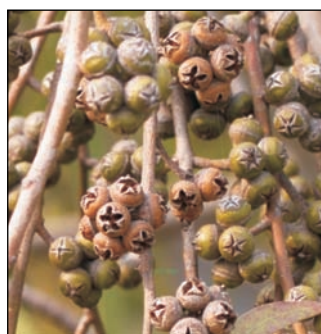


# Seed Tech News



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

**Volume: 49, No. 1 & 2  
Jan.-June 2019**



**Eucalyptus Fruits**



**Eucalyptus Seeds**

In India Eucalyptus was first planted around 1790 by Tippu Sultan, the ruler of Mysore, in his palace garden. According to one version he received seed from Australia of about 16 species. Eucalyptus is a multipurpose tree species used for charcoal, timber, paper pulp, oil, honey, poles and firewood. The tall (> 50 m) trees of eucalyptus have tiny seeds (~ 1 mm). The seeds are developed in woody fruits/ capsules with valves at one end to release seeds.

## From President's Desk...

Dear Members,

Greetings from the Secretariat!

The year 2019 was significant for the seed technologists for reasons more than one. The year began with a National Seminar held in February 2019 at Imphal to draw the attention of planners and policymakers; scientists and academicians; seed professionals from the public and private sectors and farmers and students of agriculture to the needs of strengthening the quality seed supply system for the North-Eastern states and drawing a road map. The seminar was a huge success, in spite of several logistic challenges faced by the hosts. It was attended by ~250 seed professionals from far and near, in which renowned seed experts deliberated on specific problems and shared their valuable views to meet the challenges and young researchers also presented significant scientific achievements in different aspects of seed technology. The representatives of different stakeholders held a panel discussion on important issues. This much-awaited, first of its kind initiative in the country, received accolades and appreciation from all concerned.

This national event was followed by the most prestigious International seed event, the 32<sup>nd</sup> ISTA Congress, 2019 at Hyderabad, India, which was held for the first time in Asia. The Congress and several Pre – and Post – Congress events were organised during 25 June – 3 July 2019. The ISTA seed symposium under the aegis of Congress was held from 26-28 June 2019. This symposium, which was attended by ~400 delegates from across the world, deliberated on a wide range of topics, covering every single aspect of Seed Technology and related issues. The presentations made by Indian scientists were appreciated by all, in terms of content as well as the precision of presentation. A testimony of this was the Best Paper Award received by Dr. Nagamani of IARI. Election of Dr. K. Keshavulu, MD, TSSC and Director, TSSOCA, as the Vice President of ISTA was a rare moment of pride for all Indians! We hope that our members will also send high-quality scientific papers to their journal 'Seed Research' and help improve its rating.

Like last year the Society also celebrated its Foundation Day in April 2019 by organising a Panel Discussion on a very important issue that is disturbing the scientific and academic fraternity. The discussion centred around the topic of "Ethics in Scientific Research and Publication". The Panel was chaired by Padma Bhushan Prof. R. B. Singh and included many eminent scientists. Condemning the unethical practices in scientific research such as plagiarism, denial of due credits to the actual contributors and extending the same to gain personal favours, use of unreliable and forged data in scientific publications etc. were discussed and ways and means were suggested. This timely initiative of the ISST was much appreciated and this issue generated serious concerns and discussed at different fora.

Following the adoption of National Policy on Ethics by the Government of India, the UGC has made two credit courses on publication ethics and publication misconduct mandatory for all Ph. D. students. We hope that the members of ISST will keep contributing meaningfully and ethically for the advancement of Seed Science and Technology and work towards developing a robust seed system in the country.

**Malavika Dadlani**

**Secretary** : Sandeep Kumar Lal  
**Chief Editor** : Shiv K. Yadav  
**Editor** : D. Vijay

## AWARDS AND HONOURS

**Dr. Prashant Goel**, General Manager (Research and Development) in Star Agriseeds Pvt. Ltd. received the **“Young Achiever Alumnus Award 2018”** from Alumni Almamater Advancement Association (4A), Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Udham Singh Nagar, Uttarakhand during Alumni Almamater Meet on 25th November 2018. This award has been given to him for their dedication toward exemplary contribution in nation-building and bringing many laurels to the Pantnagar University. Earlier he worked as General Manager (Research and Development) in Ananya Seeds Pvt. Ltd. and J4 Seeds Pvt. Ltd. where he has made a tremendous contribution in the direction of growth of the seed business. He has vast experience of more than fourteen years with multitasking responsibilities such as seeds research, IPR, seed production, quality, management, liaisoning and product development in different companies i.e., Sungro, Kesar Seeds, Ananya Seeds. He has been involved in the development of several vegetable varieties and has more than 15 research papers in international and national journals to his credit.



Delhi. He was awarded for his contributions in the field of plant improvement through varietal development in the mustard crop.

The Indian Society of Seed Technology bestowed the prestigious **Ch Amir Singh Memorial Lifetime Achievement Award** to Padma Bhushan **Dr. Rajendra Singh Paroda**, former Secretary (DARE) & Director General (ICAR) in the National Seminar at Imphal (3-5 Feb 2019) for his untiring efforts for the development of seed science and technology in the country. Presently he is the chairman of the Trust for Advancement of Agricultural Sciences, New Delhi.



**Dr. D. K. Yadava**, Head, Division of Seed Science and Technology, IARI and ADG (Seeds) i/c, ICAR has received the **“Recognition Award in plant improvement”** from the National Academy of Agricultural Sciences. He received this award during the XIV Agricultural Science Congress from Agricultural Minister of India Sh. Radha Mohan Singh on 20<sup>th</sup> Feb 2018 at NASC Complex, New



**Dr. Shiv Kumar Yadav**, Principal Scientist, Division of Seed Science and Technology, IARI, New Delhi has received the first **“Scientist of Eminence”** award constituted by the ISST during the National Seminar at Imphal on 5<sup>th</sup> Feb. 2019. Dr. Shiv Kumar Yadav has significantly contributed in seed testing and seed vigour evaluation, seed enhancement, uniformity in seed testing, seed production

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technology of varieties/hybrids, seed supply system, characterization of crop cultivars and CMS lines using morphological, biochemical and computer-based machine vision technology and watershed management while, working in various externally funded, inter-institutional and inter-disciplinary research projects. He has more than 65 publications in peer-reviewed International and National Journals and authored four books and many book/manual chapters. He has also been associated with the development of six Indian Mustard and one Pigeon pea varieties. Since last 20 years, he has been teaching various seed technological courses to the postgraduate students at IARI, besides guiding 11 M.Sc. and six PhD students.

