Seed Tech News

INDIAN SOCIETY OF SEED TECHNOLOGY
ISST
Estd. 1971

ISST: Disseminating Knowledge of Seed Science & Technology

Volume: 46, No. 3&4, Sept & Dec 2016

SEED IS LIFE
ISF
International Seed Federation

ISF WORLD SEED CONGRESS-2017

International Seed Federation (ISF) and Hungarian National Organising Committee are going to organise 68th ISF World Seed Congress-2017 at Budapest, Hungary from 22 to 24 May. Online congress registration will be available from 10th January 2017 to 3 May 2017. This congress provides the oppurtunity to create the best environment for the global movement of seed, to promote plant breeding and innovation in seed. For more details please visit the website http://www.worldseedcongress2017.com.

Bid to export new varieties to Organisation for Economic Co-operation and Development (OECD)

In a bid to boost export of seeds, the union government has added 42 new seed varieties to the Organisation for Economic Co-operation and Development (OECD) list after receiving recommendations from the industry taking the total number of registered varieties to 190 and 24 crops. OECD is a group of 35 countries which has set up standards for seed development and the same can be traded among the member countries. Ministry of Agriculture and Farmers Welfare had added 42 new varieties to the OECD list. As of now, about 190 varieties and 24 crops have already been registered. Earlier this year, the government had included 38 varieties to the OECD list. Inclusion of more varieties in this list will allow Indian companies to boost exports as it opens up a huge export market. Rajasthan and Telangana has been identified as the lead designated agencies for seed certification for Northern India and Southern India respectively. Telangana State Seed Certification Agency also got the permission for establishment of an International Seed Testing Association (ISTA) cell and has already disbursed Rs.12.8 lakh for this purpose.

(***Source***: *Extracts from Economic Times*)

The ISST Announces XIV National Seed Seminar at ICAR-IARI, New Delhi to be held during January 28-30 2017 (for details: www.nssiari2017.in)

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DR. KESHAVULU KUNUSOTH
Member-at-Large

Dr. Keshavulu Kunusoth, is the Director, Telangana State Seed and Organic Certification

Authority (TSSOCA), which is the regulatory body for State of Telangana in India. He is also Designated Authority of OECD Varietal Certification for four Indian states and also authority for Organic Certification of organic food and agricultural products. Dr. Keshavulu Kunusoth completed Bachelor's Degree in Agricultural Sciences and Masters in Seed Science and Technology at Acharya N G Ranga Agricultural University, Hyderabad, India, Ph.D. at Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India and Post-Doctoral Research at University of California, Davis, USA with Professor Kent J. Bradford in the year 2009-10. As Professor & University Head in the State Agricultural University (Formerly ANGRAU), made significant contributions in the areas of seed biology, seed production, seed certification, quality control, variety identification and storage. He was instrumental in establishment of Nodal Centre for conducting DUS test and training for southern states of India, under PPV&FR Authority of India. He gained extensive research experience on characterization of crop cultivars and Plant Genetic Resources using morphological, electrophoresis and molecular markers. Dr. Keshavulu was involved in the development of simple and inexpensive seed storage technologies and also he was a strategic member for USAID projects on "Seed Systems in South East Asian and East African Countries". He made several National and International research broad and working collaborations, he was instrumental in establishing Seed Science and Technology division and DNA laboratory in the University. He taught several courses and acted as mentor for number of students specializing in Seed Science and Technology. The first ISTA Congress that Keshavulu attended was in Iguassu Falls, Brazil in 2007, since then involved as working collaborator in variety testing through Dr. Berta Killermann. Thereafter, he became Member of Variety Committee in 2011, he has been actively contributing to ISTA activities and participating ISTA meetings, Keshavulu was elected to the Executive Committee. He wish to promote ISTA linkages with Indian Seed Industry, SAARC seed forum, seed organizations like APSA. He is a Member of Indian Seed Sub-Committee on Crop Standards, Notification and Release of Crop Varieties since 2013 and also a member of several technical committees at the state and national level. He organized several capacity building programmes including workshops and conferences in India and abroad as well, since 2003. Dr. Keshavulu has published more than 75 research articles and abstracts, books, technical bulletins/ descriptors and reports, training manuals etc., at National and International level. He has executed several special Seed Technology assignments at state and National level. He visited several countries, recognized as a successful seed scientist and received several awards in recognition for his outstanding contributions in the area of Seed Science and Technology.

