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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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E-mail icarda@cgiar.org www.icarda.org

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 in order 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, your editor Zewdie Bishaw is joined by Niels Louwaars, your regular contributor from the Dutch Seed Association, writing about *World Seed Partnership: Strengthening the Global Seed Sector*, elaborating on the development of the organized seed sector and subsequent establishment of international organizations for facilitation of cooperation and collaboration addressing the free movement of seed across the globe. We also provide highlights on the history of 'Biopest', the first company in commercial bumblebee rearing. Thirty years later, the company has become a global player in sustainable crop management as growers in more than 70 countries rely on Biobest products to grow a healthy and sustainable crop. Biobest is part of a vibrant and rapidly growing biocontrol and pollination industry, which is still tiny compared to the agrochemical industry, but thriving. Other news in this section come from regional and/or international organizations, such as the International Seed Federation (ISF), the International Seed Testing Association (ISTA), and the International Union for the Protection of New Varieties of Plants (UPOV). ISF reports on establishment of the World Seed Partnership, a global alliance of four international organization dealing with seed sector development. We regularly receive a summary of highlights from UPOV which we gratefully acknowledge which is important in our quest to inform our audience.

The section on **Seed Programs** presents news from Ethiopia and Turkey. Ethiopia is stepping up its decentralized seed production scheme, by promoting Cooperative-Based Seed Production licensing to produce and market seed at local level and to ensure the availability and access to seed of improved varieties along with agricultural service centers. Moreover, there is on-going effort for scaling the Input Voucher System (IVS) in Ethiopia. IVS was formulated in response to the difficulties that smallholder farmers face in accessing credit for agricultural inputs, such as fertilizers, seeds, and farm tools. The system engages local microfinance institutions (MFIs) or Rural Saving and Credit Cooperatives (RuSACCos) to qualify farmers for loans and issue cash or credit vouchers that can be used to redeem inputs at nearby cooperative stores.

The report from Turkey provides a detailed history of chickpea and lentil production and variety development since the 1960s, as well as highlighting recent efforts in certified seed supply to revive the food legume sector. Although Turkey is a major global player in chickpea and lentil production and trade, food legume production went through ups and downs due to changing policies and priorities. In the 1980s, fallow Replacement Project played an important role, which resulted in peak production of chickpea and lentil in 1988 and which gradually declined to its current state. Currently, the private sector is stepping up legume seed production and delivery due to favorable government policies, promoting the use of improved agricultural technologies through various incentives.

The **Research** section of *Seed Info* captures information on adaptive research or issues relevant to the development of seed programs in the CWANA region and beyond. This issue features an article by Aynewa et al. from ICARDA, Ethiopia, titled *Identification of Field Pea Varieties in Southeastern Ethiopia*. The paper discusses the participatory variety selection carried out at Africa Rising project sites in the Sinana district of Bale Zone in southeastern Ethiopia. Farmers identified high-yielding field pea varieties that were well adapted and preferred by farmers and entered into local seed production by farmer groups.

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. Take time to share and contribute to your newsletter.

Have a nice read,

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.

ICARDA Organizes Seed Courses

ICARDA continues to provide short- and long-term seed science and technology courses in order to strengthen the capacity of the human resources of national seed sectors through bilateral and multilateral projects. These courses bring together staff from the various sub-sectors of national seed systems.

Seed Production Technology of Barley and Food Legumes in Ethiopia

Introduction

Since 2015, ICARDA is implementing two scaling out/up projects on malt barley, faba bean, and chickpea technologies in four regional states of Amhara, Oromia, SNNPR, and Tigray in partnership with NARS and development practitioners in Ethiopia. Capacity development of partners and stakeholders is one of the main components of the project in order to enable partners to implement the project and to sustain the achievements after the project phases out. In 2017, a Training of Trainers course on *Crop and Seed Production of Malt Barley, Fab Bean and Chickpea* was held at Addis Abeba from 24-25 April 2017.

Course objectives and contents

The course is aimed at providing information on malt barley, faba bean, and chickpea technologies and the principles and procedures of crop and seed production. The training covered available improved crop varieties and management practices; use and safety of fertilizers, biofertilizers, and pesticides; seed production, processing, storage, quality assurance; organization and management of seed producer cooperatives and local seed business.

Course participants

A total of 42 participants from 13 partner agricultural research centers and seed production coordinators of five agricultural research institutes from Amhara, Oromia, SNNP, and Tigray regional states attended the course.

In another development, about 22 socio-economists from 7 partner agricultural research centers, one university, and one development agency attended a short course on Econometrics of adoption and impact assessment using Stata from 25 April to 9 May 2017 at the Sirinka Agricultural Research Center.

Participants of the training course on Seed Production Technology

*Adamu Molla, ICARDA, Addis Abeba, Ethiopia; e-mail: admau_molla@yahoo.com and Zewdie Bishaw, ICARDA, Addis Abeba, Ethiopia; e-mail: z.bishaw@cgiar.org; Girma Tesfahun, ICARDA, Addis Abeba, Ethiopia; e-mail:*g.tesfahun@cgiar.org

Seed Science and Technology Course in Iran

Introduction

ICARDA in collaboration with the Dry Land Agricultural Research Institute is implementing a project entitled *Increasing the Productivity of Cereal-based Systems to Enhance Food Security Iran*, funded by the Islamic Republic of Iran. The project has a component on the dissemination of readily available improved technologies, through increased access to certified seed of wheat, barley, and chickpea. Fast track variety evaluation and release and early generation seed production by NARS, coupled with large-scale certified seed production by the public or private sector, are key components of the project, targeting rainfed areas with cold, moderate, and warm climates in East Azerbaijan, Kermanshah, Kurdistan and Lorestan provinces.

The project area covers 1,220,000 ha of wheat, 289,000 ha of barley, and 302,000 ha of chickpea, where it is anticipated to increase certified seed coverage to 45%, 30%, and 25% of the area, respectively. Currently, the availability of certified seed of wheat appears adequate but most of the area is covered by an old improved landrace called *Sardari*, where there is a disproportionate area

coverage between new and old varieties. A concerted effort should be made to increase the availability and regular replacement of certified seed of wheat, barley and chickpea.

ICARDA organized two Training of Trainers courses on *Seed Production Technology* from 20-26 May 2017 in Marageh, East Azerbaijan and Khorrambad, Lorestan.

Course objectives and content

Training the Trainers courses aim to improve the technical skills of the project staff on effective planning, operation, and management of functional seed delivery systems in the four target provinces of the project, planned during the first year of the project implementation.

Theoretical presentations and practical sessions were made covering the essential components of a functional national seed program, pertaining to: variety development, evaluation, registration, release, and popularization, as well as the organization, planning of early generation seed and certified seed production, processing, storage, marketing, and seed quality control. The issues of seed system diversification, institutional arrangement, and integration were also discussed.

Course participants

The target group of the course are the managerial and technical staff involved in organizing, planning and implementing early generation seed production and large-scale certified seed production, including seed processing, storage, marketing, and seed quality assurance in the four target provinces of the project.

A total of 31 participants from East Azerbaijan and 22 from Kurdistan provinces, representing agricultural research institutes, provincial agricultural extension services, seed companies, seed certification institute, attended the two-day course from 22-23 May 2017 in Marageh. Similarly, 15 participants from Kermanshah and 21 from Lorestan, representing different partners and stakeholders, attended a similar two-day course on 25-26 May 2017 in Khorramabad.

The participants visited seed processing plants of public and private seed companies and innovation platforms, where new and improved technologies of wheat, barley, and chickpea are being demonstrated along with quality seed production.

Participants of the seed production technology course in Marageh (top) and Khorramabad (bottom), Iran

Abdoul Aziz Niane, ICARDA, Beirut, Lebanon; e-mail: a.niane@cgiar.org; Zewdie Bishaw, ICARDA, Addis Abeba, Ethiopia; z.bishaw@cgiar.org; S. Y. Sadeghian, ICARDA, Iran; s.sadgheian@cgiar.org; and S.A. Rezaei, ICARDA, Iran; s.rezaei@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.

World Seed Partnership: Strengthening the Global Seed Sector

The World Seed Partnership (WSP) was announced by the Organization for the Economic Cooperation and Development (OECD), the International Union for the Protection of New Varieties of Plants (UPOV), the International Seed Testing Association (ISTA), and the International Seed Federation during the ISF world Seed Congress 2017.

This paper highlights the history of the organized seed sector, its growth and subsequent establishment of international organizations to nurture collaboration and cooperation across the

globe. The paper presents the current response and way forward.

Early history of organized seed sector

For most of the human history, seed played a key role in the agricultural development. The knowledge-based agriculture, including scientific plant breeding, mechanization, commercialization, diversification, and specialization at various stages of agricultural development led to the emergence of an organized seed sector in Western Europe and in North America over a century and half ago, with specialization in seed production, seed testing, and organized plant breeding. The gradual progress in the organized seed sector development called for harmonized standards across the industry in terms of crop improvement, seed production, and seed quality assurance for the growth of the industry in a healthy competition.

This progression brought about three important developments in the seed industry. The first development was the need for a systematic procedure and criteria for introducing new varieties to commercial seed production: varietal evaluation, registration and release. The second aspect was the need for developing a procedure for maintaining the varietal identity and purity of the new varieties for seed production and distribution to farmers: varietal certification. And the third is the seed quality control, such as testing seed for germination, purity, and health. In recognition of these developments, initially voluntary associations of breeders, merchants and farmers were established to organize and control seed production of new varieties, gradually evolving into what is now commonly called seed certification. Over the years, this led to a separation of crop improvement (variety development) from variety evaluation, registration, and release, as well as commercial seed production from seed quality control and certification. Such separation of tasks was also gradually identified in other countries, where breeding and seed production originated in the public sector and eventually expanded to include the private sector.

Growth of the seed industry

Initially, seed firms started as independent, small family enterprises with a division of labor between grain and seed production. Until the 1960s and 1970s, the seed industry in developed countries consisted of mainly family-owned businesses and agricultural cooperatives, producing seed for national and international markets. In the 1970s and 1980s, the consolidation of independent seed firms with (agro)chemical companies into transnational corporations proceeded with great speed. The complimentary role between seed and agrochemical inputs, such as pesticides and the emergence of biotechnologies, provided great opportunities. Currently, mergers are in preparation among six major multinational companies. These companies organize their research, production, and marketing activities on a regional or global scale The development of modern seed industry took centuries to reach the current level of progress. Even in countries with advanced seed programs, this is an evolutionary rather than a revolutionary process.