The Indian Society of Seed Technology has honoured the following eight seed technologists with ISST Fellow Award for their immense service in the field of Seed Science and Technology. The awards were presented in the National Seminar at Imphal on 5<sup>th</sup> Feb. 2019.

- **Dr. Shantappa Tirakannanavar**, Professor, College of Horticulture, Banavasi Road Sirsi, Uttar Kannada District, Karnataka
- **Dr. K. Keshavulu**, Director, Telangana State Seed and Organic Certification Authority, Hyderabad
- **Dr. D.S. Uppar**, Professor, Department of Seed Science & Technology, College of Agriculture, UAS, Dharwad, Karnataka
- **Dr. P. Masilmani**, Professor & Head, Department of Basic Engineering and Applied Sciences, Agricultural Engineering College & Research Institute, Kumulur

- **Dr. P. Murugesan**, Principal Scientist, Division of Crop Improvement, ICAR-Central Tuber Crops Research Institute, Sreekariyam, Thiruvanthapuram, Kerala
- **Dr. J. Renugadevi**, Professor, Department Seed Science and Technology, Tamilnadu Agricultural University, Coimbatore
- **Dr. Asit Kumar Basu**, Professor (Retired), Department of Seed Science and Technology, Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur, Naida, West Bengal
- **Dr. J.K. Sharma**, Dean, Baddi University, Solan, Himachal Pradesh

On the sidelines of National Seminar at Imphal from 3-5 Feb 2019, the ISST has bestowed the **Young Scientist** awards to **Dr. Dilipkumar A. Masuthi**, Assistant Professor, Seed Science and Technology, KRC College of Horticulture, Arabhavi and **Dr. Amrit Lamichaney**, Scientist, Division of Crop Improvement, Indian Institute of Pulses Research, Kanpur for the year



Dr. Dilipkumar A. Masuthi



Dr. Amrit Lamichaney

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2017 and 2018 respectively for their contributions in seed research, seed production and teaching activities for the past three years.

The ISST awards the **Best research paper** in the Seed Research Journal every year. The award for the year 2017, was conferred to **Ms. Nipa Biswas et al.**, from Division of Seed Science and Technology, ICAR-IARI, New Delhi for their article “Correlation between superoxide content and radicle length during seed germination in different types of Indian Mustard” published in Seed Research volume 45 issue 2, page no. 125-130. The award was presented on the sidelines of the National Seminar at Imphal on 5 Feb 2019.



**Dr. Vijay Kumar Kurnalliker**, working as Asst. Prof. in the Department of Seed Science and Technology, College of Agriculture, Raichur is commissioned in Indian Army as **Lieutenant** with the designation of **Associate NCC Officer**, after the three months of rigorous military training from NCC Officers Training Academy, Nagpur in the passing out parade on 23 Feb 2019. He received his Master's degree in Agriculture from GBPUA&T, Pantnagar, Uttarakhand and Doctorate from Division of Seed Science and Technology, IARI, New Delhi in 2007 and 2011 respectively.



**Shri Sukhjeet Singh Bhangu**, a progressive farmer and member of ISST received the **Innovative**

**Farmer** award in the “Farm Level Processing” category at the 2<sup>nd</sup> All India Progressive Farmer Convention-2019 organized by the Indian Council of Food and Agriculture from 28 Feb to 01 Mar 2019 at New Delhi. The award was presented by Member of Parliament, Sh. Ashok Bajpai. Shri Sukhjeet Singh Bhangu did his masters in Physical Education from Bharaktullah University Bhopal and Diploma in Agriculture from Ryat Bahra University, Kharar, Chandigarh. He is also the owner of A-One Seed Plant, Sangrur. He has undergone specialized training in seed production, seed supply, tissue culture and water management from IARI and several other universities.



**Dr. Basave Gowda**, Special Officer (Seeds), UAS, Raichur received **Fellow of Society for Tropical Agriculture Award-2019**, Outstanding Achievement Award 2019 and Best Oral Presentation Award during International Conference on Agriculture and Horticultural Plant Sciences organised by The Society for Tropical Agriculture at Dharmashala, Himachal Pradesh on June 27-28, 2019.



## NEWS ITEMS

### Indian scientists develop gel to protect farmers from pesticide toxicity

The Indian farmers are more vulnerable to the pesticide toxicity during their application in the crop fields due to non-use of proper protective gear. A team of Indian researchers from the Institute for Stem Cell Science and Regenerative Medicine, Bangalore developed a gel to protect the farmers from pesticide toxicity. The gel can be applied on the skin and will break down toxic chemicals in pesticides, insecticides and fungicides including the most hazardous and widely used organophosphorus compounds. Exposure to pesticides results in their entry into the body through the skin and causes neurotoxicity by interfering with an enzyme called acetylcholinesterase which is present in the nervous system and is critical for neuromuscular functions. The gel, named poly-Oxime, deactivates these chemicals, preventing them from going deep into the skin. And it can do so at temperatures ranging from 20 to 40 degrees, and even after prolonged exposure to ultraviolet light. The gel was found to be effective in tests done on rats and researchers hope to test it on humans soon.

