NATIONAL ACADEMY OF BIOLOGICAL SCIENCES
NABS
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NABS News Letter

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Contents

From the Desk of President.....

Dear NABSians,

Warm greetings to all NABSians.

I am penning this note for the Newsletter with a sense of relief. It has been nearly two years since we could convene the Technical Review Committee meeting to evaluate the applications for Fellowships and awards. At last we made it in April, 2022 and evaluated a large number of applications.

Hope the mail from Secretary, NABS must have reached all those who are selected for Fellowships and Awards. Congratulations to all awardees. We found the applications by the candidates were good compared to earlier years. I am grateful to the TRC members who did a great job of screening the applications. A big thanks to TRC members. To my fellow office bearers Prof. D. J. Bagyaraj, Prof. N. Mathivanan, Prof. T.L. Baskaran and above all, the Secretary, Prof. T. Marimuthu, I place on record my gratitude for carrying the responsibilities ably.

As I am writing this note, we received a sad news of passing away of Prof. Dr. K. V. Peter, Fellow of NABS. He held various positions such as Director, ICAR-IISR and Vice Chancellor, KAU besides being member of a large number of committees. I pray Almighty to Rest him in Peace.

I hope, if everything goes as per plan, we may have our national conference in September, 2022 wherein, Fellows and awardee may have to make a presentation before the audience as a prerequisite for being conferred with the awards/Fellowship.

I wish you all well.

With Best wishes

(V. A. Parthasarathy)
President, NABS

2. Message from Vice-President…

Dear Members of NABS,

Warm New Year Greetings.

Dear Members of NABS,

Greetings!

All the members of NABS are biologists. We do good research work in our own subject. We rarely collaborate with scientists of other disciplines. Collaborative research involves coordination between the researchers within an institute or between different institutions. It means working together with one or more people to complete a project or task or developing ideas. Such collaboration many a times brings out a new theme or concept or hypothesis or process. Collaboration can be between biologists or between biologists and non-biologists working towards a common goal. There are many examples that collaborative research has resulted in new concepts, hypothesis or answers to many difficult questions. I will give few examples from my own experience. I worked as Professor of Microbiology at University of Agricultural Sciences, Bangalore. I used to collaborate with scientists in other departments of the university. Some of the interesting results that came out of such collaboration are given below.

- World first report that submerged aquatic plants are colonized by AM fungi, contradicting the reports of earlier scientists that aquatic plants are non-mycorrhizal (collaboration with Botanists).
- World first report that ants and wasps act as disseminators of AM fungi (collaboration with Zoologists).
- Mycorrhizal colonization is a heritable trait and can be used in plant breeding (collaboration with plant breeders).
- Intercropping of a deep rooted crop with a shallow rooted crop, during drought, AM fungi helps to supply water from deep rooted crop to the shallow rooted crop, referred to as Bioirrigation (collaboration with Agronomists).
- AM fungi helps to alleviate severity of wilt disease complex in tomato caused by fungal, bacterial and nematode pathogens (collaboration with Plant Pathologists).
- Mycorrhizal plants grown under 75% FC can produce similar yield as uninoculated plants grown under 100% FC (collaboration with Plant Physiologists).
- Vase-life of mycorrhizal flowers is more than non-mycorrhizal flowers because of less peroxidase activity in mycorrhizal plants which delays flower senescence (collaboration with Horticulturists).

NABS has scientists from different branches of biology. Many a time's scientists work in water tight compartments. I have seen even in Microbiology department Bacteriologists rarely interact with Mycologists. My appeal is to avoid this attitude and collaborate with the scientists with other disciplines so that we can come out with many new findings.

(D.J. Bagyaraj)
Vice-President

3. Message from Editor in Charge

Dear Members of NABS,

Greetings.

Futuristic Agriculture

Without agriculture there will not be culture and morality among the mankind. The State and Central Government are focusing on improving the productivity and income of the farmers to reduce the distance between field and fork. Because, the conversion ratio of field to fork has to be increased to feed 9.6 billion populations by 2050. In this circumstances, the challenging responsibility placed in front of Agricultural Scientists is to ensure food and nutritional security. However, the major challenges placed in front of us are- Fragmented land

holdings; Migration of people from rural to urban areas (lack of manpower to do agriculture); Natural Resources are not at the disposal of the farmers; Inputs are not in the disposal of the farmer (eg. Source of Irrigation is a very big question); Poor Soil health (Very Low Organic Carbon in Soil); Marketing and supply chain management are not in the hands of the farmers; Unpredictable Climate Scenario

In these circumstances, we are bound to answer the following issues.

- How we are going to march forward to double the income of farmers?
- Whether the dream of the Nation will come into reality?
- How best we are going to integrate the stakeholders to achieve the demand?
- How best we are going to shape the Agricultural education to develop graduates as required by the stakeholders? (For example, a graduate in Agriculture should have the skill to dismantle and assemble the equipment to be used in Agriculture).

To address the above issues, The Triangle of Agriculture involving

1. Education Technology
2. Research and
3. Agriculture Extension has to be empowered as per the emerging needs.

Ways and Means to address futuristic agriculture:

- Providing globalized education at regional and national level.
- Providing 5-G Powered Smart farming/Precision farming
- Develop global level competitiveness among the agricultural faculties to improve the knowledge and skill.
- Development of Agri-tech, based on IOT for practicing smart agriculture.
- Empower the faculties to have globalized vision to produce graduates as demanded by the Stakeholders.
- Faculties with global vision can develop graduates into stakeholders. Thus the graduates can venture into risk to generate employment rather than seeking for an employment.

