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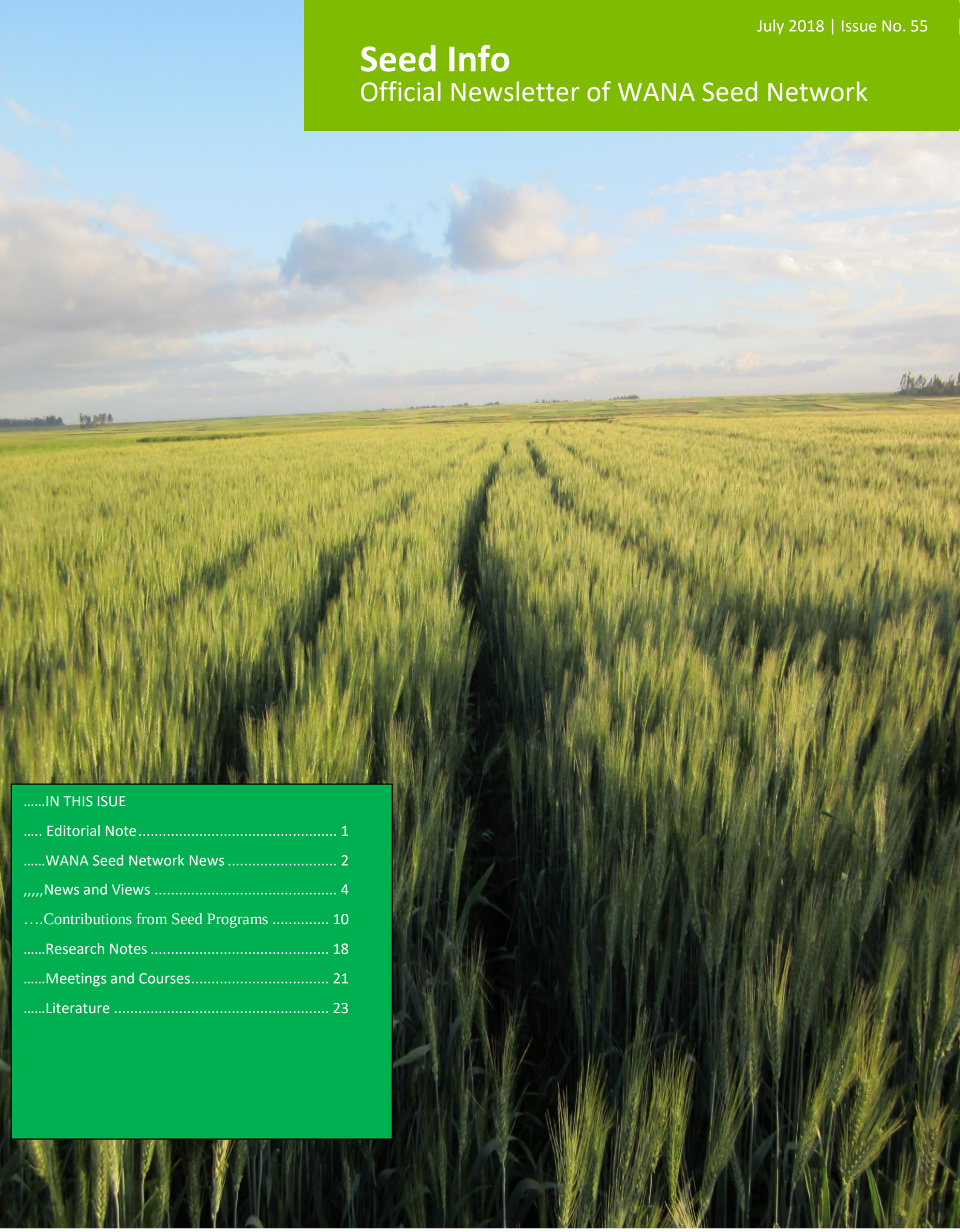
Seed Info

Official Newsletter of WANA Seed Network



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ICARDA
Science for resilient livelihoods in dry areas

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 TAAT (Technologies for African Agricultural Transformation) Wheat Project Launching and Wheat Seed Sector Consultation workshop organized by ICARDA and the Ethiopian Institute of Agricultural Research.

In the **News and Views** section, **Hélène Guillot** from the International Seed Federation (ISF), Switzerland, writes about '*Supporting seed choice for farmers*,' one of the position papers adopted by the General Assembly during the 69th ISF World Seed Congress in Brisbane, Australia. The position paper elaborates that the ISF acknowledges the contribution that farmers and local communities, as well as plant breeders, have made to the conservation and development of plant genetic resources, in line with its previous commitments (*Seed Info No. 53*). The ISF and its members – representing thousands of small, medium, large, local, regional, and international entities – are committed to the ISF Vision: '*A world where the best quality seed is accessible to all,'* supporting sustainable agriculture and food security. Other news in this section comes 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).

The section on **Seed Programs** presents news from Ethiopia, India, and Pakistan. In *Seed Info No. 53*, we reported that Ethiopia is embracing cooperative-based seed production (CBSP) and in *Seed Info No. 54*, we provided highlights of the CBSP project, initiated by the Ethiopian Agricultural Transformation Agency (ATA). In this issue, we provide the achievements of the two USAID-supported and ICARDA-implemented scaling projects on malt barley, faba bean, and chickpea in the highlands of Ethiopia. Since 2015, the project has been working to establish sustainable farmer-based seed production in the project target areas. This effort enabled the project to work with 37 farmers' seed producer and marketing cooperatives, 7 farmers' multipurpose cooperatives, and 6 unions for enhancing seed production and marketing. The project is structured within the framework of technology demonstration for demand creation cum technology multiplication and dissemination. From India we report on village seed hubs, an alternative approach where ICARDA is involved in lentil and grass pea seed production and marketing through the participation of organized farmer groups. Such alternative and innovative approaches enable the availability, access, and affordability of quality seed to smallholder farmers.

The **Research** section of *Seed Info* captures information on research activities or issues relevant to the development of seed programs in the CWANA region and beyond. This issue features an article by Aynewa *et al.* from ICARDA, Ethiopia, titled *'Identification of Faba Bean Varieties Adapted to 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 faba bean varieties, which were well adapted, preferred by farmers, and were introduced into the local seed production.

Seed Info encourages the exchange of information between 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.

Ethiopia Organizes TAAT Wheat Project Launching and Wheat Seed Sector Consultation Workshop on Transforming the Wheat Sector

Wheat is an important strategic food security crop in Africa, including Ethiopia, where billions of dollars are spent on imports although there is a great potential to produce the crop locally. The African Development Bank (AfDB) bolstered by the successes of Support for Agricultural Research and Development of Strategic Crops (SARD-SC) projects, started a new initiative called Technologies for African Agricultural Transformation (TAAT), where transforming wheat production is at the forefront of the Feed Africa agenda of the AfDB to ensure self-sufficiency of the continent.

In Ethiopia, wheat ranks fourth in terms of area, second in productivity and third in production. However, local production does not meet the national requirement and close to 1 million tonnes of wheat grain is imported every year, draining the national economy despite it being possible to produce a sufficient amount of grain locally through increasing the productivity per unit area or area expansion.

ICARDA is implementing the *Technologies for African Agricultural Transformation Wheat Project*. The project focuses on 12 countries in sub-Saharan Africa and is aimed at transforming domestic wheat production and commercialization for achieving wheat self-sufficiency in target countries.

A *TAAT Wheat Project Launching and National Wheat Seed Sector Consultation Workshop* was held from 12–14 June 2018 in Addis Ababa, Ethiopia. About 50 staff from partner organizations including NARS, public and private seed companies, and senior policy and decision makers of the Ministry of Agriculture and Livestock Resources (MoALR) attended the workshop. The opening ceremony was honored with the presence of Dr Eyasu Abraha, State Minister of MoALR, and Dr Mandefro Nigussie, Director General of the Ethiopian Institute of Agricultural Research (EIAR).

TAAT Wheat Project Launching Workshop

On the first day, the key components of the project were presented focusing on scaling-out technologies of heat-tolerant wheat varieties, best agronomic management practices for irrigated areas, strengthening the national seed sector, and capacity development. The project aimed at contributing to the transformation of the wheat sector supporting the national wheat self-sufficiency strategy of the Government of Ethiopia (GoE). Moreover, presentations were made by invited speakers from EIAR and MoALR on the state of the wheat sector in Ethiopia, highlighting key trends in production and consumption and the drive for wheat self-sufficiency within the Growth and Transformation Plan of the GoE.

Wheat Seed Sector Consultation Workshop

On the second day, ICARDA gave a presentation on the '*Trends in seed sector development: International experiences with focus on wheat*.' This was followed by presentations on the status of the national seed policy and regulatory frameworks and the national seed sector development strategy by the MoALR and the Agricultural Transformation Agency (ATA). Moreover, presentations were made on the state of planning, production, and marketing of early generation seed and certified seed by federal and regional agricultural research institutes; federal and regional public seed enterprises; private seed companies; and seed producer cooperatives supported by projects. Each presentation was followed by intensive discussions.

On the third day, two working groups discussed key issues relating to the wheat seed sector and implementation of the project. To guide these discussions, the groups were given separate focus areas, as shown below, and a list of suggested topics to consider within each area: (i) Working Group 1: Wheat seed value chain; and (ii) Working Group 2: Wheat grain value chain. In the afternoon of the third day, the groups presented their findings and recommendations, followed by further discussions.

Workshop Synthesis and Recommendations

To avoid overlap, the two group reports were merged into a composite document under two headings reflecting the main issues. Discussions covered a wide range of issues that will affect the implementation of the project. Some relevant points raised in the earlier presentations and

discussions have also been reflected in this synthesis.

Participants of the Project Launching and Wheat Seed Sector Consultation Workshop

Ethiopia is a major producer of wheat in sub-Saharan Africa. In 2016, according to Central Statistical Agency (CSA) data, about 4.99 million smallholder farmers (28.6% of all farmers) were engaged in wheat production cultivating 1.69 million ha (13.49% of cultivated crop area) and producing 4.54 million tonnes (15.63% of grain production) at the productivity level of 2.68 t/ha. During 2004–2016, area expansion, production and productivity increased at the rate of 3.9, 8.8, and 4.8% per annum respectively.

