | <b>Dr. V. Janahiraman</b><br>Assistant Professor ( Agricultural Microbiology)<br>Krishna College of Agriculture and Technology,<br>Sriengapuram -625532, Usilampatti, Madurai-Dt<br>Affiliated by Tamil Nadu Agricultural University.<br>Tamil Nadu, India. |
| Honorable Member | <b>Dr.A.Mahadevan</b><br>Assistant Professor, Dept. of Horticulture,<br>Krishna College of Agriculture and Technology,<br>Sriengapuram -625532, Usilampatti, Madurai-Dt.<br>Tamil Nadu, India   |

|                  |   |
|------------------|---|
| Honorable Member | <b>Dr.A.Manikandan</b><br>Principal,<br>Muthayammal Memorial College of Arts and Science,<br>Rasipuram, Namakkal Dist – 637408.<br>Tamil Nadu, India.   |
| Honorable Member | <b>Vijaya Bhaskara Reddy.MUTHA</b><br>Asst. Prof.Faculty of Public Health,<br>St Theresa International College,<br>1 Moo 6 Rangsit-Nakhon Nayok Road (Klong 14),<br>Bungsan,Ongkharak – 26120<br>Nakhon Nayok, Thailand.                  |
| Honorable Member | <b>Dr. R.Mary Suja</b><br>Director, Williams Research Centre, Nagarcoil – 1<br>Kanyakumari Dist,Tamil Nadu, India   |
| Honorable Member | <b>Dr. P. Chandramani</b><br>Professor, (Agricultural Entomology),<br>Agricultural College and Research Institute,<br>Tamil Nadu Agricultural University<br>Kudumiyamalai – 622 104.<br>Pudukkottai Dist., Tamil Nadu, India              |
| Honorable Member | <b>Dr. Hasan S.A. Jawad</b><br>Animal Production Department,<br>Agricultural Faculty,<br>University of Baghdad,<br>Baghdad,Iraq   |
| Honorable Member | <b>Dr. S. Suganya Kanna</b><br>Assistant Professor, (Agricultural Entomology),<br>Agricultural College and Research Institute,<br>Tamil Nadu Agricultural University.<br>Kudumiyamalai – 622 104.<br>Pudukkottai Dist., Tamil Nadu, India |
| Honorable Member | <b>Dr. D. Balasankar</b><br>Horticulture Officer,<br>Farmer Training Centre,<br>O/o Joint Director of Horticulture,<br>Udhagamandalam -643001.<br>The Nilgiris, Tamil Nadu, India.  |
| Honorable Member | <b>Dr. Ali Abdel-Hadi Mahoud Alsudani</b><br>Assistant Professor in College of Science<br>Biology Department,<br>University of Al-Qadisiyah,<br>Iraq.   |
| Honorable Member | <b>Dr. M. Manikandan</b><br>Senior Research Fellow,<br>Tamil Nadu Agricultural University<br>Coimbatore – 641003.<br>Tamil Nadu, India.   |

|                  |   |
|------------------|---|
| Honorable Member | <b>Neeta Raghuveer</b><br>Assistant Professor,<br>National College Autonomous,<br>Basavanagudi, Bengaluru<br>Karnataka,India  |
| Honorable Member | <b>Dr. Salam Hussein Ewaid</b><br>Shatra Technical Institute<br>Southern Technical University,<br>Iraq.   |
| Honorable Member | <b>Dr.S.Prema</b><br>Associate Professor of Computer Science<br>K.S.Rangasamy College of Arts and Science (Autonomous)<br>Tiruchengode – 637 215, Tamilnadu, India  |
| Honorable Member | <b>Dr.S.Sasikala</b><br>Associate Professor,<br>Department of Computer Applications,<br>Hindusthan College of Arts and Science,<br>Coimbatore - 641 028, Tamilnadu, India.  |
| Honorable Member | <b>Dr. Ghaidaa Raheem Lateef Al-Awsi</b><br>Al-Mustaqbal University College,<br>Babylon,Iraq.   |
| Honorable Member | <b>Dr.C.Ravinder Singh</b><br>Head, PG and Research Department of Botany,<br>Vivekanandha College of Arts and Sciences for Women,<br>Elayampalayam- 637 205,<br>Tiruchengode, Namakkal,Tamil Nadu, India.                           |
| Honorable Member | <b>Dr. S. Thenmozhi</b><br>Assistant Professor (SS & AC)<br>Soil Fertility and Irrigation Water Management<br>Agricultural College and Research Institute,<br>Kudumiyanmalai - 622 104, Pudukkottai – District,<br>Tamil Nadu,India |
| Honorable Member | <b>Dr. Salwan Ali Abed</b><br>Department of Environment<br>College of Science<br>University of Al-Qadisiyah, Iraq.  |
| Honorable Member | <b>Dr.G.Rajaraman</b><br>Assistant Professor & Coordinator<br>School of Agricultural and Processing Sciences<br>Kalasalingam Academy of Research and Education<br>Krishnankoil-626126, Tamilnadu. India.                            |
| Honorable Member | <b>Dr.S.Alagumanian</b><br>Head & Assistant Professor,<br>PG &Research Dept. of Botany<br>H.H. The Rajash's Collage,<br>Pudukkottai, Tamilnadu, India   |

