

# Seed Info

Official Newsletter of WANA Seed Network

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## Editorial Note

*Seed Info* aims to stimulate information exchange and regular communication between seed staff in the Central and West Asia and North Africa (CWANA) region and beyond. Its purpose is to help strengthen national seed programs and thus improve the supply of high-quality seed to farmers.

**WANA Seed Network News** provides information on activities relating to global or regional cooperation and collaboration in facilitating the development of a vibrant regional seed industry. In this issue of *Seed Info*, we report on the *Seventh ECO Regional Seed Trade Conference 2019* organized by the ECOSA (Economic Cooperation Organization Seed Association) and TÜRKTOB (Turkish Seed Union). The congress was attended by participants from member countries of Azerbaijan, Afghanistan, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Turkmenistan, and Uzbekistan. Participants from international organizations such as the International Seed Federation (ISF), the International Seed Testing Association (ISTA), the Organization for Economic Co-operation and Development (OECD), and the International Union for the Protection of New Varieties of Plants (UPOV) also attended the congress and made presentations.

In the **News and Views** section, the article *Modernizing Plant Breeding and Responding to Global Challenges* has been reproduced from Excellence in Breeding (EiB) platform aimed at modernizing plant breeding both at International Agricultural Research Centers and National Agricultural Research Systems (NARS) to meet global challenges of climate change, food and nutritional security bringing in a concept of product profile like a commercial footing by the private sector breeding and seed programs.

In addition, in this newsletter we present innovation concerning agricultural mechanization for transformation of the agriculture sector for smallholder farmers—a soya bean multi-crop thresher developed by the USAID Feed the Future Soybean Innovation Lab (SIL) and Raised Bed Machine (RBM) for irrigated agriculture developed by the International Center for Agricultural Research in the Dry Areas (ICARDA). Other news in this section comes from regional and/or international organizations, such as the African Seed Trade Association (AFSTA), ISTA, UPOV, CORAF (Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles), and the

Common Market for East and Southern Africa (COMESA).

The section on **Seed Programs** presents news from Egypt, Ethiopia, Sudan, and Syria. We report on Egypt's membership of UPOV and the outcome of the national workshop on forage seed certification in Ethiopia organized by the International Livestock Research Institute (ILRI).

From Syria, we report on the ongoing efforts to rehabilitate the agricultural and seed sector to enhance the capacity of crop production to achieve food and nutritional security in the country under the new Food and Agricultural Organization (FAO) of the United Nations project supported by the European Union as a follow-up to the previous FAO project supported by the Department for International Development (DFID) of the UK.

We also report on recent meetings in West and East Africa assessing the progress made in implementation of harmonized seed regulation in the regions. Harmonization of seed regulations was first coined in the 1990s during the meeting to establish the West Asia and North Africa (WANA) Regional Seed Network, spearheaded by ICARDA. Since then, progress has been made among different economic blocks in Africa, the Americas, and Asia, to facilitate international seed trade.

The **Research** section of *Seed Info* captures information on research activities or issues relevant to the development of seed programs in the CWANA region and beyond. This issue features an article by Yetsedaw Aynewa and colleagues from ICARDA, Ethiopia, *Identification of farmers' preferred durum wheat (*Triticum durum* L.) varieties adapted to northern Ethiopia*. The paper discusses the participatory variety selection carried out in Enda Mehoni district under Africa RISING.

*Seed Info* encourages the exchange of information among national, regional, and global seed industries. We encourage our readers to share their views and news through this newsletter. Your contributions are most welcome. Take time to share and contribute to your newsletter.

Happy New Year

*Zewdie Bishaw, Editor*





## WANA Seed Network News

This section presents information about the WANA Seed Network, including network activities and reports from meetings of the Steering Committee and the WANA Seed Council.

### 7TH ECOSA Regional Seed Trade Congress 2019

The 7th ECOSA [Economic Cooperation Organization (ECO) Seed Association] Regional Seed Trade Congress 2019 was held from November 29 to December 1, 2019, in Antalya, Turkey.

The ECOSA congress was attended by participants from member countries of Azerbaijan, Afghanistan, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Turkmenistan, and Uzbekistan. Moreover, participants from private seed companies from Asia and Europe, national and regional seed associations, and international seed organizations such as ISF, ISTA, OECD, and UPOV participated in the congress.

The congress was opened by representatives of the ECOSA, TÜRKÖB, ECO, FAO, and the Ministry of Agriculture and Forestry of Turkey.

Presentations were made by TÜRKÖB, ISF, ISTA, OECD, UPOV, as well as by ECO member countries on the structure of their respective national seed sector and trade rules. The presentations included the following:

- Evolution of the seed sector and seed trade in Turkey
- Variety registration and seed certification in Turkey
- Role of Euro-seeds in development of the regional seed trade
- Seed trade policy development in the world
- Variety registration and plant variety protection
- Seed legislation and seed quality standards
- ISTA accreditation system and international certificates
- Country presentations on national seed sector and trade rules in ECO member countries.

The participants also visited the GROWTECH 19th International Greenhouse, Agricultural Technology and Livestock Equipment Fair on November 29, 2019. The GROWTECH fair took place with the

participation of leading companies manufacturing machinery, equipment, and input services for agricultural and horticultural crops as well as the livestock sector.



*Participants of seed trade conference (top) and seed trading floors (bottom) of ECOSA*

ECOSA was established with the support of ICARDA and FAO, through a regional trust fund from FAO (2006–2009), bringing together 10 countries which are members of ECO based in Teheran, Iran. The association tries to bring together the national seed associations of the 10 countries whose members are from both the public and private sector. Several background works were carried out for harmonizing variety release, seed certification, and quarantine issues.

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### ICARDA Organizes Training Course on Seed Technology

#### Background

In the Ethiopian highlands, the cereal cropping system—particularly wheat—has many challenges including rust disease epidemics, emergence of herbicide tolerant weeds, declining soil fertility due to monoculture, and above all limited access to agricultural inputs (e.g. seeds, fertilizers, and pesticides). Although food legumes (faba bean, field pea, chickpea, and lentil) are traditionally included as rotation crops after cereals, their area coverage is declining due to their low productivity and competition from cereals, thus undermining farming systems sustainability.

Within the Feed the Future-Africa RISING (FtF-AR) Ethiopian Highlands Project led by ILRI, ICARDA is one of the partners involved in participatory variety selection (PVS) and community seed production activities at four Integrated Action Research sites of AR in four administrative regions of the country.

Since 2012, ICARDA has carried out PVS of cereals and food legumes with farmer groups. Both male and female farmers are involved in PVS, in which they apply their own criteria for selecting their preferred varieties. Accordingly, several farmer-preferred and industry-accepted wheat, barley, faba bean, chickpea, and lentil varieties have been identified at the AR sites.

Once the varieties are identified, efforts are made to engage the farming communities in producing and making available quality seed for the farmers within and beyond the AR sites. The AR site coordinators, the staff of the Bureau (Office) of Agriculture at zonal (district) levels and other development partners assist in scaling out these improved cereal and legume varieties and associated integrated crop management technologies.

The primary purpose of the course was to impart the knowledge and experience of seed science and technology and seed industry development to project partners and stakeholders.

### Course participants

A total of 30 participants attended the course. They were one each from Madda Walabu, Raya, and Debre Berhan Universities; one each from Raya Seed Union in South Tigray and Tegulet Seed Union in North Shewa Zone; one AR site coordinator each of ILRI from Amhara and Tigray regions; and 23 focal persons representing different zones and districts from four administrative regions: Amhara, Oromia, Tigray, and Southern National, Nationalities and Peoples Regions.

The training course was held at ILRI Campus, Addis Ababa, with field visits to Debre Zeit Agricultural Research Center (DZARC) and Burka Agricultural Development Private Limited Company (Burka PLC) in East Shewa zone on November 22 and 23, 2019, respectively.

### Course objectives and topics

There are knowledge and skill gaps in seed science and technology for the key partners and stakeholders involved in the project. Therefore, the training course was organized to familiarize the research and development partners with concepts of

seed science and technology, concepts and experiences of farmer-based seed production and marketing schemes, and the state of the global and national seed sector development in Ethiopia.

The training course included both theory and practice with lectures and field visits. The participants were introduced to the theoretical and conceptual issues of the national seed system including policy and regulatory frameworks; institutional and organizational arrangements; and technical aspects such as concepts of seed quality and control, principles and procedures of seed production (processing and storage); and seed marketing and distribution. It also addressed the different approaches of farmer-based seed production and marketing schemes to complement the public and private sector and to ensure availability, accessibility, and use of quality seed of improved crop varieties.

This was followed by a visit to the seed multiplication fields and seed quality laboratory of DZARC, which is responsible for the development of cereal and legume varieties and multiplication of early generation seed (breeder, pre-basic, and basic). The participants were briefed on pre-extension and pre-scaling activities undertaken by DZARC in popularizing and scaling of improved crop technologies.

Moreover, the participants visited Burka PLC, which was established two years ago by 10 member farmers and agricultural professionals. The Chairman of Burka PLC explained how over time the group evolved from membership in the Denkaka Seed Producers Cooperative into a PLC with the knowledge and experience they acquired and from the support provided by the research and development partners particularly DZARC and the projects supported by ICARDA and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). He emphasized that the sheer determination and the opportunities presented as seed producers are what drives the members despite difficulties in accessing financial resources and adequate facilities. The aspiration of the PLC is not only to become a competent seed producer and supplier, but also to be involved in integrated agricultural sector development for the benefit of its members, the farming community, and the country at large.

### Discussions and outcomes

Discussions and interactions with the participants, trainers, and organizers during the course, field visits, and at the end of the course highlighted the following key issues:

- There is a consensus in recognizing the importance of seed in transforming the agricultural sector and the need for priority to be accorded to it by policy makers. Although the Government of Ethiopia is generally aware of and supports the seed sector, coordination among the seed and crop value chains remains weak and so disrupts the functioning of the national seed system.
- Critical shortages of seed of major food security crops exist other than for wheat and maize. A concerted effort should be made for early generation seed multiplication by National Agricultural Research Systems (NARS) and certified seed production by public and private sector seed suppliers to meet the growing demand by farmers. There is a need for proper planning among NARS, seed suppliers, and development agencies to address the challenges of seed demand and supply at the national level.
- There is a need to strengthen the formal public and private sector as well as seed unions and seed producer cooperatives to diversify the national seed sector to cater to seed demand of different farmer groups, smallholders, or large-scale estate farms.
- There is a need to design alternative approaches to fill the seed demand gap by mobilizing and engaging farmers and providing them with the necessary support and linkages. Efforts should be made with regional seed quality control agencies to ensure and maintain the quality of locally produced and distributed seed.
- Shortages of technologies for some crops were reported, where appropriate packages need to be developed and farmers advised on using them accordingly. For some crops completely resistant varieties may not be available, and farmers need to be advised to integrate available packages such as use of chemical control as an additional option.
- There are several projects and initiatives undertaken by several public organizations, NGOs, and projects in addressing the agricultural sector development at regional, zonal, and district levels. However, there is a lack of coordination among partners and stakeholders to create synergy and bring about changes that are transformative and sustainable. It is important to create a forum for joint planning and execution of different activities coordinated by the local administration at zonal or district levels.

The training course was highly appreciated by the participants and most of them said it was an “eye

opener” on what they can do when they are back in their respective work places. Generally, the trainees were motivated and committed to initiate the process of establishing PLCs by farmers in their respective districts and to address seed shortages at a district level.

The training course was successfully completed with good interaction among participants, trainers, and organizers.



*Presentations and discussions during training session*



*Visits to chickpea seed production fields at Burka PLC*

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## News and Views

News, views, and suggestions relating to the seed industry are included in this section, providing a forum for discussion between seed sector professionals.

## Modernizing Plant Breeding and Responding to Global Challenges

For millennia, farmers were at the forefront of crop domestication and improvement through



continuous selection, conservation, and maintenance of crop diversity. The discovery of Mendelian genetics at the turn of the 19th century laid the foundation of modern crop improvement, and remarkable progress has been made since then. Advances in crop improvement left key milestones in this journey such as hybrid technology, mutagenesis, molecular biotechnology (biotech crops).

Among global efforts in crop improvement is an international nursery trials network spearheaded by the CGIAR, in which thousands of elite lines of their mandate crops are shared globally with collaborators from the developing and developed countries and from the public and private breeding programs. This network of international collaboration has led to the release of thousands of improved varieties with key traits such as tolerance to abiotic stresses (e.g. drought, heat, salinity, and flooding) and biotic stresses (diseases, insects, and weeds) and their planting on millions of hectares across the globe. Currently, however, the ‘old mega varieties’ continue to dominate crop production in many developing countries where yield gains are declining or stagnating.

With global food and nutrition security in a precarious situation due to population growth, and declining soil fertility due to land degradation exacerbated by the climate change, modernizing of breeding programs to increase genetic gain is becoming critical.

The CGIAR Excellence in Breeding (EiB) is an initiative, operating since 2017, intended to modernize plant breeding at CGIAR centers and NARS to meet global challenges of climate change and food and nutritional security. This aims to introduce the concept of a ‘product profile’ on a commercial footing as for private sector breeding and seed programs. The CGIAR partners include Bioversity International, CIAT, CIMMYT, International Potato Center, ICARDA, ICRISAT, IFPRI, IITA, ILRI, IRRI, and WorldFish.

