



NABS *News Letter*

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From the Desk of President.....



Dear NABSians,

Greetings from NABS.

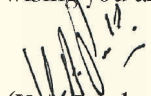
The dawn of 2020 was greeted with greater enthusiasm and hope. But, Covid-19, a tiny RNA virus has derailed the human activities around the globe throwing challenges to the entire humanity in the world as the infection by the virus became Pandemic. Naturally, the First NABS-International Conference scheduled from 23 to 25 July 2020 at Annamalai University has to be postponed. However, the deadline to receive the abstracts and registration to the conference has been extended till 31 August 2020. The cooperation and support extended by all the members and scientific fraternity is greatly appreciated. May be 2021, year of hope, will show us the way how we need to proceed further. I am fully confident that the Conference will surely be held early in 2021. Meanwhile, the process of selection of members for fellowship and awards of NABS for the year 2019 will be completed, I hope, when travel to Chennai become easy as we all know that the incidence of Covid-19 is the limiting factor to organize the Technical Review Committee meeting to select the eligible candidate for various awards of NABS.

I take this opportunity to request all the members to stay safe and follow the three golden rules to avoid contracting Covid-19. I pray the almighty to release the world from this pandemic.

Dr. M. Anandaraj who is the Editor-in Chief is not keeping well to attend to his duties. Hence, Dr. S. Nakkeeran is looking after his duties till Dr. Anandaraj resumes back. We pray for his speedy recovery.

We, the NABSians place on record our sincere thanks and gratitude to all the dedicated soldiers-the community of doctors, police, sanitary workers and public servants who are fully committed to help the nation to win over the dreadful virus.

Wishing you all a safe 2020 and ahead.


(V. A. Parthasarathy)
President, NABS

2. Message from Vice-President...



Dear Members of NABS,
Greetings.

The corona virus pandemic has changed the way we conduct meetings/ conferences/ workshops/ trainings and day-to-day official matters, etc. due to lockdown conditions imposed everywhere. Now these are being dealt online. In a way this has in fact increased the effectiveness of the programmes and reduced the cost of organization to a great extent. We humans exist within a web of life which is complex and inter connected. When one component is altered or removed the entire system is affected. Human actions like deforestation, encroachment of wildlife habitats, intensified agriculture have accelerated climate change and reduced biodiversity existing in nature. Biodiversity loss provides opportunity for pathogens to spread from animals to humans (zoonotic). COVID-19 provides us an opportunity to revisit our relationship with nature and rebuild an environment without destroying biodiversity. As global population approached 10 billion, we need to better understand the web of life in which we live and put nature at the heart of our decision making. Preserving and sustainably managing biodiversity is necessary for mitigating climate disruption guaranteeing water and food security and even preventing pandemics. As biologists in India what is our reaction?

COVID-19 emphasizes the immediate need for effective antiviral drugs and vaccines that could control and prevent the spread of this virus. Development of vaccines is underway by scientists in many institutes of our country. Traditional medicines involving plant based formulations have proven successful in boosting immunity and providing tolerance to viral infections. The Ministry of AYUSH, GOI has recommended a formulation composed of 15 plants which keeps the corona virus infection levels at bay. The Central Institute of Fisheries Technology, Cochin has developed a hand sanitizer from seaweed (red algae) for protection against COVID-19. Global Plant Council, Ontario, Canada has brought out that majority of the phytonutrients required for boosting immunity against COVID-19 are available in traditional and underutilized food crops rich in Zn, Fe, Cu, vitamins and antioxidants that strengthen human immune system. Their utilization and conservation needs more attention under the present situation. If possible, as biologists let us contribute at least little towards this goal.

Please work from home and stay safe. Wishing you all a very good health.

(D.J. Bagyaraj)
Vice-President

3. Message from Editor in Charge



Dear Members of NABS,
Greetings.

The human genome project has led to development of 'omics' sciences and advancements in sequencing and computational technologies have delivered several tools and technologies to unravel the mysteries of microbial world. The microbiome present in the rhizosphere of plants is often compared to human gastro intestinal tract. The importance of gut microbiome in the health and immunity has led to the 'faecal transplant technology'. Likewise, agricultural productivity depends on soil health and plant health. The health of soil and plants depends on the microbial wealth. But, in the present day agricultural scenario, most of the important plant species are becoming extinct. Not only the plants are getting extinct, but the microbiome associated with the plants is also put into threat. The diversity of microbial assemblages is highly complex in rhizosphere, endosphere, phyllosphere and spermosphere.