Apart from it, domains and tentacles in the field of Agriculture should come out of four walls. Agricultural graduates should be made to think out of box either to generate technologies as required by the stakeholders or knowledge transcription should aid to translate agricultural graduates into stakeholders. It could be achieved through the introduction of Massive Open Online Courses for graduates, professionals, entrepreneurs and pesticide dealers. Introduction of such courses can facilitate to develop knowledge and skill on precision farming/smart farming/vertical farming, discovery of biomolecules for pest and disease management, drone technology, artificial intelligence aided decision support system, agripreneurship on biopesticide production, tissue culture, value addition and supply chain management.

Further, agriculture scenario at global level is powered by Internet of Things, big data and advanced analytics technology. Advancement in IOT has improved data analytics, visualization and management systems. Thus it can introduce automation in irrigation, fertigation and need based application of pesticides, sensor-based systems for monitoring crop health, soil health, fields, livestock and post-harvest storage facilities. IOT has also introduced smart agriculture unmanned vehicles, drones, autonomous robots and actuators for improving the productivity. Hence, it becomes the need of the hour to inculcate knowledge and skill among the faculties, graduates and end users to practice IOT powered agriculture system. This could facilitate to promote growing food basically everywhere in supermarkets, on skyscrapers' walls and rooftops, in shipping containers and, of course, in the comfort of everyone's home. Thus knowledge and skill empowerment in present day situation could aid in implementation of 5G based futuristic agriculture to meet the challenging demand. If it comes into reality, institutions can generate their own funds and can be empowered financially through public private partnership by catering the needs of the public private sector.

(S. Nakkeeran)
Editor, NABS NL

4. News and Events

4.1. News

Fellowship and Awards of NABS for Election Year 2019 & 2020

The Technical Review Committee could meet at Chennai and evaluate the applications submitted by the members of NABS for the award of Fellowship and other NABS awards for the Election Year-2019 and 2020. Due to COVID-19 pandemic, the applications could not be evaluated in time. NABS appreciate the patience shown on this issue.

4.1.1. Fellowship for 2019 & 2020

No. Name of Member Elected as NABS-Fellow **No. Name of Member Elected as NABS-Fellow**

4.1.1.1. Fellowship for 2019

Under Agriculture & Forestry Sciences

1. Dr. Anirban Roy
2. Dr. Chirantan Chattopadhyay
3. Dr. Behere, G.T.
4. Dr. Gopal Lal
5. Dr. Haldankar, P.M.
6. Dr. Kamala Jayanthi, P.D.
7. Dr. Rajesh Kumar Singh
8. Dr. Thirumeni, S.
9. Dr. Venkatesan, T.

Under Basic Sciences

1. Dr. Amritesh C. Shukla
2. Dr. Archunan, G.
3. Dr. Chandrasekaran, M.
4. Dr. Gothandam, K. M.
5. Dr. Krishnamurthy, S. L.
6. Dr. Rajasekaran, C.

Under Veterinary & Fishery Sciences

1 Naqvi, S.M.K.

4.1.1.2. Associate Fellowship for 2019

Under Agriculture & Forestry Sciences

1. Dr. Jagesh Kumar Tiwari

4.1.1.3 NABS-Best Woman Scientist Award-2019

Dr. E. K. Janaki Ammal Memorial NABS-Best Woman Scientist Award
[Under Agriculture & Forestry Sciences]

1 Dr. Kolla Sreedevi

Dr. Kamala Sohonie Memorial NABS-Best Woman Scientist Award
[Under Basic Sciences]

1 Dr. M. Sathiyabama

4.1.1.4. NABS-Best Scientist Award-2019

Dr. B.P. Pal Memorial NABS-Best Scientist Award
[Under Agriculture & Forestry Sciences]

1 Dr. Krishna Gopal Mandal

Dr. V.S. Alwar Memorial NABS-Best Scientist Award

[Under Veterinary & Fishery Sciences]

1 Dr. Yashpal S. Malik

Dr. Smt. Rajammal P. Devadas Memorial NABS-BSA
[Under Food Sciences]

1 Dr. Naveena B. Maheswarappa

4.1.2.1. Fellowship for 2020

Under Agriculture & Forestry Sciences

1 Dr. Amod Kumar Thakur
2 Dr. Gomathi, R.
3 Dr. Kalyan K. Mondal
4 Dr. Kajal Kumar Biswas
5 Dr. MIR Asif Iquebal
6 Dr. Mohapatra, K.P.
7 Dr. Prabhakar, M.
8 Dr. Pramod Kumar
9 Dr. Sanjay Kumar Singh
10 Dr. Srinivasan, V.
11 Dr. Vinod Kumar Singh

Under Basic Sciences

1 Dr. Balagurunathan, R.
2 Dr. Sanjeeva Nayaka
3 Dr. Thajuddin, N.

Under Veterinary & Fishery Sciences

1 Girish Patil, S.
2 Rajeeb K. Mohanty

4.1.2.2. NABS-Best Woman Scientist Award-2020

Dr. E.K. Janaki Ammal Memorial NABS-Best Woman Scientist Award
[Under Agriculture & Forestry Sciences]

1 Dr. Sarika

4.1.2.3. NABS-Best Scientist Award-2020

Dr. B.P. Pal Memorial NABS-Best Scientist Award
[Under Agriculture & Forestry Sciences]

1 Dr. Dinesh Singh

Dr. G. S. Venkataraman Memorial NABS-Best Scientist Award
[Under Basic Sciences]

1 Dr. Satish Mishra

Dr. V. S. Alwar Memorial NABS-Best Scientist Award
[Under Veterinary & Fishery Sciences]

1 Dr. Rajib Deb

4.1.2.4. NABS-Best Research Paper Award-2020

Prof. G. Rangaswami Memorial NABS- Best Research Paper Award
[Under Agriculture & Forestry Sciences]

1 Dr. Prem Lal Kashyap

Dr. C. M. Singh Memorial NABS- Best Research Paper Award
[Under Veterinary & Fishery Science]

