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Seed Info

Official Newsletter of WANA Seed Network

IN THIS ISSUE

ICARDA
Science for Better Livelihoods in Dry Areas

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Editorial Note

Seed Info aims to stimulate information exchange and regular communication among 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.

The **WANA Seed Network News** provides information on activities relating to global and/or regional cooperation and collaboration to facilitate the development of a vibrant regional seed industry. In this issue of Seed Info, we report on the regional seed courses organized by the International Center for Agricultural Research in the Dry Areas (ICARDA).

In the **News and Views** section, Niels Louwaars from the Dutch Seed Association writes about *Remembering Mendel's Legacy*. This year is exactly 150 years since Gregor Mendel published his theories on inheritance. After many years of crossing and observing peas, he found that plant characters were located in the gametes – in pollen and egg cells, and that the combination of the two determined the expression of such characteristics. It took 34 years until these findings became known in the scientific community. Mendel's ideas quickly spread and were put into practice giving the theoretical basis and the birth of modern plant breeding. Since then, plant breeding has made major achievements and progress in quantitative genetics, use of hybrid vigor, mutation breeding, and transgenics. Other news in this section comes from Iran and Morocco as well as regional and/or international organizations, such as the African Seed Trade Association (AFSTA), the International Seed Federation (ISF), the International Seed Testing Association (ISTA), and the International Union for the Protection of New Varieties of Plants (UPOV). Iran expanded its membership in the OECD Seed Scheme joining the cereals and maize and sorghum schemes, with the potential to enter international seed trade. The OECD Schemes for the Varietal Certification of Seed Moving in International Trade promote the use of agriculture seed of consistently high quality. Certified seeds are produced, and officially controlled, according to common harmonized procedures in 58 participating countries.

The section on **Seed Programs** presents news from Ethiopia, Iran and Pakistan. Ethiopia reports on the release of new improved varieties of barley and chickpea by national agricultural research systems from the productive partnerships with ICARDA. Ethiopia continues with its successful chickpea revolution, releasing new improved varieties with high yield potential and resistance to major biotic stresses such as wilt/root rot complex and ascochyta blight. Ethiopia is also a major producer of barley in sub-Saharan Africa, and new malt barley varieties with high potential and better malt quality were released by the Ethiopian Institute of Agricultural Research (EIAR). The report also includes the pilot electronic field inspection system introduced in Iran. Reviewing the successful implementation of the electronic field inspection system, has led to the decision to expand it to crops other than wheat and barley.

The **Research** section of *Seed Info* captures information on adaptive research or issues relevant to developing seed programs in the CWANA region and beyond. This issue features an article *Identification of Durum Wheat Varieties in Southeastern Ethiopia* by Yetsedaw et al. from ICARDA, Ethiopia. The paper discusses the participatory variety selection of durum wheat varieties carried out at Africa Rising project sites in the Bale Zone of southeastern Ethiopia. Participatory varietal selection, both by female and male farmers, identified high-yielding durum wheat cultivars that were well adapted and preferred by farmers. The activities are coupled with local seed production by organizing farmer groups to ensure scaling out of the new varieties.

Seed Info encourages the exchange of information between the national, regional, and global seed industries. We encourage our readers to share their views and news through this newsletter. Your contributions, in Arabic, English, or French, are most welcome.

Have a nice read,

Zewdie Bishaw, Editor

WANA Seed Network News

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

ICARDA Organizes Seed Courses

ICARDA continues to provide short-term and long-term seed courses to strengthen the capacity of the human resources of national seed sectors through special projects. These regional and national courses bring together staff from the various sub-sectors of national seed systems.

Field Inspection and Seed Testing in Egypt

Introduction

High quality seed is one of the most fundamental inputs in modern agriculture, but strict quality control is critical to ensure high quality standards. The quality control scheme monitors the entire national seed program and ensures that all operations – production, processing, storage, and marketing – are carried out in a correct manner to maintain the prescribed seed quality standards. Field inspection, control plots and laboratory seed testing are the key components used to assess the value of seed for planting. In many developing countries, seed certification faces many difficulties leading to unacceptable quality of seed for distribution to farmers.

ICARDA organized two courses on *Field Inspection Methodologies and its Application and Seed Quality Testing* for participants from the National Seed Administration (NSA) of Sudan. ICARDA, in close collaboration with Central Administration for Seed Certification and Testing (CASC), Cairo, Egypt organized these courses during 10–14 April 2016.

Course objectives and contents

The courses aimed at providing the theoretical, technical, and practical aspects of field inspection and laboratory seed testing as well as the organization and management of a seed certification scheme for efficient and effective service delivery for seed producers and users. The courses covered field and laboratory techniques for varietal certification and physical purity, germination, viability, vigor, and moisture content testing. Emphasis was on self- and cross-pollinated crops such as wheat and maize.

The course provided participants with opportunities to interact with professionals from ICARDA and CASC on seed certification. This was the first time that all participants had been exposed to a seed certification system operated based on an integrated quality management system. The course also provided them with a first account of the Organization for Economic Cooperation and Development seed certification scheme, which is much simpler than the system currently used in Sudan. It provided them with the directions and horizons towards further improvements that the national seed certification scheme should take and the possible areas of expansion.

Course participants

The training course was organized for technical staff – field inspectors and seed analysts – from the NSA of the Ministry of Agriculture, Sudan. About 16 participants from eight states of Sudan attended the course, including eight female participants and a participant from Nile Sun Private Enterprise.

Participants of training course on field inspection methodology (top) and seed quality testing (bottom)

The Seed Development Project of the International Fund for Agricultural Development in Sudan covered the full cost of both training courses.

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Seed Production, Processing, and Quality Control Courses in Lebanon

Introduction

ICARDA is currently implementing a comprehensive Third Country Training Program for Afghanistan and selected countries in the West Asia and North Africa region supported by the Japanese International Cooperation Agency covering a wide range of themes in agriculture research for development, among these several seed science and technology courses were organized in 2016.

ICARDA organized two seed courses, *Seed Processing and Storage and Seed Production and Quality Assurance* courses in April and May, respectively, in Terbol, Lebanon. Both courses are an integral part of a functional national seed system to enhance crop production and productivity for greater food and nutritional security.

Course objectives and contents

The course aimed at providing the principles, procedures, organization, and management of seed production, seed processing and storage, and quality assurance in a national setting by drawing on experiences from seed programs in the Central and West Asia and North Africa region. The course program consisted of theoretical lectures, practical sessions, and technical visits.

Four training manuals on seed science and technology and soft copies and reference material of PowerPoint presentations on seed processing and storage were distributed to participants.

Participants of training course on Seed Processing and Storage

Course participants

About 19 participants from eight countries – Afghanistan, Egypt, Iraq, Jordan, Lebanon, Palestine, Syria, and Sudan – attended the *Seed Processing and Storage* course. Similarly, about 22 participants from the same eight countries attended the *Seed Production and Quality Assurance* course. The participants were primarily seed specialists and researchers from national programs of the respective countries.

Participants of training course on Seed Production and Quality Assurance

Abdoul Aziz Niane, ICARDA, Beirut, Lebanon; e-mail: a.niane@cgiar.org

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.

Mendel's 150th Anniversary

Rediscovering Mendel

This year is exactly 150 years since Gregor Mendel published his theories on inheritance. After many years of crossing and observing peas, he found that plant characters were located in the gametes, in pollen and egg cells, and that the combination of the two determined the expression of such characteristics. Dominance can play a role, meaning that a 3:1 segregation may be expected after crossing.

It took 34 years for these findings to become known in the scientific community, and the year 1900 is thus considered the birth of plant breeding as a science. Mendel had lit a small light in the black box that was breeding. Before Mendel, plant breeding had existed for a long time; however, from that moment on, we could predict at least to some extent, the outcome of a cross. After Mendel, we have learnt much more about the natural

mechanisms in plants, and have been able to breed them increasingly effectively and efficiently to serve the changing crop production methods and consumers' demands.
Mendel's research fitted well with the era of industrial revolution when science and technology were highly appreciated, including biology and agriculture: soil fertility (von Liebig), microorganisms (Pasteur), evolution (Darwin), and plant breeding. Mendel illustrated the two basic principles of plant breeding: creating diversity and selecting in that diversity.

