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Federal Ministry  
of Food  
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German Bundestag



# Indo-German Cooperation on Seed Sector Development

Report of Study Visit On  
EU Seed Certification systems  
(November 13-19, 2017)



Prepared by the consortium of



in collaboration with



सत्यमेव जयते



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This study visit report was elaborated by the consortium of Sortenfoerderungsgesellschaft mbH (SFG), ADT Project Consulting GmbH (ADT) and the German Plant Breeders' Association (BDP) which is in charge of the implementation of the project on the German side and the Telangana State Seed & Organic Certification Authority. The following key persons elaborated the study report:

- Dr. Keshavulu Kunusoth (Director of the Telangana State Seed & Organic Certification Authority);
- Ekkehard Schroeder (German Project Team Leader of the Indo-German project);
- Dr. Sowmini Sunkara (National Coordinator of the Indo-German project).
- Pradeep Korishettar (Seed Certification Officer, Telangana State Seed & Organic Certification Authority)

The list of location visited and main persons contacted during the study visit in Germany and The Netherlands is given in the annex at the end of this report.

#### **PUBLISHED BY**

the project "Indo-German Cooperation on Seed Sector Development" supported with funds from the German Federal Ministry of Food and Agriculture (BMEL)

#### **AS OF**

July 2018

#### **LAYOUT**

Consortium of SFG mbH/ ADT Project Consulting GmbH/ BDP e.V.

#### **TEXT**

Consortium of SFG mbH/ ADT Project Consulting GmbH/ BDP e.V.  
Kaufmannstr. 71-73, 53115 Bonn, Germany  
Phone: +49 228 98581-10, +49 228 91447-33  
E-Mail: ekkehard.schroeder@adt.de; sowmini-sunkara-adt@outlook.com

#### **PHOTOS**

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## ABBREVIATION

|                      |   |
|----------------------|---|
| <b>ADT</b>           | ADT Project Consulting GmbH, Germany                              |
| <b>AOSA</b>          | Association of Seed Analysts                                      |
| <b>BDP</b>           | German Plant Breeders' Association                                |
| <b>BMEL</b>          | German Ministry of Food and Agriculture                           |
| <b>BSA</b>           | Bundessortenamt (German Federal Plant Variety Office)             |
| <b>CAGR</b>          | Compound Annual Growth Rate                                       |
| <b>CC</b>            | Convention Country  |
| <b>CPVO</b>          | Community Plant Variety Office (PVP Agency of the European Union) |
| <b>DUS-Test</b>      | Distinctness, Uniformity and Stability Test                       |
| <b>EU</b>            | European Union  |
| <b>IMSCS</b>         | Indian Minimum Seed Certification Standard                        |
| <b>IPPC</b>          | International Plant Protection Convention                         |
| <b>ISTA</b>          | International Seed Testing Association                            |
| <b>LTZ</b>           | Landwirtschaftliches Technologie Zentrum Augustenberg, Germany    |
| <b>MoU</b>           | Memorandum of Understanding                                       |
| <b>NAK</b>           | Naktuinbouw, Netherlands  |
| <b>NSC</b>           | National Seed Cooperation   |
| <b>OECD</b>          | Organization for Economic Co-operation and Development            |
| <b>SSCA</b>          | State Seed Certification Authority                                |
| <b>STL</b>           | Seed Testing Laboratory   |
| <b>SWOT Analysis</b> | Strengths Weaknesses Opportunities and Threats Analysis           |
| <b>TLS</b>           | Truthfully Labelled Seed  |
| <b>TSSOCA</b>        | Telangana State Seeds & Organic Certification Authority           |
| <b>VCU-Test</b>      | Value for Cultivation and Use Test                                |
| <b>WTO</b>           | World Trade Organization  |

## **Executive Summary**

The current two-year intensification phase (2017-2018) of the project “Indo-German Cooperation on Seed Sector Development” builds on the expert dialogue that has been conducted on topics such as plant variety protection, DUS and VCU testing, management of plant genetic resource at the national level since July 2013. Within the new phase also selected pilot measures will be implemented in the southern Indian state of Telangana.

A Memorandum of Understanding (MoU) was signed during November 2016 between the Federal Ministry of Food and Agriculture (BMEL) Germany and the Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Co-operation and Farmers Welfare (DAC&FW), New Delhi, India.

The overall objective of the project is to support the Indian seed industry in providing Indian farmers with high-quality seeds, strengthening its competitive position, and improving conditions for international cooperation and seed trade.

Government of India has identified Telangana State as a partner at regional level and the project intends to plan supplementary activities to support the ‘Seed bowl’ initiative in the State of Telangana. The intensification phase with activities on national and regional level of the project is being implemented successfully in Telangana State since January, 2017. The project has given the required impetus to the existing schemes/ initiatives of the Govt. of Telangana and is also supporting new initiatives for overall development of seed sector in the State.

As a part of bilateral cooperation project, a study visit was organized to Germany and The Netherlands in November 2017 with the main objectives to study the EU seed certification systems in Germany and The Netherlands in general and to collect information on existing international rules, procedures, standards and benchmarks in seed quality regulation and international trade.

The programme included the visits of the globally renowned research institutes, seed organizations and laboratories like the Centre for Agriculture Technology (LTZ) at Augustenberg, the seed cooperation ZG Maiswerk Raiffeisen at Heitersheim, the plant breeding company Dow Agro Sciences GmbH – Seeds at Rastatt, the Institute of Seed Science and Technology of the University of Stuttgart-Hohenheim, the agricultural fair AGRITECHNICA 2017 at Hanover as well as the Dutch Seed Inspection Service Naktuinbouw (NAK) at Emmeloord, The Netherlands.

