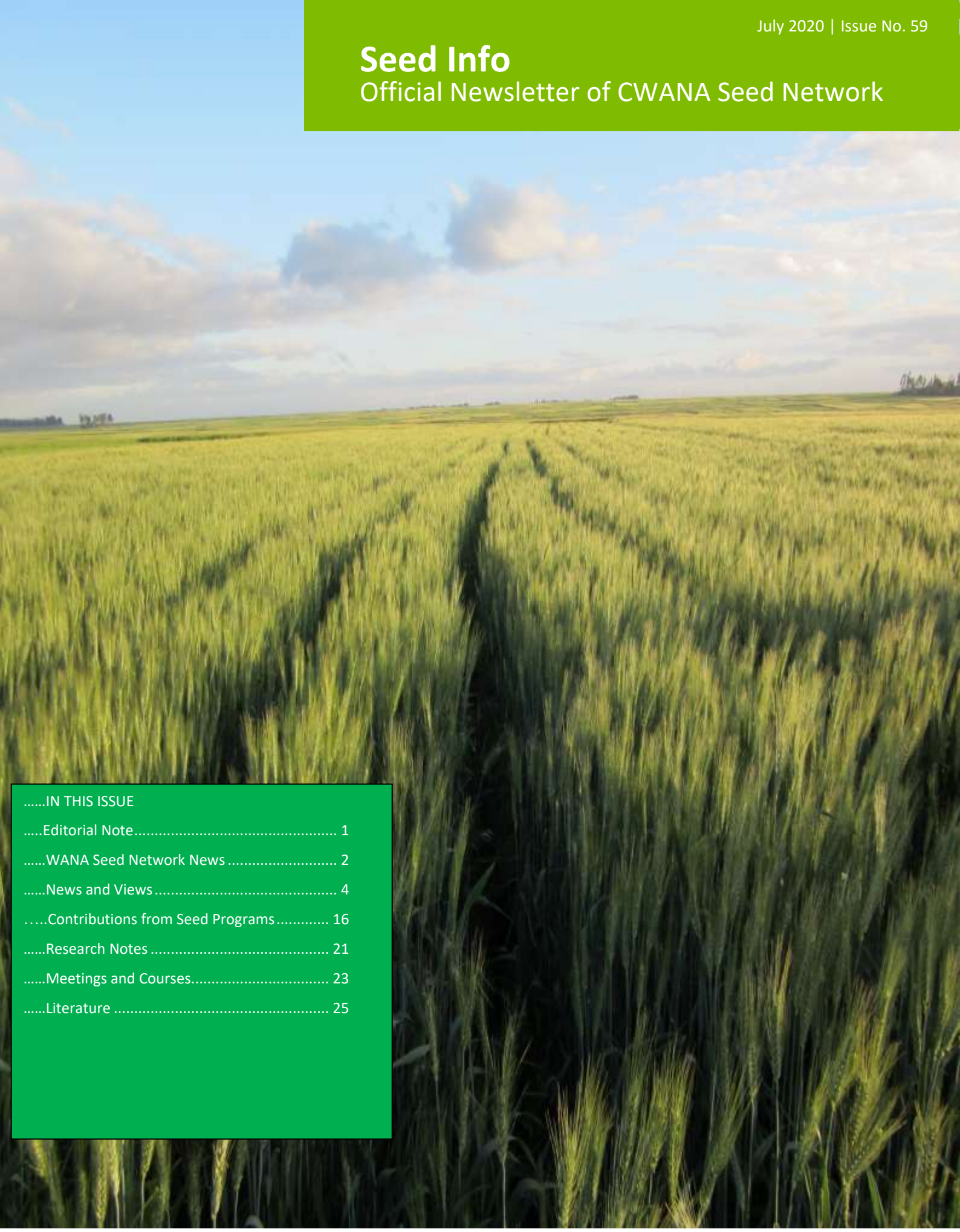
July 2020 | Issue No. 59

Seed Info

Official Newsletter of CWANA Seed Network



.....IN THIS ISSUE

Published by Seed Section, ICARDA, P.O. Box 114/5055, Beirut, Lebanon
Email icarda@cgiar.org www.icarda.org

ICARDA
Science for resilient livelihoods in dry areas

Editorial Note

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

WANA Seed Network News provides information on activities relating to global or regional cooperation and collaboration in facilitating the development of a vibrant regional seed industry. In this issue of *Seed Info*, we report on activities related to the Middle East and North Africa Grand Challenge led by ICARDA within the Two Degree Initiative proposed by the CGIAR Research Program-Climate Change, Agriculture and Food Security to address issues across diverse geographical regions with eight Grand Challenges of which the Middle East and North Africa (MENA) region is a major focus. We also present the achievements of Technologies for African Agricultural Transformation (TAAT) a flagship of African Development Bank's Feed Africa agenda. The report highlights the activities of TAAT Wheat Compact (TWC) in Ethiopia and Sudan.

In the **News and Views** section, we present an article *Gene Editing—Opportunities and Concerns* by Niels Louwaars from the Dutch Seed Trade Association. Technological developments during the past decade are now fueling an old debate in food and agriculture. CRISPR technologies have made gene editing so much easier than older technologies, such as ODM or Talen, that targeted mutagenesis has come in reach of plant breeders. This will not replace conventional plant breeding, but it enlarges the toolbox for breeders to more effectively and efficiently develop new varieties for a diverse set of farmers. In addition, in this newsletter we present innovation on seed systems related to COVID-19 response. It includes the seed security response to COVID-19: now and beyond by an international expert group coordinated by SeedSystem.org and rapid assessments of the threat of COVID-19 to and resilience of the seed sector by the team from the Wageningen University and Research. Other news in this section comes from regional and/or international organizations, such as the International Seed Testing Association (ISTA), the International Union for the Protection of New Varieties of Plants (UPOV), and Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles (CORAF).

