

# DBT-TDNBC-DEAKIN— RESEARCH NETWORK ACROSS CONTINENTS FOR LEARNING AND INNOVATION (DTD-RNA) NEWSLETTER



Ministry of Science & Technology  
Government of India



Deakin University CRICOS  
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The Energy and  
Resources Institutes

## EDITORS:

**Dr. Vibha Dhawan**  
**Dr. Pushplata Singh**

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## MESSAGE FROM DR VIBHA DHAWAN, DTD-RNA COORDINATOR

It is a great pleasure to extend heartfelt greetings to the readers of the fourth issue of the DTD-RNA newsletter.

The Energy and Resources Institute (TERI) is a leading think tank dedicated to researching the sustainable development of India and the Global South.

TERI was established in 1974; the organization formulated local and national strategies to suggest global solutions to critical energy and environment-related issues. Over the decades, it marked a research institute whose policy and technology solutions transformed people lives and the environment. TERI, best described as an independent, not-for-

profit research institute focused on energy, environment, and sustainable development and devoted to efficient and sustainable use of natural resources. TERI is headquartered in New Delhi; TERI has established offices in Gurgaon, Mumbai, Bangalore, Goa, Guwahati and Mukteshwer in the Himalayas and International centres.

Research at TERI seeks to find solutions to problems related to attaining sustainability and environmental degradation and has made a difference in many people lives. The organization of webinars and trainings committed to these areas is a continuous process. The **TERI-Deakin Nano Biotechnology Research Centre (TDNBC)** is a joint centre of excellence that aims to foster cutting-edge research in nanobiotechnology and provide global solutions for a sustainable future. Setting up is one of TERI plans to create capacity and expertise for technological solutions to inefficient use of natural resources.



This newsletter serves as a window through which the complete profile of the activities, achievements and progress made during the stipulated period can be viewed.

*"When everything changes, ADAPT!"*

Life continues to be challenging, but restrictions are starting to lift in many Countries. It has been hard to plan for the future, but the 'Great Pause' has been an opportunity to reflect, although there are events scheduled in the coming months.

Digital communication is fast becoming increasingly important. The DTD-RNA website is well-linked with its Facebook, Linked In, Instagram and Twitter connections, which means that our message now reaches even more readers. We plan to add a YouTube link and a dedicated destination section shortly.

Finally, thanks to our partners - the Department of Biotechnology, Deakin University for allowing us to take this initiative forward. Sharing resources and respect for the environment has been an important lesson for us during these uncertain times. There is much good in the DTD-RNA community, and focusing on the people can weather the storm and come out stronger!

Stay healthy and stay safe!



## MESSAGE FROM DR PUSHPLATA SINGH, DTD-RNA INVESTIGATOR

*"Shining light on the world beneath our feet"*

TERI-Deakin Nanobiotechnology Centre (TDNBC), Gurugram, India and Deakin University, Australia, in association with the Department of Biotechnology, Government of India, has created "DBT -TDNBC - DEAKIN – Research Network Across continents for learning and innovation (DTD-RNA)". This network was launched on 3rd September 2019.

TDNBC is committed to creating an ambience for nurturing innovation, creativity and excellence.

We are doing lots of activities to provide a common platform to interact and take the

initiative further of our Creation of innovation hub in India and Australia for networking with various originations working on a different nanotechnology level.

The Mycorrhiza Network at TERI has been actively developing and applying mycorrhizal biofertiliser, technology development and its transfer, and information dissemination activities. The network is responsible for linking scientists with the latest mycorrhiza information besides helping scientists and students carry out research in the field of Mycorrhiza and in promoting communication among Mycorrhizologists. We at TERI provides an opportunity to researchers to obtain specific cultures of interest; preserve germplasm available in India and elsewhere; procures strains of both ectomycorrhizal (EcM) fungi and arbuscular mycorrhizal (AM) fungi from India and abroad; multiplies and maintains these fungi in pure culture; and provides starter cultures for various research activities. The Centre is also involved in imparting training to promising youngsters who are interested in Mycorrhizal research. We conducted an E-workshop on Quality Control of Arbuscular Mycorrhizal Biofertilizers as part of our DTD RNA Network Programme at TERI-Deakin NanoBiotechnology Centre TERI Gram, Gual Pahari, Gurugram on 9th April 2021.

We aimed to impart training on fundamentals, wet lab protocols, data analyses and report generation for quality evaluation of Arbuscular Mycorrhizal Fungi (AMF) based products to researchers,



professionals and consultants working at industries research institutes, universities and regulatory organisations.

