

Seed Tech News



ISST:
**Disseminating Knowledge of
Seed Science & Technology**

**Volume: 51, No. 1
Jan-March 2021**



The UN General Assembly designated 2021 the International Year of Fruits and Vegetables (IYFV). The purpose of IYFV 2021 is to raise awareness on the important role of fruits and vegetables in human nutrition, food security and health and as well in achieving UN Sustainable Development Goals.

Secretary : Sandeep Kumar Lal
Chief Editor : Ashwani Kumar
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From President's Desk...

Dear Members,

Greetings from the Secretariat!

Wishing you all a happy and healthy year ahead.

Health and education are the two building blocks for building a strong nation. Agriculture education, therefore, assumes an important role in building resilient economy for a country like India. The New Education Policy, 2020 envisages a new India built on the strength of an equitable and knowledge-based society and has suggested several measures for educating and skilling its people.

India has an impressive agricultural research and education network, comprising 113 ICAR Centres, 5 deemed universities and 77 agricultural universities (CAUs/SAUs), commonly known as National Agricultural Research & Education System or NARES, which has served the country well. However, in spite of the global recognition of agriculture as an important stream of science, Agriculture is not preferred as an option by the science students in the schools and colleges. Hence, there is need to create awareness about the opportunities in agriculture, strengthening of vocational education with informal and non-formal models, and bridge the gap between education and research. The National Agricultural Higher Education Project (NAHEP) of the ICAR aims to build capacities for both faculty and students, and upgrade our AUs to a global level, through knowledge upgradation and upskilling. The National Agricultural Education Policy (NAEP) therefore needs to be aligned with the National Education Policy 2020, which is based on the principles of Access, Equity, Quality, Affordability, and Accountability.

The enormity and severity of Covid 19 pandemic has brought the scientific community of the world together to find some long-lasting solutions to manage this deadly virus. At the same time, it opened new business opportunities in the fields of medicine, immunology, pharmacology, diagnostics, auxiliary services, etc. This has given rise to a spurt of activities among the scientific community world-wide. As per some reports such unprecedented scientific urgency to search for new treatments and vaccines, resulted in over 100,000 scientific publications in 2020, many of which are the results of multi institutional collaborations. Such scientific collaborations are much needed in the field of seed science and technology to take innovative applications and breakthroughs for improved input use efficiency. Under the aegis of Indo-German Jan 2020 to June 2022 has planned 15 Seminar/ Webinar - cum- Training Workshops covering 12 states in three regions of the country, which are aimed at knowledge upgradation of seed researchers, trainers, students and other professionals, wherein the participants will get an opportunity to learn about the fundamentals as well as the recent advances in seed technology from experts from India and abroad. This is a commendable step forward!!

Malavika Dadlani

AWARDS AND HONOURS



Dr. Devendra Kumar Yadava, Head, Division of Seed Science & Technology, ICAR-IARI, New Delhi and discharging additional charge of Assistant Director General (Seed), ICAR, New Delhi from Feb. 2017 has been appointed as Assistant Director General (Seed) on

regular basis on 21st January, 2021. He is basically Brassica Breeder since last 25 years which include 18 years at Indian Agricultural Research Institute, New Delhi. He has Contributed in the development and release of 20 varieties (mustard-17; pulses-3). Early maturing mustard varieties viz. Pusa Mustard-25, Pusa Mustard-27, Pusa Mustard-28, Pusa Mustard-26 and RGN-145 have provided greater choice to farmers under changing climatic scenario. He has bred five low erucic acid varieties viz., Pusa Mustard-21, Pusa Mustard-22, Pusa Mustard-24, Pusa Mustard-29, Pusa Mustard-30, Pusa Mustard-32 and country's FIRST Double Zero (Canola quality) variety PUSA DOUBLE ZERO

MUSTARD 31. Demand of his bred Indian mustard varieties have touched to more than 40%.