The [CGIAR EiB Platform](#) will modernize breeding programs targeting the developing world for greater impact on food and nutrition security, climate change adaptation, and development. Drawing from innovations in the public and private sector, this platform will provide access to cutting-edge tools, services and best practices, application-oriented training, and practical advice to create synergies and accelerate genetic gains of breeding programs targeting the developing world.

Over the last few decades, the genetic improvement of crops and livestock has improved productivity and nutrition, reduced the pressure on forests, and made farms more resistant to shocks such as disease, pests, and drought. It is estimated that 30–60 percent of yield increases in farmers’ fields can be traced back to the work of geneticists.

Despite these advances, breeding programs targeting the developing world need to accelerate the rate of crop and livestock improvement in order to meet the 50–60 percent growth in demand for food expected over the 21st century but with increasingly limited resources. Climate change alone will decrease crop productivity by 5 percent for every degree increase in global temperature.

There are many proven and emerging technologies from both the public and private sector that can help breeders meet this challenge. However, the pace of breeding program modernization in the developing world has been slow, with breeders lacking the resources and knowledge required to adopt new technologies. Meanwhile, too little information is shared between breeders working on different programs and commodities.

The EiB Platform provides a space for information sharing, collaborative learning, and access to tools and services for partners including CGIAR Research Centers, national research systems, advanced research centers, and the private sector. By combining their efforts, breeding programs in the developing world can achieve the economies of scale that helped revolutionize the private sector, and greatly increase the rate at which crops are improved.

The EiB Platform aims to become the one-stop place to go for advice, tested resources, and best practices for any breeding targeting the developing world by 2022.

The EiB Platform has so far:

- Forged partnerships across CGIAR breeding programs, as well as other organizations such as Monsanto, Diversity Arrays Technology, Corteva Agriscience, Hiphen, Institut National de la Recherche Agronomique, CSIRO, Cornell University, the University of Queensland, and Kansas State University
- Held a successful series of workshops to bring breeders together to address practical problems of product development and breeding program management, including overcoming bottlenecks and identifying lower-cost and more rapid approaches to common breeding processes

- Conducted two surveys of member programs to assess needs for genotyping and breeding informatics support for CGIAR breeding programs
- Worked closely with the Breeding Program Assessment Tool team to identify priority improvements for participating breeding programs

For more information you may kindly visit the [website](#) or contact Michael Quinn; email: [m.quinn@cgiar.org](mailto:m.quinn@cgiar.org); or Genevieve Renard, email: [g.renard@cgiar.org](mailto:g.renard@cgiar.org)

## ITPGRFA Turns Fifteen

The [International Treaty on Plant Genetic Resources for Food and Agriculture](#) (IT-PGRFA) is one of the fastest growing treaties, with a current membership of 146 Contracting Parties, including the European Union<sup>1</sup>. In the 15 years since its entry-into-force<sup>2</sup>, the International Treaty (IT) has become the flagship of FAO's work on agricultural biodiversity. The IT brings together countries and partner organizations around the world to conserve and use the world's precious plant genetic resources sustainably, both in the form of seeds of plants that provide food and nutrition, and the vital information pertaining to seeds and other plant material.

The IT has achieved some remarkable milestones such as a Multilateral System of Access and Benefit-sharing, Benefit-sharing Fund, Global Information System, and Farmers' Rights.

1. **Multilateral System of Access and Benefit-sharing:** It is the world's largest global gene pool, with over 2.4 million accessions of plant genetic material being exchanged around the world at an average rate of 1,000 transfers per day. The IT's [Multilateral System](#) is currently the most systematic and largest global mechanism to ensure regular and facilitated access to plant genetic material to breeders and scientists as they work to help farmers meet the challenges of climate change, pests, and diseases.
2. **Benefit-sharing Fund:** This fund has already supported 1 million people in developing

countries through 61 agricultural development projects in 55 developing countries over three project cycles. The fourth cycle of projects started in the latter half of 2019 and includes another 20 projects involving 29 developing countries. To date, the IT's [Benefit-sharing Fund](#) has invested over US\$20 million, with at least another US\$6 million earmarked for the fourth project cycle.

3. **Global Information System:** This provides a one-stop shop for all data needs relating to plant genetic resources by using a standardized common language that bridges otherwise disparate information systems. The IT's [Global Information System](#) is growing rapidly, enabling the collection, collation, and exchange of information on plant genetic resources around the world.
4. **Farmers' Rights:** The IT is the first legally-binding international instrument that specifically acknowledges the enormous contribution of indigenous communities and farmers to the development and management of plant genetic resources for millennia. It is leading the way on [Farmers' Rights](#) and calls on all Contracting Parties to protect and promote the rights of smallholder farmers and indigenous communities.

[The Eighth Biennial Session of the International Treaty's Governing Body](#) (GB) took place at FAO headquarters in Rome, bringing all Contracting Parties together during November 11–16, 2019. The GB sessions are decision-making events, during which the work of the last biennium is reviewed, and key decisions taken about its future direction.

Over 700 delegates and stakeholders attended the GB and made some critical decisions that will guide the future work of the IT. Some of the critical issues on the agenda follow: possible amendment of the IT to expand the list of crops covered by Annex 1 and updating the Funding Strategy to establish a more encompassing and sustainable financial footing for the implementation of the IT, including its Benefit-sharing Fund.

Source: [FAO](#)

## APBA Hold its Launching Meeting

### Background

The African Plant Breeders Association (APBA) is an initiative of scientists in Africa from higher education institutions, research organizations, and

<sup>1</sup> As of October 11, 2019

<sup>2</sup> IT-PGRFA was adopted by the 31st Session of the Conference of the FAO on November 3, 2001, and entered into force on June 29, 2004, upon ratification by 45 Contracting Parties

private companies who felt the need to change the narrative of crop improvement and the seed sector in Africa. It is a forum dedicated to building capacities, problem solving, resource mobilization, and long-term strategic development of the agricultural sector in Africa through effective plant breeding programs and provision of tangible solutions to governments, seed companies, non-governmental organizations, and individual growers.

The APBA was launched at a maiden conference on October 23–25, 2019, in Accra, Ghana with the theme *Advances in classical breeding and application of modern breeding tools for food and nutrition security in Africa*. The first conference of APBA brought together plant breeders, researchers, students, private companies, as well as national agriculture policy-makers.

### Goal and objectives

The conference was to reflect on the current state and the prospects of plant breeding research in Africa:

- Promote scientific plant breeding and related research through discussion and communication
- Offer opportunities to researchers and practitioners to present their findings and network with their peers, and promote interaction to advance the science and business of plant breeding
- Influence plant breeding training and education and contribute to continuing professional development of members so that they are technically up-to-date and remain relevant for their current and future employers both locally and globally
- Reflect on emerging issues in food and nutrition security
- Promote high standards of professional ethics among its members
- Raise awareness on the importance of plant breeding and seed systems

### GPC and FAO Sign a Three-Year Partnership

The FAO and the Global Pulse Confederation (GPC) agreed on a three-year partnership to promote cultivation of pulses—such as lentils, dry beans, dry peas, and chickpeas—and raise awareness of their high nutritional values. The agreement provides a framework for the FAO and the GPC to demonstrate leadership in the development of the global pulse sector.

For the FAO, closer ties will build on the successful collaboration with the International Year

of Pulses celebrated in 2016, for which the GPC became the main donor. The new partnership aims to move from advocacy to on-the-ground actions, including a pilot program in Burkina Faso and mapping out ways to leverage value chains for products such as cowpeas, chickpeas, lentils, and dry beans.

The FAO and the GPC will work together to boost the visibility of World Pulses Day, proclaimed by the General Assembly of the United Nations on December 20, 2018, to be celebrated on February 10 of each year starting in 2019. The GPC will use its networks to encourage greater private-sector participation.

The FAO and the GPC will also cooperate to identify at least three investment opportunities involving at least 1,000 smallholders each and pitching the plan to potential investors.

In support of this effort, the FAO will conduct value-chain analyses using its AgrInvest framework in selected countries, while the GPC will analyze the identified opportunities and propose business plans to investors and donors.

The GPC membership includes 24 national associations and over 600 members of the private sector.

Source: [FAO](#)

### The Journey to Provide a Locally Fabricated, Multi-crop Thresher for Smallholder Farmers and Service Providers in Africa

#### Background

When the USAID Feed the Future Soybean Innovation Lab (SIL) started working in Africa in 2014, the goal was to improve yields of soybean and to address gaps in the soybean value chain, ranging from field inputs to processing. It did not take long for the SIL team to realize that there were numerous bottlenecks for soybean production, including the lack of post-harvest equipment for threshing plants. Traditional stick threshing led to grain contaminated with stones and dirt, making locally produced soybean unsuitable for oil extraction and processing as poultry feed. The poultry industry is the major driver of soybean production in Africa, but buyers from this sector often preferred imported soy to the contaminated local supply. Although some threshing equipment is available to smallholder farmers, this mostly consists of maize and groundnut shellers.



### Designing and Testing

After a meeting with the Peace Corps office in Ghana, SIL researcher Kerry Clark was contacted by a young Peace Corps volunteer who relayed information about a women's group that had commissioned a local fabricator to design and construct a soybean thresher. A visit to this group and the local metal workshops in the Upper West Region of Ghana provided evidence that local fabrication of soybean threshers was a real possibility.

In 2016, the SIL held a contest for students at six universities: three in Ghana and three in the USA. The objective was to produce a design for a thresher that was inexpensive enough to be afforded by smallholder farmers, especially women. The winning design was that of Gabriel Abdulai, from the Ghana Savanna Agricultural Research Institute and a former student from the Kwame Nkrumah University of Science and Technology (KNUST). The second-place winner was a team from KNUST, led by 19-year old Jeffrey Appiagyei<sup>3</sup>, now of SAYeTECH.



*Gabriel Abdulai and the original three SIL soybean threshers for smallholder farmers. This design was dropped after field testing with farmers in Ghana*

A few months later, SIL worked with Catholic Relief Services in Ghana to identify 12 metal workshops from the three northern regions of Ghana to participate in training on the new thresher design. After a one-week training with hands-on thresher fabrication, SIL had three units that they sent to rural communities in Northern Ghana for testing. After one harvest season, SIL went back for feedback on the machines. Community members reported that the threshers were too small to be feasible for soybean threshing. They also stated that

none of them would purchase a soybean thresher unless it could also thresh maize. At a price of US\$600 per unit for the small threshers, the SIL researchers realized that individual ownership was probably not feasible and that a thresher more suitable for commercial service provision would be more appropriate.

Two Ghanaian fabricators with experience in thresher design, Imoro Donmuah and Hakeem Abdul-Karim, were tasked with developing a more efficient and commercially viable design. After two more years of designs and testing with farmers, a multi-crop thresher debuted that could shell 2–3 metric tons of maize and 200 kg of soybean per hour. The current SIL multi-crop thresher is sized for service providers and, under some conditions, has been found to net US\$100 day<sup>-1</sup> for the operator/owner.

The machine can thresh maize, soybean, rice, wheat, barley, sorghum, millet, sunflower, beans, cowpea, and pigeon pea. It is designed to be quickly and easily switched between crops by changing out a perforated metal sieve concave. The hole sizes of the sieve depend on local crops and their average seed sizes, but in most locales only two sieves are needed: one for maize, beans, and other large-seeded crops; and another for soybean, rice, and grains of smaller size. The thresher sits on a metal frame with four wheels and can be powered with a diesel engine or a tractor power takeoff.



*SIL trainer and thresher designer, Imoro Donmuah (far right), with SIL multi-crop thresher in Kigali, Rwanda.*

### Training local fabricators

The SIL then developed an intensive one-week training program to teach fabricators how to build the multi-crop thresher. The trainers are Imoro, Hakeem, and Jeffrey Appiagyei, the Ghanaian designers and fabricators who have been involved with the project since the beginning.

<sup>3</sup> Jeffrey Appiagyei is the CEO of SAYeTECH s, the SIL trainer who competed in the design contest as a young KNUST student

The first organization to work with SIL to provide training for local fabricators was Soya Solutions Eastern Africa Ltd, in Kampala, Uganda. Since then, SIL has partnered with CIAT, the Kilimo Trust, AGRA, Bountifield International, Kospi Metal, CAMS Engineering, and the Institut des Sciences Agronomiques du Burundi. This has led to the training of 142 fabricators in Ghana, Ethiopia, Uganda, Rwanda, Tanzania, Burundi, and Malawi. Additional training is planned in early 2020 for Zimbabwe, Nigeria, Kenya, Mali, and Zambia. The ADM Institute for Post-Harvest Loss at the University of Illinois and ADM Cares have been instrumental financial supporters of the thresher development and training programs.



*A multi-crop thresher manufactured by SAYeTECH in Kumasi, Ghana.*

For each training, the in-country partner recruits the fabricators, finds the training facility, finances the materials for production, and supports the trainees with food during the training hours. The SIL can train 10–20 people at a time and build 1–3 threshers during the week-long training. The days are long and tiring but trainees always report satisfaction with their new-gained skills. After training, the real work begins for the fabricators and the in-country partners.

### Creating market linkages

For local fabrication to reach smallholder farmers, organizations must make strong efforts to connect the manufacturers with people who can buy the threshers. Assistance from Catholic Relief Services and SIL with promotional events, such as thresher demonstrations at field days or farmer fairs, has helped recruit customers for fabricators in Ghana, where over 100 multi-crop threshers are now in use.

The threshers provide excellent employment and entrepreneurial opportunities for young people who no longer want to farm using ancient methods or who wish to develop a service provision business. The SIL is actively seeking organizations who would like to help develop young people as providers of threshing services. The SIL will work with in-country partners to

train young people to properly operate, maintain, and repair the threshers.