In contrast, the *Green Revolution* probably served as a stimulus for introducing agricultural research and for establishing an organized seed sector throughout most developing countries, particularly for economically and strategically important food security crops. In comparison with the slow evolution of commercial seed industries in developed countries over the centuries, this was a ‘top-down’ process initiated by governments for social and developmental reasons. From the outset, this development-oriented approach led to the establishment of public agricultural research and parastatal seed companies. In countries with an appropriate or enabling environment, the seed sector started diversifying with greater participation of the private sector, including multinationals, domestic private seed companies, and small to medium enterprises of different sizes and shapes. It remains to be seen how the seed sector in these countries will develop further.

Emergence and growth of international organizations

Regarding the progress of the seed industry, several domestic and regional associations of breeders, seed producers, and suppliers and seed quality control schemes have emerged. With a continued increase in international seed movement, a need for supporting cross border cooperation and collaboration was identified. This provided the impetus for establishing the international organizations still operating today. The International Seed Testing Association was established in 1924 with the express purpose of developing international rules for seed testing. Common sampling and testing methods and procedures are still being developed there today. In 1924, the International Seed Trade Federation followed suit by supporting seed trade across the globe (it merged with ASSINSEL (1938) to create the International Seed Federation in 2002). The OECD seed scheme (1958) and AOSCA (1919) emerged as a response to a need for harmonized seed certification schemes among member countries. UPOV was established in 1961 in order to harmonize effective plant variety protection and to ensure continuous investment in plant breeding. These institutions went through several changes to

accommodate for the trends in the development of the global seed industry.

As recently as 2009, the ISF, ISTA, OECD and UPOV in collaboration with FAO organized the 2nd World Seed Conference to take stock of the development of the global industry and to make recommendations on the way forward. The conference highlighted the critical role of new plant varieties and high quality seed in providing a dynamic and sustainable agriculture that can meet the challenges of a changing world. It concluded that governments need to develop and maintain an enabling environment to encourage plant breeding, and the production and distribution of high quality seed. Furthermore, it established the World Seed project in which the partners would collaborate to assist countries in strengthening their institutions that support the seed sector.

Present response

According to the World Bank's report *Enabling the Business of Agriculture 2017*, quality seed remains crucial for the development of agriculture around the world and for food security. The World Seed Partnership (WSP) was established in 2017 by the OECD, UPOV, ISTA and ISF in response to the discussions at the Second World Seed Conference in 2009.

Aware of their individual roles in helping governments, the WSP is now an initiative by four international organizations to enhance the cooperation and to provide a focal point for information on internationally harmonized seed systems in support of sustainable agriculture:

- *Organization for Economic Co-operation and Development*: Develop a reliable and internationally acceptable seed varietal certification system for seed movement nationally and internationally.
- *International Union for the Protection of New Varieties of Plants:* Establish and implement an effective system of plant variety protection.
- *International Seed Testing Association*: Enhance seed quality assurance for better on-field performance through improved seed sampling, seed testing, and storage capabilities.
- *International Seed Federation*: Facilitate growth of the local seed industry to ensure farmers' access to improved varieties and seeds.

Combining their knowledge and expertise, the partnership provides countries with guidance on the development of an enabling environment to encourage plant breeding and to produce and distribute high quality seed.

Going forward, the WSP will focus on interaction, collaboration, and engagement with key players and stakeholders from the public and private sectors.

The WSP website was launched at the ISF World Seed Congress in May 2017 in Budapest, Hungary (visit: www.worldseedpartnership.org). To find out more, please contact the WSP directly to see how a country can reap the benefits of a developed regulatory seed framework (contact: *info@worldseedpartnership.org*).

Zewdie Bishaw, ICARDA, Addis Abeba, Ethiopia; e-mail: z.bishaw@cgiar.org; and *Niels Louwaars, Dutch Seed Association, Gouda, Netherlands; e-mail: niels.louwaars@wur.nl;*

We Invented the 'Buzzines': The Journey of Biobest and Bumblebees

With a passion for bumblebees, Biobest was founded 30 years ago by Dr Roland De Jonghe in Belgium and invented the 'buzziness'. Soon after, Biobest was the first company to succeed in commercial bumblebee rearing. It did not take long before bumblebees proved to be a real technological breakthrough for greenhouse tomato growers. Thirty years later, the company has become a global player in sustainable crop management as growers in more than 70 countries rely on Biobest products to grow a healthy and sustainable crop. Biobest is part of a vibrant and rapidly growing biocontrol and pollination industry, which is still tiny compared to the agrochemical industry, but it is thriving. This is a great time to highlight the crucial role that bumblebees have played in the development of this industry.

How bio got buzzing

Today, the environmental and health impact of pesticides makes regular news headlines and are still far too widely used in the open field. Due to pressure from consumers, retailers, and stricter legislation, pesticide use has been substantially cut back for horticultural products in greenhouses. Chemical control in greenhouses was still the norm when bumblebees were introduced back in the late 1980s. The first challenge was to get the bees to deliver their full impact on yield and quality (40% more yield is not uncommon) and to have them from being killed by chemicals. Being one of the first insects introduced by growers, bees triggered a gradual awareness among tomato growers to use fewer pesticides and, if pesticides couldn't be avoided, to opt for less toxic and persistent products. Biobest invested in research around the 'side-effects' of pesticides on bumblebees and developed a strong

expertise. Against this background, growers who at that time were rarely ready to go for biological control started viewing biological control as a means to provide a proper working environment to their bees. And if your bees deserve a healthy setting, you're more likely to realize that the people working in the greenhouse also deserve it. 'We invented the buzziness' really sums up nicely how the bees played a crucial role in preparing the growers for biological control. It is our firm conviction that, without bumblebees, the biological control industry would not be where it stands today.

The bio buzz spreads

What started in tomato is now common in most of protected horticulture. In vegetables and soft fruits, also in ornamental crops, sustainable production and biological control is high on the agenda. Also, when a crop does not need bumblebees because pollination is not important, there are many reasons today to use biological control in integrated pest management or even to go for organic production. Consumer and retailer demand and stricter laws are certainly key, but in many cases, it's more efficient to use natural solutions rather than to spray products against which pests are rapidly developing resistance. Even with a higher dosage, it becomes difficult to control the pest. Growers who master the art of fostering a natural equilibrium in the crop, with the help of our advisors, avoid unnecessary plant stress due to chemical applications and grow a higher quality crop with a higher yield. We strive to offer growers a complete set of natural solutions by introducing new biocontrol agents or by developing more effective release and introduction methods. For example, Biobest pioneered the use of food supplements to preventatively establish a strong army of predatory mites in the crop.

New frontiers

Many developments in biocontrol of horticulture started in Europe, North America, and the Far East. Our industry, and indeed our company, is now spreading its wings across the globe. Growers in other continents are developing their expertise in biological control. Often, as in Africa and South America, biocontrol first gains ground in export crops. However, we are convinced that consumer awareness about healthy products will gradually get on the agenda also for the local market. That's why we are happy to have made significant steps in entering the market in Africa through the acquisition of Real IPM Kenya. We have also made a start in China and are looking at opportunities in South America. And often our old trick still works. In many parts of the world we have played a pioneering role in bringing local bumblebees to the market. We did it in Mexico and Turkey. We're doing it in China and South America. Once again, bumblebees have a role to play in opening the door for biocontrol. We're buzzing and we'll get bio buzzing as well. So, even after 30 years, we keep re-inventing the 'buzziness', confident of our pioneering spirit. For more information you may please visit the website.

Lise Verachtert, Biobest Belgium NV, Ilse Velden 18, 2260 Westerlo, Belgium; e-mail *lise.verachtert@biobest.be*

AATF Establishes First Early Generation Seed Production Entity in Sub-Saharan Africa

The African Agricultural Technology Foundation (AATF) has established the first early generation seed production entity in Sub-Saharan Africa (SSA) to effectively and efficiently supply high quality foundation seed for small and medium seed companies on the continent. The establishment, announced on 30 January 2017, will be based in Nairobi, Kenya and has received an initial five-year investment of US$ 8.4 million from the Bill and Melinda Gates Foundation.

QualiBasic was established to address technical, infrastructural, and financial challenges that seed companies face in maintenance, multiplication, and the timely supply of quality foundation seed. Overcoming these challenges is essential in order to improve farm productivity by smallholder farmers accessing certified seed.

Huge investments have been made by donors through various global public crop improvement programs for the benefit of African farmers. These breeding programs have released high yielding and very adapted crop varieties, for example, maize hybrids, offering opportunities for higher productivity. However, the benefits of these products are yet to be realized by smallholder farmers due to delayed seed production in some cases and low quality seed in others.

Under this partnership, AATF will help establish and nurture QualiBasic into a specialized fully-fledged, independent, and sustainable private sector driven business within five years.

QualiBasic operations will start with foundation seed for maize in East and Southern Africa; and then grow to serve other cereals and legumes across SSA when fully functional. Three foundation seed production hubs with seed processing and storage facilities will be established in Kenya, Zambia, and South Africa by the second and third year of operations, in order to meet the demand for

products in a timely manner and to avoid lengthy delays in seed movements.

For more information, contact Nancy Juma on: n.juma@aatf-africa.org

Source: Crop Biotech Update (February 1, 2017)

Forage Seeds Market Worth USD17.37 Billion by 2022

According to the 'Forage Seeds Market' report, the global forage seeds market is estimated to be valued at USD 9.91 billion in 2016 and projected to reach USD 17.37 billion by 2022, at a compound annual growth rate of 9.81%.

The market is driven by factors, such as improvement in the quality and quantity of forage crops, increase in livestock population, and enhancement of soil health resulting in improved yield. Moreover, the demand for livestock and livestock product is increasing in export markets, which influences the supply of improved forage for animal production. As a result, many multinational players have entered into the production of various forage seeds that provide essential nutrients to livestock. The report brochure can be accessed through this link and it includes the profiles of leading companies.

Alfalfa segment dominated forage seeds market

Due to its high yield, high content of protein and digestible fiber, and quality, the consumption of alfalfa is high in the overall forage seeds market. Alfalfa contains about 15-22% crude protein and a high volume of 10 different vitamins. It is primarily used for feeding cattle, dairy cows, goats, sheep, and horses.

Grasses projected to be fastest-growing segment

Grasses include natural grasses for grazing, pasture, and hay crops. With their wide adaptability and long-lived perennial nature, grasses are projected to grow at the highest rate during the forecast period. Grasslands form an important part in mixed agricultural systems since they provide a break in the rotational cropping system and provide feed to the livestock. Globally, ~60% of pasture land is categorized as grazing land. Furthermore, it ensures the efficient utilization of land, destruction of weeds, and safety against unusual weather conditions, hence accounting for the fastest growing market.