The section on **Seed Programs** presents news from Ethiopia, Pakistan, and Syria. There is no doubt that early generation seed (EGS) production remains a major stumbling block for public breeding programs in many developing countries. ICARDA advocates linking varietal release with commercialization and promotes the establishment of functional seed units representing the business interest of public breeding programs handling variety protection, licensing, and commercial EGS production. Several studies conducted elsewhere across the globe are recommending different archetypes of EGS production. Here we report on EGS production and supply looking into the studies conducted, legal frameworks provided, and the state of its implementation in Ethiopia. There is also news on the national seed sector of Pakistan, and it provides highlights on the performance of the public and private sectors in the country. From Syria, we report on the ongoing efforts to rehabilitate the agricultural and seed sector to enhance the capacity of crop production to achieve food and nutritional security in the country under the new Food and Agricultural Organization (FAO) of the United Nations project supported by the European Union as a follow-up to the previous FAO project supported by the Department for International Development (DFID) of the UK.

The **Research** section of *Seed Info* captures information on research activities or issues relevant to the development of seed programs in the CWANA region and beyond. This issue features an article by Yetsedaw Aynewa and colleagues from ICARDA, *Identification of farmers' preferred bread wheat (Triticum aestivum L.) varieties in southern Ethiopia*. The paper discusses the participatory variety selection (PVS) carried out in Lemo district under an Africa RISING project where ICARDA is a partner implementing PVS and community seed production.

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

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.

The MENA Grand Challenge within the Two Degree Initiative

The Middle East and North Africa (MENA) region is highly vulnerable to climate change, which in turn drives increasing socioeconomic challenges. Here, a greater share of water resources (70–85%, depending on the country) is used for food production than in any other region globally. In this region, along with water scarcity exacerbated by climate change, food production is constrained by the demand from rapidly growing populations, challenging policies, and lower crop productivity, leading to heavy dependence on food imports. Agriculture and agri-food systems remain fragile and a radical transformation is necessary to meet future needs under a changing climate. Rural areas in MENA can play a crucial role in providing stability, jobs, food security, and economic opportunities (despite the prevailing volatility in climate, markets, and geopolitics), while populations in urban areas require access to nutritious and affordable food in the context of increased rural–urban migration. Cognizant of this, the CGIAR Research Program Climate Change, Agriculture and Food Security is proposing the Two Degree Initiative to address issues across diverse geographical regions with eight Grand Challenges of which the MENA region is a major focus.

The MENA Grand Challenge (MENA-GC), coordinated by ICARDA, focuses on the opportunities of public–private partnerships identified as potential major 'Climate Smart Lifts' (defined as a set of drivers, technologies, and an enabling environment that can leverage mitigation and adaptation at scale) for food security and resilience of socio-ecological systems to climate change in the MENA region.

The Climate Smart Supply Chains and Services 'lifts' identified from agri-food systems analysis, as well as from success and failure stories in the MENA region, follow:

1. Advisory and early warning systems for extreme weather events and unforeseen crises.
2. Integrated seed systems development to contribute to a vibrant, pluralistic, market-oriented, and harmonized seed sector that provides farmers access to climate-resilient productive varieties and technologies across the countries of the region.
3. Climate friendly agribusiness vegetable and fruit value chains with diversified and sustainable farming systems to support healthy diets (including fish–vegetable combinations and aquaponics) and sustainable climate-smart agriculture interventions.
4. Water management and accounting ensure sustainable use and management of water both in terms of use-efficiency and various types of water resources (including treated wastewater) that can be effectively tapped to support farm-level agricultural production systems and support partner engagement in new technologies and services.

Superimposed on this are three cross-cutting themes that will support the four lifts:

- Gender and youth-based innovation
- Capacity development in climate-smart innovation, entrepreneurship, and policies
- Trade, policy, finance, and institutional responses to climate and market changes.

These lifts and cross-cutting themes are co-coordinated by colleagues from IMWI, Wageningen University and Research, Word Fish, and IFPRI.

A series of webinars were organized during July 22–24, 2020, where close to 400 participants representing different stakeholders such as National Agricultural Research and Extension Systems, private sector, development practitioners, civil society organizations and NGOs, and donors with national, regional, and global remit attended. A high-level synthesis report will be prepared for the MENA-GC within the context of a global report under the Global Commission on Adaptation.

Ajit Govind, ICARDA, Cairo, Egypt; email: a.govind@cgiar.org*; Zewdie Bishaw, ICARDA, Addis Ababa, Ethiopia; email:* z.bishaw@cgiar.org*; Bezaiet Dessalegn, ICARDA, Cairo, Egypt; email:* b.dessalegn@cgiar.org*; Amgad Elmahdi, IWMI, Cairo, Egypt; email:* a.elmahdi@cgiar.org

Sudan and Ethiopia Boost Wheat Production Through the TAAT Wheat Compact Project

The TAAT Wheat Compact (TWC) aims at achieving a transformational impact and

sustainable increases in wheat productivity and production for enhanced food security, economic growth, and poverty alleviation in African countries. In doing so, Africa can and will significantly reduce and stop the unsustainable overdependence on wheat imports through the following: (i) scaling up and enhancing the adoption of proven wheat technologies and innovations across African countries; (ii) expanding domestic wheat production and commercialization toward attaining African wheat self-sufficiency; and (iii) spearheading a widespread transformational impact in terms of increasing productivity, production, farmers' incomes, value addition, and job creation.

High-level monitoring visits to TAAT project sites in Sudan and Ethiopia show that adoption of new wheat varieties, coupled with innovative production technologies and methods, substantially increases production and commercialization, raises farmers' incomes, and creates job opportunities for women and youth.

The ICARDA-coordinated TWC project, funded by the African Development Bank, aims to strengthen production capacity and seed systems, and disseminate improved climate-resilient wheat varieties, while simultaneously introducing innovative production technologies and integrated crop management practices (water-saving technologies) in order to increase Africa's agricultural productivity of staple crops.

A unique aspect of TAAT is the use of innovation platforms, which are instrumental in creating networks and partnerships, bringing together committed and newly interested stakeholders including the private sector, at vertical and horizontal level. Through linkage, information sharing, and debate, the innovation platforms promote new technologies, raise the capacity of farmers, and link them to input and output markets at a strategic and operational level, bringing together all stakeholders along the value chain.

High-level visits by country and regional government officials, along with independent stakeholders from public and private agricultural sectors to TAAT innovation platform sites in Ethiopia and Sudan, have shown substantial development in wheat production practices, adoption of new technology and methods, and integration of stakeholders at all levels.