During his additional charge as ADG (Seed), he was involved in the Monitoring and Management Breeder Seed System of the Country and significantly contributed in the development of state seed rolling plans with latest released varieties of field crops and bringing down the varietal mismatches from 34.7% in 2015-16 to 16.9% during 2020-21. He is bestowed with various awards viz., Rafi Ahmad Kidwai Award – 2017, ICAR, New Delhi; Dr. B.P. Pal Memorial Award, 2012, IARI, New Delhi; National Academy of Agricultural Sciences Recognition Award-2018; Dr. P.R. Kumar Brassica Outstanding Scientist Award 2017, Society for Rapeseed and Mustard Research, Directorate of Rapeseed Mustard Research, Bharatpur; Best Research & Experimentation Award, 2002, Agricultural Research Station (RAU, Bikaner), Sriganganagar. He has published 90 research publications in high impact factor Journals and 170 other publications. Besides, he has also guided three M.Sc. (Genetics) and four Ph.D. (Genetics) students as Chairman and presently guiding four Ph.D. students.

SCIENTIFIC BREAKTHROUGHS (Collated from various sources)

Comprehensive transcriptome and proteome analyses reveal a novel sodium chloride responsive gene network in maize seed tissues during germination

Germination is a plant developmental process by which radicle of mature seeds start to penetrate surrounding barriers for seedling establishment and multiple environmental factors have been shown to affect it. Little is known how high salinity affects seed germination of C4 plant, *Zea mays*. Preliminary germination assay suggested that isolated embryo alone was able to germinate under 200 mM NaCl treatment, whereas the intact seeds were highly repressed. We hypothesized that maize endosperm

may function in perception and transduction of salt signal to surrounding tissues such as embryo, showing a completely different response to that in Arabidopsis. Since salt response involves ABA, we analysed in vivo ABA distribution and quantity and the result demonstrated that ABA level in isolated embryo under NaCl treatment failed to increase in comparison with the water control, suggesting that the elevation of ABA level is an endosperm dependent process. Subsequently, by using advanced profiling techniques such as RNA sequencing and SWATH-MS-based quantitative proteomics, researchers found substantial differences in post-transcriptional and translational changes between salt-treated embryo and

endosperm. In summary, the results indicate that these regulatory mechanisms, such as alternative splicing, are likely to mediate early responses to salt stress during maize seed germination. The research was published during 2021 in *Plant Cell & Environment* vol. 44 at <https://doi.org/10.1111/pce.13849>

Seed-specific expression of *TaYUC10* significantly increases auxin and protein content in wheat seeds

Auxin is a vital endogenous hormone in plants, which is involved in the regulation of various physiological and biochemical processes in plants. The flavin-containing monooxygenase encoded by the *YUCCA* gene is a rate-limiting enzyme in the tryptophan-dependent pathway of auxin synthesis. *TaYUC10.3* was identified, cloned and found that it was abundantly expressed in wheat young seeds. In this study, a seed-specific expression vector of *TaYUC10.3* was constructed with the promoter of 1Bx17 glutenin subunit gene and transformed wheat using the particle bombardment method. The quantitative RT-PCR showed that *TaYUC10.3* was expressed in a large amount in young seeds of the transgenic lines. Plant hormone-targeted metabolomics showed that the auxin content of the transgenic lines was significantly increased compared with controls. The GC / MS non-targeted metabolite multiple statistical analyses showed that the variable importance in projection (VIP) of tryptophan reduced in the transgenic lines. Simultaneously, the VIP of indole acetic acid increased. The precursor amino acids for synthesizing some proteins and carbohydrates were upregulated in the transgenic lines. Subsequently, it was found that the protein content of the seeds of the transgenic *TaYUC10.3* wheat was significantly higher than that of the control. The wet gluten content and sedimentation value of the transgenic *TaYUC10.3* wheat were also high. This result indicated that *TaYUC10.3* might participate in auxin synthesis and affects the protein content of wheat seeds. For more details of the research, refer to the published paper in the *Plant Cell Reports* vol. 40 during 2021 at <https://doi.org/10.1007/s00299-020-02631-y>

INNOVATIVE SEED DISTRIBUTION SYSTEM

Beeja Kalyana- An innovative programme for sustainable seed supply in Kalyana Karnataka