Continuous growth in livestock productivity and support from governments, as well as national and international associations, are key to the success in the Asia-Pacific region. High growth was observed in the Asia-Pacific region for the forage seeds market over the past few years. The main reasons for this growth are the increasing livestock production and rising demand for animal feed in the countries of the Asia-Pacific region. China and India constituted the largest country-level markets in the Asia-Pacific region in 2016. Enquiries can be made through this link.

COMSHIP Mutual Accountability Framework Meeting Held in Zambia

A partners meeting was held in Lusaka, Zambia, to discuss a proposed Mutual Accountability Framework (MAF) for partners working under the COMESA Seed Harmonization Implementation Plan (COMSHIP). The framework will provide COMSHIP partners with mechanisms to report, to hold each other accountable, and to improve coordination and effective implementation. Simply known as MAF, it will provide guidelines that will clearly define a framework that helps bring the partners together to enhance accountability.

COMSHIP is expected to integrate clear processes and mechanisms for its implementation; shared agenda and objective; and mechanisms to evaluate, review, debate, and negotiate performance; and meet the fundamental principles of mutual accountability.

Prior to the kick-off meeting held from May 22 to 23, 2017, an initial online survey was conducted to gauge the demand and to obtain input for the roadmap and elements of the MAF.

The workshop aimed to design the COMSHIP Mutual Accountability Framework (COMMAF) and to review and identify areas that require joint action in order to speed up implementation of COMSHIP. Furthermore, it aimed at discussing areas and strategies for collaboration with USAID bilateral missions on the domestication of the regional seed policy at country level.

The workshop to develop COMMAF is a response to the needs identified during the previous review meetings. Furthermore, it is building on past and ongoing consultations during the COMESA Seed Committee meeting in Egypt in February 2017, the COMSHIP Program Advisory Committee (PAC) and the Technical Working Group (TWG) meetings in Uganda in April 2017, the COMMAF annual review meeting, and other consultation processes.

Charles Nyachae, AFSTA, Nairobi, Kenya; e-mail: charles@afsta.org

ISF World Seed Congress 2017: 'Growing Beyond Bridges'

At the International Seed Federation (ISF) World Seed Congress (22-24 May), 1680 delegates from 68 countries convened in Budapest, Hungary, for the largest gathering of seed professionals to date. During the three-day event, delegates discussed, debated, and collaborated on the issues and challenges facing the seed industry through open meetings, panel discussions and roundtable events.

In his opening address, ISF President said that the seed industry needed to 'respond and adapt to global challenges to ensure it continues to thrive, and not just survive, in this changing world'. Citing examples of geopolitical, economic, and technological changes as affecting the movement of seed, he said: "We must do everything we can to move toward more consistent policies for products developed through the latest innovations, to make them accessible to all and ensure uninterrupted trade."

Highlights of the Congress program included a panel discussion on strengthening partnerships with smallholder farmers. Of the panel's recommendations was for ISF to keep identifying bottlenecks where regulations prevent the movement of seed. They also concluded that the needs of smallholder and commercial farmers are similar in that both require good practice and clear regulations.

Exploring the congress theme of 'Growing Beyond Bridges', ISF plans to advance its strategic objectives for plant breeding innovation, intellectual property rights, genetic resources, engagement, and the international movement of seed. the Secretary General highlighted a number of achievements in priority areas of the ISF, including the adoption of the International Standard on Phytosanitary Measures (ISPM), which is hailed as a landmark decision for the movement of seed, representing a significant step towards harmonized phytosanitary measures.

The Congress saw the launch of the World Seed Partnership, a joint effort by OECD, ISTA, UPOV and ISF to support the development of the seed sector worldwide and to achieve internationally harmonized seed systems (See the World Seed Partnership website).

Next year's ISF World Seed Congress will be held in Brisbane, Australia, on 3-6 June 2018, with the theme of 'Where Innovation Shines'. See the ISF World Seed Congress 2018 website for more info.

AOSA/SCST/ISTA Joint Annual Meeting

The 32nd International Seed Testing Association (ISTA) Annual Meeting was held from 19 - 22 June 2017 in Denver, Colorado, US A and was hosted together with Association Official Seed Analysts (AOSA) and Society Commercial Seed Technologists (SCST). This joint meeting was an opportunity to consolidate and strengthen the interactions that already exist, and for members of all three organizations to discuss and exchange ideas.

The main objectives of the ISTA Annual Meeting are to decide on proposals for changes to the lnternational Rules for Seed Testing, to present the work of ISTA's Technical Committees and to provide a forum for exchange of recent scientific advancements in seed science and technology. The joint event brought together 284 participants from 35 countries, including AOSA/SCST and ISTA delegates and representatives from both the seed industry and governments.

This year, the Annual Meeting was preceded by four workshops: i) Applications on Statistics in Seed Sampling, ii) Native Seed Testing, iii) Flower Seeds Testing, and iv) Tolerances in Seed Testing.

The program of the event begins with two half day sessions: "Trait Purity Testing for GMO" and "Building relations and collaboration in seed testing".

Every day during the event, each committee was given the opportunity for side meetings at the meeting venue. Many of this year`s session were held jointly amongst the three associations. The week was full of insightful presentations, thoughtful discussions and new resources for collaboration and working relationships.

The ISTA Annual Meeting ended with the Ordinary General Meeting (OGM), where ISTA Members voted on ISTA Rules changes. This year changes to be highlighted include two new Subchapters in Chapter 7: Seed Heath (7-031: Filtration method for

detection of *Ditylenchus dipsaci on Medicago sativa, Ditylenchus dipsaci and Ditylenchus gigas* on *Vicia faba* and 7-032: Detection of *Verticillium dahliae* on *Spinacia oleracea* (spinach) seed) as well a revision of Chapter 18: Testing Seed Mixtures.

Representatives of several international organizations such as the ISF, OECD, ABRATES and APSA were also attending the event.

ISTA would like to thank AOSA and SCST for organizing and hosting a joint successful event, and invites the seed testing community to save the date for ISTA's Annual Meeting 2018, which will take place in Sapporo, Japan, on 11-14 June.

ISTA Accreditation

What is ISTA Accreditation?

Accreditation is the procedure by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks (ISO/IEC Guide 2:1996).

The aim of ISTA Accreditation is to verify whether a seed-testing laboratory is technically competent to carry out seed testing procedures in accordance with the *'ISTA International Rules for Seed Testing'*. Accredited laboratories must show that they run a quality assurance system, fulfilling the requirements of the ISTA Accreditation Standard. The laboratories accredited by ISTA are authorized to issue *ISTA Seed Lot and Sample Certificates*.

By reporting seed test results on *ISTA Seed Lot Certificates*, the issuing laboratory assures that the sampling and testing has been carried out in accordance with the ISTA Rules. Methods of the ISTA Rules have been validated, internationally harmonized, and voted on by the ISTA membership.

How to become ISTA Accredited?

There are five steps to become ISTA accredited member:

Step 1: ISTA membership
Only member laboratories of ISTA may be accredited

Step 2: ISTA proficiency tests
Prior to accreditation, applicants must demonstrate their ability to test seeds in accordance with ISTA Rules by participating in the proficiency testing program.

Step 3: Quality management system
Candidate laboratories are required to establish a quality management system which complies with ISTA standard.

Step 4: ISTA audit
Part of the accreditation is on-site assessment. An experienced audit team evaluates the laboratory's compliance.

Step 5: Accreditation
Once the laboratory is accredited, it is authorized to issue ISTA certificates for methods and species covered by its scope of accreditation.

The time necessary to achieve accreditation will depend on the experience of the laboratory.

French version of accreditation procedures

ISTA is pleased to announce that the French translation of the ISTA Accreditation Standard for Seed Testing and Seed Sampling (version 6.0) is now available and published on the ISTA website through the following link.

News from UPOV

UPOV membership

The International Union for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization based in Geneva, consisting of 74 members and covering 93 States from Americas, Africa, Asia and Australasia (www.upov.int/members/en/). The purpose of 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.

Socio-economic benefits of UPOV membership in Viet Nam

The UPOV Council, at its 34th extraordinary session on 6 April 2017, welcomed the publication of 'The socio-economic benefits of UPOV membership in Viet Nam; An ex post assessment on plant breeding and agricultural productivity after 10 years' by HFFA Research GmbH. Follow the links for the Executive Summary and complete study.

Adoption of documents

The UPOV Council adopted the following documents:

Explanatory notes

- UPOV/EXN/EDV/2: Explanatory Notes on Essentially Derived Varieties under the 1991 Act of the UPOV Convention (Revision)

- UPOV/EXN/PPM/1: Explanatory Notes on Propagating Material under the UPOV Convention

Information documents
UPOV/INF/6/5: Guidance for the preparation of laws based on the 1991 Act of the UPOV Convention (Revision)

All adopted documents will be published in the UPOV Collection at the following link.

Test Guidelines

UPOV Council adopted five new Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability (Test Guidelines) and nine revised Test Guidelines and four partially revised Test Guidelines. UPOV has now developed 321 Test Guidelines, all of which are freely available on the UPOV website.

English common names	**Botanical names**
New test guidelines	
Abelia	Abelia R. Br.
Chinese Evergreen	Aglaonema Schott.
Cassava	*Manihot esculenta* Crantz
Scorpion Weed	*Phacelia tanacetifolia* Benth.
Bread Grass, Palisade Grass, Palisade Signal Grass, Signal Grass; Basilisk Signal Grass, Signal Grass, Spreading Liverseed Grass, Surinam Grass; Creeping Signal Grass, Koronivia Grass; Congo Grass, Congo Signal Grass, Ruzi Grass	*Urochloa brizantha* (Hochst. ex A. Rich.) R. D. Webster (*Brachiaria brizantha* (Hochst. ex A. Rich.) Stapf); *Urochloa decumbens* (Stapf) R. D. Webster (*Brachiaria decumbens* Stapf); *Urochloa dictyoneura* (Fig. & De Not.) Veldkamp P. (*Brachiaria dictyoneura* (Fig. & De Not.) Veldkamp P.); *Urochloa humidicola* (Rendle) Morrone & Zuloaga (*Brachiaria humidicola* (Rendle) Schweick.); *Urochloa ruziziensis* (R. Germ. & C. M. Evrard) Morrone & Zuloaga (*Brachiaria ruziziensis* R. Germ. & C. M. Evrard)
Revisions of test guidelines	
Wheat	*Triticum aestivum* L.
Lettuce	*Lactuca sativa* L.
Freesia	Freesia Eckl. ex Klatt
Chestnut	*Castanea sativa* Mill.
Walnut	*Juglans regia* L.
Leaf Chicory	*Cichorium intybus* L. var. *foliosum* Hegi
Witloof, Chicory	*Cichorium intybus* L. *partim*
Petunia	*Petunia Juss.*; xPetchoa J. M. H. Shaw
Papaya, Pawpaw	Carica papaya L.
Partial revisions of guidelines	
Tomato	*Solanum lycopersicum* (L.) Karst. ex Farw.
Lavendula, Lavendar	Lavandula L.
Flax-lily, Dianella	Dianella Lam. ex Juss.
Tomato Rootstocks	*Solanum lycopersicum* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner; *Solanum lycopersicum* L. x *Solanum peruvianum* (L.) Mill.; *Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosberg

Experience of members of the Union in the Examination of New Plant Varieties

Members of the Union have indicated their practical experience in the examination of distinctness, uniformity and stability (DUS) and the number of taxa had increased from 3,462 in 2016 to 3,561 in 2017 (+2.9%). The list of taxa in 2017 included 3,416 different genera/species. Information on members of the Union with practical experience in DUS examination is freely accessible via the GENIE database (see http://www.upov.int/genie/en/).