The visit also included interactions with eminent seed experts & policy makers like Mr. Hansjoerg Mayer and Dr. Andrea Jonitz at LTZ, Karlsruhe, Germany, Mr. Ekkehard Hipp of

ZG Maiswerk Raiffeisen, Heitersheim, Dr. Ingrid Grane, of Dow Agro Sciences, Prof. Michael Kruse, Institute of Seed Science and Technology of University of Stuttgart-Hohenheim and Mr. Ad Toussaint of NAK, Netherlands.

The visit intended to identify the gaps existing in Indian seed industry with respect to seed legislation/regulations and international seed trade. The exposures and experiences extracted out of the visit are presented in the form of recommendations, which would help to set up an ideal seed system in the country with internationally harmonized procedures, standards and benchmarks for seed quality regulation and also improves the access to quality seed for the farming community besides accelerating seed exports from the country.

## 1 Introduction

Seed certification is a process designed to ensure the continuous supply of high quality seeds and propagating materials of notified kinds and varieties, with the appropriate quality standards. It is a legally sanctioned system for control of seed quality during multiplication and production.

The concept of seed certification was coming out of the increased concern for the rapid loss of identity of varieties during production cycles. It began with the visits of agronomists and plant breeders to the fields of progressive farmers who took the seeds of new varieties primarily to train them on seed production. Accordingly, the process of field inspection was initiated and later on found to be very helpful in keeping varieties pure in the production chain.

In India, the field evaluation of the seed crop and its certification started with the establishment of National Seeds Corporation in 1963. The legal status was given to seed certification with the enactment of Indian Seeds Act in 1966 and formulation of Seed Rules in 1968. The Seeds Act of 1966 provided the required impetus for the establishment of official State Seed Certification Agencies. Subsequently, the Indian Minimum Seed Certification Standards and Seed Certification Manuals were prepared in 1972. At present, 25 State Seed Certification Agencies with more than 140 notified laboratories are functioning with the purpose of assuring and regulation of seed quality in the country.

As a result, seed certification has been recognized as an integral part of seed quality control in India with a purpose to maintain and make available high quality seeds and planting material of notified kind and varieties to farmers. However, the seed certification was made as voluntary and labelling as mandatory so as to encourage the seed companies to produce adequate quantity of quality seeds. Indian seed industry has come a long way since its inception, the developments particularly in the last 50 years are very significant. India being the 5<sup>th</sup> largest seed industry in the global seed market, involved in seed production of a wide range of crop species under varied agro-climatic ranging from temperate to tropical conditions. During the past 5 years the Indian seed industry has been growing at a CAGR of 12%, which is very high compared to global growth of 6-7%. However, India's share in international seed trade is less than 2% as the export of seeds in case of vegetable and field crops is very negligible both in terms of quantity and value.

The seed quality assurance in India comes under the ambit of the Seeds Act 1966 and other related legislations, wherein it is mandatory that seed must satisfy the requirements of Indian Minimum Seed Certification Standards (IMSCS). But under global scenario seed quality assurance system for seed export comes under the ambit of Organization for Economic Cooperation and Development (OECD) seed certification standards and International Seed Testing Association (ISTA) methodology of seed testing. EU Member States such as Germany and The Netherlands have to take into account the regulation of the European seed sector (relevant EU directives).

Critical analysis of both, Indian and global seed certification system suggests that there are some discrepancies and need to harmonize existing quality assurance system of India with OECD/EU and ISTA standards for providing a better place for Indian seed in international seed market and to facilitate international seed trade.

In the view of the above, an exposure visit was made under the frame of Indo- German Cooperation project on Seed Sector Development to Germany and The Netherlands to study the EU seed certification systems. The information and experiences received of the visit is briefly presented in this report, which would help to revise & update the seed certification, policies and regulations in India in harmonization with international rules.

Dr. K. Keshavulu, Director, Telangana State Seed & Organic Certification Authority (TSSOCA) was nominated on behalf of Government of Telangana to visit Germany & Netherlands to make a detailed study on the EU Seed Certification system and to identify the differences existing between Indian and EU certification system along with Dr. Sowmini Sunkara, National Project Coordinator and Mr. Ekkehard Schroeder, Team Leader of the Indo-German Seed Sector Development project.

The tour includes the visit of state-of-the-art facilities of globally renowned research centers, seed organizations and laboratories and also interaction with different stakeholders in the seed value chain of Germany and Netherlands which could help in harmonization of Indian seed certification procedures with international rules.

## 2 Overview: Seed Certification in Germany

In the Federal Republic of Germany, the responsibility of seed certification is given to the single Federal States according to the German legislation including Seed Act. Each of the 16 Federal States has its own Seed Certification Agency. Some work together so only 12 are active. These 12 Federal State certification agencies are responsible for seed certification which are variably structured and they either belong to Chambers of Agriculture or agriculture authorities or other state institutions. All certification agencies follow German Seed Act which is based on EU-Directives (e.g. 66/402/EWG – cereals, 2002/56/EG – seed potatoes, 2002/57EG – oil and fibre plants, 2008/90/EG – fruit species) which consist of detailed procedures regulated in Seed Ordinance or Seed potato Ordinance resp. and also on international context: OECD Seed Schemes.