Sudan produces about 24 percent of its total demand of about 2.2 million metric tons of wheat and the deficit is imported at the average cost of US$450 million annually, while Ethiopia imports 1.7 million metric tons of its 7-million-metric-ton consumption at a cost of around US$700 million. Both countries expect their wheat consumption to increase substantially in the next five years, further widening their wheat deficits. Both countries and the continent have vast potential to increase their wheat production.

Sudan

Located between the two Nile Rivers, occupying about 1.0 million ha and inhabited by close to 1.2 million people, Gezira State is the breadbasket of Sudan, producing about 60 percent of commercial wheat grain in the country. Yet for several years, production of certified wheat seed in Sudan declined progressively. This trend is now being reversed. The TAAT innovation platforms involve key stakeholders at all levels such as the Gezira Scheme, Agricultural Bank of Sudan, private seed companies, development agencies, agro-industry, and farmer associations. The number of stakeholders continues to rise as new private seed companies connected through TAAT are sensing commercial potential.

The results are remarkable. In 2018/2019, a total of about 29,965 metric tons of certified and quality seed was produced and distributed, covering an estimated total area of 299,650 ha—close to the entire wheat area in the country. The expected production of certified wheat seed in 2020 is about 76,000 metric tons of all seed classes, engendering the planting of 500,000 ha.

Ethiopia

Through TAAT in Ethiopia, new frontiers in wheat production have been opened by utilizing climate-resilient, high-yielding varieties, bred and introduced by ICARDA, to grow crops in traditional rainfed highland areas and heat-tolerant, high-yielding wheat varieties to expand wheat production in irrigated lowland areas.

The Government of Ethiopia established a high-level committee among its Agricultural, Finance, Trade and Industry, and Water and Irrigation Ministries, and expanded the wider adoption of new methodologies, significantly improving water resource management. More women and youths were reached through the establishment of business centers that promote rural entrepreneurship, and access to credit facilities for inputs (seed, fertilizers, and agrochemicals) for both smallholder and large-scale farmers was improved.

About 21,000 ha of wheat is now being cultivated under irrigation in three river basins within

programs spearheaded by the Government of Ethiopia. Moreover, new partnerships with large-scale cotton farms were established and expectations are for a bumper crop harvest with yields expected to reach 6 t ha^{-1}. At an estimated average yield of 4 t ha^{-1}, a total wheat production of 84,000 metric tons is expected, which, at the projected conservative price of US$250, can save Ethiopia about US$21 million.

Irrigated wheat production in lower Awash, Afar Region, Ethiopia

Irrigated wheat production in Gezira Scheme, Sudan

For more information visit the link

Izzat Tahir, ARC, Wad Medani, Sudan; email: izzatahir@yahoo.com; *Tolessa Debele, EIAR, Addis Ababa, Ethiopia;* email: tolessadebele@yahoo.com; *Zewdie Bishaw, ICARDA, Addis Ababa, Ethiopia; email:* z.bishaw@cgiar.org; and *Wuletaw Tadesse, ICARDA, Rabat, Morocco; email:* w.tadesse@cgiar.org

News and Views

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

Gene Editing—Opportunities and Concerns

Technological developments during the past decade are now fueling an old debate in food and agriculture. The CRISPR technologies have made gene editing so much easier than older technologies, such as ODM or Talen, that targeted mutagenesis is in reach of plant breeders. This will not replace conventional plant breeding, but it enlarges the toolbox for breeders to more effectively and efficiently develop new varieties for a wide range of farmers.

Mutagenesis in history

Random mutagenesis using chemical or physical treatments has been widely used in breeding since the 1940s. These treatments mimic the natural occurrence of mutation, which is one of the main drivers of evolution—next to recombination and natural selection leading to the survival of the fittest. Mutations are small heritable changes in the DNA or RNA, which may alter, delete, or enhance the expression of characteristics in living organisms. Selecting useful variants commonly requires detailed observations on large numbers of plants grown from treated cells or tissues. The randomness of such mutations has always been a major bottleneck in the application of mutagenesis in breeding.

Based on a natural mechanism of bacterial cells to identify and kill invading viruses, scientists have developed a way to target a very particular location of a DNA-molecule and alter it in a prescribed way. The simplest is just cutting the (double stranded) DNA and let the cell repair the cut using its natural mechanism. Such repairs are commonly not perfect and often result in smaller or larger changes. Such mutations may be useful, for example when it results in a new allele of a disease resistance, or they may 'silence' the gene completely, which may turn out to be useful if the gene codes for a negative trait.

The second application is to leave less to chance. The scissors that cut the DNA are accompanied by a template for the repair. This means that a very accurate small change can be created in the cell. Such new diversity can be extremely useful. Such uses are also very useful to investigate the functioning of the gene, which provides knowledge that can also be used in conventional breeding. Both these uses of gene editing are called targeted mutagenesis.

Thirdly, CRISPR techniques can also be used to replace a complete gene with one from a different species. This is basically the same as traditional

genetic transformation with the exception that the new gene is now introduced at a predetermined location.

Modification or mutation?

This technological development has spurred various debates. First, there are the ethical discussions about whether mankind is allowed to 'violate the integrity of the cell' and change DNA, the basic structure of life. Such discussions occur in genetic research on human and animal cells, but also on plants, notably within religious and some organic agriculture circles.

The next question is whether this is genetic modification, and then whether safety rules should apply to the products of such gene editing. This relates to hazards that may be expected, including the unintended effects of the edits. Studies indicate that random mutagenesis does not create risks that are additional to those of cross breeding or random mutagenesis using chemicals or irradiation. However, it is clear that less unintended changes may occur. Different countries, including the EU, still struggle with the legal definition of genetic modification, with the result that currently gene-edited crops cannot be grown without presenting the extensive safety dossiers needed for the release of transgenic genetically modified organisms (GMOs).

There are also general worries in parts of society about technology in general, such as the 5G network to make the Internet quicker, and especially technology applied to food. Consumers have never been well informed concerning all the technologies used in breeding such as embryo-rescue, male sterility to produce hybrids, and interspecific crosses. Scientists in white laboratory coats presenting the marvelous benefits of gene editing do not match their perception of the 'naturalness' of food.