Organization of UPOV sessions

The UPOV Council decided to organize only one annual session of the Council, Consultative Committee, Administrative and Legal Committee and Technical Committee from 2018, with the sessions being held during one week at the end of October or beginning of November.

UPOV electronic application form

The plant breeders' rights (PBR) electronic application tool (EAF) is now available online. The features of the EAF are:

- An online PBR application tool that can be used to provide application data to all participating PVP Offices in the required format (hard copy, e-mail, system to system communication)
- Application forms can be displayed in a range of languages (answers must be provided in acceptable language for PVP Office)
- Information can be automatically re-used in subsequent application data
- Different user roles can be specified (e.g. drafter, signatory, translator, agent, procedural representative)
- Controlled access to all PBR application data
- Security and confidentiality

For more information on the crops covered, participating PVP Offices and fees, see http://www.upov.int/upoveaf.

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

Status of Genetically Modified Crops: 2016

Introduction

The International Service for the Acquisition of Agri-biotech Applications publishes the Annual Global Review of Biotech Crops Commercialization (ISAAA Briefs). Brief 52 provides the latest information on the subject, a global database on the adoption and distribution of biotech crops in 2016, as well as the accumulative data since 1996, country situations, approval trends of biotech crops, and future prospects of the technology in the biotech crop-growing countries and the world. ISAAA Brief is one of the most cited references in the field of modern agri-biotechnology due to its credibility and accuracy. Since the adoption of biotech crops in 1996, ISAAA has remained the single most prominent source of this information.

The year 2016 was momentous, since for the first time, Nobel Laureates released a statement in support of biotechnology. The Food and Agriculture Organization, International Food and Policy Research Institute, the G20 countries, and other like-minded bodies, guided by the 2030 Agenda for Sustainable Agriculture have committed to eradicate hunger and malnutrition in 15 years or less. More importantly, the US National Academies of Sciences, Engineering, and Medicine published a review of 900 researches on biotech crops since 1996 and found that genetically modified crops and conventionally-bred crops are no different in terms of probable risks to human health and the environment. Biotech crops have now had an unblemished record of safe use and consumption for over 20 years. Future generations will benefit from a wider choice of biotech crops with improved traits for high yield and nutrition, as well as improved safety for food use and the environment.

Highlights of 2016 Adoption of Biotech Crops

Biotech crop planting in 2016 showed high adoption at 185.1 million ha worldwide

A year after the second decade of commercialization of biotech/GM crops in 2016, 26 countries grew 185.1 million ha of biotech crops – an increase of 5.4 million ha or 3% from 179.7 million ha in 2015. Except for the 2015 adoption, this is the 20th year on year increase; and notably 12 of the 20 years were double-digit growth rates.

Biotech crops provide more diverse choices to consumers in 2016

Biotech crops have expanded beyond the big four (corn, soybean, cotton, and canola) to provide more choice to many of the world's consumers. These biotech crops include sugar beet, papaya, squash, eggplant, potatoes that are already on the market, as well as apples, which will be on the market in 2017. Potato is the fourth most important staple crop in the world and eggplant is the number one vegetable consumed in Asia. Non-bruising and non-browning apples and potatoes can contribute to the reduction of food waste. Additionally, research done by public sector institutions include crops such as rice, banana, potato, wheat, chickpea, pigeon pea, mustard and sugarcane at advanced stages of evaluation, and are likely to provide even more diverse offerings to consumers, especially in developing countries.

New biotech crops and traits for the benefit of farmers and consumers

It is noteworthy that new biotech crops and traits are being field tested to cater to farmers and consumers. These include among others, staple crops such as beta-carotene enriched Golden Rice being tested in the Philippines and Bangladesh; bunchy top virus resistant biotech banana in Uganda; fusarium wilt resistant biotech banana and biotech wheat with disease resistance, drought tolerance, altered oil content, and grain composition being field tested in Australia; high yield and biomass wheat in the United Kingdom; late blight resistant potato varieties Desiree and Victoria in Uganda and late blight and nematode resistant potato variety Maris Piper with less bruising and less acrylamide potato in the EU; insect resistant chickpea and pigeon pea, and biotech mustard which are staple vegetables and oil source, respectively, in India; drought tolerant sugarcane in India and Indonesia; and omega-3 enriched camelina in the EU.

Biotech crops increased 110 fold from 1996

The overall global area of biotech crops has increased ~110-fold, from 1.7 million ha in 1996 to 185.1 million ha in 2016, making biotech crops the fastest adopted crop technology in recent times. An accumulated 2.1 billion ha was achieved in 21 years of biotech crop commercialization.

About 26 countries, 19 developing and 7 industrial countries grew biotech crops

The 185.1 million ha of biotech crops were grown in 26 countries, of which 19 were developing and 7 industrial countries. Developing countries grew 54% (99.6 million ha) of the global biotech crop area compared to 46% (85.5 million ha) in industrial countries.

Biotech soybean reached 50% of global biotech crop area

The four major biotech crops: soybean, maize, cotton, and canola (in decreasing area) were the most adopted biotech crops in 26 countries. The area planted to biotech soybean was the highest at 91.4 million ha, which is 50% of the global area of 185.1 million ha for all biotech crops. Although the soybean area only showed a marginal decrease of 1% from 2015 (92.7 million ha), the area is still substantial at 91.4 million ha. Based on the global crop area for individual crops, 78% of soybean, 64% of cotton, 26% of maize and 24% of canola were biotech in 2016.

Herbicide tolerance traits occupied 47% of hectarage

Herbicide tolerance deployed in soybean, canola, maize, alfalfa, and cotton, has consistently been the dominant trait at 47% of the global hectarage. A declining trend on herbicide tolerant crops planted was observed with the rise of stacked traits (combined insect resistance, herbicide tolerance, and other traits). The area planted to herbicide tolerant crops was 86.5 million ha in 2016, occupying 47% of the global biotech area of 185.1 million ha. On the other hand, area planted to stacked traits increased by 29% in 2016 to 75.4 million ha from 58.4 million ha in 2015. Stacked traits occupied 41% of the global biotech crop area of 185.1 million ha.

Top five countries growing 91% of biotech crops

The USA lead biotech crop planting in 2016 at 72.9 million ha, followed by Brazil (49.1 million ha), Argentina (23.8 million ha), Canada (11.6 million ha) and India (10.8 million ha) for a total of 168.2 million ha, 91% of the global area.

Source: Crop Biotech Update (May 4, 2017)

Ethiopia to Commercialize BT Cotton in Two Years

Ethiopia is set to begin the commercialization of biotech cotton following the adoption of a law by the House of Peoples Representatives that granted experiments both in laboratories and the conduct of confined field trials of BT cotton. Ethiopia will probably put the biotech cotton varieties on the market within a year or two. The confined field trail of the BT cotton has now entered the final stages, which will allow the cotton to be commercialized. The trials have been conducted for at least four years on four varieties introduced from India and Sudan.

The field trials have been conducted in selected cotton growing areas in the north, south and eastern parts of the country. Based on the results of the field trail, Ethiopia will have a BT cotton variety in the field soon, which is resistant to bollworm, a pest that greatly affects the productivity of cotton, returns high yields, uses fewer herbicides, water, and other agricultural inputs.

In Ethiopia, the expansion of the textile manufacturing sector has seen an increasing demand for cotton. Furthermore, the introduction of industrial parks in the manufacturing sector is expected to push the increase in the supply of cotton production.

Since 2001, COMESA has been engaged in promoting biotech activities across member states. In addition to initiating biotech policies, the regional bloc has been active in awareness campaigns. One example is the collaboration of the Common Market for Eastern and Southern Africa has with US Department of Agriculture, The International Service for the Acquisition of Agri-biotech Applications stationed in Kenya, the South Asia Biotechnology Centre, and others, having long joined hands to induce the use and utilization of GMOs across Africa and beyond.

Source: Africa Business Communities

GE Cowpea Seeds to be Available for Nigerian Farmers in 2019

Nigeria's National Biotechnology Development Agency (NABDA) announced that genetically engineered (GE) cowpea will be commercially available in the country in or before 2019. GE cowpea is currently under field trials and has shown positive results. The Ethical Committee is working to ensure that no rule is breached. Nigerians should be assured that the GM beans and other crops to be made available in the country would be safe for consumption. In the next 2-3 years, cowpea should be commercially available in the country.

Source: Daily Trust

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.

International Wheat Conference Loud Recent Successes of Wheat Sector in Africa

The international wheat conference was organized by the AfDB funded SARD-SC Wheat project of ICARDA and was held from 27 February to 2 March 2017 in Abuja, Nigeria in order to take stock of the current efforts in reducing wheat imports and the impact that has been realized by scientists and private sector working through the project. The conference was attended by wheat scientists and NARS leaders from 15 African countries, senior policy makers, AfDB officials, private sector representatives (millers, input suppliers, financial institutions, service providers) government institutions, model wheat farmers and partner CGIAR centers (IITA, ICARDA, CIMMYT and IFPRI).

During the official opening, the impact of SARD-SC project was acknowledged and commended by policy makers and higher officials in Nigeria. However, the scientific community and stakeholders have been challenged to provide scientific data on comparative production costs of wheat in various African countries and their competitors from the global market in order to enable policymakers to make policies that do not penalize local wheat farmers and actors in the wheat value chain.