The diverse microbial genomes support plant growth and health by better understanding the microbial signalling with plant. Nowadays, crop production is facing many challenges such as climate change, the demographic development, and an increasing demand of sustainable production. As microbes have been explored as biofertilizers or biopesticides there is increasing interest to integrate them as alternatives to chemical products to improve soil health, plant health and human health. In this juncture, to explore the potential of microbiome a smart, knowledge-driven selection of microorganisms is highly imperative. Besides, the use of suitable delivery approaches and formulation development is required. On the other hand, farming practices or the plant genotype can also influence plant microbiota and their functioning. Therefore, selection of appropriate farming practices and germplasm accessions leading to improved plant-microbiome interactions can serve as avenues to increase the benefit of plant microbiota. For example, the diversity of rhizomicrobiome, endomicrobiome and phyllobiome are totally different between the resistant and susceptible genotypes. The microbiome present in the resistant genotypes are highly diverse with antimicrobial and plant growth promoting properties than the microbiome presents in the susceptible genotypes. Thus, resistant nature of a genotype to biotic or abiotic stress relies upon the diversity of microbiome. Hence, it is customary to conserve the plant diversity and microbiome diversity for the betterment of plant health, soil health and mankind. In conclusion, different avenues making use of a new generation of inoculants as well as the application of microbiome-based agro-management practices and improved plant lines could lead to a better use of the plant microbiome.

(S. Nakkeeran)
Editor in charge, NABS NL

4. News and Events

4.1. News

4.1.1. Dr. R. S. Paroda is bestowed with Dr. M.S. Swaminathan Award



Dr. Raj Paroda, the former member of the ICRISAT Governing Board and former Secretary, DARE & Director General, ICAR, New Delhi and current Chair, Trust for Advancement of Agricultural Sciences, has been bestowed with **Dr. M.S. Swaminathan Award** for Environment Protection 2020, as announced recently by the Rotary Club of Madras East.

The award is in recognition of his great contributions in the field of Plant Breeding and Genetic Resource Management, as well as towards establishing several institutions in the sectors of Agriculture & Horticulture crops, Livestock, Natural Resource Management, Fisheries, Agricultural Engineering and Social Sciences.

Dr. Raj Paroda will be the first Indian Scientist to receive this award. The Award Ceremony is planned to be held on the evening of 8 August 2020.

4.1.2 “National Jawaharlal Nehru Award” from Indian Council of Agricultural Research, New Delhi was bagged by Dr. S. Vinodkumar of Tamil Nadu Agricultural University, Coimbatore



ICAR institutes the prestigious Jawaharlal Nehru Award for P.G. Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences. Since 1969, the award is conferred annually in order to promote high quality doctoral thesis research. It consists of 18 awards with 2 awards in each of the 9 categories including, Crop sciences, Animal sciences, Natural resource management, Crop protection, Fisheries, Horticulture, Agricultural engineering, Social sciences and Biotechnology. Each award consists of Rs. 50,000/- in cash, citation, certificate and gold polished, silver medal. Every year the list of awardees are announced during the ICAR foundation day ceremony.

The 92nd Foundation Day and Award Ceremony of the Indian Council of Agricultural Research was organized on 16th July, 2020 through Video Conferencing. The ICAR awards for the year 2019 was announced through live stream in the presence of Hon'ble Agriculture & Farmers Welfare Minister - Shri Narendra Singh Tomar and Hon'ble Ministers of State for Agriculture & Farmers Welfare – Shri Parshottam Rupala and Shri Kailash Choudhary, Dr. Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR) and other panel members.

Dr. Vinod Kumar Selvaraj representing Tamil Nadu Agricultural University was awarded with the ICAR-Jawaharlal Nehru award under the crop protection category. His Ph.D. research was on the **“Emergence of tobacco streak virus infecting cotton: Investigations on symptom expression, transmission, spread and management”**. which is a GOI-DBT funded research project received by Dr. P. Renukadevi, Associate Professor (Plant Pathology), TNAU, Coimbatore.

The research work was executed under the advisory committee comprising,

Chairman: Dr. S. Nakkeeran, Professor (Plant Pathology)

Principal Investigator: Dr. P. Renukadevi, Associate Professor (Plant Pathology)

Members: Dr. V. G. Malathi - Adjunct faculty

Dr. S. Mohankumar, Director, Centre for Plant Molecular Biology & Biotechnology (CPMB & B)

Late. Dr. Amala balu - Professor Centre for Plant Breeding & Genetics (CPBG)

Two research articles were published in peer reviewed, International journals with a cumulative impact factor of 5.3, that helped Dr. Vinod kumar, S. to bag the prestigious Award.