Finally, opposition to conventional GMOs has been largely related to concerns about the multinational companies and their use of modification technology in creating herbicide tolerance. Genetic transformation is a quite expensive technique and the added cost of the safety regulations, which runs into many millions of dollars, indeed led to the use of the technology only by globally active companies on globally important crops like maize, soybean, and cotton. Patenting of the technologies and the resulting traits may have contributed to this.

Political choices

This socioeconomic argument does not need to apply to gene editing. The technology is inherently less complicated than transformation, even though there needs to be a solid genomic knowledge of the crop before it can be applied. Nonetheless, it is important that access can be obtained to the various necessary patented technologies. However, when the products of random mutagenesis are treated as GMOs, including the required safety regulations, then the same will happen as with transgenics—public research and smaller breeders will not be able to use the technology to create new varieties that have a higher resource use efficiency, require less crop protection products to withstand pests and diseases, and that are more nutritious for consumers.

Politicians should make choices and create laws that restrict or guide the use of technology, and/or develop support mechanisms to facilitate their use. When they create rules, these should be implementable. Regulating gene editing has challenges in implementation because the products of gene editing can generally not be identified through tests from products of other types of mutation breeding.

Policy makers who are faced with the above debates in society about ethics and safety concerns should weigh these against the sustainability benefits that the technology can have. I am sure that such political consideration will lead to embracing the opportunities of the technology and to policies that make them accessible to a wide range of researchers and breeders.

Niels Louwaars, Plantum, Vossenburchkade 68, 2805 PC Gouda, Rotterdam, The Netherlands; email: n.louwaars@plantum.nl

COVID-19 and Functioning of Seed Systems

The COVID-19 pandemic, apart from its toll on human health, economics, and global and domestic trade, has brought unprecedented disruption to the agricultural sector and threatened the food and nutritional security of the most vulnerable population, particularly small-scale farmers across developing countries. Government lockdowns and social distancing measures have already serious disrupted labor availability and movement, local trade and markets, and transportation. COVID-19 is bringing new challenges in agricultural production systems, such as input supply chains (seeds, fertilizers, and agrochemicals), extension and advisory services, farm operations, transportation, and trade. Accordingly, there is a need to

emphasize the mobilizing of all available instruments, institutions, and stakeholders from both public and private sectors and civil society to ensure appropriate and timely responses.

Measures have been taken in response to COVID-19 from global to regional to national levels—a flurry of webinars on seed systems to immediate actions for a more robust approach for seed sector development. Here we provide a few highlights on these measures by an international group of experts and Wageningen University and Research.

Seed Security Response to COVID-19: Now and Beyond

The document on *Seed Security Response to COVID-19: Now and Beyond* focuses on critical seed security responses needed now (next 1–2 seasons) and those to build back better, more resilient seed systems (next 2–3 years). The document specifies priorities for action. It contains 10 immediate and four future recommendations and warns that ill-conceived interventions can have very negative impacts on farmers.

The Thinking Group guiding this statement (also reproduced below) included professionals with expertise in emergency, recovery, and developmental programming; as well as those working in the formal, intermediate, and informal seed sectors; and on central themes of storage, last mile delivery, and digital inclusion. Advice has been shared and debated as individuals, not as representatives of any institution.

Below is the Statement Summary of the document (for full statement you may visit the link).

COVID-19 brings new challenges worldwide, including to smallholder farmers and their seed systems. In response, an escalating number of seed projects are being planned to deliver immediate aid or to alter current seed production programs. This statement aims to steer both the immediate aid and more developmental planning toward wiser, better, and more informed practice—and to stop unproductive or even harmful decisions. Supporting farmers through seeds is a rational choice both in emergency and more normal situations. However, poorly designed seed interventions can do serious harm to farmers' immediate food security and commercial markets. A diversity of seed systems provides the necessary channels for farmers to sustainably access seeds. Seed assistance, aid and development, should proceed only if there is evidence of seed insecurity, whether due to availability, access, or quality. Constraint identification informs the set of intervention options that could support seed systems in the short run, and not counter longer-term system sustainability; hence, seed system security assessments are obligatory not optional. Direct seed distribution (emergency seed provision) is a last option and needs to respect a clear set of elements, including the range of crop seeds to be supplied, varietal characteristics, and seed quality options. Flexibility and choice must be built into seed intervention design so that farmers can respond rapidly and effectively to fluctuating circumstances. Seed assistance should integrate feedback and feedforward systems. More generally, information and communication technology systems to shape remote assessments and information sharing need to become more strategic and operate at scale. Seed system strengthening and resilience building is best achieved through sustained support over time. The current document identifies priorities for funding and action for the next two seasons (now) and several years beyond.

Comments, detailed feedback, or alternative opinions are very welcome. For your comments and more information, you may contact: Louise Sperling, SeedSystem at email sperling@seedsystem.org.

Rapid Assessments Reveal the Threat of COVID-19 to and the Resilience of the Seed Sector

Wageningen University and Research, in collaboration with its partners in Ethiopia, Myanmar, Nigeria, and Uganda, has been conducting rapid assessments of the impacts of COVID-19 on the seed sector. "We are deeply concerned about the impact of the pandemic on people's health and lives, and on its disruption to the economy and society. The resilience of the seed sector and its contribution to securing food and nutrition security is at stake," exclaims the project's leader, Dr Walter de Boef of the Wageningen Centre for Development Innovation (WCDI), a part of Wageningen University and Research. A synthesis of 11 lessons from across these four countries has been shared for low- and middle-income countries elsewhere that are looking to avoid a food crisis in quick succession to the public health crisis currently faced. The synthesis can be read here link. Below we present the assessment made in Ethiopia.

Ethiopia

In Ethiopia, leading the effort is a program on Integrated Seed Sector Development (ISSD Ethiopia)—a partnership of Bahir Dar University, Haramaya University, Hawassa University, Mekelle University, Oromia Seed Enterprise, and WCDI, working in close collaboration with the Ministry of Agriculture and many others. Part of

the Bilateral Ethiopian–Netherlands Effort for Food, Income and Trade (BENEFIT) partnership, ISSD Ethiopia looks to transform the seed sector; raising its performance in contributing to food, income, and trade in Ethiopia. The program's manager, Dr Amsalu Ayana, has been leading the country's rapid assessments resulting in the Seed Alerts published in May and June. Dr Amsalu explains that, "Seed Alerts highlight the need for practical and immediate action in the seed sector to ensure continuity in its performance and overcome the disruptions posed by the pandemic and our response to it." Seed Alerts for the months of May and June, can be obtained here: Seed Alerts.

