

क्राविका

being
Transactions of the
Mycological Society of India

Golden Jubilee Year

Volume 59, Issue 1
March 2023



VOLUME 59, ISSUE 1 (MARCH) 2023

EDITOR OF THE ISSUE

Prof. M. Kalaiselvam

CAS in Marine Biology, Faculty of Marine Sciences,
Annamalai University, Parangipettai - 608502, India
kalafms@gmail.com

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.

MYCOLOGICAL SOCIETY OF INDIA

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 - 202001, India
aahmad786@gmail.com

VICE PRESIDENT

Dr. Sushil Kumar Shahi

Botany Department,
Guru Ghasidas Vishwavidyalaya,
Bilaspur - 495009, India
sushilkshahi@gmail.com

SECRETARY

Prof. M. Sudhakara Reddy

Department of Biotechnology,
Thapar University,
Patiala- 147004, India
msreddy@thapar.edu

JOINT SECRETARY

Prof. Anil Kumar

Department of Biotechnology
Thapar University,
Patiala -147 004, India
adatta@thapar.edu

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
nkubeybhu@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 - 144411, 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 Mamuniv 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, Mangalagangothri,
Mangalore - 574 199, India
kandikere@gmail.com

Prof. Absar Ahmad
Interdisciplinary Nanotechnology Centre,
Aligarh Muslim University,
Aligarh - 202001, India
aahmad786in@gmail.com

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

COUNCIL MEMBERS

Dr. Lhanjey P. Wangdi
Department of Botany,
NBBGC, Tadong, Gangtok,
East-Sikkim - 737102, Sikkim, India
lhanjeyb@gmail.com

Dr. A. Panner Selvam
Department of Botany & Microbiology,
A.V.V.M. Sri Pushpam College,
Poondi - 613 503 Thanjavur, 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. Lakhpanal
Department of Biosciences
H.P. University,
Shimla - 171 005, India
tezlakhpanal@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 - 431606, India
mulani1961@gmail.com

Dr. Sushil Kumar Shahi
Botany Department,
Guru Ghasidas Vishwavidyalaya,
Bilaspur - 495009, India
sushilkshahi@gmail.com

Dr. Yogesh Joshi
Department of Botany,
Central University of Rajasthan SSJ Campus,
Almora - 263601, 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
avneet7@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

Congratulations and greetings from Kavaka!

As we celebrate the 50th anniversary of the Mycological Society of India (MSI), coinciding with G20 Presidency of India and 75 years of Independence, we embark onto the journey of releasing the 59th volume of 'Kavaka', the official journal of the MSI.

While we harp on the tune of G20, implementing sustainable development goals becomes critical more so, entailing wide-ranging targets from moderating climate change, affordable and clean energy to responsible consumption and sustainable use of resources into the bargain. Lately, attention has grown to the role of microbiome in achieving the actualisation of the 'sustainability' goals. The dire need of sustainable development has renewed global interest in microbiome and bio-functionality thereof in delivering multiple agroecosystem services. With giving due cognizance to their nuisance value, exploiting the potential of microbes, as promising as the 'Fungi', is considered, without exaggeration, the most definitive solution to sustainable agriculture for the remote future.

The world of fungi provides a fascinating and incessant source of biological diversity, which is a rich source to harness. Only a fraction of total fungal wealth has been subjected to scientific scrutiny, which has unfurled their potential applications in the bioeconomy and sustainable future. The scientific community needs to be saturated with information about the collective microbial database, including the uncultivated 'unseen majority', and in achieving that 'Kavaka' plays a key role by providing a platform for dissemination of such information. Since years, 'Kavaka' as a service to science, has helped in strengthening the mycological 'mycelia' by narrating the multifarious roles of fungi in the bioeconomy and otherwise.

In India, the potential of fungal biome has not been fully tapped. In that case, a journal like 'Kavaka', which is devoted to mycological research premised in Indian context becomes particularly pertinent. 'Kavaka' has set out as an educational resource to promote awareness about the importance of fungi and their applications. As the Editor-in-Chief, it imbues a sense of pride in me while highlighting that this journal, volume after volume, has been providing a platform for decades to both established and budding researchers to communicate their work, which usually does not find due place in the international journals. With this renewed sense of gratification, I sincerely hope that this issue of 'Kavaka' will contribute, in some way or another, to the ongoing discussion on sustainable agriculture practices and inspire researchers, policymakers, and farmers to explore the potential of microbiome. This will not only advance us towards achieving the goals of G20 but will also shape and strengthen the Indian academic architecture on a global forum.

The transformative promise of 'Leave No One Behind' will fast-track global progress, and fungal biology is in a good position to make this work. Hence, through Editor's desk, I take this opportunity to invite all the promising and incipient mycologists to unite and contribute towards uplifting the facade of mycological science in India. I am much grateful to the members of MSI and office bearers and contributors of 'Kavaka' for their unflinching enthusiasm. I am rather excited to take to the road for working towards a collective mission of cultivating mycology for the goodwill of scientific society and society *per se*. I owe an unpayable debt to President MSI, Prof. N. Raaman; Secretary MSI, Prof. Sudhakar Reddy; former Editor-in-Chief, Prof. Yashpal Sharma, and Editor of the issue Prof. Kalaiselvam for their constant support. It is with their cooperation and dedication that the 59th volume of 'Kavaka' has seen light of the day.

31 March 2023

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