Mandate of the Division of Seed Science and Technology

ICAR-Indian Agricultural Research Institute, New Delhi

- Development of seed production technology
- Basic, strategic and applied research on seed quality assessment, maintenance and enhancement
- Standardization of seed testing procedures
- Facilitating implementation of Seeds Act, Plant Variety Protection and Farmers Act and issues related to seed marketing
- Strengthening human resource development in seed science and technology
- Enhancing quality seed availability through Farmers' participation

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ORGANIC SEED IN SHORT SUPPLY

While the demand for organic crops has risen sharply in recent years, it's a struggle to keep pace.Not only is the demand for organic crops up in recent years, it is way up.As per Michelle Klieger, director of international programs and policy for the American Seed Trade Association (ASTA) "As the demand for organic products increases, so does the demand for organic seed in all sectors, including corn, soybean and sorghum to meet the demand for feed and food products". Several seed companies have developed varieties for organic seed market and are selling seed. With the diversity of companies, producers can purchase varieties with different maturities and characteristics. However, it is important to point out that demand varies by crop. Seed companies are able to meet market demand when they are given the appropriate lead time to produce for the demand as in the case of other identity-preserved seed sectors. The companies scale up their production processes to meet the growers demand by developing relationships with the organic farmers. Even though 2015 showed significant growth for the organic industry, meeting consumer demand remains a big challenge. Organic Trade Association (OTA) reported that in response to organic production lagging consumption, the industry has come together in creative and proactive ways.

Organic Seed Alliance (OSA) released a report "State of Organic Seed 2016" which clearly stating that investments in organic plant breeding have increased and are resulting in more organic varieties and trained organic seed professionals. More than 70 percent of these investments occurred during the past five years. Some surveys were saying that organic crop farmers are using more organic seed than they were three years ago and they were happier with the quality of the organic seed (Kristina Hubbard, Advocacy and communications director for OSA). Organic seed is also a regulatory requirement. For example, in USA organic corn production for grain or seed, not including corn produced for silage, increased 30 percent between 2011 and 2015; soybean production increased 10 percent; and sorghum production more than doubled".

Organic Seed Industry Challenges

Even though, there is an improvement in area under organic seed, largest organic farms still use relatively little organic seed and the organic certifiers' enforcement of the organic seed requirement is weaker. While organic seed research investments have increased, they still less in comparison to funding directed toward seed developed for conventional systems. With the increased use of genomics and other more expensive breeding technologies (that have led to the patenting and consolidation of crop seed stocks by an increasingly small number of private seed companies) more organic farmers lack access to seed stocks uniquely tailored to their growing needs.The OSA report says this is particularly problematic for organic farmers, who use 75 percent organic seed on average for operations under 10 acres, but only 20 percent organic seed on average for operations over 480 acres. Organic farmers report that genetically engineered (GE) crops harm the integrity of products, since GE is an excluded method in the organic standards.Another challenge is broader seed industry consolidation, which affects all farmers.A number of smaller organic seed companies have emerged in response to consolidation, while others have also been motivated to take seed into their own hands.Seed companies face mainly two major challenges as the demand for organic seed increases: "First, the lead time to produce seed is one to two years from when the order is placed until sufficient seed can be produced for delivery". Each season, seed companies produce enough new inventory to meet their estimated demand for the following season. That estimate is based on their sales in the current season and, like in any industry, seed producers do not want to produce seed they may not be able to sell. So it is imperative that organic producers work with seed companies well in advance of the time they will need seed for planting." This is especially true in a specialty market such as organic seed, where total units sold is less than 5 percent of the overall corn seed market. The second challenge is breeding varieties that can survive and be profitable even without inputs normally available to conventional farmers. With the limits on allowable organic inputs, the seeds themselves must be more resistant to diseases and better adapted for natural pressures.

What's Next?