The journey to develop the SIL multi-crop thresher has been one that has required partnerships and commitment from a wide variety of people and organizations. As the SIL has moved from country to country and crop to crop, modifications have been made to address issues that arise during testing under local conditions. The importance of beans in East Africa led to design changes that would prevent breakage of the somewhat delicate dicot seeds, discovered in testing in Tanzania. After testing in Uganda, the design was changed to pull whole plants into the threshing chamber faster. Testing in Malawi on groundnuts has led to ongoing modifications to the threshing concave to prevent seed damage. The price of the thresher is dependent on the cost and availability of materials in each location. Part of the journey is networking the fabricators so that they can leverage their collective power to shop for better prices and demand that local markets carry the necessary materials and supplies. As urbanization increases across the continent and demand for food skyrockets, the need for mechanization will also continue to increase. The SIL multi-crop thresher is filling an important gap for farmers and addressing a bottleneck for crop production in Africa. It provides jobs for fabricators and operators and relieves farmers of the intense drudgery of stick threshing. To learn more about getting threshers in your area, contact Kerry Clark at [clarkk@missouri.edu](mailto:clarkk@missouri.edu).

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## Egypt Rolls Out Water-Saving Smallholder Equipment

### Background

The Raised Bed Machine (RBM) was developed by ICARDA in collaboration with agricultural research centers and public and private sectors, with a view to expanding its use among smallholders in Egypt and beyond. It can prepare an acre of agriculture land in half an hour, a task that would take farmers a working day to complete manually, using at least 10 workers.

The equipment simultaneously prepares and cultivates the soil, increasing yields by 15–20 percent and saving up to 25 percent of irrigation water. This is particularly advantageous in a country already experiencing severe water scarcity and where the population is predicted to grow from 92 million to 110 million by 2025, adding to pressure on dwindling resources.



*RBM developed by ICARDA in collaboration with NARS and public and private sectors in Egypt*

Initially, Egyptian farmers were reluctant to use a new agricultural machine, despite attempts by local agricultural departments to convince them of its advantages. After painstaking efforts to convince smallholder farmers, and provision of incentives, some farmers finally agreed to use the RBM. This decision paid off, with unprecedented increase in wheat yields in the last winter season. This positive experience led the new technology to be moved from trial to commercial phase in August 2019 after being modified over the past five years to have more economic value for smallholders.

### Boosting profits

Although the first thought for the device was saving irrigation water, it was not attractive to smallholders, whose focus was profitability. This led the ICARDA team to work on a design that had more advantages for smallholders, including productivity, cost-effectiveness, and profitability.

The RBM achieved this with wheat crops when piloted with farmers in Sharqiya Governorate, northeast of Cairo. The researchers chose to develop it further, to suit other crops and different soils.

Most of the smallholders who use the RBM cannot afford to own it themselves; there are just a few owners who have invested in the machinery and charge a fee for its use.

### Sowing the seeds

The multifunctional machine has a row of furrow openers which allow farmers to dig water channels in the land, and it can drill seeds into the soil between these channels in a simple mechanical way.

The design was ideal for dense farming of crops such as wheat, alfalfa, and barley; however, it was not successful with crops such as sorghum and maize, which are grown using hill planting. This technique involves planting seeds in groups on flat-

top circular mounds where the soil stays warmer, plants have greater access to water and nutrients, and roots have more room to expand.

So the machine was developed to also facilitate hill planting, saving effort and money for farmers who use this technique. These modifications had the added advantage of making it suitable for intercropping—planting more than one crop at the same time. Farmers were also able to use it for fertilization, which was a totally unplanned benefit.

### Efficiency savings

With ongoing investment from the public and private sector, alterations were also made to the RBM's structure: it was built using stronger materials to suit any land, allowing it to cultivate even untilled ground. As a result, it has become more economically efficient and multifunctional, with greater appeal to agriculture machinery owners.

According to a study by the manufacturers, the machine is expected to have a life span of around 12 years, and within three years the owner can recoup the expenses of purchasing it.

Source: [ICARDA](#)

*Note: The article was originally produced in SciDev.Net (Middle East and North Africa desk) November 11, 2019 and is supported by the [CASA program](#)*

### Collaboration to Improve Tanzanian Rice Production

Real IPM, Biobest's subsidiary in Kenya, is one of three collaborators in an innovative project to improve rice production in Tanzania by developing innovative microbe-based methods to manage rice blast.

Funded by the UK's Development Fund for International Development, it is an Agri-Tech Catalyst project (managed by Innovate UK). The project aims to take innovative ideas to tackle challenges in agriculture.

This collaborative project sets out to combine seed coating/priming with root dipping in specific beneficial bacteria, complemented with foliar applications of biocontrol agents (BCAs). Real IPM will be working with the UK's National Institute of Agricultural Botany and CropNuts Kenya, which provides crop nutrition support services to farmers across Africa. The project aims to optimize the effects of seed coating/priming and



root dipping on rice endophytes and induced resistance, as well as the survival and dispersal of BCAs on leaf surfaces under field conditions. A network of field studies in Tanzania and Kenya will be used to evaluate the effectiveness of the management strategy.



*Rice production field in Tanzania*

Training courses are planned to promote the principles of integrated disease and pest management. It is envisaged that adoption of the project results will lead to significant increases in marketable yield without excessive input of fungicides.

For more information, please contact: Lise Verachtert, Biopest Group, Ilse Velden 18, 2260 Westerlo, Belgium; email: [lise.verachtert@biobestgroup.com](mailto:lise.verachtert@biobestgroup.com)

## Abridged Version of ISAAA Brief 54-2018 Executive Summary

### Introduction

Biotechnology can be used to develop stress-tolerant and more nutritious crop varieties to protect natural resources and human health. Each biotech crop is evaluated on a case-by-case basis, while approved commercial products in the market have been subjected to rigorous scientific scrutiny. Biotech crops should be considered as a tool for improving crop yields, have an unblemished record of food safety, and provide a larger income for food-insecure farmers. The economic benefits, health improvements, and social gains obtained through biotech crop adoption should be made known to the global community so that farmers and consumers can make informed choices on what crops to grow and consume, respectively; to the policy makers and regulators to craft enabling biosafety guidelines for commercialization and adoption of biotech crops; and to the science communicators and the media to facilitate dissemination of the benefits and potentials of the technology.

The International Service for the Acquisition of Agri-biotech Applications strongly supported the above and the scientific truths underpinning them with the publication of *Global Status of Commercialized Biotech/GM Crops: 2018* (Brief 54). This publication documents the latest information on the subject, the global database on the adoption and distribution of biotech crops since the first year of commercialization in 1996, country situations, and prospects of the technology in the world.

### Highlights of 2018 adoption of biotech crops

- *High adoption of biotech crops continued in 2018 with 191.7 million ha worldwide*

On the 23rd year of commercialization of biotech/GM crops in 2018, 26 countries grew 191.7 million ha of biotech crops—an increase of 1.9 million ha or 1 percent from 189.8 million ha in 2017. This is an increase of ~113 fold from 1.7 million ha in 1996.

- *Adoption rates of top five biotech crop-growing countries reached close to saturation*

The average biotech crop adoption rate in the top five biotech crop-growing countries increased in 2018 to reach close to saturation, with USA at 93.3 percent (average for soybeans, maize, and canola), Brazil (93 percent), Argentina (~100 percent), Canada (92.5 percent), and India (95 percent).

- *A total of 70 countries adopted biotech crops*

The 191.7 million ha of biotech crops were grown by 26 countries: 21 developing and five industrial countries. Developing countries grew 54 percent of the global biotech crop area compared to 46 percent for industrial countries. An additional 44 countries (18 plus 26 EU countries) imported biotech crops for food, feed, and processing. Thus, a total of 70 countries have adopted biotech crops.

- *Biotech crops provided more diverse offerings to consumers in 2018*

Biotech crops have expanded beyond the big four (maize, soybeans, cotton, and canola) to give more choices for many of the world's consumers and food producers. These biotech crops include alfalfa, sugar cane, sugar beet, papaya, squash, eggplant, potato, safflower, and apple, all of which are already in the market. Additionally, biotech crop research conducted by the public sector includes rice, banana, potatoes, wheat, chickpea, pigeon pea, and mustard with various economically important and nutritional quality traits beneficial to food producers and consumers in developing countries.

- *Biotech soybeans covered 50 percent of global biotech crop area*

The four major biotech crops—soybeans, maize, cotton, and canola—in order of decreasing area, were the most adopted biotech crops by 26

countries. Soybeans lead at 95.9 million ha and 50 percent of the global biotech crop adoption. This is followed by maize (58.9 million ha), cotton (24.9 million ha), and canola (10.1 million ha). Based on the 2017 FAO global crop area for individual crops, 78 percent of soybean, 76 percent of cotton, 30 percent of maize, and 29 percent of canola were biotech crops in 2018.

- *Area planted to biotech crops with stacked traits increased by 4 percent and occupied 42 percent of the global biotech crop area*

Stacked traits with insect resistance and herbicide tolerance increased by 4 percent and covered 42 percent of the global area, a testimony to farmers' adherence to smart agriculture with no-till and reduced insecticide use. Herbicide tolerance in soybeans, canola, maize, alfalfa, and cotton has consistently been the dominant trait, which in 2018 covered 46 percent of the global area.

- *Top five countries planted 91 percent of global biotech crop area of 191.7 million ha*

The USA led the biotech crop planting in 2018 at 75 million ha, followed by Brazil (51.3 million ha), Argentina (23.9 million ha), Canada (12.7 million ha), and India (11.6 million ha) for a total of 174.5 million ha, representing 91 percent of the global area.

#### Status of approved events for biotech crops

A total of 70 countries (42 + 28 EU member countries) have issued regulatory approvals to genetically modified or biotech crops for consumption either as human food or animal feed, as well as for commercial cultivation. Since 1992, there have been 4,349 approvals granted by regulatory authorities of these 70 countries. These were granted to 387 biotech events from 27 biotech crops, excluding carnation, rose, and petunia.

#### Contribution of biotech crops to food security, sustainability, and climate change mitigation

Biotech crops are being adopted globally because of the enormous benefits to the environment, health of humans and animals, and contributions to improved socioeconomic conditions of farmers and the general public. Global economic gains contributed by biotech crops in the last 21 years (1996–2016) have amounted to US\$186.1 billion to more than 16–17 million farmers, 95 percent of whom come from developing countries.

Biotech crops contributed to food security, sustainability, and climate change solutions by:

- *increasing crop productivity* by 657.6 million tons valued at US\$186.1 billion in 1996–2016; and 82.2 million tons valued at US\$18.2 billion in 2016 alone;

- *conserving biodiversity* during 1996–2016 by saving 183 million ha of land, and 22.5 million ha of land in 2016 alone;
- *providing a better environment* by preventing 671 million kg. a.i. of pesticides in 1996–2016, from being released into the environment; by saving on pesticide use by 8.2 percent in 1996–2016; and by reducing Environmental Impact Quotient by 18.4 percent in 1996–2016;
- *reducing CO<sub>2</sub> emissions* in 2016 by 27.1 billion kg, equivalent to taking 16.7 million cars off the road for one year; and
- *helping alleviate poverty through uplifting the economic situation* of 16–17 million small farmers and their families, totaling >65 million people, representing some of the poorest people in the world.

Thus, biotech crops can contribute to a *sustainable intensification* strategy favored by many science academies worldwide, which allows productivity and production to be increased on the current 1.5 billion ha only of global crop land, thereby saving forests and biodiversity. Biotech crops are essential but are not a panacea; adherence to good farming practices, such as rotations and resistance management, are as essential for biotech crops as they are for conventional crops.

#### Economic gains from biotech crops reached US\$186.1 billion during 1996–2016

A total of US\$186.1 billion in economic benefits were gained by countries planting biotech crops during 1996–2016. The highest gain was obtained by the USA (US\$80.3 billion) followed by Argentina (US\$23.7 billion), India (US\$21.1 billion), Brazil (US\$19.8 billion), China (US\$19.6 billion), Canada (US\$8 billion), and others (US\$13.6 billion).

#### Conclusion

The Global Report on Food Crises 2017 revealed that the UN Millennium Development Goals that ended in 2015 were not achieved, and that around 108 million people in 48 food crisis-affected countries are still at risk of or in severe acute food insecurity since 2016. Moreover, the UN Report on the State of Food Security and Nutrition in the World in 2018 indicated that for three years in a row (since 2016), there was a continuous increase of hunger worldwide, with current levels equivalent to the records a decade ago. These findings translate into a clear warning that more efforts are rapidly needed to achieve the Sustainable Development Goal of Zero Hunger by 2030.

Once again, in its 23rd year of commercialization, the increase in global biotech crop adoption (cultivation and import) manifests the satisfaction of more than 17 million farmers, 95 percent of whom are small farmers, and consumer acceptance due to the agricultural, socioeconomic, and environmental benefits as well as food safety and nutritional improvement brought by biotech crops. The contribution of this continuing increase in biotech crop adoption could help in alleviating the problems of hunger and malnutrition globally. Ensuring that these benefits will continue in the future depends on the diligence and forward-looking regulatory steps based on science, critically looking at the benefits instead of risks, agricultural productivity with a sense of environmental conservation and sustainability, and most importantly taking into consideration the millions of hungry and impoverished people in need of resources.

For more information visit the [link](#).

