Seed Tech News

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International Year of Family Farming 2014

Family farming is inextricably linked to national and global food security. Both in developing and developed countries, family farming is the predominant form of agriculture in the food production sector. Family farmers carefully manage their lands to sustain remarkably high levels of productivity despite having less access to productivity resources such as agricultural inputs and support. The General Assembly of United Nations declared 2014 to be the "International Year of Family Farming" (IYFF). The IYFF, which aims to raise the profile of family farming and small holder farming by focusing world attention on its significant role in eradicating hunger and poverty, providing food security and nutrition, improving livelihoods, managing natural resources, protecting the environment and achieving sustainable development, particularly in rural areas.

For more information please visit *www.fao.org/familyfarming-2014*

Secretary : SK Jain
Editor : Manjunath Prasad CT

Allele Mining for Seed Quality Traits

Progress in plant breeding in terms of development of superior and high yielding varieties of agricultural crops was made possible by accumulation of beneficial alleles from vast plant genetic resources existing world wide. Still, a significant portion of these beneficial/superior alleles which were associated with seed quality were not utilized as these were left behind during evolution and domestication. This untapped genetic variation existing in wild relatives and land races of crop plants could be exploited gainfully for development of superior quality seed/vigourous seed. Introgressions of novel alleles from wild relatives of crop plants into cultivated varieties (Mc Couch *et al.*, 2007) have clearly demonstrated that certain alleles and their combinations potentially make dramatic changes in trait expression when moved to a suitable genetic background by overcoming the genetic bottlenecks which restricted their introgression to cultivars. Hence, the vast germplasm resources need to be relooked for novel alleles to further enhance the genetic potential of crop varieties for various seed quality traits.

Seed quality: It is the degree of excellence in regard to the seed characteristics that determine the seed quality. Generally, the standards fixed for certified seeds are considered as quality standards. It implies that if seed lot meets the certification standards it is of good quality seed. The good seed should have these quality attributes.

- Improved variety-superior than existing ones
- Genetic purity-trueness to type
- Physical purity-seeds of same kind
- Seed germination and vigour
- Planting value
- Freedom from weeds and other crop seeds
- Seed health
- Seed moisture
- Other characteristics like seed size, weight, specific gravity and seed colour.

Allele mining

An allele is one of two or more forms of a gene or a genetic locus (generally a group of genes). Mining is nothing but searching the new alleles in the wild germplasm. Allele mining is a research field aimed at identifying allelic variation of relevant traits within genetic resources collections.

Evolution of new alleles

Mutation is considered as an evolutionary driving force which underlies existing allelic diversity in any crop species. For creation of new alleles or causing variations in the existing allele and allelic combinations, mutations in the genic regions of the genome either as single nucleotide polymorphism (SNP) or as insertion and deletion (InDel) are important.

Steps in the development of allele mining set

From the gene bank collection we have different allele resources that we called as entire collection, from the entire collection, characterization should be done by morphologically and molecularily then we should estimate the diversity, then we make entire collection into core collection (10% of entire collection) then we should go for diversity analysis for core collection, and develop mini core collection (10% of core collection or 1% of entire collection) in this way we should develop allele mining set.

Sequencing-based allele mining

This technique involves amplification of alleles in diverse genotypes through PCR followed by identification of nucleotide variation by DNA sequencing. Sequencing-based allele mining would help to analyze individuals for haplotype structure and diversity to infer genetic association studies in plants.

Approaches

Two major approaches are available for the identification of sequence polymorphisms for a given gene in the naturally occurring populations. They are (i) modified TILLING (Targeting Induced Local Lesions in Genomes) procedure called '***EcoTilling***' and (ii) sequencing based allele mining.

EcoTilling

TILLING is a technique that can identify polymorphisms resulting from induced mutations in a target gene by heteroduplex analysis (Till *et al.*, 2003). A variation of this technique, EcoTilling, represents a means to determine the extent of natural variation in selected genes in crops. Like TILLING, EcoTilling also relies on the enzymatic cleavage of heteroduplexed DNA (formed due to single nucleotide mismatch in sequence between reference and test genotype) with a single strand specific nuclease (*i.e.*, Cel-1, mung bean nuclease, S1 nuclease, etc.) under specific conditions followed by detection through Li-Corgenotypers (Li-Cor, USA).