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Kalyana-Karnataka region comprising Bidar, Kalaburagi, Ballari, Yadgir, Koppal, Vijayanagar and Raichur, an agrarian area with an irrigation potentiality of 12 lakh hectares through Tungabhadra, Krishna, Karanja, Mullamari, Hirehalla, Bennethore and other irrigation projects, spanning a total geographic area of 44.96 lakh hectares accounting 33.60 percent of the geographical area of the state, of which nearly 68 per cent is under cultivation and has a unique combination of medium (32.42%) and large farmers (36.69%) bestowed with rich natural resources especially for agricultural development. The prosperity and growth prospects of the rural economy as well as the region as a whole therefore, mainly depend on the growth of agriculture. The region is primarily a dry land region. The investment on the development of dry land agriculture has been marginal in the state as a result extreme backwardness in dry land farming dominates the region. Low annual rainfall, rugged terrain landscape, non-availability of long stretches of plain lands and hard clay soil texture incapable of retaining humus have crippled agricultural growth of the region.

The percentage of the high yielding variety cropped area to the total cultivated area of the region is also lower than that of the state. The emphasis should be made on availability of quality seeds of high yielding varieties as seed is a vehicle for delivery of improved technologies and is a mirror for portrayal of inherent genetic potential of a variety/ hybrid. Seed offers to integrate production, protection and quality enhancement technologies in a single entity, in a cost-effective way. Seed can play pivotal role in achieving higher productivity, use of quality

seeds alone could increase productivity by 15-20 % highlights the important role of seed in agriculture. Seed is the critical input for achieving sustainable production and efficacy of all other inputs depends upon quality supply of seed to farmers at right time. Majority of the small and marginal farmers require high-volume low-cost seeds that are neglected by seed producing organizations. All these factors lead to non-availability of quality seeds to the farmers at right time and at reasonable price. Alternatively, the farmers use their own farm saved seeds of less potential, traditional local varieties resulting in low productivity.

Therefore, the University of Agricultural Sciences, Raichur has given priority for quality seed production and technology transfer through supply of quality seeds to the farming community by giving more emphasis on implementing various programmes like Scientists-Farmers Participatory Seed Production, decentralized seed production system, establishment of seed infrastructure facilities at various research stations of the University, seed village programme etc. Recently, Seed Unit, University of Agricultural Sciences, Raichur has implemented an innovative programme called “**Beeja Kalyana**”. It is an programme concentrating mainly on seed sustainability where in a village would be selected in each Raita Samparka Kendra/hobli level for developing as model seed village. The scientists attached to Raita Samparka Kendras under One Scientist-One Raita Samparka Kendra will be entrusted the responsibility of implementing this programme. Under this programme, various activities like organizing training programmes on selection of crops, varieties/hybrids, seed treatment, weed management, pest management, seed production, post-harvest seed quality management, seed storage, exchange of quality seeds of improved varieties among the farmers, market information etc. and planned to establish 100 such villages in the north eastern Karnataka.

During 2020-21, University of Agricultural Sciences, Raichur has implemented **Beeja Kalyana** programme in association with ICAR-National

Seed Project (crops), Seed Village programme of Ministry of Agriculture & Farmers Welfare, Govt. of India, Directorate of Extension, UAS, Raichur, Raita Samparka Kendra, Department of Agriculture, Govt. of Karnataka in 16 villages and conducted 16 training programmes on various aspects related to agriculture covering 400 farmers and promoted new varieties of redgram (GRG 811, GRG 152), chickpea (Super Annigeri-1, GBM-2, NBeG 49), Maize (RCR MH-2), sorghum (GS-23), foxtail millet (HN-46), safflower (ISF 764) etc. under this programme. It was one of the effective programme to achieve the desired seed replacement rate and varietal replacement rate.