Wheat is one of the strategic crops because of its role for food security, import substitution, and supply of raw material for the nascent agro-processing industry. It ranks fourth in terms of area, second in productivity and third in production in the country. However, local production cannot meet the national requirement and, on average, over 1 million tonnes of wheat grain has been imported annually in recent years. There is great potential to produce enough grain locally through increasing the productivity per unit area or area expansion. More than 12 million ha of highly suitable area is available for both bread and durum wheat production in rainfed areas in the highlands and an additional 3 million ha of potentially irrigable area in the low lands in the country. To achieve self-sufficiency in wheat and to meet the Growth and Transformation Plan (GTP) target of the GoE, transformation in the wheat sector is a must. An enabling policy environment ensuring the functioning of the value chain from field to fork is a prerequisite for this transformation to happen on the ground.

From 12–14 June 2018, a Launching Workshop of the TAAT Wheat Project and a National Wheat Seed Sector Consultation Workshop were held; both aimed at transforming domestic wheat production and commercialization for achieving wheat self-sufficiency in Ethiopia. Both meetings assembled key players and a broad range of stakeholders of the wheat value chain including: National Agricultural Research Systems (NARS) from the federal and Regional Agricultural Research Institutes; seed and input suppliers from the public seed enterprises, private seed companies and seed producer cooperatives and unions; representatives of various projects dealing with agricultural and seed sector development; representatives of the agro-industry; and above all key leaders and policy makers from the MoALR and Regional Bureaus of Agriculture and Livestock Resources (BoALR).

Following the key presentations and ensuing discussions, the following key outcomes have been synthesized for policy consideration by Government of Ethiopia considering wheat seed and grain value chains.

Wheat Seed Value Chain

The availability of, access to, and use of improved wheat technologies and associated integrated crop management practices, plays an important role in raising productivity and production, ensuring food and nutritional security, and enhancing the livelihood of smallholder farmers. In this context, the role of seed in transferring agricultural innovation to farmers is of paramount importance. A robust wheat seed system, supported by an enabling policy environment and a flexible regulatory framework, will be able to produce sufficient quantities of seed of the desired quality and reasonable price within the spatial and temporal reach of millions of smallholder farmers involving both the formal (public and private), intermediate (alternative and innovative) and informal sectors. Among policy, institutional, and technical issues, the following key recommendations were outlined for the wheat seed sector:

1. Promotion of wheat seed system specific to the major wheat production zones (MWPZs) along with establishment of effective national wheat seed information system which need to:
   1.1. Identify the MWPZs and potential wheat seed actors in respective identified MWPZ (public seed enterprises, private seed companies, seed producer cooperatives, and others);
   1.2. Review the current certified seed demand assessment approach at federal and regional state levels considering sales volumes and present performance of seed

suppliers (public or private sector, seed producer cooperatives, etc) and aligning with early generation seed (EGS) production at a set target of seed replacement rate at national level.

2. Create a national forum for planning, production and marketing of EGS and certified seed by variety and MWPZs involving a broad range of stakeholders such as NARS, public and private seed producers and suppliers and seed and input marketing departments of MoALR and BoALR, development partners, commercial farms, wheat flour industries, etc.

3. Develop an incentive mechanism to attract both domestic and foreign investments. Cognizant of the role of public and private sector in variety development and seed supply, the Government of Ethiopia should create an incentive to attract both domestic and foreign investments particularly in irrigated areas through implementation of plant variety protection laws in place and other tax incentives and access to finance.

4. Ensure public investment in human and institutional capacity of seed value chain actors. There is a huge gap in human and institutional capacity of seed value chain actors, and the government should allocate adequate physical (for example, land, machinery, and irrigation, particularly for EGS production by NARS), financial and human resources.

Wheat Grain Value Chain

A vibrant grain sector is to stimulate farmers' interest in production and is linking them to markets. It can attract private sector investments in seed production and encourage farmers in adopting the improved technologies for increasing productivity and production. Among policy, institutional, and technical issues, the following key recommendations were outlined for wheat grain sector:

1. Promote product aggregation from smallholder wheat producers for improved market access by MWPZs. This requires exploring the potential role of cooperatives, and farmer traders as potential local level aggregators.

2. Establish of a functional platform for wheat commodity value chain chaired by MoALR bringing together a broad range of stakeholders including the development (MoALR), trade (Ministry of Trade), agro-processing (Ministry of Industry) and finance (banks) sectors to enhance proper coordination among different institutions.

3. Grain price volatility forces smallholder farmers to shift between crops, as there is no minimum guaranteed price during surplus production, depressing the market. Introduce the guarantee price and grain grading system to incentivize farmers in wheat grain production based on evidence-based analysis of import substitution.

4. Lack of market segmentation and product quality segregation is a disincentive for farmers as well as for the agro-industry. Introduce grain quality grades to reward farmers on quality through third-party certification.

5. Promote contract farming and its enforcement mechanism to ensure contract obligation among different value chain actors such as cooperatives and traders and traders and agro-processors based on product quality and pricing.

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News and Views

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

Supporting Seed Choice for Farmers

At the 69th International Seed Federation (ISF) World Seed Congress in Brisbane, Australia, the General Assembly approved the adoption of eight position papers including '*Supporting seed choice for farmers.'*

"Farmers should be able to choose the type of seed they want to plant," says ISF International

Agricultural Manager Hélène Guillot, encapsulating the recently adopted position on '*Seed choice for farmers.'*

"Based on ISF's experience of seed systems, ISF members conclude that we have to be open to all kinds of seed because farmers cannot access commercial seed everywhere around the world. In addition, some countries have no national seed association or seed companies, so farmers have to depend on the seed that they have at their disposal, which could mean landraces or local varieties. This is the reality. However, we want to encourage governments to face up to this reality and put in place the right frameworks for making quality seed available to their farmers.

"We want governments to see farmers as entrepreneurs and company directors. Governments should be aware that bringing commercial, quality seed to farmers takes their business to the next level, allowing them and their families to prosper and flourish.

"ISF strongly believes that all efforts should be made to enable subsistence farmers' access to progress – that being better seed choice. Additionally, nobody should limit access to scientific advances. Why should a farmer in Namibia have to wait decades to get access to what everybody already has and is talking about? Plant breeding innovation, CRISPR CAS9, Talen and double haploids – these technologies help farmers stabilize yields and face climate change, and are even more critical to developing countries," said Ms Guillot.

Joseph Gafaranga, Secretary General of the Rwandan Farmers' Organization (IMBRAPA), which represents more than 27,000 farmers, spoke at a roundtable organized by the World Seed Partnership during the 7th session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture in October 2017. He said that in Rwanda, only 10% of the seed is certified, and that farmers cannot grow their business with such inputs.

Hearing Joseph's story and many others like it in geographies around the world, ISF is committed, more than ever, to its vision: *'A world where the best quality seed is accessible to all.'*

To help, some NGOs are working on the ground with farmers from developing countries. One example of this is Fair Planet's implementation of trial fields in Ethiopia. In these trial fields, local farmers can see and choose varieties that best suit their needs. Proposed varieties transition from local landraces to improved varieties from seed companies that are partnering with Fair Planet. Farmers also participate in training to help them make the best use of the varieties they choose to grow.

On this front, ISF developed the position paper that was adopted during the World Seed Congress. The paper urges governments and international organizations to promote farmer access to all kinds of varieties: local and commercial, from the public and private sector. Fundamentally, access to high-quality seed is the way forward for farmers to make a living from their activity, and for countries to ensure food security for their people.

You can find all the position papers on the ISF website under 'Resources'.

Hélène Guillot, ISF International Agricultural Manager, Chemin du Reposoir, 71260 Nyon, Switzerland; e-mail: h.guillot@worldseed.org

ISAAA Reports New Record-High Adoption of GM Crops

The International Service for the Acquisition of Agri-biotech Applications (ISAAA) launched an annual report on the '*Global Status of Commercialized Biotech/GM Crops: 2017'* (ISAAA Brief 53) on 26 June 2018 in Manila, Philippines. The report is the 22nd of the ISAAA series of global status reports documenting the latest information on the adoption and benefits of biotech crops. The event, which was co-organized by the SEARCA Biotechnology Information Center (SEARCA BIC), presented an opportunity for media partners to connect with scientists and experts, representatives from the national government, and partners in the biotech community.

Biotech crop land area reached a new record-high adoption at 189.8 million ha worldwide in 2017. Also notable was the increase in biotech crop areas in developing countries, continuously surpassing those in industrial countries in terms of total land area, with 100.6 million ha and 89.2 million ha, respectively.

The global GM crop area is expected to expand in the coming years and new biotech crops and traits in different parts of the globe are now in the pipeline. Highlighting the importance of regulation, it was stated that science-based regulations are very important, and regulation cannot be based on perceptions alone, as these are often proven wrong.

The global farm income gains contributed by biotech crops in the last 21 years (1996-2016) have amounted to 186.1 billion USD, benefitting more than 17 million farmers, 95% of whom come from developing countries.

Download the ISAAA Brief 53 Full Report, Executive Summary, Press Release, Infographics, and Presentation Slides from the ISAAA website.

Source: Crop Biotech Update (May 16, 2018)

High Adoption of Biotech Crops Recorded in 2016

In 2016, the global area of biotech crops reached 185.1 million ha, according to International Service for the Acquisition of Agri-biotech Applications (ISAAA) study published on 2 February 2018 in *GM Crops and Food.*

According to the paper, 26 countries planted biotech crops in 2016, 19 of which were developing countries. Biotech crop plantings increased in several countries, including Brazil, United States of America, Canada, South Africa, Australia, Bolivia, Philippines, Spain, Vietnam, Bangladesh, Colombia, Honduras, Chile, Sudan, Slovakia, and Costa Rica. Decreased plantings of biotech crops were reported in China, India, Argentina, Paraguay, Uruguay, Mexico, Portugal, and Czech Republic. The significant changes in biotech crop area (increase and decrease) are attributed to several factors such as acceptance and commercialization of new products, demand for meat and livestock feeds, weather conditions, global market price, disease/pest pressure, and governments' enabling policies. Read the abstract in *GM Crops and Food.*

Source: Crop Biotech Update (February 7, 2018)

Africa: Inroads to Adoption of Biotech Crops

Swaziland Approves Import and Release of Bt Cotton

The Swaziland Environment Authority (SEA) has granted two landmark approvals for importation of Bt cotton seed and environmental release of the crop making the Kingdom of eSwatini among African countries to adopt Bt cotton. In accordance with the Biosafety Act, the SEA granted approval to the Swaziland Cotton Board (SCB) to import 3,000 kg of GM cotton seed for commercial release. The Board will import the seed from JK Agri-Genetics Limited, an Indian-based seed company.

The approval is subject to export and transit permits, which should be sought by the applicant or supplier. The SEA also requires the SCB to adhere to the requirements for conveyor shipment as dictated in Article 7 of the Cartagena Protocol on Biosafety on the Advance Informed Agreement procedure.