Source: *Crop Biotech Update August 22, 2019*

## AFSTA Organizes ISPM38 Workshop in Nairobi, Kenya

### Introduction

The African Seed Trade Association (AFSTA), in partnership with the Inter-African Phytosanitary Council of the African Union (AU-IAPSC) and Syngenta Foundation, organized a one-day workshop on International Standards for Phytosanitary Measures 38 (ISPM38), held on October 10, 2019, in Nairobi, Kenya. The main objective was to bring together representatives of National Plant Protection Organizations (NPPOs) from east and south African countries to share knowledge and experiences in the implementation of [ISPM38](#). The workshop focused on (i) introduction to international movement of seeds, (ii) implementation of ISPM38–Africa perspective, (iii) pest risk assessments and ISF’s Regulated Pest List Initiative and seed health testing, and (iv) how ISPM is being implemented in the participating countries.

### Workshop participants

The workshop was attended by over 30 participants comprising NPPOs from 16 countries (Burundi, Egypt, Ethiopia, Eswatini, Kenya, Malawi, Namibia, Rwanda, South Africa, South Sudan, Sudan, Tanzania, Tunisia, Uganda, Zambia, and Zimbabwe) and the Seed Trade Association of Kenya, South Africa National Seed Organization (SANSOR), ISF, and AFSTA.



*Participants of ISPM38 workshop in Nairobi, Kenya*

The opening remarks were made by the AFSTA Secretary General and President. They both welcomed the participants and reiterated the importance of key phytosanitary issues with impacts on facilitating seed trade in the African seed industry and emphasized the role and the engagement of NPPOs with the seed traders for effective implementation of the ISPM38 at national level and facilitating cross-border trade of seeds.

### Highlights of presentations

Presentations were made by the ISF, AU-IAPSC, and SANSOR. In addition, each representative of the NPPOs from 16 countries gave a briefing on how they are implementing ISPM38 in their countries.

The highlights of the presentations follow:

- The values and quantities of Africa’s seed exports and imports continue to increase. In 2016, Africa exported about 197,542 metric tons (MT) of seed worth US\$165 million and imported about 97,057 MT seed worth US\$395 million.
- The present-day complexity of seed business is characterized by different sites for research and development, seed production, and distribution, and fast means of transportation. This leads to the need for effective seed health programs focusing on prevention, detection, and eradication of seed-borne pathogens to ensure pest-free seed to consumers.
- Phytosanitary measures are legislations, regulations, or official procedures with the purpose of preventing the introduction or spread of quarantine pests. Thus, limiting the economic impact of regulated non-quarantine pests as performed by NPPOs aligned to the International Plant Protection Convention (IPPC).
- The seed industry’s goal is to generate technology and deliver quality seed that satisfies customer needs and is regulated by



NPPOs. International seed movements are subject to phytosanitary regulations by NPPOs to minimize the risk of introducing or spreading pests worldwide.

- As the standard, ISPM38 provides guidance to assist NPPOs in identifying, assessing, and managing the pest risk associated with the international movement of seeds.
- A pest risk analysis is the foundation for fact-based and proportionate phytosanitary regulations instituted by a country.
- The ISF's Regulated Pest List Initiative is developing a database of information on regulated pests of internationally traded seed species.
- Phytosanitary requirements that lack scientific justification should be removed, e.g. where seed is not a pathway and not a host of the pest in question.
- The International Seed Health Initiative was established in 1993 to bring together public and private seed sectors to develop seed health testing methods that are internationally recognized as references and accepted as industry standards.
- The IPPC provides standards for preventing the introduction and spread of plant pests.
- IPPC/ISF collaborated to develop ISPM38 to facilitate international seed movement.
- Need to encourage the global seed network of ISF; IPPC, RPPOs, and NPPOs; and regional and national seed associations.

#### Highlights of the discussions

- All the participating NPPOs were yet to implement ISPM38 due to varied challenges.
- AFSTA and AU-IAPSC requested to undertake outreach programs to create awareness on seed health testing methods to seed companies and NPPOs in Africa
- Need for capacity building of human resources and infrastructures of NPPOs
- Need for harmonization of phytosanitary measures by NPPOs to enhance safe seed trade in Africa

#### Conclusion and way forward

- Each country should make efforts to build capacity to properly implement ISPM38 and consequently build trust/confidence among NPPOs.
- Consistent sensitization of the seed stakeholders on the importance of cross-border

facilitated seed trade, backed up by appropriate phytosanitary measures in line with ISPM38.

- Implementation of the harmonized quarantine pest list at the Regional Economic Community level, which should be updated as necessary.
- Regular networking and exchange among the countries belonging to the same Regional Economic Communities and beyond.

*Charles Nyachae, AFSTA, Nairobi, Kenya; email [charles@afsta.org](mailto:charles@afsta.org)*

#### ISTA Reference Pest List

The ISTA has updated an annotated list of seed-borne diseases. It can be down loaded at [ISTA Reference Pest List](#)

#### Why is the list being revisited?

A recent issue of the International Standard for Phytosanitary Measures, provided by the International Plant Protection Convention (IPPC) and published by the FAO, was dedicated to the international movement of seeds ([ISPM38](#)). This standard included the definition of seed-associated pests: (i) a seed-borne pest is one carried by seeds externally or internally that may or may not be transmitted to plants growing from the seeds, causing their infestation; and (ii) a seed-transmitted pest is a seed-borne pest that is transmitted via seeds directly to plants growing from these seeds, causing their infestation.

In the context of seed trade, seed can be a pathway for the introduction and dissemination of pests in a new geographic area. Safeguarding seed health is critical in avoiding the trade-related spread of pests. Thus, it is of crucial importance to provide national plant protection organizations (NPPOs) with an updated, scientifically evidenced list of seed-associated pests. Phytosanitary requirements for the import of seed lots, as defined by NPPOs, have mostly been supported by the book *An Annotated List of Seed-borne Diseases* (1st Edition, 1958). However, the 4th and last edition of this book was published by ISTA in 1990 and is now outdated. Curating this reference is therefore necessary.

#### How have the revisited crops been selected?

This challenge was initiated a few years ago under the framework of the European project TESTA–Seed Health. One objective was to identify references on seed-associated pests in hundreds of crops to update the current knowledge and to disseminate these through an updated annotated list, to be made available on the ISTA website. To avoid repetition, references related to vegetable

species were transferred to the International Seed Federation (ISF), which is updating its own regulated [pest list database](#). At ISTA, the Seed Health Committee (SHC) is focusing on non-vegetable species.

The first part of the project (2018) has focused on cereals (barley, oat, wheat, triticale, rice, and sorghum), legumes (alfalfa and soybean), and oleaginous crops (cotton, oilseed brassicas, and sunflower). In 2019, the second part of the project is dedicated to seed diseases in many other plant species, including forest trees (almond, cedar, chestnut, eucalyptus, firs, oak, *Pinus* spp., poplar, spruce, sycamore, and walnut), fruit trees (apple, lemon, orange, papaya, pomegranate, and *Prunus* spp.), and legumes (chickpea, lentil, lupin and peanut). The webpage will be updated regularly as novel data become available regarding seed pests.

#### How was the review process set up?

To successfully offer a robust, revised list of pests, the scientific relevance of hundreds of articles, and more particularly their conclusions on the seed-borne/-transmitted status of pests, was evaluated by a board of international experts in seed diseases in the investigated crops, working either in private seed companies or in academic research laboratories. Each article was reviewed by two to four referees who provided constructive reports to the project coordinator. These reviews served to build the updated list, which was validated by the SHC members prior to public release.

#### How to read the updated annotated list

##### Taxonomy

- *Plants*: The crop name and its binomial nomenclature (species); the names of the diseases.
- *Pests*: Their current nomenclature, all the synonyms according to the databases [Species 2000 & ITIS Catalogue of Life](#) and the [Index Fungorum](#); their taxonomy (kingdom, phylum).

##### Pest interaction

- *Is the crop a host for the pest?* The answer is 'Yes', if the pest is pathogenic on the crop, causing disease. Otherwise, the answer is 'No'. When current knowledge is unclear or without strong support to a decision, the answer is 'Not proven'.
- *Is the pest a pathogen or saprophyte?* The answer is 'Saprophyte', if the pest only infests seeds during non-adapted storage conditions, or if it is associated with seeds without causing diseases on seedlings. Otherwise, the answer is 'Pathogen'. When current knowledge is unclear

or without strong support to a decision, the answer is 'Not proven'.

#### Seeds as a pathway for pest dissemination

- *Is the pest seed-borne or -transmitted?* The answers are based on scientific articles and due to the expertise of the worldwide panel of reviewers. When the conclusions are supported by current scientific and practical (field experience) knowledge, the response is 'Yes' (it is proven that the pest *is* seed-borne or -transmitted) or 'No' (it is proven that the pest *is not* seed-borne or -transmitted). When current knowledge is unclear or without strong support to a decision, the answer is 'Not proven'.
- *Is seed a pathway for pests?* The answer is 'Yes' for all seed-transmitted pests and for seed-borne pests that can be introduced and disseminated; 'No' for non-disseminated pests and saprophytes; and 'Not proven' when scientific evidence is still lacking or currently unclear.

#### Scientific articles:

- *Experimental design and results*: A summary of the experiments performed in the laboratory and in the field to characterize the role of seeds in pest-crop interactions.
- *Remarks*: Notes about the reference analyzed.
- *References*: Article source used to support the conclusions.

#### Completeness of the list

The list is expected to evolve regularly, due to novel scientific evidence of the seed-borne/-transmitted status for a known pest, or after identification of a novel pest for a given crop. A continuous literature survey guarantees to be well-timed with novel discoveries and to provide accurate information on the webpage. Readers are encouraged to [subscribe](#) to the updates for current information. If you have comments on the conclusions or new information to offer, please contact [ISTA](#).

For more information, please contact: ISTA, Zurichstrasse 50, 8303 Bassersdorf, Switzerland; tel: +41 44 838 6000; fax: +41 44 838 6001; email: [ista.office@ista.ch](mailto:ista.office@ista.ch); website: [www.seedtest.org](http://www.seedtest.org)

#### News from UPOV

##### UPOV membership

The purpose of the International Union for the Protection of New Varieties of Plants (UPOV) is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the

benefit of society. UPOV is an intergovernmental organization based in Geneva, with 76 members, covering 95 States.

The members of UPOV are (as of November 2019): two regional organizations (the African Intellectual Property Organization<sup>4</sup> and the European Union<sup>5</sup>) and [74 sovereign countries](#) (see also the map below).



UPOV

November 1, 2019

### Examination of the Draft Laws

#### *Positive decision on the Draft Law of Mongolia and Afghanistan*

The UPOV Council in its 53rd ordinary session on November 1, 2019, took a positive decision on the conformity of the “Draft Law of Mongolia on Crop Seed and Variety” with the provisions of the 1991 Act of the UPOV Convention, which allows Mongolia, once the Draft Law is adopted, with no changes and the Law is in force, to deposit its instrument of accession to the 1991 Act.

Similarly, the UPOV Council took a positive decision on the conformity of the “Draft Plant Variety Protection Act of Afghanistan” with the provisions of the 1991 Act of the UPOV Convention, which allows Afghanistan, once the Draft Law is adopted, with no changes and the Law is in force, to deposit its instrument of accession to the 1991 Act.

#### *Reaffirmed decision on the Law of Egypt and Myanmar*

The UPOV Council noted the developments on the Law on Plant Variety Protection of Egypt and reaffirmed its 2015 decision on conformity with the 1991 Act of the UPOV Convention, allowing Egypt to become a UPOV member.

<sup>4</sup> Operates a plant breeders' rights system which covers 17 member states (Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal, and Togo)

<sup>5</sup> Operates a plant breeders' rights system which covers 28 member States (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom)

Similarly, the UPOV Council noted the developments on the Law on Plant Variety Protection of Myanmar and reaffirmed its 2017 decision on conformity with the 1991 Act of the UPOV Convention, allowing Myanmar to become a UPOV member.

### New UPOV Member

Egypt deposited its instrument of accession to the 1991 Act of the International Convention for the Protection of New Varieties of Plants on November 1, 2019; and will become the seventy-sixth member of UPOV on December 1, 2019.

### Events

On October 30, 2019, UPOV organized a *Seminar on the Impact of Policy on Essentially Derived Varieties (EDVs) on Breeding Strategy*. The Seminar was attended by 180 participants.

(see

[https://www.upov.int/meetings/en/details.jsp?meeting\\_id=50787](https://www.upov.int/meetings/en/details.jsp?meeting_id=50787)).

The concept of EDVs was introduced in the 1991 Act of the UPOV Convention with the aim of providing an effective incentive for plant breeding that would maximize progress in the development of new, improved varieties for the benefit of society.

The purpose of the seminar was to consider the impact of EDV policy on breeding strategies and the consequences for the development of new, improved varieties of plants. The seminar provided perspectives covering various breeding methods and different types of plants. The seminar was expected to assist the Administrative and Legal Committee in its review of the guidance on EDV provided in document [UPOV/EXN/EDV/2](#).

In the closing remarks, it was concluded that:

- There is evidence that the current UPOV guidance does not reflect the practice among breeders in the understanding of EDVs;
- Evolution of breeding technologies has created new opportunities/incentives for predominantly deriving varieties from initial varieties, more rapidly and at a lower cost;
- It was clear from presentations and discussions that the understanding and implementation of the EDV concept influences breeding strategy—therefore, it is important that UPOV guidance is tuned to maximize benefits to society in terms of maximizing progress in breeding.



## UPOV PRISMA

UPOV PRISMA is an online, multi-lingual tool for making plant breeders' rights' applications in participating UPOV members. Currently it has 35 participating UPOV members, covering 74 countries (see <http://www.upov.int/upovprisma/en/index.html>).