Tools required for allele mining

An important step in allele mining, irrespective of the methods used, essentially involves the identification of polymorphism by comparative analysis of sequences of various genotypes. Several software tools are available for handling the complex nucleotide data, prediction of putative functional or structural components of complex macromolecules, prediction of transcription factor binding sites, identification of sequence polymorphisms and to predict the amino acid changes which are responsible for changes in encoded protein structure and/or function. These tools simplify the access and analysis of DNA sequence; help in identification of sequence polymorphism, and probe whether the variation correspond to the variation in TFBMs.

Applications of allele mining

1. Gene prediction
2. Expression study
3. Evolution study
4. Discovery of superior alleles
5. Identification of new haplotypes
6. Similarity analysis –inter and intra species
7. Functional molecular marker development for MAS

Challenges in allele mining

Considering the huge number of accessions that are held collectively in various gene banks, genetic resources collections are deemed to harbour a wealth of undisclosed allelic variants. Now the challenge is to efficiently identify and exploit the useful variation for crop improvement. Here, we describe the challenges in allele mining and suggest the ways to overcome them in order to increase the efficiency.

Table 1: Status of allele mining to enhance seed quality attributes in other crops

SNo.	Crop	Allele/Locus	Trait/Name of the protein	Author
1	*Aegilops* sp.	*GluDy y*	subunit of glutenin	Giles and Brown (2006)
2	Barley	*Bmy1 β-amylase 1*	starch break down enzyme	Chiapparino *et al.* (2006)
3	*Phaseolus* sp.	*Lectin locus*	Storage and defense proteins	Lioi *et al.* (2007)
4	Rice	*Badh 2*	Fragrance	Amarawathi *et al.* (2008)
5	Soybean	*SKTI*	Soybean Kunitz trypsin inhibitor	Wang *et al.* (2008)
4	Barley	*Gpc-B1*	Grain protein content	Distelfeld *et al.* (2008)
7	Wheat	*Viviparous-1*	Pre-harvest sprouting tolerance	Xia *et al.* (2008)

Higher sequencing costs

One of the important challenges is to minimize the time and efforts required, whereas reducing the cost per data point. These challenges may partly be overcome by resorting to cheaper and faster sequencing platforms for high throughput detection of allelic variations. Allele mining in relation to the seed quality can be best explained by taking rice, the number of superior alleles found in rice by different authors summarizing below:

Since rice is the first crop species sequenced. superior alleles like

1. *Sh4* for seed shattering (Li and Sang *et al* .,2006)
2. *Rc7* for seed pericarp colour (Sweeney *et al.*, 2007)
3. *Wx* for granule-bound starch synthase (GBSS) (Wang *et al.*, 1995)
4. *GS3* seed size/shape (Fan *et al.*, 2006)
5. Disease resistant alleles like bacterial leaf blight resistance gene *Xa21* from *Oryza longistaminata* (Khush *et al.*, 1991).
6. Blast resistance genes like *Pi9* from *Oryza minuta* (Sitch *et al.*, 1989; Amante-Bordeos *et al.*, 1992)
7. *Pi40* from *Oryza australiensis* (Jeung *et al.*, 2007)
8. Trait-enhancing alleles like grain filling *GIF1* (Wang *et al.*, 2008)

These are important superior alleles from different germplasms of rice. So, incorporating these alleles into the desired cultivar, we can enhance the better quality parameters, and efficiency of crop can be increased.

Conclusion

Allele mining can be visualized as a vital link between effective utilization of genetic and genomic resources in genomics. It is certainly expected that sequencing-based allele mining would emerge as a method of choice in natural variations and in providing novel and effective alleles and would take center stage for all seed improvement activities.