So, what is next for the organic food and seed industry to overcome these challenges? In case of USA, most of food companies have developed initiative and strategic partnerships aimed at increasing overall domestic production of these crops, which could spur additional organic production and demand for organic seed. Seed companies will continue to work with their organic grower customers to meet the demand they have for seed to be used in their organic production. As breeding techniques continue to evolve and provide opportunities to improve varieties, seed companies will continue to strive to maximize the potential that is in the seed."

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GMOS CULTIVATION AND TRADITIONAL BREEDING-SONOMA COUNTRY, USA

There was News* "Sonoma County's voters weigh banning GMOs". The article immediately draws the attention to read the full article. The city of Petaluma in the valley was known as " The Egg Capital of the World - The City of a Million Hens. It has a largest Seed Bank of USA. Today the town has transformed into "Agro tourism".

Hundreds of Organic Farms, covers the thousand acres of apples, wine grapes and crop products, six times more than hatcheries. But the organic farmers and activists are apprehensive to the invasion of genetically engineered crops (GMOs). The County's proposed measure "M" to a ban on GM crops in the county's (already rejected measure in 2005) seed multiplication and crops production program. The ban is already implemented in five counties of California. The lobby of campaigners opposing GMOs is in favor of traditional Breeding.The main GM crops in the valley are corn and alpha alpha. Farmers who have fear contamination of crops by GMC pollen, supports the measure 'M'. Measure 'M' would prohibit the cultivation, propagation and raising the GM crops in Sonoma county, however, it will not restrict medical supplies like vaccine and insulin.

It was observed that that United States Department of Agriculture (USDA) has never decertified any produce of Organic Farmers for any kind of "pollen flow".The apprehension has no support by the "National Academy of Sciences" as there are non-significant increase in health problems in countries raising GM crops as compared to countries who has put ban on GM cultivation.So, the opposition for cultivation of GM crops is mainly by individuals, local businesses men, organic farms and natural foods business in the valley. The support of GMOs is funded by multinational agricultural and bio technology firms. Recently these companies have won a legal battle from court in Hawaii State to grow and multiply GM crops in the state.

In view of non-adverse comments by USAD and National Science Academy of USA will be immense importance in decision of GM crops cultivation and seed multiplication in India. The committee of experts appointed by GOI will decide favorably the role of GM crops and its seed multiplication in enhancing national growth in agriculture and contributions in national GDP. It will also improve common man's right to have quality food with social uplifting of common men.

*(***Source***: *Extracted from "SAN FRANCISCO CHRONICLE, Bay Area News). (Dr D S Mathur, Camping at Pleasanton CA, USA, Former PS, DSST, IARI., New Delhi 110 012)*

IMPACT OF *ASCOCHYTA* BLIGHT ON CHICKPEA SEED QUALITY AND DEVELOPMENT OF SCAR MARKER

Ascochyta blight is one of the most important diseases in NWPZ areas of our country, where favourable climatic conditions prevail during cropping season. At all the locations selected for collection of samples the *Ascochyta* blight of chickpea disease was observed in varying severity. The disease incidence was more in Kabuli genotypes than those to Desi genotypes. Cultivation of two Desi genotypes namely; ICCV 07110 and WR 315 and one Kabuli genotype namely L-550 should be avoided as minimum germination was found in them out of all genotypes evaluated. Similarly cultivation of two Desi genotypes namely; WR 315 and JG 11 should be avoided as maximum electrical conductivity was recorded in these two genotypes. In Kabuli genotype, ILC 212 and L 550 was recorded with maximum electrical conductivity and therefore farmers should avoid their cultivation. Based on the screening results two promising genotypes under Desi chickpea namely; ICCV-13645 and ICCV04523 and one genotype under Kabuli chickpea namely ILC 3279 can be recommended to the farmers. Maximum growth and sporulation of *Ascochyta rabiei* was seen at 20°C in Potato Dextrose Chickpea Seed Extract Agar medium in comparison to Potato Dextrose Agar medium. A total of 63 RAPD primers were used for preliminary primer screening for this pathogen. Of these, only 22 RAPD primers gave amplification against *Ascochyta rabiei*; and only 7 promising primers identified (with reproducible results against all 10 isolates). Two primers namely OPS-5 and OPN-18 could be developed into SCAR marker based on the specificity and reproducible banding pattern. SCARs were advantageous over RAPD markers in specificity and reproducibility.

