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.

<u>ijonstnsro@gmail.com</u>, 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
Publisher	TamilNadu Scientific Research Organisation ,
	Pudukkottai, Tamil Nadu, India
Chief Editor	Dr.S.Vijikumar
Copy right	TamilNadu Scientific Research Organisation (TNSRO)
	Pudukkottai, Tamil Nadu, India.
Starting Year	2010
Subject	Multi Disciplinary Science Subjects
Language	English
Publication Format	Print
Phone No:	04322-261088
Email	<u>ijons@tnsroindia.org.in</u> & ijonstnsro@gmail.com
Mobile No.	9952886637, 8778365515
Website	https://www.tnsroindia.org.in/
Registered office	No 46-141, Meenakshipuram Rd, Near Post Office,
Address	Arimalam 622 201, Pudukkottai, Tamil Nadu, India.
Admin. Office Address	Plot No 39, Mura Bhavan, Koodal Nagar,
	Rajagopalapuram Post, Pudukkottai, Tamil Nadu, India.

Indian Journal of Natural Sciences (IJONS)

Editorial Committee Members (ECM)

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

Honorable Member	Dr.S.P.Subramaniyan Asst.Controller of Patents and Designs (Govt.of India) Patent Office,IPR Building,GST Road,Guindy,Chennai 600032
Honorable Member	Er. Abdul Samad. M. Kamdod Assistant Professor, Department of Civil Engineering Bharat Institute of Science & Technology for Women Mangalpally, Renga Reddy Dist. Andhra Pradesh, India
Honorable Member	Dr. Hina kousar Assistant Professor, Department of Environmental Sciences, Kuvempu University, Shankaraghatta, Shivamogga – 577 451, Karnataka ,India
Honorable Member	Mr.B.Rajesh Manager (Tech. Services Env.) Grass Roots Research & Creation India (P) Ltd Noida – 201301,Uttar Pradesh,India
Honorable Member	Mr. K.Ramanathan Head, Department of Bioinformatics, Thanthai Hans Roever College Perambalur, TamilNadu, India.
Honorable Member	Dr. K.Gurunathan Prof & Head, Department of Nano science & Technology, Alagappa University, Karaikudi, TamilNadu, India.
Honorable Member	Dr. Rajashekhar O, Patil Assistant Professor, Department of Environmental Management Sant Gadge Maharaj College of Commerce & Economics, Mumbai 400004, India
Honorable Member	Dr.M.Ravichandran Prof.& Head Department of Environmental Management Bharathidasan University, Tiruchirappalli. Tamil Nadu. India.
Honorable Member	Dr.M.Krishnan Prof.& Head, Department of Environmental Biotechnology Bharathidasan University, Tiruchirappalli. Tamil Nadu. India
Honorable Member	Dr.K.Kumarasamy Prof.& Head,Department of Geography Bharathidasan University, Tiruchirappalli. Tamil Nadu. India
Honorable Member	Dr.A.Sathya, Assistant professor – III, School of Civil Engineering, SASTRA University, Thanjavur – 613401, TamilNadu, India.
Honorable Member	Dr.G.G.Hammad Ahmad Shadab Senior Assistant Professor, Department of Zoology Aligarh Muslim University, Aligarh-202002, Uttar Pradesh
Honorable Member	Dr.H.Syed Jahangir Assistant Professor, P.G. and Research Department of Botany Jamal Mohamed College (Autonomous) Trichirappalli-620020, TamilNadu, India.

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

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

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

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

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

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

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

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

Honorable Member	Dr. Syed Abrar Research Associate, Department of P.G. Studies & Research in Applied Botany, Kuvempu University, Shivamogga, Karnataka, India.
Honorable Member	Dr.V.Violet Dhayabaran Associate Professor ,Department of Chemistry, Bishop Heber College (Autonomous), Puthur, Tiruchirappalli,TamilNadu,India.
Honorable Member	Dr.H.T.Raghavendra Gowda Haluvalli, Opposite Bus stand, Mallalur,Chikamagalore, Karnataka,India.
Honorable Member	Dr. Goverdhan Rathla K. S Assistant Professor, Department of Physics, Government First Grade College, Birur, Kadur Talluk, Chickmagalore District. Karnataka, India.
Honorable Member	Dr.Ananthnag B Lecturer, Department of Environmental Science, Kuvempu University,Shivamogga, Karnataka,India.
Honorable Member	Dr.M.Ramesh Associate Professor, Department of Biotechnology, Alagappa University, Karaikudi-630003, Sivagangai Dt, TamilNadu, India.
Honorable Member	Dr.S.Yamini Sudha Lakshmi Assistant Professor, Department of Medical Biochemistry, University of Madras, Taramani Campus, Chennai-600113, Tamil Nadu, India.
Honorable Member	Dr. SA. Ramyabharathi 253/ A37, TNHB Colony, Kollapatti, Animur (PO),Tiruchengode (TK), Namakkal District- 637214, TamilNadu,India.
Honorable Member	Dr.B.Kaleeswaran Assistant Professor, Dept. of Zoology & Biotechnology, A.V.V.M.Sri Pushpam College, Poondi, Thanjavur,T.N.India.
Honorable Member	Dr.A.Radha Assistant Professor, Dept. of Zoology Kunthavai Naacchiyar Govt Arts College for Women, Thanjavur-7, T.N.India.