**Source:** <http://advances.sciencemag.org/content/advances/4/10/eaau1780.full.pdf>

### Corteva Agriscience completes separation from Dow Dupont

Corteva, Inc. completed its separation from DowDuPont, becoming a leading, global pure-play agriculture company on 3 June 2019. After separation of Corteva, the remaining entity of DowDupont is recast as Dupont de Nemours. In April 2019 Dow was separated from DowDupont. Corteva combines the crop protection chemical and seed businesses of Dow Chemical and DuPont, which merged in 2017 to form DowDuPont. With a presence in more than 140 countries, Corteva Agriscience generated \$14.3 billion in net sales in 2018 and some 56% of these sales came from seeds. The company has more than 150 research and development facilities and more than 65 active ingredients. The company is headquartered

in Wilmington, Delaware with Global Business Centers in Johnston, Iowa and Indianapolis, Indiana and five regional offices in Calgary, Canada; Johannesburg, South Africa; Geneva, Switzerland; Singapore; and Alphaville, Brazil.

**Source:** <https://cen.acs.org>

### Corteva Agriscience acquires Clearfield Canola System from BASF

The agriculture division of DowDuPont, Corteva Agriscience has acquired the Clearfield canola system in Canada and USA from BASF. Clearfield® canola is a globally-recognized non-genetically modified herbicide tolerance (HT) system, consisting of a herbicide tolerance trait and Imidazolinone (IMI) herbicides sold today in Canada primarily under the brand, Ares®. Bayer was forced to sell one of its herbicide-tolerant systems out of Roundup and LibertyLink after acquiring Monsanto. It chose to keep the Roundup system and sold the LibertyLink system to BASF. The Competition Bureau of Canada determined that competition in the canola business would have been “substantially lessened” with BASF owning both the LibertyLink and Clearfield systems and asked it to sell its Clearfield system once it acquired Bayer’s LibertyLink trait. The financial terms of the deal were not disclosed.

**Source:** [www.corteva.com](http://www.corteva.com)

## SCIENTIFIC BREAKTHROUGH

### Broomcorn millet (Proso millet) genome sequenced

The scientific team led by Dr. Zhang Heng and Dr. Zhu Jiankang from Shanghai Center for Plant Stress Biology of Chinese Academy of Sciences has sequenced the genome of broomcorn millet also known as Proso millet (*Panicum milliaceum*). They have published the details in Nature Communications journal on 25 Jan 2019 (<https://www.nature.com/articles/s41467-019-08409-5>). Broomcorn millet is the highest water use efficient cereal with high harvest index and one of the earliest domesticated plants. Broomcorn millet contains

55,930 protein-coding genes and 339 microRNA genes. Researchers achieved a chromosome-scale assembly of the genome through a combination of single-molecule long-read sequencing (PacBio), short-read sequencing (Illumina), Hi-C and a high-density genetic map. The C4 plants are traditionally classified into three subtypes based on the main decarboxylation enzyme: nicotinamide adenine dinucleotide-dependent malic enzyme (NAD-ME), nicotinamide adenine dinucleotide phosphate-dependent malic enzyme (NADP-ME), or phosphoenolpyruvate carboxykinase (PEP-CK). Most of the plant species have either NAD-ME or NADP-ME. The coexistence of all three C4 subtypes of carbon fixation candidate genes was found in broomcorn millet. The genome sequence is a valuable resource for breeders and will provide the foundation for studying the exceptional stress tolerance as well as C4 biology.

**Source:** [http://english.cas.cn/newsroom/research\\_news/201901/t20190128\\_205035.shtml](http://english.cas.cn/newsroom/research_news/201901/t20190128_205035.shtml)

## **Maternal and environmental control of seed dormancy through epigenetics**

The depth of dormancy, which is influenced by various factors, is inherited from the mother plant was previously reported by researchers from Switzerland. Now they have identified how this maternal imprint is transferred through small interfering RNA which inactivate the genes. Also, the temperatures during seed development will be imprinted by a similar mechanism. However, this information will be erased from the embryo so that new information during their growth will be transmitted to the next generation. In 2016 they identified that the dormancy levels in *Arabidopsis thaliana* are inherited from mother plant based on the level of expression of *ALLANTOINASE* (ALN) gene which is a negative regulator of dormancy. In the new study, they found that the maternal imprint of ALN gene is transmitted through epigenetics. They found that the suppression of ALN paternal allele expression is imposed by non-canonical RNA-directed DNA methylation (RdDM) of the paternal ALN allele promoter. For more details of the research refer to the published paper in the March issue of eLife Journal at <https://elifesciences.org/articles/37434>

## **Master controller of temperature sensing in plants is identified**

Temperature is one of the major weather parameters that effect the plant life and reproduction. Apart from plant distribution, it also affects the flowering time, seed setting, crop yield and even resistance to diseases. A molecular understanding of how plants sense and respond to temperature is critical for predicting the ecological impact of climate change especially raising temperature and to develop suitable strategies to mitigate it. A team of researchers led by Prof. Chen from University of California Riverside, USA identified the master control for temperature sensing in plants. Their studies on *Arabidopsis* showed that Phytochrome B (PHYB) which is thought to operate mainly at night, plays an equally important role in daytime temperature sensing. In daytime thermosensing, PHYB signals primarily through the temperature-responsive transcriptional regulator PIF4, which requires the transcriptional activator HEMERA (HMR). HMR does not regulate PIF4 transcription, instead, it interacts directly with PIF4, to activate the thermoresponsive growth-relevant genes and promote warm-temperature-dependent PIF4 accumulation. HEMERA is conserved in all plants, from moss to flowering plants. A central mechanism underlying thermomorphogenesis in both long day and short-day conditions is through the regulation of the central temperature-responsive transcriptional regulator PIF4 and the activation of PIF4-dependent auxin biosynthetic and signalling genes. This study reveals that the PIF4-mediated thermosensing depends on HMR. HMR regulates PIF4 not at the transcript level but rather at the posttranslational level by controlling the expression of the temperature-responsive PIF4 target genes and PIF4 accumulation. Thus, the study reveals a novel PHYB-mediated temperature-signalling mechanism, in which HMR acts as an essential transcriptional activator to induce the expression of growth-relevant PIF4 target genes and PIF4 accumulation in warm temperatures. For more details of the research refer to the published article in January issue of Nature Communications journal at

