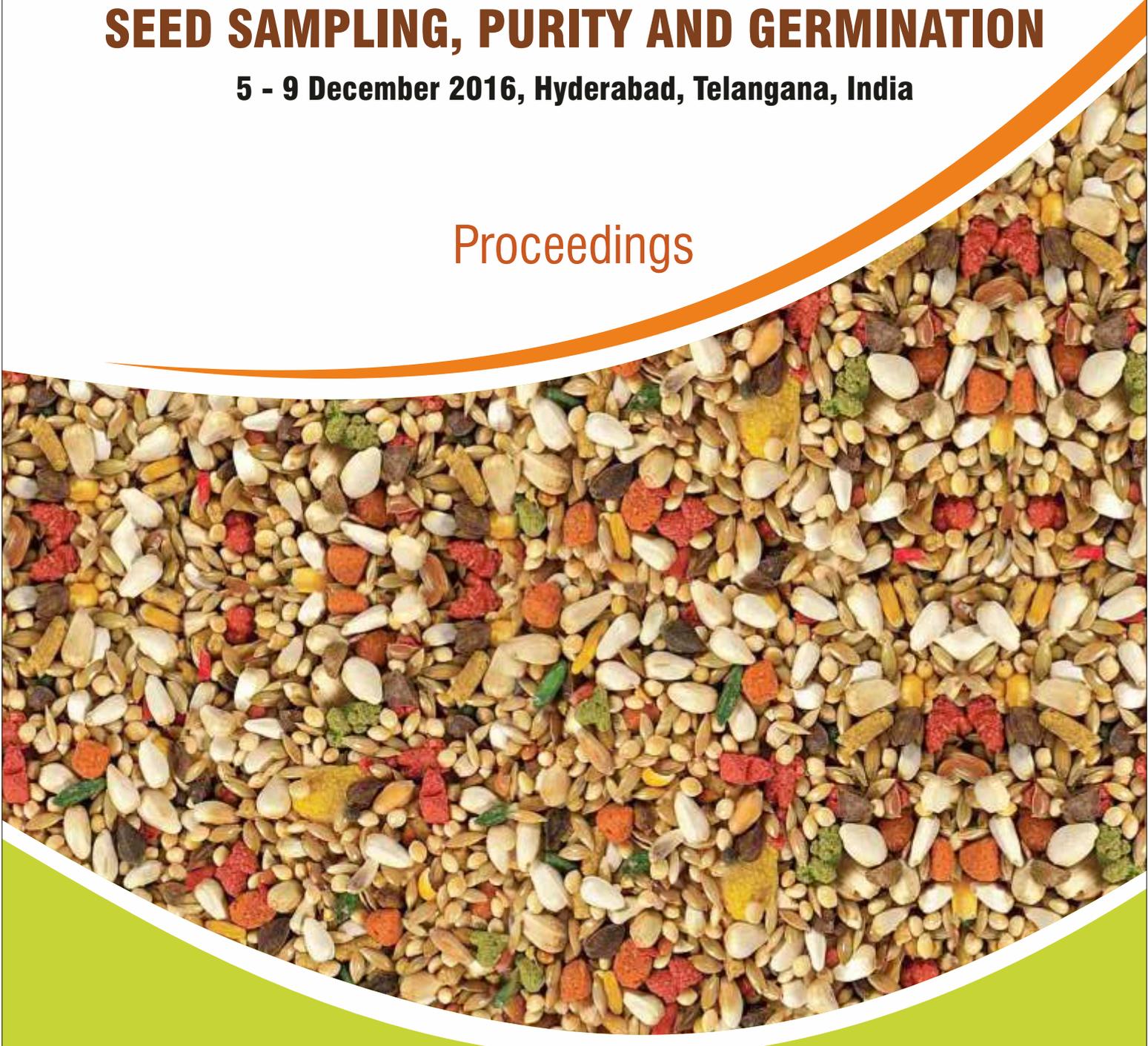




# ISTA WORKSHOP ON SEED SAMPLING, PURITY AND GERMINATION

5 - 9 December 2016, Hyderabad, Telangana, India

Proceedings



Organised by  
Telangana State Seed and Organic Certification Authority  
Government of Telangana, Hyderabad, Telangana State, India  
in collaboration with  
International Seed Testing Association, Switzerland.





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## PROCEEDINGS



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## ISTA Workshop on Seed Sampling, Purity and Germination, 2016

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## ISTA Workshop on Seed Sampling, Purity and Germination



The first ever in the history, a combined ISTA Workshop on Seed Sampling, Purity and Germination was held over five days from 5 to 9 December, 2016 in Hyderabad, Telangana State, India. The aim of the workshop was to provide an overview of seed sampling, as well as purity and germination analysis of a range of species and also to provide a forum where questions relating to seed sampling and testing methodologies are discussed.