Dr. S. Vinodkumar is also the recipient of Prof. G. Rangaswami Memorial NABS-Best Research Paper Award (under Agricultural Science & Forestry) for the year 2017 & 2018

4.1.3 First NABS-International Conference

- The First NABS-International conference with the theme, “Life Sciences: Contemporary Approaches in Biological Sciences for Food, Health, Nutrition Security and Conservation of Biodiversity” (12th NABS-Conference) scheduled from 23 to 25 July 2020 at Annamalai University Chidambaram stands postponed due to Covie-19 pandemic. However, the abstracts and registration are permitted up to 31 August 2020. The exact date of the conference will be notified in the website of NABS/Annamalai University.
- For any updates, you may please visit the following website or contact Organizing Secretary/Secretary, NABS.

Website

NABS : www.nabsindia.org / www.annamalaiuniversity.ac.in

Contacts

Organizing Secretary : nabsauconference2020@gmail.com

Secretary, NABS : secretarynabs@gmail.com

4.1.4 Recommendations of 11th NABS-National Conference on “Climate Change Driven Challenges on Indian Biodiversity: Innovative solutions for Sustainable Development”

The 11th NABS conference on “Climate Change Driven Challenges on Indian Biodiversity: Innovative Solutions of Sustainable Development” was held from 25th September to 27th September 2019 at Pondicherry University in collaboration with the Department of Microbiology, School of Life Sciences, Pondicherry University, Puducherry. There were seven sessions covering 15 invited lectures by eminent scientist in various fields of biology covering climate change. There was a parallel session on oral presentations by various scientists distributed in six technical sessions- (i) Plant, Animal biodiversity and Fishery Sciences, (ii) Impact of Climatic Changes on Agriculture and Forestry Biodiversity, (iii) Plant Genetic Resources and Protection of Plant Varieties, (iv) Impact of Climatic Changes on Microbial biodiversity, (v) Impact of climate changes on defense strategies and (vi) Nutrition and Food security

The salient recommendations are as follows:

1. Biodiversity inventories carried out across the globe has indicated that there are about 1.5 millions of species described and about 50 million still unexplored /undescribed. The scariest truth is that more than half of all hotspots have already lost over 90% of their intact habitat.
2. In the field of agriculture, the present production system leads to loss of biodiversity as being affected by climate change. This causes genetic erosion and shifting of crop suitability from one zone to another. The major cause of climate is the green house gases such as CO₂, methane, nitrous oxide etc, it is recommended that governmental effort to reduce the pollution would aid in mitigating the problem. Stubble burning adds to the quandary. There must be balance between agro biodiversity and production system. We should create awareness among the communities, documentation of traditional practices for future use and promote the concept of sacred forests. Encourage establishment of community seed banks and policy support to promote sustainable use of plant genetic resources.
3. It is imperative to protect the endemic genetic materials, particularly in alpine and temperate deserts as they house the most useful endangered medicinal plants in areas such as Eastern and Western Himalayas besides Western Ghats. It is estimated that there are about 8500 traditional medicinal plants used in Indian folklore. Hence surveying and conserving these genetic materials must be considered on priority.
4. Exploration in cold deserts has revealed the presence of over 920 genera that includes fruit trees, ornamentals and medicinal plants. The golden bush named as 'brahmphal' is a typical example of “weed to wealth” by realizing the potential as antioxidant and promoting the products for human health.
5. Among the most useful ecosystem that could protect from vagaries of nature, mangrove systems are to be considered as prime importance. The mangrove forest cover in India should be increased at 180km² / year to mitigate the climate change which would aid in significant removal of atmospheric CO₂ besides protecting the

coastline against cyclones, floods as well as fish fauna. It would be a panacea for containing green house gases. It would also protect the coastal zones from threats of tsunami.