**Figure 1: Distribution of Seed Certification Agencies in Germany**

### 3 Market Control on Seeds in Germany

In order to ensure that both the requirements as to the quality of the seed and the provisions for ensuring its identity are complied with during marketing, the EU Member States must make provision for appropriate market control arrangements. In Germany, control authorities of the single Federal States are also responsible for market controls which include

- samples drawn from lots during marketing (identity, purity, germination, labelling);
- samples drawn from imported seeds;
- samples provided by farmers (discontent with quality of seed or questioning identity of variety);
- book-keeping of seed companies.

### 4 Centre for Agriculture Technology Augustenberg (LTZ)

The Centre for Agriculture Technology Augustenberg (LTZ) is the seed certification agency in Baden-Wuerttemberg. Baden-Wuerttemberg is a State in southwest of Germany which has the border with France and Switzerland. It is Germany's third-largest state, with an area of 35,751 km<sup>2</sup> and about 10.8 million inhabitants. The state capital and largest city is Stuttgart.



The team visited the LTZ with an aim to understand the Seed Certification System, procedures, and standards (incl. OECD seed certification) and also Seed quality testing system. The origins of LTZ date back to 1859 and seed testing in 1872 with 11 Central proving grounds, 4 proving on organic farming two agronomic field trials and experimental station and teaching and experimental orchard farm. Today the LTZ is an institution of the Ministry of Rural Affairs and Consumer Protection of Baden-Württemberg.

The main objectives of LTZ are:

- protecting safety of human nutrition and animal feed;
- protection of natural resources; and
- economic efficiency in plant production and effective use of resources.

It performs the activities like Agriculture production and protection, Plant protection/ health, Protein initiatives: Soybean, Organic farming, Protection of bees/ insects, Quarantine causative organisms/ invasive pests, Biological protection, Examination and analysis, Official control of animal feed, Monitoring of GMOs and grain inspection stations, **Seed Certification and Seed testing**.

The key activities of the centre are plant production and production related activities, protection of the environment and research activities in the areas like protein initiative, organic farming, conservative tillage, precision farming, water protection, certification of seeds, climate change Laceration strategies, renewable resources and agro-biodiversity (flowering areas and processing).

**Figure 2: Presentation at LTZ**

A presentation on Seed Certification in Baden-Wuerttemberg was done by Mr. Hansjoerg Mayer-Ullmann, Head of Seed Certification. Wherein, he briefed about the centre and provided an overview of the EU seed certification system in general and Germany in particular. The seed certification is mandatory in EU Member States. All 28 EU Member States are following the EU directives. The German seed certification regulations and other seed regulations are based on EU-Directives.



The registration of new varieties is compulsory and is in the form of publication in each country and also maintained at the Community Plant Variety Office (CPVO). DUS and VCU testing at public variety office such as BSA in Germany are mandatory for any new variety listening that is intended to be in seed production and commercial marketing. If a seed company of a non-EU Country intends to produce and market seed in EU Countries, it has firstly to apply for DUS and VCU testing in any one of the EU Countries (for testing performance) and then can get permitted to market in all EU Countries.

**Figure 3: Interaction with Senior Experts at LTZ Augustenberg, Germany**

In Germany procedures of seed certification is comprised of different steps such as:

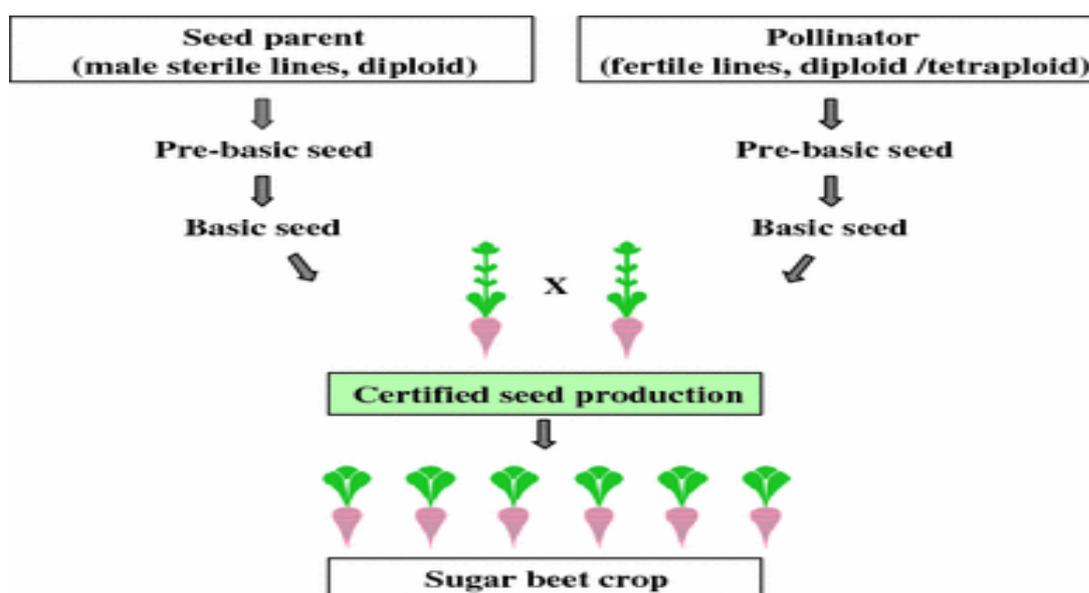
1. Application for seed multiplication- verification of data;
2. Field inspection (for maize minimum 3 times);
3. Seed Sampling;
4. Laboratory analysis;
5. Certification – final;
6. Trading/ commence and delivery of the certified seeds to the farmers.

The LTZ is receiving annually about 5 000 electronic applications for seed multiplication. The applications are checked and managed by 3 persons of LTZ. The fully completed application should arrive at LTZ minimum 2 months before the first field inspection has to take place.

