



Transactions of the Mycological Society of India

# **Golden Jubilee Year**

Volume 59, Issue 2 June 2023



## VOLUME 59, ISSUE 2 (JUNE) 2023

# EDITOR OF THE ISSUE Prof. Naveen Kango

Department of Microbiology, Dr. Harisingh Gour Vishwavidyalaya, Sagar - 470 003, Madhya Pradesh, India nkango@gmail.com

## ASSOCIATE EDITOR OF THE ISSUE Dr. K. Malarvizhi

Centre for Advanced Studies in Botany, University of Madras, Guindy Campus, Chennai - 600 025, India malar.kaliyaperumal@gmail.com, malarvizhi@unom.ac.in

Competition for Design of Logo for Golden Jubilee was conducted among Members of Mycological Society of India during January 2023. Logo designed by **Mr. Kailash Patel**, Ph.D. Research Scholar, Department of Plant Pathology, College of Agriculture, SKRAU, Bikaner, Rajasthan, India was selected as the best and it is included in the Front Cover page.

#### PRESIDENT

#### Prof. N. Raaman

Centre for Advanced Studies in Botany, University of Madras, Guindy Campus, Chennai - 600 025, India raaman55@gmail.com

## PAST PRESIDENT

#### **Prof. Absar Ahmad**

Interdisciplinary Nanotechnology Centre, Aligarh Muslim University, Aligarh - 202 001, India aahmad786@gmail.com

#### SECRETARY

#### JOINT SECRETARY

#### Prof. M. Sudhakara Reddy

Department of Biotechnology, Thapar University, Patiala - 147 004, India msreddy@thapar.edu **Prof. Anil Kumar** Department of Biotechnology Thapar University, Patiala - 147 004, India adatta@thapar.edu

# VICE PRESIDENT

#### Dr. Sushil Kumar Shahi

Botany Department, Guru Ghasidas Vishwavidyalaya, Bilaspur - 495 009, India sushilkshahi@gmail.com

#### TREASURER

#### Prof. N. Mathivanan

Centre for Advanced Studies in Botany, University of Madras, Guindy Campus, Chennai - 600 025, India prabhamathi@yahoo.com

The Mycological Society of India was founded in January 1973 with a view to bring together the mycologists of the country and with the broad objective of promoting the development of Mycology in India in all its aspects and in the widest perspective.

Membership is open to all interested in mycology. The Life Member subscription is Rs. 4000/- in India and £100 or US\$ 200 for those in abroad. The annual member subscription is Rs. 1000/- in India and £20 or US \$ 40 for those in abroad. The hard copies of Kavaka can be made available for individuals in India @ Rs. 2000/- per year, institutions in India @Rs. 5000/-per year, individuals in foreign countries @ US\$150/ Euro 125 per year and institutions in foreign countries @ US\$250/ Euro200 per year. Subscriptions are to be sent to the Treasurer, **Prof. N. Mathivanan**, Centre for Advanced Studies in Botany, University of Madras, Guindy Campus, Chennai - 600025, Tamil Nadu, India (Email: prabhamathi@yahoo.com).

All general correspondence should be addressed to **Prof. M. Sudhakara Reddy**, Department of Biotechnology, Thapar University, Patiala-147004, Punjab, India (Email: msreddy@thapar.edu).

Manuscripts for publication and books for review should be forwarded through online portal available on the official website of the Kavaka (http://www.kavaka.fungiindia.co.in) and the website of Mycological Society of India (http://www.fungiindia.co.in) to the Editor-in-Chief of the journal.

Disclaimer: The data, figures, graphs and views expressed in the individual papers are author's own and the responsibility for these things lies with the author's of the individual paper themselves.

The name of the journal KAVAKA is a Sanskrit word which means Fungus.