1 Dr. Namita Ashish Singh

5. Research Highlights

5.1. Abstract of paper presented for Carl Linnaeus Award

***[Presented for the award competition-First International Conference held at Annamalai University, Annamalainagar, Tamil Nadu from* 23 to 25 July 2020]**

5.1.1. Induction of *in planta* resistance by flagellin (*Flg*) and elongation factor-TU (*EF-Tu*) of *Bacillus amyloliquefaciens* (VB7) against groundnut bud necrosis virus in tomato

Role of plant growth promoting rhizobacteria (PGPR) in growth promotion and induction of resistance against various plant pathogens have been extensively studied. However, MAMP (Microbe Associated Molecular Pattern) triggered immunity (MTI) against plant viruses are not well exploited. The present study enlightens the role of two MAMP genes including, flagellin (Flg) and elongation factor (EF-Tu) in the induction of plant defense against GBNV infecting tomato. Secondary metabolites of *Bacillus amyloliquefaciens* (VB7), effectively suppressed GBNV symptom expression up to 84% compared to untreated control in cowpea. Treatment with *A. tumefaciens* EHA105 clones containing flagellin (Ag- Ba.Flg) and elongation factor-TU (Ag-Ba.EF-Tu) genes as soil drench and foliar spray, reduced virus titre,0.369 OD and 0.379 OD respectively as compared to control 1.249 OD. The disease severity was reduced up to 15% in Ag-Ba.Flg treated plants compared to 88.25% in inoculated control. Further there was an increased expression of defense associated genes including, MAPKK1, WRKY33BB, NPR1 and PR1.The present investigation clearly indicated the efficiency of MAMP genes in triggering defense mechanism in tomato against GBNV.

Vanthana M. , Nakkeeran S.*, Malathi V. G., Renukadevi P. and Vinodkumar S.

Department of Plant Pathology, Centre for Plant Protection Studies, Tamil Nadu Agricultural University, Coimbatore-641003, India

**Correspondence: nakkeeranayya@gmail.com*

5.2. Abstract of paper presented for Prof. M. S. Swaminathan Award

***[Presented for the award competition-First International Conference held at Annamalai University, Annamalainagar, Tamil Nadu from* 23 to 25 July 2020]**

5.2.1. Awareness and adoption of climate resilient recommended farm Technologies in rearing livestock and fisheries in Namakkal district of Tamil Nadu

The climate change issues in Namakkal district have affected the farm sector in a big way. The production and productivity losses coupled with the need to satisfy their thriving animal husbandry sector has resulted in farming community adopt and use a combination of new recommended farm technologies with their traditional farm expertise catering to their daily dairy needs and long-term development interests. Many climate resilient recommended farm technologies introduced as a part of National Innovations on Climate Resilient Agriculture (NICRA) under the technical leadership of Central Research Institute for Dry land Agriculture (CRIDA) was introduced and adopted in farming and this has assisted them in getting fodder for their dairy animals. A study undertaken among 120 farmers in Erumapatty block of Namakkal district revealed the extent of awareness and adoption of climate resilient recommended farm technologies. At present in farming more emphasis is given to achieve more production and productivity related gains for achieving increased farm production throughout the country. However, in Namakkal district emphasis is given by farmers to judiciously use the available resources at their disposal to cultivate more fodder crops in their respective land and also use the farm waste as feed for animals. This new model of climate resilient farming integrating it with rearing livestock needs be adopted across geographies as climate resilient recommended farm technologies in similar drought prone areas suited to the development needs of our nation.

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5.3. Influence of rhizobia, *Bradyrhizobium liaoningense* and an arbuscular mycorrhizal fungus, *Ambispora leptoticha* on growth and yield performance of soybean cultivars, MAUS 2 and MAUS 212.

A glasshouse experiment was conducted to understand the influence of rhizobia, *Bradyrhizobium liaoningense* and an arbuscular mycorrhizal fungus, *Ambispora leptoticha* on growth and yield performance of soybean cultivars, MAUS 2 and MAUS 212 (drought susceptible) and DSR 12 (drought tolerant) under different levels of moisture stress conditions [100%, 75% and 50% FC].

The results showed that the plant growth parameters like biovolume index, total dry biomass, root volume and seed yield were significantly higher in dual inoculated plants in all the cultivars at all the moisture levels. Significant difference was not observed between inoculated plants grown at 100% and 75% FC suggesting dual inoculation is beneficial when stress is severe in all the 3 cultivars. The results therefore signify the importance of dual inoculation for imparting stress tolerance in soybean.

Bagyaraj , D J., Ashwin, R. and Mohan Raju, B.

Bagyaraj & Ashwin - Centre for Natural Biological Resources and Community Development (CNBRCD), 41 RBI Colony, Anand Nagar, Bangalore 560 024, Karnataka, India

Mohan Raju - Department of Crop Physiology, University of Agricultural Sciences, Bangalore 560 065, Karnataka, India

6. Awards, Recognitions, Honors received by members of NABS

Amit Baran Sharangi

- SAS Eminent FELLOW Membership in 2021 (By Scholars Academic & Scientific Society, India)
- Awarded PROFESSORSHIP Degree by Cypress International Institute University (Texus-USA) on 28 August, 2021
- Featured in the World Scientist and University Rankings-2021 (By AD Scientific Index, www.adscientificindex.com)
- Member, Asian Council of Science Editors in 2021 (Membership No. 91.367)

Bagyaraj, D.J.

- Nominated as selection committee member for the posts of scientists at CSIR-NBRI, Lucknow on Oct 26, 2021.

Basavaprabhu L. Patil

- Fulbright-Nehru Academic & Professional Excellence Fellowship (2022-23), by USIEF, to visit University of California, Davis, USA, for 9 months.
- Conferred with Prof. B.M. Johri Memorial Award-2021, by Society for Plant Research.