The UPOV Council agreed to introduce a fee of 90 Swiss francs (CHF) for UPOV PRISMA starting from January 2020.

## PLUTO database

The UPOV Council agreed the following approach for the PLUTO database from November 2020:

- Free option: the PLUTO database with a search function will be free to all users. Search results will be limited to an on-screen display of a single page of results. There will be no facility to download search results or data from the PLUTO database;
- Premium option: users paying a fee will have access to all PLUTO database features and will be able to download data without restrictions. The fee will be CHF 750 per annum;
- Members of the Union and data contributors: access to all PLUTO database 'premium' features will be free to all members of the Union and data contributors (i.e. OECD); and
- Access to PLUTO data may also be granted in cases approved by the Consultative Committee.

## Revised FAQ on benefits of new varieties of plants for society

The UPOV Council adopted the following revised FAQ. It focuses on three broad areas: (i) feeding the world; (ii) improving lives in rural and urban areas and providing economic development; and (iii) respecting the natural environment.

## Cooperation in the Examination of New Plant Varieties

In 2018, the number of plant genera and species for which there were agreements between members of the Union for cooperation in the examination of distinctness, uniformity, and stability totaled 2,132 (5.7 percent increase).

## Plant Variety Protection Statistics

The number of applications for plant variety protection increased from 18,306 in 2017 to 20,031 in 2018 (8.6 percent increase).

The number of titles granted increased from 12,685 in 2017 to 13,288 in 2018 (4.5 percent increase).

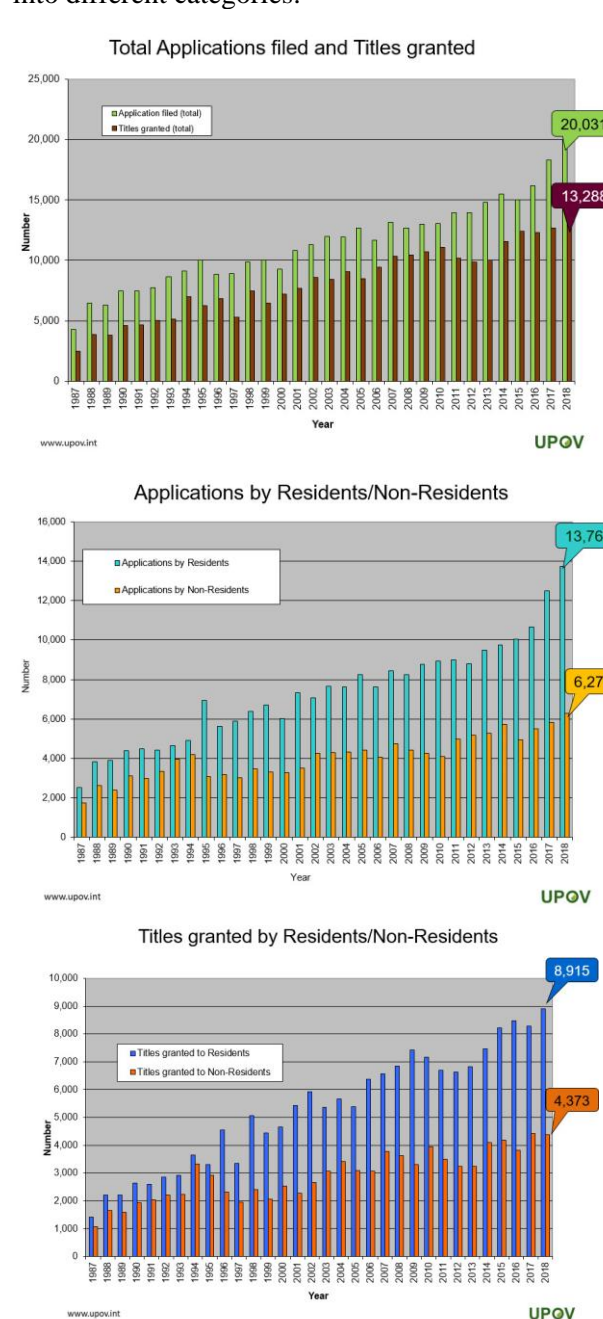
The total of 132,403 titles in force in 2018 represented a 4.6 percent increase compared to 2017 (126,322).

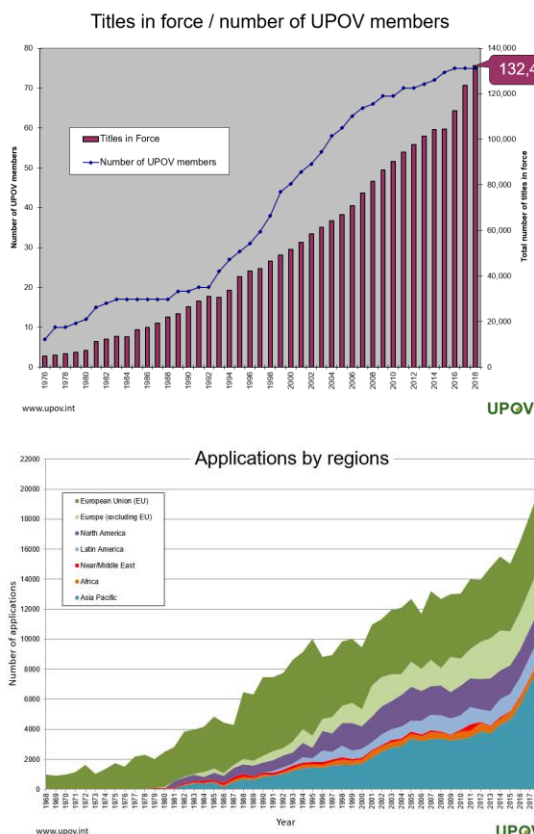
The graphs, available at:

<https://www.upov.int/databases/en/> (and reproduced below) indicate trends in applications filed and titles granted since 1986. Information is also provided on the 10 UPOV members who received the largest number of applications in 2008, 2017, and 2018 and an analysis of applications by residence of breeders for the same years.

The UPOV website

(<https://www.upov.int/databases/en/>) provides a series of animated graphics showing the Top 10 UPOV members over the period 1997–2018 broken into different categories.





For more information, please contact the UPOV Secretariat; tel: +41 22 338 9155; fax: +41 22 733 0336; email: [upov.mail@upov.int](mailto:upov.mail@upov.int); website: [www.upov.int](http://www.upov.int)

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## Contributions from Seed Programs

### Egypt Becomes a UPOV Member

In Egypt, the need for plant variety protection has long been recognized and several efforts have been made over the years. A unique national royalty payment scheme was installed to support the public breeding program in which both public and private seed companies access public-bred varieties from the Agricultural Research Center (ARC), the apex public body for agricultural research in the country. The ARC has a full-fledged seed unit with a farm, which is responsible for production and supply of foundation seed for public-bred crop varieties. The private sector will access the seed of new crop varieties through purchase of foundation seed at relatively higher price for further multiplication and marketing of registered and certified seed without any levy for royalty payment. Additionally, the public seed company (Central Administration for Seed Production) will buy the foundation seed at a regular market price for further multiplication and

marketing but will pay royalties based on sale of certified seed. The royalties collected will be used for supporting the national research and breeding programs of ARC.

In 2002, the Law on the Protection of Intellectual Property Right (Law No. 82 of 2002) was enacted and Ministerial Decree No. 1366 of 2003 was issued in 2013 as implementing regulations. Moreover, in the same year a Ministerial Decree 2813 of 2003 also established a plant variety protection office under the Central Seed for Testing and Certification Administration of the Ministry of Agriculture and Land Reclamation. However, the law did not conform with the UPOV Convention and revisions were required to align it to the convention. Hence, it was subsequently amended by Law No. 26 of 2015 and finally by Law No. 144 of 2019 to conform to the UPOV Convention.

The UPOV Council on its fifty-third ordinary session on November 1, 2019, noted the developments in the Law on Plant Variety Protection of Egypt and reaffirmed its 2015 decision on conformity with the 1991 Act of the UPOV Convention, allowing Egypt to become a UPOV member. Egypt officially became a member of UPOV as of December 1, 2019. It is envisaged that the UPOV membership will provide opportunities for the Egyptian agricultural research and seed sector.

### Africa RISING—Scaling of Wheat Technologies in Bale Zone, Southeastern Ethiopia

Feed the Future-Africa RISING (FtF-AR) is the initiative of the Government of the United States and supported by USAID. The Institute of Livestock Research Institute is leading the AR-Ethiopian Highlands project collaborating with a consortium of CGIAR centers including CIMMYT, CIP, ICARDA, ICRISAT, and national partners such as NARS and development practitioners such as farmer's cooperatives and NGOs.

In Phase II of the project the primary mandate of the AR project is to conduct on-farm research that could backstop the scaling-up activities. The emergence of diseases and climate change impact can easily break down the resistance of crop varieties and force farmers to look for new crop technologies within a few years. Thus, introduction of new varieties, awareness creation, and dissemination of the new crop technologies together with local partners continued during Phase II.

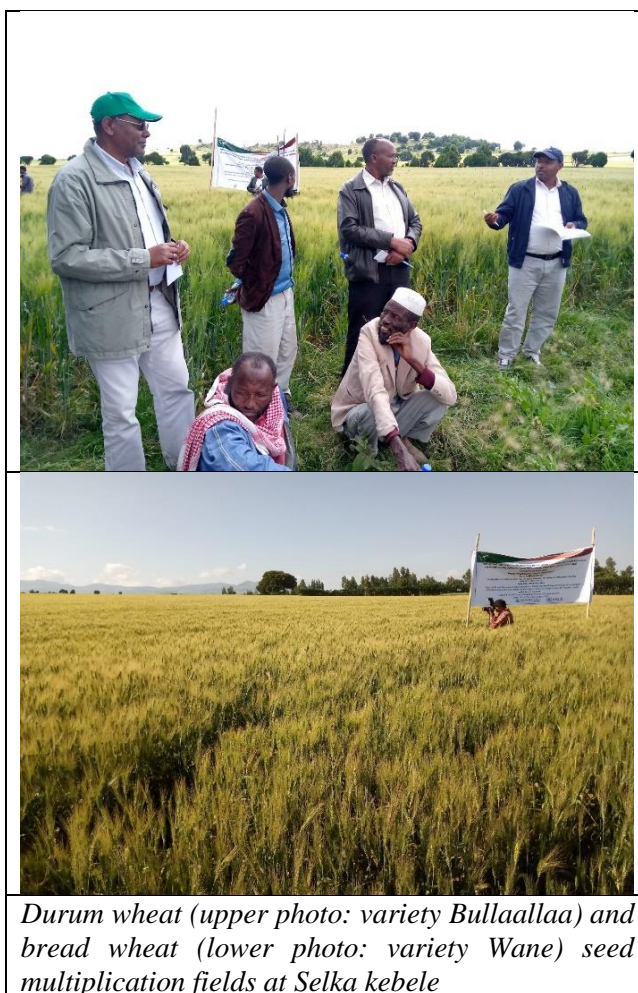
In 2018, an on-farm participatory variety selection (PVS) of bread and durum wheat along with improved management practices were conducted in the two AR *kebeles* (lowest administrative unit) of Sinana District, Bale Zone. The major objectives of the PVS trials were to demonstrate to farmers the improved crop varieties with the full production packages, and identify varieties that were high yielding, disease and insect pest tolerant, early maturing, and of high market demand that will enhance food security and income for farmers and feed for livestock. Mid-season evaluation of PVS trials was conducted during physiological maturity, where neighboring farmers, extension agents from the *woredas* (districts), as well as researchers from higher learning institutions and agricultural research centers were invited. The varieties were collectively ranked and rated based on their performance for traits listed above. Accordingly, out of the seven bread wheat varieties demonstrated, Wane was selected in 2018. Similarly, out of the seven durum wheat varieties demonstrated, Bullaallaa and Utuba were also selected by farmers; the latter two varieties are from ICARDA.

Wheat certified seed shortage is a major bottleneck for scaling of crop technologies and adoption of new varieties is moving slowly. To accelerate scaling of these technologies, we initiated a cooperative-based seed production in the 2019 main cropping season. It is part of research for development, but oriented toward alleviating the seed shortage for at least the first few years. To achieve this objective, 1 ton of basic seed of Wane variety and 0.40 tons pre-basic of Bullaallaa and 0.65 tons of basic seed of Utuba were supplied by ICARDA-AR. The seed was multiplied by Seko-Jafer Seed Producer Cooperative on 13.6 ha of clustered land. Ten farmers (50 percent females) were engaged in seed multiplication and we expect to harvest about 69 tons of quality seed (basic and C1) at the end of the year. It is envisaged that the multiplication fields will be inspected, and the seed will be tested and approved by the regional quality control agency. The cooperatives will return the amount received in kind under the ‘Revolving Seed Scheme’ for similar exercise with other farmer groups in other *kebeles*/districts. The remaining seed will be further multiplied and/or sold to neighboring farmers in the village or beyond to expand the area coverage in the coming years.

A training-of-trainers course was organized for experts from zonal and *woreda* extension offices on seed production, marketing, and enterprise management by ICARDA on November 22–23, 2019, to enable them to provide technical

backstopping to the seed producers. They are also expected to train farmers and development agents. With these supports, the seed producers are expected to address a greater number of farmers reaching about 600–650 households and covering 400–450 ha in 2020. The benefits from the spill over will continue to spread through formal and informal channels reaching a greater number of farmers over the years and meeting the anticipated project targets.