The Telangana State Seed and Organic Certification Authority has successfully organized a five day ISTA Workshop on Seed Sampling, Purity and Germination from 5<sup>th</sup> to 9<sup>th</sup> December, 2016 in Hyderabad, Telangana State, India under the leadership of Dr Keshavulu Kunusoth. Special mention needs to be made of Shri Ch. Kishen Rao, Shri Pradeep Korishettar, Shri Jessu Ashish, Dr. Razia Sultana and Mrs Vijitha Reddy who ably assisted in arranging all the specific requirements of the lecturers for the different disciplines. In addition, Shri Chitla Partha Sarathi, IAS, APC and Secretary, Department of Agriculture and Cooperation, has taken keen interest and was a constant guiding force in organizing this workshop. The complex requirements of the workshop has necessitated to be held at three different locations. Our sincerest appreciation goes to the seed companies viz., M/s Kaveri seeds, M/s Nuziveedu seeds, Dupont –Pioneer for making available their facilities and preparing seed lots for sampling, and seed samples for purity analysis and germination evaluations.

A total of twenty eight (28) participants had attended the workshop. The participants came from government and private sectors from countries of Eastern Asia viz Bangladesh (2), India (16), Indonesia (3), Japan (1), Myanmar (1), The Philippines (2) and Thailand (2) (Annexure).

The lecturers for the workshop were: For sampling - Eddie Goldschagg, ISTA Bulking & Sampling Technical Committee Chair (South Africa) and Gerry Hall, ISTA Bulking & Sampling Technical Committee Member (United Kingdom); for purity – Gerarda de Boer-Raatgever, ISTA Purity Technical Committee Chair (Netherlands) and Jane Elizabeth Taylor, former ISTA Purity Technical Committee Chair (United Kingdom); for germination – Sylvie Ducournau, Germination Technical Committee Chair (GEVES, France); and special guest lecturer for the ISTA Overview and Accreditation lectures – Dr Kunusoth Kehavulu, ISTA Executive Committee Member (TSSOCA, India). All the lecturers have vast experience in their fields and in lecturing.

## INAUGURAL SESSION 5<sup>th</sup> December, 2016

The ISTA Workshop on Seed Sampling, Purity and Germination was organized by Telangana State Seed and Organic Certification Authority, Government of Telangana, Telangana State, India from 5-9 December, 2016 at The Park Hotel, Hyderabad. The Workshop was inaugurated with pomp and ceremony by Shri Pocharam Srinivas Reddy, the Hon'ble Minister of Agriculture and Allied sectors, Telangana State, Dr. Jagan Mohan, Commissioner & Director of Agriculture, Government of Telangana, India, Eddie Goldschagg, ISTA Bulking & Sampling Technical Committee Chair (South Africa) and Dr. K. Keshavulu, Director, Telangana State Seed and Organic Certification Authority.

At the outset, the invocation song was sung, followed by the lighting of lamp by the Chief Guest and the dignitaries and formal Welcome address by Dr. K. Keshavulu Director, TSSOCA. Hyderabad.



Ceremonial lighting of the lamp by the Minister of Agriculture and Cooperation of Telangana State of India, the honorable Shri Pocharam Srinivas Reddy

He introduced the ISTA Delegates Eddie Goldschagg, ISTA Bulking & Sampling TCOM Chair (South Africa) and Gerry Hall, ISTA Bulking & Sampling TCOM Member (United Kingdom); for purity – Gerarda de Boer-Raatgever, ISTA Purity TCOM Chair (Netherlands) and Jane Elizabeth Taylor, former ISTA Purity TCOM Chair (United Kingdom); for germination – Sylvie Ducournau, Germination TCOM Chair (France); to the chief guest and the participants from different countries. He has given a brief introduction of the purpose of the ISTA workshop on Sampling, Purity and Germination and about the importance of ISTA Accreditation of seed testing laboratories.



Dr. Jagan Mohan, Commissioner & Director of Agriculture, Government of Telangana, India briefed the importance of quality seed at global market and its potentiality in increasing the yield and productivity of the crops, and its effect on increase in the GDP of the country. He also emphasized that quality seed supply can be possible only when the quality of seed is maintained at both field and laboratory level. He said that this workshop will give an ample knowledge about the exact procedures to be followed to obtain the quality seed.