Bharathi, N.

- Conferred with "Distinguished Alumnus Award-2021" by Tamil Nadu Agricultural University, Coimbatore [The awardee is Founder Director, Growmore Biotech Ltd., Hosur, India].

Francis Borgio, J.

- Ranked among top 2% scientists in world by Stanford University as the most influential scientists in 2020 (Published on 19 Oct., 2021).
- Received 'Outstanding Reviewer Award' from Society for Experimental Biology and Medicine (SEBM), Washington, D.C. USA. On 06th Jan 2021.
- Patent granted by United States Patent and Trademark Office [Patent No: "US 11,118,229 B2" on 14th Sep 2021] for 'Single tube multiplex PCR method for the detection of HBA1, HBA2 and HBA12 genes in Saudis

	▪ Selected as Leader: Microbiology Research Group, Since 17th Nov 2021 at the Institute for Research and Medical Consultations (IRMC), Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia.
Inbakandan, D.	▪ Received 'Sathyabama High Score Award - 2021" for overall performance in Academics, Research and Outreach by the Management of Sathyabama Institute of Science and Technology on Teacher's Day Celebration (05 May 2021)
	▪ Recognized as the Task Force Co-Chair, Ecosystem-based Aquaculture Group (E-bAG), from March 2022 by the International Union for Conservation of Nature - Commission on Ecosystem Management (IUCN - CEM)
	▪ Recognized as the Aquaculture Cluster Coordinator, MSME - TIFAC TAP Academic Partner Programme from January 2022 by the Sathyabama Institute of Science and Technology
	▪ Recognized as the Editorial board member of PLOS ONE from November 2021 by the Plos Publishers
	▪ Recognized as the Editorial board member of Mitochondrial DNA Part from September 2021 by the Taylor & Francis Group
	▪ Recognized as the Editorial board member of BMC Research Notes from October 2021 by the Springer Nature Publishers
	▪ Recognized as the Guest Editor for Special issue in Journal of Basic Microbiology from October 2021 by the Wiley Publishers
	▪ Recognized as the Guest Editor for Special issue in Biomass Conversion & Biorefinery from March 2022 by the Springer-Nature
	▪ Recognized as the Reviewer board member of Fishes from October 2021 by the MDPI Publishers
	▪ Recognized as the Expert member to frame Marine Ecosystem Syllabus for the Master of Arts in Sustainability Science by Indira Gandhi National Open University (IGNOU), on April, 2022.
Kalyan K Mondal	▪ Fellow ARRW 2021, Association of Rice Research Workers (ARRW), ICAR-NRRI, Cuttack
	▪ Fellow SARP 2020, Societies for Advancements of Research on Pomegranate, ICAR -NRCP, Solapur, MS
Kirti Singh	▪ Awarded with 'Gomti Devi Eminence National Award-2022-Life Time Achievement Award by Nav Bharat Samittee, Varanasi (U.P.) on 23-04-2022 by Shri Mahendra Nath Pandey, Union Cabinet Minister.
Krishna Gopal Mandal	▪ Joined as Director, ICAR-Mahatma Gandhi Integrated Farming Research Institute (MGIFRI), Motihari, Bihar; prior to that he was working as Principal Scientist at the ICAR-IIWM, Bhubaneswar.
	▪ Received the 'Certificate of Honour' conferred by the Indian Society of Agronomy (ISA), New Delhi, during the 5th International Agronomy Congress held at Hyderabad on November, 2021.
Murugesan, A.G.	▪ Awarded D.Sc. in Environmental Science by Madurai Kamaraj University, Madurai.
Narendra Pratap Singh	▪ Conferred with Life time achievement awards, 2021, Indian society of agronomy, New Delhi

Panneerselvam, A.

- Patents obtained- A process and system for wastewater treatment and sludge minimization (A. Panneerselvam et al., (2021), Published date: 07/05/2021).
- Patents obtained for Compositions comprising Ganoderma lucidum polysaccharide peptide and therapeutic applications thereof (A. Panneerselvam et al., (2021). Published date: 07/05/2021.

Prakash, M.

- Awarded 'Best Researcher Award' (2021) in recognition of his research publications in peer reviewed indexed journals during 2021 by Annamalai university on 28 February, 2022

Prakash, M.

- Awarded Best Researcher Award 2021 by Annamalai University for publishing in impact factor journals.

Shiva, K. N.

- Appreciation letter received from PI, Medi-Hub TBI of ICAR-DMAPR, Anand, Gujarat for delivering a lecture (vide F.No. DMAPR/Medi-Hub, TBI/2021; dt. 20-9-2021).
- Appreciation letter received from North Malabar Chamber of Commerce and Natural Malabar Fruits Farmers' Producer Company (NMFPC) at the Chamber Hall, Kannur, Kerala for delivering Processing of Banana for Business Development (including ABI), (vide WhatsApp/e-mail; dt. 9th December 2021).
- Received Certificate of Appreciation from CEO, Vegetable and Fruit Promotion Council of Kerlam (VFPCK), Government of Kerala on 1st December 2021 for successfully developing a Sea shipment protocol for export of Nendran banana from Kerla to Europe at APEDA Certified Pack House in Nadukkara, Kerala during September 2020 to March/April 2021.
- Consultant to the Tamil Nadu Banana Producer Company Ltd., Tamil Nadu for the export project on "Commercial Sample Shipment of Indian grown 'Red Banana' to Europe Market" (Vienna, Austria & Germany)

Sinosh Skariyachan

- Associate Editor- Computers in Biology and Medicine published by Elsevier (2021- till date)
- Editorial Board Member- Informatics in Medicine Unlocked published by Elsevier (2021- till date)
- Bill and Melinda Gates Foundation Abstract Award for Scientists to attend World Microbe Forum 2021 by ASM Microbe 2021 and FEMS2021 (2021)
- Conference grant from EMBO-EMBL to attend EMBL Symposium: New Approaches and Concepts in Microbiology (2021)
- EMBO-EMBL Symposia fellowship to attend EMBL Symposium: Multiomics to Mechanisms: Challenges in Data Integration (2021)
- Best Research Paper Award: DBT and CSIR Sponsored International Virtual Conference on Biological innovations & Computational Exploration for Pandemic Challenges (CICPAC'22) organized by Department of Biotechnology and Bioinformatics, Bishop Herber College, Tiruchirappalli, Tamil N?du. (2022)

Thajuddin, N.

