

Seed Tech News



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

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Inflorescence of *Brachiaria mutica* with violet colour stigma and anthers

Brachiaria mutica (Para grass/ Buffalo grass) is the most suitable forage species for longterm flooded/seasonally waterlogged or swampy conditions with high palatability and high nutritive value (14-20% crude protein). Produces 3-4 t/ha/year green fodder under unfertilized situation and yields up to 10-12 t/ha/year with fertilizer application. It cannot tolerate extended dry conditions and very sensitive to frost damage.

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

From President's Desk...

Dear Members,

Greetings from the Secretariat!

We begin every year with a lot of expectations and setting individual, collective and societal goals to make our lives better than before. We all have a dual responsibility as responsible citizens and agricultural scientists, who must contribute towards achieving the Sustainable Development Goals in one way or the other. As seed professionals we need to do our bit in increasing the farmers' income through the use of better seed. We will continue to work towards building a strong technological base for a system of quality seed supply, reaching every part of the country.

Though a relatively new branch of Crop Improvement, Seed Science has come to be recognized as one of its essential components. In most of the universities both nationally and globally, Seed Science either exists as a Sub-division or a Section in the departments of Plant Breeding, or a division in the core programme of Crop Improvement. In the last 50-60 years, Seed Science has emerged as a full-fledged discipline with many inter-related branches. Every one or two decades, the focus of technology development sees a shift, depending on the farming needs. The goal of the R&D in seeds being "every seed counts", the priority has unquestionably been the enhancement of seed performance through genetic manipulation or using seed quality advancement treatments. Seed treatments mostly remained confined to the application of broad-range fungicides during 70s and 80s and progressed to polymer coating, pelleting and priming in the later part of the 20th century. However, the concern over climate uncertainties, degrading soils and diminishing resources, and increasing threat of severe abiotic and biotic stresses, has put the focus of research on sustainable technologies leading to improved performance of seeds under a wide range of conditions. Application of pesticides through seed minimizes the environment pollution by 5-10 times compared to soil and foliar applications. Notwithstanding the fact that efficacy of pesticides applied through seeds have a limited window compared to other modes (which can be applied as and when required), seed treatments offer effective protection against seed and soil-borne pests and pathogens during emergence and early vegetative stage. Development of effective and safe seed treatments has become the priority research area in seed science. There is need to innovate and come up with indigenous solutions which are both effective and affordable.

We, as seed scientists have a responsibility to spread science-based information and diffuse misconceptions. Benefits of using quality seeds of the right variety, replacing every 3 to 4 years in case of untreated OPVs or every year in case of hybrids need to be highlighted. Similarly, judicious use of pesticides can also help in reducing the production cost and containing pollution of the ecosystem.

Looking forward to your views and suggestions and with warm personal regards,

Malavika Dadlani

AWARDS AND HONOURS

Prof. S.V.S. Chauhan, Former Professor and Dean, Life Sciences, Agra University, Agra got unanimously elected as President, Indian Association of Angiosperm Taxonomy for 2017-18 and delivered presidential address at University of Delhi on 10th November 2017.

Dr. Kalyanrao Patil, Assistant Professor, Department of Seed Science and Technology, B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat received the “Best Teacher Award” in the faculty of Agriculture from Hon’ble Governor of Gujarat, Shri. O. P. Kohli during 14th Annual Convocation held on 02-01-2018 for his efforts in enlightening the students.



Dr. Atul Kumar, Principal Scientist and Nodal Officer Hindi was awarded with first prize in Power Point Presentation Competition in Hindi in 2017 on the topic



“Nitiparak Krishi Anusandhan” meaning Ethics in Agriculture. He was felicitated by the Director IARI Dr. A. K. Singh and Joint Director (Research) Dr. K. V. Prabhu, in a function organised at Dr. B. P. Pal Auditorium on 22nd January 2018 with a certificate and a cash prize of Rs. 10000.

Students' Achievements

Miss. Pusarla

Susmitha, Ph.D. Scholar in Seed Science and Technology, under the guidance of Dr. Kalyanrao Patil, Anand Agricultural University, Gujarat has been selected for “Innovation in Science Pursuit for Inspired Research (INSPIRE)”, Department of Science



and Technology, Ministry of Science and Technology, Government of India during the academic year 2017-18. She is doing research work on “Assessment of seed viability, vigour and associated characters using genomic tools in wheat (*Triticum aestivum* L.) under salt stress conditions”.

Mr. Debashis Paul,

MSc Student in Seed Science and Technology, under the guidance of Dr. S.K. Chakrabarty ICAR-Indian Agricultural Research Institute, New Delhi received the IARI Merit Medal from President of India for his outstanding academic and research work on “An assay on hardseededness and germination in Mungbean (*Vigna radiata* L.)” in the 56th convocation of IARI.



NEWS ITEMS

Bayer takes over Monsanto

Bayer successfully completed the acquisition of Monsanto on June 7, 2018. Bayer, a German pharmaceutical and chemical company, bought agricultural giant Monsanto for \$62.5 billion. The two companies agreed to spinoff \$9 billion worth of assets. Bayer will sell its seed and herbicide business to third party, BASF, a German chemical company to avoid monopoly due to merger. With merger Bayer will become the major supplier of corn seed in the world. Farmers across the globe fear increase in seed prices due to this merger.

New Leaders of ISF

At the 69th World Seed Congress at Brisbane, Australia from 3-6 June, the General Assembly of International Seed Federation elected Mr. Eduard Fito from Spain as new president and Donald Coles from Australia as Vice President. The newly elected president Mr. Fito during his acceptance speech informed that he will strengthen the two pillars of ISF's mission, movement of seed and innovation. (Source: <http://european-seed.com/isf-world-seed-congress-elects-new-leaders-adopts-position-papers/>).