|                  |   |
|------------------|---|
| Honorable Member | <b>Dr. Faiza Kadhim Emran</b><br>Department of Biology,<br>College of Science,<br>University of Baghdad,<br>Baghdad, Iraq.  |
| Honorable Member | <b>Dr.N.Vasanthakumar</b><br>Librarian, The American College,<br>Madurai – 625 002, Tamilnadu, India  |
| Honorable Member | <b>Dr.Nagubudi. Varadarajulu Naidu</b><br>Director of Research,<br>Acharya N.G Ranga Agricultural University,<br>Administrative Office, RARS, Lam,<br>Guntur -522034 Andhra Pradesh, India.                   |
| Honorable Member | <b>Dr. Ahmed Mahmood Shukur AL-Nedawi</b><br>Assistant Professor,<br>Animal Resource Department,<br>Faculty of Agriculture,<br>University of Baghdad, Baghdad, Iraq   |
| Honorable Member | <b>Dr.Thirumal Kumar D</b><br>Assistant Professor(Jr)<br>Department of Integrative Biology,<br>School of Bio Sciences and Technology<br>Vellore Institute of Technology<br>Vellore – 632014, Tamilnadu, India |
| Honorable Member | <b>Dr.R.Jayapandi</b><br>Assistant Professor, Department of Bio Chemistry,<br>The American College, Madurai – 625 002<br>Tamilnadu, India   |
| Honorable Member | <b>Dr.C.Ravindran</b><br>Assistant Professor (Horticulture)<br>Department of Fruit Crops<br>Horticulture College and Research Institute<br>Periyakulam – 625 604, Theni District, Tamilnadu, India.           |
| Honorable Member | <b>Wejdan Thamir Mahdi</b><br>University of Qadisiyah, Iraq   |
| Honorable Member | <b>Dr.K.F.Bharati</b><br>Assistant Professor, Department of Computer Science and<br>Engineering, JNTUA College of Engineering,<br>Ananthapuramu - 515002,<br>Andhra Pradesh, India.                           |
| Honorable Member | <b>Dr.Huda Falah Hasan Radi Alqaraghuli</b><br>Assistant Professor,<br>College of Veterinary Medicine,<br>University of Baghdad, Baghdad, Iraq.   |
| Honorable Member | <b>Dr.S.V.Sai Prasad</b><br>Principal Scientist & Head<br>ICAR-IARI, Regional Station,<br>Near Agriculture College,<br>Indore – 452 001, Madhya Pradesh, India  |