References

Amarawathi, Y., Singh, R., Singh, A.K., Singh, V.P., Mohapatra, T. and Sharma, T.R. 2008. Mapping of quantitative trait loci for basmati quality traits in rice *(Oryza sativa* L.). *Mol Breeding,* **21**: 49-65.

Chiapparino, E., Donini, P., Reeves, J., Tuberosa, R. and Sullivan, D.M. 2006. Distribution of β-amylase I haplotypes among European cultivated barleys. *Mol Breeding* **18**: 341-54.

Distelfeld, A., Korol, A., Dubcovsky, J., Uauy, C., Blake, T. and Fahima, T. 2008. Co-linearity between the barley grain protein content (GPC) QTL on chromosome arm 6HS and the wheat Gpc-B1 region. *Mol Breeding* **22**: 25-38.

Fan, C., Xing, Y., Mao, H., Lu, T., Han, B. and Xu, C. 2006. *GS3*, a major QTL for grain length and weight and minor QTL for grain width and thickness in rice, encodes a putative transmembrane protein. *Theor Appl Genet.* **112**: 1164-71.

Giles, R.J. and Brown, T.A. 2006. GluDy allele variations in *Aegilops tauschii* and *Triticum aestivum*: implications for the origins of hexaploid wheat. *Theor Appl Genet.* **112**: 1563-72.

Jeung, J.U., Kim, B.R., Cho, Y.C., Han, S.S., Moon, H.P. and Lee, Y.T. 2007. A novel gene, *Pi40(t)*, linked to the DNA markers derived from NBS-LRR motifs confers broad spectrum of blast resistance in rice. *Theor Appl Genet.* **115**: 1163-77.

Khush, G.S., Bacalangco, E. and Ogawa, T. 1991. A new gene for resistance to bacterial blight from *O. longistaminata*. *Rice Genet Newsletter*, 121-22.

Li, C. and Sang, T. 2006. Rice domestication by reducing shattering. *Science,* **311**: 1936-39.

Lioi, L., Galasso, I., Lanave, C., Daminati, M.G., Bollini, R. and Sparvoli, F. 2007. Evolutionary analysis of the APA genes in the *Phaseolus* genus: wild and cultivated bean species as sources of lectin-related resistance factors? *Theor Appl Genet.* **115**: 959-70.

Liu, S., Gao, X. and Xia, G. 2008. Characterizing HMW-GS alleles of decaploid *Agropyron elongatum* in relation to evolution and wheat breeding. *Theor Appl Genet.* **116**: 325-34.

McCouch, S.R., Sweeney, M., Li, J., Jiang, H., Thomson, M. and Septiningsih, E. 2007. Through the genetic bottleneck: *O. rufipogon* as a source of trait-enhancing alleles for *O. sativa*. *Euphytica*, **154**: 317-39.

Sitch, L.A., Amante, A.D., Dalmacio, R.D. and Leung, H. 1989. *Oryza minuta* a source of blast and bacterial blight resistance for rice improvement. In: Mujeeb-Kazi A. and Sitch L.A. (eds). *Review of Advances in Plant Biotechnology*. Mexico and IRRI, Philippines: CIMMYT; p. 315-22.

Sweeney, M.T., Thomson, M.J., Cho, Y.G., Park, Y.J, Williamson, S.H. and Bustamante, C.D. 2007. Global dissemination of a single mutation conferring white pericarp in rice. *PLoS Genet.* **3**: 133.

Till, B.J., Reynolds, S.H., Green, E.A., Codomo, C.A., Enns, L.C. and Johnson, J.E. 2003. Large-scale discovery of induced point mutations with high-throughput TILLING. *Genome Res.* **13**: 524-30.

Wang, X., Jia, Y., Shu, Q.Y. and Wu, D. 2008. Haplotype diversity at the *Pi-ta* locus in cultivated rice and its wild relatives. *Phytopathology*, **98**: 1305-11.