- Elected Fellow of Royal Society of Biology (FRS-B) London from 1st January 2022.
- Elected Fellow of Mycological Society of India (FMSI) for the year 2021.
- Received National Level Senior Scientist Award from Microbiologists Society, India (2021):

	▪ Patent Granted: Microbial Bioconversion of Curcuminoids to Calebin-A (MBCC) Patent No. 11,299,706 B2, Date of Patent granted: April 12, 2022 - A Method for the Microbial Bioconversion of Curcuminoids to Calebin-A using Microorganisms for large Scale production. Dr. M. Majeed, Mrs Anju Majeed, Dr. N. Thajuddin, et al (US Patent)
	▪ h index- 42; i10 index - 150; Total citations - 8769 (Google Scholar as on 17.5.2022)
Thiruvengadam Venkatesan	▪ Awarded Fellow of National Academy Agricultural Sciences (2022)
Umesha, S.	▪ Awarded BN Chakraborty and Usha Chakraborty IPS Best Teacher Award (2021) by IPS, New Delhi (25 March 2022) at 8th International Conference, Plant Pathology: Retrospect and Prospects, held on March 23-26, 2022 at Sri Karan Narendra Agriculture University, Jobner-Jaipur, Rajasthan, India.
Venkata Raghavendra Rao	▪ Appointed as Senior Executive Vice-President of The World Academy of Medical Sciences by the President, World Academy of Medical Sciences.
	▪ Awarded Fellow of World Academy of Medical Sciences.
	▪ Appointed as the Chairman of the WAMS National Council of India by The World Academy of Medical Sciences.
Viswanathan, R.	▪ Conferred with "Distinguished Alumnus Award-2021" by Tamil Nadu Agricultural University, Coimbatore

7. Publications

A. Books

7.1. Dr. D. J. Bagyaraj

Bagyaraj D.J., Muthukumar T., Ashwin R. 2021. History and Development of Arbuscular Mycorrhizal Research in India. In: Satyanarayana T., Deshmukh S.K., Deshpande M.V. (eds) Progress in Mycology - An Indian Perspective. Springer, Singapore. pp. 223-248.

Mathimaran, N., Singh, D., Rengalakshmi, R., Thimmegowda, M.N., Prabavathy, V.R.., Sekar, J., King, E.D.I.O, Bagyaraj, D.J., Boller, T., Kahmen, A., 5 and Mäeder, P. 2021. Millet based intercropping system facilitated by beneficial microbes for climate resilient sustainable farming in tropics. *In:* Orphan crops for sustainable food and nutrition security: Promoting neglected and underutilized species. Earthscan/Routledge in association with Bioversity International (Eds. Padulosi, S., King, E.D.I.O., Hunter, D., Swaminathan, M.S.,), Routledge, Taylor & Francis Group, London & NY. pp: 273-280.

Anuroopa, N., Anshu, B. R, Ranadev, P., Ashwin, R., Bagyaraj, D.J. 2021. Pseudomonas species in soil as a natural resource for plant growth promotion and biocontrol characteristics - an overview. Madras Agric. J., 108 https://doi.org/10.29321/MAJ.10.000571

Agnihotri, R., Sharma, M.P., Bucking, H., Dames, J.F., Bagyaraj, D.J. 2022. Methods for assessing the quality of AM fungal bio-fertilizer: Retrospect and future directions. World J. Microbiol. Biotechnol. Https://doi.org/10.1007/s11274-022-03288-3

7.2. Prof. Brahma Singh

Monograph- on DRDO Life Sciences R&D-Brahma Singh, 2022. (in press), DRDO-DESSIDOC, New Delhi page 418

E- Magazine NEW AGE PROTECTED CULTIVATION- Jan-Jun 2022. Brahma Singh, 2022. BSHF publications

7.3. Dr. J. Francis Borgio

Ebtesam Abdullah Al-Suhaimic, J. Francis Borgio and Hind Saleh Alsuwat (Eds.). 2021. *Souvenir and Book of Abstracts of IRMC-SRP-2021*. Institute for Research and Medical Consultations (IRMC), Imam Abdulrahman Bin Faisal University (IAU), Dammam, Saudi Arabia. ISBN: 978-603-91617-9-0

7.4. Dr. Basavaprabhu L. Patil

Patil, B.L., and Fauquet, C.M. (2021) *Ecology of plant infecting viruses, with special reference to geminiviruses*. In: Studies in Viral Ecology, C. Hurst (ed.). Hoboken, NJ.: John Wiley & Sons, Inc. Chapter 6, pp. 183-229. https://doi.org/10.1002/9781119608370.ch6

Patil, B.L., Chakraborty, S., Czosneck, H., Fiallo-Olivé, E., Gilbertson, R.L., Legg, J., Mansoor, S., Castillo, J., Naqvi, R.Z., Rahman, S.U., and Zerbini, M. (2021) *Plant Resistance to Geminiviruses*. In: Bamford, D.H. and Zuckerman, M. (eds.) *Encyclopedia of Virology*, 4th Edition, vol. 3, pp. 554-566. Oxford: Academic Press. http://dx.doi.org/10.1016/B978-0-12-809633-8.21565-3 (*Corresponding author) (No. of Citations=2)