6. Biodiversity includes microbes as well which are also affected by climate change. There must be funding to microbial prospecting for searching microbes for use in fermentation technology, anti-biofilm compounds and antifungal besides medicinal uses.
7. Climate change has great deleterious effect on water. To feed our population we may have to divert our land for agriculture for food production. For the use of secondary metabolites produced by plants, it would be prudent to use bioreactor technology as being done in Japan and South Korea for commercial production of Ginseng and Barbarine. This would also generate employment to young graduates.
8. Another area to suitably conserve water and space is protected cultivation using solar power. This has led to the cultivation of vegetables required for the defense forces serving at -30°C. The protected cultivation also paved the way for hydroponics which in turn could be adopted for higher productivity of vegetables in Ladakh.
9. Climate change affects human health as in case of the habitat changes of the vectors of human diseases like malaria and filaria and the adaptation of habitat changes due to intrusion of sea water into freshwater by vectors. We must have strategies to handle this situation.
10. The climate change affects the insect pests affecting food crops. Pests considered minor have become serious. There are migrations of insect pests causing invasion. It is also causing extinction of insect fauna. New encounter, as described by FAO, is a cause for concern. This happens when new crops are introduced to a new region; some of the pests of these crops follow the crops and attack the existing crops of the region.

4.2. Events

4.2.1. A Brief on Policies and Action Plan for Secure and Sustainable Agriculture' prepared by a Committee constituted under the Chairmanship of Padma Bhushan Dr. R.S. Paroda, Formerly Secretary, DARE & Director General, ICAR, New Delhi

A Report on 'Policies and Action Plan for Secure and Sustainable Agriculture' prepared by a Committee constituted under the Chairmanship of Padma Bhushan Dr. R.S. Paroda, was presented recently to Prof. K. Vijay Raghavan, Principal Scientific Advisor to the Government of India. The mandate of the Committee was to suggest policy reorientation and accelerated action plan for achieving sustainable agriculture for improved livelihood of smallholder farmers as well as addressing the issues of poverty, hunger and malnutrition that continue to prevail in India, despite various agricultural revolutions (green, blue, white, etc.) over the past few decades.

The report explicitly highlights how adoption and scaling of new technologies and innovations through an enabling policy environment, with inclusiveness of all stakeholders, can accelerate agricultural growth. It spells out a clear strategy and road map that can lead India to achieve sustainable, innovative and profitable farming approaches to remove the triple burden of poverty, hunger and malnutrition while ensuring conservation of natural resources, as enshrined in the agenda of Sustainable Development Goals (SDGs).

The report has some transformative suggestions that encompass policy, institutions, infrastructure, market, science, technology and innovations, which together contribute directly or indirectly to agricultural output and thereby GDP of the country. More importantly, the report has kept farmers in the centre stage while suggesting reforms that would address their distress and enhance income as well as wellbeing.

Some key institutional reforms recommended include: review of existing agricultural policies and forming a new policy on agricultural development and farmers' welfare to meet emerging challenges; needed reorientation of on-going missions/national programs, including urgency for initiating some new missions; strengthening of ICAR/SAUs/KVKs/PRIIs with urgency for doubling current public funding for research; establishment of a new National Agricultural Development and Farmers' Welfare Council (NAD&FWC) under the chairmanship of Prime Minister to ensure effective coordination and convergence so critical for agriculture, being a State subject; establishing Farmers'

Welfare Commissions both at the Centre and State level: an Independent Strategic Planning, Monitoring, and Evaluation Unit: expanding the mandate of KVKs as 'Knowledge-Skill-Innovation Centres' and to facilitate the establishment of Agri-Clinics; and finally the empowerment and motivation of women and youth to remain in agriculture and become important game changers.

The report also suggests needed policy reforms to increase capital investment in agriculture (both public and private); increase in credit access to the farmers and young entrepreneurs at low interest rate (4%) and creation of more financial institutions such as Kisan Banks, provision of pledged warehouses, availability of farm machinery on custom hire basis etc.

The committee has strongly recommended that henceforth the subsidies in agriculture be rationalized as incentives for good agronomic practices through direct benefit transfer (DBT) mechanism. It is recommended to convert existing subsidies as incentives for both farming efficiency and environmental services @ Rs. 10,000 per acre per annum up to a maximum of 10 acres (4 ha) per farming family.

It is also recommended that the farmers be henceforth paid minimum support price (MSP) at 1.5 times of cost C2 and the procurement be extended to all important agricultural commodities. Also, there is need to enhance markets intensity in rural areas and ensure market linkages through e-NAM requiring uniform adoption of Agriculture Produce and Livestock Marketing (APLM) Act and Contract Farming Act by various States. Further, the Mandi tax has also to be rationalized around 5-7 per cent only. The Essential Commodities Act (ECA) and Agricultural Produce Marketing Committee (APMC) Act also need to be reviewed for their relevance in the present context when we want one national market for e-NAM and for global exports. The concerns of seed industry with regard to implementation and harmonization of Biological Diversity Act and Protection of Plant Varieties and Farmers Rights Act (PVP&FRA), unresolved issues relating to access and benefit sharing (ABS) for use of genetic resources, besides intellectual property (IP) protection on innovation such as genetic modification (GM), genome editing, etc., pricing policy on seeds and long awaited revision of Seed Act need to be addressed on priority. Corporate social responsibility (CSR) be now linked to efficient technology dissemination through active involvement of youth (including women) as technology/extension agents, input and/or service providers and for the establishment of Agri-Clinics involving young entrepreneurs. Export-import (EXIM) policy needs to be made long-term and foresight oriented for which APEDA needs to be strengthened.