The aim of the SARD-SC wheat project was to achieve transformational impact through a sustainable increase of wheat productivity for enhanced food security, economic growth, and poverty alleviation across the project's target countries. Enhancing the productivity and competiveness of wheat involved the development and deployment of appropriate technologies for targeted production environments and markets, while providing resilience and adaptation to climate change. The project specifically focused on testing, adapting, and promoting proven wheat-based technologies that are best adapted to the different wheat growing environments of Africa.

Generation of Technology

One of the main achievements of the project in technology generation is the release of heat tolerant bread wheat varieties with significant yield advantage over the current varieties both under rainfed and irrigated conditions in Ethiopia (8), Nigeria (4) and Sudan (2) since 2013.

Adoption of technology

The SARD-SC wheat adopted the innovation platform (IP) as an effective approach for disseminating and promoting proven technologies and for linking farmers to input and output markets, through active participation and interaction of all concerned stakeholders along the value chain, including farmers, extension officers, inputs providers, seed producers, financial institutions, agro-processors and policy makers. The adoption and performance of wheat varieties by farmers in IP sites was tremendous where yields reached as high as 6 t ha^{-1} with significant increase in farmers' incomes.

Policy impacts

The adoption and performance of wheat varieties by farmers in IP sites enabled major policy shifts in the target countries.

In Nigeria, wheat has been included as a priority in the Agricultural Transformation Agenda (ATA). Government created a market for domestic wheat – with minimum price guarantees for farmers to promote domestic production. Through the ATA program, the Government launched a nation-wide scaling up program to expand the wheat area – from 70,000ha in 2015 ha to 340,000 ha in 2019 and set a target to reduce Nigeria's import burden by up to 50% in 2019, a saving of around USD 2 billion each year in import costs.

In Sudan, the government has officially adopted the IP approach in its national agricultural technology extension program throughout the country, for wheat and other major food security crops. Created a market for domestic wheat – with minimum price guarantees for farmers and incentives for millers to buy domestic wheat. Launched a national target for expanding wheat acreage from 214,000 ha in 2015 to 500,000 ha in 2019 and then progressively to 600,000 ha over subsequent three years to boost domestic production and to significantly reduce and eventually stop importation.

In Ethiopia, the government adopted the IP approach for clustering wheat farmers to provide better extension services, improved access to inputs and mechanized equipment for field operation and harvest, and for developing integrated corridor-based wheat production and milling/ processing zones across the country. The government also launched a national target for expanding domestic wheat production by developing 300,000 ha of irrigated land in the lowland areas of the country to achieve national wheat self-sufficiency over the coming 5-10 years.

Source: Wheat 4 Africa Updates

Ethiopia Step-up Cooperative-Based Seed Production

Improved seeds deliver varieties that are high-yielding and resistant to pests and diseases, thereby increasing crop production. The availability of quality seed in sufficient amounts, however, remains a challenge for smallholder farmers in most parts of Ethiopia. In order to address this, the Agricultural Transformation Agency (ATA) and partner organizations started the cooperative-based seed production (CBSP) project to fill specific gaps in seed supply through local seed production and marketing across the country. In particular, the project targets seed production of self-pollinating varieties not yet handled by the formal seed sector. The CBSP project aims to transform the intermediate seed sector to significantly increase the quality and volume of improved seeds produced and marketed through unions. This requires a strong focus on both institutional and individual capacity building for existing seed cooperatives and farmers.

Although there are more than 285 seed producing cooperatives operating at different scales and efficiencies in four main regions, 96% of these do not meet the regulatory requirements to become licensed enterprises. The project addresses the weak institutional capacity of cooperatives to develop and manage robust business plans by modelling seed unions that are inclusive, and financially sustainable, with capable leadership and improved internal quality control capacity. In its work with cooperatives, the project trains smallholder farmers on seed production and post-harvest handling. It encourages seed unions to adopt the direct seed marketing modality, which facilitates a streamlined seed distribution system.

Much of the work draws from the experience of the Edget Cooperative Union, which until recently was the only seed-specific union in the country and has been one of the most successful. Edget has modeled the benefits of forming a strong seed-specific union for better leadership, management, and coordination of community-based seed producers. The Union provides nearly one-quarter of the seed supplied in SNNP, which it has achieved by enhancing its physical capacity, internal quality control, leadership, and governance.

Seven new seed unions have been set up in SNNP (3), Amhara (2) and Tigray (2) since launching the CBSP project, where 147 primary cooperatives were grouped into unions and 32 primary cooperatives were strengthened during the first year of Growth and Transformation Plan (GTP) II. Another seed union in Amhara was included for capacity building intervention in the last quarter of 2016. Furthermore, three existing multipurpose unions in Oromia were restructured to enable them to incorporate seed production businesses. Finally, sub-grant agreements between the ATA and local partners have been signed to facilitate the physical capacity of phase II unions.

Physical capacity building has also been a strong area of performance for the CBSP initiative. The storage, processing, and production facilities of 32 primary cooperatives and one seed union have been improved through this initiative. Moreover, 147 primary seed producing cooperatives were transformed into seed unions. This is expected to bring about structural changes in cooperative-based seed production throughout the GTP II period.

Capacity building of skills is also a priority of the project. Accordingly, a training of trainers course was offered to agronomists and experts in SNNP and Tigray regions, where 1,851 seed-producing farmers were trained on seed production and post-harvest handling techniques. Similar training courses will be organized in Oromia and Amhara planned for the 2017 planting session.

To improve the governance and seed business management capacity of the new unions, a learning visit was organized for 35 union leaders and cooperative experts in SNNP. Training on seed business management and governance was given to 150 union and primary cooperative leaders in Oromia and 34 in Tigray.

Limitations of varieties remain a challenge for CBSPs. Hence, 14 varieties were popularized in the four regions through 12 farmers' field days. Another success of the project has been that targeted seed unions have secured 70% of their basic seed demand for major varieties of wheat and teff in all the regions. Seven primary cooperatives have been engaged in basic seed production for the first time in Tigray and Amhara. As a result, these CBSPs are becoming self-sufficient in meeting their own basic seed demand - a concept introduced by the CBSP project - and are now able to cover much of their own basic seed demand, whereas previously they were covering none.

Building on the successes and lessons from the inception phase of the project, the next phase is expected to expand the support across a wide range of policy and capacity-focused interventions.

GTP II recognized CBSPs as key players, and seeds as critical input, in Ethiopia's agricultural

development. The GTP II has set objectives to boost seed production and marketing, to build competitive community institutions, to scale up the intermediate seed sector while decentralizing the roles previously dominated by the public seed sector; and to influence national and regional governments and to strike a balance between public sector and CBSP investments.

Source: Agricultural Transformation Agenda: Annual Report, 2015-16

Ethiopia Scaling Input Voucher Sales System for Better Access by Farmers

The Input Voucher System (IVS) was formulated in response to the difficulties that smallholder farmers face in accessing credit for agricultural inputs such as fertilizers, seeds, and farm tools. The system engages local microfinance institutions (MFIs) or Rural Saving and Credit Cooperatives (RuSACCos) to qualify farmers for loans and issue cash or credit vouchers that can be used to redeem inputs at nearby cooperative stores. By doing so, it minimizes the risk that farmers will be deterred from using inputs because of their high initial costs. Facilitating access to credit encourages farmers to experiment with and use improved technologies.

Ethiopia has not had formal credit facilities for agricultural inputs since regional governments discontinued a previously existing lending scheme. The scheme established with the Commercial Bank of Ethiopia (CBE), provided loans to finance the import of inputs. These inputs were then distributed to cooperatives for onward sale to farmers, either on credit or for cash. Regional governments would offer a 100% credit guarantee, bearing the burden of repaying loans to CBE whenever farmers defaulted. The accumulation of sizeable unpaid loans to CBE strained the budgets of regional governments, leading them to discontinue credit facilities and making input sales on a cash-only basis. Among the many reasons for these defaults was the inability of multipurpose cooperatives to systematically handle major financial transactions, including the collection of input loan repayments.

The IVS is part of the overall rural financial services program that aims to address these and other financial institutions in meeting the needs of rural communities. Initiated in 2014, the fundamental objectives of the IVS are to increase access to demand-driven rural credit and contribute toward building strong, client-centered rural financial institutions. In distributing vouchers, the IVS has designated MFIs and RuSACCOs as the agents for cash and credit sales, and in doing so, minimized the cash risk exposure for participating farmers, cooperatives, and regional governments.

The MFIs play the additional role of collecting loan repayments from farmers, allowing for effective audit and control processes by all institutional participants and supporting effective financial flows between and among all stakeholders.

The ATA piloted the initiative in 2014 in five *woredas* of the Amhara region, in collaboration with the Amhara Credit and Saving Institution (ACSI), which opened 55 new branches for this purpose. During the pilot period, ETB 243 million worth of vouchers were issued to 168,000 farmers who either paid cash or accessed their vouchers on credit (worth over ETB 52 million) had repaid their debts in full. The newly established ACSI branches mobilized more than ETB 35 million in savings from over 24,000 farmers in the pilot *woredas* within the same time frame. To this end, 219 ACSI and primary cooperative staff were trained on IVS implementation. Following these remarkable results, the IVS was rapidly scaled up in Amhara, SNNP, and Tigray regions.

Since its inception, the project has been widely promoted through a financial awareness campaign using radio in all four regions, as well as trainings given to experts in Amhara (4, 200), Tigray (645), and SNNP (1,000) to ensure successful rollout. In the 2016 planting season the IVS was piloted in six *woreda*s in Oromia. To support the implementation, a training of trainers (ToTs) course was provided to zonal and *woreda* experts in Amhara (350), SNNP (194), Tigray (290) and Oromia (105). Additional training on IVS operations was given to over 10,000 agents at *kebele* level across the four regions.

In 2016, the IVS was automated and upgraded from paper to electronic format as e-vouchers. In order to save costs, reduce errors, and streamline the process, piloting of the e-voucher was carried out from mid-2016 in two *woredas* in Amhara and three *woredas* in Tigray regions.

Transaction recording began before the end of the calendar year in two *woredas* in SNNP. A combined total of 150 officials, and 450 MFI and primary cooperative agents were trained in the three regions. About 170 mobile devices and 85,000 NFC tags were also distributed.

In its two years of operation, the voucher system has streamlined the process of input purchases, improved access to credit, and encouraged savings in rural communities. Farmers have begun planning their input purchases and related expenses in

advance of planting seasons. Since farmers are given 12 months to repay loans given through the IVS, they have the flexibility to store and sell grain when prices are attractive, rather than being forced to sell at harvest time.