|                  |  |
|------------------|--|
| Honorable Member | <b>Dr. Intedhar Abbas Marhoon</b><br>Biology Department,<br>Faculty of Science, University of Al-Qadisiyah, Iraq   |
| Honorable Member | <b>Dr.Omkar Prasad Baidya</b><br>Assistant Professor, Department of Physiology,<br>ESI-PGIMSR and ESIC Medical College,<br>Joka, Kolkata, West Bengal, India   |
| Honorable Member | <b>Dr.Reem Zuhair Shaker Abdul Rahman Shanshal</b><br>Assistant Professor in Life Sciences,<br>College of Education for Girls,<br>University of Mosul, Iraq.   |
| Honorable Member | <b>Dr.V.Kavitha</b><br>Associate Professor,<br>PG and research Department of Computer Application,<br>Hindusthan College of Arts and Science,<br>Coimbatore -28, Tamilnadu, India  |
| Honorable Member | <b>Dr. Preethi Balasundaram</b><br>Post-Doctoral Fellow, Wieden Group<br>Alberta RNA Research & Training Institute<br>Department of Chemistry and Biochemistry<br>University of Lethbridge, 4401 University Drive<br>Lethbridge, Alberta, Canada T1K 3M4 |
| Honorable Member | <b>Dr. Vikas Sharma</b><br>Associate Professor/Sr. Scientist (Agronomy)<br>Regional Agricultural Research Station<br>SKUAST-JAMMU, Tandwal-Rajouri, Teh. And District Rajouri,<br>State Jammu and Kashmir, India   |
| Honorable Member | <b>Dr.C.Vijai</b><br>Assistant Professor,<br>Department of Commerce,<br>St.Peter's Institute of Higher Education and Research, Avadi,<br>Chennai-600 054, Tamil Nadu, India  |
| Honorable Member | <b>Dr. Gopal Muthu</b><br>Scientist -'C'<br>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              |
| Honorable Member | <b>Dr.N.Revathy</b><br>Associate Professor,<br>PG and research Department of Computer Application,<br>Hindusthan College of Arts and Science,<br>Coimbatore -28, Tamilnadu, India  |
| Honorable Member | <b>Dr.M.Ananthi</b><br>Teaching Assistant,<br>Directorate of Planning and Monitoring,<br>Tamil Nadu Agricultural University,<br>Coimbatore – 03, Tamilnadu, India.   |

|                  |   |
|------------------|---|
| Honorable Member | <b>Dr.Pushpa S Murthy</b><br>Senior Scientist, Department of Spice and Flavor Science<br>AcSIR Associate Professor (Biological Sciences),<br>CSIR - Central Food Technological Research Inst.<br>MYSURU, Karnataka, INDIA   |
| Honorable Member | <b>CH.V.Satyanarayanaraju</b><br>Scientist, Research Centre Imarat,<br>DRDO Hyderabad,<br>Telangana, India  |
| Honorable Member | <b>Dr. Vickram A S</b><br>Associate Professor,<br>Department of Biotechnology<br>Saveetha School of Engineering<br>Saveetha Institute for Medical and Technical Sciences<br>Chennai, Tamilnadu, India   |
| Honorable Member | <b>G.Menaka</b><br>Assistant Professor,<br>Computer Science Cum Deputy Controller of Examinations<br>Vivekanandha College Of Arts & Sciences For Women<br>(Autonomous), Elayampalayam, Tiruchengode,<br>Namakkal (Dist.), TamilNadu, India  |
| Honorable Member | <b>Dr. Karthikeyan Rajamani</b><br>Senior Research Scientist (Biomarker)<br>ICMR Centre for Advanced study in Air pollution,<br>Department of Environmental Health Engineering, Sri<br>Ramachandra Institute of Higher Education and Research,<br>Porur-600116, Chennai, TamilNadu, India |
| Honorable Member | <b>Dr. P.Yasodha</b><br>Assistant Professor (Agrl. Entomology)<br>Anbil Dharmalingam Agricultural College & Research Institute,<br>Tamil Nadu Agricultural University, Navalur Kuttapattu 620 027,<br>Tiruchirappalli, Tamil Nadu, India.   |
| Honorable Member | <b>Dr. SAIKAT SEN</b><br>Associate Professor<br>Faculty of Pharmaceutical Sciences<br>Assam down town University,<br>Panikhaiti, Guwahati, Assam - 781026, India  |
| Honorable Member | <b>Dr.E.Selvarajan</b><br>Research Assistant Professor<br>Department of Genetic Engineering<br>School of Bioengineering<br>SRM Institute of Science and Technology<br>Kattankulathur-603203, Chennai, Tamilnadu, India  |
| Honorable Member | <b>Dr.V.Shanmuga Sundaram</b><br>Assistant Professor & Head<br>Department of Statistics<br>Mahendra Arts & Science College (Autonomous)<br>Kalippatti, Namakkal-637501.<br>Tamilnadu, India.  |