The Seed Bill, Pesticide Management Bill, Biotechnology Regulatory Authority of India (BRAI) Bill, and other important Bills/Acts relating to agriculture and rural development need to be cleared by the Parliament on priority. National Policies on Biotechnology, Livestock Breeding, and Land Utilization should be considered for quick decision and implementation by all the States concerned. Finally, it is committee's resolve that the growth of agriculture sector can be accelerated to help achieve SDGs much faster provided the recommendations given in the report are implemented through both a missionary zeal and as a package by the Government.

Full report is available on the website of PSA office, GoI, New Delhi

5. Research Highlights

5.1. A Grain saved is a Grain Produced

[International Integration in Science led to an invention in the Food Security field]

For any invention to happen in any field, there is a need to have greater interaction between scientists concerned across the world. This will give an innovator a clear direction to proceed not only to invent but also to see that the invention he makes is translated into use for society. Though this is true for all disciplines of science, it assumes greater importance in the field of food security which means to provide the world's growing population with a sustainable, secure supply of good quality food. Food security is not just a poverty issue. It is closely linked to health. From my perspective, insect free clean food grains are needed because in a short time insects can turn clean sound grain into a pile of moldy dust.

The challenge is to provide a way to control insects that is reliable, effective, simple and inexpensive without using any insecticides. Chemical fumigation has been the standard means to control insects in India and around the world, but it is costly and insects have now developed resistance making it harder to control populations. Contact insecticides sprayed onto the grain have similar issues as well as leaving residues on the grain.

Even though my research attempts from the year 1983 resulted in the development of simple gadgets for stored grain insect management ([HYPERLINK](http://www.mohantrap.com)) "<http://www.mohantrap.com>" www.mohantrap.com) I could not invent a device which can significantly control the stored product insects.

At last it happened.... The drive behind

In January 2000, I was deputed to Cereal Research Centre (CRC), Agriculture and Agri-Food Canada, Winnipeg, Manitoba under a World Bank scheme for Human Resource Development to get trained in my area of specialization under Dr. Paul Fields, Scientist, CRC, Canada. We both developed a technique. [Mohan, S. and Paul Fields. 2002. A simple technique to assess compounds that are repellent (or) attractive to stored product insect. Journal of Stored Product Research, 38: 23-31].

Understanding my fervent desire for innovation, Dr. Paul Fields showed me an important research link. Research finding by Dr. Quentin, M.E. and her team from Michigan State University (Quentin, M.E., J.L.Spencer and J.R.Miller, 1991. Bean tumbling as a control measure for the common bean weevil, *Acanthoscelides obtectus* (say) Entomol. Exp. Appl., 60: 105-109). Dr. Quentin, M.E. team research became a precursor for my dream coming true.

What was the dream? My dream was to develop a protocol to control insects attacking grains / seeds in storage. The protocol should workout for effective control of eggs, larvae, pupae of insect stage, besides large scale removal of adult insects. Soon after my return from Canada, I started working with the great and kind inputs from Dr. Paul Fields and Dr. M.E. Quentin and successfully filed a patent with Indian Patent office on 10.07.2002 giving the details of my invention as “A device to remove insect eggs from stored pulse seeds”. Finally Government of India granted patent on 03.02.2006, a momentous event in my life and in turn for Tamil Nadu Agricultural University (TNAU).

About the Machine

The machine has the capacity to clean the eggs, larvae, pupae and adult insects present in grains. As many stored product insects have been reported of having developed resistance to chemical fumigants, this machine is one of the best alternative strategies for stored product insect control.

This machine fits well in the food grain processing chain at a place before grains are packed in different capacity bags as per consumer preference.

Once I had developed the device, my real work began, i.e., taking the machine to the farmers and other users. My efforts that began in 2006 culminated in success in 2015. I could get it commercialized benefitting end-users with different insect cleaning efficiency models (50kg/h, 200kg/g, 1000kg/h, 2000kg/h).