IVS scale-up during 2016 planting season

Region	Participating farmers (million)	% female farmers	Value of inputs (ETB million)
Amhara	2.100	12%	4,080
SNNP	0.283	18%	344
Tigray	0.336	25%	343
Oromia	0.056	25%	172
Total	**2.775**		**4,939**

On the other hand, the system has enabled financial institutions to facilitate the collection of credit and cash sales, easing the burden on the budgets of regional governments. In Amhara alone-where the IVS has been implemented across all *woredas*, 1200 ACSI satellite offices have mobilized close to ETB 800 million in savings. Furthermore, the system reports reliable information regarding the use of inputs by smallholder farmers in each *woreda*, assisting officials at all levels to make better informed decisions.

Source: Agricultural Transformation Agenda: Annual Report, 2015-16

New Seed Labels Reinforcing Efforts for Genuine Certified Seed for Kenyan Farmers

Access to certified seed is one of the biggest problems for smallholder farmers, particularly in Kenya where such growers constitute 75 per cent of all agricultural producers. A lack of adequate certified seed affects productivity even in places that have good soils and receive adequate rainfall and have over time had optimum yields.

As part of its campaign to ensure that farmers have certified seed that they can trust, The Seed Trade Association of Kenya (STAK) which is a membership of seed producers, marketers, and other actors in the seed value chain has partnered with the Kenya Plant Health Inspectorate Service (KEPHIS) to ensure that farmers get certified seed. Traceability in the event of problems with particular seed lots will be easier, and so will be the ability of the regulator, KEPHIS to stop sale of expired seed.

In a clever remedy, mPedigree makes available the technology to check the authenticity of seeds through a cloud-based solution that creates a unique 12-digit number, which is to be placed on each seed pack. The unique number, hidden under an opaque layer is only revealed when the farmer purchases the product and scratches. Farmers can send a text with the number to a special short code for instant confirmation of the product's authenticity free of charge. Farmers are encouraged as much as possible to send this message at the point of choice. It is envisaging that farmers without a hand set will be supported by agro dealers to have their seed parks scratched.

This is the reason why Kenyan farmers need to be empowered so that as they increase quality seed purchases and that they have the confidence that their investments will yield the desired results. This will cumulatively enhance household food security and incomes.

They will have systematically dealt a body blow to unscrupulous traders who have over time thrived in selling of fake seed; reaping where they never sowed. It is anticipated that with this new drive, there will be renewed interests in farmers getting involved in farming since they will be putting their hard earned income in a predictable venture; challenges such as climate change notwithstanding.

By October 2017, all seed packets weighing less than 10 kg in Kenya will be required to have tamper-proof scratch labels. The idea of having labels is also in line with that of Common Market for Eastern and Southern Africa (COMESA), which is introducing the use of labels across member states in an effort aimed at facilitating cross border trade within COMESA member states.

Charles Nyachae, AFSTA, Nairobi, Kenya; e-mail: charles@afsta.org

Chickpea and Lentil Seed Delivery in Turkey

Introduction

Chickpea and lentil are important and widely cultivated food legumes in Turkey. Turkey is one of the global players in the international chickpea and lentil trade. Coordinated food legumes research started in 1975 with the National Food Legumes Research Project. Currently, eight agricultural research institutes work on chickpea whereas only two work on lentil, including some agricultural universities where they carry out breeding and agronomy.

In 1982, Turkey initiated a project to reduce the fallow area under wheat-fallow rotation system. The project was implemented in two phases during 1982-87 (Phase I) and 1987-1991 (Phase II) primarily in Central Anatolia and Transitional Zones. About 1.4 million ha of fallow land were planted with annual crops mainly chickpea and

lentil. Thus, chickpea and lentil production increased from 1982 until early 1990s. However, marketing problems and a sharp decline in price led to a decrease of area planted and production to the current level.

Chickpea

In 1960s, the chickpea area was about 100,000 ha (Figure 1) and it reached the peak in 1991 with 874,393 ha. Since then, it has declined steadily to 359,529 ha in 2016. Although the area has decreased by about 60% from 1991 to 2016, production has not decreased by as much due to an increase in yield by about 30% over that of 1991 (Figure 1). There are 36 chickpea cultivars in the national list in 2016 (Table 1); and 25 (69%) of them are from germplasm of ICARDA origin.

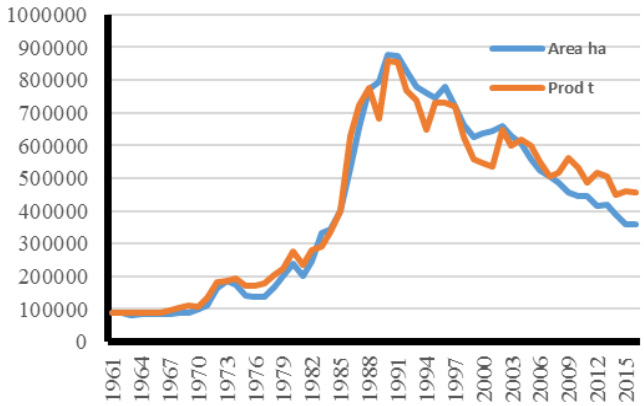

Figure 1. Chickpea area and production from 1961 to 2016

Table 1. Chickpea varieties released in Turkey

Release period	ICARDA	NARS	Total
1990s	12	4*	16
2000s	7	3	10
2011-14	6	4	10
Total	**25**	**11**	**36**

Note: *One variety is from 1987 and one variety is of unknown origin

Out of 36 chickpea cultivars on the national list, 26 are under certified seed production in 2016 (Table 2). Chickpea certified seed production increased steadily from 1239.4 t in 2012 to 3915.6 t in 2016, as shown in Figure 2. The main drivers are subsidy payment for both certified seed producers and certified seed users, the farmers. *Azkan* (2009) followed by *Çagatay* (2001) released from germplasm of ICARDA origin were among the varieties with larger amount of certified seed production. ICARDA originated cultivars collectively occupy 93, 96, 80, 86 and 91%, respectively during 2012, 2013, 2014, 2015 and 2016 (Figure 2).

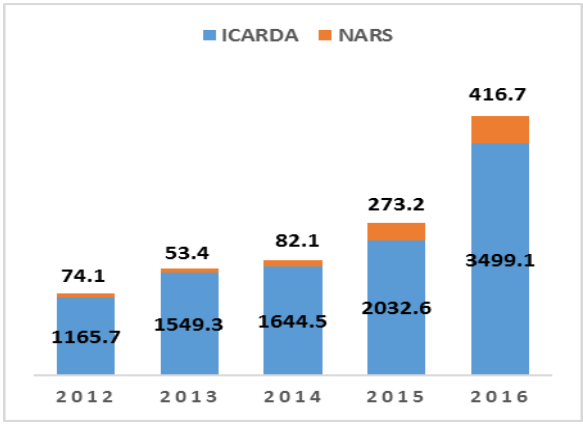

Figure 2. Chickpea certified seed production (t) during 2012-16

In 2016, chickpea was planted on 360,000 ha where more than 35000 t of seed is required to plant the whole area (Table 2). In Turkey, the target is that farmers replace certified seed once every 3 years, although the rule of the thumb is 4 (25%) to 5 (20%) years for self-pollinated crops. In 2016, about 3916 t of certified seed was supplied which is still low and did not reach the desired seed replacement rate. Although the coverage of certified seed has increased over the years, the amount of certified seed supplied in 2016 is only 32.7% of the three-year seed replacement rate. This amount is equivalent to 11% of the total seed requirement to cover the total chickpea area, compared to conventional seed replacement rate of 4 to 5 years (20-25%) for self-pollinated crops.

Table 2. Chickpea certified seed supply and area coverage 2012-2016

Year	Area (ha)	Potential seed required (t)	Certified seed required (t)*	Certified seed supplied (t)	Certified seed (%)**
2012	416242	41624.2	13735.9	1239.4	8.9
2013	423557	42355.7	13977.4	1602.5	11.4
2014	388518	38851.8	12821.1	1726.3	13.3
2015	359304	35930.4	11857.04	2305.4	19.2
2016	359529	35952.9	11864.1	3915.6	32.7

Note: * Planting certified Seed once every 3 years; ** certified seed supplied as per cent of seed replacement rate

Lentil

The lentil area was about 100,000 ha until mid-1970s and it increased gradually to 250,000 ha in 1981 (Figure 3). However, the area has more than doubled to over 600,000 ha in 1982 and continues to increase until 1988, reaching 979,632 ha during the fallow-replacement project. Since then the area dropped to 235,474 ha in 2016, which accounts to less than one third of the 1988 area. Production has also been decreased from 1,040,000 t in 1988 to 345,000 in 2016, around 33% of the 1988 production.

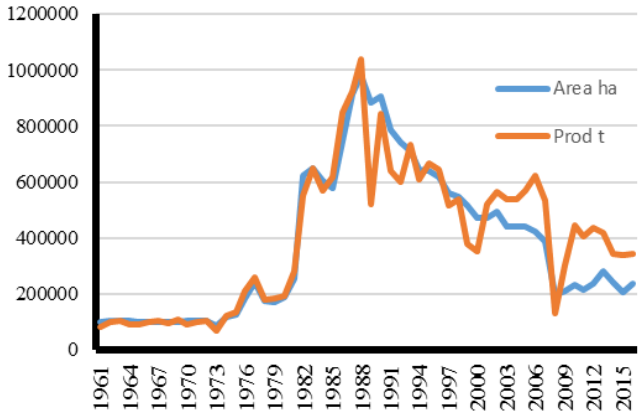

Figure 3. Lentil area and production between 1961 and 2016

There are 22 lentil cultivars in the national list as of 2016 in Turkey, of which fourteen (64%) are of ICARDA origin (Table 3).

Table 3. Lentil cultivars released in Turkey

Year	ICARDA	NARS	Total
1970s	-	2	2
1980s	1	-	1
1990s	2	1	3
2000s	-	-	-
2011-16	11	5*	16
Total	**14**	**8**	**22**

Note: *One variety of unknown origin

Lentil certified seed production fluctuated over the years from 304.8 t in 2014 to 1398.7 t in 2016 mainly due to price and drought as it has been produced under rainfed conditions (Table 4). *Cağıl, Firat 87* and *Şakar* are among the varieties most produced and supplied. The ICARDA originated varieties occupy close to 100%.