Wang, Z.Y., Zheng, F.Q., Shen, G.Z., Gao, J.P., Snustad, D.P. and Li, M.G. 1995. The amylose content in rice endosperm is related to the post transcriptional regulation of the waxy gene. *Plant J.* **7**: 613-22.

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Monitoring Germination Chambers: Comparison of Requirements for Quality Management System

Many seed testing labs are developing Quality Management Systems and are being certified either through the International Organization for Standardization (ISO), the USDA's Accredited Seed Laboratory programme (ASL), and/or the International Seed Testing Association (ISTA) standards. All these standards have requirements for monitoring equipment. One of the most important equipment used by seed testing laboratories is the germination chamber. This article compares ISO 9001 and ASL requirements for monitoring germination chambers. It also details how these standards are applied in ISTA, Association of Official Seed Analysts (AOSA), and Federal Seed Act (FSA) rules and regulations.

ISO 9001:2008 7.6(a) states, "measuring equipment shall be calibrated or verified, or both, at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification shall be recorded." The wording for the ASL requirement is essentially the same. Thus, for a laboratory to be accredited to one of these standards, it must have in its quality documentation a procedure stating how often and in what manner the germination chambers will be monitored.

When deciding how often to monitor chambers, laboratory management should consider the guidelines or rules they are most often testing by and any recommendations of the chamber manufacturer. AOSA and FSA do not provide guidelines for how often a chamber should be monitored. The ISTA Handbook on Seedling Evaluation (A5.2.4) gives the following guidance: "For constant temperature equipment at least three readings should be recorded per day at regular pre-set times. If records show that the equipment is stable in terms of temperature with variations of less than 1.0°C between readings the recording frequency can be reduced to once per day. However, if there is any indication of a change in performance recording frequency should be increased." In addition, "Where records show that a piece of apparatus is stable, with day to day variations of less than 1.0°C, measures to take readings at weekends and public holidays are not required. Where apparatus is unstable, with day to day variations greater than 1.0°C, measures to take readings at weekends and public holidays are required." Thus, a laboratory procedure requiring daily temperature monitoring would satisfy the ISO and ASL requirements of verification against an international (ISTA) standard. However, if the chamber has different day and night temperatures, then two measurements should be made daily to capture both of these temperature settings.

The other element which must be included in the laboratory monitoring procedure is how the chamber temperatures will be checked. Thermometers are the most common measuring device used, although electronic data loggers can be used as well. Again, ISO and ASL require that these thermometers be calibrated against national or international standards. One way to meet this requirement is to purchase thermometers that have been calibrated by a professional organization such as the National Institute of Standards and Technology (NIST). Alternately, if a number of thermometers are being used, a single NIST thermometer could be purchased and the other thermometers calibrated against it. Finally, the ISTA Handbook on Seedling Evaluation indicates that thermometers can be verified by placing them in a zero degree ice bath. Whether using an external thermometer or ice bath, ISTA recommends that any thermometer that differs by more than 0.5°C from the control be removed from service. The ISTA Rules state that chambers should not deviate by more than 2 degrees from their set point. AOSA Rules indicate that this variation should not be more than 1 degree. Any thermometer used should be divided into units smaller than the acceptable variation. In other words, units of 0.5°C are desirable. Finally, ISO and ASL require that records of equipment monitoring be kept. The daily temperature monitoring should be recorded and these records stored in a designated location. Records should be stored so as to prevent deterioration or alteration, but should be accessible to necessary personnel such as managers or auditors.

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Notification

Ministry of Agriculture
(Department of Agriculture and Co-operation) Govt of India

New Delhi, the 24 January 2014

S.O. 244 (E) – In exercise of the power conferred by Section-5 of the Seeds Act, 1966 (54 of 1966), the Central Government, after consultation with the Central Seed Committee, being of the opinion that it is necessary and expedient to regulate the quality of the seeds of the varieties specified in column (2) of the table below of the kind specified in the corresponding entries in column (1) of the said table, hereby declares that the said varieties of seeds shall be the notified varieties to be sold for purpose of agriculture for the States mentioned in column (3) of the said table and shall be the notified varieties for the whole of India for the purpose of seed production and quality control with effect from the date of publication of this notification in the Official Gazette, namely:

Kind (1)	Variety (2)	States (3)
Arecanut	Nalbari (VTL 75)	KA, GA & MH
	Madhuramangala (VTL-62) (Shriwardhan 1)	KA, GA & MH
Ashgourd	Kashi Surbhi (IVAG-03)	PB, UP, BR & JH
Barley	Narendra Barley 1445 (NDB-1445)	UP
Maize hybrid	P1864 (X8F984)	PB, HR, DL, UK & UP
Pearlmillet	KBH 108 (MH 1737)	RJ, GJ, HR, UP, MP, PB & DL
Rice	CSR 43 (CSR 89-IR8) (IET 18259)	UP
	SHIATS Dhan-1 (AAIR 2) (IET 20928)	UP
Rice hybrid	Ankur-7434	CG
	JKRH-401 (JKRH 2000) (IET 18181)	UP
	PAC 807	CG
	US 305 (IET 21827)	AP, TN & MH
Tapioca	Sree Apporva (Triploid 5-3)	TN & KL
	Sree Athulya (Triploid 4-2)	TN & AP
Wheat	DBW 90	PB, HR, DL, RJ, UP, JK, HP & UK
	HD 3090 (Pusa Amulya)	MH & KA
	Narendra Wheat 4018	UP
	Pusa Gautami (HD 3086)	PB, HR, DL, RJ, UP, JK, HP & UK

Sd/-
Atanu Purkayastha, Joint Secretary
[F. No. 3-30/2013-SD. IV]

New Delhi, the 24 January 2014

S.O. 245 (E) – In exercise of the power conferred by Section-5 of the Seeds Act, 1966 (54 of 1966), the Central Government, after consultation with the Central Seed Committee, hereby makes the following amendments in the notification of the Government of India in the Ministry of Agriculture, Department of Agriculture and Co-operation, number **S.O. 952 (E)** dated the 10th April 2013 and published in Gazette of India, Extraordinary, Part II, Section-3, Sub-section (ii), dated the 12th April 2013, namely:

In the Table to the said notification, for Rice and entries relating thereto, the following details shall be substituted, namely:

Kind (1)	Variety (2)	States (3)
Rice	DRR Dhan-40 (IET 21542) (RP Bio 4918-248-S)	TN, MH & WB

Sd/-
Atanu Purkayastha, Joint Secretary
[F. No. 3-30/2013-SD. IV]

The two letter abbreviations of Indian States & UT's is as per '***ISO-3166-2 Code***', where AP-Andhra Pradesh; AR-Arunachal Pradesh; AS-Assam; BR-Bihar; CG-Chhattisgarh; DL-Delhi; GA-Goa; GJ-Gujarat; HR-Haryana; HP-Himachal Pradesh; JK-Jammu & Kashmir; JH-Jharkhand; KA-Karnataka; KL-Kerala; MP-Madhya Pradesh; MH-Maharashtra; MN-Manipur; MG-Meghalaya; MZ-Mizoram; NL-Nagaland; OR-Odisha; PB-Punjab; RJ-Rajasthan; SK-Sikkim; TN-Tamil Nadu; TR-Tripura; UT-Uttarakhand; UP-Uttar Pradesh; WB-West Bengal.

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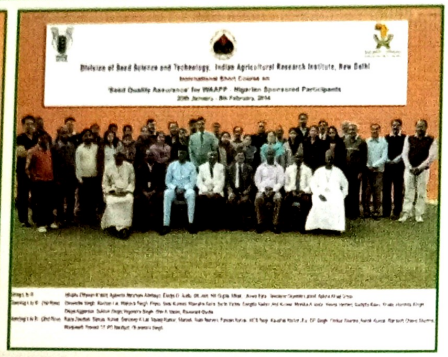
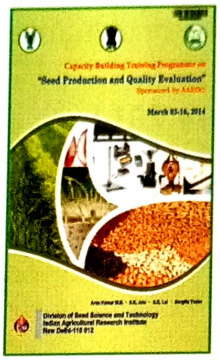
International Training Programme on "Seed Quality Assurance"