AMF has emerged as a vital contributor to sustainable agriculture. They enhance plant nutrition and yield up to 25% and are also known to curtail chemical fertiliser inputs by up to 50%. Due to such essential beneficiary roles and market demand of AMF-based products, quality checks (QC) of arbuscular mycorrhizal based biofertilisers is required by the researchers, industries, and regulators to ensure that only quality products to be produced enter the Agri-markets.



# WEBINAR ON: E-WORKSHOP ON QUALITY CONTROL OF ARBUSCULAR MYCORRHIZAL BIOFERTILIZERS

DTD-RNA (DBT -TDNBC - DEAKIN – Research Network Across continents for learning and innovation (DTD-RNA)) Network organized an “E-Workshop on Quality Control of Arbuscular Mycorrhizal Biofertilizers” on 9th April, 2021, 2.00-4.00 PM (IST). The aim of the E-workshop was to educate, train and spread awareness among the researchers, professionals and consultants working at industries, research institutes, universities and regulatory organizations about the fundamentals, wet lab protocols, data analyses and report generation about the quality evaluation of AMF-based products.

The event commenced with the introductory remarks and welcome address by Dr Alok Adholeya, Program Director, Sustainable Agriculture, The Energy and Resources Institute (TERI), New Delhi, India.

Session 1 focussed on the “Quality control of arbuscular mycorrhizal fungi based products and current perspectives on their policies and regulations in India and Europe”. Three expert talks were delivered in this session by Dr Gagnesh Sharma (Director (Incharge), National Centre of Organic Farming, Ghaziabad, India), Dr Christian Hecker (Representative of the presidency at IF TECH, France) and Dr Alok Adholeya followed by an interactive session. Dr Gagnesh Sharma delivered talk on “Indian perspective on AMF based biofertilizers and their policies and regulation” apprising audience on regulations laid by Indian government for AMF based fertilizers and discussed importance on amendment on norms for analyses of AMF fertilizers. Dr Christian Hecker, gave insights on the European Union (EU) regulation n 2019/1009 where mycorrhiza was included under the product function category of plant biostimulants of the EU fertilizing products. His talk stressed on the requirement of a simple, low cost, reliable method for counting of AM propagules. Furthermore, Dr Hecker set forth some questions in his concluding points for further discussion which included need for acclaimed quality testing labs, universal denomination/reference for quality control (QC) of mycorrhizal inoculum, acceptance of new methods by industries developed by scientific community and an international agreement between government authorities on the quality parameters of the mycorrhizal inoculum.

Thereafter, Session 2 began with the Web-based demonstration for quality control analysis of various AMF-based formulations with two special talks and demonstration sessions. Special talks were delivered by Dr Ankit Kumar and Dr Pushplata Singh about the laboratory protocols recommended for Quality evaluation of AMF products and molecular tools for quality check of AMF products respectively. Dr. Ankit discussed about the fundamentals and practical aspects of quality control analysis of the various AMF based products in the market. He discussed about the FCO parameters and the challenges being faced by the Industries with regard to practical implementation of the regulatory guidelines. This was followed by discussion on the protocol for enumeration of spores, viability assessment of spores in the product and assessment of root colonization potential of AMF in the product. Later, Dr Pushplata Singh, presented on molecular characterization of AMF species. Instead of the generally used method of molecular characterization of AMF with the single set of universal ITS primers, it was shown that by using 2-3 different sets of primers from the highly conserved rDNA genes AMF species can be uniquely characterized. Particularly, primers from small subunit rRNA (SSU rRNA) gene improves species level identification because this region of rDNA is less variable than ITS primers in AMF in comparison to other fungi and allows enough resolution down to the species level in AM fungi. Identification of species from both in-situ mixed cultures and in-vitro monosporal cultures were shown. For species level identification of AMF, DNA extracted using single spore is directly utilized for PCR and sequencing were also shown.

Session 2 was followed by Web-based demonstrations (conducted in two parts) of step-wise quality control analysis of AMF-based formulations by Dr Leena Johny. First part explained the basics for quality control assessment of AMF based formulations which included requirements of a QC facility, prerequisites before QC analysis, awareness on AM propagules and available AM formulations in market. Second part included demonstration of five QC procedures for two categories of AM based formulations- Technical

concentrate (powder and liquid based formulations) and finished product (powder, granule and liquid based formulations). All QC procedures also showcased spore observation under microscope, spore counting and data recording template. Furthermore, mycorrhiza spore viability via MTT {3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide} assay was demonstrated. The principle and prerequisites of the assay, and observation of viability were explained during the demonstration. Molecular characterization of AMF-based products was demonstrated by Ms Pratima Vasistha.