<https://www.nature.com/articles/s41467-018-08059-z>

## BOOK REVIEW

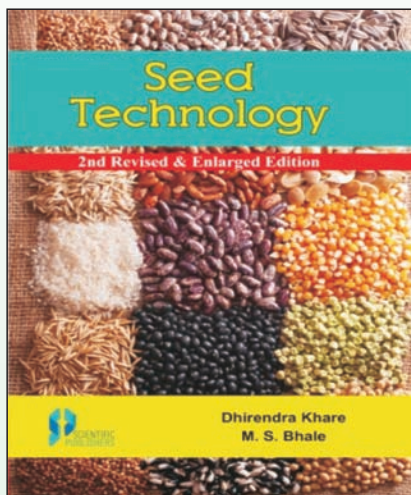
### **Seed Technology (2nd revised & Enlarged Edition)**

(ISBN: 9788172338831)

**Dhirendra Khare and M.S. Bhale**

*Scientific Publishers, Jodhpur*

The year 2018 had been a year of books published on Seed Technology from every corner of the country and covering almost every aspect of this multidisciplinary subject. The book 'Seed Technology' by Dr. Dhirendra



Khare and Dr. Mohan S. Bhale, is a significant addition to the list. The authors are distinguished scientists having long experience of research and teaching in Seed Science and Technology and have published several books on related topics in the past. The first edition of the book, published in 2000, was well received and the credit goes to the authors for making much efforts to revise and expand the scope of the book in its present edition. There is a book by the same title 'Seed Technology' by Dr. R.L. Agarwal, published by Oxford IBH, which had been a 'must-read' textbook for all seed professionals in India for decades. So, I was a little sceptical, whether the present book will be able to meet similar expectations! I am happy to say that the book under review will not disappoint its readers.

The book is voluminous at 944 pages and covers 80 topics, starting from the basic aspects of Seed Morphology, Dormancy and Deterioration to applied aspects viz., Variety Release & Notification; Protection under PPV&FR Act; Seed Production, Processing and Storage; Certification and Seed Testing procedures and standards; Seed Health Testing and Seed Health Management. It also covers all seed related Policies, Legislations, Amendments

and Quality Regulation processes for domestic and international seed trade, including the trans-boundary movement of seed. Some chapters, viz., Maintenance of Genetic Purity; Seed Treatment and Management of Seedborne Pathogens, and Hybrid Seed Production need special mention for presenting comprehensive, yet condensed, information. Chapters viz., Forecasting of Seed Demand in Public and Private Sector and Determining Price of Seed will be particularly useful to the students, as these are few books dealing with these. Similarly, all seed regulatory documents have been covered well. It also provides a list and contact details of all organisations dealing with seed, nationally and internationally, which would be useful for seed industry as well as research institutions to further useful contacts.

The book is clearly planned as a textbook for the students and researchers in the discipline of Seed Technology and a reference book for the seed professionals. The purpose fulfils well. It will also be a good source of seed related information for those preparing for various examinations, though the students may find the book somewhat expensive at INR 3950. The paperback edition is priced at INR 675, but handling such a voluminous book in paperback may be difficult. The Glossary and Subject Index will be useful too. However, the authors have not provided any references or suggested books/papers for further reading. There are also several typographic errors in the book. It is hoped that these shortcomings will be corrected in future editions. Overall, a good reference book.

Reviewed by: **Dr. Malavika Dadlani,**

Former Head, Div. of Seed Sci. & Technol. & JD(R)  
IARI, New Delhi

### **Seed Industry Management**

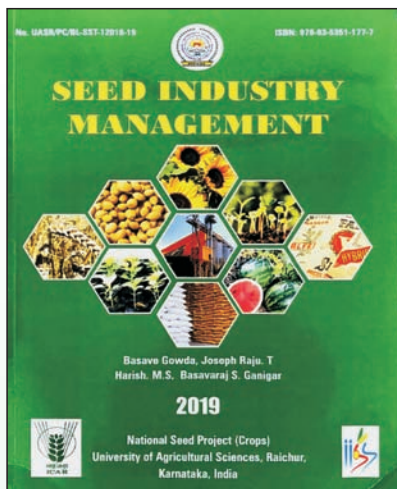
(ISBN: 9789353511777)

**Basave Gowda, T. Joseph Raju, M. S. Harish and Basavaraj S. Ganigar**

*National Seed Project (Crops), UAS, Raichur, Karnataka*

The Indian seed industry is the most vibrant sector with a cumulative annual growth rate of 10-14%. It comprises both public and private sectors with

almost equal contribution. The development of the seed industry in India is remarkable and has its own contribution in realising food security of the country. The seed science and technology being a multi-disciplinary subject covers seed industry component also. However, the information on the seed industry and entrepreneurship are not well included in many of the seed technology textbooks.



In the present title, the authors tried to compile the information about seed industry, related legislation, seed marketing management and entrepreneurship development. The book comprises of eight different chapters dedicated to various topics viz., Seed industry, Seed programs, International seed trade, Policies on seeds, Seed marketing, Recent advances in seed biotechnology, Guidelines for the establishment of seed entrepreneurship and Management of seed storage. These eight chapters were further divided into several subtopics comprising information on history of seed industry, current status and future growth of seed industry, various seed programs including seed village concept and compact area approach, various international organizations and treaties related to seed sector, seed production and quality control systems in foreign countries, different seed related policies and legislations starting from 1966 Seeds Act to current Seed Bill; seed pricing, demand forecasting, market intelligence, transgenics in seed industry, seed production and quality control systems; seed storage and pest management. The entire information was spanned over 349 pages.