An international short course on "*Seed Quality Assurance*" for five Nigerian participants was organized at DSST, IARI from 20th January to 08th February 2014 sponsored by WAAPP-Nigeria under the aegis of World Bank and mediated by Agrinnovate India Ltd under ICAR, New Delhi. Establishment of Nigeria Agricultural Seeds Council had paved way for economic upliftment of farming community and amidst such development to receive trainees from Nigeria is a welcome step. The training was conducted through classroom lectures, practical's, demonstrations, interactive sessions and field visits, including progressive farmer's fields. During the theory, ample time was devoted for discussions. Majority of sessions were of interactive mode.There were in total 46 lectures coupled with 14 practicals by 64 resource persons. Faculty of eminent scientists were drawn pre-dominately from Division of Seed Science & Technology, IARI and 6 other institutions, namely, NBPGR, ICAR HQ, DAC, Ministry of Agriculture, GoI, PPV&FR Authority, University of Delhi and PAU. Visits were arranged to quality seed production plots, maintenance breeding plots, state-of-the-art facilities of seed processing, seed storage (Nucleus, Breeder and Truthfully Labeled seeds), CPCT, National genebank (seed gene bank, *in-vitro* genebank, cryo-bank and DNAFP labs) for spot demonstrations and interaction with concerned scientists. Visits were also arranged to museums of IARI and ICAR at NASC Complex. Course content developed covered seed to seed programme, namely seed anatomy to floral biology; seed production in self and cross pollinated crops, hybrid seed production technology, climate resilient quality seed production, maintenance breeding, seed quality testing and assurance (from seed sampling to ISTA accreditation); genetic purity testing and GM testing; seed health testing, major pests and disease management; plant quarantine; seed processing; safe seed storage; seed quality enhancement, policy issues related to crop variety development, release and notification, Seeds Act and new Seed Bill, PPV&FR, Indian seeds legislation and law enforcement were the other part.The valedictory function was presided over by Dr. HS Gupta, Director, IARI who appreciated the course director and coordinator for their commendable work and reiterated that IARI is committed to take up such assignments to impart knowledge across boundaries.

Course Director: **Dr. SK Jain**, Professor & Head
Course Coordinators: **Dr. Atul Kumar**, Senior Scientist
Dr. Monika A Joshi, Senior Scientist
Mr. Manjunath Prasad, C.T., Scientist
Venue: **Div. of Seed Science & Technology, IARI, New Delhi**

Capacity Building Programme for AARDO Member Countries



An International capacity building programme on "*Seed Production and Quality Evaluation*" was organized in the Division of Seed Science and Technology, IARI on behalf of Ministry of Rural Development, Govt. of India and Afro-Asian Rural Development Organization (AARDO) Secretariat from March 03-16, 2014. In the past DSST had organized three AARDO sponsored courses during the year 2010 for 6 member countries, 2011 for 3 member countries and 2013 for 9 member countries. In total, there were 10 participants from Ghana (1), Malaysia (2), Oman (1), Sri Lanka (1), Sudan (1), Taiwan (2), Yemen (1) and Zambia (1). These participants are experienced with different background of working on plant pathology, seed science, agronomy, agricultural extension, horticulture etc. The two week training included classroom lectures, hand's-on practical, demonstrations, interactive sessions, field visits. There were in total 34 lectures coupled with 10 practicals. The faculty of total 59 resource persons was drawn predominantly from DSST, IARI and 6 other Institutes namely ICAR, NBPGR, DAC, Ministry of Agriculture, PPV&FR and Delhi University. Visits were arranged to quality seed production plots, maintenance breeding plots, state-of-the-art facilities of seed processing, seed storage, CPCT, National Gene Bank for spot demonstrations and interactive session with concerned scientists. Visits were also arranged to museums of IARI and ICAR at NASC Complex. Course Content covered all major aspects of seed production *i.e.* from seed to seed. Seed quality evaluation principles, procedures, methodology and reporting of results was also dealt at length. Policy issues related to crop variety development, release and notification, Seeds Act and new Seed Bill, PPV&FR were the some other part of the course curriculum.During valedictory function, Dr. S. Ayyappan, Secretary (DARE) & DG, ICAR extended his wishes for successful conduct of training and demanded greater engagement with AARDO member countries establishing peace and prosperity. The function was presided over by Dr. HS Gupta, Director, IARI and Dr. RK Jain, Dean and Joint Director (Education) whose support always remains the vital force to make such programmes successful.