ISSN 0379-5179 ISSN-L 0379-5179

Copyright @ 2023 Mycological Society of India

http://www.fungiindia.co.in http://www.kavaka.fungiindia.co.in (All back volumes are available on the website)

## KAVAKA being transactions of Mycological Society of India

#### **EDITOR-IN-CHIEF**

**Prof. Rupam Kapoor** Department of Botany, University of Delhi, Delhi - 110 007, India kapoor\_rupam@yahoo.com

#### **SECTION EDITORS**

## Fungal Systematics, Evaluation, Phylogeny and Evolution

#### Prof. Yash Pal Sharma

Department of Botany, University of Jammu, Jammu - 180 006, J&K, India yashdbm3@gmail.com

#### Prof. Krishnendu Acharya

Department of Botany, University of Calcutta, Kolkata - 700 019, India krish\_paper@yahoo.com

#### Fungal Endophytes, Secondary Metabolites and Mycorrhiza

#### Prof. B.F. Rodrigues

Department of Botany, Goa University, Goa - 403 206, India felinov@gmail.com

#### Dr. Sanjeeva Nayak CSIR-National Botanical Research Institute, Lucknow - 226 001, India

nayaka.sanjeeva@gmail.com

## **Fungal Biotechnology**

#### Prof. J. Savitha

Department of Microbiology & Biotechnology, Bangalore University, Jnanabharathi Campus Bangalore - 560 056, India drsvtj@yahoo.co.in Prof. Naveen Kango Department of Microbiology, Dr. Harisingh Gour Vishwavidyalaya, Sagar - 470 003, Madhya Pradesh, India nkango@gmail.com

#### Marine Biology and Fungal Physiology

# Prof. M. Kalaiselvam

CAS in Marine Biology, Faculty of Marine Sciences, Annamalai University, Parangipettai - 608 502, India kalaifms@gmail.com

#### Prof. N. Thajuddin

Department of Microbiology, Bharathidasan University, Tiruchirappalli - 620 024, India nthaju2002@yahoo.com

#### Plant Pathology and Disease Management

#### Prof. N. Mathivanan

Centre for Advanced Studies in Botany, University of Madras, Guindy Campus, Chennai - 600 025, India prabhamathi@yahoo.com

# Dr. Pankaj Baiswar

Plant Pathology Division, ICAR Research Complex for NEH Region, Umiam - 793 103, Meghalaya, India pbaiswar@yahoo.com

#### MANAGING EDITOR

Dr. Surinder Kaur Walia

Department of Botany, SGTB Khalsa College, University of Delhi, Delhi - 110 007, India skwalia24@yahoo.co.in

#### ASSOCIATE MANAGING EDITORS

Dr. C. K. Pradeep Jawaharlal Nehru Tropical Botanic Garden & Research Institute, Palode, Thiruvananthapuram - 695 562, Kerala, India drckpradeep@hotmail.com Dr. V. Venkateswara Sarma Department of Biotechnology, School of Life Sciences, Pondicherry University, Puducherry - 605 014, India sarmavv@yahoo.com

#### EDITORIAL BOARD

Prof. Resurreccion B. Sadaba Division of Biological Sciences, College of Arts and Sciences, University of the Philippines Visayas, Philippines sadaba09@gmail.com

Prof. C. Manoharachary NASI Senior Scientist Department of Botany, Osmania University, Hydrabad - 500 007, India cmchary@gmail.com

Prof. T. Satyanarayana Division of Biological Science and Engineering, Netaji Subhas University of Technology, New Delhi - 110 078, India tsnarayana@gmail.com

> Prof. M. V. Rajam Department of Genetics, University of Delhi, South Campus, New Delhi - 110 021, India rajam.mv@gmail.com

> > Prof. N.K. Dubey Botany Department, Banaras Hindu University Varanasi - 221 005, India nkdubeybhu@gmail.com

Dr. Sanjay K. Singh National Fungal Culture Collection of India, MACS Agharkar Research Institute, Pune - 411 004, India singhsksingh@gmail.com

> Prof. Ashish Vyas Department of Microbiology, Lovely Professional University, Phagwara - 144 411, India vyas.lpu@gmail.com

Dr. P.Y. Prakash Dept. of Microbiology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal - 576 104, India prakashpy123@yahoo.co.in

> Prof. R.N. Kharwar Department of Botany Banaras Hindu University, Varanasi - 221 005, Uttar Pradesh, India rnkharwar@gmail.com

Prof. Dilip Hande Botany Department, Shri Shivaji Science College, Amravati - 444 603, Maharashtra, India dvhande@gmail.com

Dr. V. Kumaresan Department of Botany, Kanchi Mamunivar Govt. Institute for Postgraduate Studies and Research, Puducherry - 605 008, India vkumaresan36@yahoo.com