Impact of Beja Kalyana programme

Creating awareness about improved agricultural technologies

- Improvement in Seed replacement rate (SRR) and varietal replacement rate (VRR)
- Strong linkage between state agricultural universities and farmers
- It expedites the transfer of developed technologies to the needy farmers
- Dissemination of information related to agriculture development schemes
- Adoption of best pest management practices by the farmers
- Achieving seed sustainability in turn higher food production and productivity
- Less dependency of farmers in purchasing seeds every year especially improved varieties
- Reduction in expenditure towards purchase of seeds every year by the farmers
- The demonstrations on improved technologies like varieties could be undertaken in this programme for its better reaching the unreached farmers
- The remote villages could be covered under this programme for integrated development of farmers
- Improved socio-economic status of the farmers due to higher returns from adoption of improved technologies

OBITUARY

Prof. Rathindra Narayan Basu, D Sc, FNASc



(1 May, 1937 – 6 March, 2021)

Prof. R N Basu, an eminent seed scientist and revered teacher, was born on 1 May, 1937. He did his graduation from the State College of Agriculture, Calcutta (1957), post-graduation in Agric. Botany from Calcutta University (1959) and obtained his Ph.D. degree in Plant Physiology from Indian Agricultural Research Institute, New Delhi under the able guidance of the doyen of Plant Physiology Dr. R D Asana in 1962. He was conferred the degree of D.Sc. by Calcutta University in 1973 for his work done in collaboration with Prof. M B Wilkins, University of Nottingham, UK.

Prof. Basu began his professional career in 1962 as a Lecturer in the Faculty of Agriculture, Calcutta University and subsequently rose to become a Reader (1973), Khaira Professor (1985), Dean (1991) and finally was appointed as the Vice Chancellor for two consecutive terms (1991 – 1999), a rare event in one of the oldest and most prestigious conventional universities in the country. He also served as a Member of State Planning Board (1998-2002) and the Chairperson of West Bengal State Agriculture Commission (2006 – 2009).

A brilliant scientist, excellent mentor and able administrator with high integrity and humility, Prof. Basu was respected by his colleagues, students and scientific fraternity, both nationally and internationally. Though his initial scientific research was mainly in the areas of physiological adaptations for drought tolerance and physiology of rooting of cuttings, since early 70s, he devoted his entire scientific career to Seed Science focusing on the physiology of seed deterioration, invigoration

treatments and quantification of seed vigour. An out-of-the box thinker and innovative researcher, he contributed both in furthering the fundamental knowledge of seed ageing and its control, and development of farmer friendly treatments to enhance seed vigour and prolong storability under ambient conditions. His concept and statistical analysis and quantification of seed vigour received wide acclaim at the ISTA Seed Symposium, 2019.

In his long and illustrious scientific career, Prof Basu guided 22 Ph.D. and many M.Sc. students and published more than 200 research papers, of which over 110 are in Seed Science. He also published two authored and three edited books, besides several other policy, technical and popular papers. His latest edited book on 'Seed Invigoration – Treatments and Quantification of Vigour' was published days before he breathed his last in March, 2021.

A Fellow of the National Academy of Science; Academy of Sci. & Technol. of WB; Indian Society of Seed Technology; Indian Society of Plant Physiology, Prof. Basu was felicitated by many scientific and academic bodies. A life member of the Indian Society of Seed Technology, he was felicitated at a special function at TNAU, Coimbatore in 1993 and delivered a special lecture. He was a Member of Seed Storage Committee of ISTA (1981-83).

The Indian Society of Seed Technology pays homage to Prof. RN Basu for his outstanding contributions to the cause of seed science and technology and pray for eternal peace to his noble soul! The seed fraternity extends its deep condolences to his wife Mrs. Jharna Basu, son Mr. Arnab Basu and other family members.

Dr. M. Mahadevappa



(4 August 1937 – 06 March 2021)

Dr. M. Mahadevappa, a renowned and dedicated rice breeder as well as seed scientist who born on 4th August 1937 at tiny village of Madapura, Chamrajanagara District, Mysore State, British India (Presently Karnataka). He did his B.Sc. (Agri.) from Agriculture College, Bangalore of Mysore University in 1960 and M.Sc. (Agri.) and Ph.D. in Genetics & Plant Breeding at the Agricultural College, Coimbatore of Madras University in 1962 & 1965, respectively.