Course Director: **Dr. SK Jain**, Professor & Head
Course Coordinator: **Dr. Sangita Yadav**, Senior Scientist
Dr. Sandeep K Lal, Senior Scientist
Dr. Arunkumar, M.B., Senior Scientist
Venue: **Div. of Seed Science & Technology, IARI, New Delhi**

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ISTA Executive Committee 2013-2016

The Executive Committee manages the affairs of the Association. According to the ARTICLE 15(a) of the Articles of the ISTA, the Executive Committee shall consist of the President and Vice-President, together with nine members-at-large.

Name	Country	Position
Joel Lechappe	France	President
Craig McGill	New Zealand	Vice- President
Margus Friedenthal	Estonia	Member-at-Large
Cecilia Jones	Uruguay	Member-at-Large
Steve Jones	Canada	Member-at-Large
Berta Killermann	Germany	Member-at-Large
Alexander Malko	Russia	Member-at-Large
Masatoshi Sato	Japan	Member-at-Large
Mable Simwanza	Zambia	Member-at-Large
Grethe Tarp	Denmark	Member-at-Large
Rita Zecchinelli	Italy	Member-at-Large

Source: ***www.seedtest.org***

ISTA Rules 2014 now Online

The 'International Rules for Seed Testing' are ISTA's primary instrument to promote uniformity in seed testing. The ISTA Rules have 19 sections that provide definitions and standardized methods to be used in, for example, sampling, testing seed lot quality and reporting results for international trade. The ISTA Rules are also useful reference guide to germination conditions and methods for over 1000 species. The International Rules for Seed Testing are approved by and amended at ISTA Ordinary Meeting on the basis of the advice tendered by the ISTA Technical Committees. Beginning with 2014 Edition (effective from January 01, 2014) the Rules will be published as PDF files which includes the latest changes which were passed at the ISTA Ordinary General Meeting 2013, held at Antalya, Turkey.

The ISTA Rules 2014 are now available on the ingentaconnect **website.**

If you have any questions, comments or ideas about the electronic Rules, please contact Jonathan Taylor; ***jonathan.taylor@ista.ch***

News from DSST

1. Dr. Surendra S. Parihar, Head, DSST superannuated from his official duties on January 01, 2014. ISST wishes him a fruitful retirement life and look forward for his continuous support.
2. Dr. SK Jain, Professor, DSST, IARI assumes charge as Head, Division of Seed Science and Technology, IARI *w.e.f.* January 01, 2014.
3. The Hon'ble Governor of Uttarakhand state has nominated Dr. Virender Singh Lather, Principal Scientist, IARI, New Delhi as Member of Board of Management, GB Pant University of Agriculture and Technology, Pantnagar (UK) for three years vide office order No. 36(1)/XIII-II/ 2014 dated 29.01.2014.

Editorial Contact Information

Please send us information related to any news, new projects, opinions on policy issues, current happenings, publications, book reviews, foreign visits, new appointments, trainings, seminars, workshops and conferences or other interesting stuff related to seed for the next issue of Seed Tech News.

Suggestions and comments are welcome!