The seed multiplication is almost same as Indian system after the breeder seed material namely pre basic, basic and certified seed. The breeders/ organizing companies and farmers execute contracting agreements between each other which includes all details from planting to until supply outlets. However, unlike in seed systems the pre-basic, basic and certified seed production is usually under the control/ supervision by the state seed certification agencies in Germany.

Pre-basic and basic seed production plots certified by authorized certification officials/ inspectors after field inspections whereas certified seed production plots are certified by trained private seed inspectors which are contracted and supervised by the LTZ as well. In addition to private/ contract certification officials, 5% of certified seed samples are randomly checked for quality of certification by government authorized field inspectors which is mandatory as per the EU law. In addition, 5% post control is taken up for certified seed randomly every year.

**Figure 4: Stages of Seed Production in Germany**



On average field inspection is done in an approximate area of 600 ha per seed inspector per season. The contracted private field inspectors are covering usually up to 200 ha per season with regard to maize to ensure that they can cover the area under the part-time job.

However, in India the extent of area to be covered by each seed certification officer is considerably more and varies with the States.

In Germany, the observations and results of each field inspection will immediately enter into the database of LTZ. In addition, a detailed discussion on protocols/ procedure followed for corn hybrid seed production in Germany. It is learnt that, minimum three times field inspections are carried out during de-tasseling and there would be minimum of five field inspections during the seed crop growing period on maize. The clearing and grading is done in seed processing plants that are certified with ISO certification. Further, there was a discussion on seed processing and sampling procedures. The sampling is being done as per procedures of ISTA rules, samplers are well trained either official 'or' private. If private samplers are involved, at least 5% sampling is done by official samplers randomly to cross check the efficiency and accuracy of private samplers.

In addition, bigger seed companies and seed processors mostly use automatic seed sampling method after which samples go to seed testing laboratory and then certified by certification authorities as per the procedures laid down as per the German seed law/ EU seed directives. Dr. Andrea Jonitz, head of seed testing station at LTZ also made a detailed presentation on seed sampling and testing procedures to assess the planting quality of seed lots produced. This is being done as per the ISTA rules.

Afterwards, the Seed Testing laboratory of LTZ in Augustenberg, one of the pioneer and oldest seed testing laboratory with ISTA accreditation which was founded by Prof. Friedrich Nobbein 1872. The seed system in Germany is divided into different wings namely breeding, multiplication, certification, seed trade and quality control department especially genetic purity and seed quality shall be monitored in all generations.

The German seed systems is based on the German seed law of 1953 and mainly concentrates on the law for consumer protection in Germany. The variety development is done by private plant breeders, the variety registration by Federal Plant Variety Office (Bundessortenamt). Seed production is done by farmers and seed quality testing is done in the official seed testing station of each federal state as per the international rules of ISTA.

The State of Baden-Wuerttemberg is a major maize seed production area having about 13000 ha that includes the major crops such as maize on 4000 ha, cereals 7300 ha and leguminous about 800 ha.

Further, the Seed Testing laboratory of LTZ is also participates in applied seed science research with the research areas like actual problems in seed trade, method development, enhancement of testing quality and efficiency, participation in scientific technological progress and consultation of policy, administration, courts and seed economy.

For the post-control of pre-basic and basic seed the LTZ covers 11 locations for field trials. The seed can be traded finally only if the post-control was successful.

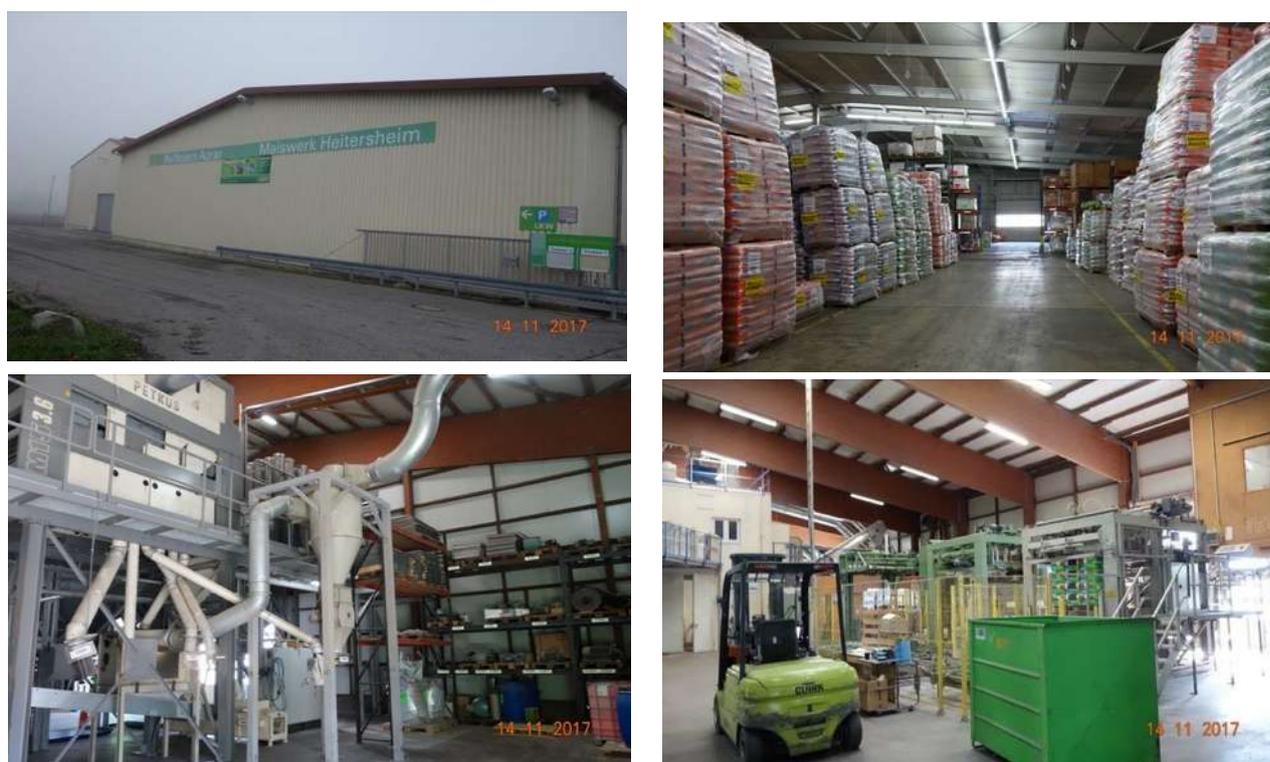
## 5 Visit of ZG Maiswerk Raiffeisen in Heitersheim