Table 4. Lentil certified seed production (t) in Turkey

Origin	2012	2013	2014	2015	2016
ICARDA	1046	2077.4	304.4	462.6	13952
NARS	0.6	0.3	0.4	7.2	35.5
Total	10477	2078	301	470	13987
% ICARDA	**99.9**	**100.0**	**99.9**	**98.5**	**99.7**

In 2016, lentil was planted on 235,474 ha where more than 23,547 t of seed is required to plant the total area (Table 6). As for chickpea, the target is that farmers replace certified seed of lentil once every 3 years. In 2016, about 1399 t of certified seed was supplied compared to the total seed requirement to cover the whole lentil area. The amount of certified seed supplied in 2016 is only 17.8% of the three-year seed replacement rate. This amount is equivalent to 5.9% of the total seed requirement to cover the total lentil area, compared to conventional seed replacement rate of 20-25% for self-pollinated crops.

Table 6. Lentil certified seed supply and area coverage 2012-2016

Year	Area (ha)	Potential seed required (t)	Certified seed required (t)*	Certified seed supplied (t)	Certified seed (%)**
2012	234378	23747.8	7915.9	1046.6	13.2
2013	214847	28115.1	9371.7	2077.7	22.2
2014	281151	24337.0	8112.3	304.8	3.8
2015	207469	20746.9	6915.6	469.8	6.8
2016	235474	23547.4	7849.1	1398.7	17.8

Note: * Planting certified seed once every 3 years; ** Certified seed supplied as per cent of seed replacement rate

Almost all chickpea and lentil varieties are from public breeding institutes and universities. While the public NARS and universities are responsible for early generation seed production of the varieties, certified seed production and marketing are almost entirely handled by the small to medium private seed companies.

Conclusion

The cereal-fallow replacement program increased both chickpea and lentil production. However, marketing problems and a sharp decline in price led to the decline both in area planted and production of chickpea and lentil over the years in Turkey. The main drivers for chickpea and lentil seed supply in recent years are the government policy in providing subsidies for both the seed producers and seed users. It is critical to have a stable policy environment to promote food legume production to ensure diversification, intensification and sustainability of farming systems.

Acknowledgments

The information was compiled from personal communications with seed producers, researchers and government administrators/officials. More information can be found at the following sites:

- http://www.tuik.gov.tr/PreTablo.do?alt_id=1001
- http://www.tarim.gov.tr/BUGEM/TTSM/Menu/30/Kayit-Listeleri
- http://www.fao.org/faostat/en/#data/QC

Mesut Keser, ICARDA, Ankara, Turkey; e-mail: m.keser@cgiar.org

Research Notes

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

Evaluation of Field pea (*Pisum sativum* L.) varieties with farmers' participation in Southeastern Ethiopia

Yetsedaw Aynewa[1], Seid Ahmed[2], Negussie Tadesse[1]and Zewdie Bishaw[11]*

Abstract

Field pea participatory variety selection was conducted to select varieties that are high yielding and resistant to pests with better nutritional and feed values. Five released field pea varieties were evaluated at Selka and IluSanbitu *kebeles* in Sinana district, southeastern Ethiopia. Male and female farmers evaluated the varieties at physiological maturity of the crop using defined criteria and scored the value by using a matrix ranking method. The overall mean score value for male and female farmers at both villages showed that varieties *Burkitu*, *Gume* and *Markos* ranked first, second, and third, respectively. The farmers' involvement in variety evaluation ensures identifying preferred traits, speeds up adoption of new varieties, and strengthens semi-formal and informal seed systems.

Key words: Ethiopia, field pea, matrix ranking, PVS, score value

Introduction

Field pea (*Pisum sativum*) is the third most important legume crop next to faba bean and chickpea in terms of area and production in Ethiopia. In the 2015/16 cropping season, more than 221,000 ha of land was covered by field pea and more than 300 thousand t was produced (CSA, 2016). Field pea is used for human consumption and its straw is used as livestock feed (Beck et al., 2015). The nutrient-dense grain legume contains modest fiber, high energy, and is a good source of crude protein for animal feed.

It is now recognized that the shortcomings of centralized plant breeding are related to their inability to address the enormous diversity of environmental conditions and the need of end users (Morris and Bellon 2004). Farmer participation in variety selection is often advocated on the basis of equity, sound scientific and practical reasons to increase the efficiency and the effectiveness of a breeding program (Ceccarelli and Grando 2002) in the developing world. Therefore, in the 2015/16 cropping season, participatory variety selection (PVS) was conducted in southeastern Ethiopia with two main objectives: (i) to identify suitable field pea varieties in wheat mono-cropping areas as part of crop rotation and diversification (ii) to identify and recommend farmers preferred field pea varieties for community-based seed production and supply.

Materials and Methods

Field pea PVS was conducted on four farmer's fields (two farmers per *kebele*) at Selka and IluSanbitu *kebeles* in Sinana district in the 2015/16 cropping season. Five field pea varieties released by NARS, *Bilalo, Burkitu, Gume, Markos and Megeri*, were used. Each variety was planted on a plot size of $25m^2$ (5 m x 5 m) in mother trials. A seed rate of 150 kg ha^{-1} was used with 100 kg ha^{-1} DAP fertilizer.

In each *kebele*, a group of farmers having male and female members were selected randomly from the community and organized to participate in the PVS processes. Field pea varieties were evaluated using criteria like plant height, crop stand, disease and insect tolerance, maturity period, pods per plant, seeds per pod and branching capacity. Matrix ranking was used, based on criteria identified through a brain-storming session with the farmers. Ranking was made in groups with score values of 1 (very poor) to 5 (excellent). Other farmers in the community participated in the field days.

Results and Discussion

At Selka *kebele*, male farmers ranked *Burkitu* (score value 741), *Gume* (535) and *Megeri* (532) as first, second and third, respectively. On the other hand, *Megeri* (339), *Burkitu* (329) and *Markos* (307) ranked first, second, and third, respectively by female farmers. At IluSanbitu *kebele*, *Burkitu* (407), *Bilalo* (297) and *Gume* (253) varieties ranked first, second and third respectively by male farmers. Female farmers ranked *Burkitu*, *Gume* and *Markos* varieties as first, second, and third, respectively. Both at Selka and IluSanbitu *kebeles*, weighted mean of scores of male and female farmers showed that *Burkitu, Gume* and *Markos* ranked first, second, and third, respectively (Figure 1).

[1] [1]ICARDA, P.O. Box 5689, Addis Abeba, Ethiopia; [2]ICARDA, B.P. 6299, Rabat, Morocco; e-mail: s.a.kemal@cgiar.org *Corresponding author: e-mail: ayenyetse@gmail.com

PVS was very successful both in facilitating the adoption by poor farmers in marginal environments, not previously reached by formal plant breeding, and in understanding the farmers' preferences (Maurya *et al*., 1988; Sperling *et al*., 1993; Joshi and Witcombe, 1996). In addition, grandmother and mother trials of malt barley PVS in northwest Ethiopia (Aynewa *et al.* 2013) and mother trial on durum wheat (Yetsedaw *et al*., 2016) and lentil (Aynewa *et al*., 2017) in southeastern Ethiopia successfully identified the farmers' variety preferences.

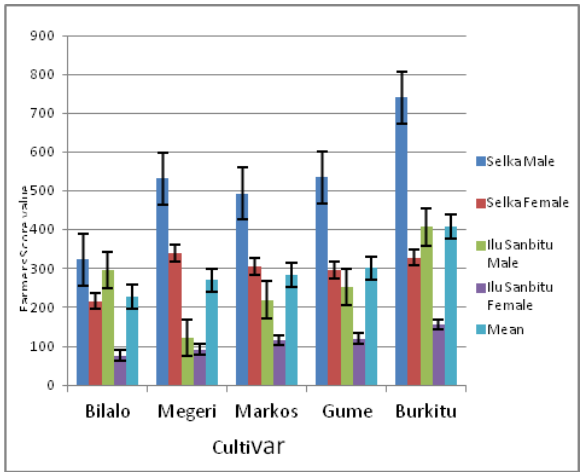

Figure 1. Selection score values of field pea varieties by farmers in Sinana during 2015/16 cropping season

Figure 2. PVS trials of field pea at flowering and during evaluation by farmers

The highest grain yield was recorded for var. *Gume* (3.2 t ha^{-1}) followed by var. *Burkitu* (2.8 t ha^{-1}) at Ilu Sanbitu (Figure 3) but at Selka, the highest yield recorded was by var. *Megeri* (2.4 t ha^{-1}). On the other hand, high biomass yield was recorded for var. *Gume* (11.4 t ha^{-1}) at Selka and for var. *Megeri* (4.8 t ha^{-1}) at Ilu Sanbitu (Figure 4). Two cultivars, *Gume and Burkitu*, were selected for further scaling-out in Bale Zone, southeasten Ethiopia.

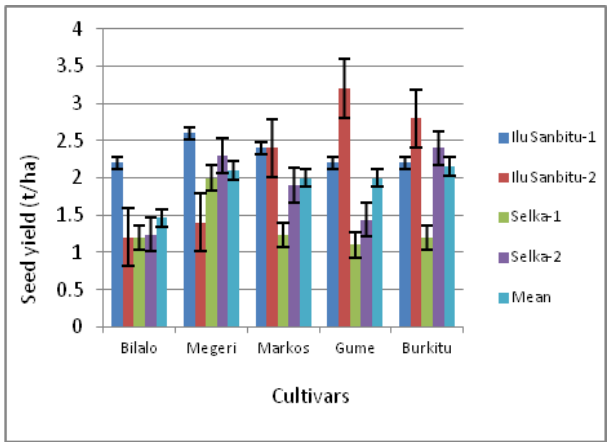

Figure 3. Mean seed yield of field pea varieties at IlluSanbitu and Seleka *kebeles*

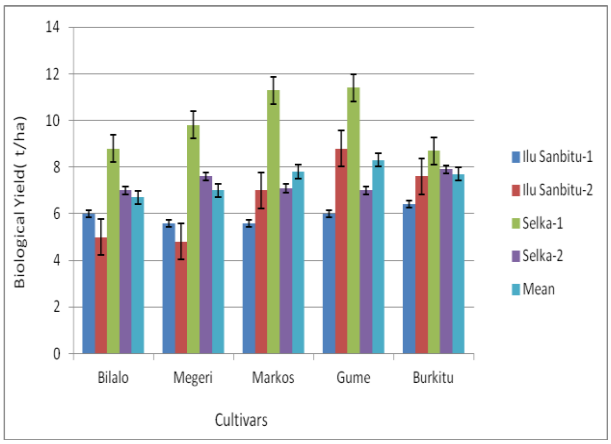

Figure 4. Mean biomass yield of field pea varieties at IlluSanbitu and Seleka *kebeles*

Conclusion

The overall results indicated that there is scope for crop improvement of field pea varieties through PVS. It played an important role in identifying varieties and in involving farmers to select and test released varieties that are adapted to their environment, production system, and meet their preferences. PVS enabled to diversify varietal choices to ensure sustainable production and income for farmers.

