

Seed Tech News



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

**Volume: 45, No. 1&2,
March & June 2015**



The 31st International Seed Testing Association Congress will be held from 15 to 21 June 2016 in Tallinn, Estonia. The ministry of rural affairs of the republic of Estonia is delighted to be hosting the next ISTA Congress. The Congress will take place in Tallinn, a modern city in medieval clothing that was first marked on a map in 1154. The city's historic Old Town is inscribed on the UNESCO World Heritage List. Following the congress two post-Congress tours, to West and South Estonia, are scheduled for 22-23 June 2016.

The congress is a unique opportunity for seed science specialists and industry representatives to meet and exchange work-related information and experiences. The event also provides an opportunity to present scientific discoveries and technical innovations as well as their practical applications.

For more details visit www.seedtest.org

Secretary : SK Jain
Chief Editor : PK Agrawal
Editor : DG Gupta
Associate Editor : Nagamani Sandra

DISTINGUISHING CROP VARIETIES - USE OF MACHINE VISION

Comprehensive characterization of crop varieties is desirable to protect the rights of the breeders/breeding institutions against misappropriation and plagiarism. The Protection of Plant Varieties and Farmers' Rights Act, 2001 (PPV&FR Act) encourages public/private investment in research and development of new plant varieties by giving protection to different categories of plant varieties against unauthorized multiplication of seeds or propagating materials for a specified period. The Act also recognizes farmers as breeders who breed new varieties as well as conserve traditional varieties. At present, varietal identification keys for various crops are primarily based on morphological and physiological parameters. Plant morphological characters have been recognized to constitute universally undisputed descriptors for DUS testing and varietal characterization. However, morphological characterization requires skilled human power and is time consuming as well as quantitatively variable. Therefore, there is a need to ensure precise distinction of varieties with cost effective technologies using modern tools like machine vision.

Concept of machine vision

Machine Vision System is a computerized tool for Image Analysis (IA). Machine vision refers to the acquisition of data (shape, size, etc.) via a video camera or similar system and the subsequent computer analysis of these data following suitable processing. The colour, size, shape characteristics of plant products, and their capability to produce digital images suitable for further processing make modern image acquisition techniques highly adaptable tools. In mid-1980s when computational capabilities were limited, human vision was considered to be far more capable than machine vision. However, with ever increasing computational power and better sensors, many of the limitations recorded earlier have now been overcome to a larger extent.

Use of machine vision offers considerable advantages in studying plant part characteristics. Images of number of plant parts can be captured. Stored images can be retrieved at any time for study and analysis. Image based methods more often give reliable

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measurements, especially those which cannot be measured using simple measuring tools e.g. curvature, area, perimeter, surface texture, etc. Machine vision has much higher resolution than the capability of human vision; therefore, miniscule details could be observed and analysed.

In light of the above, the study was undertaken to distinguish varieties of rice, mustard and chickpea. The images of various plant parts were captured by using an imaging set-up as in Fig. 1 and Fig. 2. For seed images, a flat bed scanner (Canon LiDE 110 version 1.2.00) was used. Size and shape features are then extracted by using Grain Analysis Software (Fig. 3).



Fig. 1: Imaging with front light source (for illumination of sample)

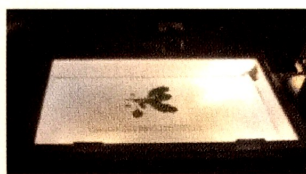


Fig. 2: Imaging of plant parts using back lighting (for sample outline)

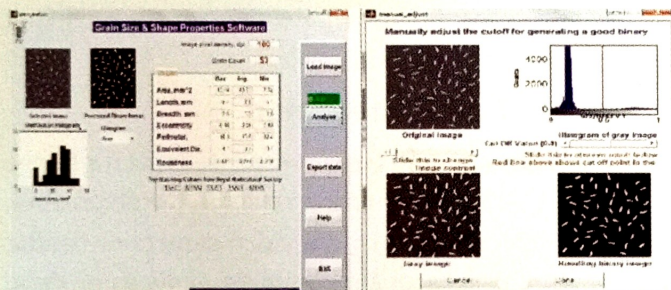


Fig. 3: Extraction of size and shape features of seed using Grain Analysis Software

Design and development of imaging setup

An imaging setup was designed and developed by considering the plant parts of interest of study. An imaging setup with aluminium angle pieces, soft board and glass top surface has been fabricated that has provision for using either front light or back-light. The set-up (Figs. 1 and 2) was used to capture images of various plant following standard protocol. Figs. 4 and 5 indicate variations observed in petal colour of chickpea and leaf venation on rice, respectively.