Patil, B.L. (2021) *Cassava Brown Streak Viruses* (*Potyviridae*). In: Bamford, D.H. and Zuckerman, M. (eds.) *Encyclopedia of Virology*, 4th Edition, vol. 3, pp. 293300. Oxford: Academic Press. http://dx.doi.org/10.1016/B978-0-12-809633-8.21239-9

Patil, B.L. (2021) *Plant Viral Diseases: Economic Implications*. In: Bamford, D.H. and Zuckerman, M. (eds.) *Encyclopedia of Virology*, 4th Edition, vol. 3, pp. 81-97. Oxford: Academic Press. http://dx.doi.org/10.1016/B978-0-12-809633-8.21307-1 (No. of Citations=18)

7.5. Dr. K. M. Kothandam

KM Gothandam, R. Srinivasan, S. Ranjan, N. Dasgupta, E. Lichtfouse (Eds.) Environmental Chemistry for Sustainable World. 2021 (Environmental Biotechnology Volume 4 2021). 68, Springer Nature Switzerland. P.243 pages. ISBN 978-3-030-77794-4; eBook ISBN: 978-3-030-77795-1 DOI: 10.1007/978-3-030-77795-1 https://www.springer.com/in/book/9783030777944

Vaibhav Kumar Maurya, KM Gothandam, N. Dasgupta, S. Ranjan, E. Lichtfouse (Eds.) Sustainable Agriculture Reviews, (Micro and Nano Engineering in Food Science Vol 1. 2021) Springer Nature Switzerland. ISBN: 978-3-030-76812-6; eBook ISBN: 978-3-030-76813-3; DOI: 10.1007/978-3-030-76813-3 https://www.springer.com/gp/book/9783030768126

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7.6. Dr. Kalyan K Mondal

Chakrabarty PK, Karmakar R, Sellappan S, Saharan MS, Mondal KK, Gurjar MS, and Gogoi, R 2021. Technical Bulletin on Stewardship for Safe Use and Handling of Pesticides. Indian Phytopathological Society, New Delhi, India, 114+vi p. ISBN No. 978-81-953723-3-1

Dubey SC, Chalam Celia V, Hooda KS, Saharan MS, KK Mondal, Kumar Atul, Gurjar MS, Prakash G, Gogoi R, Ghasolia RP, Bagri RK, Meena AK, Chandrawat BS, Sharma Pinki, Raja M, Javeria Shaily (eds.) 2022. Plant Pathology: Retrospect and Prospects, Indian Phytopathological Society, New Delhi (ISBN: 978-81-953723-8-6), pp. 413

Misra AK, Sharma Pratibha, Singh D, Sharma RK, Gogoi R, Mondal KK, Gurjar MS 2022. Indian Phytopathological Society-A Journey of Seventy-Five Years. Indian Phytopathological Society, New Delhi (ISBN: 978-81-953723-7-9), pp 207.

Mondal KK, Laha GS, Mukherjee AK, Prasad MS, Ramanathan A, Rao GP, Krishnaveni D, Matiur Rahaman, Bag MK, Bashyal Bishnu Maya, Prakasam V. 2022. Rice Disease Compendium. Indian Phytopathological Society, New Delhi (ISBN:978-81-953723-5-5) pp 108.

7.7. Dr. M. Prakash

Abdul Majid Ansari, Wajid Hasan and M. Prakash. 2021. *Solanum melongena*: Production, Cultivation and Nutrition. Nova Science Publishers, New York. DOI: https://doi.org/10.52305/RKTC8440 ISBN: 978-1-68507-311-4.

Prakash, M., S. Arivudainambi, S. Rameshkumar and S. Babu. 2021. Coastal Agriculture and Climate change. New India Publishing Agency, New Delhi. ISBN:9789390175017. Pp.180.

8. Activities of Members

8.1. Dr. D.J. Bagyaraj

- Invited by Association of Biotechnology Led Enterprises to participate on their Annual Bio Economy Conclave-2022 and deliver a talk on "Microbial technology enhancing crop productivity"
- As Convener/ Resource Person of the National Academies (INSA, NASI, IASc) Lecture Workshop/ Refresher Course- delivered virtual lectures on different aspects of Microbiology PSG College of Arts & Science, Coimbatore on January 18-19, 2022; Cauvery College for Women, Trichy on February 22-23, 2022.

8.2. Dr. George V. Thomas

- Chaired Farmers Seminar cum Farmer Scientist Interface organized on 24th April, 2022 as a part of Inaugural Function of Platinum Jubilee Celebration of ICAR-Central Plantation Crops Research Institute, Regional Station, Kayamkulam, Kerala

8.3. Dr. J. Francis Borgio

- Delivered an Invited Lecture on "Sequential approaches and practical applications of PCR, RT-PCR, microarray, sequencing and next generation sequencing techniques at "Zoology in 21stCentury", organized by Department of Zoology, Shivaji University, Kolhapur. Maharashtra, India (21st Jan, 2022).

8.4. Dr. Amit Baran Sharangi

- Delivered an invited lecture as Guest Speaker in an Online Webinar at the *Dept of Food Science & Technology, Maulana Abul Kalam Azad University of Technology (MAKAUT)*, West Bengal, India (May 26, 2022)

8.5. Dr. Arati Yadawad

- Organizing Seminar: Climate smart precision farming for sustainable development and augmenting farmer's income from 8-10 March, 2022.
- Delivered invited lecture-"Evaluation and breeding methods for development of sugarcane varieties"

8.6. Dr. G. Archunan

- Organized Seminar-"International Seminar on the Challenges of Surviving the Ramifications of COVID-19", at Marudupandiyar College, Thanjavur on 6 January 2022.
- Delivered an invited talk "Need for the biosensor in pheromone detection" in the National conference on Nanomaterials Driven Advances in Chemical Biosensors organized by the Department of Bioelectronics and Biosensors, Alagappa University,KarIkudi on 24 March 2022.