The Maiswerk Raiffeisen in Heitersheim is a farmer owned local cooperative with 3,200 members in the region Baden which organizes seed production activity and post-harvest management with local farmers active in seed multiplication on the basis of contracts with plant breeding companies. The cooperative is mainly dealing with the seeds of maize, oil rape seed and rye at Heitersheim.

The service is including the planning of seed growing and coordination with farmers and plant breeding companies, the advisory support during the seed growing period, the quality checks, the organization of harvest with machinery, the drying, cleaning and other post-harvest activities.



**Figure 5: Processing Facilities at the ZG Maiswerk Raiffeisen in Heitersheim**



The high demands on quality and maturity for maize seed confines seed propagation in Germany only in the climatically favoured growing areas on the upper Rhine river valley region. In the beginning of the 20<sup>th</sup> century, maize was bred and propagated in Baden. At that time only OPV's (free flowering land varieties) were cultivated in the Germany.

In 1950s and 60's, the land races were increasingly replaced by the high yielding hybrids. In the year 1958, it began with production of hybrid maize initially only in 20 ha which got extended to 37 ha in 1959 at ZG Raiffeisen. In 1962, the first maize plant was built in Bad Krozingers. This plant was steadily expanded and the area is now more than 2500 ha. The area of propagation essentially extends from South to North.

ZG Maiswerk Raiffeisen in Heitersheim also provides various services to all its seed growers like fertilizers, pesticides, breeder seeds for multiplication (input) and enter into buy back contracts/ agreements with them on charge basis (service fees/1 Ton seeds). It also gives field wise alerts to all the seed growers so that the farmers can plan well in advance when to harvest and when to get their harvested produce to ZG Maiswerk, which dryer should be used.

## 6 Visit of Company Dow Agro Sciences GmbH – Seeds

The Division of Dow Agro Sciences in Rastatt in Germany is involved in plant breeding and seed production activities. The Division was established in Europe in 2008 with 6 breeding facilities in Europe and 2 testing platforms in Russia. Dow Seeds is the fastest growing business in the seed market with more than 450 testing locations in 17 countries and its 1/3of the turnover is invested in research and development (R&D).

Dow Agro Sciences has established six breeding and testing sites in Europe namely Greven & Lichtenau at Germany, Château Renault at France, Carcarès at France, Szeged at Hungary and Belgorod at Russia. Similarly, they have their sales sites at Paris (France), Budapest (Hungary), Bucharest (Romania), Kiev (Ukraine) and Moscow (Russia). The centre at Rastatt is the European Headquarters which coordinates all European seed activities. The main function carried out at this centre is pre-commercial production maize seed processing and logistic arrangements for European with annual processing capacity of 500 tons out of 850 tons capacity with 45 staff working since long time. The centre not only produces parental lines, hybrid testing production, breeding but also has sale point.

The Dow Seeds maize breeding program foundation was developed through the merger of three established regional European breeding programs in 2008. With the experience and cumulated genetic pool of companies such as Cargill, Mycogen, MTI and SWS Dow Seeds can now offer the most unique genetics that result in cutting-edge hybrids.

The Dow Seeds Europe Sunflower program was established in 2008, starting with competitive germplasm leveraged from the breeding programs in America and Argentina, where Dow Agro Sciences holds leading the market positions. Dow Seeds is the leading supplier of high-oleic, low-linoleic spring oilseed rape in Europe. Their spring oilseed rape hybrids offer the best in class low linoleic fatty acid profile. To ensure the highest possible yields for the costumers, Dow Seeds have focused their breeding efforts on developing varieties perfectly adapted to specific conditions and environments.

## 7 Visit of the University of Stuttgart-Hohenheim

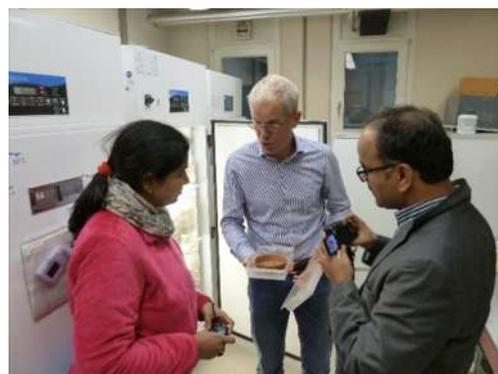
The University of Stuttgart-Hohenheim, Germany was founded in the year 1818 and has one of the largest Faculty of Agricultural Sciences in Germany. The total number of students is about 10 000 who are currently pursuing their degrees in various disciplines. About 25% are students of Agricultural Sciences.