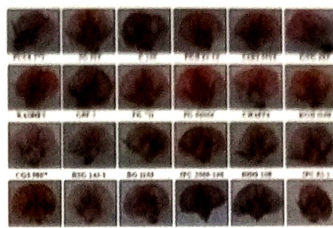


Fig. 4: Petal colour intensity and venation pattern in chickpea



Fig. 5: Leaf venation pattern in rice

A portal of digital image database for rice, mustard and chickpea has been created with the financial support of National Agricultural Science Fund (NASF, formerly NFBSFARA, Fig. 6); highlighting the distinct features of various plant parts in respective crops.



Fig. 6: Database of digital images - <http://cropcorpus.ciae.res.in>

Note: A paper from the project on 'Comparative assessment of human measurement with machine vision for establishing varietal distinctness in rice' by MA Joshi, N Kotwaliwale and D Aggarwal was awarded the Best Oral Paper at International Conference ERCICA held at Bengaluru, August 2014.

Dr Monika A. Joshi

Senior Scientist

DSST, ICAR-IARI, New Delhi

Dear Reader:

Seed Tech News publishes news items from all over India, therefore we request that all the staff to send the NEWS and EVENTS from your seed department. In absence of such news, we are giving news only from "IARI". Kindly help us to make it truly NATIONAL NEWS LETTER.

Editor

seedtechnews@gmail.com

NEW APPOINTMENT

Dr. D.K. Yadava is presently Head, Division of Seed Science and Technology, ICAR- Indian Agricultural Research Institute, New Delhi w.e.f. 22.10.2014, has very strong background and rich experience of pulses and *brassica* breeding, starting career as Assistant Professor (Pulses and *Brassica* Breeding), Agricultural Research Station, Rajasthan Agricultural University, Sriganaganagar (1996-2003), Senior Scientist and Principal Scientist (*Brassica* Breeding), Division of Genetics, ICAR-Indian Agricultural Research Institute, New Delhi (2003-2014), born on 10.4.1966 in village Chandawas (Rewari) Haryana. Completed primary/secondary school education with strong rural background. Graduate/postgraduate and PhD (1982-1993) from College of Agriculture, Haryana Agricultural University, Hisar.



Dr. Yadava, the strategic mustard breeder ensured amalgamation of high yield quality traits by targeted utilization of diverse germplasm leading to the development/release of sixteen varieties of mustard and three varieties of pulses. These varieties have provided farmers the choice in different cropping systems under changing climate scenario. Some of the important early maturing and high yielding varieties, developed as a result of strategic breeding by Dr. Yadava are Mustard-25, PM 28, PM 27, PM 26 and RGN 145 and also breed low erucic acid mustard varieties Pusa mustard 21, 24, 29 and 30. Also released country's first double zero Indian mustard variety viz. Pusa Double Zero Mustard-31 during the year 2015. Further combined conventional and molecular breeding in mustard to expedite crop improvement process. Introgressed low glucosinolate genes in **PM-21** and **Pusa Karishma** through MAS. Devised and refined various methodologies/protocols viz. for screening against high temperature at seedling stage, new method for methyl esterification of fatty acids, maintenance breeding method etc.

The outcome of Dr. Yadava's findings are evident from the fact that breeder seed demand of IARI bred Indian mustard varieties have reached to more than 56%. Efforts are on the way to popularize them in North Eastern Hill Zone as replacement to toria as new crop in rice- and maize-fallows and as new crop in southern parts of the country.

Dr. Yadava is the recipient of Dr. B. P. Pal Memorial Award (2012), ICAR-Indian Agricultural Research Institute, New Delhi, Best Research and Experimentation Award (2002)

- Agricultural Research Station (RAU Bikaner), Sriganaganagar. He is the Fellow of National Academy of Agricultural Sciences; Indian Society of Genetics and Plant Breeding, IARI, New Delhi; Indian Society of Oilseeds Research, DOR, Hyderabad; Indian Society of Pulses Research and Development, IPR, Kanpur; Society for Rapeseed-Mustard Research, DRMR, Bharatpur; Indian Society of Forage Research, HAU, Hisar, India.