8.7. Dr. Basavaprabhu L. Patil

- Delivered an Invited Lead Talk on "*miRNA-induced Gene Silencing (MIGS) for control of multiple pathogens*", in VIROCON-2021, AIIMS, Hyderabad, during 28th March 2022.

8.8. Prof. Brahma Singh

- TIFAC, GOI assignment completed. Report submitted on Vertical Farming and Horizontal Farming in India concluded as Vertical Farming is Future Urban Farming for Fresh Food in India.

8.9. Dr. D. Inbakandan

- Organized a 5 days Virtual FDP to celebrate the World Water Day 2022 from 22nd to 26th March 2022, jointly with the Centre for Ocean Research, Sathyabama Institute of Science and Technology and Ministry of Earth Sciences (MoES) - Earth Science Technology Cell (ESTC) and with IUCN Commission on Ecosystem Management (IUCN CEM)
- Organized a 5 days - Online Faculty Development Program (FDP) on Advanced Integrated tools for research in Marine Biology and Biotechnology from 25th - 29th April, 2022, jointly with the Centre for Ocean Research, Sathyabama Institute of Science and Technology and Ministry of Earth Sciences (MoES) - Earth Science Technology Cell (ESTC)
- Organized a 15 days - Internship & Hands on training in Aquaculture & Marine Biotechnology from 06th 20th May 2022, jointly with the Centre for Ocean Research, Sathyabama Institute of Science and Technology and Ministry of Earth Sciences (MoES) - Earth Science Technology Cell (ESTC)
- Delivered an invited lecture on 'Artemia: an excellent live feed for Aquaculture Industry' in the National One day Awareness Programme on "Fisheries Technologies for Alternative Livelihoods" organized Guru Nanak Centre for Research, Guru Nanak College, Chennai, during 12.01.2022.

8.10. Dr. Kalyan K. Mondal

- As Co-convener organized 8th International Conference (Hybrid Mode) on Plant Pathology: Retrospect and Prospects by Indian Phytopathological Society at SKN AU Jobner-Jaipur, Rajasthan, India March 23-26, 2022.
- Co-chaired a technical session on Host Plant Resistance March 24, 2022 in the 8th International Conference (Hybrid Mode) on Plant Pathology: Retrospect and Prospects by Indian Phytopathological Society at SKN AU Jobner-Jaipur, Rajasthan, India March 23-26, 2022.
- Invited talk on "Xanthomonas oryzae pv. oryzae-effectors vs rice: an unending tug of war. *In Proceedings of IPS 8th International Conference on Plant Pathology: Retrospect and Prospects*, March 23-26, 2022, SKN Agricultural University, Jobner-Jaipur, Rajasthan, India 53-54 pp. (Keynote speaker).

8.11. Dr. Narendra Pratap Singh

- Organized Kulagar - A traditional Agriculture system for Agro- ecotourism in the Konkan region of India in National symposium on self - reliant coastal agriculture, May 11-13,2022, State level workshop on Kulagar on May 26th 2022.

8.12. Dr. N. Thajuddin

- Delivered a lecture on 'Microalgae Taxonomy to Technology' in the MHRD - RUSA 2.0 sponsored Skill Based Internship Programme on 'Advanced Techniques for Microalgal Cultivation organized by CAS in Botany, University of Madras, Chennai on 4th January 2022.

- Delivered a lecture on "Microalgae a Potential to be Exploited" in the *Refresher Course in Biotechnology* organized by the Centre of Biotechnology, University of Allahabad, Allahabad- 211002, Uttar Pradesh on 11th January 2022.
- Delivered a lecture on " *Research Funding Schemes and Project Proposal Preparations*" in the UGC sponsored online short-Term course in 'Research & Publication Ethics' for the University and College Teachers organized by the UGC-Human Resource Development Centre, Bharathidasan University, Tiruchirappalli 620 023 on 24th January 2022.
- Delivered inaugural address as Chief Guest in the DST-SERB sponsored Scientific Social Responsibilities (SSR) activity-based workshop on two days National Virtual Workshop on "Best Practices in Plant Tissue Culture" on 11th February 2022 at the Department of Botany, Bharathidasan University, Tiruchirappalli 620024.
- Delivered valedictory address as Chief Guest in the DST PURSE and RUSA 2.0 sponsored two days 3rd National Workshop on "Biotechnological Solutions for Environmental Challenges" (BITSFECs) on 23rd February 2022 at the Department of Environmental Biotechnology, Bharathidasan University, Tiruchirappalli 620 024.
- Delivered a lecture on " *Cyanobacterial taxonomy to Biotechnology*" in the RUSA 2.0 sponsored National Workshop on Molecular methods in Taxonomy to Biotechnology of Actinobacteria and Cyanobacteria (MoMeTBAC-22) organized by the Department of Microbiology, Bharathidasan University, Tiruchirappalli 620 024 on 8th March, 2022.
- Demonstrated "*Morpho-taxonomical methods of Cyanobacterial identification*" in the RUSA 2.0 sponsored National Workshop on Molecular methods in Taxonomy to Biotechnology of Actinobacteria and Cyanobacteria (MoMeTBAC-22) organized by the Department of Microbiology, Bharathidasan University, Tiruchirappalli 620 024 on 9th March, 2022.
- Delivered MSI Fellow 2021 award lecture on "*Diversity, Morphological, Biochemical and Molecular characterization of Marine Fungi*" in the National Conference (Virtual) on Mycology and Mankind: Marching ahead in the new era & 48th Annual Meeting on Mycological Society of India on 9th March 2022 organized by ICAR Research Complex for NEH Region, Umiam, Meghalaya & Mycological Society of India.
- Delivered a Keynote address on " *Cyanobacteria and Microalgae From Biodiversity to Biotechnology*" in the Ten days Internship on Fermentation Technology" organized by the Department of Microbiology, Karpagam Academy of Higher Education, Coimbatore on 17th March, 2022.
- Delivered a invited talk on "*Cyanobacterial biodiversity and their role in Biotechnology"* in the Symposium on Biological diversity National Perspective, Biodiversity Crisis, Concerns and Mitigation Approaches organized by the Department of Biotechnology, Alagappa University, Karaikudi jointly with Bhabha Atomic Research Centre (BARK), Mumbai on 13th May, 2022.