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

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

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

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

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

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

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

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

Honorable Member	Dr.Reem Zuhair Shaker Abdul Rahman Shanshal Assistant Professor in Life Sciences, College of Education for Girls, University of Mosul, Iraq.
Honorable Member	Dr.V.Kavitha Associate Professor, PG and research Department of Computer Application, Hindusthan College of Arts and Science, Coimbatore -28, Tamilnadu, India
Honorable Member	Dr. Preethi Balasundaram Post-Doctoral Fellow, Wieden Group Alberta RNA Research & Training Institute Department of Chemistry and Biochemistry University of Lethbridge, 4401 University Drive Lethbridge, Alberta, Canada T1K 3M4
Honorable Member	Dr. Vikas Sharma Associate Professor/Sr. Scientist (Agronomy) Regional Agricultural Research Station SKUAST-JAMMU, Tandwal-Rajouri, Teh. And District Rajouri, State Jammu and Kashmir, India
Honorable Member	Dr.C.Vijai Assistant Professor, Department of Commerce, St.Peter's Institute of Higher Education and Research, Avadi, Chennai-600 054, Tamil Nadu, India
Honorable Member	Dr. Gopal Muthu Scientist -'C' DHR-Model Rural Health Research Unit ICMR-National Institute of Epidemiology Government of India, Primary Health Centre Campus Kallur-627 010, Tirunelveli District, Tamil Nadu, India
Honorable Member	Dr.N.Revathy Associate Professor, PG and research Department of Computer Application, Hindusthan College of Arts and Science, Coimbatore -28, Tamilnadu, India
Honorable Member	Dr.M.Ananthi Teaching Assistant, Directorate of Planning and Monitoring, Tamil Nadu Agricultural University, Coimbatore – 03, Tamilnadu, India.
Honorable Member	Dr.Pushpa S Murthy Senior Scientist, Department of Spice and Flavor Science AcSIR Associate Professor (Biological Sciences), CSIR - Central Food Technological Research Inst. MYSURU, Karnataka, INDIA
Honorable Member	CH.V.Satyanarayanaraju Scientist, Research Centre Imarat, DRDO Hyderabad, Telangana, India

Honorable Member	Dr. Vickram A S Associate Professor, Department of Biotechnology Saveetha School of Engineering Saveetha Institute for Medical and Technical Sciences Chennai, Tamilnadu, India
Honorable Member	G.Menaka Assistant Professor, Computer Science Cum Deputy Controller of Examinations Vivekanandha College Of Arts & Sciences For Women (Autonomous), Elayampalayam, Tiruchengode, Namakkal (Dist.), TamilNadu, India
Honorable Member	Dr. Karthikeyan Rajamani Senior Research Scientist (Biomarker) ICMR Centre for Advanced study in Air pollution, Department of Environmental Health Engineering, Sri Ramachandra Institute of Higher Education and Research, Porur-600116, Chennai, TamilNadu, India
Honorable Member	Dr. P.Yasodha Assistant Professor (Agrl. Entomology) Anbil Dharmalingam Agricultural College & Research Institute, Tamil Nadu Agricultural University, Navalur Kuttapattu 620 027, Tiruchirappalli, Tamil Nadu, India.
Honorable Member	Dr. SAIKAT SEN Associate Professor Faculty of Pharmaceutical Sciences Assam down town University, Panikhaiti, Guwahati, Assam - 781026, India
Honorable Member	Dr.E.Selvarajan Research Assistant Professor Department of Genetic Engineering School of Bioengineering SRM Institute of Science and Technology Kattankulathur-603203, Chennai, Tamilnadu, India
Honorable Member	Dr.V.Shanmuga Sundaram Assistant Professor & Head Department of Statistics Mahendra Arts & Science College (Autonomous) Kalippatti, Namakkal-637501. Tamilnadu, India.
Honorable Member	Dr. J. Rajangam Professor and Head, Department of Fruit Crops, HC & RI, Periyakulam, Tamilnadu, India
Honorable Member	Dr.R.R.Saravanakumar Librarian & Head Department of Library and Information Science Sadakathullah Appa College (Autonomous) Rahmath Nagar, Tirunelveli, Tamilnadu, India