Nagamani Sandra, PhD Plant Pathology from IARI joined as Scientist in Division of Seed Science and Technology, IARI in April 2015. She completed her BSc (Ag) & MSc in Seed Science and Technology, respectively from Agricultural College Bapatla (AP) and IARI, New Delhi. She is willing to cooperate in Seed Science



activities with positive support in the sphere of her specialization in Plant Virology and as such is associated with two projects (a) Identification of putative priming associated genes in soybean under various abiotic stresses. (b) Molecular characterization of good and poor storers and mapping population at F_6 generation related to seed quality/vigour traits in soybean. Thus her responsibilities include strengthening quality programme through acquiring new knowledge/techniques befitting to climate change.

Usharani Peddireddi completed Master's degree with specialization in Seed Science & Technology from Acharya N.G. Ranga Agricultural University, Hyderabad with distinction and bagged Shri Bhojja Venkat Reddy Memorial Gold Medal. Usha Rani joined as Scientist in Division of Seed Science &



Technology IARI, New Delhi in April 2015. She is associated with two projects (i) Development of technologies/methodologies for quality seed production, maintenance of seed purity and varietal identification (ii) Seed quality enhancement by processing, packaging and storage options in high volume seed crops. In addition, she is associated with one project in Genetics division on nucleus seed production of mung bean and lentil.

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MINISTRY OF AGRICULTURE (Department of Agriculture and Co-operation) NOTIFICATION

New Delhi, the 28 January 2015

S.O. 268 (E). – In exercise of the powers conferred by Section 5 of the Seeds Act, 1966 (54 of 1966), the Central Government after consultation with the Central Seed Committee, is of opinion that it is necessary and expedient to regulate the quality of the seeds of the varieties specified in column (3) of the table below of varieties of seeds shall be the notified varieties to be sold for purposes of agriculture for the states mentioned in column (4) of the said table and shall be the notified varieties for the whole of India for the purpose of the said Act, with effect from the date of publication of this notification in the Official Gazette, namely:

S.No. (1)	Kind (2)	Variety (3)	State (4)	S.No. (1)	Kind (2)	Variety (3)	State (4)
1.	Rice	Arize 6444 Gold (HRI-174) (IET-22379)	AS, CG, OR, UP, BR, ML, KA & TN	24.	Urd	Vallabh Urd-1 UK & JK	PB, HR, DL, RJ, UP,
2.	Rice	INH97288 (HR1-178) (IET-22381)	PB, CG & UP	25.	Sesame	SMARAK (OSC 560)	OR
3.	Rice	RC Maniphou 12	MN	26.	Sesame	SUBHRA (OSC 207)	OR
4.	Rice	Indira Aerobic-I (R1570-2649-1-1546-1) (IET 21686)	GJ, CG & TN	27.	Linseed	Pratap Alsi-2	RJ
5.	Rice	Basmati 564 (IET 17269)	JK	28.	Gobhi Sarson	RSPN 25	JK
6.	Rice	6129 (BS-129) (HRI 152) (IET 18815)	HR	29.	Marvel grass	Phule Marvel 06-40	MH
7.	Rice	BNKR-1 (Dhiren) (IET 20760)	WB	30.	Maize Hybrid	PMH 6 (JH 31292)	BR, WB, JH, OR & UP
8.	Rice	Pushpa (IET 17509)	WB	31.	Rice	IR-64 Drt I (IR87707- 44-5-B-B-B) (IET 22836)	TN, AP, TS, MP, CG & JH
9.	Rice	Vallabh Basmati-24 (IET 20827) (MAUB-171)	UP, HR & JK	32.	Maize	NMH-713	UP, BR, JH, OR, AP, KA, TN & MH
10.	Wheat	Nilgiri Khapli (HW 1098)	GJ, MH, KA & TN	33.	Safflower	NARI-57	MH, KA, MP, RJ, PB, UP, JH & WB
11.	Wheat	Pusa Kiran (HS-542)	HP, UK, JK, AR, AS, ML, MN, MZ, NL & TR	34.	Oat	JO-03-93 (Jawahar Oat 03-93)	MP, MH, GJ & UP
12.	Wheat	RSP 561	JK	35.	Oat	OS-377	UP, MH, GJ, CG & MP
13.	Maize	CoH (M) 10 (CMH 08-433)	AP, TN, KA, MH, RJ, GJ, MP & CG	36.	Bread wheat	DBW 110	MP, CG, GJ, RJ & UP
14.	Maize	HM-13 (HKH-317)	JK, HP & UK	37.	Bread wheat	DBW 107	UP, BR, JH, WB, AR, AS, ML, MN, MZ, NL & TR
15.	Pearl Millet	NBH 5767	MH, KA, AP & TN	38.	Wheat	PUSA VATSALA (HD 3118)	UP, BR, JH, WB, OR, AR, AS, ML, MN, MZ, NL & TR
16.	Soybean	NRC 86 (Ahilya 6)	MP, RJ, GJ, UP & MH	39.	Durum wheat	Pusa Anmol (HI 8737)	MP, CG, GJ, RJ & UP
17.	Ground- nut	Gujarat Junagadh Groundnut-18 (JSP-49)	OR, WB, JH & MN	40.	Barley	DWRB 101	PB, HR, DL, UP, RJ
18.	Ground- nut	Raj Mungfali-2 (RG-578)	OR, WB & MN	41.	Cotton	Nirmal-18 (NACH-18)	MH, MP, GJ, KA, AP & TN
19.	Sorghum	SPH 1635	MH	42.	Soybean	KDS 344 (Phule Agrani)	MH, KA, TN & TS
20.	Sorghum	Phule Suchitra (RSV 1098)	MH	43.	Sugarcane	CoP 2061	BR, UP, WB & AS
21.	Chickpea	Bidisha (BG 1084) (WEG 29)	WB	44.	Green gram	CO 8	TN
22.	Chickpea	Vallabh Kabuli Channa-I (WCGK-2000-16)	PB, HR, RJ, UP, DL & JK	45.	Lucerne	CO 2	TN
23.	Chickpea	RBG 202	UP, RJ				