In November 2016, the SEA okayed the SCB to undertake confined field trials for the GM crop. Cotton has been one of the leading industries driving Swaziland's economy. However, production has been dwindling owing to insect attack, key among them the bollworm.

For more on this, contact Swaziland Cotton Board at ceosec@cottonboard.co.sz.

Source: Crop Biotech Update (May 16, 2018)

Ethiopia Approves Release of Bt Cotton and Grants Permit for GM Maize

The Government of Ethiopia authorized the cultivation of biotech crops by granting two landmark approvals for environmental release of Bt cotton and research trials on biotech maize. The country will start with two Bt cotton hybrids: JKCH1050 and JKCH1947.

The release for Bt cotton is based on expert analysis of the results from two-season confined field trials conducted under the supervision of the Biosafety Affairs Directorate of the Ministry of Environment, Forest and Climate Change. A Biosafety technical working team drawn from different institutions has evaluated the final report submitted by the applicant. The Ethiopian government has identified cotton as a strategically important commodity crop to supply raw material for the rapidly growing textile sector and to generate thousands of jobs along the cotton sub-sector value chain.

For maize, the agricultural research institute will start confined field trials of an event with stacked traits for drought tolerance and insect resistance in partnership with the African Agricultural Technology Foundation. The research permit is for five years.

Ethiopian researchers are also working closely with International Institute of Tropical Agriculture on an enset bacterial wilt project, to develop resistant varieties through modern agricultural biotechnology. Enset, also commonly known as the false banana, is a key food security crop. Enset can withstand long periods of drought, heavy rains, and flooding, which normally devastate other crops.

However, bacterial wilt is devastating the crop, threatening food security for over 15 million people who depend on it as a staple food. Thirty years of research efforts by the national system to manage/control bacterial wilt of enset using conventional techniques could not succeed due to absence of resistant clones in the genetic base of the crop.

For more on this and other biotech developments in Ethiopia, contact Mr Assefa Gudina at bile.kela1@gmail.com.

Source: Crop Biotech Update (June 6, 2018)

Kenya Starts Planting Biotech Cotton Under National Performance Trials

Kenya is one step away from commercializing Bt cotton following the commencement of National Performance Trials (NPTs) to identify suitable varieties for different agro-ecological zones. This comes after the National Environmental Management Authority (NEMA) granted an Environmental Impact Assessment (EIA) license to the Kenya Agricultural Livestock and Fisheries Organization (KALRO) to undertake the trials as of June 2018 starting in Kisumu, western Kenya. The NPTs will be carried out in seven sites spread across six counties. GM cotton planting is a significant move in the revitalization of the textiles and apparel industry, which the Kenyan government has identified as key in upscaling manufacturing and realizing the 'Big Four' agenda, a five-year ambitious economic recovery plan. More than 200,000 ha is earmarked for Bt cotton.

If the trials produce favorable data, farmers are likely to access the Bt cotton hybrid seeds in April 2019. This will be a culmination of a process that started in 2001 when the first application to introduce Bt cotton was made. The first transgenic cotton confined field trials were planted in 2004 and completed in 2010. An environmental release approval by the National Biosafety Authority followed in 2016, subject to meeting some conditions, among them an EIA clearance certificate. NEMA issued the license for implementation of the NPTs on 30 May 2018.

Source: Crop Biotech Update (June 13, 2018)

Highlights of the IFLRC-VII

The International Food Legumes Research Conference (IFLRC) was started in 1986 to disseminate current knowledge and achievements of research and development in food legumes and identify research needs, new scientific approaches and partnerships.

IFLRC-VII was jointly hosted by ICARDA and INRA from 6–8 May 2018. Held in Marrakech, Morocco, the emphasis was on stronger multidisciplinary research partnerships and enhanced cross-country collaborations to develop and promote improved varieties for nutrition security.

There were 320 participants representing 42 countries including scientists and big data experts joined by policy makers, traders and entrepreneurs in various discussions and workshops to come up with recommendations on strengthening research on legumes. The recommendations were:

- Build strong multidisciplinary partnerships for legume research and enhance research collaboration, including public-private partnerships;
- Mainstream nutritional traits in breeding programs;
- Minimize yield gaps in farmers' fields;
- Emphasize increasing farmers' incomes and not just increased production;
- Converge technologies with policies and institutions;
- Demonstrate the role of legumes in poverty alleviation, nutritional security and sustainable development;
- Research agendas to focus on intercropping of legumes and cereals, as cereals will continue to be a major diet component for both humans and livestock.

The conference had technical sessions that ranged from production and consumption scenarios to marketing, nutrition, breeding, and genomics. Workshops on specific legumes as well as on data and analytics were organized.

The next IFLRC-VIII will be hosted by International Crop Research Institute for Semi Arid Tropics (ICRISAT) and the University of Nairobi and will be held in 2022 in Nairobi, Kenya.

FAO Lists 20 Tools for Transforming Food and Agriculture to Achieve SDGs

The Food and Agriculture Organization of the United Nations (FAO) has released a set of 20 interconnected actions designed to show the impact that sustainable agriculture can have on tackling the world's greatest challenges.

'Transforming food and agriculture to achieve the SDGs' is a practical guide for countries on strengthening food security, generating decent employment, spurring rural development and economic growth, conserving natural resources, and responding to climate change. The publication is essentially a tool that offers how-to pointers to expedite actual implementation of the Sustainable Development Goals (SDGs).

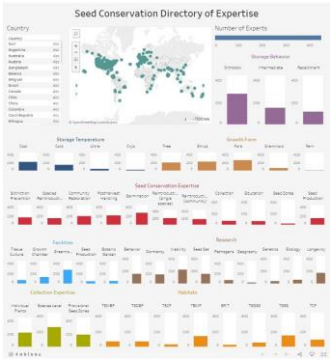
The 20 interconnected actions can help map strategies to achieve Zero Hunger and the SDGs related to food and agriculture, including fostering more resilient livelihoods and higher productivity and incomes for rural smallholders. Each action is graphically identified with its contribution to the SDGs and reflects insights from FAO's technical expertise.

For more information, read the news release and the report available on the FAO website.

Source: Crop Biotech Update (June 13, 2018)

Global Seed Conservation Challenge

The Global Seed Conservation Challenge, an initiative run through Botanic Gardens Conservation International has been working with partners to create a Seed Conservation Directory of Expertise. The directory contains a comprehensive list of individuals from over 400 institutions around the world who are working on collecting and conserving species of wild origin.



The directory includes easily searchable country, facility, research, and expertise information at the individual and institutional level. This tool will benefit the global plant conservation community through expanding seed conservation networks, facilitating exchange of information and ideas, and enable better seed conservation stewardship by facilitating connections, collaborations and exchange.

This resource was developed with funding from the US Forestry Service in collaboration with the IUCN Species Survival Commission Specialist Group on Seed Conservation.

Katherine O'Donnell, BGCI, Royal Botanic Gardens, Kew, UK; e-mail: katherine.o'donnell@bgci.org

SeedSystem.Org

Are you looking for a way to promote your seed-related ideas and work among fellow experts – with no cost and minimal effort?

SeedSystem.org seeks to partner with "guest bloggers" to develop blog content on any provocative seed-related issue – to encourage readers to think and solve problems and increase your visibility as a thought leader. As a guest blogger, you will be invited to write 2–4 short (400-word) blogs over the course of several weeks on a single issue, and then respond to reader comments at your leisure. Your posts will be emailed to more than 1,500 seed system specialists around the globe and reach thousands more through social media channels. There is no cost to you, except for a few hours of your time.

Previous guest blog series have focused on:

- Strengthening public-private partnerships for sweet potato early generation seed businesses;
- Providing vegetable seeds in a crisis;
- Creating a sustainable cassava seed chain in Nigeria.

If you are interested, please connect with Louise Sperling at *louise.sperling@crs.org* or Patrick Gallagher at *pgallagher1@gmail.com*

Louise Sperling, Catholic Relief Services, 228 West Lexington Street, Baltimore, MD, 21201, USA: e-mail: louise.sperling@crs.org

Highlights of the ISF World Seed Congress 2018

During the four-day event from 3–6 June 2018, about 1200 delegates from 64 countries attended the ISF World Seed Congress in Brisbane, Australia. At the opening ceremony, ISF President JC Gouache shared the seed industry's mission to unlock the potential of genetics. Honorable Senator James McGrath, Assistant Minister to the Australian Prime Minister, told delegates: "The responsibility for delivering higher yields and more nutritious food rests on the innovation that the seed

industry brings to world food production." ISF Secretary General Michael Keller outlined the eight position papers that were to be presented to the General Assembly, and explained their link with the ISF's vision: *'A world where the best quality seed is accessible to all.'*

Partial view of ISF Seed Congress 2018

Committee Meetings and Position Papers

During the open meetings of the ISF's Sections and Committees, members worked on the draft position papers on seed sector, and a roundtable on the International Standard for Phytosanitary Measures. At the General Assembly meeting, representatives from 45 countries approved the adoption of eight position papers that will support the delivery of the ISF's strategic objectives. The positions will provide ISF members with a clear stance on the key industry issues, including the movement of seed, plant breeding innovation, illegal seed practices, and seed choice for farmers.

Election of Executive Committee

The General Assembly unanimously elected new leaders. The new Executive Committee will continue to oversee the implementation of the ISF's five-year Strategic Plan and is composed of the following:

- President: Eduard Fito (Spain)
- Vice President: Donald Coles (Australia)
- Past President Jean-Christophe Gouache (France)
- Chair of Breeders Committee: Marc Cool (USA)
- Treasurer: Christophe Betschart (Switzerland)

Through its positions, the ISF is able to take a clear stance on key industry issues and drive them at an international level. Together with its members, national seed associations, the ISF promotes policy decisions that affect the whole seed industry.

For more information please visit the websites:

- ISF position papers: http://www.worldseed.org/resources/papers/
- ISF press releases: http://www.worldseed.org/resources/press/#press-releases

The ISF has a key role to play in uniting the many voices of the global seed industry and establishing common ground to facilitate the movement of seed around the world. For more information you may contact: ISF, Chemin du Reposoir 7, 1260 Nyon, Switzerland; tel: +41 22 365 4420; Fax: +41 22 365 4421; website: www.worldseed.org

Jennifer Clowes, ISF Communication Manager, hemin du Reposoir, 71260 Nyon, Switzerland; e-mail: j.clowes@worldseed.org

ISTA Marketing Activities Go Digital

It's a common challenge to keep up with rapidly evolving consumer behavior in the current digital era. The International Seed Testing Association (ISTA) is evolving and integrating digital initiatives to reshape its operations.