Honorable Member	Dr. Shivendu Ranjan Senior Research Associate Faculty of Engineering & Built Environment University of Johannesburg, Johannesburg (Auckland Park Kingsway Campus) South Africa
Honorable Member	Dr.Nagubudi.Varadarajulu Naidu Director of Research, Acharya N.G Ranga Agricultural University, Administrative Office, RARS, Lam, Guntur -522034, Andhra Pradesh, India
Honorable Member	Dr.I.Muthuvel Associate Professor (Horticulture), Department of Fruit Crops, Horticultural College and Research Institute, Periyakulam – 625 604, Theni Dist. Tamil Nadu, India
Honorable Member	Subburaj. M Deputy Director Food Safety and Standards Authority of India Ministry of Health and Family welfare, Govt. of India Benfish Tower, 31 GN Block, Sector V, Salt lake city Kolkata -700091, India
Honorable Member	Dr.Bhagyalakshmi Rajaram Associate Professor, Department of Management Studies, PSNA College of Engineering & Technology, Dindigul, TamilNadu, India
Honorable Member	Dr.S.Annapoorani Assistant Professor in Biotechnology, Dr.Umayal Ramanathan College for Women Karaikudi, Sivaganga (Dt), TamilNadu, India
Honorable Member	Dr Bhasker Sharma Homoeopathy Doctor Sharma Homoeopathy Chikitsalya and Research Center Itwa Bazaar, Dist-Siddharth Nagar, Pin-272192 Uttar Pradesh, India
Honorable Member	Dr.R.Parimalan Scientist (Agrl. Biotech) & Hon. Faculty (QAAFI, UQ), Division of Genomic Resources, ICAR-National Bureau of Plant 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
Honorable Member	Dr. M.PANDIYAN., Professor (PBG), Former Dean, TNAU, Regional Research Station, Vridhachalam, Cuddalore District. Tamil Nadu, India

Indian Journal of Natural Sciences (IJONS)

Volume XIII (13) February 2023 CODEN: IJONS (76) (2023) ISSUE 76 ISSN: 0976 - 0997

S. No.	CONTENTS	Page No.
109	Pharmacological Properties of North Indian Herbs of <i>Abelmoschus moschatus -</i> A Review Devi.R, Shakthivel.K, R.Srinivasan, E.Karthikeyan, R.JothiLakshmi N.Jayaramakani, R.Saravanan, M.Vasanthkumar, S.Kalaivanan and Sam David.E	52664-52670
110	Phytochemical Analysis and Antimicrobial Activity of <i>Vitex negundo</i> Sri Padmapriya.R and Anita RJ Singh	52671-52679
111	Screening of Phytochemicals and Antimicrobial Activity of Lithophytic Fern <i>Pyrrosia porosa</i> (C.Presl) Hovenkamp D.Sowmiya, H. Rehana Banu, R. Divya, R.Rakkimuthu, P.Sathishkumar and A.M Anandakumar	52680-52688
112	An Investigative Study on Consumer Cognizance towards Electric Vehicles D.Priya, G.R.Rajalakshmi, T.Priyadharshini and P.Aishwarya	52689-52695
113	Response Surface Methodology Approach for Adsorptive Removal of Hexavalent Chromium: A Fixed-Bed Column Study Palas Roy (P. Roy)	52696-52705
114	Diversity of Cyanobacteria from Freshwater Habitats of Tehatta Subdivision, Nadia, West Bengal Prankrishna Debnath and Harisankar Dey	52706-52714
115	Contract Farming in India: A Theoretical Study M.S. Kamalaveni, Suriya A, Vignesh.S, Pooja M and Ramya P	52715-52720
116	Formulating Co ₃ S ₄ on Graphene Oxide (GO) Nanocomposite as Active Electrode Material for Hybrid Supercapacitor by Solvothermal Method D.Ravi Sankar, D.Geetha, P.S. Ramesh and V.Vinothkumar	52721-52727
117	Emotional Neutrality and Human Well-being with Special Reference to the Teachings of Indian Vedic Literature Sayee Bhuvaneswari and Sugumar.S.N	52728-52732
118	Analysis of Best Replacement Strategy during Sudden Failure using Pentagonal Neutrosophic Number R.Hema and Rajeshwari.S	52733-52739
119	Study of Teaching and Learning Second Language through Authentic Documents Shelly Bohra and Tanuja Yadav	52740-52743
120	A Study to Compare the Effect of Upper Extremity Exercise Versus Lower Extremity Exercise Training on Blood Pressure in Subjects with Hypertension Pragna Vasoya, Ankur Khant and Jayesh Parmar	52744-52751
121	Bipolar Valued Multi Fuzzy Function in Bipolar Valued Multi Fuzzy Subnearring of A Nearring S.Muthukumaran and B.Anandh	52752-52756
122	Agricultural land suitability Assessment for the part of Dharmapuri District using AHP and GIS Techniques M. Ramya, S. Sathiyamurthi, K. Dhanasekaran, R. Gobi and M. Sivasakthi	52757-52768