The book acts as an introductory guide for those who wish to know about the seed industry and its management. It is useful to the student community to understand the industry component of seed science and technology. It is priced at Rs. 500/-

and is easily affordable. Further, it was perceived that specific chapters like seed marketing, entrepreneurship development and seed trade should be more elaborative and cover various updated and related aspects as the book is covering the industry and management; these may be incorporated in the next revised edition. Overall the book is a good compilation of information related to the seed industry and may be used as a textbook by undergraduate and postgraduate students pursuing seed technology as a major.

Reviewed by: **Dr. D. Vijay**,  
Principal Scientist, Div. of Seed Sci. & Technol.  
IARI, New Delhi

## UP COMING EVENTS

### **Pre-Congress ISTA workshop on varietal identification**

**Organizers:** Telangana State Seed & Organic Certification Authority

The use of protein-based and DNA based tools for obtaining protein or DNA profiles had gained great value on the determination of seed mixtures, variety verification/identification schemes and for helping enforcement of breeder's rights over the last decade. ISTA Variety Committee has been working on DNA based techniques standardization since long to include these techniques into the Rules as it is already done for traditional and protein-based methods. As a way to promote the adoption and knowledge of the methods included in the ISTA Rules for Variety Testing a Workshop on Variety Verification Using Biochemical and Molecular Techniques that will be held in Hyderabad, India, from 20 to 24 June 2019.

The workshop is destined to introductory level for anyone involved with crop variety identification and genetic purity assessments using morphological, electrophoresis techniques and DNA based molecular markers. The number of participants is a minimum of 15, without which the workshop will be cancelled and limited to a maximum of 20 participants. The participation fee

is 450 USD for ISTA Members and 675 USD for ISTA Non-Members.

<https://www.seedtest.org/en/event-detail-0-0-0-109.html>

## **ISTA workshop on seed sampling, purity, germination and moisture**

**Organizers:** Telangana State Seed & Organic Certification Authority

The workshop aims to provide an overview of Seed Sampling, as well as Purity and Germination Analysis and Testing of Seed Moisture content of a range of species, but also to provide a forum where questions relating to seed sampling and testing methodologies can be discussed. The workshop will be held at Hyderabad, India from 5-12 July 2019.

The number of participants is limited to a minimum of 25, and a maximum of 30. The participation fee is 590 USD for ISTA Members and 890 USD for ISTA Non-Members.

<https://www.seedtest.org/en/event-detail-0-0-0-108.html>

## **ISTA Seed Symposium 2019**

The seed symposium of the 32<sup>nd</sup> International Seed Testing Association Congress under the theme “Seed Technology and Quality in a changing world” is going to be held in Hyderabad, Telangana from 26-28 June 2019. The symposium provides an opportunity for the seed analysts, technologists, researchers and managers from universities, research institutes, government and the seed trade to discuss various aspects of seed quality and its technological application in seed testing. For more details, visit the website

<https://www.seedtest.org/en/seed-symposium-content-1-3400.html>

## **SCIENTIFIC GATHERINGS**

### **Recommendations of the National Workshop, UAS, Raichur**

Recommendations of the National Workshop on Strengthening Seed Production and Distribution System for Enhancing Availability of Quality Seeds



organised by ICAR - National Seed Project (Crops) UAS, Raichur in collaboration with ICAR-Indian Institute of Seed Science, Mau (UP) during February 15-16, 2019.

1. Public sector institutes should have independent advance research establishment, and collaboration needs to be made with other institutes to develop the need-based high yielding research varieties/hybrids. More budget allocation should be made to one integrated unit for research purpose instead of identical institutions.
2. Separate maintenance breeding should be established in public research institutes for retaining varietal characters and productivity.



3. Assured irrigation facilities should be established in public institutes, especially in potential farms for enhancing the productivity of seed crops.
4. The responsibility of the only breeder and foundation seed production should be bestowed

- to State Agricultural Universities with more emphasis on certified /truthfully labelled seed production of only newly released varieties for the initial periods whereas, State Seed corporations, National Seed Corporations, Co-operative seed organizations and private institutions are accountable for only certified seed production. Provision should be made for indenting the breeder and foundation seed requirement in advance to State Agricultural Universities.
5. Breeder seed and Foundation seed production should be undertaken based on seed demand with inter-institutional collaboration.
  6. Crop based Special Zones should be developed for quality seed production, which will reduce transportation and also avoid isolation and other problems.
  7. An incentive programme to seed growers should be adopted effectively to encourage the farmers' participation in seed production.
  8. State of art-facilities related to seed processing plants should be adopted to minimize the cost of processing with mechanization.
  9. Seed cooperatives at the local level should be established to enhance the seed production and expanding seed distribution system through milk union/co-operatives, farmers producers' organizations.
  10. Support should be provided to State Agricultural Universities by the government for state-bred varieties to promote new varieties/hybrids and to increase varietal replacement rates.
  11. In view of the support for the Govt. the existing seed certification charges should be reduced with the provision of allowing contract farming for registration of seed production programme as that of other neighbouring states.
  12. Foundation seed production monitoring committee should be reconstituted district wise with Head of Agricultural Research Station as Chairman, Concerned crop breeders, Assistant Seed Production Specialist, Karnataka State Department of Agriculture, Karnataka State Seed Corporation and National Seed Corporation nominee as members and Assistant Director of Seed Certification as the conveyor.
  13. Preference should be given for Seed Science & Technology graduates in all the KVKs, Seed corporations and Seed certification agencies for strengthening seed activities.
  14. Encouraging new start-up in quality seed production to provide employment to unemployed youths; financial support should be made available from the government. Provision should be made to create corpus fund in government to provide to loan at low interest rate.
  15. The government should provide more seed risk fund to all public institutes through establishing seed risk fund for total unsold seed quantity.
  16. The advance indent should be given for foundation and certified seeds by State Seed Corporations, private institutes to State Agricultural University.
  17. Subsidy for seeds should be extended for breeder and foundation seeds which are distributed to seed growers by public institutes including Agricultural Universities.
  18. Breeder seed price should be reimbursed to seed growers.
  19. Both procurement and selling price seeds should be fixed on a scientific basis by the committee constituted by the state government.
  20. Seed certification agencies should adopt uniform seed certification charges.
  21. Strengthening the state seed certification agency to enhance certified seed production.
  22. For effective implementation of farmers participatory seed production programme at all State Agricultural Universities, it is decided to discuss the following points in the co-ordination committee meeting of the farm university.
- Recommendations of the National Seminar, Imphal, Manipur**
- The national seminar on "Strengthening of seed systems in the north eastern and unreached regions:

Problems, prospects and policies” was organized by ISST in collaboration with ICAR Research Complex for NEH region, Manipur centre and CAU Imphal from 3-5 Feb 2019 at Imphal, Manipur. This seminar was attended by more than 250 delegates consisting of ISST members and other seed scientists across the nation. For the first time this kind of seminar was organized targeting the NE region. The important recommendations emanated from deliberations of the National Seminar are as follows.



1. Establishment of state seed certification agencies to ensure the quality of seed for the benefit the farmers of the North East region. (Action: State Government of NE region & DAC&FW)
2. Till the certification agencies start functioning, the CAU may take up the quality assurance of seed produced in the region through their seed testing laboratories in collaboration with state agriculture departments and DAC&FW, GOI (Action: VC, CAU, Imphal, DAC&FW)



3. Notification of the Seed Testing Lab in the Department of Agriculture of Manipur to be expedited (Action: Department of Agriculture, Manipur)
4. Incorporation of farmer producing agencies for successful seed multiplication of local varieties and establishing Custom Hiring Centers for farm mechanization in the region (Action: State Department of Agriculture/ CAU/ ICAR institutes)
5. Modernization of existing seed testing labs and processing units with the help of DAC&FW, GOI (Action: Department of Agrl. of states and DAC&FW)
6. Establishment of State Seed Corporations or Subsidiary unit of NSC exclusively for NE region (Action: State Governments, NEC, DAC&FW and NSC)
7. More focus on horticulture crops suitable for hilly regions with quality assured seedling nurseries (Action: Depart of Agriculture and Horticulture)
8. Data on crop-wise area for the entire NE region is to be prepared for drawing crop-wise and variety-wise effective seed rolling plans (Action: DAC&FW)
9. Adaptive trials of suitable crop varieties before undertaking large scale seed production with strict monitoring in focused manner (Action: VC, CAU and Director, ICAR-RCNEH)
10. Lifting of quality assured TL seed present with CAU and ICAR organizations through MOU rather than through tendering (Action: State Agriculture Department)
11. Extensive training in seed production and quality assurance through various government-sponsored training programs (Action: CAU with the help of NSRTC)
12. The private sector should be encouraged with associated incentive reward system through subsidies for the TL seed of CVRC/SVRC varieties (suitable for the NE Region) produced by them (Action: DAC&FW)

13. Creating awareness about the new varieties released for the NE region through extension programs (Action: KVKs of ICAR and CAU)
14. Regular and consistent indenting of breeder seed of varieties suitable for NE region (Action: State Department of Agriculture)
15. Creation of Seed Rescue Fund (linking with Fasal Beema Yojana) to compensate for the losses of seed producers particularly the farmers when the seed was not lifted and producers are forced to sell as grain (Action: State Government)
16. Development of organic seed production and certification guidelines and exploring the potential for organic seed production in the northeast region (Action: DACFW, State Agriculture Department, ICAR and CAU)
17. Formulation of a group of specialists to deliberate and prepare a road map for strengthening the seed systems in the NE region. (Action: President and Secretary, ISST)
18. A strategy paper on the NE seed systems consisting of policy issues should be published by ISST (Action: President and Secretary, ISST).
19. Use of balanced or near organic farming is the need of hour, rather than Zero Budget Natural Farming or total organic farming.
20. Formation of Organic Community Forum for testing and recommendation of biological seed treatments in large scale.

## Proceedings of 30<sup>th</sup> Annual General Body meeting of ISST

The 30th Annual General Body (AGBM) Meeting of the Indian Society of Seed Technology (ISST) was held under the Chairmanship of Dr. (Mrs.) M. Dadlani, President, ISST on 4 Feb 2019 at Imphal Manipur in sidelines with the National Seminar Organized by ISST. A total of 39 members were present. As the number of members present was not sufficient to meet the quorum, the meeting was adjourned and resumed subsequently. Dr. Sandeep Kumar Lal, Secretary, welcomed the chair and other members of ISST.



Following EC members, besides the other members of ISST were present

1. Dr.(Mrs.) M. Dadlani, President
2. Dr. M. Bhaskaran, Vice-President
3. Dr. J.K. Sharma, Vice-President
4. Dr. Sandeep Kumar Lal, Secretary
5. Dr. Shiv K. Yadav, Chief Editor
6. Dr. Satish Kr. Yadav, Executive Councillor (Delhi Zone)
7. Dr. Kalyanrao Patil, Executive Councillor (West and Central Zone)
8. Dr. Sunil S. Mahajan, Executive Councillor (West and Central Zone)
9. Dr. P.K. Barua, Executive Councillor (East Zone)
10. Dr. Rame Gowda, Executive Councillor (South Zone)

The brief agenda of the AGBM was circulated earlier to all the members and the agenda items were discussed one by one. At the outset, Dr (Mrs.) Malvaika Dadlani, President, ISST welcomed all the ISST members, including members of Executive Council. She briefed the house about the activities being undertaken for achieving the goals of the society and also urged all the ISST members to support in this endeavour.

## **Item no. 1: Confirmation of proceedings of previous general body meeting of ISST**

Dr. Sandeep Kumar Lal, Secretary, briefly apprised the house about the major recommendations of the previous AGBM held on 10.05.2018 & presented the action taken report which was approved by the GB.