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(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
46.	Cauliflower	Sabour Agrim (SBECF-01/09)	BR	60.	Garlic	Agrifound Parvati-2 (G-408)	JK & HP
47.	Coriander	Pratap Raj Dhania-1 (RKD-18)	RJ	61.	Garlic	Agrifound Parvati (G-313)	JK, HP & UK
48.	Pumpkin	Punjab Samrat (WIR-4446)	PB	62.	Garlic	Yamuna Safed-8 (G-384)	JK, PN, DL, HR & RJ
49.	Garden Pea	Punjab-89	PB	63.	Knol khol	G-40 (SJKK-01)	JK
50.	Cucumber	Punjab Naveen	PB	64.	Rice	DRR Dhan 41 (IET 22729) (RP 5311-PR 26703-3B-PJ7)	BR & KA
51.	Turmeric	Punjab Haldi-1	PB	65.	Rice	CO 51	TN
52.	Turmeric	Punjab Haldi-2	PB	66.	Rice	Birsa Vikas Dhan-111 (PY-84) (IET 19848)	JH
53.	Coriander	Punjab Sugandh	PB	67.	Rice	Samba Sub-1 (IET 21248)	UP
54.	Chilli (Hybrid)	NCH-587	PB, UP, MP & BR	68.	Rice	Birsa Vikas Dhan-203 (IET 19896)	JH
55.	Bitter gourd (Hybrid)	Savitri (NBSGH-167)	PB, UP, MP & BR	69.	Basmati Rice	Vallabh Basmati 23 (MAUB-57) (IET-19491)	UP
56.	Brinjal	Pusa Hybrid-20(DBHL-20)	PB, DL, UP & BR	70.	Rice	Sabour Shree (RAU 724-48-33) (IET 18878)	BR
57.	Tomato Hybrid	Bhagya (NTH-301)	RJ, GJ, HR & DL				
58.	Okra Hybrid	NBH-180	MP, MH, GA, CG, OR, AP, TN, KA, KL & PY				
59.	Bottle gourd Hybrid	Anurag	PB, UP, BR & JH				

[No. 3-40/2014-SD.IV]

RAJESH KUMAR SINGH, Jt. Secy.

NOTIFICATION

New Delhi, the 28 January 2015

S.O. 269(E). – In exercise of the powers 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 further amendments in the notification of the Government of India in the Ministry of Agriculture, Department of Agriculture and Co-operation number S.O. 2125(E), dated the 10th September, 2012, namely:

In the table to the said notification, for serial numbers 2, 7 and 24 and entries relating thereto, the following serial numbers and entries shall respectively be substituted, namely:

(1)	(2)	(3)	(4)
“2	Rice Hybrid	Arize Tej (HR1 169) (IET 21411)	BR, CG, GJ, AP, TN and JH
7	Maize Hybrid	NMH-731	GJ, RJ, MP, CG, AP, KA, TN and MH
24	Rice Hybrid	27P31 (IET 21415) (27P31)	JH, MH, KA, TN, UP, BR, CG, MP and OR”

[No. 3-40/2014-SD.IV]

RAJESH KUMAR SINGH Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii), vide number S.O. 2125(E), dated the 10th September, 2012 and subsequently amended vide numbers S.O. 2816(E), dated the 19th September, 2013 and S.O. 1920(E), dated the 30th July, 2014.