123	Mosaicplasty for Osteochondral Defect – A Case Study Sheetal Patel (PT) and Himanshi Ruparelia (PT)	52769-52772
124	Global Research Trends in Sustainable Development Goals between 2000 and 2021 Saddam Hossain and M. Sadik Batcha	52773-52783
125	Enhancing the Quality of Higher Education using Process Mining and Lean Six Sigma P. Suresh Kumar and P. Ajitha	52784-52788
126	Reframing Leadership Practices to Improve Employee Engagement and Retention in Remote Working Environments Amritha Rajkumar, F.J. Peter Kumar and A.G. Sudha	52789-52796
127	Maiden use of Carboxymethylated Tamarind Kernel Powder in the Design, Development and Evaluation of Melt in Mouth Films of Caffeine Aishwarya.A.K, Shashank Nayak.N and Thimmasetty Juturu	52797-52805
128	A Study on (Q, L) –Anti Fuzzy Subsemiring of a Semiring S. Sampathu	52806-52811
129	Climate Change and its Impacts on Bay of Bengal Region Delliswararao Konduru	52812-52822
130	Circular Economy of a No Waste Tree "Cocos nucifera (L.) (Arecaceae)": A New Sunrise for the Coconut Sector in India V Venkatakrishnan	52823-52833
131	Heat Transfer Analysis of MHD Casson Fluid Flow Over an Unsteady Vertical Permeable Porous Plate Under the Influence of Heat Source and Thermal Radiation with Hall Current Effect Ramesh Manogaran, Vijayaragavan Rajaram and Karthikeyan Shanmugam	52834-52847
132	A Survey on usefulness of Quill as a Web Tool for English Language Enhancement Ankitkumar Patel	52848-52855
133	Phenological Analysis in Relation to Physiological and Yield Attributes of Triticum aestivum L. (Wheat) under Late Planting Condition Navneet Kumari, Komal, Aarushi and Kirpa Ram	52856-52865
134	Phytochemical Screening and Fluorescence Analysis of 4 <i>Curcuma</i> Species: <i>Curcuma aromatica</i> Salisb., <i>Curcuma caesia</i> Roxb., <i>Curcuma longa</i> L. and <i>Curcuma zedoaria</i> Roscoe the Zingiberaceae Rhizomes K. Ramani	52866-52872
135	Effectiveness of Nurse Tailored Interventions on Pain and Discomfort among Patients undergone Coronary Angiogram Samuel Prabakar Panchanathan, Periyar Selvi Ramu, Muruganandam Natesan, Anandhi Duraikannu and Shankar Shanmugam Rajendran	52873-52877
136	Comparative Phytochemical Composition of <i>Pauropsylla</i> Induced Galls Vs Normal Leaves in <i>Alstonia scholaris</i> (L.) R.Br. and <i>Ficus racemosa</i> L. Reshma Kariyil Ramesh, Jayalekshmi Chandran Vasanthakumari, Daniya Vazhapuravan and Suresh Veerankutty	52878-52891
137	Analytical Method Development and Validation of Rivaroxaban: A Concise Review Anjali Nayak, V.Punith Kumar and Paramita Das	52892-52901

138	Framework for an Interactive Tool to Screen Specific Learning Disability in Primary School Children using Machine Learning Sailaja Mulakaluri and Girisha G S	52902-52910
139	A Study on Home based Occupational Therapy Functional Training for Senile Population K. Kalaichandran and . M. Vetrikani	52911-52916
140	Comparative Analysis of Classification Techniques using Feature Selection Methods for Stroke Prediction K. Chithra	52917-52926
141	A Student Reflection on Web 2.0 Tools in Promoting Learning Autonomy in Undergraduate Programs: Enhancing Autonomy Based Language Teaching in Indian Scenario Keshav Nath and Neha Meena	52927-52932
142	An Assessment of the Services of University Libraries in the Context of Changing Information Scenario with Special Reference to Moradabad and Meerut Ashok Kumar, B.K Rajput and Sunil Kumar	52933-52943
143	Comparison of Rooting Hormone Concentrations in a Local Resource for Vegetative Propagation of Oriental Cypress (<i>Platycladus orientalis</i>) Jerry B. Acero	52944-52949
144	Kinetic Studies on Microbial Production of Protease by <i>B.cereus</i> using Agro Residues P.Rathakrishnan, R.Jayakumar, R.Palaniraj and P. Balamurugan	52950-52954
145	Magnetic Resonance Imaging Characterization of Disc Degeneration Vashist Baburao Mhalsekar and Lathika Shetty	52955-52961
146	On $(1,2)^*$ - \ddot{g} Closed Sets in Intuitionistic Fuzzy Bitopological Space S. Mukesh Parkavi and A. Arivu Chelvam	52962-52968
147	Experimental Study on Strength and Durability of Concrete with Partial Replacement of Cement with Granite Slurry and Aggregates with Quartz Stone Shyamala Bhoomesh and Kashireddi Shivani	52969-52977
148	SvNet for Detecting Pneumonia from Chest X-Ray Images Sarwath Unnisa and Vijayalakshmi A	52978-52982
149	Plithogenic Picture Fuzzy EDAS and Digital Teaching Tools P.Pandiammal, N.Ramila Gandhi and Nivetha Martin	52983-52987
150	Critiquing the Native Spirit of Adi Tribe in Mamang Dai's the Black Hill Pinki Sharma and Arpit Kothari	52988-52993
151	Chebyshev and Block Pulse Wavelet Approach for the Non-Linear Quasi- Singular Integral Equation K. T. Shivaram, Umesha.V and C.S.Komala	52994-53000
152	Extraction and Evaluation of Antimicrobial Activity from <i>Basella alba</i> Leaves Gnanambal.R, Vishnu Priya.K and Senthil Kumar.J	53001-53007
153	Bipolar Valued Multi I-Fuzzy Subrings of A Ring K.Vairamuthu and S. Loganathan	53008-53013
154	Plant Disease Analysis in Industrial Region by using Machine Learning Techniques L.Subash and G.Arulselvi	53014-53021
	Nanoparticulate Lipid based Carriers System: Promising Advances in Drug Delivery	53022-53033