EU banned outdoor use of pesticides harmful to bees

Bees are the most important insect species that help in cross pollination and there by seed/grain production in several crop species. Some of the modern pesticides like neonicotinoids are harmful to bees. The European Commission has adopted the Regulations to completely ban the outdoor uses of imidacloprid, clothianidin and thiamethoxam on 29 May 2018. The regulation published in the journal mentioned that “Member States shall, in accordance with Regulation (EC) No 1107/2009, where necessary amend or withdraw existing authorisations for plant protection products containing the above three chemicals as active substance by 19 September 2018 at the latest” and “Any grace period granted by Member States in accordance with Article 46 of Regulation (EC) No 1107/2009 shall be as short as possible and shall expire by 19 December 2018 at the latest”. For more information on these regulations, refer the Official Journal of European Union (L132, Vol. 61) at [https://](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2018:132:FULL&from=EN)

eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2018:132:FULL&from=EN.

The neonicotinoids mentioned in the new restrictions will be allowed only in permanent greenhouses where no bees are expected to visit. Bayer Crop Science the company which developed one of the banned neonicotinoids expressed its displeasure and felt that these regulations reduce the European farmers' ability to tackle important pests for which no alternative treatments are available.

Release of UPOV PRISMA ver.2

UPOV Prisma is the online application tool for submitting application data to participating Plant Variety Protection offices (<http://www.upov.int/upovprisma/en/>) under UPOV. This tool provides controlled, secured and confidential accesses to the users and helps in tracking their applications. The relevant data can be reused in subsequent applications and also it translates to official languages of the participating PVP offices. A similar approach shall be adopted by the Indian PPVFR Authority for the registration of plant varieties.

National Phenomics facility available for Indian Research

The Indian Council of Agricultural Research (ICAR) through National Agricultural Science Fund (NASF) established a state-of-the art plant phenomics facility at the ICAR-Indian Agricultural Research Institute, New Delhi. This facility is the largest in India and one of best facility in terms of analytical capabilities among the public funded Institutions in the world. For non-destructive phenotyping, eight different imaging platforms viz., Thermal Infra-red, Chlorophyll fluorescence, calibrated light source, Root imaging, Visual color imaging, Near Infra-Red shoot imaging, Visible-Near Infra-Red Hyperspectral imaging and Short-Wave Infra-Red Hyperspectral imaging are available in this facility. These sensors are useful to measure early vigor, growth rate, biomass, senescence, photosynthetic pigments, photosynthesis efficiency, plant water content, chemical composition such as sugars synthesized by the plants, nitrogen status, etc. in response to different stresses and climate conditions. This centre was dedicated to the Nation by Shri Narendra Modi, Hon'ble Prime Minister of India in the name of “Nanaji Deshmukh Plant Phenomics Centre” on 11th October 2017.

Prediction of global yield level reduction of vegetables and legumes due to environmental changes

For the first time, the scientific study led by scientist of London School of Hygiene and Tropical Medicine predicted 35% and 9% reduction in non-staple foods viz., vegetables and legumes respectively. They performed meta-analysis of hundreds of research publications since 1975 across 40 countries and concluded that If no action is taken to reduce the negative impacts on agricultural yields, environmental changes predicted to occur by mid- to end-century in water availability and ozone concentrations would reduce average yields of vegetables and legumes. (Source: London School of Hygiene and Tropical Medicine).

SCIENTIFIC BREAKTHROUGHS

Speed Breeding

A new plant breeding technique called 'Speed Breeding' that may revolutionize the way we grow crops particularly under the realm of climate change was developed and published by a group of scientists from Australia, UK and Malaysia. By accelerating the crop growth as well as its reproduction, the number of generations can be accelerated by the breeder and produce new varieties which are nutritious, resistant to diseases and tolerant to climate change. The technique comprises intensive light regimes to boost the crop growth and productivity. The initial results are disappointing and through series of experiments, they optimised the conditions like nutrition, water supply, light frequency and glasshouse temperature to produce normal healthy plants. Speed breeding can be used to achieve up to 6 generations per year in spring wheat, durum wheat, barley, chickpea and pea and 4 generations in *Brassica napus* in place of 2-3 generations under normal glass house conditions. Under 22 hours of continuous light the seed to seed duration in spring wheat was reduced to just 8 weeks making it possible to enhance the number of generations to six per year. Thus, speed breeding is another tool in the arsenal of plant scientists. The real impact can be visualized when these new tools like CRISPR, high-throughput genotyping, genomic selection, speed breeding etc. are used in

combination to achieve new levels of productivity and quality enhancement. For more information about this technique read the original paper at <https://www.nature.com/articles/s41477-017-0083-8>.

Multi spectral imaging for seed quality?

Seed quality comprises several characters including varietal and analytical purity, germination capacity, seed vigour, seed health and uniformity. Several methods viz., physical, physiological, chemical and visual inspections are available to test these quality characteristics of the seed. The non-destructive, reliable and fast techniques are the need of the hour and multispectral imaging (MSI) is one such technique which has potential for seed quality assessment. The usefulness of this technique to identify the seed health issues, seed maturation, varietal identification and insect damage was discussed in the latest review by the scientists of Denmark. The multi spectral images were analysed by a normalized canonical discriminant analysis (nCDA) to identify the maturation levels or fungal infections etc. MSI in combination with chemometric methods is useful in identifying the transgenic plants viz. Bt Rice, Glyphosate resistant soybean seeds etc. For more information on this topic refer the review paper at <https://doi.org/10.1017/S0960258518000235>.

New deadly pathogen threatens Olive cultivation in Mediterranean region

Olive tree forests in the Mediterranean coast passed on through several civilizations over thousands of years are presently under threat. The culprit is a bacteria *Xylella fastidiosa* subspecies pauca which causes a rapid dieback of shoots, twigs and branches followed by death of the entire tree. It also infects peaches, almonds, oranges, grapevines and several other plants. No established cure for the infection was present. Researchers from all over the world are working hard to find solutions, and there are indeed some promising approaches for blocking the infection or finding resistant olive cultivars. However, scientists need more time. Until then, containment methods based on solid scientific ground are to be followed. This is a wakeup call for other regions where these crops are grown. The resistant sources are to be identified at the earliest to

stop the global spread of this deadly bacteria (Source: <https://doi.org/10.1016/j.bbrc.2018.05.073>).