Disruptions in the processes of variety release and registration; in seed processing, testing, and distribution; and in the supply of EGS, other inputs, and labor to seed producers as a result of mobility restrictions have been cited in the May and June Seed Alerts for Ethiopia as major concerns for the sector.

At the time of writing, the second Seed Alert for Ethiopia, the National Variety Release Committee had not yet met nor received summary of the technical reports on candidate varieties for release. "If the process for the release and registration of varieties is not concluded in June, farmers' access to new and better-performing candidate varieties of rainfed crops such as maize, sorghum, and potato will be delayed by one year," reports Dr Amsalu.

This has a knock-on effect for the research organizations and breeding companies responsible for developing these varieties. Prior to release, they will be unable to multiply EGS or carry out pre-extension demonstration for the popularization of their varieties. This means that farmers are unlikely to benefit from advances in crop improvement for a few more seasons to come.

Dashboards

Where impact is felt the hardest can be seen at a glance on the country's dashboard. The dashboard for Seed Alert #2, published in June, shows the change from the previous month. "Seed sector activities are seasonal and time-dependent," reiterates de Boef, "they take place in farmers' and companies' fields and involve many interactions of stakeholders and market transactions." The dashboards of the different countries show how dynamic the situation is, or, on the contrary, how persistent some problems are, if considering the cases of the Nigeria and Uganda respectively. "Countries are at a different stage of their agricultural season, which makes the data highly contextual, but also interesting for getting a glimpse into the future," says Gareth Borman, a colleague of de Boef at WCDI. "That being said, dashboards are not meant to monitor progress, they serve as a barometer for the crisis and an indicator for where urgent action is needed," he continues. Nevertheless, lessons are offered from one country to another.

Derived from a panel of local experts

Via mobile and web-based applications, a panel of 40+ local experts completes the rapid assessment survey and the results are generated automatically. These are processed into draft alerts and input for two crop-specific focus group discussions where practical actions are recommended.

Recommendations, and the stakeholders best positioned to drive their action, are proposed to and confirmed by senior leadership in the sector. All meetings are conducted virtually using (video)conferencing software and the entire process from survey to publication of the Seed Alert is completed within seven working days. "Quick turnaround is essential," concludes de Boef, "We kept the time short between the survey, Focused Group Discussions, and publication of the 'Seed Alert', as we were operating in a time of urgency." Conditions in terms of the pandemic, government measures, and people's responses are continuously changing, making the relevance of recommendations highly time sensitive. This is one of the 11 lessons learned.

Guiding sector transformation

Another of the 11 lessons shared in the synthesis document is that the assessments consider not only the issues that impact the current season, but that they also look at how the crisis will affect seed sector functions and access to quality seed in the future. The resilience of the seed sector has been shown here by the vulnerability of its activities to the unfolding circumstances of the crisis caused by the pandemic. "Although this calls for immediate action, we must not lose sight of where we are headed," proposes Borman, "If anything this is a lesson in preparedness and may well be reason for considering structural reforms to how the sector operates." ISSD Ethiopia and its sister programs in Myanmar and Uganda work toward the transformation of the seed sector in these countries. A recent video captures the effort in Ethiopia along with its conclusions for policy making and programing. The video can be watched here.

Amsalu Ayana, ISSD, BENFIT, Addis Ababa, Ethiopia; email: aga.amsaluayana@gmail.com; *and Gareth, WCDI, Wageningen, Netherlands; email*: gareth.borman@wur.nl

CORAF Adjusting Priorities to Tackle COVID-19

In response to a recent call by the Economic Community of West African States (ECOWAS) and West African Ministers of Agriculture and Food, CORAF is making considerable tweaks to its programmatic priorities to support smallholder farmers, seed businesses, and seed cooperatives that are being increasingly hurt by COVID-19.

Vulnerable farmers, businesses, and decision-makers are central to the CORAF COVID-19 Emergency Seed Support Initiative. With the help of national seed systems in ECOWAS-member countries, the CORAF intervention would be implemented through an online system. The digital system will garner, store, and disseminate critical seed-related information on the availability of breeder, foundation, and certified seeds in each country, access points, accessibility, quality, traceability, and market related information.

Individual countries have adopted stringent measures in attempts to contain COVID-19. These range from partial or total containment of populations, limiting the mobility of people, closing borders, and closing urban, peri-urban, and rural markets, thus disrupting the food supply and demand chain.

"While these measures have had positive effects on slowing down the spread of COVID-19, the unintended consequences have included an increase in prices for basic commodities, inadequate access to food for vulnerable people, a drastic drop in the marketing of perishable products, higher transport costs, difficult access to seeds, fertilizers, plant protection products, and rarefaction and high cost of agricultural labor," says His Excellency Sekou Sangare, the ECOWAS Commissioner of Agriculture, Environment, and Water Resources.

Stemming the Hunger Crisis Lurking on the Horizon

With its track record of delivering on quality seeds, CORAF has developed this emergency measure, which primarily ensures there is updated information on the availability of breeder, foundation, and certified seeds. The system will contain information on the available quantity, where it is found, with what businesses or cooperatives, and the challenges of taking them to the market or where there is demand. The overarching objective is to stem the hunger crisis lurking on the horizon.

More than 15 million people were already affected by the difficult food situation, according to the Food Crisis Prevention Network (RPCA), an initiative of the Sahel and West Africa Club. Even before COVID-19, the food system in West Africa was affected by a challenging climate, a security crisis, the fall armyworm, and locust attack.

This figure could, in a context without COVID-19, exceed 17 million people during the period of June–August 2020, according to the RPCA data.

The RPCA comprises the leading players in the West African food and nutrition system. It tracks the food and nutrition situation in West Africa, the Sahel, and Cameroon and publishes critical information for decision making and action by policymakers and program implementers as well as the private sector.