Twentieth-century plant breeding

Mendel's ideas quickly spread and were put into practice, giving the theoretical basis for plant breeding (line and family selection) and, from the 1920s and 1930s, quantitative genetics, use of hybrid vigor, and the first uses of mutation breeding. In the twentieth century, the discovery of the structure of DNA in the 1950s (Watson and Crick) lit another light in the black box. It again gave rise to the science of molecular biology, making plant breeding more effective and efficient. Genetic modification, or transgenics, used molecular biology to create new diversity, organisms that could not normally develop in nature. The emergence of transgenics created a whole set of new regulations of environmental and food safety measures which cost about US$100 million for each *event*, limiting its use to only globally major crops and the largest companies with the technical, marketing, and legal capacity to earn returns on such huge investments. Much less controversial is the use of marker assisted breeding, the branch of molecular biology that focuses on efficient selection of natural diversity, the other of the two main components of breeding.

Current developments in plant breeding

During this century, new breeding methods have been developed based on increasingly detailed insights into the natural mechanisms in plants, and these provide us with yet more precise ways to use the biodiversity of our crops. These are methods that may create mutations in particularly targeted locations of the genome, and which use the natural repair mechanisms of DNA to create minute but stable changes. This can also occur through small natural mutations but since these are random, the useful ones may be difficult to find. Cisgenesis is another new method, which transfers useful traits within the genome much more effectively than crossing and selection, especially in polyploid or slow growing species such as potato and many fruit trees. Even though they may fall within the legal definition of 'genetic modification', it would be a pity if excessive regulation also limited their use to major crops and the largest companies.

One hundred and fifty years of Mendel

Mendel opened up a completely new science that has created tremendous benefits for a quickly growing society. One hundred years after his official public presentation of his findings, it is time to look back and celebrate his legacy. Plant breeding is a powerful science which coupled with seed technology, creates an important input for farmers. It is also a moment to look ahead and realize that further understanding of the natural mechanisms of plant biology leads to new and exciting ways to use biodiversity to enhance food security in a time of climate change, challenges with chemical crop protection, and increasing demand for food safety and diversity. It is up to society to determine whether all breeders or just those with the strongest financial and legal capabilities can use these new methods. It is time for seedsmen and plant breeders alike not to quietly work behind the scenes as we normally do, but to show how we contribute to this debate.

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Communiqué on Commercial and Sustainable Supply of Early Generation Seed (EGS) of Food Crops in Sub-Saharan Africa

Most countries in Sub-Saharan Africa face major constraints in the supply of adequate quality EGS to meet the needs of its suppliers. The purpose of the EGS convening referenced in this communiqué is to bring together key problem solvers to identify practical solutions to this problem of EGS supply and begin to create coalitions of farmers, suppliers, researchers, government and development agencies, and donors so that farmers, especially smallholders, can have better access to quality seed of new, improved varieties.

Eleven organizations jointly convened and sponsored a convening with the title *Promoting Commercial and Sustainable Supply of Early Generation Seed of Food Crops in Sub-Saharan Africa (EGS Africa Convening)* to develop practical solutions to technical, institutional, and systemic constraints that hamper EGS supply. Discussions focused especially, but not exclusively, on the 11 countries for which multi-stakeholder delegations participated. The convening involved 148 participants representing 87 organizations, and included representatives from governments, regional and continental organizations, farmers' organizations, private sector, research,

development, donor and international financial organizations, and service providers.

As a way to provide a synthesis of the many crop- and country-focused discussions, as well as the various technical sessions, the Steering Committee is pleased to release the EGS Africa Communiqué. Since the convening, we have prepared this communiqué, which places EGS supply within a larger policy context, and also synthesizes the many discussions. The communiqué incorporates a series of principles from the convening which address EGS supply, drawing from the global EGS study; the follow-up national studies in Ethiopia, Rwanda, Uganda, and Zambia; and a series of discussions during the EGS Convening. These principles may help formulate the in-country recommendations for promoting a commercial and sustainable supply of EGS of food crops.

We emphasize that these principles are a synthesis of discussions during the convening, endorsed by all the convening and sponsoring organizations. The communiqué represents the consensus of the 11 co-conveners and co-sponsors, and we recognize that it may not reflect a consensus among all convening participants.

Through the support of AfricaLead, we translated the communiqué into French and Portuguese. To access the documents in different languages, please use the links below:

- EGS Africa Communiqué – English
- Communiqué SPG Afrique – French
- Communicado PGS África – Portuguese

The final report of the convening will be published in June on AGRA's website.

Iran Joins Two More OECD Seed Schemes

High-quality seed is a pre-requisite to achieve maximum outputs and good returns for farmers. In many countries, seed trade is also an important source of foreign income. In 2015, the commercial world seed market was valued at US$42 billion, and the value of internationally traded seed was estimated at US$8.2 billion in 2010. To strengthen the seed sector, it is crucial for seed growers and companies to follow policies that guarantee quality standards and appropriate regulatory features. Many countries have adopted seed laws. Although standards differ, considerable efforts have been made and are continued to harmonize national seed laws and seed trade regulations.

Many international organizations, conventions, and treaties deal with the regulation of seed trade, ranging from access to delivery of quality seed to growers. They all provide an international regulatory framework representing the interests of breeders, producers, and consumers. One of these organizations is the Organization for Economic Cooperation and Development (OECD). The OECD Seed Schemes are globally recognized for certification of seed moving in international trade. The OECD Seed Schemes provide an international framework for the certification of seed. They aim to facilitate seed trade by reducing technical barriers, improving transparency, and lowering transaction costs. These seed schemes have been set up since 1958 to encourage the use of seed with consistently high quality in participating countries. There are currently 58 members to one or more of the OECD Seed Schemes worldwide. The schemes authorize the use of labels and certificates for seed produced and processed for international trade according to agreed principles. One of the main principles is that OECD certification is applied only to those varieties that are officially recognized as distinct and have an acceptable value in at least one participating country. Moreover, certified seed must be related directly through one or more generations to authentic Basic Seed of a variety. In addition, satisfactory conditions for the production and processing of Basic and Certified Seed must be ensured and verified by field inspection and post-control tests. The rules of the seed schemes cover seven groups of species, constituting seven distinct and independent schemes.

If a country wished to become a member of an OECD seed scheme, several criteria must be met. The country must provide a description of the national seed certification scheme and a copy of the national rules and procedures including governing variety registration and seed certification. Particular attention should be paid to the country's national rules regarding previous cropping, isolation, verification of varietal identity, and varietal purity standards. It must be proved that the country has a national list of varieties that are distinct, uniform, and stable according to international guidelines. In the case of agricultural species, varieties must have an acceptable value for cultivation and use. These criteria ensure coordination of seed certification standards. Once a country is accepted into the OECD Seed Schemes, its certification standards are considered equivalent to all other member countries within the same scheme.

Iran joined the OECD Seed Scheme for Sugar Beet in 1995. To date, private companies produce more seeds of cereals, hybrid maize, and sorghum than

the country needs, and the companies are looking for new international markets. There is a capacity to export seed of wheat (~100,000 tonnes) and hybrid maize (~8000–10,000 tonnes). In order to support and broaden the role of private companies, Iran tried to create the needed infrastructure and facilitate seed export. Since Iran's scheme is adapted from the OECD seed certification scheme, they applied for cereals, maize, and sorghum and were accepted by the General Assembly in 2015. Iran is planning to join the Oil Seed Scheme in the near future.

Samad Mobasser, Seed and Plant Certification and Registration Institute (SPCRI), Karaj, Iran; email: s.mobasser@areo.ir

AFSTA Congress 2016: Another Resounding Success for the African Seed Industry

Delegates who attended the African Seed Trade Association (AFSTA) Annual Congress in Nairobi expressed their satisfaction regarding organization of the AFSTA congress 2016 and congratulated the National Organizing Committee for a job well done. The success of the Congress was not only reflected by the high number of participants but also from the professional contents of the presentations, the numerous meetings, and the deep growing interest by everyone at the Congress. Over 400 delegates from 50 countries attended the Congress in Nairobi, Kenya.

During the opening ceremony of the AFSTA Congress, the Minister for Agriculture in Kenya, called on the African seed players to invest strategically in the sector to awaken it from under-performance, with only 20% of quality seed demand in the continent being met.

Africa's share, estimated at US$47 billion, is less than 2% of the global seed trade. There is a need to increase this trade through concerted efforts by governments and the seed industry to enhance access to certified seed by farmers. This will require strategic partnerships between governments, research institutions, and seed enterprises in the continent.