Mobile based deep machine vision to identify plant stress

Researchers from Department of mechanical engineering and agronomy of Iowa State University, USA have developed deep machine vision technology based on 25000 visual images of soybean plants under different biotic and abiotic stress conditions. They have built a deep convolutional neural network (DCNN)-based supervised classification framework to efficiently extract complex features from images and automated the plant stress identification, classification and quantification through a model. The approach presented here is widely applicable to digital agriculture and allows for more precise and timely phenotyping of stresses in real time. For more details about this technology refer the published article at <https://doi.org/10.1073/pnas.1716999115>.

Pollen Tube Dependent Ovule Enlargement - A New Step in Plant Reproduction

Pollination is a crucial step in plant reproductive biology as well as in seed production. The pollen tube is generally considered to be a carrier of sperm cells for the double fertilization in angiosperms. The recent studies are deciphering the other role played by pollen tube and its contents. Recent findings in past few years found that pollen tube contents have the ability to enlarge the ovules and initiate the seed coat development. The new phenomenon called as Pollen tube dependent Ovule Enlargement Morphology (POEM) is a new phase between pollen tube guidance and fertilization during plant reproduction. This was the first report in plants concerning the paternal function of pollen tube contents (PTC) in facilitating the maternal development of the ovule without fertilization. For more information on this refer the original article at <https://doi.org/10.1080/19420889.2017.1338989>. The latest findings with the help of Arabidopsis mutant drop1- drop2-, which produces pollen grains and pollen tubes without sperm cells this POEM phenomenon was further proved. (<https://onlinelibrary.wiley.com/doi/abs/10.1111/jipb.12577>).

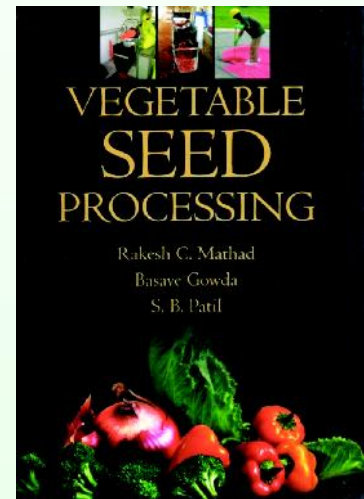
BOOK REVIEW

Vegetable Seed Processing

(ISBN: 9789385516030)

Rakesh C. Mathad, Basave Gowda and S.B. Patil
New India Publishing Agency, New Delhi

India is the second largest producer of vegetables and is one of the preferred destinations for vegetable seed production. The large-scale variability in the vegetable seeds results in variation of their processing requirements. The efforts by the authors to compile this information in the form of present book is highly appreciable.



The title comprises eleven chapters spread over 140 pages, wherein the authors have addressed every aspect of postharvest management of vegetable seed viz., pre-conditioning, seed extraction, seed drying before processing and packaging. It also covered seed processing equipment and crop wise seed processing specifications to enhance the seed quality in terms of physical purity and standard germination, seed blending to improve a poor seed lot, seed treatment to make it free from pests and vegetable seed storage for increasing its shelf life. The book is a valuable reference to students, academic and industry personnel associated with vegetable seed processing. It is reasonably priced at Rs. 1200.00 and hope it will be useful for the various personnel involved in vegetable seed production, processing, testing and certification; and thereby contribute towards enhancement of quality seed supply in the system. Further, it was perceived that the seed-drying chapter should precede processing chapter as in general drying is done before the processing. Similarly, in chapter number five the example given for 'Processing for improving genetic purity' is a very

specific case and not a generalized thing, which may be dealt more appropriately in the revised edition. Overall, the book is a good compilation of information useful for academic and practical purposes.

Reviewed by: Dr. Ashwani Kumar

*Senior Scientist (Seed Technology), ICAR-IARI,
Regional Station, Karnal*

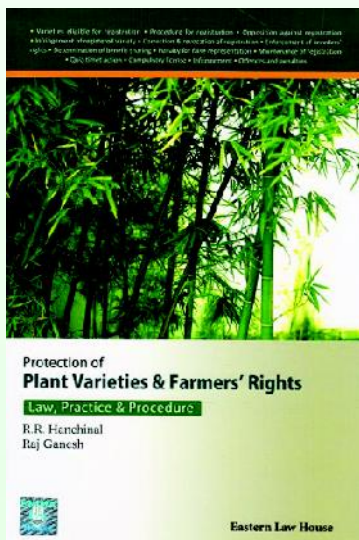
Protection of Plant varieties & Farmers' Rights – Law, Practice & Procedure

(ISBN:9788171773374)

R. R. Hanchinal and Raj Ganesh

Eastern Law House, Kolkata

India, with its rich plant genetic resources, is recognized as a cradle of agricultural bio-diversity. With the New Policy on Seed Development (1988), the need for a mechanism of Plant Variety Protection was felt and keeping the farmers' interest in view India passed the legislation



Protection of Plant varieties & Farmers' Rights Act, 2001, which came into operation in 2005. Even after 13 years since its implementation, the Act is still not well-understood. Hence, this book on PPV&FR Act, 2001 by none other than the Former Chairperson of the Authority Dr. R. R. Hanchinal and its Legal Advisor Mr. Raj Ganesh, assumes a special significance. The book is intended to present the Act in a lucid manner which is easy-to-understand by the students, researchers, breeders, seedsmen as well as the legal professionals. Dr. Hanchinal's depth of understanding of the IPR issues in agriculture both from the point of a plant breeder and the Chairperson of the Authority implementing this Act, is evident throughout the book.