What is in CORAF's Intervention?

CORAF's intervention is designed to effectively link quality seed producers with farmers desiring such seeds by developing an up-to-date information system on seed systems.

The system will not only enhance farmers' access to improved quality seeds and planting material but also help farmers better understand the impact of COVID-19 crisis on lives and livelihoods.

The information will initially involve cereals such as maize, rice, sorghum, millet, cowpea, and groundnut and is to be expanded to roots and tubers like cassava, yam, and potatoes.

The emergency seed and planting materials support initiative will cover all 15 ECOWAS countries, plus Chad and Mauritania. It will be aligned with and complement the products designed for the West Africa COVID-19 Fertilizer Watch led by the International Fertilizer Development Center (IFDC).

This COVID-19 response is to ensure that there are no restrictions on the imports, distribution, and use of quality seeds by farmers, producers, and other users. The ultimate goal is to strengthen the resilience of the sub-region's agricultural system and to prevent a food crisis.

"Early generation and certified seeds should not be banned or subject to any restriction on their production, distribution, and use by producers during the duration of the pandemic and beyond," says Dr. Yacouba Diallo, a seed expert with decades of experience on the seed sector in West Africa.

IFDC is already serving farmers, producers, decision-makers, and other key actors with critical

information on fertilizers. CORAF intends to work in close collaboration with other input actors to ensure the integrated delivery of inputs.

The Partnership for Agricultural Research, Education and Development, a quality seed delivery intervention led by CORAF and funded by USAID West Africa, will be responsible for data collection, clearance, and dissemination to farmers, seed businesses, government officers, and other key partners.

Source: CORAF This Month April 24, 2020

Improving Farmer Productivity Through a Sustainable Private Sector Seed System

Soybean is a growing global commodity crop with strong demand due to its use as an edible oil and as a key ingredient in animal feeds. Farmer yields in sub-Saharan Africa are one-third the average yields worldwide. One reason is the limited quantity and poor quality of soybean varieties available to farmers. Public sector breeders struggle due to lack of resources and are unable to release improved and locally adapted varieties on a regular basis. Private sector breeders do not develop new varieties because they lack intellectual property protection.

In many African countries, there have been no new varieties released in over 10 years despite there being active breeding efforts in nearby countries. To increase access to high-yielding varieties, the Soybean Innovation Lab (SIL), together with partners at the Syngenta Foundation for Sustainable Agriculture, the International Institute of Tropical Agriculture), and the African Agricultural Technology Foundation, initiated the Pan-African Soybean Variety Trials (PATs) (Figure 1).

Pan-African soybean variety trials

The SIL's PATs fast-track the introduction and testing of commercial soybean varieties sourced from across Africa, USA, Australia, and Latin America to provide the private sector, farmers, and processors with access to a broader selection of varieties than currently available. The program consortium leverages its role as an independent third party and its unique access to international, regional, and national supplies of high-yielding and disease-resistant germplasm to swiftly bring new varieties to market.

Four high-performing soybean varieties have already been registered and are accessible to farmers in Uganda and Ghana as a result of the research and findings from the PATs. An additional 27 soybean varieties are in the process of being registered in Cameroon, Ethiopia, Kenya, Malawi, Nigeria, and Zambia. Local seed producers now have access to multiple varieties for registration, multiplication, and commercialization, rather than just one or two old national varieties.

Figure 1. Pan-African Soybean Variety Trials (PATs) in sub-Saharan Africa.
Note: PATs started in 2016 with four countries and have grown to 17 countries across 80 locations with 46 public and private sector partners

Partnership among breeders and seed companies

Breeders and seed companies understand that seed contracts and royalties are central to commercialization. Public breeders now see a new revenue source for their breeding programs. Private breeders see new markets, and a low-cost way to enter these new markets. Local seed producers see a way forward to improve farmer productivity. This three-part incentive-based structure of PATs is enabling countries across sub-Saharan Africa to shift away from seed-saving practices and toward a sustainable private sector seed system that will drive development of the soybean sector (Figure 2). This incentive-based system will lead to higher yields, profitable soybean production, and reduced poverty and hunger across the African continent.

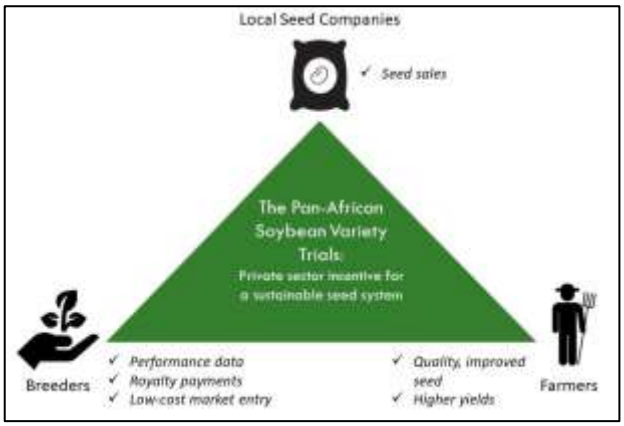


Figure 2. SIL's PATs provide a three-part incentive system for breeders, seed companies, and farmers
Note: The three-way partnership will drive soybean development across the value chain in sub-Saharan Africa.

However, it is important to note that this incentive system will not work if farmers continue to save seed, as this practice reduces the incentives for

breeders and seed producers. Brown bagging, or the process of seed companies producing and selling seed without a license, will also reduce incentives. In order to maintain a sustainable seed system in sub-Saharan Africa, licensing agreements and royalty payments are critical. Local seed companies and distributors must communicate with farmers the importance of paying royalties and will need to manage collection. Without royalty payments, breeders have no incentive to invest in bringing new and improved varieties to market. As long as breeders, seed companies, and farmers continue to benefit from this three-part incentive-based structure, high-performing varieties will become available.

Michelle da Fonseca Santos, Soybean Innovation Lab, 164 National Soybean Research Center, University of Illinois at Urbana-Champaign, 217-300-8975, USA; email: mdfsanto@illinois.edu

Revolving the Seeds and Diffusing the Beans: Reviving Faba Bean Cultivation in Ethiopian Highlands

Despite reports of continued increase in area, productivity, and production of faba bean, its cultivation has confronted many challenges over the past two decades at the country level in general and particularly in the Amhara region. The main production constraints are the introduction of a parasitic weed (*Orobanche crenata*) and newly emerging disease such as faba bean gall (*Olpidium viciae*) in central and northern Ethiopia.