To create awareness of new technology among farmers, to measure the progress of technology dissemination, and to get feedback on performance of the technology, a field day was organized on December 3, 2019, where on-farm adaptation trials of forage crops, wheat seed multiplication fields, and beneficiary farmers were visited.



*Durum wheat (upper photo: variety Bullaallaa) and bread wheat (lower photo: variety Wane) seed multiplication fields at Selka kebele*

The field day participants included AR implementing partner organizations from CGIAR centers (ILRI, ICARDA, and ICRISAT); zonal and district administration offices; zonal and district offices of agriculture, natural resource management, and livestock development; agricultural research centers; universities; public seed enterprises; unions and cooperatives; NGOs;



government-led projects [Agricultural Transformation Agency (ATA) and Agricultural Growth Program (AGP)]; the media; and above all the development agents and farmers from the same and neighboring districts. More than 140 participants attended the field day.

Discussions at the end of the field day emphasized the need for coordination and collaboration among different research for development actors operating in the region for creating synergy and complementarity. Farmers appreciated the concerted effort made by ILRI and its implementing partners in identifying and scaling improved crop, livestock, and natural resource management technologies.

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### **ILRI Organizes Stakeholders Meeting on Forage Seed Certification in Ethiopia**

#### **Background**

The forage seed certification study was commissioned by ACDI/VOCA and implemented by the ILRI during February–October 2019. The objective was to prepare a certification scheme for forage seeds in order to improve quality and thus strengthen marketing opportunities for both producers and sellers. The study took place in three stages: a scoping study in March 2019 to gather background information, followed by two weeks of field work in May 2019 during which a wide range of stakeholders were consulted, and a report was prepared. The third stage was two meetings (October 10 and 11, 2019) in which the report was discussed, and the opinions of stakeholders were sought on the best way to carry this initiative forward.

The first meeting on October 10, 2019, was to present the report and seek opinions at more strategic and policy levels. There were 20 participants, representing a wide range of institutions and interests. The purpose was to provide background on the forage/forage seed sector in Ethiopia, to set out the current status of forage seed certification, and to propose next steps for forage seed quality improvement. The second meeting on October 11, 2019, brought together a group of seed producers to assess their interest in the proposed certification scheme to improve marketing opportunities.

Forage seed quality and access is a longstanding issue in Ethiopia. There have been various efforts to address this, including a national symposium

organized by the Ethiopian Institute of Agricultural Research in 2012 and the ‘FEEDSEED project’ funded by GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) that was implemented by ILRI during 2013–2016. Although these both stimulated some progress, access to quality seed remains a major impediment to the wider use of planted forages that is necessary to support a more productive livestock sector. Recognizing this, the ACDI/VOCA FEED III project funded by United States Department of Agriculture commissioned ILRI to conduct a further scoping study specifically on forage seed certification in Ethiopia to improve quality.

#### **Workshop presentations**

Background papers on the national seed system in general and particularly the forage seed sector were presented during the workshop, including a forage seed certification study.

A presentation made on livestock feed in Ethiopia with a focus on forage/forage seed by the ATA indicated that the country has a negative feed balance, with supply satisfying only 17–46 percent of the maintenance requirements (in dry matter) in different parts of the country. The situation is even more serious when the protein balance is considered.

An overview on the achievements of forage research and development for the last five decades was presented wherein a total of 49 varieties/species of forages have been registered and their production and utilization packages also developed. It was emphasized that despite all these efforts and intensive demonstrations, the observed adoption and impact remained very low. This was mainly due to lack of inputs like seed, lack of market-orientation among smallholders, and inadequate extension systems to promote cultivated forages, particularly among farmers who could use these as a cash crop in their rotations.

Forage seed certification in Ethiopia, including recommendations from the consultation exercise, was also presented. The key finding of the consultation was that all the legal framework and technical standards for certification already exist; but are used for cereal seeds and not for forages. Moreover, the quality specifications published by the Ethiopian Standards Agency are unachievable in practice. The report proposes that, as an interim measure, Quality Declared Seed (QDS) should be adopted as a more flexible approach and the requirements for this were explained.

### Group discussions on thematic areas and way forward

After the presentations, participants divided into three groups to discuss the following questions: (i) What are the key barriers to improving forage seed quality and access? (ii) Do we agree that QDS is an approach worth pursuing? Is forage seed supply likely to move toward commercialization? (iii) Can simpler QDS standards be produced/approved quickly? (iv) How can regions be linked? How will seed production be organized? (v) What are your top three specific next steps to move the forage seed sector forward?

In addition, during the second day, participants also discussed the way forward for forage seed production and certification in Ethiopia.



*Participants of forage seed certification workshop in Ethiopia*

### Synthesis of key conclusions from the workshop

#### Thematic group discussions

The outcomes of thematic discussions are listed below:

1. There was general agreement among participants that a quality assurance scheme would help to enhance the supply of quality forage seed. The consensus was that existing reputable suppliers are being hampered by unscrupulous informal producers who offer poor quality seed at low prices. Bulk buyers are often complicit in maintaining low seed quality by their willingness to purchase seed of doubtful quality at low prices in order to fulfill quotas.
2. A further barrier to a healthy forage seed sector is the practice of NGOs and others to bulk purchase seed and offer this free to smallholder farmers thus creating an artificial market which limits the scope to become a commercially viable system and expand in response to demand. This has previously been identified as a problem, but persists.
3. The proposal to start with a QDS scheme was accepted, although progression to full

certification can remain as the final goal. The rationale for using QDS is:

- a. Availability of QDS guidelines for seed certification
  - b. More flexibility in the standards—if agreed by the regulatory bodies
  - c. Improved timeliness and lower cost of inspection procedures.
4. The key principles of the QDS scheme must be accepted by policy makers and regulatory authorities so that no difficulties are encountered during implementation.
  5. QDS must be owned by a group of producers (and possibly other parties) who are committed to maintaining the standards and protecting the reputation of the scheme; this will require a robust Code of Conduct in addition to the technical guidelines.
  6. Although QDS will address quality issues, this is certainly not the only constraint in seed production. Many participants emphasized the problem of matching demand and supply. This can only be achieved if there is closer linkage through the whole marketing chain. This consistent with the direct seed marketing initiative that is currently being rolled out.
  7. Forage seed should be more widely available to farmers at a wide range of outlets, such as farm service centers, one-stop shops, and feed sales points so that they can make a spot purchase—this exploits the long-established principle that ‘availability creates demand.’
  8. Putting the above points into practice will require the use of packages to facilitate retail selling in small units and with a reasonable shelf life.

#### Proposed next steps

The following were agreed as important next steps to move forage seed production forward and with more emphasis on quality standards:

1. Prepare a draft guideline for a QDS scheme containing the key principles and procedures; this will define the scheme in more detail so that all parties know what is being proposed and what they have to do.
2. Present this draft to the National Seed Advisory Group for comments and hopefully approval in principle or with no objections so that discussions can continue.
3. Secure commitment by a group of producers to sign up to the draft QDS scheme and discuss the organizational structure, including legal

status and governance. This will require some sensitive consultation to decide who is considered reliable and eligible; it cannot be too inclusive and there must be criteria for membership, embodied in the Code of Conduct.

4. At this stage, it will be necessary to find external support to operationalize the scheme including identifying all the key participants, securing their support, and making the organizational arrangements as listed in Annex 5 of the main report. This will also require basic facilities/arrangement for quality assurance and packaging.

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### **Sudan: TAAT Wheat Program Yields Significant Results**

ICARDA is implementing a wheat project under Technologies for African Agricultural Transformation (TAAT) in three hub countries, Ethiopia, Nigeria, and Sudan; and five satellite countries, Kenya, Mali, Niger, Tanzania, and Zimbabwe. Sudan is one of the primary beneficiary countries of the project. Scaling of wheat innovations is a primary task of TAAT.

In Sudan, farmers and other players in the agricultural sector are celebrating the success of new heat-resistant wheat varieties which could transform the food landscape in the country.

New heat-resistant wheat cultivars such as Imam, Zakia, and Bohain, contribute to the increase in Sudan's wheat-growing areas to around 303,000 ha, up from 230,000 ha in 2017. The high productivity and wheat area expansion witnessed will lead to a record high production expectation of around 0.85 million tons of wheat, covering up to 45 percent of national demand, announced at the time.

Speaking at a national Farmers' Field Day event, one of several held during March 26–29, 2019, to showcase the achievements of the wheat project, developed under the Africa Development Bank's (AfDB's) TAAT program. The project has led to the rollout of technologically enhanced wheat varieties, in line with one of AfDB's top High Five Priorities-Feed Africa.

The TAAT wheat program has already yielded significant results in Sudan. The field days, which received widespread media coverage, were attended by a broad range of stakeholders in the wheat value chain. The events promoted the success of the cultivars that were released in the past five years.

Policy makers, the private sector, credit institutions, input providers, processors, NGOs, youth and women's associations, and thousands of farmers showed up to witness the success of the project.

In addition, four members from the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending shared their experiences and promised future collaboration with different partners in Sudan.

During the field day, seed production farms were visited, along with farmers' fields involved in scaling-up activities. Youth and women's groups were trained in wheat production, value addition, and farm machinery maintenance services at the Basatna, Wad Elbur, and Mukashfi innovation platform sites. These sites were selected by the TAAT wheat team for scaling up and widely promoting the impact of proven wheat technologies to farmers and stakeholders along the value chain.

At another field day event, technology-adopting farmers expressed their happiness with the impressive performance of heat-tolerant wheat varieties and said they were expecting yields of 4–6 tons ha<sup>-1</sup> this season, compared to 2 tons ha<sup>-1</sup> before joining the project. At Wadelneim village, a group of innovative farmers who adopted the heat-tolerant varieties said they expected yields of 6–7 tons ha<sup>-1</sup>. They attributed their success to the hands-on training they received at the TAAT farmer field school.

During 2012–2016, Sudan only produced 24 percent of the country's national wheat demand, leaving it heavily reliant on annual imports of over 1.5 million tons of wheat.

Heat stress in sub-Saharan Africa is a major constraint to wheat production. In places like Sudan temperatures often exceed 38°C and climate change is expected to worsen the situation.

In response to the food crunch, the AfDB decided to intervene to boost one of the most vital food sources in Sudan. The growing partnership between the private and public sectors engaged in seed



production could result in a record amount of certified seed, enough to cultivate around 420,000 ha of wheat in the next season.

Source: [Devdiscourse](#) (*Discourse in Development*)

### ICARDA Continues Rebuilding the Seed System in Syria

In 2018/2019, under the agreement of the FAO and the support of DFID, ICARDA implemented a project *Provision and Multiplication of Cereals and Legumes Varieties in Syria and Improving Access to Knowledge at Community Levels*.

ICARDA supplied pre-basic seed of wheat, barley, chickpea, and lentil varieties to initiate local seed production by mobilizing, organizing, and training farmers in local seed production in a target district of Aleppo Province. In total, 1,450 kg of pre-basic seed of bread wheat (Cham 4, Cham 6, and Cham 10), durum wheat (Cham 3 and Cham 7), barley (Arta and Furat 3), chickpea (Ghab 3, Ghab 4 and Ghab 5), and lentil (Idleb 3 and Idleb 4) were provided to the pioneer farmers. About 21 ha of wheat, barley, chickpea, and lentil was planted and 40 tons of basic seed was produced by the project.

In 2019/2020, a new project has been initiated focusing on further multiplication of pre-basic seed under a project *FAO Syria Smallholder Support Program (SSP) for Agriculture Transformation*. A total of 6.5 tons of pre-basic seed (4.65 tons of wheats, 0.8 tons of barley, 0.7 tons of chickpea, and 0.35 tons of lentil) will be made available from ICARDA to initiate the basic seed multiplication on approximately 65 ha of private growers in the 2019/2020 cropping season under the direct supervision of ICARDA.

The project will deliver the following outputs or outcomes:

1. Pre-basic seed of target varieties secured, and basic seed produced
2. Farmer-based seed producer unions for seed production and marketing in target locations established
3. Agriculture services and input support provided to the farmers of seed producer unions
4. Capacity strengthened of seed producer unions, partners, and stakeholders along the seed value chain through training of trainers and farmers
5. New improved varieties and integrated crop management technologies demonstrated, and field days organized.

To ensure sustainability in project implementation, continuous support and follow-up actions beyond the project life-time will be required for seed producer unions to continue certified seed production and marketing after the closure of this project. These are strategic seed system development issues, which can only be adequately addressed through a strategic partnership among the national and international research for development practitioners and donors. The FAO and ICARDA need to give due attention to fostering this partnership to ensure long-term sustainability.

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### The Thriving West African Seed Industry

West African seed companies are thriving as a result of the harmonization of regulations, as acknowledged by actors in the sector during a regional gathering in Abuja, Nigeria in October 2019.

Governments, research institutes, and development agencies have been working together in the past decade to implement a policy that would allow for the free flow of seeds across West Africa. Funded by the United States Agency for International Development and implemented by [CORAF](#) on behalf of three intergovernmental bodies, the efforts are seemingly starting to yield fruits.

Removing barriers for the free movement of seeds across boundaries is one of the central tenets of this policy. The harmonization of regulations has made it easy for companies to trade across the different countries in the region. Having access to a regional seed market with fewer barriers to seed trade contributes to the growth of seed enterprises. Small-scale seed enterprises are now emerging and providing quality seeds to farmers across countries of West Africa.