Stringent and outdated seed trade regulations in many African countries hamper cross border seed movement, forming a barrier to effective seed trade. Countries in each region should harmonize their seed regulations, standards, and procedures to enhance access by farmers of seeds of improved crop varieties and promote seed trade in each region in Africa. In addition, there is an increasing need to establish effective agricultural data management systems including seed databases to guide decision making and planning of appropriate interventions to address farmers' needs. Stakeholders in the public and private seed sectors should endeavor to share information to enhance effective participation, collaboration, and partnership in agricultural development.

All seed companies are urged to form national seed trade associations and join AFSTA and the International Seed Federation to promote a competitive and vibrant seed industry within each region in Africa.

Seed access by farmers is still a major challenge but is crucial in enhancing the uptake of technologies for increased agricultural growth and development in the continent.

ISTA Held its Thirty-First Congress in Estonia

The 31st ISTA Congress 2016, hosted by the Ministry of Rural Affairs, was held from 14 to 21 June 2015 in Tallinn, Estonia. ISTA also organized a *Seed Symposium 2016* under the theme *Progress in seed testing and seed quality improvement through science and technology* from 15 to 17 June 2016, as part of the Congress. A total of 34 oral presentations and 87 posters were presented during the symposium covering five thematic areas.

The Congress ended with the Ordinary General Meeting (OGM), where ISTA Members voted on

ISTA Rules changes. During the OGM, the ISTA membership elected the new Executive Committee (ECOM) for the 2016–2019. The new ECOM will be conducting its mandate under the leadership of President Craig McGill (New Zealand), Vice-President Steve Jones (Canada), Immediate Past President Joël Léchappé (France) and eight Executive Committee Members-at-large representing different regions.

About 300 participants from 52 countries attended the symposium and congress including representatives from international organizations such as ISF, UPOV, AOSA (Association of Official Seed Analysts), OECD, ABRATES, AFSTA and ICARDA. The ISTA congress provided an excellent opportunity to meet other seed experts and to exchange experiences. It also provided a chance for in-depth discussions about topics of interest to the ISTA community.

Founded in 1924, with the aim to develop and publish standard procedures in the field of seed testing, ISTA is intrinsically linked with the history of seed testing. With member laboratories in 80 countries/distinct economies worldwide, ISTA membership is truly a global network. ISTA members are working together to achieve their vision of uniformity in seed quality evaluation worldwide. The association produces internationally agreed rules for seed sampling and testing, accredits laboratories, promotes research, provides international seed analysis certificates and training, and disseminates knowledge in seed science and technology. This facilitates seed trading nationally and internationally, and also contributes to food security.

For more information contact: ISTA Secretariat, Zürichstrasse 50, 8303 Bassersdorf, Switzerland; tel: +41-44-838 60 00; fax: +41-44-838 60 01; e-mail: ista.office@ista.ch; www.seedtest.org

ISF Publishes FAQs on Plant Breeding Innovations

The International Seed Federation (ISF) recently published a set of Plant Breeding Innovation FAQs. These FAQs are the first part of a Plant Breeding Innovation Toolkit that is being developed. The next step is to develop talking points to assist organizations to speak publicly about the different aspects of innovation in plant breeding. For more information, visit the website at www.worldseed.org/resources/faqs

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 development of new varieties of plants for the benefit of society.

UPOV is an intergovernmental organization based in Geneva and the members as of 15 June 2016 include: two regional organizations (African Intellectual Property Organization and European Union) and 72 countries from Americas, Africa, Asia and Australasia (www.upov.int/members/en/).

New developments for UPOV members

The Government of Kenya deposited its instrument of accession to the 1991 Act of the UPOV Convention on 11 April 2016. Kenya was already one of the 74 members of UPOV and is the 56th member to become bound by the 1991 Act of the UPOV Convention. The 1991 Act entered into force for Kenya on 11 May 2016, one month after the deposit of its instrument of accession.

Development of new and revised test guidelines

The Council of UPOV at its 33rd extraordinary session, held in Geneva on 17 March 2016, welcomed the adoption by the Technical Committee of five new Guidelines for the Conduct of Tests for Distinctness, Uniformity, and Stability (Test Guidelines) and 11 revised test guidelines. The new test guidelines developed include items shown in the following table:

Common name	Botanical name
Coconut	*Cocos nucifera* L.
Cordyline, Cabbage tree, Torquay palm	*Cordyline* Comm. ex Juss. excluding *C. brasiliensis* Planch. and *C. fruticosa* (L.) A. Chev.
Avocado; Coyo avocado (rootstock)	*Persea americana* Mill.; *P. schiedeana* Nees (rootstock)
Plectranthus, Spur flower	*Plectranthus* L'Hér. excluding *P. scutellarioides*
Salvia, Sage	*Salvia* L.

UPOV has now developed 316 test guidelines, all of which are freely available on the UPOV website (www.upov.int/test_guidelines/en).

Experience of UPOV members in examination of new plant varieties

The number of genera and species for which UPOV members have indicated their practical experience in the examination of distinctness, uniformity, and stability (DUS) increased from 3382 in 2015 to 3462 in 2016 (+2.4%). Information on UPOV members with practical experience in DUS examination is freely accessible via the GENIE database (see www.upov.int/genie/en).

Symposium and seminar by UPOV

A joint *UPOV–International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) Symposium* on areas of interrelations between ITPGRFA and the UPOV Convention will be held in Geneva on 26 October 2016, and be open to the public.

Moreover, a *Seminar on Propagating and Harvested Material in the context of the UPOV Convention* will also be held in Geneva on 24 October 2016. The seminar will be open to the public and a publication of the proceedings will be available on the UPOV website.

For more information, please contact the UPOV Secretariat: tel: +41-22-3389155; fax: +41-22-7330336; e-mail: upov.mail@upov.int; website: www.upov.int

Morocco Declaration for Better Policies on Pulses Endorsed at ICP 2016

The 68th United Nations General Assembly declared 2016 the International Year of Pulses (IYP2016) and nominated the Food and Agriculture Organization of the United Nations (FAO) to facilitate collaboration with governments, relevant organizations, non-governmental organizations, and all other relevant stakeholders to celebrate the event.

ICARDA and INRA-Morocco (Institut National de la Recherché Agronomique) in collaboration with FAO, OCP-Foundation (Office Chérifien des Phosphates Fondation), and CGIAR Research Program-Grain Legumes, under the patronage of the Ministry of Agriculture and Fisheries, organized an *International Conference on Pulses for Health, Nutrition, and Sustainable Agriculture in Drylands* in Marrakech, Morocco during 19–20 April 2016. The ICP2016 was held as part of the IYP2016 to provide a platform to various stakeholders, including scientists, policy-makers, extension workers, traders, and entrepreneurs, and to discuss the various contributions of pulses to food and nutritional security and ecosystem health.

About 357 participants from over 35 developed and developing countries attended the conference and endorsed the Morocco Declaration on Pulses as Solutions to Food and Nutrition Security, Agricultural Sustainability and Climate Change Adaptation during the first week of May 2016 by participants of the ICP2016. The conference gathered world science experts to find a path forward for boosting pulses production in developing countries through measures in science, research for development investments, policy, and markets.

The *Morocco Declaration* recommends increasing global pulses production by 20% from the current level by 2030 through closing the yield gaps, expansion in new niches that include intensification of rice fallows with pulses, and short season windows in existing intensive cropping systems; it also reaffirms the need for partnerships among countries in scientific and technical arenas.

The *Morocco Declaration* recognizes that pulses production has significantly lagged behind the rising demand in the developing world. This is despite many benefits of pulses, which are a win–win for people and the environment – healthier soils, low carbon and water footprints, and greater household nutritional security, while also generating extra income for farmers.

The *Morocco Declaration* further recommends a comprehensive review of policy related to pulses production and consumption in pulse-producing countries and an increased investment in pulses research and development.

The Ministry of Agriculture and Fisheries, ICARDA, INRA, OCP-F, the Institute of Agronomy and Veterinary Science, the International Fund for Agricultural Development, FAO, and the CGIAR Research Program-Grain Legumes participated in drafting and endorsement of the *Morocco Declaration*.