ICARDA in collaboration with national agricultural research system (NARS) partners and development practitioners has implemented projects supported by the Austrian Development Agency during 2012–2013 and USAID (US) during 2014–2018. The former addressed the critical constraints in yield gaps and the latter focused on scaling of improved technologies of faba bean.

The Sirinka Agricultural Research Center (SrARC) and ICARDA have been undertaking scaling of new and existing improved faba bean varieties and integrated crop management technologies in collaboration with the Bureaus of Agriculture (BoAs) at zonal (district) levels and *kebeles* (lowest administrative unit) in South and North Wollo Administrative Zones.

Wereilu district

Participatory variety selection (PVS) initiated by SrARC and ICARDA identified locally adapted and farmer preferred faba bean varieties. However, availability and access to quality seed remain a major constraint. The preliminary scaling work of faba bean variety Walki (from ICARDA) was initiated on 8 ha at Kabe *kebele* in Wereilu district during 2015/2016. Faba bean cultivation has reached full-scale expansion and has been implemented on a total area of 1,200 ha, reaching an estimated 10,000 households (or 60,000 household members) in the 2018/2019 crop season.

Farmers harvested a yield of up to 4 t ha^{-1} with an estimated total production of 4,800 metric tons. If only 2,400 metric tons (50 percent) is used as seed for scaling it is enough to plant 12,000 ha in the 2020/2021 cropping season and it may reach about 100,000 households (500,000 household members). The district is already assisting in scaling the technology to the neighboring districts as a source of technology and experience sharing. The spill-over effect is expected to greatly increase faba bean production over the coming years.

Faba bean production fields at Kabe village in Wereilu district during 2019 cropping season

Kutaber district

Kutaber, a very rugged district in South Wollo Zone, is one district where farmers were robbed of their livelihoods due to orobanche infestation. People below the age of 20 years have never seen a standing faba bean crop in their entire life according to Seid Abebe, a nodal farmer who singlehandedly played a key role in spreading a newly released orobanche-tolerant faba bean variety Hashenge originated from ICARDA and directly released by Alemata ARC of Tigray Agricultural Research Institute in 2015. A single plot and a single farmer were the beginning of the project, and today the variety is spreading like wildfire jumping the gorgeous but distant valleys (picture below) in all its 21 *kebeles*, each with an average of 1,500 households that have each planted part of their plot to the new faba bean variety. In some villages there are more faba bean fields than cereal crops such as wheat or teff. The variety was also distributed to the adjoining districts of Ambasel, Dessie Zuria, Mekdella, and Tenta

through informal exchange (direct sale of seed), BoA, Wollo University, and NGOs working on scaling improved technologies with major spill-over effects.

A gorgeous, but treacherous valley where faba bean production is spreading at Haroye and surrounding villages in Kutaber district

Seed system innovations

Small seed pack distribution coupled with a revolving seed fund scheme played a significant role in this endeavor. Farmers were mobilized, trained, and provided with source seed of improved faba bean varieties for seed production and marketing with technical backstopping from the agricultural research centers and district offices of agriculture. Farmers return the seed in kind for further scaling of the technology by the district agricultural office while they are free to save or sell part of the seed directly to other farmers, public seed enterprises, or development practitioners operating in the locality after the seed is inspected and certified by the regional seed quality control agency.

Organizing these farmers into seed producer cooperatives and linking them with seed unions is the next step, which has already shown very good results elsewhere in the country for similar or other crops. This ensures continuity and sustainability and creates a sense of independence and self-reliance in the farmers.

Promoting the technology

As part of promoting the technology and continuity of project activities, a field day was organized on October 19, 2019, by SrARC in collaboration with South Wollo Zone BoA and Wereilu district Office of Agriculture, in Wereillu district of South Wollo Zone. The field day was attended by the Head of BoA of Amhara Region, Heads of zonal and district BoAs in South and North Wollo Zones, development agents, technical staff from partners and stakeholders, and above all by farmers from the same and neighboring districts.

Farmers involved in the scaling work were pleased with the technology and said they were very grateful that the SrARC and ICARDA, working with the BoAs at all levels, had enabled the resurrection of faba bean production, which had almost disappeared in all districts. Field day participants and farmers were impressed with the performance of the new improved crop technologies and all agreed to continue adopting and promoting them.

Dr Meles Mekonnen, Head of BoA of Amhara Regional State thanked SrARC and the BoA of South Wollo Zone and Office of Agriculture of Wereilu district and expressed his appreciation for the exemplary work they had done, and the achievements so far. He assured that his office would provide all the necessary support for such problem-solving work at the grassroots levels. He thanked the agriculture extension agents in the South Wollo Zone, the SrARC, ICARDA, as well as the participating farmers who had trust in the new technologies and were adopting and diffusing them.

Dr Zewdie Bishaw, Principal Coordinator of the USAID Project at ICARDA, said that “Many observers quite often question the continuity and sustainability of project activities once they are completed. However, having the right technology solving the constraints faced by farmers and having the right partners from agricultural research and development practitioners remains critical in transferring the technology and transforming the production system, which we have now witnessed.”

Dr Adamu Molla, formerly a National Project Coordinator of the USAID project at ICARDA, invoked the adage that “helping farmers to help themselves” is the best way of transferring technologies with significant outcomes. Farmers were provided with quality seed of improved varieties and organized and trained to produce and provide the seed for their members and the community at large. “Seeing is believing, and the technology spread like a wildfire within the communities and adjoining districts.”

Mr Abebe, a nodal farmer who is a key for scaling of Hashenge variety in Kutaber and adjoining districts, heard an elderly man of 92 years from the village who quipped that “I am glad and happy to see the faba bean crop in the field in our village before I die.” This invokes emotions which cannot be explained in words by farmers for whom farming is part of their culture and livelihood.