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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

12th Triennial International Society for Seed Science, 10-14 September 2017, Monterey, California, USA

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, in all aspects, pure and applied, from molecular biology to ecology.

The triennial ISSS conference aims to provide a forum for the exchange of information and ideas on seed science and the development of new scientific collaborations. It encompasses the latest research progress in key areas, including: seed development, dormancy, germination, stress tolerance, germplasm preservation, seed ecology, and seed biotechnology to improve seed quality.

The conference includes oral presentations, themed sessions of invited talks by domestic and international professionals from the public sector and industry to discuss the latest developments in seed science, including poster sessions, special seed industry events include arranged tours to sites of interest in the Salinas Valley region followed by trade show and career fair, and seed central networking event and presentation or discussion panel.

For more information, please visit the conference website.

Crop Genomics: Present and Future, 7-8 December 2017, ICRISAT, Hyderabad, India

ICRISAT's Center of Excellence in Genomics (CEG) is celebrating its Tenth Anniversary by organizing a two-day symposium during 7-8 December 2017 at ICRISAT campus, Hyderabad, India.

CEG is making it possible for agricultural breeding and research programs to fully utilize modern genomics tools in developing countries. More details are available at http://ceg.icrisat.org. All relevant information concerning scientific or practical matters related to this event are available at the symposium website (http://ceg10.icrisat.org/). Registration is open now through the symposium website (http://ceg10.icrisat.org/registrationx/).

The symposium is expected to discuss anticipated advances, requirements and challenges for sequencing data generation, analysis as well as the application of genomics for understanding the plant biology and crop improvement.

The symposium will be organized under following technical sessions: i) Advances in genomics; ii) Genome & germplasm diversity; iii) Sequencing based trait mapping; iv) Genomics-assisted breeding; v) Genomics for complex traits; and vi) Decision support tools and databases.

Online registration through the symposium website (http://ceg10.icrisat.org/registrationx/) is mandatory for everyone.

For more information, please contact: Ms Anu Chitikineni, Symposium Secretariat, c/o CEG, Bldg # 300, ICRISAT, Patancheru-502324, Hyderabad, Telangana, India: e: mail: ceg10@cgiar.org; a.chitikineni@cgiar.org

6th Seed Congress of Americas

The Seed Association of the Americas (SAA) and the Colombian Seed and Biotechnology Association (ACOSEMILLAS) are pleased to invite you to attend the 6th Seed Congress of the Americas. This event will take place in Cartagena de Indias, Colombia from 5-7 September 2017. For more information, please visit the website.

European Seed Association

The European Seed Association (ESA) will hold its 2017 Annual and European Seed Trade Meeting in Riga, Latvia from 8-10 October 2017. For more information, please visit the website.

Asian Seed Congress 2017

The Asia Pacific Seed Association (APSA) Congress will be held in Bangkok, Thailand from 13-16 November 2017. For more information, please visit the website.

AFSTA Congress 2018

The Africa Seed Trade Association (AFSTA) Congress will be held in Cairo, Egypt, from 28 February to 2 March 2018, and preparations are already in full swing. For more information, please contact the AFSTA Secretariat at afsta@afsta.org

ISF World Seed Congress 2018

The International Seed Federation (ISF) World Seed Congress 2018 will be held in Brisbane, Australia on 3-6 June 2018, with the theme of 'Where Innovation Shines'. Conference registration will open on 9 January 2018 at 11:00 GMT. See the ISF World Seed Congress 2018 website for more info.

ISTA Annual Meeting 2018

The International Seed Testing Association Annual Meeting 2018 will take place in Sapporo, Japan, on 11–14 June 2018. 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, please contact: Charles Kleinermann, ICARDA, Amman, Jordan; e-mail: c.kleinermann@cgiar.org

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

The second session of each of the following UPOV Distance Learning Courses will be run in 2017: (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 of all courses for Session II in 2017 is as follows:

- Registration: August 14 to September 15
- Study period: September 25 to October 29
- Final examination: October 23 to 29

The categories of participants are as follows:
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.**

Seed System Security Assessment

Overview

With increased global scrutiny focused on ill-tailored or dependency-generating seed responses, Seed System Security Assessments (SSSAs) are rapidly becoming the de-facto tool in preventing misdiagnosis of seed insecurity. Seed security is now widely seen as distinct from food security and there is growing worldwide interest in this new field of SSSAs. With increased visibility, the demand for SSSAs is rising. Seed System Security Assessments have recently been integrated into USAID guidelines and standards for best practice and organizations like Catholic Relief Services and

the UN-Food and Agriculture Organization are routinely commissioning actual field assessments. There is an urgent need to build a specialized network of experts who can lead such assessments worldwide.

Course content

This course will provide training in both rapid and more comprehensive forms of SSSAs. It will focus on a) analysis of all seed channels (own stocks, social networks, local networks, formal seed sellers) and b) targeted response options to deal with problems at hand. Tools will be both qualitative and quantitative (including options for automated data tallies and table formats). Methods for training will figure prominently as the aim is to create a training of trainer's capacity, as well as to strengthen direct field assessments. Note that the focus will embrace different types of disaster, chronic stress and developmental contexts (see **www.seedsystem.org**).

Time and location

15 September to 7 October 2017, Harare and multiple rural sites, Zimbabwe

Preconditions for course participation

- At least a BA/BSc in fields such as: agriculture, rural development, international studies, agronomy, applied economics
- At least five years of field experience among smallholder farmers;
- Training experience or field mission leadership experience;
- Time availability/flexibility to go on missions and train others;
- Willingness to cover airfare (to indicate strong interest. Exceptions can be considered).
- Registration will be limited to the first 20 suitable candidates.

Certification

A partial certification will be issued to those who successfully complete the course. Full certificates will be after trainers complete an independent SSSA.

For more information, please contact: Dr Louise Sperling at *Catholic Relief Services, 228 West Lexington Street, Baltimore, MD, 21201, USA:* **e-mail: louise.sperling@crs.org**

International Seed Testing Association (ISTA) Training Workshops

ISTA Workshop on Advanced Seed Vigor Testing, 20-23 November2017; Bengaluru, India.

The workshop will focus on two of the ISTA validated tests, the Radicle Emergence test and the Conductivity test. The workshop will report on practical experience of the two tests, providing lectures and interactive seminars. It will also offer an opportunity for general discussion on seed vigor and time for participants to ask specific questions regarding vigor testing procedures.

For further details and registration, please visit: http://www.seedtest.org/en/event-detail---0--0--0--91.html

ISTA Workshop Seed Health Testing Sunflower, Soybean and Flax, 18- 21 September 2017; Angers, France

Previous proficiency tests showed unexpected results between participants. This workshop will provide participants with training on seed health testing methods for detecting fungi and harmonize notations.

For further details and registration, please visit: http://seedtest.org/en/event-detail---0--0--0--83.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

Bokern, M., F. Stoddard and C. Watson (eds.). 2017. Legumes in Cropping Systems

Published by CABI (www.cabi.org); ISBN: 9781780644981*; Price: $126 (soft cover); 278 pp*

Based on contributions from members of the Legumes Future research consortium and complemented by articles from other research teams, this book provides a comprehensive overview of knowledge relevant to developing legume-supported cropping systems in Europe. It reflects the growing interest in using legumes to

improve cropping and the current debate over the imbalance in European systems, where the low use of legumes has caused concern in the agricultural policy community. This book supports informed debate and decision-making that addresses the associated challenges.

Legumes in Cropping Systems presents current knowledge on this subject across 15 coordinated chapters. Each chapter addresses a specific aspect of legume cropping and provides insight into the relevant literature to help support understanding and to explore the underlying processes that influence cropping system development.

This book includes coverage of:

- role of legumes in cropping systems
- role of legumes in European protein supplies
- environmental effects of legumes
- current status of major legumes
- economic effects
- policy development

This book is an invaluable resource for researchers in agronomy and crop sciences, agricultural professionals, policy makers, and students.

The information about the book can be accessed on website of CABI

Egli, D. 2017. Seed Biology and Yield of Grains, 2nd Edition.

Published by CABI (www.cabi.org); ISBN 9781780647708*; Price: $126 (Hard cover); 232 pp*

This new edition examines the determination of grain crop yield from a unique perspective, by concentrating on the influence of the seed itself. As the food supply for an expanding world population is based on grain crops harvested for their seeds, understanding the process of seed growth and its regulation is crucial to our efforts to increase production and meet the needs of that population.

The yield of grain crops is determined by their assimilatory processes, such as photosynthesis and the biosynthetic processes in the seed, which are partly regulated within the seed itself. This book provides a timely update in this field and highlights the impact of the seed on grain crop yields.

This book:

- Describes all aspects of seed growth and development, including environmental and genetic effects on growth rate and length of the filling period.
- Discusses the role of the seed in determining the two main yield components: individual seed weight and number of seeds per unit area.
- Uses the concepts and models that have been developed to understand crop management and yield improvement.

Substantially updated with new research and further developments of the practical applications of the concepts explored, this book is essential reading for those concerned with seed science and crop yield, including agronomists, crop physiologists, plant breeders, and extension workers. It is also a valuable source of information for lecturers and graduate students of agronomy and plant physiology.

The information about the book can be accessed on website of **CABI.**

Websites

World Seed Partnership

The World Seed Partnership is pleased to announce the launch of its website at the ISF World Seed Congress 2017, which was held in Budapest, Hungary, from 22-25 May 2017.

To find out more, please contact the partnership directly to see how a country can reap the benefits of a developed regulatory seed framework (contact: *info@worldseedpartnership.org*).

Newsletters

MarketsandMarkets™

MarketsandMarkets™ provides quantified B2B research on 30,000 high growth niche opportunities/threats which will impact 70% to 80% of worldwide companies' revenues, currently servicing 5000 customers worldwide, including 80% of global Fortune 1000 companies as clients. Almost 75,000 top officers across eight industries worldwide approach Markets and Markets™ for their pain points around revenues decisions.

MarketsandMarkets™ is determined to help benefit more than 10,000 companies this year in their revenue planning and help them take their innovations/disruptions to market early by providing them with research ahead of the curve.

MarketsandMarkets's flagship competitive intelligence and market research platform, "RT" connects over 200,000 markets and entire value chains for a deeper understanding of the unmet insights, along with market sizing and forecasts of niche markets.

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. 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, 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