In the last decade consumer behavior has shifted based on continuous digital advances; therefore, the association's marketing tactics have also evolved to fulfill the new online members' requirements.

Two years ago, the ISTA started in social media with its LinkedIn platform. In the last year, marketing efforts have increased, and we now have almost 1,800 followers from around the world. India represents the greatest community with 14% and United States the second with 8% of our total followers.

This year we have also relaunched the YouTube channel, and with two new videos in April and June we have already increased our followers by 55%. We plan to launch two new videos in the coming months and fulfill the community interest on the association.

Moreover, the ISTA has integrated a new automated marketing platform to create more responsive and brand-aligned e-mail newsletters. At the beginning of June 2018, we sent the first newsletter through Mailchimp and we expect to achieve great results, as we have with the other marketing tools.

The ISTA's digital marketing plan wants to support the association's digital transformation but also to meet members' needs. Through integrating more digital initiatives and implementing new processes,

the association expects to provide members with a better user experience. In this direction, the ISTA also updated its data policy to ensure compliance with the new European General Data Protection Regulation and provide all members with better control over their personal data.

Looking into the future, the association's marketing efforts will focus on the existing channels but will also add others and integrate new technologies within the marketing mix. However, despite the online marketing tendency, traditional and offline marketing remain integral parts of the ISTA strategy.

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News from UPOV

UPOV PRISMA PBR Application Tool

The International Union for the Protection of New Varieties of Plants (UPOV) PRISMA Plant Breeders' Rights Electronic Application Tool is available online at http://www.upov.int/upovprisma.

Why use it?

Quick and easy transmission of application data for Plant Breeders' Rights

Currently covers 21 countries and the European Union with new countries expected to join in September 2018.

How does it work?

- Online application tool to submit application data to participating Plant Variety Protection (PVP) Offices in required format;
- Easy access to PVP application forms, which can be displayed in a range of languages;
- Much of the information provided in the Technical Questionnaire will be automatically translated;
- Relevant data can be re-used in subsequent applications;
- Different user roles can be specified (e.g. drafter, signatory, translator, agent);
- Controlled access, secure and confidential.

Use of UPOV PRISMA is free until December 2018.

New videos on the benefits of the UPOV system

The following videos have been published on the UPOV website at: http://www.upov.int/about/en/benefits_upov_system.html:

- *See how the Government of Canada uses PVP to improve the livelihoods of Canadian cherry growers;*
- *Discover how the UPOV system enabled Kenya to develop a $500 million cut-flower industry that employs 500,000 Kenyans.*

For more information, please contact the UPOV Secretariat; tel: +41 22 338 9155; fax: +41 22 733 0336; e-mail: upov.mail@upov.int; website: www.upov.int

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.

Reaching the Uncharted Territories: Scaling Chickpea, Faba Bean, and Malt Barley Technologies in Ethiopia

Introduction

The Ethiopian highlands contribute to the bulk of crop production in the country but face many major crop production challenges due to natural and human made factors. Degradation of natural resources, including soil erosion and declining soil fertility, are common due to inappropriate agricultural practices. Improved seeds and complementary management technologies generated to suit different agro-ecologies, and the food and nutritional security needs of smallholder farmers in particular and national needs in general, have not been sufficiently promoted to bring about meaningful change. During 2015–18, ICARDA implemented two USAID-funded projects on scaling malt barley, faba bean and chickpea technologies with the overall goal of improving the livelihoods of smallholder farmers in the Ethiopian highlands.

Approach

The approach includes: (i) Demonstration and popularization of new chickpea, faba bean, and malt barley varieties and integrated crop management practices; (ii) Accelerated early generation seed (breeder, pre-basic and basic) production by NARS during the main and off-seasons. In the absence of formal sector actors: (iii) Rhizobia distribution in

partnership with the private sector for both seed producers and grain producers to create awareness and demand in chickpea and faba bean production; (iv) Farmer-based seed production using small-pack seed distribution through a revolving fund scheme to produce quality seed for local distribution; (v) Capacity development of project partners and stakeholders including farmers in providing facilities for NARS and seed producers and training to upgrade knowledge and skills; and (vi) Characterizations of farm households to establish benchmarks and measure the project impact on adoption and food and nutritional security.

The project was implemented forging an effective partnership with private, public, and farmer-based actors for sustainability of seed multiplication and dissemination. The achievements of these approaches during the three-year period (2015–17) of the two projects are summarized below.

Achievements

Demonstration and Popularization of Improved Technologies to Create Awareness and Narrow the Yield Gaps

Promoting improved malt barley, faba bean and chickpea varieties and integrated crop management technologies was carried out in 98 districts across four regional states to create awareness among farmers and development practitioners. The demonstration showed bridging the yield gaps and created awareness and demand for the new technologies by farmers. About 1257 farmers (13.8% female) hosted the demonstrations (Table 1) and demonstrations with full packages are also meant to bridge the yield gap (Table 2).

Several field days have been organized to inform farmers, partners, stakeholders, and policymakers from federal to district offices of agriculture as well as *kebele* administrations. A total of 33,088 (18.3% female) farmers and 7,003 (15.9% female) technical staff attended the field days. The field days created opportunities to gain firsthand information on the performance and feedback on improved crop technologies and create awareness of and demand for existing technologies. Key constraints were also identified along the crop value chain along with opportunities to link with and to create synergy among development practitioners within the research for development continuum.

Seed Production and Delivery of Improved Varieties

NARS are engaged in breeder and pre-basic seed production on-station and basic seed and/or certified/quality seed with farmer seed producer cooperatives (SPCs)/groups. Existing cooperatives or newly formed farmer groups were identified, trained, and engaged in basic and certified/quality seed production through access to seed as well as technical support from NARS and district Office of Agriculture. A total of 80.4, 333.2 and 916.2 ha (Table 1) was planted for breeder, pre-basic and basic seed production with the respective harvested yield of 119.6, 483.6 and 2014.4 tonnes (Table 3).

Since 2015, the project has been working to establish sustainable farmer-based seed production in the project target areas and by 2017 about 37 farmers' seed producer and marketing cooperatives, 7 farmers' multipurpose cooperatives, and 6 unions were involved seed production and marketing. During in 2015-2017, for on-farm seed production about 7,1495.9 tonnes of seed was provided to farmers through small-pack seed distribution to SPCs, revolving seed from previous years' provisions, farmer-to-farmer seed exchange, community-based seed production (CBSP) schemes, and farmers attached to other projects and stakeholders (Table 1), including Amhara and Oromia public seed enterprises. A total of an estimated 34,787.2 tonnes of certified seed was produced (Table 3) on 12,785.2 ha of land for own use or local exchange (Table 1).

However, the productivity of on-farm seed production (about 2.5 t/ha) was less than the minimum achievable potential (3.0-4.5 t/ha), the major yield reducing factor being use of sub-optimal input and poor crop management. Farmer-based seed production approaches directly benefited 48,093 farmers (14.5% female). The amount of planted area, certified/quality seed produced, and number of direct beneficiary farmers would increase when revolving seed, farmer to farmer seed exchange, seed disseminated by other organizations using seed sourced from partner farmers and cooperatives including newly injected seed of 251.7 tonnes in 2018. Moreover, it was possible to directly benefit 42,120 farmers (14.1% female) by providing 58,937 packs of chickpea and faba bean rhizobia inoculants for improving soil fertility and health.



Chickpea basic seed production by Kolbe SPCs (left), malt barley basic seed production by Tuka Ketara SPC (center); and faba bean basic seed production by Lemu Dima SPC (right)

Capacity Development

The capacity-building component focused on providing critical facilities to equip NARS and SPCs and training of extension staff and seed producers with practical knowledge and skills to be more effective in their research and development activities. In malt barley–faba bean project, training was provided to 386 train-the-trainers (10.1% female) who in turn trained 11,750 farmers (15.3% female) and 2,122 technical staff (18.1% female) from project partners and stakeholders, which include development agents, district extension experts, and junior researchers. Similarly, in the chickpea project, training was provided to 500 train-the-trainers (11.2% female) who in turn trained 9,706 farmers (16.9% female) and 1,811 other staff (17.6% female) from implementing partners and stakeholders, which include development agents, district extension experts, and junior researchers. This relatively higher level of female participation was achieved through deliberate effort in involving women farmers in capacity building and other seed-related activities.

Field vehicles, irrigation facilities, breeding cages, and threshers are among important facilities required for improving quality and early generation seed production by partners. Four field vehicles, two water pumps, 12 insect proof screen houses (each with 840m^2) for faba bean breeding, variety maintenance and breeder seed production, 10 threshers and 13 bag sealers were provided to NARS partners. Many partner SPCs lack facilities required to produce quality seed acceptable by seed certification agencies. Twenty five multipurpose mobile threshers and 17 bag sealers were provided to 25 and 13 partner SPCs, respectively. Threshers are very important for timely threshing to escape erratic rainfall, which usually comes during February to March and spoils seed quality while the harvested crops are heaped in the field.

Develop Land Suitability Maps

To assist crop technology targeting and scaling up, land suitability maps for seven selected varieties of each of chickpea and faba bean, and six selected varieties of malt barley have been completed. These maps will be published and be available for users.

Characterization of Value Chains

Characterizations of farm households to establish benchmarks and measure the impact of the project, the project completed both baseline and impact assessment surveys. Baseline survey established benchmarks for the impact assessment survey. Established benchmarks include level of adoption, size of land allocated to each crop, crop productivity, and gross margin.

Success stories

Building Sustainable Local Seed Supply Through Farmer Mobilization

Linkages with district Office of Agricultural Development and farmers' SPCs/groups enabled decentralized on-farm quality seed production and marketing and certification. Further support is required to strengthen the linkages among stakeholders in the value chains to ensure sustainability.

Adaptation of Chickpea to Droughts and Climate Change

Farmers plant chickpea in late September, towards the end of the main season, on residual moisture because of ascochyta blight disease and waterlogging on vertisols, which devastate early planted chickpea. Demonstrations and scaling up/out early planting (July to late August) using ascochyta blight-resistant varieties ('Arerti' and 'Habru') and overcoming waterlogged vertisols using broad bed and furrow soil drainage for early planting in late August increased production area and yield as compared to late September planting, characterized by crop failure, and very low yield.

Integrated Faba Bean Gall Disease Management

Faba bean gall disease reached epidemic levels in Ethiopia with significant implications for the production of the crop and the country's economy. The project applied integrated faba bean gall disease

management (introducing gall disease-tolerant faba bean varieties and fungicide spray). Because of their vigorous growth, the improved varieties are relatively more tolerant than the local varieties.