|                  |  |
|------------------|--|
| Honorable Member | <b>Dr. J. Rajangam</b><br>Professor and Head,<br>Department of Fruit Crops,<br>HC & RI, Periyakulam, Tamilnadu, India  |
| Honorable Member | <b>Dr.R.R.Saravanakumar</b><br>Librarian & Head<br>Department of Library and Information Science<br>Sadakathullah Appa College (Autonomous)<br>Rahmath Nagar, Tirunelveli, Tamilnadu, India                                      |
| Honorable Member | <b>Dr. Shivendu Ranjan</b><br>Senior Research Associate<br>Faculty of Engineering & Built Environment<br>University of Johannesburg, Johannesburg<br>(Auckland Park Kingsway Campus)<br>South Africa                             |
| Honorable Member | <b>Dr.Nagubudi.Varadarajulu Naidu</b><br>Director of Research,<br>Acharya N.G Ranga Agricultural University,<br>Administrative Office, RARS,<br>Lam, Guntur -522034, Andhra Pradesh, India                                       |
| Honorable Member | <b>Dr.I.Muthuvel</b><br>Associate Professor (Horticulture),<br>Department of Fruit Crops,<br>Horticultural College and Research Institute,<br>Periyakulam – 625 604, Theni Dist. Tamil Nadu, India                               |
| Honorable Member | <b>Subburaj. M</b><br>Deputy Director<br>Food Safety and Standards Authority of India<br>Ministry of Health and Family welfare, Govt. of India Benfish<br>Tower, 31 GN Block, Sector V, Salt lake city<br>Kolkata -700091, India |
| Honorable Member | <b>Dr.Bhagyalakshmi Rajaram</b><br>Associate Professor,<br>Department of Management Studies,<br>PSNA College of Engineering & Technology,<br>Dindigul, TamilNadu, India  |
| Honorable Member | <b>Dr.S.Annapoorani</b><br>Assistant Professor in Biotechnology,<br>Dr.Umayal Ramanathan College for Women<br>Karaikudi, Sivaganga (Dt), TamilNadu, India  |
| Honorable Member | <b>Dr Bhasker Sharma</b><br>Homoeopathy Doctor<br>Sharma Homoeopathy Chikitsalya and Research Center<br>Itwa Bazaar, Dist-Siddharth Nagar, Pin-272192<br>Uttar Pradesh, India  |
| Honorable Member | <b>Dr.R.Parimalan</b><br>Scientist (Agrl. Biotech) & Hon. Faculty (QAAFI, UQ),<br>Division of Genomic Resources, ICAR-National Bureau of Plant<br>Genetic Resources, PUSA Campus, New Delhi-110012                               |

Honorable Member

**Dr.P.Sivakumar**

Assistant Professor (Biotechnology)  
Agricultural College and Research Institute  
Tamil Nadu Agricultural University,  
Eachangkottai, Thanjavur, Tamil Nadu, India