Praveen Patted (*M.Sc. Student*)

SEED PROGRAMME PLANNING AND MANAGEMENT

GENERAL SITUATION

Seed production has been identified as one of the main thrust areas ever since 1960-61.Since then Indian seed world has made phenomenal progress.Enactment of seed quality regulations, liberal policies ofgovernment of India has always played very vital role to build sound seed industry and has supported both public and private sector seed organisations to develop and to meet increasing demand of seed in the country.

For elaboration on seed programme planning-seed production and multiplication technology edible oil seed crops are taken to highlight various steps and strategies required to ensure success full seed production. Oil seeds and production of oil crops are important eye catching problems at all levels to the planner, technologist producer and industrialist.

Oilseeds are grown in a system of subsistence farming and attendant uncertainties. They have never been treated at par with food grain crops. They are cultivated mostly on marginal, sub marginal lands and in rain fed situations. Only about 15% area has assumed irrigation as against 72% of area under wheat has assured irrigation.Therefore, timely rains are important for the yield of oil seeds. Similarly, inadequate availability of quality seed of improved varieties including for problem areas are also the factors for low yield. For seed technologies oil seed crops represent complex floral biology, which comprise self-cross and often cross pollinated crops, including typical problems of production, research needs and processing requirements thy fundamental details given in this paper are also applicable to various other crops (cereals, pulses, fibres, and vegetable crops)seed production and their multiplication strategies.

A. Seed demand

H = High demand in lakh quintals

M = Medium demand in thousand quintals

L = Low demand in hundred quintals

B. Multiplication ratio

HM = Multiplication ratio high greater than 1:100

LM = Low multiplication ratio less than 1:100

C. Speed of genetic deterioration

RD = Rapid deterioration (cross pollinated or often cross pollinated crops)

SD = Slow deterioration/self-compatibletype.

Groundnut multiplication model (BS-FSI-FSII-CS, 4 generation model)

A. a = Assumption- seed requirementof certified seed (in the year 2016-17) 10,000 quintals

b = Multiplication plan (multiplication ratio 1:10)

Foundation seed requirement

FS II (2015-16) $\frac{10,000}{10}$ = 1000 quintals

FSI (2014-15) $\frac{1000}{10}$ = 100 quintals

Table 1: Classification of crops for determination of appropriate seed production model

Name of the crop	Category			Suggested model
	Seed demand (A)	Multiplatinum ratio (B)	Speed of genetic deterioration(C)	
Groundnut	H	LM	SD	4 generations or 5 generations
Rape seed/ Mustard	H	HM	RD	3 generations
Soybean	M	LM	SD	4 generations
Sesamum	L	HM	SD	3 or 4 generations
Sunflower /Safflower	L	LM	RD	3 or 4 generations

Breeder seed requirement (2013-14)

$\frac{100}{10}$=10 quintals

c = to reduce the time gap, off season multiplication is necessary/ two season seed multiplication within the same region/outside may be done.

B. Rapeseeds/Mustard (BS-FS-CS)

a. Assumption 10,000 quintals certified seed requirement (2016-17)

b. Multiplication ratio 1:150

FS requirement (2015-16) $\frac{10000}{10}$=66.60quintals

BS requirement (2014-15) $\frac{66.60}{150}$=0.44 quintals

Table 2: Seed is essential for crop production

Crop	Seeds rate/kg	Multiplication rate
Groundnut	150	1:10
Rape seed/mustard	5	1:150
Sesame	5	1:105
Soybean	62	1:18
Sunflower	10	1:80
Safflower	12	1:70

The relative importance of oilseed crops on all India basis is Groundnut, Rapeseed / Mustard, Soybean, Sunflower, Safflower, Sesame and others (Niger, Linseed, Castor)

Genesis of Crop Breeding Research

Crop breeding research is the foundation of a seed programme. How varieties were developed, where they originated and source of seed from where they came are secondary matters. The primary focus must be on availability of best varieties to farmers. If the varieties perform well and are accepted by farmers, this part of the programme can be considered successful.