Integrated Faba Bean Parasitic Weed Management

Orobanche became a threat to faba bean production in northern Ethiopia where farmers abandoned the crop for a long time. Integrated orobanche management (introducing the tolerant variety 'Hashengie', N fertilization and low dosage glyphosate) enabled reintroduction of a healthy faba bean production in the northern and central highlands of Ethiopia.

Local Seed Market

Farmers who produced 60.7 tonnes of chickpea seed exchanged with farmers through sale and earned an average income of 52,422.7 USD; had it been for grain, the income would have been 33,109 USD. Similarly, a total of 894 farmers (7% female) obtained 10.75 tonnes of malt barley seed, and 40.7 tonnes of faba bean seed through farmer-to-farmer seed exchange. The respective seed sale earned an average income of 6,460 and 49,025 USD; had it been for grain, the respective income would have been 3,665 and 30,525 USD. These are just small samples in three years of endeavor, otherwise the impact is huge if the information is exhaustively collected and documented by partners.

Conclusions and Recommendations

Demonstrations of improved crop varieties and integrated crop management technologies proved successful in raising productivity and increasing production in target project areas, but the partial adoption of the full package of improved technologies by smallholder farmers remains an outstanding and persistent reason for a significant yield gap in the farmers' fields.

Not enough early generation seed (EGS) production by NARS and certified seed production by commercial seed suppliers remains a critical challenge that currently limits the adoption of improved barley and legume varieties. Strengthening and consolidating decentralized production and planning of EGS with Regional Agricultural Research Institutes (RARIs) remains critical to overcome the chronic problem of source seed in the seed sector.

Proven technologies promoted with potential impacts for increasing productivity and production in biotic stress areas (orobanche-infested areas, faba bean gall disease-prone areas) and abiotic stresses (vertisols management) still need concerted effort and support to reach meaningful and greater impact at national level.

The effort made in strengthening linkage and capacity among actors in barley, chickpea and faba bean value chains has been very limited in the face of ever-demanding seed supply continuum, marketing and commercialization, which need bulk production and aggregation. This needs further effort for strengthening capacity, linkage among actors, bulk production and aggregation, and marketing.

Table 1. Summary of demonstrations, seed provision, area planted and beneficiary farmers in 2015–17

Activity	Chickpea	Faba bean	Malt barley	Total
Demonstrations (number of farmers = number of sites)	657	357	243	1257
Area (ha) planted for breeder seed production	32.1	29.5	18.7	80.4
Area (ha) planted for pre-basic seed production	163.9	106.0	63.3	333.2
Area (ha) planted for basic seed production	509.4	151.9	254.9	916.2
Small-pack seed provided (t), including revolving seed	162.7	295.6	187.1	645.4
Seed provided through farmer-to-farmer seed exchange (t)	112.7	138.8	78.7	330.1
Seed provided through other organizations (t)	459.6	35.7	25.1	520.4
Area (ha) planted through small-pack seed, including revolving	1965.7	1535.4	1659.2	5160.3
Area (ha) planted through farmer-to-farmer seed exchange	915.6	724.7	724.8	2365.1
Area (ha) planted through seed by other organizations	3677.0	178.5	227.4	4082.9
Area (ha) planted by Amhara & Oromia Seed Enterprises	0.0	0.0	1176.9	1176.9
Number of rhizobial packs distributed	20329.0	38608.0	0.0	58937.0
Area (ha) covered by rhizobial fertilizers	5082.3	10247.3	0.0	15329.5
Number of direct beneficiary farmers (demos, small packs, farmer-to-farmer, PSEs & others)	27940	25752	10203	63895

Number of direct beneficiary farmers from rhizobia	16679	25441	0	42120
Number of indirect beneficiary farmers (target beneficiary farm HHs)	556222	178267	403409	1137898

Note: *PSEs=Public Seed Enterprises; HHs=households; number of indirect beneficiary farmers include farmers who could benefit through spillover effect in 2018 from the accessible improved seeds and technologies of project target areas in 2015-2017*

Table 2. Productivity of malt barley, faba bean and chickpea demonstrations of improved technologies in 2015–17

	Productivity (t/ha)		Technologies demonstrated	Demonstration target areas of Ethiopia
	Conventional technology	Improved technology		
Demonstration of crop varieties				
Malt barley	2.6-2.8	2.8-4.6	New vs commercial varieties	South, central, north
Faba bean	0.68-1.78	2.20-2.22	New vs local varieties	South, central, north
Chickpea	1.36	1.52-1.82	Kabuli vs local desi	Southeast
Demonstration of integrated crop management technologies				
Malt barley	2.29	4.44	Axial selective grass killer & 2,4-D vs weedy check	South
Faba bean	1.5	2.68	Rhizobia (FB1305) & NPS fertilizer (100 kg/ha) Rhizobia vs local practice (unfertilized check)	South
Faba bean	0.94	2.15	Gall disease tolerant variety & Baylethon vs untreated control	Northwest
Faba bean	1.10-1.01	2.20-3.23	Dual Gold or Premagra pre-emergence herbicide with or without one hand weeding vs weedy check	South, central

Table 3. Summary of achievements in seed production in 2015–17

Activity	Chickpea	Faba bean	Malt barley	Total
Breeder seed produced (t) by NARS	45.7	34.9	39.0	**119.6**
Pre-basic seed produced (t) by NARS	174.1	156.4	153.1	**483.6**
Basic seed produced (t) by NARS through SPCs & CBSP	1113.3	352.8	548.3	**2014.4**
Certified/quality seed produced (t) through small-pack seed provision, including revolving seed	4727.7	3129.4	6445.2	**14302.3**
Certified/quality seed produced (t) through farmer-to-farmer seed exchange	2121.0	1917.0	1740.9	**5778.9**
Certified/quality seed produced (t) through other organizations using project partners' seed source	11069.1	452.6	659.5	**12181.2**
Certified/quality seed produced (t) by ASE & OSE			2524.8	**2524.8**
Total	**19250.9**	**6043.1**	**12110.8**	**37404.8**

Note: *SPCs=Seed producer cooperatives; CBSP=Community based seed production; ASE=Amhara Seed Enterprise; OSE=Oromia Seed Enterprise*

Village Seed Hubs: Transforming Lentil and Grass Pea Seed Production in Rural India

Introduction

Pulses are a perfect mix of vegetarian protein of high nutritive value ensuring food and nutritional security. Pulses are also an excellent feed and fodder for livestock. Endowed with the unique ability of biological nitrogen fixation, carbon sequestration, low water requirement and capacity to withstand abiotic stresses, pulses are major a component of sustainable crop production, especially in rainfed system.

Pulses are the daily diet of millions of Indians. India is the largest producer of pulses in the world, covering 24% of the global production, but it is also the largest importer and consumer of pulses. With the ever-increasing population, there has been a sharp decline in the availability of pulses from 70 g/capita/day in 1960–61 to 33 g/capita/day in 2009–10, whereas, the World Health Organization recommendation is about 80 g/capita/day.

Among pulses, lentil (*Lens culinaris* L.) is a major *rabi* crop grown in India contributing significantly to food, feed and sustainable farming systems. It provides nutritional security to consumers owing to the high amount of digestible protein (up to 35%),

macro- and micronutrients, (especially iron and zinc) and vitamins. Lentil is cultivated mainly in Madhya Pradesh, Uttar Pradesh, Bihar, West Bengal, Rajasthan, Haryana, Punjab, Assam, and Maharashtra states. The crop is used both as food and fodder crop.

Similarly, grass pea (*Lathyrus sativus* L.) is a popular pulse crop in India. Low-cost cultivation, and its resistance to drought, flood, salinity, diseases, and insect-pest attack, attracted farmers to grow this crop despite official discouragement. Grass pea can be the only available food source for the poorest section of society, and sometimes is a survival food in times of crop failure and drought-induced famine. It is predominantly grown as a relay crop, popularly known as *utera*, in rice fields, which is a well-established popular rice-based cropping system and farmers do not have a better alternative under such harsh rainfed conditions. Grass pea is mainly cultivated in Chhattisgarh, Madhya Pradesh, Bihar, Jharkhand, Maharashtra, Odisha, Assam, West Bengal, and eastern Uttar Pradesh. It is used as *dal* and as a fodder crop, etc.

Availability of and access to seed is critical for dissemination and adoption of improved crop varieties. In India, as per the National Seed Plan (2005) the desirable seed replacement rates (SRRs) are 25% for self-pollinated crops, 35% for cross-pollinated crops and 100% for hybrids. Average SRRs are very low in pulse crops, ranging from 2–5% (Directorate of Pulses Development) because of a lack of awareness among farmers and unavailability of quality seed at the right time. The stagnant or slow growth in productivity in lentil production is attributed to many factors including non-availability of quality seed of improved varieties, low SRR (2.3%) and complex disease-pest syndromes.

Breeder seed production of pulses has increased from 410 tonnes in 1998–99 to 1,340 tonnes in 2009–10. However, the efforts have been inadequate in meeting the seed requirement due to lack of further multiplication and commercialization of foundation and certified seeds by the public or private sector (Ali and Gupta 2012). Non-availability of quality seed in adequate quantity is one of the major constraints in pulse production. This calls for alternative approaches where farmers' involvement is becoming crucial in quality seed production.

National Food Security Missions (NFSM)–Pulses for Lentil and Grass Pea

Cognizant of the seed supply gap, ICARDA collaborated with the Department of Agriculture Cooperation & Farmers Welfare (DAC & FW), Government of India and the Indian Council of Agricultural Research (ICAR) under the National Food Security Mission (NFSM)–Pulses for lentil and grass pea to work in the states of Assam, Bihar, Manipur, Meghalaya, Tripura, Uttar Pradesh, and West Bengal in two phases during 2010–16.

Identification of Improved Varieties

Many improved varieties of lentil and grass pea have been identified through a participatory approach and made available to farmers. Farmers identified lentil varieties according to their criteria *viz* grain yield, seed size, cotyledon color, resistance to insect pests and diseases. For lentil, 'Moitree', 'Subrata', 'Suvendu', 'K-75', 'KLS-218', 'HUL-57', 'NDL-1', 'PL-06', 'PL-07', 'PL-08', 'IPL-316', 'IPL-81', 'IPL-406', 'VL Masoor-103', 'VL Masoor-126', 'Asha', 'Ranjan', 'JL-3', and 'DPL-62' varieties were supplied.