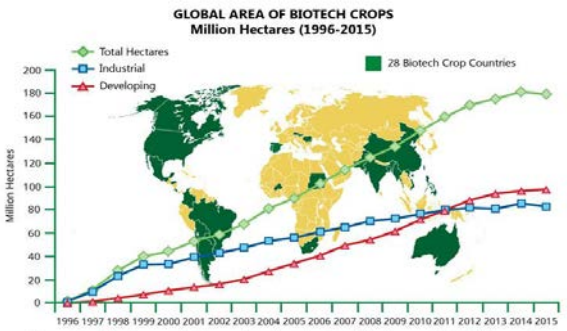
Source: ICARDA

Status of Biotech/GM Crops in 2015

The International Service for the Acquisition of Agri-Biotech Applications (ISAAA) released its annual report for 2015 detailing the adoption of biotech crops, *20th Anniversary of the Global Commercialization of Biotech Crops (1996–2015) and Biotech Crop Highlights in 2015*. These show the global increase in biotech area from 1.7 million ha in 1996 to 179.7 million ha in 2015, a 100-fold

increase in just 20 years making biotechnology the fastest adopted crop technology in recent times. Additionally, farmers in up to 28 countries have reaped an estimated more than US$150 billion in benefits from biotech crops since 1996. This has helped alleviate poverty for up to 16.5 million small farmers and their families, annually, totaling about 65 million of some of the world's poorest people.

For the fourth consecutive year, developing countries planted more biotech crops (14.5 million ha) than industrialized countries. In 2015, Latin American, Asian, and African farmers grew biotech crops on 54% of global biotech area (97.1 million ha) and of the 28 countries that planted biotech crops, 20 were developing nations. Annually, up to 18 million farmers, 90% of whom were small, resource-poor growers in developing countries, benefited from planting biotech crops during 1996–2015.



Source: Clive James, 2015.

Following a remarkable run of 19 years of consecutive growth during 1996–2014, with 12 years of double-digit growth, the global area of biotech crops peaked at 181.5 million ha in 2014, compared with 179.7 million ha in 2015, equivalent to a net marginal decrease of 1%. This change is principally due to an overall decrease in total crop area, associated with low prices for commodity crops in 2015. ISAAA anticipates that total crop area will increase when crop prices improve. Other factors affecting biotech area in 2015 include the devastating drought in South Africa, which led to a massive 23% decrease of 700,000 ha in intended plantings in 2015. The drought in eastern and southern Africa in 2015/16 puts up to 15–20 million poor people at risk for food insecurity and compelled South Africa, usually a maize exporter, to rely on maize imports.

Additional highlights from ISAAA's 2015 report include:

- New biotech crops were approved and/or commercialized in several countries, including the United States, Brazil, Argentina, Canada, and Myanmar.
- The United States saw a number of firsts including the commercialization of new products such as:
  - Innate™ Generation 1 potatoes (with lower levels of acrylamide, a potential carcinogen, and resistance to bruising) and InnateTM Generation 2 (also late blight resistance) approved in 2015. It is noteworthy that potato is the fourth most important food crop in the world.
  - The first-time approval of a GM animal food product, GM salmon, for human consumption.
- Biotech crops with multiple traits, often called *stacked traits* were planted on 58.5 million ha, representing 33% of all biotech area planted and a 14% year-over-year increase.
- Vietnam planted a stacked-trait biotech *Bt* and herbicide-tolerant maize as its first biotech crop.
- Biotech DroughtGard™ maize, first planted in the United States in 2013, increased 15-fold from 50,000 ha in 2013 to 810,000 ha, reflecting high farmer acceptance.
- Sudan increased *Bt* cotton area by 30% to 120,000 ha, while various factors precluded a higher area in Burkina Faso.
- Eight African countries field-tested pro-poor, priority African crops, the penultimate step prior to approval.

Looking ahead to the future of biotechnology in agriculture, ISAAA has identified three key opportunities to realize continued growth in adoption of biotech crops, as follow:

- High rates of adoption (90–100%) in current major biotech markets leave little room for expansion. However, there is a significant potential in other 'new' countries for selected products, such as biotech maize, which has a potential of approximately 100 million more hectares globally: 60 million ha in Asia, of which 35 million ha is in China alone, plus 35 million ha in Africa.
- More than 85 potential new products in the pipeline are now being field-tested; including a biotech drought-tolerant maize from the Water Efficient Maize for Africa project expected to be released in Africa in 2017, Golden Rice in Asia, and fortified bananas and pest-resistant cowpea in Africa.
- CRISPR (Clustered Regularly Interspersed Short Palindromic Repeats) a new powerful genome editing technology has significant comparative advantages over conventional and GM crops in four domains: precision, speed,

cost, and regulation. When combined with other advances in crop sciences, CRISPR could increase crop productivity in a 'sustainable intensification' mode on the 1.5 billion ha of global arable land, and make a vital contribution to global food security.

For more information or the executive summary of the report, visit www.isaaa.org

Source: Crop Biotech Update Special Edition 13 April 2016

Contributions from Seed Programs

In this section we invite national seed programs, projects, universities, and regional and international organizations to provide news about their seed-related activities.

Ethiopia Releases Barley and Chickpea Varieties

High yielding and better quality malt barley varieties

Barley is one of the major crops in the highlands of Ethiopia where both food and malt barley are grown extensively; and the country is one of the major producers in sub-Saharan Africa. In 2014/15, barley was grown by 4.1 million smallholder farmers on close to 1 million ha producing 1,953,385 tonnes, with a national average yield of 1.96 t ha^{-1}. Malt barley production covers about 150,000 ha with an estimated yearly production of 375,000 tonnes, which is short of national demand. The malting and brewery industry are taking roots with both international and domestic brands operating in the country. Following the privatization and expansion of the capacity of local breweries, there is further widening of the gap between domestic demand and supply of malt. In 2015, malt supply was 33,205 tonnes (35% of demand) and the remaining 63,526 tonnes of malt was imported at a cost of US$38 million. The favorable biophysical environment on one hand and the gap between domestic supply and demand on the other indicate a huge opportunity to increase local production not only to substitute imports but with potential for export markets. There is great potential and opportunity to expand contract farming of malt barley through public–private partnership involving national agricultural research systems (NARS), malt factories, breweries, and farmers – which could be a game changer for livelihoods of smallholder farmers.

In 2016, the Ethiopian Institute of Agricultural Research (EIAR) released two malt barley varieties from germplasm received from ICARDA (see table on next page). The two new malt barley varieties, named HB1963 (PFC9215/3/ZHEDAR#1/SHYRI//OLMO) and HB 1964 (RECLA78//SHYRI/ GRIT/3/ATAH92/GOB) after the Holeta Agricultural Research Center (HARC), which released them. The two varieties have potential yields in the range of 3.3–6.0 t ha^{-1} with good malting quality characteristics such as high hectoliter weight (60.9 and 66.6 kg hl^{-1}), thousand kernel weight (47.9 and 55.1 g), screening recovery (> 90%), extract value (81%), and acceptable protein content (10.6 and 11.5%).

In another development, the Sinana Agricultural Research Center (SARC) of Oromia Agricultural Research Institute has also released the first malt barley variety *Singitan* (Carina/Moroc 9-75) with resistance to shoot fly (*Delia flavibasis*), one of the major insect pests limiting barley production, particularly in southeastern Ethiopia (see table on next page). The variety is developed from improved ICARDA germplasm (Carina/Moroc9-75) received in 2008 and subsequently evaluated in Ethiopia for its performance. Malt barley is more susceptible to shoot fly damage with up to 100% yield losses during shorter rainy seasons compared to food barley. The variety is also resistant to major diseases such as leaf rust, scald, etc. and has a potential yield of up to 4.1 t ha^{-1} with good malting quality characteristics such as high hectoliter weight (67.45 kg/hl), thousand kernel weight (47.68 g), screening recovery (>98.3%), malt extract value (78%), and acceptable protein content.

HARC and SARC embarked on accelerated seed multiplication of the newly released varieties during the off-season along with commercial malt barley varieties. The seed produced will be further multiplied during the coming main season to advance the seed multiplication cycle. The irrigation facilities partly supported by previous ICARDA projects and the scaling out projects supported by ICARDA-USAID are playing a critical role not only for barley but also for faba bean, providing opportunities to produce sufficient quantity of early generation seed to meet demand from seed suppliers.