8.13. Dr. A. Panneerselvam

- Chaired a session at a national conference on "Mycology and mankind: Marching ahead in the new era", 48th Annual Meeting of Mycological Society of India, March 8-10, 2022.

8.14. Dr. T. Senthil Kumar

- Attended Innovative Research Approaches in Biological Sciences at Jamal Mohamed College (Autonomous), Tiruchirappalli-620020 during 25th & 26th May 2022 and Chaired a Scientific session.
- Attended 31st IAAT Annual Conference & International Conference on "Documentation, Bioprospecting & Conservation of Biodiversity for Sustainable Development" at Yash Resort, Bhandardara, Kalsubai-

Harishchandragad Wildlife Sanctuary, TalukaAkole, Ahmednagar, Maharashtra, India from 5th to 7th April 2022 and also Chaired a Scientific session.

- Attended International Conference cum Workshop (in hybrid mode) on "Agrotechnology,Value Addition, Global Trade and Sustainability of Medicinal / Neutraceutical Orchids" and Orchid Show organized by The Orchid Society of India (TOSI) jointly with Dr Y S R Horticultural University,Venkataramannagudem- 534 101, West Godavari (Andhra Pradesh) during March 25-27, 2022 and Chaired a Scientific session.
- Organized Workshop on "Basic practices in Plant Tissue Culture" sponsored by DST-SERB under Scientific Social Responsibility (SSR) for College Teachers at Bharathidasan University, Tiruchirappalli during 11th & 12th February 2022.
- Attended " XLIV AIBC of the Indian Botanical Society & National Symposium on Plant Science Research in Present Scenario: Opportunities and Challenges" held during 18th October 2021 to 20th October 2021 at Jai Narain Vyas University, Jodhpur, Rajashtan and Co-Chaired a Scientific session.

8.15. Dr. Sinosh Skariyachan

- Organized (Organizing secretary) Gracias Gurú 2022: Two-day National Webinar on Emerging Trends and Frontiers in Applied Microbiology and Biotechnology jointly organized by the Department of Microbiology, St. Pius X College, Rajapuram, Kasaragod, Kerala and Microbiologists Society, India (MSI). 10- 11 March 2022.
- Delivered an invited lecture in National Webinar on World Malaria Day. Jointly organized by Microbiologists Society, India, Jharkhand Unit and St. Xavier's College, Ranchi, Jharkhand. Topic: Scope of Computational Biology and Omics Sciences for the Discovery of Novel Antimalarial Agents. 25 April 2022.

Obituary

Mrs. Mina Swaminathan, wife of agricultural scientist Prof. M S Swaminathan, Honorary Fellow of National Academy of Biological Sciences, Chennai, passed away on 14- March 2022 (Monday) in Chennai. She was a renowned educator and child care expert who chaired the committee that recommended what became the Integrated Child Development Scheme (ICDS). She was one of the founders of the Mobile Creches; a former chair of the Delhi Social Welfare Board; an Emeritus Trustee of the M S Swaminathan Research Foundation; a founding member of the Centre for Women's Development Studies and an international consultant with UNESCO and UNICEF on childhood care and education. As chair of the Central Advisory Board of Education (CABE) Committee on 'The Preschool Child', she steered the development of the Report on the Preschool Child (1972) which led to the setting up of ICDS, the most comprehensive child care service in the developing world. Her contribution to ICDS, particularly in Tamil Nadu, is notable after she moved to Chennai in 1989, setting up mobile training teams, a unique innovation, travelling widely across the state and working with ICDS frontline workers. We deeply mourn the demise of Mrs. Mina Swaminathan who passed away on 14 March 2022. The members of Executive Council of National Academy of Biological Sciences [NABS] and all members of NABS covey their deep condolences to Prof. M. S. Swaminathan and his family members.

9. Enroll yourself as a member and be a part of NABS

Types of Membership available (one time payment)

A. Life Member	:	₹ 5,000/- or US$ 200/-
b. Provisional Life Membership	:	₹ 5,000/- or US$ 200/-
c. Corporate Life Member	:	₹ 10,000/- or US$ 400/-
D. Corporate Fellow	:	₹ 1,00,000/- or US$ 4000/-

- Duly filled membership form shall be sent as Secretary NABS in WORD format by E-mail to secretarynabs@gmail.com
- The prescribed membership fee shall be transferred on line

9.1. Account details of National Academy of Biological Sciences

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Account number	:	**10496978637**
Type of account	:	Savings Account
Name of Bank	:	State Bank of India, Valmikinagar Branch, Thiruvanmiyur, Chennai - 600 041
Branch code / IFSC code	:	Branch code: 11721 - IFSC code: SBIN0011721

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On behalf of National Academy of Biological Sciences

An appeal to members of NABS
Kindly inform change of address including phone numbers and
E-mail to the Secretary, NABS by
E-mail (secretarynabs@gmail.com)

Circulated to members as E-copy on 12.07.2022