## **Item no. 2: Presentation of progress report by Secretary.**

The Secretary apprised the house about the major achievements of the society during the year 2018-19, which was approved by the GB. The main points highlighted were,

1. Renovation of ISST office at NASC and it was made fully functional.
2. Formation of WA group for ISST Members
3. Formation of WA group for ISST EC Members
4. Redesigning of Seed Research Journal

## **Item no. 3: Presentation of Audited account of the society of the year 2017-18**

Since, Dr. Zakir Hussain, Treasurer was not present at the meeting, Dr. Sandeep Kumar Lal, Secretary, presented the Audit Report of the society of the year 2017-18, which was approved by the GB. He also informed the house about the release of grants of financial assistance amounting to Rs. 2.00 lakhs from ICAR, New Delhi for publication of Seed Research during the year 2018-19.

## **Item no. 4: Budget Proposal of society by Treasurer for the year 2018-19**

Dr. Sandeep Kumar Lal, Secretary, also proposed the tentative expenditure of Rs. 11.20 lakhs for ISST during the financial year 2018-19. He also proposed a budget of Rs. 15.095 lakhs for funding the society's

activities during the financial year 2019-20, which were approved by the house. The issue of filling of ITR was discussed at length and the house approved that ISST will file the ITR during this financial year and also seek IT exemption for a not-for-profit body. (Action: Treasurer and Secretary)

## **Item no. 5: ISST Publications - Chief Editor.**

The concern was expressed about the quality of manuscripts being submitted for publication in Seed Research. Therefore, it was urged to all the ISST members for submission of good quality papers in the Seed Research Journal. The matter of publication of volume 38(2) was also discussed. It was decided that all the interested members may submit the manuscripts based on the research conducted before June 2010. Moreover, an undertaking also needs to be enclosed by the author(s), that the data provided in the paper have not been published elsewhere. Such papers (for vol. 38 (2) must be submitted by 15 March 2019. (Action: Chief Editor)

The issue of providing a soft copy of Seed Research to the ISST members to reduce the publication charges was also discussed. It was decided that an option note in this regard will be published in the upcoming issue of Seed Tech News and the members will be required to indicate their opinion for the same. (Action: Editor, STN)

## **Item no. 6: Proposal of different activities/program for the coming year by the President**

It was suggested that society should plan for the organisation of an International seminar during 2021 on the completion of 50 years of the establishment of ISST. It was decided to organise the foundation day at UAS, Dharwad 21.04.2019 based on the request of Dr. Ravi Hunje, Professor, Seed Science and Technology, University of Agricultural Science, Dharwad, Karnataka. It was also decided that all the executive councillors will organise the ISST foundation day on in their respective zones.

## **Item no. 7: Any other item with the permission of the Chair**

- i. It was decided to initiate ISST chapters in the regions having the strength of at least 50 members.

- ii. It was decided for the inclusion of “Best PhD Thesis Award” in the field of Seed Science and Technology for encouraging the students.
- iii. While framing the scorecard for the ISST awards, utmost care will be taken that contribution in research, teaching extension and other accomplishments in society/academic/institutional activities get the equal weightage. Moreover, all possible components should be included as per the ASRB pattern. As volunteered, the scorecard will be prepared by Dr. Rame Gowda and Dr. Kalyanrao Patil within one month and submitted to ISST Secretariat for further necessary approval or modifications, if any.
- iv. It was decided that all the Executive Councillors will initiate membership in their respective zones drive to motivate the students and young researchers.
- v. It was also decided to update the latest contact details of ISST members for the publication of Members’ directory. All the ISST members are requested to provide their support and cooperation in this regard.
- vi. The issue pertaining to the appointment of one seed technologist for the seed production activities in KVK’s was discussed. Dr. H.S. Gupta, Former Director, ICAR-IARI suggested that this matter should be pursued at the level of ASRB and DDG (Agricultural Extension), ICAR, New Delhi.

The meeting ended with the Vote of Thanks to the chair and all the ISST members present, including EC members for their wholehearted support as well as for providing valuable inputs and taking a keen interest in the activities of the Society.

## SIGNIFICANT RESEARCH FINDINGS

### Combating seed shortage in *Cenchrus ciliaris* (Anjan grass) through round the year seed production

*Cenchrus ciliaris* (Anjan grass) is an essential perennial grass component of the *Dichanthium-Cenchrus-Lasiurus* pasture cover of arid and

semi-arid regions of the tropical and sub-tropical climate of India. It is adapted in a wide range of environments due to its drought tolerance, deep roots, rapid response to summer rains, high biomass, resistance to overgrazing, high nutrition value (protein 8-10% with 60-70% digestibility) and excellent palatability for all kinds of grazing animals. It is also suitable for production under cut and carry system as green fodder, hay and for making silage. After well establishment, it gives 6-8 t/ha dry fodder out of 2-3 cuts in a year and 80-150 kg/ha seed yield. The seed of *Cenchrus* grasses is mostly produced during monsoon as a rainfed crop but seed quality (spikelet filling and germination) is poor. There is a wide gap between demand and supply of *Cenchrus* grass seed which limits rejuvenation of grazing lands. Hence, there is a need to develop technologies for enhancing quality seed production. During the evaluation of *Cenchrus* grass germplasm at Avikanagar it was observed that these species respond well even to little amount of precipitation and produce seed other than monsoon season too. Therefore, to work out the seasonal effect on seed yield and quality an experiment was undertaken during three seasons of a year *viz.* monsoon season (July to September), the autumn season (September to November) and spring season (February to April). Seven varieties/genotypes of *C. ciliaris viz.*, IGFRI-3108, CAZRI-75 (National checks), IGFRI-727, IG 67-365, IG 96-531, IG 96-414 and IG 67-3833 were planted in RBD design during monsoon, 2014 at IGFRI-WRRS, Avikanagar, Dist.- Tonk (Rajasthan). The experiment was conducted during 2014 to 17 under rainfed condition during monsoon season while during autumn and spring season need-based sprinkler irrigation was applied.