The 380 pages in the book have been divided into 21 Chapters with necessary Sub-Sections in each of these. The chapters cover every aspect of Plant Variety

Protection and Farmers' Rights, starting from the origin of PVP laws to filing of application forms as per the PPV&FR law, conduct of DUS tests, issuance of certificates of registration and maintaining the IPR after registration of plant variety in India, compulsory licensing, farmers' rights and benefit sharing, infringements, offenses and penalties are meant to provide detailed explanations on the provisions under the Act. These are supported by eight of Appendices and a number of case examples provided to clarify the interpretation of the Act. To offset the rather dry nature of the subject, authors have inserted some nice quotes and interesting facts about the wonders of plant kingdom in the beginning of each chapter. Though it would have been more appropriate if the quotes and plant facts had some relevance with the topic of a given chapter, these add value to the book. This is the first authentic book on this very important Act in agriculture, which is a must for all institutions and individuals engaged in research, development and commercialization of plant varieties and seed. The hard cover book is very reasonably priced at INR 790.

Reviewed by: Dr. Malavika Dadlani

Former Joint Director (Res) and Head, Seed Science & Technology, IARI, New Delhi

Fundamentals of Seed Science and Technology

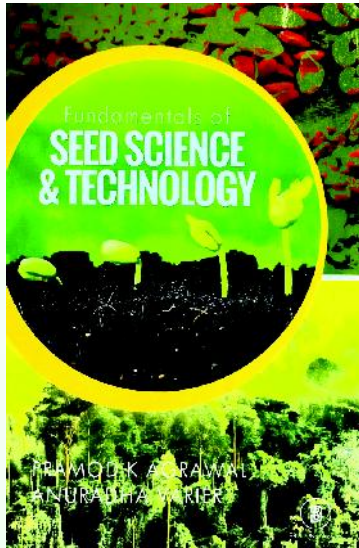
(ISBN: 9789387296756)

Pramod K Agrawal and Anuradha Varier

Brillion Publishing, New Delhi

Seed played a crucial role in realizing the full potential of improved varieties in India. Seed sector both public and private are well developed in India and are contributing a lot towards realizing the food security of the nation. Under the changing scenario of climate and its adverse effects leading to exposure of crops to both biotic and abiotic stresses coupled with yield plateau in important food crops has thrown challenges to agriculture sector. Towards meeting these challenges lots of new developments are taking place in various fields of agriculture including Seed Science and Technology. Seed Science and Technology is an amalgamation of various branches of science dealing with seed. A comprehensive information covering the current developments in the seed sector is the need of hour. The publication of this book is very timely, which

focuses on the fundamental aspects of seed science by Dr. P.K. Agrawal and Dr. A. Varier; the renowned seed scientists of the country. Their vast experience in seed research and management as well as long experience of private sector helped in bringing out this book in a more comprehensible manner, covering various branches of seed science and technology.



The book comprising of 227 pages, is divided into 17 chapters starting from seed development to marketing. The information on seed quality concept, seed production and certification, seed borne diseases and insect pests, seed testing, varietal identification, processing, storage and packaging, marketing and legislation covers all the aspects of seed science and technology. The new topics on effect of climate change on seed production and quality, relationship between plant breeding and seed technology, plant variety protection and priming are helpful to both academicians as well as students. Though, the topics were covered in a very lucid manner, yet there is scope for better editing. It would have been better if the book incorporated recent references (viz., IMSCS, 2013 and ISTA 2017) in different chapters. The provision of references at the end of all the chapters for further reading would have been helpful for researchers and academicians. Certain topics like Hybrid Seed Production, Testing of GM seeds and OECD certification need to be incorporated and chapters like Indian Seed Legislation and Seed Marketing may be improved further in future updated edition. The typographical errors, incomplete information and references here and there shall be corrected in next edition. The book is reasonably priced at INR 695.

Reviewed by: Dr. D. K. Yadava

*Head, Div. of Seed Science and Technology,
IARI, New Delhi and Assistant Director General (Seed)
Acting, ICAR, New Delhi*

SCIENTIFIC GATHERINGS

47th Foundation Day of ISST

The 47th Foundation Day of the Indian Society of Seed Technology (ISST) was celebrated on 21st April 2018. This year, a Panel Discussion on “The Role of ISST in Shaping the Indian Seed Sector” was organized from 2:30 PM to 5.00 PM at IARI Virology auditorium, New Delhi. Dr. R. S. Paroda, Former Secretary, DARE and DG, ICAR and President, TAAS was the Chief Guest and Chair for the panel discussion. Dr. K. V. Prabhu, Chairman PPV&FRA and Former Joint Director (Res), IARI was the Co-Chair. Eminent personalities from various fields presented their opinions, which were followed by discussion, comments and conclusion by Chair and Co-Chair. Dr. R. S. Paroda launched the ISST website www.isst-india.com during the event. The key recommendations that emerged from the panel discussion are,



- ISST has to play a greater role in human resource development by bringing both public and private sector to a common platform
- It should actively involve in the policy advocacy through series of policy papers and white papers on various debatable issues
- ISST should deeply involve in inculcation of temperament in scientific research and act as a guiding force to take up new vistas in the seed research
- Trainings shall be conducted for the upgradation of knowledge of both public and private seed personnel by inclusion of resource persons from both public and private sector
- The reach of scientific knowledge to various seed workers shall be made through high quality research and review articles publication in Seed Research
- Every year one or two knowledge sharing brainstorming sessions and workshops shall be conducted in different parts of the country
- It should play a major role as a neutral body and negotiating partner at International fora
- ISST should form Special Interest Groups consisting of experts from both public and private sector for formulation of guidelines and/recommendations on different contentious issues
- ISST should develop a road map covering various issues related to Indian seed sector for the next 20 years
- A vision document for the society shall be prepared as a future reference and guiding post.

ISST Foundation Day Celebrated at Assam Agricultural University, Jorhat

The 47th ISST Foundation day was also celebrated at the Assam Agricultural University (AAU), Jorhat through special lectures on 'Prospect of seed industry in Assam' by Dr. P. Talukdar and 'Application of nanotechnology in plant varieties and seeds' by Dr. R. Boro on 21 April 2018. The Department of Genetics and Plant Breeding of AAU took the initiative in organizing these lectures. Several faculty and students attended these lectures.