To conclude, I am optimistic for an insect free stored grain revolution not only in India but also in many South East Asian countries through this non-chemical method.



From Left to Right: Stored Grain Insect Egg Remover (cap.200 to 300kg); Stored Grain Insect Egg Remover (cap. 2 ton ; TNAU Egg Remover (cap.50 kg)

Dr. S. Mohan

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5.2. Abstract of paper presented for Carl Linnaeus Award [Paper listed for competition]

Extracellular polymer profiling of *Nostoc microscopium* and *Calothrix desertica* with its anti-oxidant property assessment

Two cyanobacterial isolates *Nostoc microscopium* and *Calothrix desertica* were scrutinized to understand its capability to synthesize extracellular polymers. Forty-four days old cyanobacterial cultures having heterocyst were grown in nitrogen and magnesium deficient BG11 medium. The elementary morphological features were defined with the aid of light microscope and CLSM. 16S rRNA amplification and phylogenetic studies were conducted to understand the taxonomy of the isolates. The acetone extraction of EPs from *N. microscopium* and *C. desertica* was done which supplied 900 mg L⁻¹ and 450 mg L⁻¹ of EPs per month. The EPs seemed soluble in diethyl ether and showed fibrous and globular topography for corresponding FE-SEM images. The carbohydrate and protein content of EPs from *N. microscopium* was estimated as 795 mg g⁻¹ and 350 mg g⁻¹ while for *C. desertica* only 630 mg g⁻¹ of carbohydrate was present. The amide I and II bands at 1643.07 cm⁻¹ and polysaccharide bands at 1108.95 cm⁻¹ was found for *N. microscopium* EPs while *C. desertica* EPs was associated with polysaccharide peak only, GC-MS analysis determined mannitol in both were elevated viscous property and anti-oxidant property was found in *N. microscopium* EPs alone.

**Ramachandran Lavania¹, Marappa Narayanasamy¹,
Modenkattil Sethumadhavan Kavitha¹ and *Nooruddin Thajuddin^{1,2}**

¹Division of Microbial Biodiversity and Bioenergy, ²National Repository for Microalgae and Cyanobacteria – Freshwater (DBT, Govt. of India),
Department of Microbiology, Bharathidasan University, Tiruchirappalli- 620 024, Tamil Nadu, India

5.3. Abstract of paper presented for Prof. M. S. Swaminathan Award [Paper listed for competition]

Salinity tolerance and transcriptome analysis in Rice (*Oryza sativa* L.)

Ten genotypes of rice viz., (IRLON GSR-9, IRLONGSR-5, CSR-2016-IR-18-18, CR-3878-245-2-4-1, CSR-11-143, CARIDHAN-7, CSR-2748-441-195, CR-3437-1*200-83, JK-58 and NDRK-11-20) were screened for saline tolerance under simulated saline stress condition. Each genotype was sown in artificially simulated saline condition and irrigated with saline water. Under in vivo, the soil was estimated for saline concentration and before the onset of experiment, the soil salinity was 4.6 dsm⁻¹. Each pot was irrigated with saline water with different concentrations of 0 dsm⁻¹, 2 dsm⁻¹, 4 dsm⁻¹, 6 dsm⁻¹, 8 dsm⁻¹, 10 dsm⁻¹, 12 dsm⁻¹ and 14 dsm⁻¹ respectively. Beyond that the seedlings were scorched due to yellowing of leaves and necrotized. There were dose dependent reduction in the germination per cent, root length, shoot length, seedling fresh weight, seedling dry weight as well as seedling vigour index for both under in vivo and in vitro. However, the trend was nonlinear which may be due to better expression of saline tolerant genes with increased concentration of salt. In general, lower dose of salt concentration stimulated the trait of interest. Among the ten genotypes, CARI Dhan 7 tolerated simulated stress upto 6 dsm⁻¹ of irrigated water. Comparative transcriptome analysis was done with the genotypes by treating the soil of the pot with saline water upto 0 dsm⁻¹ to 6 dsm⁻¹. It was found that a total of 1013 genes differentially expressed under simulated stress condition. Out of which 551 genes were up regulated and 462 genes were down regulated. Gene ontology enrichment studies revealed the presence of transcripts involved in some biological processes (like response to stress, response to stimulus,