156	An Overview of Effect of Fluorosis on Cognitive Health of Children and Its Outcome: an Approach towards SDG 3 Neha Mumtaz and Tabish Izhar	53034-53047
157	Parallel Summable of Interval Valued Range Symmetric Fuzzy Matrices M. Kaliraja and T.Bhavani	53048-53055
158	Psychosocial Conditions of Healthcare Workers during Fight against COVID-19 Bijoy Das, Manimugdha Medhi, Rajgun Handique and Nironjon Islary	53056-53060
159	Studies on the Silkworm's <i>Bombyx mori</i> (L.) (<i>Lepidoptera: Bombycidae</i>) Fed with Control and V-1 Mulberry Leaves Treated with Copper Nanoparticles (CuNps) V. Rajathi and M.Veerappan	53061-53068
160	Research and Knowledge Production in Rural Tourism Entrepreneurship: A Bibliometric Analysis and Visualisation Reyaz Ahmad Qureshi, Zubair Ahmad Dada and Waseem Ahmad Bhat	53069-53087
161	Predicing the Severity of Disease by using Data Mining Techniques Based on Healthcare Information System M.Rajitha and S. Santhana Megala	53088-53092
162	Isolations and Identification of Biosurfactant Producing Marine Yeast Saccharomyces sp (CAS 09) from Karaikal Fishing Harbor, Puducherry S.Harikrishnan, S.Mjm Basha, S.Sudarshan, K. Sivasubramani, R.Muthezhilan and S. Jayalakshmi	53093-53100
163	Assessment of Antagonistic Activity of Nitrogen Fixing Bacteria against Plant Pathogens Anjan Kumar Sarma, Bobita Deb and Prasenjit Bhagawati	53101-53105
164	Bamboo – An Asset for Phytoremediation: A Review Vidhya.A and R.Kalaivani	53106-53112
165	MATLAB based Automatic Speech Recognition using MFCC Anitha Bujunuru, C.Silpa and B.Mythily Devi	53113-53118
166	A Review on Hepatitis A Virus Kannan.G, Narayanan.G, Selvanand.S, Srinivasa Murugan A.V, Rajaganapathy.L Alagu Pandiaraj.C, Anandharaj.G and Sriram.K	53119-53125
167	A Study on Key Drivers of Online Impulse Buying Behaviour among Youth in Odisha Neha Gupta and Lingam Naveen	53126-53134
168	Crude Oil Degradation by Pure and Mixed Bacteria and their Enzyme: A Review Swagota Gogoi and Moitrayee Devi	53135-53142
169	Performance Enhancement of KNN Classifier for Guitar Chord Tonality Classification Nipun Sharma and Swati Sharma	53143-53148
170	Cough Syrup Deaths a Toxicological Review of the Diethylene Glycol M.Arunkumar, P. Pandian and K. Kathiresan	53149-53153
171	An Improved Region based CNN Model for RGB Color Detection in Plant Images T.Senthil and J.Deepika	53154-53161
172	A Brief Review of the Pharmacological Activity of <i>Curcuma caesia</i> Savi Biswakarma, Yana Tayum and Keserla Bhavani	53162-53169
173	Impact of Fish Oil Consumption on Human Health S. Mirunalini and P.Caroline	53170-53181