A concerted effort at breeding superior varieties for oilseed crops was started when the all India Coordinated Research Project on oil seeds was established in 1967 since then rate of release of oil seed varieties quite spectacular and multi facet development in varietal improvement programme along withmultifaceted expansion of oil seed production have taken place where time to time policy decision taken by Govt. of India to promote all sided development / expansion has played vital role.

Continuity of supply and quality control

If a seed programme is to succeed, the seed of improved varieties must consistently be better than the seed farmer produces himself. Concern for quality cannot be left to one person; it must pervade every aspect of seed programme. Therefore, it is necessary to make all preparations systematically for raising seed crop which include:

a. Careful selection of the field with known precious history and free from weeds.

b. Proper field isolation as prescribed under Indian Minimum Seed Certification Standards for each crop so that no unwanted pollen reaches the seed corp.

c. All equipment should be thoroughly cleaned particularly sowing or planting equipment and also the harvesting equipment. These precautions are obviously the responsibility of seed grower, therefore, selection of seed grower to achieve best multi plication rate with valuable seed is the pre-requisite.

d. Checking the seed growers work-field inspections/ seed sample testing.

Seed crop can be inspected at any time, but to be of the most value it is necessary to go at a time when the characteristics of the variety can be seen to the fullest extent.The crop wise/stage wise number of field inspections required to be made are prescribed under Indian Minimum Seed Certification Standards. Seed crop inspection reveal the state of crop at the time of inspection in relation to prescribed field standards including genetic purity but does not predict the quality of seed which eventually be harvested. For this, seed samples are drawn and are sent to Seed Testing laboratory for testing in relation to prescribed seed standards.

Quality seed programme basic concepts and terms.

- The Seed Act (1966)
- The Seed Rules (1968)
- Notified kind/ variety
- Truth full labelling
- Seed certification: Foundation seed-white tag; Certified seed- Blue tag;Labelled seed equivalent to certified seed-except not carrying of official certificationtag.
- Seed Certification Authority
- Field inspection procedure
- Grow out test
- Seed processing
- Seed lot: submitted sample and working sample
- Seed testing: Service sample, certification sample, official sample

The above listed terms (certification sample and official sample) in relation to basic concepts for successful seed programme need to be adequately understood and facilities are required to be developed so that the quality seed production continuity be maintained.

Resources

Most seed programmes face competition for personnel, local funds etc. Seed programme administrators must strive to obtain resources when they are needed. A large and costly seed processing plant or an impressive seed testing laboratory does not necessarily guarantee better seed for farmers. The administrator's ultimate goal must be to ensure that resources are used to achieve the results intended.

Physical resource-equipment:

a) Seed growing and harvesting equipment- plot size equipment as well as commercial; size equipment.

b) Seed drying – seed moisture content influences seed viability enormously. Consequently, artificial drying is mandatory especially in warm, humid areas. Many drying systems are available, devising solution to drying problems is not simple in tropics and sub- tropics while the problems are more complex for seed of oil seeds and vegetables.

c) Seed processing- The processing plant is one of the largest capital investment in a seed programme. It needs to be properly equipped and managed. It is a tremendous asset to seed operation, otherwise it become a major liability. Often a simple processing line consisting of an air screen cleaner linked with conveyors, surge bins, elevators, seed treater, packaging equipment is entirely satisfactory.

d) Seed storage – In most sub- tropical and tropical regions, seed programmes that do not have adequate storage facilities are likely to suffer losses while holding stocks. High temperature and high relative humidity lower seed viability and favour storage insects, rodents are the constant threat. In a seed programme, facilities for short term, intermediate and long term storage are required. Accordingly, availability of the space needs to be assessed. Availability for local building material for seed storage construction, insulating materials, electricity, air conditioning and dehumidification equipment be considered to meet seed storage requirement.