## Indian Journal of Natural Sciences (IJONS)

| Volume X (10)            |  | February 2020     |
|--------------------------|--|-------------------|
| CODEN: IJONS (58) (2020) |  | ISSN: 0976 - 0997 |
| ISSUE 58                 |  |                   |
| S. No.                   | CONTENTS   | Page No.          |
|                          | Editorial  |                   |
| 01                       | Effect of Endurance Training Program on BMI and Lipid Profiles among College Boys<br>K.Sadeep, K.Sreedhar, P.M.Sudhirkumar and N.Saravanan   | 17954-17963       |
| 02                       | Screening of Rice ( <i>Oryza sativa</i> L.) Genotypes for cold Tolerance at the Seedling and Reproductive Stages based on Morpho-Physiological Markers and Genetic Diversity Analysis<br>Md Ariful Islam, Md Rasel, Sakina Khanam and Lutful Hassan                          | 17964-17985       |
| 03                       | Frequency of Menstrual Irregularities after Tubal Ligation in Women of Reproductive Age<br>Shazia Majid Khan, Ammara Batool, Noreen Nasim, Amna Saeed and Ayesha Munawar   | 17986-17991       |
| 04                       | Ocean Acidification Impacts on Hatching Success and Reproductive Tissue Damage in Anemonefish<br>Gunasekaran Kannan, Saravanakumar Ayyappan and Yosuva Mariasingarayan   | 17992-18000       |
| 05                       | Chemical Composition and Antioxidant Activity of Essential Oil of <i>Achillea fragrantissima</i><br>Sameeh Al- Sarayreh, Jihad Al-Shuneigat, Mahmoud Al-Qudah and Ibrahim Al-Tarawneh  | 18001-18007       |
| 06                       | Review on Microbial Conversion of Agrowastes to Value Added Products<br>Nirav Bhavsar, Jatin Patel and Gopalkumar Raol   | 18008-18018       |
| 07                       | Molecular Diagnosis of Aminoglycoside Transferase Genes in Methicillin - Resistant <i>Staphylococcus aureus</i> (MRSA) Strains<br>Sumaya Najim Abedali Al-khateeb, Alaa Abdulhassein Rasool and Hashim Ali Abdualmeer Al-sherees   | 18019-18023       |
| 08                       | Antecedents Percussion Instruments of Tamil Music (தமிழர் இசை முற்காலத் தோற்கருவிகள்)<br>Manikandan.M  | 18024-18035       |
| 09                       | Protective effect of Alphalipoic acid (ALA) on Some Oxidants and Antioxidant on Heart Damage Induced by Monosodium Glutamate (MSG) in Male Rabbits<br>Eman.M.Heil, Wefak Al-Bazi, Muna H. AL-Aameli and Mohamed El-shazly  | 18036-18042       |
| 10                       | Evaluation of Water Quality Index from 2008 to 2010 of Euphrates River : Case Study, Upstream of Al-Hindiya Barrage, Iraq<br>Ali Hassan Hommadi and Fadhil M. Dahir  | 18043-18054       |
| 11                       | Assessment of Hypercapnia Induced Biomarker Response in Sea Star <i>Goniodiscaster scaber</i> (Moebius, 1859) – A Microcosm Approach for Climate Change Induced Ocean Acidification<br>Rangesh Kannan, Anand Muthusamy, Rajeswari Balakrishnan and Jeeva Priya Radhakrishnan | 18055-18065       |