oxidation reduction), molecular function terms (like cation binding, metal ion binding, oxidoreductase activity) and cellular function terms (like membrane bound organelle, intra-cellular membrane bound organelle) were observed to be enriched in the sample at 6 dS/m when compared to the sample at 0 dS/m. Based on the metabolic pathway analysis, diterpenoid biosynthesis pathway, MAPK signaling pathway, cutin, suberin, and wax biosynthesis were enriched in the saline stressed sample. Based on previously available reports, 9 ion transporter genes, 1 potassium channel, 1 protein phosphatase gene, 2 ROS scavenging-related genes and 4 Stress-regulated genes were identified to be significantly up-regulated. The IAA homologs OsIAA9 was significantly up-regulated and OsIAA14 was down-regulated in the present study. Fifteen functional proteins, one unique stress-responsive protein and a total of 22 transcription factors were up-regulated during salt-stress. An AP2-like ethylene-responsive transcription factor PLETHORA 2 was found to be down-regulated. The results suggested that the genotype CARI Dhan 7 undergoes various saline tolerant mechanisms and pathways in response to the stress imposed when compared with the unstressed seedlings.

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

6.1. Awards, Recognitions and Honors

Congratulations to all the NABSians who received awards and recognition from various institutions and organizations in the country and outside during 2019-20

Name of Member

Name of Award / Recognition received

A. Awards and recognitions received from other organizations

- | | |
|----------------|--|
| Anup Das | <ul style="list-style-type: none"> ■ Received Fellowship of National Academy of Agricultural Sciences (FNAAS), 2019. ■ Co-Chief editor, Indian Journal of Hill Farming, Umiam, Meghalaya ■ President, Society for Advancement in Agricultural Innovation (SAAI), Tripura, India |
| Brahma Singh | <ul style="list-style-type: none"> ■ Conferred with Honorary Fellow of ISAE by Indian Society of Agriculture Engineers, India. |
| Lalitha, S. | <ul style="list-style-type: none"> ■ Received award for excellence in PGPR Research at 6th Asian PGPR International Conference held at Tashkent, Uzbekistan (20 August 2019). ■ Received award for excellence during international conference on modern organic agriculture forum, held at China from May 11-15, 2019. ■ Awarded Smt Guman Devi Varma memorial Best Women Scientist Award at Dharwad University, Dharwad, Karnataka (September 24-26, 2019). ■ Received Best Women Scientist Award (2018-19) from Nature Science Foundation, Coimbatore, Tamil Nadu, India. ■ Received Outstanding leadership award for the year 2019 during 8th International conference on Integration of science and Technology for sustainable Development, P.R.China (November 19-22, 2019) |
| Pradeep Sharma | <ul style="list-style-type: none"> ■ Elected as Fellow of society for Advancement of Wheat and Barley Research (SAWBAR) 2019 ■ Serving as Editor-in-Chief of Journal of Cereal Research since 2018-19 |
| Pramod Kumar | <ul style="list-style-type: none"> ■ Certificate of Merit (2019) was presented by Hon'ble Minister of State for Forest, Transport and Youth and Hon'ble Vice-Chancellor of YSP University of Horticulture and Forestry, Nauri, Solan, HP for 'Excellence in Service' |
| Renu Agrawal | <ul style="list-style-type: none"> ■ Received Karamveer Chakra -Silver medal as Global Fellow (27 November 2019) |

- Honored and felicitated at Vidya Vikas Engineering College, Mysuru on 18-02-2020.
- Honored and served as a speaker during Get-together program for scientists at Brahmakumaris Vishwa Vidyashala, Mysuru on 24-02-2020.
- Nominated as Jury member in the selection committee of I-women Global Awards 2020 by Random kindness.
- Nominated as Advisor to the CQFS9 Centre for quality and food safety) New Delhi (22 June 2020).

7. Activities of Members of NABS

7.1. Dr. M Anandaraj

- Delivered a lecture on “Soil health for Plant and Human health” at Bharathiar Arts and Science College for women at Thalaivasal, Salem being the NABS lecture workshop on 18 July 2019.
- Participated at the 6th Asian PGPR conference at Tashkent during 18-22 Aug 2019 and made a presentation on “Delivery of beneficial microorganisms through capsules and seed coating”.
- On invitation from the Ankara Chamber of Commerce, Ankara, Turkey, participated in the Second Global summit on Geographical Indications and delivered an invited talk on “Best practices on Geographical Indications tagged spices -Black pepper and chillis” during 19-21 Sep 2019.
- Participated in the NABS 11th conference at Pudhuchery University from 25-27 Sep 2019.