> **Dr. D. Nagaraju** Department of Botany, Govt. City College(A), Hyderabad - 500 002, Telangana, India nagaraj.bot9@gmail.com

**Dr. M. Kandhasamy** Department of Botany, Government Arts College, Karur - 639 005, Tamil Nadu, India mookiah\_kandhan@yahoo.co.in Prof. D.J. Bagyaraj Centre for Natural Biological Resources and Community Development, Bangaluru - 560 024, India djbagyaraj@gmail.com

> Prof. D.J. Bhat 128/1-J, Azad Housing Society, Curca, P.O. Goa Velha, Goa - 403 108, India bhatdj@gmail.com

Prof. N.S. Atri, Department of Botany, Punjabi University, Patiala - 147 002, India. narinderatri04@gmail.com

Prof. K.R. Sridhar Department of Biosciences, Mangalore University, Mangalagangotri, Mangalore - 574 199, India kandikere@gmail.com

Prof. Absar Ahmad Interdisciplinary Nanotechnology Centre, Aligarh Muslim University, Aligarh - 202 001, India aahmad786in@gmail.com

Dr. K. B. Vrinda Jawaharlal Nehru Tropical Botanic Garden & Research Institute, Palode, Thiruvananthapuram - 695 562, India drvrindakb@hotmail.com

Dr. Kanad Das Botanical Survey of India, Cryptogamic Unit, P.O. Indian Botanic Garden, Howrah - 711 103, India daskanadbsi@gmail.com

Prof. K.P. Kannan Dept. of Biotechnology, Bannari Amman Institute of Technology, Sathyamangalam - 638 401, India drkpkannan@gmail.com

#### **COUNCIL MEMBERS**

Dr. Lhanjey P. Wangdi Department of Botany, NBBGC, Tadong,Gangtok, East-Sikkim - 737 102, Sikkim, India Ihanjeyb@gmail.com

Dr. A. Panner Selvam Department of Botany & Microbiology, A.V.V.M. Sri Pushpam College, Poondi - 613 503 Thanjaur, Tamil Nadu, India panneer\_1959@yahoo.com

Prof. C. Srinivas Dept. of Microbiology & Biotechnology Bangalore University, Jnanabharathi Campus, Bangalore - 560 056, Karnataka, India srinivasbub@gmail.com

Dr. Shambhu Kumar, Forest Pathology Department, KSCSTE - Kerala Forest Research Institute, Kerala, India skumartaxon@gmail.com

Dr. M. Kumar Department of Plant Biology and Plant Biotechnology, Madras Christian College, Chennai - 600 059, Tamil Nadu, India kumarmccbotany@gmail.com **Prof. T.N. Lakhanpal** Department of Biosciences H.P. University, Shimla - 171 005, India tezlakhanpal@rediffmail.com

Dr. Chandralata Raghukumar Emeritus Scientist National Institute of Oceanography, Goa - 403 004, India lata\_raghukumar@rediffmail.com

Prof. Geeta Sumbali Department of Botany, University of Jammu, Jammu - 180 006 geetasumbali1957@gmail.com

Prof. K.R. Aneja Department of Microbiology Kurukshetra University Kurukshetra - 136 119, India anejakr@yahoo.com

> Prof. Munruchi Kaur Department of Botany, Punjabi University, Patiala - 147 002, India munruchi@gmail.com

Prof. R.M. Mulani, School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded - 431 606, India mulani 1961@gmail.com

> Dr. Sushil Kumar Shahi Botany Department, Guru Ghasidas Vishwavidyalaya, Bilaspur - 495 009, India sushilkshahi@gmail.com

Dr. Yogesh Joshi Department of Botany, Central University of Rajasthan SSJ Campus, Almora - 263 601, India dryogeshcalo@gmail.com

Prof. Praveen Gehlot Department of Botany, Jai Narain Vyas University, Jodhpur - 342 001, Rajasthan, India drpg73@rediffmail.com

Dr. K. Malarvizhi Centre for Advanced Studies in Botany, University of Madras, Guindy Campus, Chennai - 600 025, Tamil Nadu, India malar.kaliyaperumal@gmail.com