Session 3 elaborated about the data collection and descriptive analyses for quality control of AMF-based products and was demonstrated by Dr Shivani Srivastava followed by an interactive session with the participants. An overwhelming response was received in the interactive session where both industrial and academia participant raised and discussed their queries for the expert speakers and gained valuable insights.

Towards the end of session 3, Q&A session was conducted by Dr Reena Singh where participants raised queries for experts on topics such as i) repeatability and reproducibility on number of spores/ gm for AMF fertilizers based in India and importance of acceptable range (variability limitation on spore count) was discussed, ii) MPN assay effectiveness for AMF product assessment, iii) consideration on revisiting label claiming of mycorrhizal product and their efficacy in India, iv) correlation between spore number and infection potential and dependence on species type and virulence and energy level, v) consideration on consortia products for multifunctional properties for a given ecosystem, vi) importance of dose definition for per acreage application of AMF based fertilizers.

Dr Alok Adholeya proposed a vote of thanks to all the dignitaries, industrial and academia participants and organizing team members for making this e-workshop a success.

The E-workshop was attended by 75 participants from India, Kenya, Indonesia, Chile, Venezuela, USA, UK, Greece, Australia, Morocco, Germany, South Africa and Costa Rica.

Event Cell  
Host, me



Layout

Viewing TERI GRAM BOARD...

**QUALITY**

**terri** DEAKIN UNIVERSITY

**E-WORKSHOP ON QUALITY CONTROL OF ARBUSCULAR MYCORRHIZAL BIOFERTILIZERS**

9<sup>TH</sup> APRIL 2021 | 2:00 PM – 4:00 PM

Event Cell  
Host, me



Layout

Viewing TERI GRAM BOARD...

# Indian perspectives on AMF-based bio-fertilizers and their policies and regulations



Dr. Gagnesh Sharma  
Director (Incharge)  
National Centre of Organic Farming, Ghaziabad

Unmute Start video Share Record Participants Chat

Event Cell  
Host, me

Leena Jhony

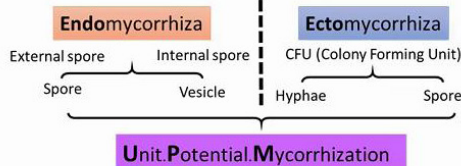


pushplata singh

Layout

Viewing christian HECKER's ...

## A common denomination : Unit of Potential Mycorrhization



**A common denomination :** number of UPM per metric (L/g/kg/cm<sup>3</sup>) - (% spores, % propagules) - In vivo/In vitro

Examples :

- 500 UPM per g (80% vesicle, 20% spores) in vitro
- 100 UPM per g (100% spores) in vitro
- 200 UPM per cm<sup>3</sup> (100% spores) in vivo

Poster "The Concept of Mycorrhizal Potential Applied to Inoculants", C. Plenchette, C. Hecker, presented at the International Conference On Mycorrhiza in Merida, Mexico in 3/5/2019 2019

Unmute Start video Share Record Participants Chat

Event Cell Host.me   pushplata singh   christian HECKER   Leena Jhony



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Participants Chat

# DTD-RNA PARTNERS THAT HAVE JOINED DURING DECEMBER 2020-MARCH 2021

## Network Partners



BioNanonet (BNN), Austria

## Institute Partners



Developing Agriculture from the Ground Up

International Fertilizer  
Development Centre (IFDC), USA

## Industry Partners



Better Science.  
Better Harvest.



- ▶ KLR Green Biologicals Pvt. Ltd (KLRGB), Nagarjuna Fertilizers & Chemicals Ltd., India
- ▶ DCM ShriRam Ltd, India
- ▶ Coromandel International Ltd, India
- ▶ Adventz Group (Zuari Agro Chemicals Ltd.), India
- ▶ Croda India Company Private Limited, India
- ▶ Nuziveedu Seeds Ltd and Global Agrigenetics, India
- ▶ Smart Farming Technologies, Netherlands

## Upcoming events of DTD-RNA network during April–June 2021

Website: <https://www.teriin.org/projects/dtd-rna/events.php>

- ▶ Consultative Webinar on Nanostructured Materials in Food Packaging, Preservation and Diagnostics - On 26th August, 2021
- ▶ E-Workshop on International Test Guidelines and Methods for Nano safety” on 22nd-23rd July, 2021