The agricultural faculty of the university comprises of 13 departments in plant sciences. The division of plant breeding, seed science and population genetics has four faculty professors. The working groups consist of Ph.D. students and the faculty should spend 50% time on research and rest 50% on teaching.

Later, we visited the seed testing laboratory facilities of the Institute of Seed Sciences and Technology with Prof. Michael Kruse, Director of the Institute.

The seed testing laboratory at the University was founded in 1878 in the institute of Botany. This lab is working as per ISTA rules and developing ISTA standards on sampling and seed testing methods with main focus on method of development on sampling. In addition, the seed laboratory focuses on research on seed pelleting, seed coating, seed vigour, cold test and image analysis.

**Figure 6: Division of Seed Science and Technology, University of Stuttgart-Hohenheim**



## 8 Visit of Agriculture fair AGRITECHNICA 2017 in Hanover

AGRITECHNICA is the world's leading trade fair for agricultural technology, the leading companies in the industry present their innovations and innovations. It is the showcase of the global agricultural engineering industry and a forum for the future of plant production.

At AGRITECHNICA 2017, around 2800 exhibitors from 52 countries presented their machinery and technology for professional crop production there were 458 000 visitors from 128 countries attended the show during seven days out of which 110 000 were international visitors.

A brief meeting with representatives from German Federal Ministry of Food and Agriculture was held to discuss project activities of the ongoing project phase.

**Figure 7: Pictures of AGRITECHNICA 2017 in Hanover, Germany**

Display of large machinery useful for general agricultural purpose along with specific seed production and post-harvest technologies available were visited during the fair.

## 9 Visit of Naktuinbouw in Emmeloord, Netherlands

Naktuinbouw (NAK) in Emmeloord is the Dutch General Inspection Service for Agricultural Seeds and Seed Potatoes. NAK services include testing of seed potatoes and seed from cereals and grasses from all over the world. NAK services in Emmeloord is a subsidiary of NAK (The Dutch General Inspection Service). NAK services is a reliable, independent research institute for the agricultural sector that commissions its activities to NAK. All tests are carried out by the NAK laboratory.



NAK Services is partner of an organization which runs quality systems based on the EN ISO/IEC 17020:2012 (scope I124) and the EN ISO/IEC 17025:2005 (scope L490) norm. The seed laboratory is certified by the International Seed Testing Association (ISTA) standards. NAK offers the services like fields trial, training and courses on field and lot inspection, seeds, seed potatoes and laboratory methods, laboratory tests, seed health tests for potatoes (seed) on viruses, nematodes and bacteria, cereals and grasses on germination, purity, moisture and health.

Mr. Ad Toussaint of NAK office explained in detail about seed policy and inspection system in The Netherlands. NAK is functioning since 75 years in the field of seed certification and which has Legal basis in Seeds Act and is supervised by the Ministry and is self-financed through the certification fees and the office in Emmeloord mainly concentrates on agricultural seeds and seed potatoes. Another unit of NAK at different location is focused on horticulture.

NAK has a Governing Board and technical committee that includes experts, farmers' seed merchants, seed growers and breeders etc. The NAK Board has an independent president, 8 representatives of breeders, growers, users and merchants. The board is responsible for

general policy, financial matters and personnel. The Technical Committees lead by the independent president, four members such as breeders, growers, users and merchants. The committee is responsible for inspection rules and standards. The NAK has 213 permanent staff, 89 field inspectors with annual budget is 20 million Euros. In addition, it is also having an ISTA accredited seed testing station.

**Figure 8: ISTA Accredited lab at NAK in Emmeloord, The Netherlands**



NAK seed testing station is supervised by the Ministry which takes care of the president of the boards, approval of the inspection regulations, approval of fees, continuity of the NAK services and financial support by the Ministry. NAK has accreditation according to ISO/IEC 17020 on the following areas: Field inspection of seed potatoes, lot inspection seed potatoes, phytosanitary inspection for plant, phytosanitary export inspection, sampling for phytosanitary export, sampling for ring testing of ring root and potato cyst. i.e. nematode testing

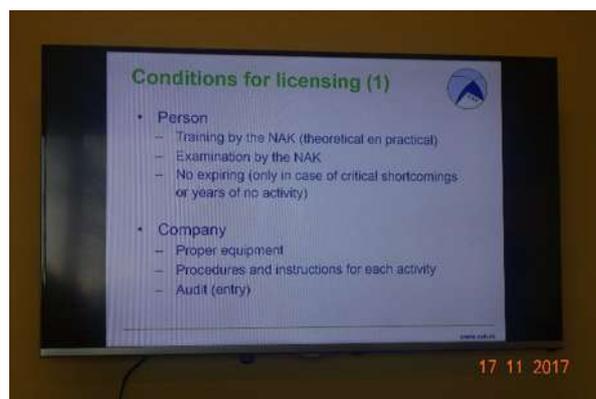
- The lab is accredited by ISTA for lab tests and manual sampling and since inspection of all diseases and certification of seed for marketing is obligatory in the EU, the official task is delegated to NAK by ministry of economics.
- Inspection and certification of agricultural crops: cereals (including Maize), grasses, pulses, false, rape, poppy causeway, mustard, clover sugar beet, potato, hemp with total area of seed production is 61 776 ha in Netherlands.