Chief Guest Shri Pocharam Srinivas Reddy, Minister of Agriculture, Government of Telangana, India has addressed the esteemed gathering and emphasized about the Agriculture in Telangana State and role of quality seed from the view point of beneficiary i.e., farmer, as it helps in increasing the income and growth of the farmer. He stressed that the Telangana State has congenial agro-climatic conditions for seed production and excellent logistic service facilities as it is located in the focal point of the country connecting East-West and North-South, thereby Telangana State is recognized as “Seed bowl of the Country”.





He also stressed that Telangana State has stepped forward in exploring the possibilities by implementing innovative approaches to increase the export potential to make this state as “Global Seed Hub”. Further, he stressed that this workshop will help in learning the procedures for improving the quality of seed at international and thanked the ISTA seed testing experts and the organizer Dr. Keshavulu Kunusoth for conducting the workshop in Hyderabad .



Eddie Goldschagg, ISTA Bulking & Sampling TCOM Chair (South Africa) introduced himself and requested all the participants for their self introduction and their experiences in the seed industry and their expectations from the workshop.



**Day 1: December 5, 2016**  
**Technical Session**

Theme: Introduction and Sampling

Eddie Goldschagg, ISTA Bulking & Sampling TCOM Chair (SANSOR, South Africa)

Gerry Hall, ISTA Bulking & Sampling TCOM Member (SASA, United Kingdom)



The session was the curtain raiser for the technical deliberations after a colourful inaugural session. The First topic of the session was delivered by Dr. K. Keshavulu, on short overview of ISTA: Facilitating Global Seed Trade. He explained about the producing and maintenance of High Quality Seed, Global Seed Trade, World Seed Market, factors that play a key role in Growth of seed trade and seed associations like ASFA, ASTA etc. He also emphasized the role of ISTA in Seed Trade and summarized the ISTA membership Categories enlisting about 226 member laboratories, 136 Accredited

laboratories, 57 associate members, 38 personal members and 4 new industry members of the ISTA. He stressed on Accreditation programme and the ISTA Orange certificate which is considered as the VISA for International Seed Trading.



Gerry Hall, ISTA Bulking & Sampling TCOM Member (SASA, United Kingdom) delivered a lecture on “ General Principles of Sampling “ where he explained about the basic principles , purpose of sampling and responsibilities of the sampler and sampling intensity and sampling procedures followed. He explained about sources of heterogeneity and shown practically the movement of seed before and after bagging.



Eddie Goldschagg, ISTA Bulking & Sampling TCOM Chair (SANSOR, South Africa) delivered a lecture on “Introduction to Sampling Methods” where he explained the procedures of sampling and defined about the drawl of primary samples by different methods using various seed samplers and exact insertion technique i.e., 30° to the right angle during sampling. He has practically shown to obtain the submitted sample and duplicate samples.





Gerry Hall, ISTA Bulking & Sampling TCOM Member (SASA, United Kingdom) has introduced the topic on “Dividing composite samples into submitted samples. He emphasized on manual and Mechanical sample reduction methods and procedure to be followed to obtain submitted sample and procedure to operate the centrifugal divider and various sample dividers of conventional to modern era and their importance. Later a practical exercise on the “Envelope Sampling “Experiment” by the participants to know whether the true percentage of colored sample coins in all the envelope (which represents the off-type seeds in the submitted sample) is same or not. A clear definition

for sampling and its drawl is practically understood by all the participants.

Later, Eddie Goldschagg, ISTA Bulking & Sampling TCOM Chair (SANSOR, South Africa) has presented the topic on “ Control, Calibration and maintenance of sampling equipment”. He had given an overall view about the ISTA Accreditation standards for maintenance of equipments, the accuracy required for the equipment and the calibration before use and thereafter, tolerance levels and their acceptance criteria. He also gave a detailed account of the calibration and the right time for calibration He discussed about the most important part of the session i.e. evaluating results after dividing the sample. He has given the SOP for calibration of Soil riffle type for Cereals.



**Day 2: December 6, 2016**  
**Practical Session**

Theme: Practical Session on Sampling

Eddie Goldschagg, ISTA Bulking & Sampling TCOM Chair (South Africa)

Gerry Hall, ISTA Bulking & Sampling TCOM Member (United Kingdom)

The practical session on sampling was conducted at the warehouse of M/s. Kaveri Seeds which is located outskirts of the Hyderabad. Seed lots of various species packed in various types of containers (hessian bags, bulk bags and small packages) were presented for practical sampling exercises.

Participants are made into three groups of nine each for conducting the practical session on Sampling. Eddie goldschagg gave a practical training on the sampling of small packages; Gerry Hall gave an excellent practical exposure in drawing the samples with Nobbe trier; Gerarda de Boer-Raatgever and Jane Elizabeth Taylor has shown the procedure of seed sampling from hessian bags.