Accelerated seed multiplication of newly released malt barley varieties during the off-season at HARC: HB1963 (left) and HB1964 (right)

Agronomic and morphological descriptors of released malt barley varieties in 2016 crop season			
Description	**HB1963**	**HB1964**	**Singitan**
Pedigree and source	PFC9215/3/ZHEDAR#1/SHYRI //OLMO	RECLA78//SHYRI/GRIT/3/AT AH92/GOB	IBON-MRA 2008/09-26 (Carina/Moroc 9-75)
Adaptation (regions, soils, and altitude)	Central highlands of Shoa, Arsi, Bale, and similar ecologies in NW and South Ethiopia; well drained reddish brown soils; altitudes of ≥ 2300 masl	Central highlands of Shoa, Arsi, Bale, and similar ecologies in NW and South Ethiopia; well drained reddish brown soils; altitudes of ≥ 2300 masl	Highlands of Bale and similar agro ecology altitudes of 2200-2500mabsl; rainfall from 700-1000mmy
Days to heading	90	81	65
Days to maturity	146	138	119
Plant height (cm)	95.7	96.9	83.6
1000 seed weight (g)	47.9	55.1	47.7
Test weight (kg hl^{-1})	60.9	66.6	67.5
% screening recovery (2.8 + 2.5)	> 90	> 90	>98.3
Extract value (%)	81	81	78
Protein content (%)	10.6	11.5	
Grain color	White	White	
Yield in research fields (t ha^{-1})	3.5–6.0	3.3–5.6	3.1-4.1
Disease resistant	Scald and net blotch resistant	Scald and net blotch resistant	Shoot fly, net blotch, scald and rust resistant

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High yielding and disease resistant chickpea varieties

Legumes play an important role in contributing to food and nutritional security, diversification and intensification of agriculture, and sustainability of farming systems in the Ethiopian highlands. Chickpea is one of the major legume crops, with both Kabuli and Desi types grown extensively; and the country is one of the major producers, consumers, and exporters in sub-Saharan Africa. In 2014/15, about 1.1 million smallholder farmers grew chickpea on 239,755 ha producing 458,682 tonnes, with a national average yield of 1.9 t ha^{-1}. Although Kabuli chickpea is a recent introduction, it is now expanding in terms of area, production, and productivity.

Expanding food legume production provides multiple benefits: a major source of protein, especially for the majority of farmers who cannot afford animal products; improving soil fertility through fixing atmospheric nitrogen, thus reducing

the need for inorganic fertilizers and reducing costs to farmers; and as a cash crop in view of the growing domestic and international markets. Legumes are considered one of the strategic crops for diversifying the export market and the Government of Ethiopia is providing due attention to its increased production and productivity. During 2007–2011, on average, 53,080 tonnes of chickpea were exported with revenue of US$28.7 million annually. In 2012, about 1.8 million tonnes of food legumes were exported at the value of US$984.2 million, with chickpea representing 17.8% of this revenue. A relatively high export performance index, the economy's relative factor endowment, and productivity in specific commodities, indicate that Ethiopia has potential among legume exporting countries such as Canada, China, Egypt, Kenya, and India. The favorable biophysical environment on one hand and the gap between supply and demand on the other indicate a huge opportunity to increase production for both domestic and international markets. There is great potential and opportunity to expand contract farming of chickpea through public–private partnership involving NARS, agro-industry, and farmers. This could make a major change to livelihoods of smallholder farmers.

ICARDA has been working with Ethiopian NARS and has jointly developed many profitable Kabuli chickpea technologies. In 2016, Debre Zeit Agricultural Research Center (DZARC) of EIAR released two Kabuli chickpea cvs. Dhera and Hora from ICARDA germplasm (see table below). Dhera has a yield potential of 2.6 t ha^{-1}, an increase of 11% over the standard check (cv. Ejere) and suitable for mechanization. Similarly, Hora has a yield potential of 2.7 t ha^{-1} and yield advantage of 23% over Ejere. These varieties have attractive medium-large seeds and are resistant and/or tolerant to important diseases such as Ascochyta blight and wilt–root rot complex. They are also suitable for early planting.

Agronomic traits of Kabuli chickpea varieties released by DZARC, 2016

Description	Dhera	Hora
Pedigree	DZ-2012 CK-009/FLIP 0163/ X98TH30/FLIP-93-55C X S-96231	DZ-2012 CK-001/FLIP 04-9C/ X2000TH50/FLIP 98-52C X FLIP 98-12C
Adaptation	Mid to high altitudes (1800–2800 masl)	Mid to high altitudes (1800–2600 masl)
Days to flowering	61	60
Days to maturity	134	133
Plant height (cm)	61	48
100 seed weight (g)	33	31
Seed color	White cream	Creamy
Potential yield (t ha^{-1})	2.6	2.7
Resistance to disease	Tolerant to wilt–root rot complex and resistant to Ascochyta blight	Resistance to wilt–root rot complex and Ascochyta blight

DZARC has embarked on accelerated seed multiplication of the newly released varieties during the off-season. The seed produced will be further multiplied during the main season to advance the seed multiplication cycle. These varieties will be promoted within the ongoing scaling out projects supported by USAID for wider adoption and dissemination among the farming communities.

Accelerated seed multiplication of newly released Kabuli chickpea variety by DZARC

The newly released malt barley and chickpea varieties will be promoted within the ongoing scaling out projects supported by USAID for wider adoption and dissemination among the farming communities. ICARDA acknowledges the support provided by USAID in scaling out technologies in Ethiopia within the Feed the Future initiative of the United States Government.

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Iran Introduces Electronic Field Inspection System

Seed certification is a legally sanctioned scheme for seed quality control and consists of field inspection, control plot testing, and laboratory seed testing. Field inspection is an essential step in verifying conformity of seed crops to prescribed certification standards. The objective of field inspection is to verify the factors that may cause contamination to the genetic purity and varietal identity or seed health.

In developing countries, where seed industries are not fully developed, it is the responsibility of seed certification schemes to control seed quality and to propose technical recommendations to seed growers. In Iran, over 220,000 ha of seed production fields of different crops are inspected annually (mostly wheat and barley).

According to the national regulations, field inspection is carried out at different crop growth stages to verify land and isolation requirements and estimate various impurities such as off-types and other varieties, other crops, noxious weeds, and seed-borne disease infected plants. In Iran, at least four field inspections are used to verify that seed crops meet nationally prescribed standards.

The first inspection is at planting time to advise the growers concerning land (cropping history) and isolation requirements. The second inspection is during vegetative/pre-flowering stage to check if contaminant plants are rogued. The stage of seed crop and the type of and distance of contaminant crops within the isolation distance, area of seed field, approximate area of contaminant fields, and percentage of varietal impurity in contaminant fields are verified. The third inspection is during post-flowering and pre-harvest stage. In this inspection, detailed counts are used to determine the extent of various contaminants present in the seed field. The fourth inspection is at pre-harvesting stage, when detailed counts are made for various factors and isolation requirements are finally checked to confirm that the seed meets the required field standards. If the seed crop meets all requirements then the field is accepted, otherwise it is rejected.

At each stage of field inspection, inspection forms are completed and a copy provided to the seed producer and contract grower in a form of recommendations.

Providing reliable data on seed production fields in terms of geographic distribution and area under cultivation are necessary to create a database for a seed certification system. The need for gathering data in real time and integrating it into electronic files to eliminate errors in the data capture process has led to the Iranian seed inspection organization utilizing an electronic inspection system (EIS) that eliminates paper collection and manual entry and makes data available in near real-time.

In this EIS, information submitted on the application form concerning field number, variety, area planted, and previous crop grown are recorded. Seed growers are required to apply at least four weeks prior to planting any seed crop for certification purposes. Lodging the seed crop application form ensures that all necessary inspections required will be conducted. As soon as the information from the application form is transferred to the database, a work order is sent to the inspector as an electronic message.

In the first inspection at sowing time, the land, isolation, accessibility, and irrigation sources are checked; and, if the field is accepted, the inspector allocates a unique registered area. This area is based on the geographic location of the farm. Data is only downloaded or uploaded at this registered point and can be sent to the certification manager by the inspector.

In the second inspection (i.e. pre-flowering time), the inspector checks all information about land and isolation requirements, species, variety, seed origin, area of seed crop, seed crop and contaminant crop, and percentage of varietal impurity. The inspector walks to the registered area to download the forms, uploads the information and pictures, and sends the completed forms to the manager. By using the GPS application on the tablet, the inspector can also prepare a field map.

If the field does not comply with the certification requirements and if the compliance can be corrected by the producer, then the inspector mails

a copy of the inspection form to the seed producer and sends a short message to the contract grower. Subsequently, the field can be re-inspected after corrections at a time set by the inspector.