Joint Annual Group Meeting of AICRP-NSP (Crops) & ICAR-Seed Project

Joint Annual Group Meeting of 33rd Annual Group Meeting of AICRP-NSP Crops & 13th Annual Review Meeting of ICAR-Seed Project "Seed Production in Agricultural Crops" has been organized in liaison with PAJANCOA&RI, Karaikal, Puducherry from 09-11th, May 2018. Inaugural session was graced by Hon'ble Agriculture Minister, Govt. of Puducherry, Sri. R. Kamalakannan and Dr. D. K. Yadava; ADG (Seed), ICAR, New Delhi. The seed scientists from state agricultural universities and ICAR Institutes across the country attended the three-day meeting.



During the deliberations, the progress of national projects was reviewed and technical program for the current year was finalized. During the meeting, it was decided to concentrate the seed research towards identification of alternative niches for seed production under climate change, amelioration of Varietal Replacement Rate (VRR) and Seed Replacement Rate (SRR), revision of IMSCS, seed health testing, strengthening of seed chain in NEH region, organic seed production and use of molecular tools for augmentation of seed production capabilities.

The AICRP-NSP (Crops), best performing centre award was bestowed to PAU, Ludhiana and TNAU, Coimbatore under Breeder Seed Production and Seed Technology Research categories respectively. The ICAR Complex for NEH region, Imphal and UAS, Raichur were awarded as the best performing centres under ICAR and SAU category of ICAR-Seed Project respectively.

Conference on “Seed and Seed Treatment”, 23-24 May, 2018, London, UK

A conference on “Seed and Seed Treatment” was held on 23-24 May, 2018 at Gatwick, London. The conference provided a platform to seed scientists, academicians and industry partners to share and discuss the advancements in basic and applied research in seed viability, vigour and enhancement of its planting value. Fourteen presentations were made by eminent seed scientists covering topics ranging from the effects of climate change on seed viability and vigour to significance of DNA endoreduplications during seed maturation and germination; application and scope of seed treatments – chemical, non-chemical and biological; regulatory requirements; application of digital imaging technology



in seed testing and many more. Dr. Malavika Dadlani, President, Indian Society of Seed Technology and Former Joint Director (Res) and Head, Seed Science & Technology, Indian Agricultural Research Institute was one of the invited speakers at the Conference. She delivered a talk on “Biological Seed Treatments for Sustainable Agriculture”, which generated a lot of interest among the participants, particularly in view of the growing concern on environmental impacts of chemical pesticides. The conference was attended by more than hundred participants from public and private sectors across the world.

Annual General Body meeting of ISST

The 29th annual general body meeting (AGBM) of ISST was conducted alongside the Annual Group Meeting of AICRP-NSP (Crops) & ICAR Seed Project at Karaikal, Puducherry on 10th May 2018. The proceedings of the meeting are herewith furnished

AGBM Proceedings



The Annual General Body Meeting (AGBM) of the Indian Society of Seed Technology (ISST) was held under the Chairmanship of Dr. (Mrs.) M. Dadlani, President, ISST. A total of 54 members were present. As the number of members present was not sufficient to meet the quorum, the meeting was adjourned and resumed subsequently, as per the requirement of the bye-laws.

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

Dr. (Mrs.) M. Dadlani, President

Dr. S. Rajendra Prasad, Member

Dr. Shiv K. Yadav, Chief Editor

Dr. S. K. Lal, Secretary

The other EC members could not attend the meeting due to their pre-occupation.

Dr. R. R. Hanchinal, Former Chairperson, PPV&FRA, was a special invitee.

The agenda of the AGB meeting was circulated well in advance through email, which is given as under:

Confirmation of the minutes of the last General Body Meeting held at SKRAU, Bikaner on 22.04.2017

- Presentation of Secretary's report
- Presentation of Treasurer's report.
- Suggestions from the Chief Editor to improve the quality and periodicity of publications.
- Means to update members' details.
- Creation of Zonal Chapters.
- Any other item with the permission of the Chair

At the outset, Dr (Mrs.) Malavika 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 goal of the society and also urged all the ISST members to support for this endeavour for achieving newer heights. Dr. Rajendra Prasad, outgoing President congratulated the newly elected EC members and thanked the members for their support during his tenure. Subsequently, Dr. S. K. Lal, Secretary, ISST presented the agenda and initiated the deliberations.

Item No.1: Confirmation of the minutes of the last General Body Meeting held at RAU, Bikaner on 28.04.2017

Dr. S.K. Lal, Secretary apprised the house about the major recommendations of the last AGBM held on 28.04.2017 & presented the action taken report. The ratification of the proceedings of the last AGBM held on 28.04.2017, RAU, Bikaner, Rajasthan was done unanimously by the house.

Item No. 2: Presentation of Secretary's report

The Secretary briefed about the major achievements of the Society during the period, 15.08.2017 to 9.05.2018 which was unanimously approved by the house. The

main highlights of the report were:

- Renovation of ISST office.
- ISST Foundation Day celebration.
- Launching of ISST Website.
- Updating of contact details & proposal for publication of ISST members' and EC members' directory.
- Proposal for the creation of zonal chapters

Dr. S.K. Lal, thanked outgoing President, Dr. Rajendra Prasad & outgoing secretary Dr. Shiv K. Yadav for successful organisation of National Seed Seminar-2017, restoration of NAAS rating of Seed Research & smooth conduct of elections for new ISST Executive Council.

Item no.3: Presentation of Treasurer's report

Dr. Zakir Hussain, Treasurer was not present at the meeting. Hence, Dr. S.K. Lal, Secretary, ISST presented the Audited Report of the society of the year 2017-18, which was approved by the GB. He apprised the house that the financial commitments for Seed Seminar from NABARD and balance from ICAR are to be realised soon. He also informed the house regarding the release of grants of financial assistance to ISST for publication of Seed Research during the year 2017-18 after a gap of 7 years.