Dr. M. Mahadevappa popularly known as Rice *Mahadevappa* for his outstanding contributions of developing high yielding rice varieties and hybrids. He served as the Professor and Head of Department of Genetics & Plant Breeding as well as Seed Science & Technology at College of Agriculture, UAS, GKVK, Bangalore. He was also served as Director Instruction (Agri) at GKVK and later he has become Vice-chancellor of University of Agricultural Sciences, Dharwad. He served for two terms and then the Chairman of *Agricultural Scientists Recruitment Board*, New Delhi. He also served as Member, Governing Council of Indian Council of Agricultural Research. Besides, he was also Honorary Director, JSS Rural Development Foundation, Mysore, till his last breath on 06-03-2021.

He was the recipient of Padma Bhushan, India 's third highest Civilian Honour in 2013 and various other accolades *viz.*, Padmashri (2005), Rajyotsava Prashasti (1984), Bharat Ratna Sir. M. Visweshwaraiah Memorial Award (1999), Hookar Award and so on. Very recently, he has been honored with Prof. C.N.R. Rao Karnataka

Science & Technology Academy (KSTA) Life Time Achievement Award in Science & Technology in Agriculture (2020).

Dr. Mahadevappa was an elected fellow of the National Academy of Agricultural Sciences for his exceptional contributions to the Indian Agrarian Community through various innovative applications and research initiatives. While, being a pioneer in hybrid rice farming in the country, he has been also credited for his *Integrated Parthenium Weed Management*, a scientific and efficient weed management system against the invasive Parthenium. Besides, he has guided several post graduate students in both Genetics & Plant Breeding and Seed Technology as well. He has written several books both on seed science & plant breeding; published several research papers in reputed Journals and written popular articles that are very useful to farming community.

He was an active member of ISST since 1984 and patron and contributes a lot to the Society of Seed Technology as well as Genetics & Plant Breeding by sharing his rich experiences and knowledge in various conferences, seminars, symposia, etc. Several National Seed Programs have been organized under his Leadership and Guidance. He served as panelist in many technical sessions of the Societies.

The Indian Society of Seed Technology pays tribute to Dr. Mahadevappa for his outstanding contributions in seed science and technology and pray for eternal peace. The Seed fraternity extends heartfelt condolences to his family and pray God to give enough strength to his bereaved family.

Dr S. NATARAJAN



(29 June 1971 – 17 Feb. 2021)

Dr. S. Natarajan, a renowned and dedicated Seed Scientist was born on 29.06.1971 in Pondicherry. He did his BSc (Agri.) from PAJANCOA & RI, Karaikal and M.Sc. (Agi) & Ph.D in Seed Science & Technology at TNAU, Coimbatore before joining Agricultural Research Service (ARS) in the discipline of Seed Science & Technology. He served at ICAR-IGFRI, Jhansi & its Regional Station at Avikanagar before joining ICAR-IISS, Mau as Senior Scientist in the year 2007. During his tenure at ICAR-IISS (2007-2016), he was instrumental in streamlining the activities pertinent to Co-ordination of AICRP on National Seed Project (Crops). He was also Member Secretary for QRT DSR, Mau. Later he had been posted as Principal Scientist at ICAR-IARI, Regional Centre, Aduthurai (TN). Due to severe illness, he expired untimely on 17.02.2021.

His gentle demeanor, team work perspective and cordial relations with everybody make him one of a kind and will be forever in our memories. He also contributed immensely to the research especially devising seed testing protocols in Tropical Grass spp. and in institutional building of ICAR-IISS, Mau. He was a recipient of Sri. R V Swaminathan Gold Medal for his best PhD and guided nine postgraduate students of seed technology. He has published several research papers in the reputed journals and wrote many articles that are useful to farming community. He was an active life member of ISST since 2003 and very much involved in Society activities and meeting deliberations.

The Indian Society of Seed Technology pays honor to Dr. S. Natarajan for his immense contributions in seed science and technology and pray for

eternal peace. The Seed fraternity extends heartfelt condolences to his family and pray God to give enough strength to his grieving family.