The advantages of the EIS are as follows:

- After the vegetative stage, the inspector allocates a unique registered area in the field and this allows the inspector to fill the inspection form, upload information, and pictures and to send the file to the manager. The inspector cannot fill out the forms in places other than that registered area.
- The inspector has to visit the field during different stages of field inspection, fill the forms, and send the information to the manager. Moreover, the inspector can provide a copy of the form and technical recommendations to the seed producer and contract grower.
- The EIS solves the problems with point of inspection data that seemingly integrated with database, service manager, compliance, and operational efficiencies.
- Provides immediate access to data for greater visibility for managers and provides the ability to quickly evaluate results and make critical decisions.
- Enables the organization to convert the original paper forms into electronic forms, from which the data are captured and sent directly to the database system.
- It is a web-based application (for sending emails, uploading pictures, and downloading forms) and telecommunication system (for sending messages to the seed producer and contract grower).
- It can be run in offline mood. In fields where there is no network, the inspector can save the inspection forms and information in a tablet and when ultimately connected to the network, the data are saved and sent to the manager.
- EIS makes it possible to control and inspect fields and gather important information concurrently.

If an inspector does not check the field on time, fails to appropriately inspect the land, or if any complaint is received, it is possible to respond to questions and resolve doubts referring to data saved in the system. All data are received online on a server at the Seed and Plant Certification and Registration Institute (SPCRI). All information of the seed production fields in the country is saved in the database and allows the managers to make critical decisions on availability of seed.

In Iran, EIS for wheat and barley was piloted in 2015 in five provinces. Following the successful outcomes, it was decided to extend the EIS to hybrid maize, hybrid sorghum, and potato fields. In autumn 2016, all wheat and barley fields will be inspected and controlled with the new system. Approximately 250 associate inspectors equipped with a tablet and an electronic program will cooperate with SPCRI in inspecting fields of different crop seeds. If this project is fully implemented in Iran, SPCRI is willing to share its experiences with other countries.

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Pakistan Releases New Improved Varieties

The 45th meeting of the Punjab Seed Council was (PSC) held on 7 January 2016. The meeting was convened for the approval of new varieties of different crops for general cultivation. In this meeting, nine new varieties of different crops were released, including three maize and one each of wheat, green pea, ground nut, sorghum, seedless kinnow, mungbean, and canola.

The Punjab Agriculture Secretary also constituted a sub-committee for complete review of cases of 19 BT cotton, two non-BT cotton, and 11 mango varieties. The Secretary of the PSC will head this committee that, after thorough analysis, will submit recommendations to the Provincial Secretary of Agriculture. Farmers were urged to grow the latest high-yielding approved varieties to make the country self-sufficient in agricultural commodities. Cotton production of the Punjab would be considerably enhanced by cultivation of BT varieties, which have effective resistance against bollworms and viruses.

Source: Pakistan Biotechnology Information Center

Research Notes

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

Identification of Farmer's Preferred Durum Wheat (*Triticum durum* L) Varieties in Southeastern Ethiopia

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Abstract

Participatory varietal selection (PVS) of durum varieties was conducted at Selka and Ilu Sanbitu *kebeles* in southeastern Ethiopia. Four released durum wheat varieties were evaluated on two farmers' fields per *kebele* (lowest administrative unit). Using farmers' selection criteria, cv Utuba was ranked first by male and female farmers at Ilu Sanbitu; while at Selka cvrs. *Mangudo* and *Utuba* were ranked first by male and female farmers, respectively. Mean seed yield of *Utuba* was the highest (3.6 t ha^{-1}) among the cultivars, and at Selka its yield was 5.6 t ha^{-1}. Both female and male farmers participated in PVS and selected *Utuba* followed by *Mangudo*.

Key words: Durum wheat, farmers' selection, PVS, seed yield, biomass yield

Introduction

The shortcomings of conventional and centralized plant breeding to address the enormous diversity of environmental conditions and end users' needs have been recognized (Morris and Bellon 2004). Participatory crop improvement involving farmers has been found an effective tool in variety selection. Participatory plant breeding and participatory variety selection (PVS) are proposed as a solution to the problem of fitting the crop to a multitude of both target environments and users' preferences (Ceccarelli et al. 1996, 1997, 2000; Walker 2006). In PVS, farmers are exposed to finished or nearly finished breeding materials to select the germplasm that meets their needs.

The project aimed at introducing, identifying, and diversifying durum wheat varieties with participatory varietal evaluation. Moreover, attempts were made to establish local seed production by organizing farmers into seed producer cooperatives to complement the seed provision of the formal sector.

Objectives

The main objectives of PVS were:

- To identify high yielding, farmer and industry preferred durum wheat varieties for scaling out
- To initiate decentralized seed production by mobilizing farmer groups
- To strengthen the capacity of development partners, seed producers, and farmers.

Materials and Methods

PVS on durum wheat was conducted in the Africa Rising project sites at Selka and Ilu Sanbitu *kebeles* in Sinana district during the 2015/16 cropping season. In each *kebele*, two farmers participated in hosting the PVS trails for variety evaluation and selection. The experiments were planted on 25 m^2 (5 m × 5 m) for each treatment. In each *kebele*, one group each of female and male farmers were organized for the selection and the members were selected randomly from nearby experimental sites. Farmers in the community also participated in the selection process through guided visits and field days to the trial sites. Four released durum wheat varieties were used for PVS: cvs. *Mangudo, Ginchi,* and *Utuba* from Debre Zeit ARC; and cv. Tate from SARC.

A group of female and male farmers participated in the selection and ranking of varieties. Criteria used for selection included crop stand, plant height, maturity, lodging resistance, disease tolerance, tiller number, spike length, kernel number, grain yield, and marketability.

Matrix ranking was used, based on criteria identified through brain storming with farmers. Ranking was made in groups with score values of 1 (very poor) to 5 (excellent) during the middle and end of the crop cycle.

Results and Discussion

Both female and male farmers selected *Utuba* at Ilu Sanbitu (Figures 1 and 2). Both male and female farmers gave high score values to both Mangudo and Utuba at Selka. Based on mean score values, both male and female farmers selected Utuba followed by Mangudo at both locations. A similar approach was used for malt barley PVS in mother and grandmother trials in northern Ethiopia (Aynewa et al. 2013).

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Figure 1. Participatory variety selection by male (A) and female (B) farmers

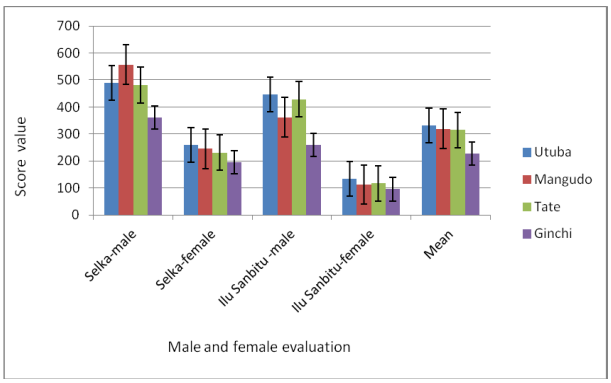

Figure 2. Selection score values of farmers (female and male) for durum wheat genotypes (bars indicate SEM)

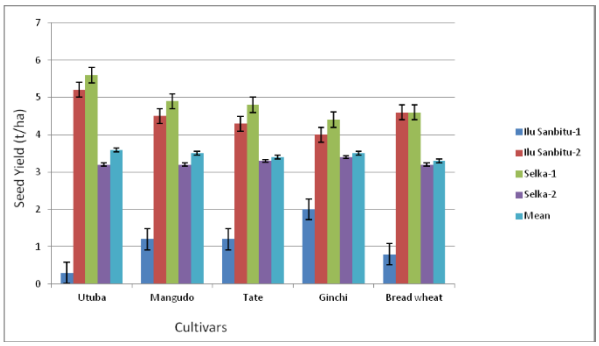

Figure 3. Mean grain yield of cultivars evaluated at Ilu Sanbitu and Selka kebeles (bars indicate SEM)

The highest seed yield was for Utuba (5.4 t ha^{-1}) compared to durum and bread wheat varieties at Selka and Ilu Sanbitu (Figure 3). Similarly, the highest mean biomass yield was for Utuba, with 14.3 and 7 t ha^{-1} at Selka and Ilu Sanbitu, respectively (Figure 4).