Figure 9: Pictures of Meeting at Naktuinbouw in Emmeloord



## The Netherlands National Seed Regulations

NAK, the Dutch General Inspection Service for Agricultural Seed and Seed Potatoes, has been appointed by the Minister of Economic Affairs, Agriculture and Innovation to perform the official seed inspection and seed certification in The Netherlands. NAK also carries out phytosanitary



inspections and issues the plant passport as well as phytosanitary certificates.

NAK is also responsible for drafting the inspection and certification regulations. These regulations are published in the 'Keuringsreglement' and 'Aanwijzingen' which can be found on the website of NAK (under 'Publikaties') [www.nak.nl](http://www.nak.nl).

Naktuinbouw (Netherlands Inspection Service for Horticulture) promotes and monitors the quality of produce, processes and chains in horticulture. The main focus is on propagating material, of national and international origin. Naktuinbouw is an Autonomous Public Authority regulated by the Ministry of Economic Affairs. In the obligatory inspection system Naktuinbouw applies the prescribed European directives and legislation for propagation material for floricultural, arboricultural and vegetable crops ([www.naktuinbouw.nl](http://www.naktuinbouw.nl).) Naktuinbouw is the only organisation in the Netherlands authorised to assess varieties of floricultural, arboriculture and vegetable crops for distinctness, uniformity and stability (DUS).

The Netherlands has own seed law regulations as National Seed Act. The Act envisages certain quality aspects norms that are stricter than EU directives.

- Some EU directives have specific focus on fodder plants, cereals, oil and fibre plants, seed potatoes and beet root;

- Netherlands also follow OECD rules for OECD Seed Schemes and Ad Toussaint had given a detailed description of all the OECD rules.

**International rules seed crops:** After a new variety passed successfully the DUS and VCU testing and can enter into the seed chain the seed multiplication, processing, testing and marketing are being followed as per the provisions of EU directives, OECD rules, ISTA/AOSA methods for seed sampling and seed testing are being used. Further, phytosanitary control is based on WTO regulations and IPPC.

**EU Directives:** EU rules for marketing seeds describes that:

1. Listing of varieties is based on DUS and VCU testing and inspection and certification of field plot is mandatory.
2. Inspection and certification is obligatory for regulated species namely farm saved seed and not regulated species. Therefore, seed for all purposes is regulated and varieties must be listed EU Directives.
3. Describes about content, definitions, species and categories measures (official), standard field inspection, standards sealing and labelling, information on the label and also equivalence third countries.
4. EU Directives: This describes licensing (authorization) field inspection, sampling laboratory analysis, derogations, lot size, sample size, small packages and derogation general.
5. EU Directives: describes about directive on the common catalogue varieties namely National listing EU listing, DUS & VCU, VCU & DUS is not needed for grasses non-fodder purposes.
6. EU Directive: Plant health directives: quantize organism maintenance control and multiplication is carried out on breeder seed and subsequently maintained throughout generations' controls.

## Seed Certification System

1. **Pre-control:** The pre-control is carried out on breeder seed that will be source for the next generation. The pre-control test is mandatory for breeder seed, carried out either one year ahead 'or' simultaneous with the actual of the breeder seed in to pre-basic seed.
2. **Application:** The application for field inspection of pre-basic and basic seed is carried out by the breeder of the variety all other (foreign) varieties of these generations can only be inspected at a request of national maintained 'or' representative for such variety. The certified seed is declared by the grower of the crop.
3. **Field Inspection:** Before entering the field, the inspector must check the identification tag and compare the information with the data on his field inspection form. The aspects of identity, varietal purity, and seed borne diseases, contamination with other

species, noxious weeds and isolation, distances are examined, rouging is done on all above aspects.

4. **Harvesting:** Harvesting is done on appropriate time. Then transport and storage of each seed container must be identified with a grey label. Grey labels have been developed for seed.
5. **Sampling and lot inspection:** Sampling must be carried out according to the ISTA rules. The way seed should be sampled depends on the manner in which the seed lot is packed and stored. Lot inspection is two -fold. In the first place the lot should be inspected on homogeneity lots can be sampled accurately and properly.
6. **Sample Analysis:** The aim of sample analysis is to check the quality of the seed lot and subsequently use the results of analysis to determine whether lot meets the norms. The analysis must be carried out on Technical purity, Germination, moisture content, seed health and test weights as per the ISTA rules.
7. **Certification:** After a seed lot has been found to meet the norms it can be certified or labelled to each container a label is attached which can either be adhesive 'or' non-adhesive. Pre-basic seed: white with diagonal violet stripe basic seed, white, CSI Blue, CSI & II, Red & Seed mixture green.
8. **Post Control:** Post control is the final step in the inspection and certification of seed lots. In general, each pre-basic and basic seed lot is post controlled, in this case post control used as a check on identity and varietal purity. The post control of the category of certified seed is a 10% random check on the inspection system. Later, visited seed testing laboratory in NAK.