Dr. G. Mani



(1972 - 2021)

Dr. G. Mani, Assistant Professor (SST), ICAR-KVK, TNAU, Thiruvallur, was specialized in tree seed technology. He did his UG at Forestry College & Research Institute, Mettupalayam, M.Sc (Agri) & Ph.D. at Department of Seed Science & Technology, TNAU, Coimbatore. He joined TNAU as Assistant Professor at Agricultural College & Research Institute, Killikulam during 2004 and worked at various places *like* SRS, Melalathur; ARS, Vaigaidam; KVK, Tirur (Thiruvallur Dt.).

He was a soft spoken, humble and sincere seed scientist worked in the areas of teaching, research, seed production and extension. He has completed 15 years of service in TNAU and published many research papers in national and international journals. He was an active life member of ISST, New Delhi from 2002 and participated in seminars organized by the ISST and presented the research papers. He expired untimely on 26.03.2021 due to illness.

The Indian Society of Seed Technology pays tribute to Dr. G. Mani for his very good contributions in seed science and technology and pray for eternal peace. The Seed fraternity extends heartfelt condolences to his family and pray God to give enough strength to his bereaved family to bear the loss.

The Banning of Insecticides draft Order 2020 (Notification)

Atul Kumar, Vijayakumar H, P

Division of Seed Science & Technology, ICAR-IARI, New Delhi

Ministry of Agriculture and Farmers Welfare, Department of Agriculture, Co-operation and Farmers welfare had issued a notification on 14th May 2020 regarding proposed ban on use of few pesticides. Since then, so much confusion is prevailing amongst farming community as well as students and scientists. Keeping this into consideration a summary of this order has been prepared so that it is easy to know and understand what is there in it. It is a Draft order, which will come into force on the date of its final publication in the official Gazette. Totally, 27 pesticides have been put in this list. Under Insecticide group, it includes ACEPHATE, BENFURACARB, CARBOFURAN, CHLORPYRIPHOS, DELTAMETHRIN, DIMETHOATE, MALATHION, METHOMYL, MONOCROTOPHOS, QUINALPHOS and THIODICARB, (ELEVEN). Under Fungicides group, it includes CAPTAN, CARBENDAZIM, DICOFOL, DINOCA, MANCOZEB, THIOPHENATE METHYL, THIRAM, ZINEB, and ZIRAM (NINE). Under herbicide group, it includes ATRAZINE, BUTACHLOR, 2,4-D, DIURON, OXYFLUORFEN, PENDIMETHALIN and SULFOSULFURON (SEVEN). These are the chemicals, which are being most commonly used

by farmers across the country in various crops. Moreover, the seed treatment fungicides, which are most commonly used are THIRAM CAPTAN and CARBENDAZIM and all of them are in the banned list. Most important point is that if any of these are being used as combination product, even if one of them is in proposed banned list, the company will not manufacture it. In fact, based on this draft order many companies have stopped production of many of them fearing their products will go waste once this order is passed in the Parliament. Since there is a provision of sending representations against any draft order within stipulated time, many representations have been submitted against this draft order. If the points mentioned against this draft order are found valid then this order may not be passed. But, at the same time if the committee to look into it agrees with the proposal submitted then it will be passed. Although it is written that alternatives are available, but when you properly enquire, you will not get any positive reply to your query. Therefore, the take home message is that whether this order is passed or not the time has come to move to alternatives like green Pesticides mainly emphasizing on Bioagents. The yield level may not be that high as you get with chemical usage but the environment and ecology will definitely get a boost. Keeping an eye on the Human health and Plant health (Seed Health) is the need of the hour.

NOTE:

All the ISST members are requested to contribute to various columns of Seed Tech News by providing information on a) Awards and Honours received; b) Upcoming trainings/ events; c) Recommendations of scientific gatherings; d) Latest research findings etc. In addition, brief technical notes may also be submitted for fast dissemination.

Seed Tech News is provided on complimentary basis to the subscribers of 'Seed Research'

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ISST Registration No.: 21893/71