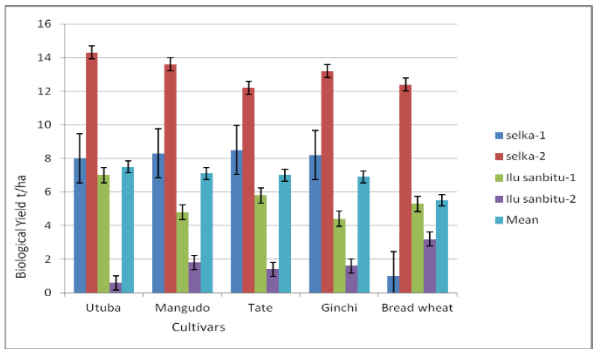

Figure 4. Mean biological yield of cultivars evaluated at Ilu Sanbitu and Selka (bars indicate SEM)

Disease severity was recorded on durum wheat at Selka *kebele*, where tan spot and yellow rust were observed. Disease severity differed among genotypes (Figure 5). Tan spot disease severity was in the range of 5–30% and yellow rust of 10–50%. Tan spot severity was the lowest on *Utuba* (5%) followed by *Mangudo* and *Tate* (10%) and highest on cv. *Ginch*i (30%). Yellow rust severity on bread wheat was 50%, but only *Ginchi* was attacked by yellow rust (10%) among the durum wheat varieties.

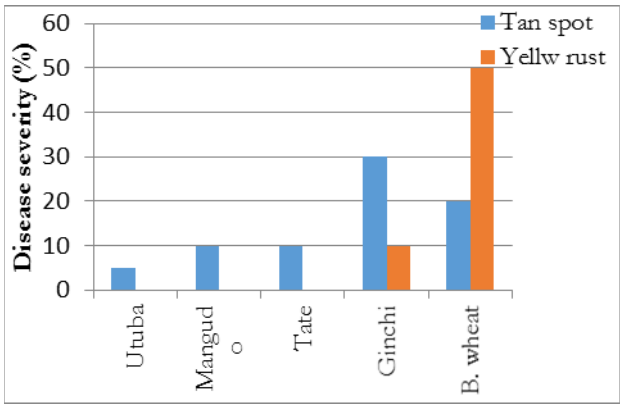

Figure 5. Disease severity on durum and bread wheat cultivars at Selka kebele

Conclusion

Farmers' involvement in selection is important in identifying varieties suitable for sustainable intensification and diversification of cropping systems. Accordingly, durum wheat cv. *Utuba* ranked first in both *kebeles* and is recommended for cultivation in the district. Efforts are underway to scale out the new durum wheat variety through the ongoing Africa Rising project.

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Meetings and Courses

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

Conferences

First International Agrobiodiversity Congress (IAC 2016)

The IAC 2016 will be held in New Delhi, India, during 6–9 November 2016. Bioversity International and the Indian Society of Plant Genetic Resources organized the conference. The IAC 2016 Organizing Committee invites all interested authors to submit abstracts for presentation within the IAC 2016 themes. Submissions are sought for oral and poster presentations and can be made via the Abstract Submission portal http://in.eregnow.com/ticketing/register/iac2016

Abstracts will only be published if the author has registered and paid before the author registration deadline of **31 July 2016**. You may register using the online system http://lpti.iceindia.in/ei/getdemo.ei?id=227&s=_47K0WFAGR. All enquiries regarding abstracts for IAC 2016 should be emailed to abstract@iac2016.in

2nd Pakistan Seed Congress

Pakistan Seed Promotion Alliance (formerly Pakistan Seed Academy) a unique forum of stakeholders from national and multinational seed companies, public seed sectors and farmers' associations, is organizing the 2nd Pakistan Seed Congress 21–22 November 2016 at Faisalabad in collaboration with the University of Agriculture Faisalabad, Federal Seed Certification and Registration Department, Seed Association of Pakistan and Crop Life Pakistan. The theme of the congress is *Seed Security for Sustainable Agriculture* which focuses on the availability and access to adequate quantities of quality seed and planting materials of crop varieties by the farming community. Key players of public and private seed sectors along with policy makers will help in discussing all possible initiatives to improve seed security in the country. More than 1000 seed industry professionals, farmers, faculty, students and foreign delegates are expected to gather to share their expertise and knowledge for ensuring quality seed production in the country and across the globe. An exhibition of seeds and seed conditioning, warehousing and storage-related equipment will be displayed during the congress.

For more information, may please contact: Dr Irfan Afzal, General Secretary, PSPA, Department of Agronomy, University of Agriculture, Faisalabad, Pakistan; e-mail: secretary@pspalliance.org

AFSTA Congress 2017

The next AFSTA Congress will be held in Dakar, Senegal, from 28 February 2017 to 2 March 2017, and preparations are already in full swing. For more information, please contact the AFSTA Secretariat at afsta@afsta.org

ISF World Seed Congress 2017

The ISF World Seed Congress 2017 will take place in Budapest, Hungary on 22–24 May 2017. Registration will open on 10 Jan 2017 at 11:00 h (GMT) and close on 3 May 2017 at 13:00 h (GMT). More than 1000 seed industry professionals are expected to gather to discuss global issues facing the seed industry. For more information, visit the website at www.worldseedcongress2017.com

Second International Legume Society (ILS) Conference

The Second ILS Conference will take place on 11–14 October 2016 at the Tróia Resort, Lisbon, Portugal. The conference is organized by the International Legume Society and the Instituto de Tecnologia Química e Biológica António Xavier of the Universidade Nova de Lisboa.

The conference will address the following themes: Legume Quality and Nutrition; Farming Systems/Agronomy; Abiotic and Biotic Stress Responses and Breeding; Legume Genetic Resources; and New 'Omics' Resources for Legumes. The health and environment benefits, as well as marketing, of legumes will be transversal topics throughout the conference. Special attention will be given to foster the interaction of researchers and research programs with different stakeholders, including farmers and farmer associations, seed/feed and food industries, and consumers.

There are several satellite events before and after this conference, including the 4th International Ascochyta Workshop two days prior to the ILS conference. For more information and registration, please contact 2ILSCSecretariat-secretariat.ils2@itqb.unl.pt or visit the website at www.itqb.unl.pt/meetings-and-courses/legumes-for-a-sustainable-world/contacts - content

International Seed Testing Association (ISTA) Annual Meeting 2017

The ISTA Annual Meeting 2017 will take place at the Renaissance Hotel in Denver, Colorado, USA, on 19–22 June 2017. The event will be held in collaboration with the Association of Official Seed Analysts (AOSA) and the Society of Commercial Seed Technologists (SCST). This will be the first time that the three seed testing associations will hold a joint Annual Meeting. We are hopeful that this meeting will foster even stronger relationships between ISTA and AOSA/SCST members, and improve seed science by creating an environment where networking, productive brainstorming, and idea-sharing can occur. To register, please visit the web site www.seedtest.org/en/event-detail---0--0--0--70.html

For more information, please contact ISTA, Zurichstrasse 50, 8303 Bassersdorf, Switzerland; Tel: +41-448386000; Fax: +41-448386001; e-mail: ista.office@ista.ch; www.seedtest.org

Courses

ICARDA courses

ICARDA organizes both short- and long-term courses in thematic areas related to its research portfolio on biodiversity and integrated gene management, integrated water and land management, diversification and intensification production systems, and socioeconomics and policy research. For more information on the ICARDA annual training program, contact Charles Kleinermann, Head of Capacity Development Unit, ICARDA, Amman, Jordan; e-mail: c.kleinermann@cgiar.org

International Union for the Protection of New Varieties of Plants Distance Learning Courses

The following UPOV Distance Learning Courses will be run in the second half of 2016: (i) DL-205 *Introduction to the UPOV System of Plant Variety Protection under the UPOV Convention*; (ii) DL-305 *Examination of Applications for Plant Breeders' Rights*; (iii) DL-305A *Administration of Plant Breeders' Rights* (Part A of DL-305); and (iv) DL-305B DUS Examination (Part B of DL-305).