Eddie Goldschagg explaining the procedure of sampling from the containers of size below 15 kg





Jane Taylor explaining the procedure of sampling from bulk container of size above 100 kg



Participants hands on training during sampling practical session



Gerry Hall Monitoring while a participant is drawing sample using Nobbe trier



In the afternoon session practical on sample reduction and validation of dividing equipment were done using different seeds like paddy, sunflower, maize and soybean using the Hand halving method, Riffle and Boerner Dividers.



Eddie Goldschagg explaining the procedure of sample reduction by using different seed dividers



Demonstration of hand halving method by Eddie Goldschagg



A visit to the seed testing laboratory of M/s. Kaveri seeds is arranged where all the participants could able to see the procedures followed viz., receipt off seed sample, coding the samples, methods of germination test like, Top of paper (TP), mostly between paper (BP), few were using the Sand method. DNA testing method to know the genetic purity of the crop.



Participants, Speakers and Organizers at M/s. Kaveri Seeds Pvt. Ltd.



A visit was also made as a part of the excursion to warehouse of M/s. Nuziveedu Seeds Pvt. Ltd. and thereafter to the ISTA Accredited Lab of Nuziveedu seeds. It was a pleasure to visit their Laboratory. Where in the staff has briefed about the procedures followed to test the quality of seed followed in the Lab and that the lab test around 10000 per year. They has shown the seed herbarium and Other Seed Determination equipment.



Participants, Speakers and Organizers at M/s. Nuziveedu Seeds Pvt. Ltd.



### Day 3: December 7, 2016 Practical Session

Theme: Theory and Practical Session on Purity

Gerarda de Boer-Raatgever, ISTA Purity TCOM Chair (Netherlands)

Jane Elizabeth Taylor, former ISTA Purity TCOM Chair (United Kingdom)

Purity part of the Workshop, for both the presentations and practical excersizes, the participants travelled to Pioneer Hibred International, which is also on the outskirts of Hyderabad. Mrs. Gerarda and Jane Elizabeth Taylor took the lead to explain the topics on Purity. Gerarda de Boer-Raatgever, ISTA Purity TCOM Chair (NAK, Netherlands) has gave a warm welcome to all the particpantns and gave a briefoulook about purity.



Jane Elizabeth Taylor, former ISTA Purity TCOM Chair (retired from NIAB, United Kingdom) has given a lead presentation on “Botanical terminology for seed testing” where in she stressed about the basic aspects of different types of seeds and distinguishably features that can be identified easily. The topic mostly covered about the internal and external features of the seed. Further, the discussion on baccate and drupaceous fruits also made.

Gerarda de Boer-Raatgever, ISTA Purity TCOM Chair (NAK, Netherlands) has spoken on

“ Introduction to the principles of ISTA Purity Analysis and Other Seed Determination”. She briefed the objective of purity analysis which is to determine the per cent composition by weight of the sample being tested and to identify any other seed impurities and other non-seed particles. An excellent pictures to determine the Pure seed and exceptions to it was presented for Poaceace. She also



briefed on “Purity seed determination on solanaceae family crops like Solanum, Capsicum; Leguminaceae family crops like *Cajanus cajan*, *Vigna radiata*, *Vigna mungo*, *Glycine max*; Poaceace family crops like Sorghum, Triticum and *Zea mays*. later on Practical session on these crops was done.





Practical session on purity analysis





Gerarda de Boer-Raatgever, ISTA Purity TCOM Chair (NAK, Netherlands) has presented a topic on “Use of Equipment and Preparation of the Purity Working Sample” where in she gave a detailed account of purity analysis and general principles; equipments that are required for purity analysis; calibration samples; seed storage; Seed reference collection and the calculations on to the whole and half working samples.

Jane Elizabeth Taylor, former ISTA Purity TCOM Chair (retired from NIAB, United Kingdom) has delivered a topic on “Quality Assurance in Purity Testing Calibration and Use of Balances and Reporting of Results”. She emphasized the quality management system, ISTA Laboratory Accreditation Standards, Quality analysis and Seed testing procedure from seed lots to analysis and reporting, Tracability in Quality Assurance and in house calibration of balances.