Item no. 4: Suggestions from the Chief Editor to improve the quality and periodicity of publications

Dr. Shiv K. Yadav, Chief Editor, emphasised about the periodicity and enhancing citation index of Seed Research by improving the quality of publication in the journal. He voiced his concern about the quality of review of the manuscripts submitted for publication and proposed to re-structure the Editorial Board for improving the quality of publications. After detailed discussion and deliberations, it was decided that Dr. Shiv K. Yadav will continue as Chief Editor and Editorial Board will be reconstituted at the earliest in consultation with executive council. It was also suggested to nominate a member in editorial board from abroad and also emphasised to develop a mechanism to attract research papers from other countries. Further, it was emphasised to publish the pending issue of Seed Research (Volume 38 No. 2, 2010) at the earliest.

Dr. D.K. Yadava, Head, SST, ICAR, IARI, New Delhi, emphasised the need for submission of quality research papers in Seed Research to raise the standard of the journal to international level.

(Action: Chief Editor, ISST)

Item No. 5: Means to update members' details

Dr. S.K. Lal, Secretary, appraised the house that the effort are being made to update the contact details of ISST members for dispatch of publication at the correct address and printing of ISST members' directory. The members were also informed about the creation of link on ISST website (www.isst-india.com) for updating of contact details of ISST members.

(Action: Secretary and Executive Councillors, ISST)

Item No. 6: Creation of Zonal Chapters

It was proposed that zonal chapters may be formed in the cities/ towns, where a minimum of 50 members are



enrolled. However, the house felt that it is premature at the moment. However, the Zonal Councillors may initiate organising independent activities in their respective zones, with prior intimation to the EC. Example of Foundation Day celebration by AAU, Jorhat was cited.

(Action: Executive Councillors, ISST)

Item No. 7: Any other item with the permission of the Chair

Dr. R.R. Hanchinal, Former Chairperson, PPV&FRA suggested for constituting an award for the students pursuing Ph.D. degree in Seed Science & Technology. It was decided to constitute an award for best Ph.D. thesis based on nomination received from Professor/ Head, Seed Technology from SAUs/Deemed Universities, where a degree course in Seed Technology is offered. Further, he put forward a proposal to bring out a publication on Seed Related Laws & Policies by ISST. The proposal for the organisation of an International Seed Seminar during 2019 was also mooted.

(Action: President and Secretary, ISST)

At the end, Dr. Sandeep Kumar Lal, Secretary, ISST, profusely thanked Dr. Malavika Dadlani, Dr. R. R. Hanchinal, Dr. D. K. Yadava, Dr. S. Rajendra Prasad, and all the members present for providing valuable inputs and suggestions for the better functioning of the Society.

The meeting ended with the vote of thanks to the chair and all the members.

UPCOMING EVENTS

Winter School

The Seed Technology Division of ICAR-IGFRI, Jhansi is going to organize ICAR sponsored 21 day winter school on "Maintenance breeding and assured quality seed production in dual purpose crops and grasses" for 25 personnel of ICAR and SAU research and teaching faculty from 11th September to 1st October 2018. The training is fully sponsored with TA/DA and free boarding and lodging during the training period for the selected candidates. Last date for the receipt of applications is July 31, 2018. For more details and application go through the cbp portal <https://cbp.icar.gov.in>.

ISTA SHC workshop

The International Seed Testing Association's Seed Health Committee and Indo American Hybrid Seeds(India) Pvt. Ltd., Bangalore are jointly organizing four day workshop on "Seed Health Methods using PCR, ELISA, dilution plating and indexing methods" in the Seed Laboratory IN07, Indo-American Hybrid Seeds (India) Pvt. Ltd., Bengaluru from 20th-23rd November 2018. The workshop is aimed for Seed Analysts and Quality managers of seed companies and seed trade officials and plant quarantine department of the private and Government officials, Seed Scientists in the Government Institutions and Agricultural Universities. The last date for registration is 20 August 2018. For more details go through the website <https://www.seedtest.org/en/event-detail-0-0-0-93.html>

4thInternational Plant Physiology Congress

The 4th International Plant Physiology Congress (IPPC-2018) is being jointly organised by CSIR-National Botanical Research Institute (CSIR-NBRI), Lucknow and Indian Society of Plant Physiology (ISPP) during December 02-05, 2018 at Lucknow. The conference would cover major areas of plant biology research including Biotic and Abiotic Stress Physiology; Genomics-assisted Breeding; Plant Productivity and Modelling; Genomics, Epigenomics; Gene Regulation; Computational and Systems Biology; Pathway Engineering; Reproductive Biology and Post-Harvest Biology. The last date for the submission of abstracts is 31 July 2018. For more information about the conference, visit their website <http://www.ippccongress.in>

ISTA Seed Symposium 2019

The seed symposium "Seed Technology and Quality in a changing world" of 32nd International Seed Testing Association Congress is going to be organized in Hyderabad, Telangana from 26-28 June 2019. The symposium is for the seed analysts, technologists, researchers and managers from universities, research institutes, government and the seed trade to discuss all aspects of seed quality. The last date for the submission of the abstract is 1 October 2018. For more details, visit their website <http://45.35.4.69/ista-events/ista-seed-symposium-2019-26-28-june>.