|    |  |             |
|----|--|-------------|
| 12 | Accelerating India's Energy Sector to Sustainable Sources, Potentials and Prospects<br>Nimay Chandra Giri and R.C. Mohanty   | 18066-18076 |
| 13 | Food and Feeding Habits of <i>Upeneus vittatus</i> (Forsskal, 1775) from Gulf of Mannar Coast (Mandapam, Tamil Nadu) of India<br>Lakshmikanth Arumugam Ramakrishnan, Anand Muthusamy and Rangesh Kannan                        | 18077-18083 |
| 14 | Performance Evaluation of One MW On-Grid SPV Power Generation Plant in Odisha, India<br>Nimay Chandra Giri and R.C. Mohanty  | 18084-18091 |
| 15 | Antioxidant Activity, Total Phenolic, and Total Flavonoid Content of Various Extracts and Fractions of Aerial Parts of <i>Ipomoea horsfalliae</i><br>Muhammed Ashraf VK, V.K.Kalaichelvan, V.V.Venkatachalam and R.Ragunathan  | 18092-18103 |
| 16 | The Influence of Adding Polycaprolactone and Polyethylene Grafted Maleic Anhydride on the Mechanical, Morphological and Biodegradation Properties of HDPE<br>Tamam M. S. Aljabori, Salah F. Abdellah Ali and M. E. El-Rafey    | 18104-18109 |
| 17 | Directive Principles of State Policy in India<br>Balasubramanian.T   | 18110-18121 |
| 18 | Simultaneous Estimation of Etoricoxib and Thiocolchicoside By RP-UPLC Method in Combined Dosage Forms<br>Nanjappan M.Kumar and B. Jaykar   | 18122-18126 |
| 19 | The Effect of Whole Body Irradiation on the Uterus of Mice<br>Madathiparambil K. Saranya and Hanumant N. Yajurvedi   | 18127-18133 |
| 20 | Nitric Oxide Protects Cucumber Plants against Drought Stress through Inducing Defense System of the Plants<br>Fahad M. AlZuaibr  | 18134-18140 |
| 21 | Retrospective Audit of Parotid Gland Tumor Cases Reported in Dr. Ruth K.M. Pfau Civil Hospital, Karachi<br>Atif Hafeez Siddiqui, Hira Hameed, Irfan Ahmed Shaikh, Danish ur Rahim and Saad Shakil                              | 18141-18144 |
| 22 | Phenotyping of Lentil Genotypes for Drought Tolerance using Polyethylene Glycol<br>Snigdha Roy, Abdelbagi Mukhtar Ali Ghanim, Wonder Nunekpeku, Rashidul Islam, Md. Rasel and Md. Mahmud Al noor                               | 18145-18159 |
| 23 | First Report of Class 1 and Class 2 Integrons in Quinolones Resistant <i>Klebsiella pneumoniae</i> Isolates from Najaf, Iraq<br>Samer A. MH Al-Hilali, Taghreed Abdul Kareem Al-Makhzoomy and Hashim Ali Abdualmeer Al-sherees | 18160-18165 |
| 24 | Cytotoxic and Apoptotic Inducing Activity of Ethanol Extract of <i>Naravelia zeylanica</i> in Human Breast Cancer Cells<br>B.Umarani and K. Saravanan  | 18166-18173 |
| 25 | Physicochemical Parameters of Costal Water In south East Coast of India, Tamil Nadu, India<br>V. Ramesh and P. Senthilkumaar   | 18174-18179 |

## Editorial

# World Pulses Day....



Pulses may be small, but they are densely packed with protein, typically containing twice the amount of that found in wholegrain cereals and three times that of rice. When other foods are combined with pulses, the nutritional value of pulses is further enhanced. For example, consuming cereals with pulses has the potential to increase the protein quality of the overall meal. Pulses are an inexpensive source of protein, which is a crucial component of any healthy diet, but especially in poorer areas where meat, dairy and fish are economically inaccessible. Pulses can also serve as a source of income, as smallholder farmers who grow pulses can sell them at markets or process them to create added-value products. Pulses are an inexpensive source of protein, which is a crucial component of any healthy diet, but especially in poorer areas where meat, dairy and fish are economically inaccessible. Pulses can also serve as a source of income, as smallholder farmers who grow pulses can sell them at markets or process them to create added-value products. Pulses are climate-smart as they simultaneously adapt to climate change and contribute towards mitigating its effects. Introducing them into farming systems can be key to increasing resilience to climate change. Pulses are able to increase biodiversity as they can fix their own nitrogen into the soil, which increases soil fertility. The genetic diversity of these crops is an essential component for on-farm soil and pest management, especially for small-scale farmers. Intercropping with pulses increases farm biodiversity and creates a more diverse landscape for animals and insects. The nitrogen-fixing properties of pulses improve soil fertility, which increases and extends the productivity of the farmland. By using pulses for intercropping and cover crops, farmers can also promote farm biodiversity and soil biodiversity, while keeping harmful pests and diseases at bay.

**World Pulses Day** is a new opportunity to heighten public awareness of the nutritional benefits of eating pulses. Pulses are more than just nutritious seeds, they contribute to sustainable food systems and a #ZeroHunger world. Under Resolution [A/RES/73/251](#), the UN General Assembly (UNGA) designated 10 February as World Pulses Day to reaffirm the contribution of pulses for sustainable agriculture and achieving the 2030 Agenda. We are kindly requesting to all researchers, students and public to conserve our traditional food grains especially pulses through our various activities.

**Conserve pulses ...**

**Poverty....**

**Vijikumar.S**

**Editor in Chief, IJONS**



**Eradicate Hunger and**

**Source : UNO/FAO**