174	A Green Analytical Method for the Estimation of Letermovir and Its Application to Forced Degradation Studies by UPLC-MS/MS Anusha Kota, M.V.Kumudhavalli, B.S.Venkataswarlu, Margret Chandria, J.S.K.Nagarajan and Venkata Rao Vutla	53182-53192
175	Dynamics of Cropping Pattern in North Western Agro-Climatic Zone of Tamil Nadu Karthick R and Velmurugan D	53193-53200
176	Rapid Stability Indicating HPLC Method for the Estimation of Organic Impurities for Ertapenem in Ertapenem Injection and Drug Substances V. Suresh Kumar Raju, P. Sanjeeva and P. Venkata Ramana	53201-53208
177	The Relationship between the Roots of Maxillary Posterior Teeth and Maxillary Sinus Floor using Cone Beam Computed Tomography: A Systematic Review Vishesh Yadav and Puneeta Vohra	53209-53216
178	Adolescent Obesity and Socio-Economic Status in Educational Institutes of Guwahati Metro, Assam Nirmali Gogoi	53217-53222
179	Production of Amylase by Endophytic Fungi Isolated from Field-Grown Plants Ashok Y. Dawande and Yogesh S.Banginwar	53223-53234
180	Comparative Evaluation of Chemical Constituents in Alpan Banana (<i>Musa paradisiaca</i>) at Different Developmental Stages Amrendra Kumar Singh and Prakash Chandra Gupta	53235-53242
181	Growth and Carbon Assimilation of Sal (<i>Shorea robusta</i>) Saplings under Influence of Ectomycorrhiza in Different Soil Combinations Ankita Singh and S.S.Singh	53243-53252
182	Tissue Competition: Surprising Role of Cross-Adhesion Nirmalendu Ganai	53253-53258
183	A Collective Setting of Cultural Tensions in Salman Rushdie's Midnight's Children Nandini Singh and Keshav Nath	53259-53262
184	A Systematic Review of Prescription Pattern of Antibiotics in Paediatrics S.Rajarajan, N.Sanjeyan, R.Bivishya, Jesni Jaison and R.Praveen	53263-53267
185	Analytical Study on Energy Efficient Secured Routing and Data Aggregation Techniques in Underwater Sensor Networks O.Vidhya and S. Ranjitha Kumari	53268-53278
186	Design and Development of an Optimization Chatbot based on Random Forest Machine Learning Algorithm with Hyper parameter Tuning Bedre Nagaraj and Kiran B Malagi	53279-53287
187	Socio - Economic Profile Characteristics of MGNREGS Beneficiaries in Dharmapuri District of Tamil Nadu V. Thirumal Kannan and T. Raj Pravin	53288-53292
188	Internet of Things Assisted Air Pollution Monitoring System in Industrial area using Mayfly Optimization with Deep Learning Model S.Arulmozhiselvi and G.Indirani	53293-53301
189	A Study on School and College Attitude toward Online Classes during the Covid-19 Pandemic Situation Nanthini.M, Vinumon.V.S and Sreoshi Das Gupta	53302-53306
190	A Study on School and College Attitude toward Online Classes during the Covid-19 Pandemic Situation Nanthini.M, Vinumon.V.S and Sreoshi Das Gupta	53302-53306

191	An M/G/1 Retrial Queue with Working Vacation, Reneging and A Waiting Server S.Pazhani Bala Murugan and R.Keerthana	53307-53320
192	An Image Analysis-Based Deep Learning Framework for Dermatology Disorder Classification and Detection A. Kalaivani and S.Karpagavalli	53321-53326
193	Understanding the Fundamentals of Uncertainty in Neural Networks, Causes and Types Ruchita Ravindranath, Farhana Kausar, Sneha Jain, Sruti Smitha Malla and Tresa Maria Josylin	53327-53332
194	Web-Page Summarization and generation of Paraphrases using a Neural Network based Transformer Model Srinadh Swamy Majeti and Chepuri Aneesh Krishna Rao	53333-53340
195	A Survey On illustration generation using Deep Dream Algorithm Durga Prasad Giri, Devi Kannan, Aswin Manoj , Ashwin Krishna.U and Arghadip Ghosh	53341-53349
196	ATM Cash Demand Prediction using Revolutionized Grandiant Boosting Regression T.V. Balakrishnan and R Kalaiarasi	53350-53358
197	Self Attention Based Legal Document Summarization - A Technical Review Krithika Jain, Devi kannan and Nikitha A	53359-53369
198	Prediction of Crypto currency trading volume in India using CNN-LSTM model T. Mangaiyarkarasi and K. Kalaiselvi	53370-53374
199	Classification of Traffic Violati ons with Helmet Detection using Open CV and YoloV3 Mamatha.T, Darshan.R and Pratima. MN	53375-53384
200	A Review of Structural Protein Sequence Deep Semantic Segmentation For Disease Detection Malavika S, Devi Kannan, Navya Ganapati Hegde, Nithika and Pratheeksha MC	53385-53393
201	Ride Sharing / Pooling using Blockchain Navin Prajapati, Neha M Basapur, Nisitosh Mohanty, Vincent Paul Fernandes and Srinivasachar G	53394-53400
202	An Exploratory Study on Ensemble Methods used for Secure Data Transmission Fredy Varghese, Laiby Thomas, Anoop B K, Sasikala and R.Reka	53401-53409
203	A Comprehensive Study of Machine Learning and Deep Learning Methods for Cyber Security Threats Manjula M, Divya Bhat, Frouzina Saleem, Ujjwal Singh and G Sowmya	53410-53416
204	Automated Extraction and Analysis of Usability Attributes from Play Store Reviews Srinadh Swamy Majeti, M Venkat Rao and Chandrasekhar Uddagiri	53417-53421
205	Survey of Technologies for Web Scraping Harishni.L, G Srinivasachar, Rajbala and Tejashree.M	53422-53432
206	Efficient Methodologies used for Resource Allocation in Fog Scenario- A Technical Review M S Ritesh, Aditi Ashok Katti, Santhosh.V, Avinash. D and Chandana.M S	53433-53437
207	A Study on Intelligent Context-aware based Explainable Recommendation Framework Pratima M N, Darshan R, Manash Sarkar, Noor-ul-Huda and Yashwanth M	53438-53447