Jane Taylor guiding the participants in purity analysis during practical session



**Day 4: December 8, 2016**  
**Practical Session**

Theme: Theory and Practical Session on Purity and Germination

Gerarda de Boer-Raatgever, ISTA Purity TCOM Chair (Netherlands)

Jane Elizabeth Taylor, former ISTA Purity TCOM Chair (United Kingdom)

Sylvie Ducournau, Germination TCOM Chair (France)



Gerarda de Boer-Raatgever, ISTA Purity TCOM Chair (Netherlands) has presented a lead topic on “ISTA Rules for other Seed De termination” where in which she has briefed about the Definition of the OSD, Complete test, Limited test, reduced test and reduced limited test, Detection of Orobanche seeds and working sample for OSD and its preparation; calculations and expression of results; retesting the OSD,

Tolerance between the OSD tests and reporting results.

Jane Elizabeth Taylor, former ISTA Purity TCOM Chair (United Kingdom) has presented a lecture on “Seed analysis, Identification tools and resources”. She emphasized on ISTA Rules for Purity Analysis – Separations for Poaceae family, Rules for damaged seed, Purity Analysis Components, Seed identification, Botany and Nomenclature of crops based on different morphological characters and gave details about Seed Reference collections.



Sylvie Ducournau, Germination TCOM Chair (France) has given an introduction on “Purpose and principles of the germination test“ with a main objective to determine the germination potential of a seed lot which in turn can be used to compare the quality of different lots and to estimate the field planting value. She briefed about the definitions, different types of germinations, conditions and methods of germination testing, Seedling classification and

evaluation of abnormal seedlings, visual / physical attributes of categories of ungerminated seed and also about the retesting.



Sylvie Ducournau also delivered the lecture on “Seedling evaluation guidelines” where in she gave a detailed account of the definitions of Normality/Abnormality and their codification. The guidelines for the evaluation of certain types of seedlings and abnormalities (e.g.. 50 % rule, loops and spirals) and the classification of the genera in categories and groups as per the elements in the ISTA Hand Book for seed testing.

An official Workshop Dinner was arranged by the oragnizer as the part of the schedule for the Foreign Delegates and the Participants were graced with the presence of Shri Chitla Partha Sarathi, IAS APC & Secretary, Department of Agriculture & Co-operation, Government of Telangana.



Shri C. Partha Sarathi, APC & Secretary, Department of Agriculture & Co-operation, Government of Telangana welcomed the ISTA delegates and all the participants from different countries and addressed the esteemed gathering in the official dinner on the fourth day of the ISTA Workshop which was held at Hotel Plaza, Begumpet, Hyderabad. He said that seed is the vital input in the agriculture and quality seed alone will boost the crop yields 10-15 % and with other inputs the production and productivity could be increased by 40%. He also stressed about the congenial climatic conditions for seed production in Telangana state which made it to become a “Seed hub of country”. Though skilled man power is available, availability of the quality seed to the farming community still a problem. He mentioned that Telangana State is has taken an initiative steps like establishment of ISTA accredited Laboratory and TSSOCA became a Designated Authority for OECD Seed

Certification for Four States which gives an ample scope for production and export of quality seed. He also said that this workshop would be very helpful to follow the exact the procedures to obtain the quality seed that meets International Standards. He advised the participants to make use of this opportunity in updating the knowledge with regard to seed testing procedures and help to strengthen there countries seed quality system.



He congratulated the organizer and supporting staff for successfully conducting the workshop and presented the mementos to the ISTA Delegates and the supporting staff for assisting in organizing the ISTA Workshop.



## Day 5: December 9, 2016

Theme: Theory and Practical Session on Germination

Sylvie Ducournau, Germination TCOM Chair (France)

Sylvie Ducournau, Germination TCOM Chair (France) has presented a lead topic on “Quality Assurance in Germination testing”. She emphasized majorly on the Control of equipment that includes counting equipment, germinator and spots to record the temperature profile in the room; control of supplies i.e., about growing media and water quality (Water Retention, pH Value, conductivity; control of germination test results (monitoring) .

Later on Mrs. Sylvie Ducournau has guided all the participants to perform the germination experiment on various crops that include *Oryza sativa*, *Zea mays*, *Sorghum*, *Triticum*, *Helianthus*, *Solanum*, *Capsicum*, *Gossypium*, *Vigna radiata*, *Vigna mungo*, *Cajanus cajan*, and *Cicer*.



Sylvie Ducournau guiding the participants in seedling evaluation during practical session





Participants evaluating different crop seedlings during germination practical session



*Felicitation*



*Felicitation to Eddie Goldschagg*



*Felicitation to Gerry Hall*



*Felicitation to Gerarda de Boer - Raatgever*



*Felicitation to Jane Elizabeth Taylor*



*Felicitation to Sylvie Ducournau*



*Felicitation to Shri Pocharam Srinivas Reddy  
Hon'ble Minister for Agriculture and Allied  
sectors Telangana State*







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