The timetable for all courses for Session 2 follows:

- Registration: 15 August to 18 September
- Study period: 25 September to 30 October
- Final exam: 24–30 October

The categories of participants for the DL 205 and DL 305 courses follow:

- *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/inter-governmental organizations endorsed by the relevant representative to the UPOV Council (*one non-fee paying student per state/inter-governmental organization; additional students, CHF1000 per student)*
- *Category 3:* Others (*fee, CHF1000).*

More detailed information about the course and online registration is available on the UPOV website www.upov.int/resource/en/ training.html

International Seed Testing Association (ISTA) Training Workshops

ISTA SHC Workshop: Molecular Methods in Seed Health Testing, 14–17 November 2016; Roelofarendsveen, Netherlands

This workshop will provide an overview of seed health testing methods using molecular methods. It will include various molecular assays for the

detection of seed transmittable pathogens with reverse transcriptase PCR, classic end-point PCR, bio-PCR and real-time PCR. Lectures and hands-on experiments will give an overview of molecular methods that are or will be used in the future for seed health testing. For further details, please visit http://seedtest.org/en/event-detail---0--0--0--74.html

ISTA Workshop on Seed Sampling, 20–23 September 2016, Ashburton, South Island, New Zealand
The aim of the workshop is to provide an overview of seed sampling in a range of species, but also to provide a forum where questions relating to seed sampling methodologies can be discussed.

This workshop will appeal to people in both seed testing laboratories and the wider seed industry, including warehouse staff who are involved in sampling seed. For further details and registration: www.seedtest.org/en/event-detail---0--0--0--77.html

For more information, please contact ISTA, Zurichstrasse 50, 8303 Bassersdorf, Switzerland; Tel: +41448386000; Fax: +41448386001; e-mail: ista.office@ista.ch; website: www.seedtest.org

Literature

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

Books

Maxted, N., M. Ehsan Dulloo and B. Ford-Lloyd (eds.). 2016. Enhancing Crop Genepool Use: Capturing Wild Relatives and Landrace Diversity for Crop Improvement

Published by CABI (www.cabi.org); ISBN 9781780646138; Price: US$168.75 (Hard cover); 496 pp

Maintaining food security in the face of human population increase and climate change is one of the critical challenges facing us in the twenty-first century. Utilization of the full range of agrobiodiversity will be a necessary tool in addressing this challenge. In this book a team of international contributors review all aspects of utilization and conservation of crop wild relative (CWR) and landrace (LR) diversity as a basis for crop improvement and future food security.

Enhancing Crop Genepool Use covers four key areas:

- Characterization techniques – novel 'omics' techniques and predictive tools that can be used to identify adaptive traits and expedite plant breeding.
- Conservation strategies – how to develop national, regional, and global CWR and LR conservation strategies; how to better target conservation to meet the needs of the plant breeding community; and how to integrate CWR and LR diversity into existing biodiversity conservation programs.
- Facilitating CWR and LR use – pre-breeding using 'exotic' germplasm, meeting breeders' needs, integrating the conservation and user communities, and policy enhancement.
- Informatics development – improving characterization, trait and conservation data management and accessibility, and inter-information system operability.

This book will appeal to a wide array of specialists and postgraduate students, such as those working in the fields of agrobiodiversity conservation and use, conservation, ecology, botany, genetics, plant breeding, and agriculture.

Tennant, P. and G.A. Fermin (eds.). 2015. Virus Diseases of Tropical and Subtropical Crops

Published by CABI (www.cabi.org); ISBN 9781780644264; Price: US$144 (Hard cover); 264 pp

This book describes interactions of plant viruses with hosts and transmission vectors in an agricultural context. Starting with an overview of virus biology, economics, and management, chapters then address economically significant plant diseases of tropical and subtropical crops. For each disease, symptoms, distribution, economic impact, causative virus, taxonomy, host range, transmission, diagnostic methods, and management strategies are discussed.

ICARDA Publications on Seed Systems

ICARDA Working Papers document the progress of the ICARDA research program and its support to country partners in more than 40 drylands countries. Working Papers are one of ICARDA's

global public goods; they capture and share knowledge and learning from projects and research partnerships. Each paper is internally reviewed as part of the center's publishing process.

Alemu, D. and Z. Bishaw. 2016. **Commercial Behavior, Varietal Preferences and Wheat Seed Markets in Ethiopia**. *Working Paper 30. ICARDA, Beirut, Lebanon*
Working Paper 30 presents the commercial behaviors in the wheat seed sector, farmers' varietal preferences, and their implications for the wheat seed sector based on primary data collected from randomly selected wheat farmers in Ethiopia. About 25% of the wheat producers are in a autarkic (neither buying nor selling), 26% in a selling, and the rest (49%) in a buying market position for seed. This implies that the formal seed sector can target only slightly more than half of wheat producers. Farmers' perceptions indicate that the value of attainment indices is high for the improved varieties compared to local landraces. This shows that the improved varieties embody more of the characteristics that are in demand. However, there is high variability in the attainment indices among improved varieties for different attributes. This suggests the need to target varieties for the different circumstances, including yield and disease and drought tolerance. The result also indicated inconsistency between the value of the attainment indices of varieties and the amount of seed supplied by the formal sector, which resulted in a mismatch between demand and supply, leading to considerable carryover of seed every year. These results, therefore, imply the need to promote (i) a market-based seed demand and supply system taking into account commercial behavior concerning wheat seed and (ii) diversification of seed supply of bread wheat varieties and increase in the capacity of seed suppliers to respond to farmers' preferences.

Turner, M.R. and Z. Bishaw. 2016. **A Review of Variety Release Procedures and Related Issues with Recommendations for Good Practice**. *Working Paper 31. ICARDA, Beirut, Lebanon*
Working Paper 31 is a synthesis of experiences gained from studies carried out in Egypt, Ethiopia, and Pakistan in 2011/12. The main purpose is to analyze the issues that arise in variety release and to make recommendations for 'good practice' that may be useful to those who manage the variety release system. In the context of this paper, the term 'variety release' refers to the full range of activities that occur from the identification of promising lines by the breeder until early-generation seed is available for multiplication. This study considers variety release in a broad perspective and with the goal of accelerating farmers' access to improved varieties. The management of varieties is a key component of the seed regulatory framework in most countries and is usually included in the national Seed Law. It involves evaluation of candidate lines by a prescribed trials system, review of data by a technical committee, and ultimately registration of the variety in an official list. Registration provides an endorsement that the variety has merit for cultivation and confirms its eligibility for certification, based on a recognized name linked to a description. Variety release is therefore a key stage in the formal 'seed chain' that links plant breeding to farmers.

Fredenburg, P., Z. Bishaw, A.A. Niane and M. Devlin. 2015. **Strengthening National Seed Systems for Household Food Security in Developing Countries**. *Research to Action 4. ICARDA, Beirut, Lebanon*
Research to Action 4 reports are published by ICARDA to provide a synthesis of research evidence and expertise gained over a number of years that is put in context for decision makers in developing countries and for development professionals working in these countries. The series offers practical approaches to improve food security and the productivity of agriculture for smallholder farmers in the world's dry areas.

This report examines the common shortcomings of national seed systems and proposes a framework to overcome them. It shows ICARDA to be the partner of choice for building and restoring resilient seed systems in the arid zones of tropical and subtropical Asia and Africa, where ICARDA has generated international public goods through highly productive partnerships for more than a third of a century. ICARDA has convened and led international initiatives to conserve agro-biodiversity; restore seed systems destroyed by conflict, notably in Afghanistan; and safeguard agriculture threatened by future conflicts, climate change, natural disasters, and crop disease epidemics.

Websites

ISSS

The International Society for Seed Science (ISSS) is a professional organization of seed scientists committed to fostering and promoting research, education, and communication in the scientific understanding of seeds by:

- Publication of scientific research on seed biology in *Seed Science Research*, the official journal of the ISSS
- Co-ordination and organization of conferences, workshops, and specialized meetings related to seed science
- Publication of proceedings of certain ISSS conferences and other meetings
- Sharing news and comment of interest to seed scientists and technologists, via online and other fora
- Support for educational activities in seed biology, including courses, slide exchanges, and web sites
- Establishment of prizes and honors for meritorious work in seed biology
- Involvement in political and public relations activities affecting seed research and utilization

An Executive Committee consisting of Elected and Appointed Trustees governs ISSS. More information about the ISSS can be found in our Membership Brochure and in the ISSS Members' Handbook.

Newsletters

IFDC Magazine

IFDC Magazine is an update on the work and progress of the International Fertilizer Development Center (IFDC).

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 socio-economic and policy research to better target poverty issues and accelerate technology adoption. A member of 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, Acting Regional Coordinator for Sub-Saharan Africa Regional Program and Head of Seed Section, Addis Ababa, ICARDA, 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