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NOTIFICATION

New Delhi, the 28 January 2015

S.O. 270(E). – In exercise of the powers 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 further amendments in the notification of the Government of India in the Ministry of Agriculture, Department of Agriculture and Co-operation number S.O. 2817(E), dated the 19th September, 2013, namely.

In the table to the said notification, for serial numbers 51 and entries relating thereto, the following serial numbers and entries shall respectively be substituted, namely:

(1)	(2)	(3)	(4)
“51	Mustard	Giriraj (DRMRIJ 31)	RJ, HR, DL, JK and PB”

[No. 3-40/2014-SD.IV]

RAJESH KUMAR SINGH Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii), vide number S.O. 2817(E), dated the 19th September 2013.

NOTIFICATION

New Delhi, the 28 January 2015

S.O. 271(E). – In exercise of the powers 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 further amendments in the notification of the Government of India in the Ministry of Agriculture, Department of Agriculture and Co-operation number S.O. 1919(E), dated the 30th July, 2014, namely.

In the table to the said notification, for serial numbers 48 and entries relating thereto, the following serial numbers and entries shall respectively be substituted, namely:

(1)	(2)	(3)	(4)
“48	Maize Hybrid	KMH-25K45 (Bumper)	PB, HR, DL, UP, AP, TS, KA, MH, TN, RJ, GJ, MP & CG”

[No. 3-40/2014-SD.IV]

RAJESH KUMAR SINGH Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii), vide number S.O. 1919(E), dated the 30th July, 2014.

NOTIFICATION

New Delhi, the 28 January 2015

S.O. 272(E). – In exercise of the powers 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 further amendments in the notification of the Government of India in the Ministry of Agriculture, Department of Agriculture and Co-operation number S.O. 2817(E), dated the 19th September, 2013, namely.

In the table to the said notification, for serial numbers 40 and entry relating thereto, the following serial numbers and entries shall respectively be substituted, namely:

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(1)	(2)	(3)	(4)
40	Maize Hybrid	NMH-1242	AP, TN, MH, KA, PB, HR, DL, UP, RJ, GJ, CG & MP*

[No. 3-40/2014-SD.IV]

RAJESH KUMAR SINGH Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii), vide number S.O. 2817(E), dated the 19th September, 2013.

NOTIFICATION

New Delhi, the 28 January 2015

S.O. 273(E). – In exercise of the powers 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 further amendments in the notification of the Government of India in the Ministry of Agriculture, Department of Agriculture and Co-operation number S.O. 1146(E), dated the 24th April, 2014, namely.

In the table to the said notification, for serial numbers 26 and entries relating thereto, the following serial numbers and entries shall respectively be substituted, namely:

(1)	(2)	(3)	(4)
26	Rice Hybrid	PAC 801	UP & JH

[No. 3-40/2014-SD.IV]

RAJESH KUMAR SINGH Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii), vide number S.O. 1146(E), dated the 24th April, 2014.

NOTIFICATION

New Delhi, the 1 April 2015

S.O. 921(E). – In exercise of the powers conferred by Section 5 of the Seeds Act, 1966 (54 of 1966), the Central Government after consultation with the Central Seed Committee, is of opinion that it is necessary and expedient to regulate the quality of the seeds of the varieties specified in column (3) of the table below of the kinds specified in the corresponding entries in column (2) of the said table, hereby declares that the said varieties of seeds shall be the notified varieties to be sold for purposes of agriculture for the States mentioned in column (4) of the said table and shall be the notified for the whole of India for the purposes of the said Act, initially period of three years from the date of publication of this notification in the Official Gazette, namely:

S.No.	Kind	Variety	States
1-4.	Rice	Binadhan 8, Binadhan 10, Binadhan 11, Binadhan 12	WB, TR and AS
5-6.	Rice	Sukhadhan 5, Sukhadhan 6	UP and BR

[F.No.3-42/2014-SD.IV]

RAJESH KUMAR SINGH Jt. Secy.