Similarly, for grass pea farmers' criteria include grain yield, resistance to insect pests and diseases, and duration of the crop. For grass pea, low-toxin, high-biomass and high-yielding varieties *viz* 'Ratan', 'Prateek', 'Nirmal' and 'Mahateora' were provided to farmers.

Demonstration of Agronomic Packages

The Lentil Project was carried out in four states through a farmers' participatory approach and resulted in an increase in yield through replacement of varieties (15–34%) and technological interventions during Phase I (27–65%) (NFSM-Pulses Lentil Pilot Project Workshop 2012). The full technological intervention may have resulted in a yield advantage of up to 140.31% compared to farmer practices (NFSM-Pulses Lentil Project 2013–15). Lentil crop was also introduced and established in the northeastern states of Manipur, Tripura and Meghalaya by ICARDA in collaboration with ICAR Research Complex for North-Eastern Hilly (NEH) Region, Shillong. The results revealed significantly higher returns realized by farmers in these states, because of farmers' adoption of improved varieties and production technology. Grass pea recorded 29-–161% yield advantage in full technological intervention over farmers' practices (NFSM–Pulses Grass Pea Project 2010–12 and 2013–15).

Both crops were sown with different methods of sowing like relay cropping, normal sowing, zero-tillage, and under rice-fallow situation.

Establishment of Seed Hubs for Seed Security

Production of quality seed is one of the important objectives of the project. For regular and sustainable

seed value chain at village level, seed hubs were created at project sites. These seed hubs are community-based, community-owned and community-managed at village level, involving farming communities. Farmers were identified, organized, and trained on quality seed production techniques to enable them to maintain seed quality. Farmer groups procured the seed produced and established sale outlets for marketing the seed in their villages. For lentil, a total of 16 and 18 seed hubs have been established during 2010–12 and 2013–15, respectively. Similarly, for grass pea, a total of 13 and 30 seed hubs were established during 2010–12 and 2013–15, respectively. Many of the seed hubs were registered under the Government Act.

Quality seeds (breeder/foundation and certified seed) of different varieties were supplied to farmers under the project. Breeder seed is produced by the plant breeder and supplied to the seed hubs which further multiply the seed to produce foundation, certified or truthfully labeled seed based on a nationally prescribed standard. All necessary steps were taken to meet the standards and seed certification was accomplished by government agencies. This ensures that seed production is undertaken according to the rules and regulations of Seeds (Control) Order 1983. Regular field visits by experts/scientists, research staff, and seed certification personnel during the crop season ensured production of quality seeds. Different seed classes such as foundation, certified and truthfully-labeled seeds were produced in significant quantities with farmers' participation and certified by State Seed Certification Agencies.

For lentil, a total of 3,890.542 tonnes (Phase I: 1,344.567 tonnes and Phase II: 2,545.974 tonnes) of quality seeds of high-yielding lentil varieties were produced by the farming community for continuity of seed chain at village level under two phases of the project (Table 1).

Table 1. Lentil seed produced during Phase I (2010–11 to 2012–13) and Phase II (2013–14 to 2015–16)

Seed class	Quantity of seed produced (t)	
	Phase I 2010–11 to 2012–13	**Phase II 2013–14 to 2015–16**
Foundation seed	326.594	667.344
Certified seed	148.685	242.893
Truthfully labeled seed	869.288	1,635.737
Total	**1,344.567**	**2,545.974**

Visit to seed production field by seed inspection officer

Monitoring harvested seed crop

Seed production by farmer

Different packs of lentil (left picture) and grass pea (right picture) seeds ready for marketing

For grass pea, a total of 2,141.772 tonnes (Phase I: 512.806 tonnes and Phase II: 1,721.442 tonnes) of quality seeds of low toxin (ODAP: β-N-Oxalyl-L, β-diaminopropionic acid) content and high-yielding varieties were produced by the farmers in respective phases of the project (Table 2).

Table 2. Grass pea seed produced during Phase I (2010–11 to 2012–13) and Phase II (2013–14 to 2015–16)

Seed class	Quantity of seed produced (t)	
	2010/11 to 2012/13	**2013/14 to 2015/16**
Breeder seed†	8.691	--
Foundation seed	74.621	78.972
Certified seed	102.74	480.145
Truthfully labeled seed	326.754	1,162.325
Total	**512.806**	**1,721.442**

†Breeder seed was produced by respective breeder during the project for the farmers

These seed hubs have been established to encourage seed production at farmer level. These hubs also assure quality seed, well-timed access, generate employment and additional income by retailing to other farmers and eventually securing livelihood.

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Reforming the Seed Sector in Pakistan

In Pakistan, the organized seed sector started in 1976 with support of the World Bank. The Seed Act 1976 was promulgated but it remains obsolete and not catering to the developments in the seed sector at the turn of the century. Cognizant of the trends in the seed industry and the need of private seed sector like GMOs, accreditation of seed laboratories, and encouragement of private sector, the seed legislation has been amended as described below.

The Seed (Amendment) Act 2015 aimed at broadening the scope of regulation, enhancing participation and investment of the private sector in the seed industry and safeguarding farmers' interests. It addresses the following:

- Availability of pre-basic seed to the private sector;
- Establishing accredited seed testing laboratories in private sector;
- Registration of seed companies/dealers and processing plants;
- Enhancement of penalties/fines for effective Seed Act enforcement;
- Restriction on unapproved/banned varieties and misbranding;
- Registration of seed-related persons/ organizations
- Every seed dealer shall clearly display at his place of business the sale prices of different crop seeds held by him including the opening and closing stocks daily.

The Seed (Amendment) Act 2015 was approved by National Assembly and rules framed under this amendment have been promulgated in 2016.

Similarly, to comply with international obligation under the Agreement of Trade Related Aspects of Intellectual Property Rights (TRIPS), Pakistan has promulgated the plant breeders' rights to attract private sector investment. The Plant Breeders Right Act 2016 meant:

- To encourage plant breeders/seed organizations/multinational seed companies to invest in research and plant breeding;
- Development of superior varieties of field, vegetable and ornamental/horticultural crops;
- Healthy competition for variety development in public and private sector;
- To facilitate access to protected foreign varieties;
- Protection of national varieties abroad;
- Encourage public plant breeders through financial incentives such as royalties on their protected varieties and revenue generation for research institutes;
- Create discipline in the national seed industry.

Consequent to such reforms many seed companies have been registered in the country (see table below).

Number of registered seed companies in Pakistan: 1980–2017

Category	Punjab	Sindh	Khyber Pakhtun Khwa	Gilgit-Baltistan	Balochistan
Public seed companies	1	1	1		1
National private seed companies	659	102	24	3	5
Multinational seed companies	4	1			
Total	664	104	25	3	6

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Research Notes

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

Identification of Faba Bean (*Vicia fabae* L.) Varieties Adapted to Southeastern Ethiopia

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Abstract

During the 2017–18 cropping season a study was conducted at Selka and IluSanbitu *kebeles* of the Sinana district in southeast Ethiopia. The study focused on identifying faba bean varieties that are adapted through participatory variety selection. Six faba bean varieties released by NARS were evaluated in mother trials on four farmers' field in the 2017–18 main cropping season. Based on farmers' selection criteria faba bean varieties were scored using matrix ranking method. Grain yield and association between female and male farmers' evaluation were estimated. At IluSanbitu var 'Didea' and 'Hachalu' were selected by female farmers while var 'Didea' was selected by male farmers. At Selka vars 'Gebelcho' and 'Didea' were selected by female and male farmers, respectively. Further analysis using Spearman correlation revealed that evaluation by female farmers was positively associated with evaluation by male farmers but negatively correlated with grain yield. Male farmers' evaluation, except for disease resistance, was positively associated with grain yield. Correlation result helps to identify varieties through indirect selection.

Key words: *Correlation, faba bean, farmer's preference, improved varieties*

Introduction

Ethiopia is the second largest producer of faba bean (*Vicia faba*) in the world next to China (Ronner and Giller 2012). Faba bean ranks first among legumes covering a total area of 428,000 ha and total production of 878,000 tonnes at the productivity level of 2.05 t/ha involving 3.6 million households in 2016. These account for 27.6% of total area and 31.2% of total production of pulses in the country.

Pulses complement cereals as a source of protein and minerals as they provide 15–40% of protein (Monti and Grillo 1983) compared to 6–10% for cereals and contain essential amino acids like lysine, which is not found in cereals. Faba bean is a key crop and a major source of dietary protein throughout north and northeast Africa.

Pulses have the potential to improve soil fertility in areas that suffer from soil nutrient depletion. When associated with the right strain of *Rhizobium* bacteria (biofertilizer), pulses can fix atmospheric nitrogen of up to 200 kg of nitrogen/ha, equivalent to 400 kg of urea fertilizer. Growing pulses in rotation with cereals reduces commercial fertilizer requirements, reduces the spread of diseases, insect pests and weeds. In Ethiopia, pulse residues play an important role in livestock feed (MoA *et al*., 2015).

Pulses are generally more profitable than cereals, giving smallholders an economic incentive to increase production. Faba bean gives up to 77% higher profit than wheat and up to six times more profit than barley (Ethiopian Working Document 2015). Moreover, faba bean is among top export pulses including haricot bean and chickpea accounting for 90% of export volumes and 85% of export earnings.

Introducing pulse like faba bean in predominantly cereal growing regions of southeastern Ethiopia also has many benefits in terms of food and nutritional security and environmental sustainability where identifying and deploying well adapted and farmer and market preferred varieties remain critical.

Problem Statement and Objectives

One of the main consequences of conventional breeding is that large amounts of breeding materials are discarded without knowing whether they could have been useful in the real conditions of farmers' fields. Moreover, the germplasm that is selected is likely to perform well in environments like the research stations but may not perform well in diverse environments in the farmers' fields. It is argued that for crops grown in environments poorly represented by the research stations, conventional approaches often result in discarding useful breeding material (Ceccarelli *et al.* 1996). Participatory plant breeding programs have considerably recognized and utilized farmers' knowledge and enriched farmers' knowledge, improved their negotiation capability, and enhanced their dignity (Soleri *et al*. 2002).

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The main objectives of this study were to: (i) Identify high yielding, disease resistant and farmer and industry preferred faba bean varieties; and (ii) Recommend varieties based on their performances for further seed production and supply.

The study is geared towards the relevance of participatory varietal selection and seed supply; it hopes to shed light on the mechanism of extending participatory varietal selection and seed supply in the study area.