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Seed Tech News

MSc Thesis Abstracts

Comparison of different drying techniques for better storability of sorghum and pearl millet

Seed moisture content (mc) determines the storage potential of germplasm conserved in seed gene banks. The genotypes of sorghum and pearl millet were dried using silica gel, saturated salt of lithium chloride, Conc. H_2SO_4 and conventional method using dryer (@15°C and 15% RH) to obtain the moisture content up to 6%. Seeds could attain 6 ± 0.2% in 8 to 12 days, desiccated using acid and silica gel compared to LiCl and seed dryer, which took 19 to 24 days. After six months of ambient storage, seeds recorded higher values for water-soluble sugars (WSS) and Electrical Conductivity (EC), irrespective of different drying methods adopted. Though the rate of drying in the conventional drying and LiCl was slow, it was not conducive for maintaining the seed quality and storage potential. Quick drying using acid had pronounced effects on seed quality during storage whereas drying using silica gel was quick maintaining high seed quality compared to other methods over the storage period. The sorghum and pearl millet genotypes were dried using silica gel to obtain about 7%, 5%, 3% mc and were stored for six months under ambient and MTS (8°C and 15% RH) conditions. Sorghum seeds with 7% & 5% mc and pearl millet seed dried to 5 & 3% mc recorded higher values for germination and associated seed quality parameters studied irrespective of storage conditions. Higher values of SOD, POX, amylase, dehydrogenase and protein content, which are positively correlated with seed quality, was observed in seeds stored with 5% & 7% mc in sorghum, whereas 3% in pearl millet over the control after six months of storage. The study suggested that optimum moisture content for extending seed storability and to ensure maximum viability is between 5-7% in sorghum, and 3-5% in case of pearl millet. Ultrastructure studies using scanning electron microscope (SEM) clearly showed the impact of acid drying and ultradrying on seed surface structure. The destruction of seed surface and endospermic starch granules in acid dried and accelerated aged seeds of sorghum and pearl millet was conspicuous. Similar impact was observed in the ultra-dried seeds of sorghum whereas no change was recorded in pearl millet. Therefore ultradrying was found to be suitable for extending the seed storage life in pearl millet.

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Effect of electromagnetic stimulation on seed quality of differentially aged maize seeds

Magnetic treatment is a potential physical seed enhancement treatment reported to improve field emergence and seed quality. Effect of static magnetic field treatment was studied on differentially aged maize seeds in *kharif* and *rabi* seasons. Along with unexposed control seeds, low and high vigour seed lots of hybrid PEHM-2 and its male parental line CM-138 were exposed to static magnetic field of 100 mT for 2 hr and 200 mT for 1 hr. Magnetic treatment of seeds increased the field emergence (2.95-5.47%: *kharif*, 6.36-6.92%: *rabi*), speed of germination (2.76-12.94: *kharif*, 21.06-22.25: *rabi*), seedling fresh weight (22.12-22.52: *kharif*; 6.6-14.71: *rabi*), seedling dry weight (6.19: *kharif*; 1.34-11.59: *rabi*), chlorophyll content, leaf area, plant height (2.43-5.53: *kharif*, 7.08-8.40: *rabi*) and seed yield (6.62-8.66: *kharif*, 2.65-7.39: *rabi*). The magnetic treatments also advanced flowering by 1-2 days over control. Both the treatments showed positive effect wherein static magnetic field of 100 mT for 2 hr was more effective as seed treatment. A comparison was made between the pulsed (100 mT for 2 hr with 6 min. interval) and static (100 mT for 2 hr) magnetic treatments on two differentially aged seed lots of Pusa composite-3 in spring-summer season. Significant increase in field emergence, speed of emergence, leaf area and root characteristics were observed in both the treatments but pulsed magnetic treatment was more effective than static magnetic field. There was reduction in the electrolyte leakage (13.82%) and increased in the activities of dehydrogenase and scavenging enzymes (catalase, superoxide dismutase, ascorbate peroxidase, peroxidase) in magnetically treated seeds as compared to control seeds. Higher and early free radical production and increased levels of hydrogen peroxide ions promoted early seedling emergence. It is concluded that both static and pulsed magnetic seed treatments are effective as pre-sowing treatment for improving field performance of maize both in *kharif* and *rabi* seasons.

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