208	Smart Parking for Urban Cities using IoT and Egde AI Mamatha T, Aditi R Patil, Anika, Chirag S and M.N. Shreyas	53448-53453
209	Wheelchair Stimulated by Tongue using Arduino and Hall Effect Sensors Shilpa Nayak and Suma.C	53454-53459
210	Intelligent Video Monitorinig and Analysis N Harsha Vardhan Reddy, MVS Thrivedh, N Anil Kumar, V Nagaraj and Krishnamurthy H	53460-53465
211	Cybernetic companion using Machine learning implemented through Python SangeethV Mathews, Shawn Biju Thomas, Jeffry M Joshua and Lijo.P.Thomas	53466-53471
212	A Hand-Gesture Recognition System Using Image Processing to Translate Indian Sign Language Alphabets to Text Abhay MS, Ashwin Hebbar, Sayan Ghosh and K.Kalaiselvi	53472-53476
213	On the M Modulo N Graceful Game of Cayley Graph C. Velmurugan and V. Ramachandran	53477-53480
214	A study on Intelligent Social Recommendation System based on user's Influence Lalitha Lahari K, Meghali Singh, Nikitha.Y and Manash Sarkar	53481-53488
215	Frequency Implications in Energy Healing Jeo Joy A, Nethravathi P S and Molly Joy	53489-53494
216	A Review on Federated Learning Techniques Suni Jose, R.Satheesh Kumar and Gopika.S	53495-53504
217	A Study on Intelligent Trustworthy System for Crowd-Funding Atul Kumar, Diksha Jaiswal, Vinay Shree Pandey and Manash Sarkar	53505-53512
218	Study on Various Noise Removal Techniques for Malayalam Palm Leaf Character Recognition Sarithadevi.S and Rajesh.R	53513-53518
219	A Comparative Study on Medical Image Denoising Methods Siji Jose Pulluparambil and Netravathi P.S	53519-53525
220	Al Chatbot for Mental Health Status Detection – A Literature Review Aditya Dilip Pansare, Amrut Wali, Shresta.U, Revanth.RM and Kavya.T	53526-53533
221	Classification of Raga in Carnatic Music Compositions using Transfer Learning Renju.K , Ashok Immanuel.V, Vinay.M and Sagaya Aurelia.P	53534-53542
222	Technical Survey on an lot Based Vehicle for Farming Assistance Anusha Jayanand Kotha, Archana V. Bhat, Yaseen Ahmed, and Sathisha G	53543-53547
223	Removal of Fraudulent activities in Electronic Health Records using Blockchain Security Framework Megha Jain, Jyoti Gautam and Tanuj Tiwari	53548-53554
224	Face Detection and Recognition-Based Automated Criminal Identification Sinchana N K, Ruchitha B M, Shivani G, Rajendraprasad and Geetha N	53555-53560
225	Traffic Crash Detection and Prediction in Intelligent Transport system using optimal hybrid deep learning Algorithms Balamurugan. M, Kalaiarasi. R, S.Stephen and G.Prathap	53561-53569
226	Human Emotion Detection Through Face, Speech and text using Machine Learning Techniques K.Kalaiselvi, Fr. Lijo P Thomas and Mariyan Ruben	53570-53575
227	Lulu Smoothened Okamoto–Uchiyama Cryptosystem for Secured Medical Chest Image Transmission J. Shaik Dawood Ansari and P. Tamilselvan	53576-53585