7.2. Dr. S. Lalitha

- Invited talk at International Conference on “Contemporary panorama of Biosciences (ICCPoB'19))” organized by Department of Botany, Sri Saratha college for Women (Autonomous), Salem -7th Feb 2019 .
- Invited talk at Young Student Scientist Programme (YSSP-2019). 3rd to 17th May, 2019 supported by TNSCST, Department of Higher Education, Government of Tamil Nadu, DOTE campus, Chennai. Organized by Sri Vidya mandir Arts and Science College, Katteri, Uthangari, Krishnagiri.
- Invited talk at Zhejiang Songyang International modern organic agriculture forum in May 11-15, 2019 at Songyang, Zhejiang, P.R.China. Title - Plant growth promoting microbial consortium –A synergistic approach towards sustainable agriculture development and rhizo-remediation of heavy metals
- Invited speaker and chairperson of 8th International conference on Integration of science and Technology for sustainable Development P.R.China, November 19-22, 2019

7.3. Dr. Renu Agrawal

- Delivered Special Lecture on “Recent Advances in Food Technology” at Maharani College organized by Society of Microbiologists, Mysuru on 29-04-2019.
- Nominated to Expert committee of SYST, Young scientists and Technologists, DST, GoI- to evaluate project proposals (March 2019 to 2022).
- Nominated to expert committee of TIASN; technical interventions for addressing societal needs by GoI, DST- to evaluate project proposals (March 2019 to 2022).
- Nominated to the editorial board of Systematic bioscience and Engineering, Universal press (October 2019 to October 2022).
- Served as an expert panelist in National conference on "Women empowerment and economic development in India-Past, present and Future”, VVCE College, Mysuru (05-10-2019).

- Serving as resource person and imparted training to group A and Group B officers of Karnataka Government, at Sustainable Development Cell, SDG Cell, Mysuru (from November 2019).
- Was Chief guest at Mahajana Institutions, Mysuru during award ceremony (04-01-2020).
- Nominated as an expert to the panel of Bangalore Chamber of Industry and Commerce (30-12-2019)
- Chief Guest and speaker on National Science Day at JSS Nanjangud college of arts, commerce and science on 28-02-2020
- Chief guest at Vidya Vikas School on Graduation and Annual Cultural Fest on 29-02-2020.
- Speaker on -Societal developments through the CSIR- Science and Technology at CSIR-CSIR Pensioners Welfare Association annual meet held at Chennai on 08-02.2020.

7.4. Dr. Pradeep Sharma

- Delivered a talk on “Identification of virulence factors and RNA silencing suppressors encoded by Geminivirus” in National conference held at ICAR-Indian Institute of Wheat and Barley Research (IIWBR), Karnal from January 9-10, 2020.

8. Publications

Gupta, O.P., Pandey, V., Narwal, S. Pradeep Sharma, Ram, S. Singh, G.P. (Eds). 2020. Wheat and Barley Grain Biofortification (ISBN: 9780128184448) 1st Edition, pp: 364.

9. An appeal to contribute for Corpus Fund

Corpus Fund for Prof. S. Kannaiyan Memorial Award is being mobilized. NABS thankfully acknowledge the contributions made by members to Prof. S. Kannaiyan Memorial Corpus Fund [vide list below- continuation]

S.No.	Name of contributor	Amount (Rs.)	S.No.	Name of contributor	Amount (Rs.)
73					

We earnestly appeal to all the rest of the Life members, NABS Fellows / Associate Fellows, Corporate Life Members, Corporate Fellows, Awardees of NABS and well-wishers to contribute to this noble cause. The Fund shall be transferred on line to the Savings Account of [National Academy of Biological Sciences](#)

[Vide details for online transfer in item 10.1. of NL]

10. An appeal to contribute for Printing of NABS-Book

The members of NABS were requested to contribute to defray the expenses incurred on printing the book. Many members have responded. The contribution by members is listed. The contribution shall be transferred on line to the Savings Account of [National Academy of Biological Sciences](#).

[vide list below-] [Vide details for online transfer in item 10.1. of NL].

S.No.	Name of contributor	Amount (Rs.)	S.No.	Name of contributor	Amount (Rs.)

11. 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

Account details of National Academy of Biological Sciences

Name of the account holder : National Academy of Biological Sciences
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

Down load your application from www.nabsindia.org

Address for all correspondences

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Disclaimer

The authors are responsible for the information related to Research notes and short communications of this issue

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Secretary, NABS
NABS-Secretariat, Room No. 209, Second Floor, CAS in Botany, University of Madras, Guindy Campus, Chennai - 600 025,
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)

Printed and circulated to members as E-copy on 03.08.2020