e) Seed certification–field inspection should never be delayed; a means of transportation is essential preferably a four-wheel drive vehicle. Similarly, for proper field inspections arrangement for stationery, printed field inspection report forms, tapes hand counters etc. is to be made well in advance.

f) Seed sampling equipment – sampling tiers, portable sample dividers, scales, sealing devices, sample containers / bags, printer's forms, labels and marking pens are required. Portable seed moisture tellers are also useful especially in seed processing plants.

g) Seed testing equipment –Apart from having an adequate laboratory building with proper space for offices and for receiving seed samples, making physical purity analysis, testing germination and storing seed sample, the laboratory must have equipment to undertake seed sample analysis efficiently. A few important equipments are given-

microscopes, lenses, balances, seed sample dividers, laboratory size cleaning machines, cabinet germinators, temperature regulated germinator rooms, paper germinator, hot air oven, grinding mills, desiccators, seed health testing sterilisation and auto clave, stereo microscopes etc.

Human Resources

Lack of skilled manpower in seed technology is the major barrier in building sound seed programme. Physical resources should be in balance with human resources. Investing heavily in physical resources without the proper personnel to operate and maintain the facilities is not productive. All personnel need training at some time. The responsibilities of the job will determine the most appropriate kind and location of training. The training may be at home, regional training as well in developed countries. Participation in seminars and conferences, travel study programmes for policy makers, planners, administrators and technical personnel focus attention on domestic, regional and international problems/development.

Financial Resources

Under various schemes on seed production and crop development in the form of grant in aid is available to develop infrastructure facilities, subsidy on certified seed production, mini-skit seed distribution of improved varieties, subsidy to seed villages on seed sowing implements, seed storage construction etc are available. It is necessary to make positive efforts by all concerned including the sates to derive the benefits from these schemes.

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IMPACT OF HEAT STRESS ON WHEAT SEED QUALITY AND ITS MITIGATION THROUGH SEED ENHANCEMENT

The present study in wheat (*Triticum aestivum* L) varieties was conducted with the following main objectives: i) to study the effect of heat stress on seed quality parameters; ii) to study the seed storability in seeds harvested from both stressed and non-stressed environments; and iii) to study the effect of seed enhancement treatments on the performance of wheat harvested under stressed environment. The experiment was conducted during *rabi* 2014-15 and 2015-16 in the experimental field of the Division of Seed Science and Technology, whereas the laboratory studies were conducted in the Divisions of Seed Science and Technology and Biochemistry, ICAR-IARI, New Delhi. Eleven representative varieties from different agro-climatic zones were procured and used. Heat stress was found to have a significant influence on the seed quality parameters. Germination decreased from 94.49 to 84.94%, whereas vigour Index I reduced from 2645.4 to 1885.4 with delayed sowing (increased heat stress) Vigour Index II also followed the similar trend. Seed harvested from heat stressed environment showed a significant decline in the seed quality parameters when stored at room temperature; however it was able to maintain the minimum seed certification standards, during storage under cool and dry conditions. For heat stress mitigation, seed priming and foliar sprays using different chemicals were tried. Based on the speed of germination, three better seed priming treatments were identified *viz.*, halo priming with KH_2PO_4 (1%); osmopriming (PEG 6000 at– 1MPa) and plant growth regulator *ie.*, GA_3 @50 ppm; however, seed priming with GA_3 was found to be the best? The study showed the enhancement in various crop morphological and seed quality parameters with seed priming. Foliar sprays using different chemicals, at vegetative (booting stage) and seed filling stage, significantly decreased the MDA content, EC values and hydrogen peroxide activitiy, whereas increased dehydrogenase activity. Hence, all foliar sprays studied, could successfully mitigate the effect of heat stress, however, salicylic acid @400ppm was found to be the most effective among the various chemical used.

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Edited and published by: **DG Gupta and Nagamani Sandra** on behalf of the Indian Society of Seed Technology, e-mail: seedtechnews@gmail.com, Division of SST, ICAR-IARI, New Delhi 110 012, and printed at M/s Kamala Print-n-Publish, O 96 New Mahavir Nagar, New Delhi 110 018
Phones : 98184 76511; 2599 7481

Price : Rs. 18/-

Registration No. 21893/71