228	A Study to Assess the Level of Self Esteem and Stress Levels among Students of Higher Education Institutions in Bangalore Urban K.Ratan Sudhakar, Swetha M.A, Jovanna E Mathew and Gopika.S	53586-53592
229	IoT Based Intelligent Parking System using Machine Learning Implemented Python Ashwin Rajan, Vignesh.K, Krishna Prasath.S and Mary Jacob	53593-53596
230	Accessibility and Usability Evaluation of Learning Management System: A case study on Kristu Jayanti Learning Management System Lijo.P.Thomas and K.Kalaiselvi	53597-53603
231	The Block Chain to Enhance the Privacy and Security in IoT based Traffic Management System Mary Jacob and K.Kalaiselvi	53604-53612
232	Web Cypher -A Phishing Classifier Prince Kumar, Kumar Shivam, NikkiChauhan, Sonam Kumari and Rakshitha P	53613-53618
233	Emotion Prediction in Pets by analyzing Body Posture and Acoustic Pattern Gopika S, Mary Jacob and Kurian George	53619-53628
234	IoT Based Intelligent Agriculture Field Monitoring System K.Pushpalatha, S.Chithra and R Kalaiarasi	53629-53634
235	Micro-I- α -open sets and Micro-I- α -Continuous Function in Micro Ideal Topological Space M.Josephine Rani and R.Bhavani	53635-53640
236	Contra Harmonic index of Benzenoid Networks S.Ragavi and R.Sridevi	53641-53646
237	Simple Graphoidal Cover on Bicyclic Graphs G.Venkat Narayanan and M. Saravanan	53647-53657
238	Electric Field Mapping of Any Given Point Charge Distribution using Python Abhay MS, Ashwin N Hebbar, Lijo.P Thomas and K.Kalaiselvi	53658-53664
239	Independent Semitotal Domination of some Special Graphs J.Sabari Manju and S.V.Padmavathi	53665-53671
240	E-Super Arithmetic Graceful Labelling of Certain Corona Graphs S. Anubala and V. Ramachandran	53672-53676
241	A Concise Exploration of the Novel: Intuitionistic Fuzzy sets and Intuitionistic Fuzzy Automata M. Ambika, V. Dhanya and M. Selvarathi	53677-53681
242	Some New Kinds of Support Domination in Fuzzy Graphs using Strong ARC - New Approach G.K. Malathi and C.Y. Ponnappan	53682-53688
243	Compactness in Grey Metric Space Rohini Vijaya Laxmi. G and J. Subhashini	53689-53692
244	A Systematic Review of Non-Stationary Fuzzy Sets V. Dhanya, M. Ambika and M. Selvarathi	53693-53698
245	Properties of (1,2)*-G* Closed Sets in Bitopological Spaces S. Mukesh Parkavi and A. Arivu Chelvam	53699-53705
246	Water Quality and Fish Faunal Composition of Poonoor River, Kerala, Southern India Archana K.V and J.Roopavathy	53706-53710

247	Design of a Mobile Application for Farmers to Get Agricultural Machinery for Farm Work Krishnaraj.R, Sanjoy Deb, Ram Nivas.D, Vikram.N, Soundarya.B and Sharmila.A	53711-53714
248	Classification of Stages of Plasmodium Falciparum using Machine Learning Techniques Priya.M.S and B.Janani	53715-53720

Editorial...



Millets' were among the first crops to be domesticated in India with several evidence of its consumption during the Indus valley civilization. Being grown in more than 130 countries at present, Millets are considered traditional food for more than half a billion people across Asia and Africa. In India, millets are primarily a kharif crop, requiring less water and agricultural inputs than other similar staples. Millets are important by the virtue of its mammoth potential to generate livelihoods, increase farmers' income and ensure food & nutritional security all over the world.

India produces >170 lakh ton (80% of Asia's & 20% of global production). India produces all the nine commonly known millets and is the largest producer and fifth-largest exporter of millets in the world. Most of the states in India grow one or more millet crop species. Greater millet production can support the livelihoods of smallholder farmers and can provide decent jobs for women and youth. The revenue created can boost economic growth. With the possibility of a health cereal alternative with millets, the risks associated with production shocks can be mitigated. Millets are nutritionally superior to wheat and rice due to their higher protein levels and a more balanced amino acid profile. They also contain various phytochemicals which have therapeutic properties due to their anti-inflammatory and anti-oxidative properties Government of India had proposed to United Nations for declaring 2023 as International Year of Millets (IYOM). The proposal of India was supported by 72 countries and United Nation's General Assembly (UNGA) declared 2023 as International Year of Millets on 5th March, 2021.

FAO Director-General QU Dongyu pointed out "This International Year is a timely reminder of this important crop. And it provides a unique opportunity to raise awareness of, and to direct policy attention to the nutritional and health benefits of millet consumption, the suitability of millets for cultivation under adverse and changing climatic conditions and creating sustainable and innovative market opportunities for many countries around the work for millets to benefit farmers and consumers globally."

-IJONS Credit: FAO/GoI