> Dr. Avneet Pal Singh Department of Botany Punjabi University, Patiala - 147 002, Punjab, India avneet?@rediffmail.com

Dr. N.K. Udaya Prakash, Department of Biotechnology, Vels Institute of Science, Technology and Advanced Studies, Chennai - 600 117, Tamil Nadu, India nkudayaprakash@gmail.com

Dr. V. Shanmugaiah Department of Microbial Technology, Madurai Kamaraj University, Madurai - 625 021, Tamil Nadu, India vshanmugaiah@yahoo.co.in

# From the Editor's Desk

## Dear readers,

Welcome to the second issue of 59<sup>th</sup> volume of KAVAKA through which we envision to delve into the fascinating world of Fungi. Through this issue the endeavour is to highlight the importance of exploring fungal diversity, documenting its wonders, and insinuating how mycology can generate incredible avenues for scientific advancement and human well-being.

Fungi, the treasure trove, occupy prime place in the biological world in their pristine form. India is a cradle for a galaxy of fungi, however only a fraction of its total fungal wealth has been subjected to scientific scrutiny. Fungi form a kingdom of their own, separate from plants and animals, with an estimated diversity of millions of species. Yet, we have only scratched the surface of understanding their true potential. It's about time to unveil nature's hidden secrets and appreciate the intricate web of life that fungi weave. Attributable to the sheer number of fungal species, cataloguing and documentation of their diversity is a challenging task. In light of that, it is imperative that we invest in comprehensive fungal surveys, DNA sequencing, and taxonomic studies to unravel the hidden treasures of the fungal kingdom before they become unsalvageable. Exploring fungal diversity and documentation thereof are extremely crucial to pave towards further evaluation of their potential in pharmaceuticals, nutraceuticals, and as biofertilizers. By studying the vast array of fungal species, we can better comprehend the intricate mechanisms that drive our ecosystems, leading to more sustainable practices and conservation efforts. Furthermore, by expanding our knowledge of fungal diversity and bioprospecting them, we can discover new bioactive compounds that may revolutionize the treatment of diseases and improve human health.

From the humble mushroom farm to the cutting-edge laboratories of pharmaceutical companies, fungi are proving to be a game-changer across industries. It is imperative that we recognize and capitalize on the potential of fungi, fostering research, investment, and sustainable practices. By doing so, we can unlock a myriad of opportunities, driving economic growth, advancing healthcare, and enhancing the quality of our lives while nurturing the planet's rich fungal biodiversity. It presents opportunities to engage with scientists, enthusiasts, and professionals alike, fostering collaboration and knowledge sharing. Through mycology societies, research institutions, and community-driven initiatives, we can build a collective effort to unravel the mysteries of fungi, harness their potential for the greater good, and ensure fair recognition and protection of the efforts and innovations derived from fungi by safeguarding intellectual property.

There is no price tag for curiosity, and it is mankind's yearning for the 'unknown' that has made our species excel. In conclusion, dear readers, I would like to emphasize that it is our moral duty as mycologists to showcase the valuable facet of fungi. By dispelling misconceptions, highlighting ecological contributions, unveiling economic and industrial benefits, and educating future generations, mycologists can play a vital role in transforming the perception of fungi. Embracing this responsibility can lead to a greater understanding and appreciation of fungi, paving the way for sustainable utilization, conservation, and the realization of the tremendous benefits that fungi offer to society and the environment. With that commitment, let us embark on a journey to explore fungal diversity with curiosity and reverence. Together, through this issue of KAVAKA, let us celebrate the wonders of the fungal kingdom and protect its rich heritage for generations to come.

The present issue of KAVAKA stands as a testament to the collective commitment of the members of MSI to academic excellence and the pursuit of knowledge. My deepest appreciation is reserved for the Editor of this issue, Dr. Naveen Kango, for his meticulous attention to detail, unwavering commitment to excellence, and the countless hours devoted to ensuring the quality of the published articles.

Undoubtedly, it is through the collaborative efforts of the entire KAVAKA community that we continue to thrive and make a meaningful impact in the scholarly landscape.

Wishing you an enlightening and inspiring reading experience.

June 30, 2023

**Prof. Rupam Kapoor** 

(Editor in Chief KAVAKA) Professor, Department of Botany University of Delhi, Delhi - 110 007