Materials and Methods

Participatory variety selection (PVS) of faba bean was conducted at Sinana (IluSanbitu and Selka *kebeles*) in the 2017–18 cropping season. Six faba bean varieties released by NARS, namely: 'Tumsa', 'Moti', 'Gora', 'Didea', 'Gebelcho' and 'Hachalu' were used for the PVS. Each variety was planted on four farmers' fields (i.e. two farmers per *kebele*) with a plot size of 16 m^2 (4 m x 4 m) in mother trials. A seed rate of 175 kg/ha was used diamonium phosphate (DAP) was applied as a starter fertilizer at the rate of 100 kg/ha. The trials were evaluated separately by groups of male and female farmers at physiological maturity of the crop. The members were selected randomly from nearby communities to the experimental sites. In addition, farmers in the community also participated in field days and guided visits to the trial sites.

Farmers' criteria for evaluation of faba bean varieties include crop stand, plant height, lodging tolerance, maturity, disease tolerance, branch number, and number of pods per plant. Grain yield was also recorded for each plot. Matrix ranking was used based on criteria identified in brain storming with famers. Ranking was made in groups with score value of 1 (very poor) to 5 (excellent). Evaluations were made during physiological maturity of the crop cycle.

Results and Discussion

In matrix ranking based on farmers' criteria, the overall evaluation score values ranged from 91 to 231 by female farmers and from 81 to 210 by male farmers (Table 1). At Selka, the lowest score value was recorded for var 'Gora' with score value of 91 and 81 by female and male farmers, respectively. At IluSanbitu, var 'Gebelcho' recorded the lowest score value with 112 and 133 by male and female farmers, respectively.

At IluSanbitu, vars 'Didea' and 'Hachalu', each with score values of 203, were selected by female farmers while var 'Didea', with a score value of 210, was selected by male farmers. At Selka, vars 'Gebelcho', with a score value of 231, and 'Didea', with a score value of 170, were selected by female and male farmers, respectively. In overall mean score value, var 'Didea' was selected by both male and female farmers followed by vars 'Hachalu' and 'Gebelcho' (Table 1).

The shortcomings of centralized plant breeding are related to their inability to address the enormous diversity of environmental conditions and end users' needs (Morris and Bellon 2004). PVS was very successful both in facilitating the adoption of cultivars in marginal environments, and in understanding farmers' preferences (Maurya *et al*. 1988; Sperling *et al*. 1993; Witcombe and Joshi 1996). In addition, grandmother and mother trials of malt barley PVS in northwest Ethiopia (Aynewa *et al.* 2013) and mother trials on durum wheat (Aynewa *et al*. 2016), lentil (Aynewa *et al*. 2017) and food barley (Aynewa *et al.* 2018) successfully identified the farmers' variety preferences in southeastern Ethiopia.

Fig.1. Evaluation of faba bean PVS trial IluSanbitu

Fig.2. Evaluation of faba bean PVS trial at Selka

Table 1. Farmers' evaluation of faba bean varieties at Sinana in 2017–18 cropping season

Participants	Tumsa	Moti	Gora	Hachalu	Didea	Gebelcho
IluSanbitu female	154	154	189	203	203	133
IluSanbitu male	147	126	196	189	210	112
Selka female	105	147	91	147	175	231
Selka male	125	135	81	127	170	150
Mean	133	141	139	167	190	157

At IluSanbitu the highest yield was recorded for vars 'Didea' (4.81 t/ha) and 'Hachalu' (4.7 t/ha) while at Selka the highest yield was recorded for vars 'Didea' (2.7 t/ha) and 'Gora' (2.63 t/ha) as shown below (Table 2).

Table 2. Grain yield of faba bean varieties at Sinana in 2017–18 cropping season

			Yield t/ha)		
Varieties	**IluSanbitu1**	**IluSanbitu2**	**Selka1**	**Selka2**	**Mean**
Tumsa	1.88	2.81	1.31	1.31	1.83
Moti	2.38	3.75	2.56	0.56	2.31
Gora	4.06	4.38	2.63	0.88	3
Hachalu	4.69	3.94	1.5	0.63	2.69
Didea	4.81	4.31	2.69	0.69	3.13
Gebelcho	2.31	3.94	2.06	1.06	2.34

Association of Evaluation by Male and Female Farmers

Spearman correlation coefficient analysis revealed that female farmers' evaluation was positively associated with male farmers' evaluation but negatively correlated with grain yield (Table 3). Male farmers' evaluation, except for disease resistance, was positively associated with grain yield (Table 3). For female farmers' evaluation, highly significant and positive associations were observed for disease resistance with number of pods ($r=0.752^{**}$) and branch number ($r= 0.716^{**}$); crop stand with number of pods (0.783^{**}) and branch number ($r=0.746^{**}$); number of pods with branch number (0.915^{**}) and disease resistance by male evaluation ($r=0.712^{**}$). Similarly, for male farmers' evaluation highly significant and positive associations were observed for crop stand with number of pods ($r=0.780^{**}$) and branch number ($r=0.741^{**}$); and number of pods with branch number ($r=0.904^{**}$). Significant and positive associations were recorded for crop stand in female evaluation with disease resistance in male evaluation ($r=0.581^{*}$) and branch number in female evaluation with disease resistance of male evaluation ($r=0.606^{*}$). Commonly, positive and significant associations of pairs of characteristics justified the possibility of a correlated response to select. The negative and significant correlations prohibit the simultaneous step up of those traits. Similar analysis is done on different characteristics associated with grain yield for indirect selection (Yetsedaw *et al.* 2015).

Table 3. Correlation between grain yield and evaluation by male and female farmers

	DRF	CSF	NPF	BrF	DRM	CRM	NPM	BrM	GY
DRF	1	0.505	0.752^{**}	0.716^{**}	0.459	0.061	0.275	0.26	-0.36
CSF		1	0.783^{**}	0.746^{**}	0.581^{*}	0.029	-0.046	0.062	-0.374
NPF			1	0.915^{**}	0.712^{**}	-0.097	-0.038	0.05	-0.608^{*}
BrF				1	0.606^{*}	0.125	0.181	0.296	-0.348
DRM					1	-0.173	0.087	0.172	-0.595^{*}
CRM						1	0.780^{**}	0.741^{**}	0.439
NPM							1	0.904^{**}	0.212
BrM								1	0.116
GY									1

NB: *DRF/M=disease resistance evaluated by female/male; CSF/M=crop stand evaluated by female/male, NPF/M=number of pods per plant evaluated by female/male; BrF/M= branching evaluated by female/male; and GY= Grain yield.*

** and * Correlation is significant at the 0.01and 0.05 level, respectively

Conclusion

Farmers' evaluations provide information for designing and developing appropriate techniques to select cultivars that are better adapted in nutrient-deficient environments and provide functional understanding of relevant systems to strengthen future crop and product development in a sustainable way. Analysis of characteristics with farmers' evaluation helps in understanding, conserving and accessing genetic diversity and can help us to integrate information at an international level and use resources safely.

References

Aynewa, Y., S. Ahmed, N. Tadesse and Z. Bishaw. 2018. Farmers' preference of food barley (*Hordeum vulgare* L.) varieties in southeastern Ethiopia. *Seed Info* No. 54. ICARDA, Beirut, Lebanon.

Aynewa, Y., A., S. Ahmed, N. Tadesse and Z. Bishaw. 2017. Identification of lentil (*Lens culinaris* L.) genotypes with farmers in Southeastern Ethiopia. *Seed Info* No. 52. ICARDA, Beirut, Lebanon.

Aynewa, Y., S. Ahmed, N. Tadesse and Z. Bishaw. 2016. Identification of farmer's preferred durum wheat (*Triticum durum* L.) varieties in Southeastern Ethiopia. *Seed Info* No. 51. ICARDA, Beirut, Lebanon.

Aynewa, Y., T. Dessalegn and W. Bayu. 2013. Participatory evaluation of malt barley and other agronomic traits at Northern Ethiopia. *Wudpecker Journal of Agricultural Research* 2: 218–222.

Ceccarelli, S., S. Grando, R.H. Booth. 1996. International breeding programmes and resource-poor farmers: crop improvement in difficult environments. Pages 99–116 *in* Participatory Plant Breeding: Proceedings of a Workshop on Participatory Plant Breeding (P. Eyzaguirre and M. Iwanaga, ed.), 26–29 July 1995, Wageningen, The Netherlands. IPGRI, Italy.

MoA, EIAR, MoT and ATA. 2015. National Pulses Value Chain Development Strategy of Ethiopia Ethiopian (Working Document 2016-2020). Addis Ababa, Ethiopia

Maurya, D.M., A. Bottrall and J. Farrington. 1988. Improved livelihoods, genetic diversity and farmer participation: a strategy for rice breeding in rainfed areas of India. *Experimental Agriculture* 24: 311–320.

Monti, L. M. and S. Grillo. 1983. Legume seed improvement for protein content and quality. *Plant Foods and Human Nutrition* 32: 253–266.

Morris, M.L. and M.R. Bellon. 2004. Participatory plant breeding research: opportunities and challenges for the international crop improvement system. *Euphytica* 136: 21–35.

Ronner, E. and K.E. Giller. 2013. Background information on agronomy, farming systems and ongoing projects on grain legumes in Ethiopia. Available at: http://www.n2africa.org/content/background-information-agronomy-farming-systems-and-ongoing-projects-grain-legumes-ethiopia. Last accessed 28 July 2018.

Soleri, D., D.A. Cleveland, S.E. Smith, S. Ceccarelli, S. Grando, R.B. Rana, D. Rijal and H.R. Labrada. 2002. Understanding farmers' knowledge as the basis for collaboration with plant breeders: methodological development and examples from ongoing research in Mexico, Syria, Cuba and Nepal. Pages 19–60 *in* Farmers, Scientists and Plant Breeding: Integrating Knowledge and Practice (D.A. Cleveland and D. Soleri, ed.). CABI Publishing International, Wallingford, Oxon, UK.

Sperling, L., M.E. Loevinsohn and B. Ntabomvura. 1993. Rethinking the farmer's role in plant breeding: local bean experts and on-station selection in Rwanda. *Experimental Agriculture* 29: 509–519.

Witcombe, J. and A. Joshi. 1996. Farmer participatory approaches for varietal breeding and selection and linkages to the formal seed sector. Pages 57–66 *in* Participatory Plant Breeding: Proceedings of a Workshop on Participatory Plant Breeding (P. Eyzaguirre and M. Iwanaga, ed.), 26–29 July 1995, Wageningen, The Netherlands. IPGRI, Italy.