[AP: Andhra Pradesh; AR: Arunachal Pradesh; AS: Assam; BR: Bihar; CG: Chattisgarh; DL: Delhi; GA: Goa; GJ: Gujarat; HP: Himachal Pradesh; HR: Haryana; JH: Jharkhand; KA: Karnataka; KL: Kerala; MH: Maharashtra; MP: Madhya Pradesh; ML: Meghalaya; MN: Manipur; MZ: Mizoram; NL: Nagaland; OR: Odisha; PB: Punjab; PY: Puducherry; RJ: Rajasthan; TS: Telangana; TN: Tamil Nadu; TR: Tripura; UK: Uttarakhand; UP: Uttar Pradesh; WB: West Bengal]

International Training Course on "Seed Production and Quality Evaluation"

Division of Seed Science and Technology IARI organised two weeks training programme (Feb. 18-28, 2015), sponsored by Afro-Asian Rural development organisation (AARDO) and Govt. of India, Ministry of Rural Development. Nine trainee participants (Fig. 1) attended this capacity building short duration training represented one each from nine different countries namely, Taiwan (R.O.C), Ghana, Iraq, Jordan, Lebanon, Nigeria, Pakistan, Srilanka and Sudan. The highlight of the course included expert lectures, practical exercises, on quality seed production, processing and seed quality testing. Apart from emphasis was given on GM detection, plant variety protection, system of variety release and notification.

All the participants were provided a complete set of soft copy of all lectures and training manual. At the end, training evaluation proforma to evaluate the programme was given to the participants for rating, relevance of topics covered, expertise of resource persons, practical visits to outside places and about overall day-to-day logistic facilities-boarding, lodging etc. All the participants opined in favour and suggested that such courses should be of regular recurrence with more emphasis on hands-on-practical training.

The present course was the fifth in the series where AARDO sponsored training programmes in the Division of Seed Science and Technology IARI had earlier been arranged (during Oct 22 to Nov 06, 2010; Oct 17-29, 2011; February 11 to 24, 2013 and Feb 18-28, 2014) in which time to time participants from Afro-Asian countries namely, Taiwan (R.O.C), Oman, Jordan, Syria, Egypt, Yemen, Malaysia, Sudan, Iraq, Morocco, Lebanon, Ghana, Srilanka, Zambia, Nigeria and Pakistan attended the training programme.

Dr SK Jain

Professor, Division of Seed Science & Technology
ICAR-IARI, New Delhi 110 012



International Training Course on "Seed Production and Quality Evaluation"



Division of Seed Science and Technology, ICAR-Indian Agricultural Research Institute, New Delhi

18 - 28 February, 2015



L to R Sitting : Majid Mohammad Khalifah Al-Louzi (Jordan), Shiv Kumar Kaddav (Course Coordinator), P. C. Nautiyal (Course Coordinator), D. K. Yadava (Head), H. E. Eng. Wessifi Hassan El Sreihni (Secretary General, AARDO), Madam Hamadi, S. K. Jain (Course Director), S. M. Ovais (AARDO Sect.), Rihab Daraballa (Sudan)
Standing (1st Row) : S. K. Chakrabarty, Cheng I-Chen (Taiwan), Sangita Yadav, Sudipta Basu, Monika A. Joshi, Sarala Yadav, Abdul Latheef (Sri Lanka), Abbas Kareem (Iraq), Anur Kumar M. B.
Standing (2nd Row) : Sandeep Kumar Lal, Abubakar T. Garba (Nigeria), Mahmoud El. Arab (Lebanon), Abdu. Gayyum (Pakistan), Peter Kwame Anokwa (Ghana), Abul Kurnar, Mahurath Prasad C. T.

MEMBERS OF ISST, KIND ATTENTION

All the existing members are kindly requested to update their membership details to ensure that all correspondence from ISST is delivered correctly. In recent past ISST have received undelivered posts/letters/correspondence. This is required to update the complete membership mailing list. Please share the information with colleagues and friends who are already members of ISST. Send the details as soon as possible by e-mail: secretaryisst@gmail.com or seedtechnews@gmail.com.

Secretary, ISST

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, IARI, New Delhi 110 012, e-mail: seedtechnews@gmail.com and printed at M/s. Kamala Print-n-Publish, O 96 New Mahavir Nagar, New Delhi 110 018
Phone : 98184 76511

Price : Rs. 18/-

Registration No. 21893/71