## 10 Conclusions and Recommendations

Indian seed sector is progressing in terms of volume, value and technologies. Owing to the congenial agro climatic conditions, diversity of crop species and rich genetic resources lead to development of promising crop varieties and hybrid varieties. Both the public and private sectors are engaged in seed production with the well established infrastructure and R & D to meet the seed demand in the country. However, there are several issues in quality seed supply and low share of global seed exports viz., outdated seed legislation, lack of uniformity and harmonization in seed certification procedures, age old methods of seed quality testing, lack of coordination of seed activities and proper capacity building trainings to the officials. Thus, there is a scope for the Indian seed industry to improve the seed sector to supply quality seed to meet the domestic demand as well as for International seed market. Since, the quality seed production can be realized by harmonising the suitable seed policies on par with the internationally accepted rules in the Indian seed certification and testing system as described below:

1. **Revision and updation of Seed Legislation:** India has brought several seed policy guidelines and legal framework to have organised seed industry and promote investment in the seed sector. However, few differences exists between the Indian and EU/Germany seed certification system, seed certification procedures and seed standards. In India, the existing seed legislation, seed certification procedures and standards were framed and brought in to effect during 1960s. Thereafter, several technological innovations have taken place in Indian agriculture. Presently the global seed industry has been advanced in terms of volume, value, number of players and technologies. Hence, there is a need to revise and update the existing seed legislation, seed certification standards and procedures by harmonizing with the international rules.
2. **Regulation of Labelled Seed Production:** Seed certification in India is voluntary and seeds can be sold in the market either certified or labelled (Truthful labelling). However, in EU including Germany, the certification and varietal registration is compulsory. Therefore, need to relook Indian seed certification system and to have some kind of monitoring/ regulation/registration system for labelled seed production in the country for better traceability and effective seed quality regulation.
3. **Varietal Development and Seed Production Activities:** In EU countries, the varietal development, maintenance breeding, testing and release activities, seed multiplication, quality control etc., are well coordinated to ensure quality seed supply. Therefore, proper division and coordination of all those activities are important for quality seed production.
4. **Participation in Technical Groups of UPOV:** India can approach Convention Country (CC) partners to support and streamline the management of plant germplasm in the Gene Banks, using modern biotechnological tools. Though, India has an observer status only in the UPOV, Germany and other European partners such as the CPVO may support participation of Indian scientists in various Working Groups of UPOV.
5. **Harmonisation of Indian and OECD Seed Certification:** There are some discrepancies between Indian and EU seed directives for certification. Thus there is a need to harmonize existing quality assurance system in India.
6. **Revision of seed certification and testing manuals:** There is need to revise and update the seed certification manual, seed testing manual and field inspector hand books.

7. **Modern tools in field inspections and labelling security:** Adoption of barcode system for labelling security, geo-tagging system in field inspections is need of the hour.
8. **Certification procedures:** Adoption & Implementation of uniform certification procedures across the country. Formulation of yardsticks for allotment of certification works for seed certification officers/inspectors viz. field inspection and seed sampling and also evolving an contract system for only field inspection purpose during peak season as similar to EU system is utmost important to enhance the efficacy of the seed certification system in the country and to realise quality work.
9. **Infrastructure for Seed Testing Laboratories & ISTA accreditation:** The adequate infrastructure facilities with modern tools have to be provide at least one seed testing laboratory in every State and need to have more ISTA accredited laboratories with independent/autonomous functioning like in EU to facilitate the seed exports. Specific educational qualifications and training requirements have to be prescribed for seed analysts with regular competency assessing system.
10. **Department of Agriculture:** State Department of Agriculture/SSCA/ SAUs may identify one STL in each state to specialize in the genetic purity testing using electrophoresis and DNA marker technologies, besides performing the routine testing. The laboratories so identified should have trained seed analysts/testing staff with seed technology background and adequate infrastructure
11. **Authorisation for Seed Processing:** There should be a check/supervision over seed processing operations with irrespective of seed categories to ensure genuine seed. A system of authorisation of processing plants by regular inspection of processing machineries/equipment has to be adopted to ensure the proper cleaning, grading and treatment of seeds.
12. **Capacity building activities:** Regular and refresher trainings have to be conducted to the seed certification officers, seed analysts and seed industry personals as similar to EU countries. Formulation of short term training courses on seed certification, seed testing, post-harvest seed handling techniques etc separately as per the needs of the seed industry to build up trained and skilled staff in the seed production and certification activities.

## ANNEX

### List of Places Visited:

1. Landwirtschaftliches Technologiezentrum Augustenberg (LTZ), Center for Agriculture Technology, Augustenberg, Karlsruhe, Baden-Wuerttemberg State, Germany;
2. ZG Maiswerk Raiffeisen, Heitersheim, Baden-Wuerttemberg State, Germany;
3. Dow AgroSciences GmbH - Seeds, Rheinfeld 7, 76437 Rastatt, Baden Wurttemberg State, Germany;
4. University of Hohenheim, Stuttgart, Baden Wurttemberg State, Germany;
5. Agritechnica- 2017, Hanover, Lower Saxony state, Germany;
6. Naktuinbouw(NAK) office in Emmeloord, Netherlands.

### List of Main Persons Interviewed:

1. Mr. Hansjoerg Mayer Ullmann, Head of Seed Certification, LTZ, Karlsruhe, Germany;
2. Dr. Andrea Jonitz, Head of Official Seed Testing Station, LTZ, Karlsruhe, Germany;
3. Mr. Ekkehard Hipp, Head of Seed Production, ZG Maiswerk Raiffeisen in Heitersheim;
4. Dr. Ingrid Grane, Parent Seed and Experimental Seed Production, Dow Agro Sciences, Rheinfeld 7, 76437 Rastatt, Germany;
5. Dr. David Balassi, Head of Seed Plant. Dow Agro Sciences, Rheinfeld 7, 76437 Rastatt, Germany;
6. Prof. Michael Kruse, Dean of Faculty of Agriculture Sciences and Director of Institute of Plant Breeding, Seed Science and Population Genetics, University of Stuttgart-Hohenheim, Germany;
7. Mr. Ad Toussaint, NAK Dutch General Inspection Service for Agricultural Seeds and Seed potatoes, Randweg, Emmeloord Centre, Netherlands.





## Indian Project Partners at National Level



## Indian Project Partners in Telangana



## German Technical Project Partners