SIGNIFICANT RESEARCH FINDINGS

Grass Seed separation using organic solvents: a quick test for seed filling

Low seed filling is the most common characteristic feature of many perennial range grass species. The seed germination standard of these grasses ranges from 20-30% owing to their low seed setting nature. Identification of filled seed is laborious task and involves manual separation of seed coverings to find out the caryopsis. The small seed size coupled with several outer appendages further enhances the difficulties in manual assessment. The lightweight of the seed with more than 60% contribution by outer coverings, makes it difficult to separate filled seeds on weight basis in range grasses. The sophisticated x-ray radiography technique is a non-destructive method to identify the seed filling. However, the cost of x-ray radiography is high and the quantity of seeds it can examine at one time are very less. The separation of unfilled seeds from the seed lot using brine solution is an age-old practice but in case of range grasses, the density of the seed is too low that even in normal water the filled seeds floats. Since the density of some of the organic solvents is lower than water, an experiment was conducted to identify suitable organic solvent to separate the filled seed from unfilled seed in range species. Seven different organic solvents whose density was less than water were used to test eight different range grass species with good fodder value. The seed filling percent of sink part and float part was measured separately to know the efficiency of organic solvent to separate the unfilled seed. Only *Brachiaria brizantha* seeds could be separated using n-hexane and acetone with 100% filled seeds in sink part and 0% filled seeds in float part. Remaining all species have either less than 100% filled seeds in sink part or more than 0% filled seeds in float part, indicating that 100% separation is not possible in them. However, the solvents, which showed higher percent ($\geq 80\%$) of filled seeds in



Brachiaria brizantha seed separation in different organic solvents

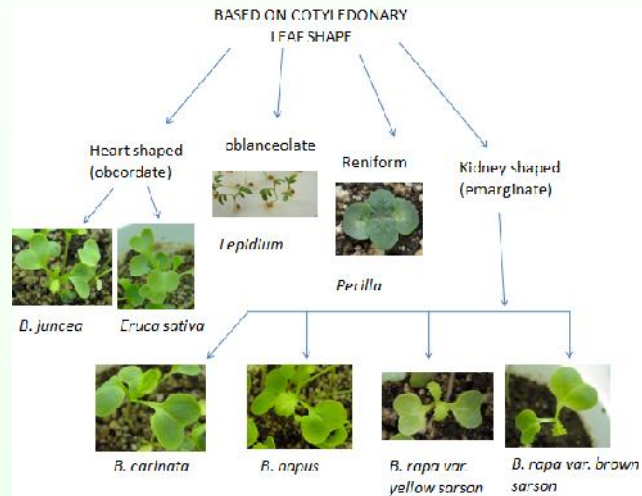
sink part and lower percent ($\leq 20\%$) in float part, can be used for having an indication of the quality of seed. Using this criteria n-Hexane is useful to assess *Cenchrus setigerus* and *Pennisetum pedicellatum*; Methanol for *Panicum maximum* and Isopropanol for *Cenchrus ciliaris*. Thus, organic solvent separation is a promising quick test for identifying the seed filling in range grasses.

D. Vijay, C. K. Gupta, A. Maity and Neelesh
Division of Seed Technology, ICAR-IGFRI, Jhansi

Seed and seedling identification key of *Brassica* species and its wild relatives

India possesses rich diversity of oilseed *Brassica* of which *juncea*, *toria* and brown sarson are considered to be native to Indian gene centre. Rapeseed- mustard crop group which is one of the largest oil producing crop and has resilience to grow under diverse agro-climatic conditions, is often faced the problem in accurate identification of species and its related genera. The National GeneBank of India houses 11,000 accessions of *Brassica* species and its related genera. For a curator, it becomes very difficult to store the seeds without proper identification. Such seeds are identified either by plant taxonomist or by growing in the field for further identification /evaluation, which is a labour intensive, time consuming and expensive work. Therefore, an attempt was made under laboratory conditions to evaluate the seeds of *Brassica* species and its wild relatives (10 species and 3-5 cultivars under each species) based on the seed and seedling characteristics to develop an identification key. The seed characters viz., seed size, diameter, length, perimeter and roundness were studied by using Grain size and shape software. The seedling characteristics (in 7-20 days old seedling raised in pots at 23°C and 70% RH) viz., cotyledonary leaf, hypocotyl pigmentation, first leaf size, shape, hairiness, Number of lobes, leaf division by margin and incision and petiole colour (using RHS colour chart) were observed. The seed surface scanning studies were conducted with High-resolution microscope (Nikon, SMZ 1500 at 20X). All the 10 species and three varieties of *B. napa* could be identified based on two seed characters (seed shape and colour), two early seedling characters (cotyledonary leaf apex and hypocotyl pigmentation) and three first leaf characters (No. of lobes in leaf, leaf blade shape and leaf margin) in

sequence. The identification key developed is simple and easy to identify the species and varieties with in *B. napus* in the lab itself without growing the crop in the field.



Seedling characters based on cotyledonary leaves

Usha Rani Pedireddi¹, J. Radhamani² and Anjula Pandey²
¹ICAR-IARI, New Delhi & ²ICAR-NBPGR, New Delhi

USEFUL TIDINGS

The ISTA Accredited laboratories in India (as on 30-06-2018):

- Bejo Sheetal Seeds Pvt. Ltd. Jalna, Maharashtra
- Indo-American Hybrid Seeds (India) Pvt Ltd, Bengaluru, Karnataka
- Maharashtra Hybrid Seeds Company Ltd., Jalna, Maharashtra
- Namdhari Seeds Pvt. Ltd., Bengaluru, Karnataka
- Nuziveedu Seeds Limited, Secunderabad, Telangana

Revised Indian Minimum Seed Certification Standards-2013

The revised Indian Minimum Seed Certification Standards are published by the Central Seed Certification Board, Department of Agriculture and Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India in 2013. The hard copy can be procured from the National Seeds Corporation, New Delhi.

An amendment was made in the revised Indian Minimum Seed Certification Standards - 2013, on 12th January 2017 for revalidation of certified seed as detailed below.

Amendment of IMSCS - 2013

File No. 15-114/2014-SD-IV
Government of India
Ministry of Agriculture & Farmers Welfare
Dept. of Agriculture, Cooperation & Farmers Welfare
(Seed Division)

Room No. 116, B-Wing,
Shastri Bhawan, New Delhi.
Dated the 12th January, 2017.