The [Economic Community of West African States](#), the [West African Economic and Monetary Union](#), and the [Permanent Interstate Committee for Drought Control in the Sahel](#) have mandated CORAF to facilitate the adoption of this policy across West Africa.

ECOWAS is among the intergovernmental bodies with an interest in the free flow of seeds. As a regional economic tool working for regional integration, ECOWAS's goal is to see its policy of free movement of people and services across West Africa become a reality.

If a researcher discovers a variety in any ecological zone, and this variety is released in one Member State, then it can be produced and marketed in another one. This mechanism is bringing all the advantages of working together in the same community.



*Participants of the meeting in Abuja, Nigeria*

### What's the Background?

For effective implementation of the seed regulation, actors have put in place a committee known as the West Africa Regional Seed and Seedling Committee (WARSSC). The body meets annually to review progress in view of tackling relevant corrective measures or actions. Its fifth meeting held during October 16–18, 2019. It provides an opportunity for all the actors from governments, private sector, researchers, and donors to examine the state of progress. About 60 actors from 17 countries took part at the Abuja event.

### Toward Full Implementation

While there is a consensus that progress has been made in the implementation of the policy, member States agree that issues like the registration of new varieties, the effective transfer of certain prerogatives to the private sector, challenges of regional trade of seeds among the West African countries need to be addressed so as to make quality seeds accessible and readily available to farmers across the sub-region.

At a recent gathering held in the Nigeria, actors took measures to ensure these issues are addressed at the national and regional levels. Specifically, the Abuja meeting recommended the following:

- Strengthen the mobilization of policy makers to support countries and the sub-region in the full implementation of the regional regulation;
- Mobilize funds for the implementation of activities in each country;
- Strengthen the capacities of Member States to better mainstream all the provision of the harmonized regulation;
- Strengthen communication about the regulation so that it is well disseminated and allows stakeholders to have the necessary information for its implementation;
- Strengthen collaboration with other organizations working in the seed sector;
- Strengthen the private sector engagement in the seed industry;
- Develop or establish reference laboratories for seeds quality control and certification and encouraging Member States to be accredited to OCED and ISTA standards.

Several countries are already well advanced in the implementation of harmonized seed regulation. However, a few countries are lagging. Support is required so that they can catch up with others and be at the same level of regulatory implementation.

Source: [CORAF This Month \(October 2019\)](#)

### Seed Sector SWAT Team Formed for Seed Sector Stakeholders in East and Southern Africa

Despite harmonized policies, cross-border seed trade is still lagging in East and Southern Africa. There is a significant discrepancy between what is stated in harmonized policies and the actual seed certification and border procedures and practices in specific countries. This contributes to mistrust and the introduction of additional requirements, such as seed testing, by recipient countries, to confirm that international standards are being met, resulting in additional costs.

As a result, seed production and trade in the Common Market for East and Southern Africa ([COMESA](#)) region is low, impeding access to appropriate, affordable, and quality seeds by smallholder farmers which is key for increased agricultural productivity and food security in the region. To address this barrier to seed trade, Africa Lead is implementing a pilot seed activity that focuses on improving regional seed trade by strengthening seed certification systems, border operations, and the engagement of national leadership on policy processes.

As part of the *pilot seed activity*, Africa Lead facilitated a joint learning visit for 57 regional seed sector leaders from six countries: Ethiopia, Kenya, Tanzania, Uganda, South Sudan, and Zambia. The visit addressed specific issues between the six participating countries and stakeholders by facilitating learning, opportunity identification, action, commitment, and collaboration. Participants of the joint learning visit in Uganda attended a field demonstration on seed inspection and digital data capturing processes, and visited the national seed testing laboratory in Kawanda, a Farm Inputs Care Centre Ltd (FICA Seeds) seed processing facility, and One Stop Border Point in Malaba, a town on the Kenya-Uganda border.

On the last day of the visit, countries were paired up, based on interests, to discuss specific trade barriers and opportunities between them and agree on follow-up actions to improve cross-border trade. Representatives from Uganda and South Sudan discussed how to address the concern of low quality (fake) seed exported to South Sudan, while representatives from Kenya and South Sudan discussed the efforts Kenya has put in place to control the Maize Lethal Necrosis disease. Representatives from Zambia and Uganda discussed the issues on GMO certificate requirement for seed from Zambia. Kenya representatives discussed opportunities for seed trade with Ethiopia, while Tanzania and Zambia representatives discussed how to improve trade between them.



*Participants at seed processing plant of FICA*

Participants underscored the need for regular country to country conversations and process audits to address day-to-day issues, share lessons, and build trust in their certification systems, alongside bilateral negotiations and actions as a practical way of facilitating domestication and cross-border trade. To improve border operations and enhance coordination, quality assurance, and confidence in each other's certification systems, participants agreed to form a team from participating countries (known as the SWAT team) to focus on:

1. Creating an independent regional team to conduct bi-annual (regular) audits of the country seed certification processes.
2. Establishing a mechanism/forum for continuous dialog between national agencies to address existing gaps and emerging issues and share lessons to build trust in each other's systems.
3. Developing country-specific Standard Operating Procedures, communication tools and a platform to support domestication and improve field and border practices; simplify and make accessible all procedures and requirements for seed import and export to all traders.
4. Addressing capacity issues relating to human resource and infrastructure at country level— numbers and skills set of personnel and facilities.
5. Establishing a regional system that can determine demand and surplus in different countries to facilitate forward planning and seed movement across countries.
6. Improving coordination and harmonization of the various digitization platforms (e.g. Seed Assure and Pedigree) to avoid duplication and confusion.

The joint learning visit was a follow up to the national consultations that developed specific national actions committed to by leaders to address bottlenecks in seed trade. Through the *pilot seed activity* Africa Lead is building an ever-stronger working relationships between major development partners, including Alliance for Green Revolution in Africa, Africa Agricultural Technology Foundation, The African Seed Access Index, Seed Trade Association of Kenya, One Acre Fund, and AFSTA which is improving information sharing, activity coordination, leveraging, and joint planning and action. More efforts are required to create incentives and synergy and to build a similar coalition at country level.

For more information visit the [link](#)

## Research Notes

**This section contains short communications on practical research or relevant information on agriculture or seed science and technology.**



## Identification of Farmers' Preferred Bread Wheat (*Triticum durum*.) Varieties in Northern Ethiopia

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### Abstract

A study was conducted to identify farmer-preferred bread wheat varieties in the 2018/2019 main cropping season at Endamehoni district, Southern Tigray Zone in northern Ethiopia. Seven released bread wheat varieties were evaluated in four farmers' field at Embahasti and Tsibet *kebeles* in mother trial types. The varieties were evaluated based on farmers' selection criteria using score values and matrix ranking methods. From the bread wheat varieties, based on overall farmers' evaluation mean score value, varieties Ogolcho, Hidase and a new candidate variety ranked first, second and third, respectively. Grain yield, availability of seed and farmers' evaluation and preferences were found crucial to disseminate, diversify and adopt newly released varieties within a short period of time.

**Key words:** Bread wheat, correlation, farmers' preference, varieties

### Introduction

Wheat (*Triticum aestivum* L.) is one of the most important cereal crops in the world in terms of area coverage and production (FAOSTAT 2019). In Ethiopia it is ranked fourth after teff, maize and sorghum (CSA 2018). Accordingly, about 4.2 million smallholder farmers cultivated wheat on close to 1.7 million ha producing 4.6 million metric tons. It is widely grown in Amhara, Oromia, SNNP and Tigray Administrative Regions. It is a principal staple crop used to make *injera*, a daily bread for rural households in the country. Additionally, wheat is also used for producing food products by the agro-processing industry.

The objectives of participatory variety selection (PVS) conducted were to: (i) evaluate and select bread wheat varieties through farmers' participation; and (ii) recommend varieties for further seed production and supply based on their performances. Factors that affect selection of elite varieties in conventional breeding are mostly under the control of the researchers and extension agents rather than considering farmers' perspectives and

farming conditions. This study investigated the application of PVS to identify bread wheat varieties that are suitable for the farmers and their production environment and the agro-industry.

### Materials and methods

The study was conducted at Embahasti and Tsibet *kebeles*, Endamehoni district, Southern Tigray Zone in northern Ethiopia. Seven nationally released varieties were planted: Deka, Hidase, Kingbird, Lemu, Ogolcho, Wane and a new candidate variety for release. The experiments were carried out in mother trial type on four farmers' fields in 2018/2019 main cropping season. The plot size was 25 m<sup>2</sup> per variety. A seed rate of 125 kg ha<sup>-1</sup> was used and fertilizers applied at 100 kg ha<sup>-1</sup> for NPS and 150 kg ha<sup>-1</sup> for urea. All of the NPS and half of the urea were applied during planting and half of the urea was top dressed during tillering.

The evaluation was performed separately by male and female farmers. Selection criteria were separately identified and ranked by male and female farmers. A matrix ranking was prepared of the criteria against the varieties.

### Results and discussion

The results for grain yield, and correlations are presented below. The farmers' PVS revealed significant differences among the bread wheat varieties evaluated.

### Matrix score ranking

The mean score values ranged within 125.5 to 185.5 (Table 1). Both male and female group evaluations gave the highest mean score value for Ogolcho (185.5) and the lowest for Lemu (125.5). The farmers' evaluation revealed that Ogolcho, Hidase and the new candidate variety ranked first, second and third, respectively.

Table 1. Evaluation of bread wheat varieties by male and female farmers in 2018/19 crop season

| Varieties | Ebahasti |        | Tsibet |        | Mean   | Rank |
|-----------|----------|--------|--------|--------|--------|------|
|           | Male     | Female | Male   | Female |        |      |
| Ogolcho   | 188      | 162    | 196    | 196    | 185.5  | 1    |
| Deka      | 161      | 156    | 182    | 189    | 172    | 4    |
| Lemu      | 119      | 102    | 140    | 140    | 125.25 | 7    |
| Kingbird  | 168      | 156    | 166    | 166    | 164    | 5    |
| Candidate | 168      | 150    | 203    | 203    | 181    | 3    |
| Wane      | 147      | 140    | 168    | 168    | 155.75 | 6    |
| Hidase    | 173      | 171    | 196    | 196    | 184    | 2    |

Similar results were recorded in grandmother-mother and mother trial types of malt barley PVS in northwest and northern Ethiopia (Aynewa et al. 2013, 2019b) and mother trials on durum wheat (Aynewa et al. 2016), lentil (Aynewa et al. 2017), food barley (Aynewa et al. 2018b), faba bean

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(Aynewa et al. 2018a) and linseed (Aynewa et al. 2019a).

### Grain yield

Analysis of grain yield results showed that there is a significant difference among bread wheat varieties evaluated under PVS. The grain yield ranged within 0.48 to 8.4 tons ha<sup>-1</sup>. Varieties Deka, Wane and Hidase recorded first, second and third highest for mean grain yield, respectively. The highest yield was recorded for Deka (8.4 tons ha<sup>-1</sup>) at Tsibet and the lowest was recorded for Kingbird (0.48 tons ha<sup>-1</sup>) at Embahasti (Table 2).

Table 2. Bread wheat grain yield in Endamehoni district in the 2018/2019 cropping season

| Varieties | Yield (metric tons/ha) |                     |                        |                        | Mean |
|-----------|------------------------|---------------------|------------------------|------------------------|------|
|           | Tsibet <sup>1</sup>    | Tsibet <sup>2</sup> | Embahasti <sup>1</sup> | Embahasti <sup>2</sup> |      |
| Hidase    | 8.24                   | 5.24                | 3.36                   | 0.92                   | 4.44 |
| Lemu      | 6.8                    | 5.68                | 2.04                   | 1.76                   | 4.07 |
| Ogolcho   | 6.92                   | 4.56                | 3.36                   | 1.24                   | 4.02 |
| Deka      | 8.4                    | 6.04                | 3.2                    | 1.76                   | 4.85 |
| Wane      | 7.32                   | 6.8                 | 2.96                   | 0.84                   | 4.48 |
| Kingbird  | 7.28                   | 4.48                | 2.92                   | 0.48                   | 3.79 |
| Candidate | 6.08                   | 6.64                | 2.71                   | 1.36                   | 4.19 |

Note: <sup>1</sup> and <sup>2</sup> refers to fields of farmer 1 and farmer 2, respectively at both kebeles

### Correlation

Spearman correlation coefficient analysis results showed that there are positive and negative associations between grain yield and farmers' participatory evaluation (Table 3). The farmers' evaluation score indicated that crop stand ( $r = 0.0357$ ), tillering capacity ( $r = 0.036$ ), disease tolerance ( $r = 0.204$ ), spike length ( $r = 0.436$ ) and plant height ( $r = 0.108$ ) were positively associated with grain yield while maturity ( $r = -0.234$ ) was negatively associated with grain yield. Generally, positive associations of grain yield and traits indicate the possibilities of correlated responses to selection, but negative correlations prohibit the simultaneous improvement of these traits. The non-significant coefficient of correlation coefficient indicates that selection for these different traits could be done separately and independently.