Fodder and seed yield and seed quality traits were observed during all three seasons of each year. IG 96-531 did not flower/produced seed during monsoon season at Avikanagar, hence, not included in the statistical calculation. The seed was collected manually thrice within a season as per maturity and seed of all pickings mixed thoroughly before taking samples for seed quality testing. For seed quality parameters, the proportion of filled spikelet was observed with manual dehusking and germination test of six-month-old spikelet was conducted

under laboratory as per International Seed Testing Association guidelines. Pooled analysis of 3 years data was done in SPSS. ANOVA showed significant differences for seasons, genotypes as well as their interactions for fodder yield, seed yield and seed quality traits. Fodder yield showed the significant difference among the seasons and highest fodder yield was recorded during monsoon season (50.3 q/ha) as the species is adapted to tropical and sub-tropical climatic conditions. Significant differences were observed for seed yield among the three seasons and highest seed yield was recorded in the spring season (121.5 kg/ha) followed by monsoon (70.1 kg/ha) and autumn (50.2 kg/ha) (Table 1). Spikelet filling significantly differed among the seasons and ranging from 53% in monsoon to 65.8% in autumn and spring season. Among the seasons lowest germination was recorded during

the monsoon season (19%) and it was about two times lower as compared to autumn and spring seasons. Poor seed quality during monsoon may be due to synchrony of rainy days and flowering and seed formation that leads to pollen wash and fungal infection (ergot formation) in a spikelet. Among genotypes, highest fodder yield was in IG 67-365 ranging from 14.1 to 59.9 q/ha followed by CAZRI-75 ranging from 15.1 to 54.7 q/ha during autumn and monsoon season, respectively. On the other hand, highest seed yield (204.1 kg/ha) and germination (54.1 %) were observed in IG-67-3833 during spring and autumn season, respectively. It was concluded that seed production of *C. ciliaris* could be taken in all the three seasons of the year but higher seed yield and quality can be obtained in spring and autumn seasons compared to monsoon season with irrigation facility.

Table 1. Fodder and seed yield of *Cenchrus ciliaris* genotypes during different seasons

Genotype/ Season	Fodder yield (q/ha)				Seed yield (kg/ha)			
	Monsoon	Autumn	Spring	Total	Monsoon	Autumn	Spring	Total
IG 67-365	59.9	14.1	17.2	91.2	18.7	18.9	73.3	110.9
IG 96-414	56.8	11.9	13.4	82.1	130.6	69.0	132.6	332.2
IG 67-3833	44.1	9.7	14.9	68.7	68.2	73.1	204.1	345.4
IGFRI-727	46.1	10.8	14.6	71.5	26.9	30.2	49.1	106.2
IGFRI-3108	40.3	8.6	11.8	60.7	119.1	59.2	149.0	327.3
CAZRI-75	54.7	15.1	15.3	85.1	56.9	50.7	121.1	228.7
Mean	50.3	11.7	14.5	76.6	70.1	50.2	121.5	241.8
CD (0.05)	Season- 1.2; Genotype- 1.9; Season*Genotype- 3.3				Season- 3.5; Genotype- 5.0; Season*Genotype- 8.7			

**RP Nagar and SS Meena**  
ICAR- IGFRI, WRRS, Avikanagar



## RETIREMENTS

**Dr. R.C. Punia**, Head, Department of Seed Science and Technology, CCSHAU, Hisar got superannuated on 28-02-2019 after rendering 33 years of service in various capacities. He joined as Assistant Scientist (Plant Breeding) on December 04, 1985, in the National Seed Project Section, Department of Plant Breeding, Haryana Agricultural University, Hisar. Later got promoted as Associate Professor in 1998 and as Principal Scientist in 2006 in the Department of Seed Science & Technology.



He was deputed as UNDP/FAO Fellow for Advanced Training on Seed Technology at Mississippi, USA in 1991 and Tifton, Georgia, USA in 2000. Dr. Punia was also engaged in UG & PG teaching program and guided 15 M.Sc. and PhD students. He is an excellent teacher and instrumental in encouraging the student to excel in their specialized field. He published more than 100 research articles in International and National Journal of repute, besides many popular articles in various farm

magazines and radio /TV Talks. The ISST wishes him a peaceful, healthy post-retirement life.

## USEFUL TIDINGS

### ISTA Accredited Seed Testing Laboratories

Throughout the world there are 235 ISTA member laboratories are present and 142 of them were ISTA accredited seed testing laboratories (IASTL). These IASTL are spread over 62 countries including India. Maximum number of IASTL are present in Germany (13) followed by France (7) and USA (7). In India, out of 24 ISTA member laboratories, only six STL, five are from private sector and one is from government sector got accredited. The Indian IASTL are,

1. Namdhari Seeds Pvt. Ltd.
2. Maharashtra Hybrid Seeds Company Private Limited.
3. Indo-American Hybrid Seeds (India) Pvt. Ltd.
4. Nuziveedu Seeds Limited.
5. Bejo Sheetal Seeds Pvt. Ltd.
6. Seed Testing Laboratory, Department of Seed Certification, Tamil Nadu.

## IMPORTANT ANNOUNCEMENT

As per the decision in the 34th General Body Meeting at Imphal, the **Seed Tech News and Seed Research** Journal will be delivered in the digital format (pdf) to members. The ISST members who still wish to have the hard copy and those who want to shift to a digital format may kindly indicate their choice to the ISST Secretariat through email (isst1971@gmail.com)/postal letter. Based on the response, the decision will be taken by the executive council. All the members are requested to respond to this for the betterment of society. If there is no response within a month of the receipt of this edition of Seed Tech News (hard/soft copy) it will be assumed that you have accepted for the digital format.

**Note:** All the ISST members are requested to contribute to various columns of the Seed Tech News by providing information on Awards and honours received; Upcoming trainings, Recommendations of scientific gatherings, Latest research findings etc. for wider dissemination among seed community.

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