Subject:- Amendment in the 'Indian Minimum Seed Certification Standards-2013

The Competent Authority has approved the following amendment in Appendix- XII at para (f) 554 of Indian Minimum Seed Certification Standards, 2013. After para (e) three para (f), (g) & (h) are added.

- (f) In case the revalidation is requested after the expiry of previous validity period, such extension will be valid only for a period of three months from the date of test.
- (g) After expiry of the validity period the holder of the certified seed stock shall ensure that the left-over certified seed will be withdrawn from the sale and kept in safe custody and ambient conditions (proper required conditions) till it is offered for revalidation to a Certification Agency. The holder of the stock of such seed shall not carry on the business of selling, keeping for sale, offering to sale, bartering or otherwise supplying the seed unless it is validated by a Certification Agency".
- (h) A complete record shall be maintained by the Certification Agency of each lot offered for extension of the validity period.

The other conditions as mentioned in Annexure - XII will remain unchanged.


(D.S. Mishra) 16/1/17
Dy. Commissioner (QC)
TeleFax: 23387661

Copy to: i) Director Agriculture (All States).
ii) Directors/ Managing Directors (All Seed Certification Agencies).
iii) Directors/ Managing Directors (All States Seed Development Corporation)
iv) CMD, NSC, Pusa Complex, New Delhi

INSPIRING STORIES

Prof. Stephen Hawking thanks Prof. R.N. Basu

The world lost one of the greatest and most popular physicists and cosmologist of our times, Prof. Stephen William Hawking (1942-2018) on March 14th this year. Best known for his paper “Black hole explosions?”, published in Nature in 1974, and the celebrity author of “A Brief History of Time: From the Big Bang to Black Holes”, published in 1988, which sold over 10 million copies and topped the list of International Bestseller, Prof. Hawking truly conquered matter with the power of mind.



Prof. Stephen Hawking (1942-2018)

However, very few of us might know about Prof. Hawking’s connection with one of the most original thinkers and a renowned seed scientist from India Prof. RN Basu, the former Vice Chancellor of Calcutta University. While reading Prof. Hawking’s “A Brief History of Time”, Prof. Basu noted some mathematical error, which didn’t seem quite right! Puzzled and thoughtful, Prof. Basu wrote a letter to Prof. Hawking hesitatingly pointing out to this error in the book (See Box 1).



Prof. R. N. Basu

Box 1

Dear Prof. Hawking,

May 21, 1993

While re-reading your famous book “A Brief History of Times: from the big bang to black holes”, I came upon a minor printing mistake on page 136, lines 4&5, which reads as follows: “(1 with eighty zeroes after it)”. This should be: “(1 with eighty five zeroes after it)”. I would humbly request you to kindly check it and, if satisfied, instruct the printer of the subsequent reprints /editions accordingly.

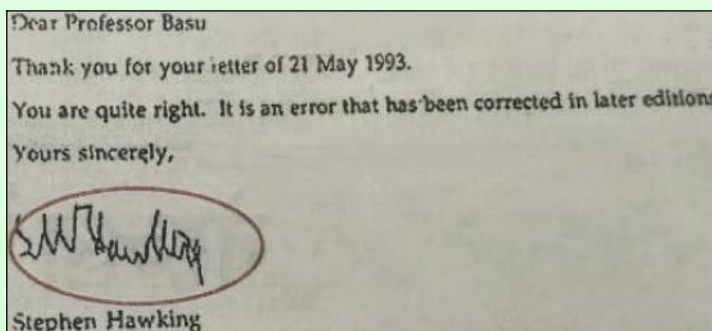
With best regards,

Yours sincerely,

R.N. Basu

Prof. Hawking, a true scientist, promptly replied to Prof. Basu admitting the error and thanking him for pointing it out (Box 2). Such was his magnanimity!

Box 2



Subsequently, in December 1993, while reading Prof. Hawking's "Black holes and baby universes and other essays" he stumbled upon some more lines in the text. He once again wrote to Prof. Hawking, seeking clarifications on the following:

- (i) On page 103, para 2, line 4: ".....converting oxygen to helium". Should it be "converting hydrogen to helium"?
- (ii) On page 133, para 2, line 17: ".....brain contains about 10^{26} particles". What is meant by particles?

He further pointed out that an adult human brain is known to contain 10^{11} neurons (10^{14} synaps); 77% of it is made of water, which alone would account for 10^{26} hydrogen and oxygen atoms.

Prompt came the reply from Prof. Hawking's Secretary on his behalf (by this time Prof. Hawking's condition had much deteriorated due to his fast progressing amyotrophic lateral sclerosis (ALS), which he was suffering from the age of 21). Prof. accepted the error, provided clarification and assured to make necessary corrections in future editions (Box 3). That was his greatness!

Box 3

Dear Professor Basu,

6 January 1994

Thank you for your letter of 13 December 1993 which Professor Hawking has read. He has asked me to tell you that the error mentioned in your point (i) should be corrected in future printings and your point (ii) Professor Hawking means atoms.

Yours sincerely

Sue Masey

These small incidences show that great are those who in spite of their stature, have open minds and humility to accept their mistakes and correct the same. Similarly, if a scientist is convinced about his/her scientific opinion, one must be courageous to express one's views without any hesitation. Such was the conviction of Prof. Basu, a Seed Physiologist, who did not hesitate to point out the mathematical errors in the writings of a world famous Professor of Mathematics in the University of Cambridge!

ANNOUNCEMENT

The ISST is updating the contact details of its life members. A web page (<http://isst-india.com/?q=node/86>) was created for the same on the ISST website www.isst-india.com. You are requested to provide your latest contact details to update the database.

Note: All the members are requested to contribute to various columns of the Seed Tech News by providing awards and honours received; news items; upcoming trainings, workshops, seminar and symposia, vacancies; recommendations of scientific gatherings with one or two photographs and one page note on latest research findings of students and scientists with good photographs for wider dissemination of the information and knowledge among the seed community including both public and private sectors.

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