Table 3. Spearman correlation coefficient of grain yield with farmer's evaluation

|    | CS     | Tr     | DT    | SL     | Ma     | PH    |  |
|----|--------|--------|-------|--------|--------|-------|--|
| CS | 1      |        |       |        |        |       |  |
| Tr | 0.901  | 1      |       |        |        |       |  |
| DT | 0.612  | 0.618  | 1     |        |        |       |  |
| SL | 0.818  | 0.633  | 0.312 | 1      |        |       |  |
| Ma | -0.018 | -0.118 | 0.618 | -0.330 | 1      |       |  |
| PH | 0.811  | 0.554  | 0.618 | 0.688  | 0.245  | 1     |  |
| GY | 0.035  | 0.036  | 0.204 | 0.436  | -0.234 | 0.108 |  |

Note: CS=Crop stand, Tr=Tiller, DT=Disease tolerant, SL=Spike length, Ma= Maturity, PH= Plant height; GY=Grain yield

### Conclusion

Analysis of grain yield and participation of farmers in variety evaluation helps in understanding their selection criteria and preferences to better design and develop appropriate techniques to select varieties better adapted to their environments and accessing genetic diversity. The PVS helps accessing a diverse set of varieties and disseminating appropriate technologies within a short period of time, if coupled with a local seed supply system.

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## Meetings and Courses

Announcements of national, regional, or international conferences, meetings, workshops, and training courses appear in this section.

### Conferences

#### 2020 BGRI Technical Workshop, John Innes Centre, June 1–4, 2020, Norwich, UK

At the BGRI 2020 Technical Workshop at the John Innes Centre in Norwich, UK, join us as scientists, policy makers and thought leaders from more than 50 countries gather to exchange research results, network, collaborate and learn about the greatest challenges faced by wheat scientists and farmers.

In addition to three days of cutting-edge presentations and plenary sessions, workshop participants will spend half a day touring the research fields of the [John Innes Centre](#), an international centre of excellence in plant science, genetics and microbiology.

#### Session topics include

- Disease resistance
- Alternate hosts
- Epidemiology/surveillance
- Pathogen biology

[Learn more about session topics](#)

#### Pre-workshop trainings include

- MARPLE diagnostics
- Speed breeding
- Quantitative genetics
- Effectors and immunity

[Learn more about trainings](#)

For more information on the conference, visit the website at: <https://web.cvent.com/event/7c1b5476-678e-46b0-8030-36e2f954fd44/summary>

#### 4th International Conference on Global Food Security

The 4th International Conference on Global Food Security under the theme *Achieving Local and Global Food Security: At What Costs?* will be held on June 16–19, 2020, at Le Corum, Montpellier, France. The conference will address the topic of food security at all spatial levels from local to global, and from an interdisciplinary and systemic food systems perspective. It aims to better understand environmental, nutritional, agricultural, demographic, socioeconomic, political,

technological, and institutional drivers, and the costs and outcomes of current and future food security. The conference will address the triple burden of malnutrition: hunger, micronutrient deficiencies, and obesity. It will explore the current state of interdisciplinary insight, address the trade-offs that occur—and synergies that can be sought—in transforming food systems.

Contributions which bridge themes or scales, foster interdisciplinarity and integration, or address interactions between science and non-academic stakeholders are particularly welcome. Single discipline or specific studies are welcome in parallel sessions or as posters.

For more details, visit the [4th International Conference on Global Food Security](#)

#### Africa Seed Trade Association (AFSTA) Congress 2020

The [AFSTA Congress](#) will be held in Livingstone, Zambia, March 3–6, 2020. For more information, please contact the AFSTA Secretariat at [afsta@afsta.org](mailto:afsta@afsta.org)

#### ISTA Annual Meeting 2020

The ISTA Annual Meeting will be held in Verona, Italy, May 25–28, 2020. Preliminary program, registration fees and other necessary information may be found on the annual meeting's [website](#). All participants are required to fill out the registration form [online](#). An email confirming the registration will be sent once the process is complete. For more information, please contact: ISTA, Zurichstrasse 50, 8303 Bassersdorf, Switzerland; tel: +41 44 838 6000; fax: +41 44 838 6001; email: [ista.office@ista.ch](mailto:ista.office@ista.ch); website: [www.seedtest.org](http://www.seedtest.org)

#### ISF World Seed Congress 2020

The International Seed Federation's (ISF) World Seed Congress 2020 will be held in Cape Town, South Africa, June 8–10, 2020. Conference registration will open on January 8, 2020 at 11:00 GMT. See the [ISF World Seed Congress 2020 website for more information](#).

#### 13th Triennial conference of the ISSS, 2020

The [13th Triennial Conference of the ISSS](#) (International Society for Seed Science) will take place September 7–11, 2020 at the University of Sussex, Brighton, UK.

The science program will cover six themes:

1. Seed memory—how environment influences traits during development
2. Seed life span—the science of maximizing survival



3. Seeds and society—local innovation systems and species added-value
4. Seed form and function—the morphology of success
5. Seed germination and stress—niches and coping strategies
6. Seed innovation systems for the 21st century—automation to zeitgeist

The website and registration will be announced soon.

## Courses

### ICARDA Courses

ICARDA organizes both short- and long-term courses in thematic areas related to its research programs under Biodiversity and Crop Improvement; Resilient Agricultural Livelihood Systems; and Water, Land Management, and Ecosystems. For more information on the ICARDA annual training programs, please contact: Charles Kleinermann, ICARDA, Cairo, Egypt; email: [c.kleinermann@cgiar.org](mailto:c.kleinermann@cgiar.org)

### UPOV Distance Learning Courses

Two sessions of each of the following UPOV distance learning courses are planned in 2020:

1. DL-205 Introduction to the UPOV system of plant variety protection under the UPOV Convention
2. DL-305 Examination of applications for plant breeders' rights
3. DL-305A Administration of plant breeders' rights (Part A of DL-305)
4. DL-305B DUS Examination (Part B of DL-305)

The timetable of all courses for 2020 is as follows:

#### Session I—2020

- Registration: January 13 to February 16
- Study period: March 2 to April 5
- Final examination: March 30 to April 5

#### Session II—2020

- Registration: August 3 to September 13
- Study period: October 12 to November 15
- Final exam: November 9–15

The categories for participants are:

*Category 1:* Government officials of members of the Union endorsed by the relevant representative to the UPOV Council (no fee).

*Category 2:* Officials of observer states/ intergovernmental organizations endorsed by the

relevant representative to the UPOV Council (one non-fee-paying student per state/intergovernmental organization; additional students, Swiss francs (CHF) 1,000 per student).

*Category 3:* Others (fee, CHF1,000).

More detailed information about the courses and online registration is available on the UPOV [website](#).

### ISTA Training Workshops

*ISTA Workshop on Quality Assurance and ISTA Accreditation for Early Beginners April 21–24, 2020, Tunis, Tunisia*

This [workshop](#) aims at presenting and discussing basic principles of quality management and it focuses on the needs of seed testing laboratories that wish to comply with the ISTA Accreditation Standard and prepare for attaining and maintaining ISTA Accreditation. It is organized by ISTA and AFSTA

The number of participants is for a minimum of 16 and a maximum of 20 participants. The fee is US\$200 for both ISTA members and non-members.

The Workshop is organized in French and there will be no English translation.

*ISTA SHC Workshop: Seed Health Methods to detect fungi, bacteria and viruses, June 31 to July 4, 2020, Pretoria, South Africa*

This [workshop](#) will provide an overview of Seed health testing methods and detection of seed-borne bacterial, viral and fungal pests which are very relevant for seed trade in field and vegetable crops in Southern Africa and other countries.

It will be focused on *Fusarium* on maize, *Xanthomonas hortorum* pv. *carotae* on carrot, *Clavibacter michiganensis* subsp. *michiganensis* on tomato and Tobamoviruses on tomato. Methods covered will be plating for fungi, dilution plating and PCR for bacteria, ELISA and indexing for viruses.

The number of participants is for a minimum of 20 and restricted to a maximum of 25 participants. The fee is €450 for ISTA members and €675 for non-members. Registration deadline is March 15, 2020.

If you require an invitation letter, or for any additional information, for both workshops please

contact: Andreea-Nicoleta Militaru; tel: +41 44 838 68 33; email: [andreea.militaru@ista.ch](mailto:andreea.militaru@ista.ch);

### New e-Learning Course on Seed System Security Assessments and Response

This e-Learning course walks participants through the Seed System Security Assessment (SSSA) process and tools and then focuses on targeted responses.

The eight modules are highly interactive, and the participants explore how to collect key data, decide if farming households are stressed (the demand side), and assess if seed markets are adequately functioning (the supply side). Throughout, hands-on exercises and frequent knowledge checks help verify that participant learning is proceeding well.

The course draws field insights from real [SSSAs](#) – conducted in many of the crisis hotspots in the world. One module models what happened in three distinct disaster scenarios, presents the evidence, and then has participants reflect on the short- and medium-term response actions required.

Although the aim of the e-Learning course is to build basic skills (e.g. how to do an SSSA), it also encourages practical thinking: what information is absolutely needed in a disaster scenario, and how can one link the findings to an effective (and doable) seed security action plan.

The new e-Learning course is a fun way to learn about SSSAs and responses. Visit the full [e-Learning course](#) or the You Tube [video](#).

For comments or clarification, please contact: [info@seedssystem.org](mailto:info@seedssystem.org) or [spierling@seedssystem.org](mailto:spierling@seedssystem.org)

## Literature

Books, journal articles, and other literature of interest to readers are presented here. It may contain relevant information on agriculture-related publications including seed policy, regulation, and technology.

### Books

**Filho, W. L., S.L. Hemstock (eds.). 2020. *Climate Change and the Role of Education***

*Published by Springer ([www.springer.org](http://www.springer.org)); ISBN 9783030328979; Price: € 159.99 (Hardback); 573 pp; ISBN 9783030328986, Price: €130.89 (eBook)*

This book offers insights into the educational dimensions of climate change and promotes measures to improve education in this context. It is widely believed that education can play a key role in finding global solutions to many problems related to climate change. Indeed, education as a process not only helps young people to better understand and address the impact of global warming, but also fosters better attitudes and behaviors to aid efforts toward mitigating climate change and adapting to a changing environment. But despite the central importance of education in relation to climate change, there is a paucity of publications on this theme. Against this background, this book focuses on the educational aspects of climate change and showcases examples of research, projects and other initiatives aimed at educating various audiences. It also provides a platform for reflections on the role education can play in fostering awareness on a changing climate. Presenting a wide range of valuable lessons learned, which can be adapted and replicated elsewhere, the book appeals to educators and practitioners alike.

**Filho, W. L. (ed.). 2020. *Handbook of Climate Change Resilience***

*Published by Springer ([www.springer.org](http://www.springer.org)); ISBN 9783319933351; Price: €749.99 (Hardback); 2198 pp (in 3 volumes)*

Climate resilience, or the capacity of socio-ecological systems to adapt and upkeep their functions when facing physical-chemical stress, is a key feature of ecosystems and communities. As the risks and impacts of climate change become more intense and more visible, there is a need to foster a broader understanding of both the impacts of these disruptions to food, water, and energy supplies and to increase resilience at the national and local level.

The Handbook of Climate Change Resilience comprises a diverse body of knowledge, united in the objective of building climate resilience in both the industrialized and the developing world. This unique publication will assist scientists, decision-makers and community members to take action to make countries, regions and cities more resilient.

**Onstad, D. W., P. Crain. 2019. *The Economics of Integrated Pest Management of Insects***

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*Published by CABI ([www.cabi.org](http://www.cabi.org)); ISBN: 9781786393678; Price: US\$120 (Hardback); 232 pp*

Many biological studies on insect management do not consider economics or fundamental economic principles. This book brings together economists and entomologists to explain the principles, successes, and challenges of effective insect management. It highlights the importance of economic analyses for decision making and the feasibility of such approaches and examines integrated pest management (IPM) practices from around the world with an emphasis on agriculture and public health.

### Websites

#### The East Africa Seed Network

[The East Africa Seed Network](#) is part of the [Africa Food Security Network](#), an online collaboration and learning platform that links together the most important stakeholders working on seed

trade in East Africa across the private and public sectors. It is supported and operated by Africa Lead, a Feed the Future and USAID program, in partnership with the African Union to further the goals of CAADP.

#### American Seed Trade Association

Founded in 1883, the [American Seed Trade Association \(ASTA\)](#) is one of the oldest trade organizations in the United States. ASTA works on behalf of the seed industry to promote the research, development and movement of quality seed to meet the world's demand for food, feed, fiber and fuel.

### Newsletters

#### E-news

[E-news](#) is an electronic news published and distributed by the American Seed Trade Association updating information devoted to the news related to the seed sector focusing in USA.



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## About ICARDA

The International Center for Agricultural Research in the Dry Areas (ICARDA) is the global agricultural research organization working with countries in the world's dry and marginal areas to deliver sustainable systems solutions that increase productivity, improve rural nutrition, and strengthen national food security. ICARDA's integrated approach includes new crop varieties; agronomy; on-farm water productivity; natural resources management; rangeland and small ruminant production; and socioeconomic and policy research to better target poverty issues and accelerate technology adoption. As a member of the CGIAR Consortium, ICARDA works closely with national agricultural research programs and other partners in more than 40 countries across North and sub-Saharan Africa, and Central, South, and West Asia.



Contact: Zewdie Bishaw, Head of Seed Section and International Nurseries & Country Manager, ICARDA-Ethiopia, Addis Ababa, ICARDA; email: [z.bishaw@cgiar.org](mailto:z.bishaw@cgiar.org)

### Note to Subscribers

Subscribers are encouraged to play a proactive role in making this newsletter a useful platform for information exchange. Contributions are most welcome in the broad areas of seed system development; meetings, courses, and electronic conferences; books and reviews; websites of special relevance to the seed sector; funding opportunities; requests to other readers for information and collaboration; and feature articles or discussion issues proposed by subscribers. The Editor always welcomes suggestions on format and content. Please send inputs by email to [z.bishaw@cgiar.org](mailto:z.bishaw@cgiar.org)

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