Meetings and Courses

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

Conferences

ICC International Conference – Grains for Wellbeing

The International Association for Cereal Science and Technology will be organizing an International Conference *'Grains for Wellbeing'* in Chinese Taipei, from 5–8 November 2018. The conference will cover a wide scope of scientific topics–plenary and keynote speeches, and technical oral and poster reports will be included to thoroughly discuss: Breeding and agronomy; Development of rice-based products and products from specialty grains and pulses; Bioactive components of grains; Structure and functions; Health and nutrition;

Micronutrients and phytochemicals in grain products; Authenticity and safety; and Communication and regulatory issues.

This two-day symposium is dedicated to food scientists, dieticians, nutrition researchers, regulatory agencies, processors, market channels and interested consumers, to discuss the opportunities and challenges facing the grain industry.

Student registration is also now possible!

Submit your abstract and register at: www.grainsforwellbeing.org

8th ISTA Seed Health Symposium and 6th International Seed Health Conference

The 8th ISTA – SHC Seed Health Symposium and 6th International Seed Health Conference will be held from 4–7 September 2018 in Poznań, Poland.

Responding to numerous requests we postponed the deadline for the submissions of abstract by June 30, 2018. Following this decision, the normal registration fee (450 EUR) will not be increased until the end of the registration.

For more information and registration, please visit the workshop website.

AFSTA Congress 2019

The Africa Seed Trade Association (AFSTA) Congress will be held in Mombasa, Kenya, from 5–7 March 2019. For more information, please contact the AFSTA Secretariat at afsta@afsta.org

ISF World Seed Congress 2019

The International Seed Federation (ISF) World Seed Congress 2019 will be held in Nice, France, on 3–5 June 2019, with the theme of '*Where Knowledge Flows*'. Conference registration will open on 8 January 2019 at 11:00 GMT. See the ISF World Seed Congress 2019 website for more info.

International Seed Testing Association (ISTA) Seed Symposium 2019 and 32nd ISTA Congress 2019

The Seed Symposium of the 32nd ISTA Congress under the theme '*Seed technology and quality in a changing world'* will be held in Hyderabad, India, on 26–28 June 2019.

The 32nd International Seed Testing Association Congress Annual Meeting 2019 will take place in Hyderabad, India, on 29 June–3 July 2019.

For more information, please contact: ISTA, Zurichstrasse 50, 8303 Bassersdorf, Switzerland; tel: +41 44 838 6000; fax: +41 44 838 6001; e-mail: ista.office@ista.ch; website: www.seedtest.org

Courses

ICARDA courses

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

UPOV Distance Learning Courses

Further sessions of each of the following International Union for the Protection of New Varieties of Plants (UPOV) Distance Learning Courses will be run in 2018:

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 in 2018 is as follows:

- Registration: 6 August to 14 September
- Study period: 1 October to 4 November
- Final exam: 29 October to 4 November 4

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.

International Seed Testing Association (ISTA) Training Workshops

ISTA Quality Assurance Workshop for Advanced Laboratories, 14-16 November 2018, Montevideo, Uruguay

The aim of the workshop is to provide the seed testing laboratories with the required tools to comply with the ISTA Rules and Accreditation Standard.
Workshop content includes:

- Management of equipment (including balances, temperature measurement, dividers)
- Substrate control
- Storage of samples
- Internal audits
- Corrective actions and non-conforming work.

For further details and registration, please visit the website.

ISTA ATC Workshop on Seed Image Analysis, 26–30 November 2018, Piracicaba, Brazil

This workshop will provide an overview of several imaging techniques for seed and seedling analysis.

The participants will learn about different imaging techniques for seed and seedling evaluation such as multispectral imaging, X-ray and micro X-ray fluorescence (µXRF) imaging, electrophotography, infrared thermal imaging, chlorophyll fluorescence, 3D X-ray imaging, and magnetic resonance imaging. Participants will acquire hands-on experience with multispectral imaging to evaluate seeds, seed surface characteristics, and chemical properties. For further details and registration, please visit the website.

For more information, please contact: ISTA, Zurichstrasse 50, 8303 Bassersdorf, Switzerland; tel: +41 44 838 6000; fax: +41 44 838 6001; 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 contain relevant information on agriculture-related publications including seed policy, regulation, and technology.

Books

OECD-FAO Agricultural Outlook 2018-2027

Published by OECD (www.oecd.org); ISBN: 9789264062030 (PDF); Price: Not available; 100 pp

The 14th joint edition of the OECD-FAO Agricultural Outlook provides market projections for major agricultural commodities, biofuels and fish, as well as a special feature on the prospects and challenges of agriculture and fisheries in West Asia and North Africa. World agricultural markets have changed markedly since the food price spikes of 2007–08, as production has grown strongly while demand growth has started to weaken. In the coming decade, real agricultural prices are expected to remain low because of reduced growth in global food and feed demand. Net exports will tend to increase from land-abundant countries and regions, notably in the Americas. Countries with limited natural resources, slow production expansion and high population growth will see rising net imports. Increasing import dependence is projected in particular for West Asia and North Africa, where a scarcity of arable land and water constrains agricultural production.

FAO. 2018. Future Smart Foods: Rediscovering Hidden Treasures of Neglected and Underutilized Species for Zero Hunger in Asia

Published by FAO (www.fao.org); ISBN: 9781780640914; Price: $67.50 (Paperback); 36 pp

Achieving the Sustainable Development Goals (SDGs) is at the heart of the work of the Food and Agriculture Organization (FAO), especially SDG 2, which calls for the eradication of hunger and all forms of malnutrition. Delivering on this pledge requires that all people can access adequate and nutritious food, which will require a sustainable increase in the productivity and incomes of smallholder farmers. Furthermore, it will entail a transformation of food systems and an inclusive pro-poor boost to rural development to be pursued while sustaining our natural resource base and safeguarding biodiversity.

The purpose of this publication is: i) to demonstrate the multidimensional benefits of neglected and underutilized species (NUS) and their potential contribution to achieving Zero Hunger; ii) to identify promising NUS – sometimes called ‘orphan crops’ – that are nutrition-dense, climate-resilient, economically viable and locally available or adaptable as ‘Future Smart Food’ (FSF); iii) to highlight the challenges and opportunities for harnessing these less-mainstream food crops; and iv) to provide strategic recommendations to create an

enabling environment for the promotion, production, marketing, and consumption of FSF, assuring healthy diets for the future.

Neglected and underutilized species are crops to which little or no attention is paid by agricultural researchers, plant breeders and policymakers. They are wild or semi-domesticated varieties that are not typically traded as commodities. To be considered a FSF, NUS must be nutritionally dense, climate-resilient, economically viable, and locally available and adaptable.

Today, just 103 edible plant species worldwide provide up to 90% of the calories in the human diet, and 60% of the world's caloric intake comes from just a few staples such as maize, rice, wheat, soybean, and potato. It is now time to take advantage of the wealth of knowledge we have accumulated on NUS so we can develop more sustainable, nutrition-dense, climate-resilient and diversified food systems.

Scoping and prioritization studies on FSF in eight countries including Bangladesh, Bhutan, Cambodia, Lao PDR, Myanmar, Nepal, Vietnam, and West Bengal in India are covered in the book. The Asia-Pacific region is home to most of the world's undernourished people (490 million) and the issues manifest in both the demand and the supply side.

There are two significant gaps in the agriculture and food systems: a production gap where agricultural production must increase by at least 50% globally to meet food demand by 2050; and a nutrition gap between what foods are grown, and what foods are needed for a healthy diet.

Future Smart Foods can close this gap because they generally do not require high inputs and can be grown on marginal and degraded lands while contributing to increased agricultural production, crop diversification and environmental sustainability. In turn, food and nutritional security are improved.

The *book* was compiled by the FAO together with the Australian Centre for International Agriculture Research (ACIAR) and is available online. Pulses are an excellent example of a FSF that exhibits all four criteria.

Agricultural Policy Monitoring and Evaluation 2018

Published by OECD (www.oecd.org); ISBN: 9789264302921 (EPUB); Price: Not available; 175 pp

This report is the 31st in the series of Organization for Economic Co-operation and Development (OECD) reports that monitor and evaluate agricultural policies across countries, and the sixth report to include all 35 OECD countries, the six non-OECD EU Member States and a set of emerging economies: Brazil, the People's Republic of China, Colombia, Costa Rica, Kazakhstan, the Philippines, the Russian Federation, South Africa, Ukraine, and Viet Nam. This annual report is a unique source of up-to-date estimates of support to agriculture and uses a comprehensive system of measuring and classifying support to agriculture – the Producer and Consumer Support Estimates (PSEs and CSEs), the General Services Support Estimate (GSSE) and related indicators. These estimates provide insight into the increasingly complex nature of agricultural policy and serve as a basis for OECD's agricultural policy monitoring and evaluation. Detailed data and documentation for the calculation of support are available on line www.oecd.org/agriculture/PSE. Comprehensive country chapters and the Statistical Annex containing detailed background tables with indicators of agricultural support are available in electronic form at the publication website.

Further information about the book can be accessed on website of OECD.

Websites

APSA

The Asia and Pacific Seed Association (APSA) was established in 1994, through the cooperation of the Food and Agriculture Organization (FAO) and DANIDA, with the aim of promoting quality seed production and marketing in the Asia and Pacific Region. Today, the APSA is the largest regional seed association in the world. It has strong links with international organizations such as the FAO, CGIAR institutions, ISF, ISTA, UPOV, the OECD, and the World Trade Organization, among others. APSA members include national seed associations, government agencies, public and private seed companies, and associate members.

Newsletters

Asian Seed and Planting Material

Asian Seed Magazine (and Planting Material) is a 36-page trade journal, and official publication published every two months by the APSA Secretariat with an ISSN number of 0859-1776.

The print publication contains interviews, news, events, announcements, schedules, pictures, and updates pertaining to the seed industry in the Asia–

Pacific region and the rest of the world. With an emphasis on matters, news and issues affecting APSA members, Asian Seed covers all aspects of the seed trade, including plant breeding, seed production, marketing, distribution, retail, technology, biotechnology, GMOs, hybrids, biodiversity, phytosanitary measures, vegetables, ornamentals, horticulture, cover crops, cereals field crops, rice, wheat, grain, agro-inputs, climate change, weather patterns, warming, cooling, drought, flooding, and more.

New issues are sent free-of-charge via post to all APSA members, while the digital version (PDF) format will be published on the website. A selection of content will also be published to the APSA website news sections when the Editor sees fit. Below are the latest issues, which can be viewed online, or downloaded for viewing offline.

To view APSA member-only advertising rates visit the link.

To subscribe to Asian Seed visit the link.

About ICARDA

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

ICARDA
Science for resilient livelihoods in dry areas

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 e-mail to z.bishaw@cgiar.org