



क्रवक

being
Transactions of the
Mycological Society of India



Volume 60, Special Issue
November 2024



Prof. C.V. Subramanian
Centennial Special Issue

A TRIBUTE TO
Prof. CVS

**VOLUME 60, Prof. CV SUBRAMANIAN CENTENNIAL SPECIAL ISSUE
(NOVEMBER 2024)**

EDITOR OF THE ISSUE

Prof. N. Raaman

Centre for Advanced Studies in Botany,
University of Madras, Guindy Campus,
Chennai - 600 025, India
raaman55@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. R.N. Kharwar
Department of Botany
Banaras Hindu University,
Varanasi - 221 005, Uttar Pradesh, India
rnkharwar@gmail.com

PAST PRESIDENT

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

VICE PRESIDENT

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

Dr. K. Malarvizhi
Centre for Advanced Studies in Botany,
University of Madras, Guindy Campus,
Chennai - 600 025, India
malarvizhi@unom.ac.in

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 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,
Punjab 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
drkpkannan@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 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. Lakhnpal
Department of Biosciences
H.P. University,
Shimla - 171 005, India
tezlakhnpal@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,
Punjab 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
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
Punjab 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

Dear readers

Greetings from KAVAKA

The landscape of Indian Mycology has been profoundly shaped by the remarkable contributions of one of its greatest luminaries, Late Professor Chirayathumadom Venkatachalaier Subramanian (C.V.S. as he was affectionately called). His name resonates with excellence in the study of fungi, particularly taxonomy, ecology, and diversity, earning him global reputation and respect. As we reflect on his contributions in this issue of KAVAKA, the official journal of the Mycological Society of India, it becomes essential to recount his life and legacy as a source of inspiration for all researchers in the field.

Prof. Subramanian's career is a reflection of perseverance and intellectual curiosity. Born in Kerala, in 1924, he embarked on a journey that transformed fungal taxonomy in India. His meticulous research and pioneering insights expanded the horizons of mycology, particularly in understanding hyphomycetes. His monographs and taxonomic revisions have stood the test of time, serving as references for mycologists worldwide, even today. Among his many achievements, Prof. Subramanian's role in establishing and nurturing institutions dedicated to fungal research merits special mention. As the Director of the Centre for Advanced Study in Botany, University of Madras, he built a strong foundation for research that continues to deliver significant outputs. His efforts to institutionalize fungal studies in India also bore fruit in the establishment of the Mycological Society of India in 1973, further ensuring a platform for collaboration and innovation. KAVAKA, the journal launched under his stewardship, remains a relevant scientific forum for fungal research to this day. Prof. Subramanian's academic prowess was matched by his ability to mentor and inspire young scientists. His students, fanned out across the globe, uphold his legacy by promoting a deeper understanding of fungal biodiversity and its ecological significance.

Given the magnanimous mycologist he was, it is only to be expected that his extraordinary contributions in his domain were recognized internationally. Prof. Subramanian was awarded the prestigious Shanti Swarup Bhatnagar Prize in 1965 for his contributions to the taxonomy of *Fungi imperfecti*, and his work on soil mycology and soil-borne plant diseases. Apart from that, he became the first Indian mycologist to receive the UNESCO Kalinga Prize for the 'Popularization of Science' in 1990. Such accolades underscore not only his scientific brilliance but also his efforts to bring mycology into the public consciousness.

As we honour C.V.S.'s centennial, his groundbreaking achievements in mycology is a powerful reminder for us to build upon his remarkable foundation. The trail of his contributions to science serves as a template for the scientific community, urging us to explore uncharted territories in fungal biology with the same passion, rigor, and dedication. The field of mycology owes much of its stature in India to his invincible spirit, and his memory continues to inspire new waves of scientific quest.

As we dedicate this issue of KAVAKA to Prof. Subramanian, we honour a visionary who not only shaped the trajectory of fungal research in India but also laid the groundwork for its global relevance. As we leaf through the pages of this journal, may we follow in his footsteps and find in his legacy the motivation to delve deeper, question persistently, and strive resolutely.

27 November 2024

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

Contents

Biographical sketches of Prof. C.V. Subramanian

N. Raaman 01-11

A research journey from epiphytic to endophytic fungi: Insights into Ecology, Diversity and Biotechnological potential

R.N. Kharwar 12-29

Strain improvement and molecular characterization of mushrooms

N. Raaman and P. Selvakumar 30-53

Mushrooms in service of the society and the environment

N.S. Atri 54-76

Halophilic *Aspergillus penicillioides* - a specialist group of fungus and its morphological adaptations in hypersaline environments

Valerie Gonsalves and Sarita W. Nazareth 77-83

Effects of physicochemical factors on vegetative growth of *Lentinus cladopus* - A wild edible mushroom

Lata and Gaurav Bhakri 84-92

Perspectives of yeast, molds and mushrooms as pro and prebiotics for the improvement of gut health and microbiome: a review

Devaraja Gayathri, Rajanna Soundarya, G.S. Shwetha and S. M. Pruthvi 93-106

Epicoccum sorghinum as a potential source for pigment production

Pushpa, H., Saritha, M., Vishal, M. and Savitha, J. 107-118

Diversity of the genus *Stereum* Hill ex Pers. from district Sirmaur (Himachal Pradesh)

Ramandeep Kaur, Maninder Kaur, Avneet Pal Singh and Gurpaul Singh Dhingra 119-124

Phylogenetic insights and first record of *Auriculoscypha anacardiicola* on *Holigarna arnottiana* from the Northern Western Ghats, India

Kunhiraman C. Rajeshkumar, Shital Desai, Parayelil A. Ansil, Abhishek A. Rane, Kuniyil Harikrishnan, Sruthi O. Paraparath, Samantha C. Karunarathna, Nakin Suwannarach, Ajay Kumar Gautam 125-132

Morpho and molecular Study on *Phellinotus badius* from Tamil Nadu

Elangovan Arumugam, Sugantha Gunaseelan, Ramesh Murugadoss and Malarvizhi Kaliyaperumal 133-137

A Review on *Pycnoporus sanguineus* Based Biotechnological Approaches for Bioremediation of Industrial Waste

Ithi Gupta, Sakshi Gautam, Surbhi Pandey, Rajendra Mehta and Bhaskar Chaurasia 138-145

Check list of Tremellales and Clavariales from Telangana and Andhra Pradesh

C. Manoharachary, P.R. Sushama and Mehtab Yasmeen 146-153