Faba bean is a major source of protein ensuring nutritional security and income for farming families, especially in the highlands, while enriching the soil by fixing atmospheric nitrogen, improving soil fertility and health, and reducing production costs for farmers. This crop makes significant contributions to integrated management of soil fertility and sustainable farming systems.

Development partners and stakeholders working on agriculture can help farmers benefit from these multidimensional crops and maximize their potential contribution to the regional and national economy, through provision of seeds, other inputs and other services such as training, credits, and market linkages.

For more information visit the link

Zewdie Bishaw, ICARDA, Ethiopia; email: z.bishaw@cgiar.org; *Adamu Molla, DBARC, Debere Birhan, Ethiopia; email*: adamu_molla@yahoo.com; and *Akalu Gebru, SARC, Woldia, Ethiopia; email*: akalgebru@gmail.com

Toolkits for the Seed Sector

In most smallholder farming systems, farmers save seed from the previous harvest to plant in the next season. They select seed from the best plants and then dry, clean, and store the seed in a safe place. These traditional seed-saving practices and farmers' sharing of seed are called the informal seed system, or the farmer/community-based seed system. They also add to their crop diversity with seed they obtain from social networks or purchase in local markets from agro-dealers or seed companies. Complementing this informal seed system is the formal seed system, which comprises public and private seed companies that develop varieties and produce high-quality seed of these new crop varieties.

The challenge for seed sector development, as elaborated in this toolkit, is how to address both the informal and formal seed systems so that farmers have access to a sustainable supply of quality seed of improved crop varieties that is affordable, meets their needs (for food, feed, and markets), is well adapted to their local agroecology, and adapted to climate change.

In March 2018, IFAD released a Toolkit on Seed Systems. This toolkit is a response to these concerns and sets out a process of analysis to provide guidance in project design to ensure the formulation of effective interventions to improve farmers' access to quality seed, to help them improve productivity and resilience, and respond to the challenges of climate change.

It consisted of three publications as follows:
The Teaser on supporting Small Farmer Seed Systems—an introduction to national seed systems and includes both the formal and information seed systems.

The How To Do Note on Small Farmer Seed Systems—provides tools for project design and implementation based on best practices collected at the field level. They guide teams on how to implement specific recommendations of IFAD's operational policies, standard project requirements, and financing tools.

Lessons Learned regarding Small Farmer Seed Systems—provides a compilation of past experiences relating to a particular topic and a reflection on evidence-based best practices and failures. Best practices refer to processes or methodologies that have been proven to produce good results and are thus recommended examples to be replicated.

For more details please visit the link.

Thomas Osborne, Rome, Italy; email: tao433@gmail.com

Redefinition and Harmonization in Biotech Regulation Necessary

Several regulatory frameworks are no longer applicable, thus there is a need to redefine regulatory approach for biotechnology to maximize its potential and benefits. This is according to Dr Markus Wyss, Strain Director of DSM Switzerland's Global Regulatory Affairs and Quality Management and one of the speakers in the ISAAA Webinar *Genome Editing 101: Healthcare and Industrial Applications and Regulations* held via Zoom on June 19, 2020.

He said, "The process-centric perspectives of the Cartagena Protocol and of many GMO regulatory frameworks are no longer fit for purpose. Now is the time for redefining our approach to biotechnology, to foster its potential in the best interest of society."

The webinar aimed to discuss the science behind genome editing, the various regulatory perspectives on genome editing, and current healthcare and industrial applications of genome editing. Aside from Dr. Wyss, the other resource speakers were

Dr. Nina Gloriani, Chair of the Vaccine Expert Panel at the Philippine Department of Science and Technology, and Dr. Martin Lema, Former Chair of the National Biosafety Commission in Argentina. Dr. Gloriani presented the various applications of CRISPR for medical and health applications, including updates in the medical interventions for genetic diseases, cancer, and viruses. Dr. Lema called for a harmonized regulation all over the world to overcome obstacles in diverging national regulatory definitions. ISAAA *SEAsia*Center Director Dr. Rhodora R. Aldemita served as the moderator of the discussions.

The free webinar, hosted by ISAAA *SEAsia*Center, reached approximately 5,214 individuals from 53 countries. Watch the replay on Youtube. The next ISAAA webinar will be held on July 3, 2020, to be hosted by ISAAA *Afri*Center. Subscribe to ISAAA.org to get updates on the upcoming ISAAA webinars.

Source: Crop Biotech Update June 14, 2020

Kenya Finally Commercializes Bt Cotton

After many years of waiting, Kenya has finally commenced commercial farming of Bt cotton, heralding a new dawn for cotton farmers in the country. The country planted its first Bt cotton seed in an unconfined and open field during a historic launch held at Alupe University, western Kenya. The country now becomes the seventh African country to commercialize the genetically modified (GM) cotton.

The planting marks the first of 1,000 on-farm demonstration plots to be planted in 23 counties for training at least 40,000 farmers prior to full commercial roll-out in the country. This latest development follows Cabinet approval for commercial farming of Bt cotton granted on December 19, 2019.

Speaking during the launch, Kenya's Agriculture Cabinet Secretary Peter Munya revealed that the Government targets having over 200,000 acres under commercial Bt cotton cultivation by 2022 creating over 25,000 jobs for Kenyans along the value chain. "These job opportunities will be in cultivation, processing, or trading in locally manufactured garments and clothes," said the Cabinet Secretary. "Cultivation of Bt cotton by our farmers will guarantee a constant supply of raw materials to ginneries and cotton processing industries thus supporting value addition and job creation up the value chain," he added.

The Government banks on Bt cotton commercialization to revive the textile and apparel industry and increase the contribution of the manufacturing sector to the country's GDP from the current 9.2 percent to 20 percent by 2022, a significant step in achieving the 'Big Four' Agenda, Kenya's economic development blueprint. The crop's commercial farming is a culmination of a process that started in 2001 when the first application to introduce Bt cotton was made. The first transgenic cotton in confined field trials was planted in 2004 and completed in 2010.

In September 2018, ISAAA *Afri*Center organized a study tour of India's Bt cotton program for Kenyan policy makers and other senior government officials from various regulatory and cotton value chain players. During the tour, the policy makers promised to fast-track the growing of the GM crop in the country.

The Bt cotton is currently planted in 15 countries globally covering an area of 24 million ha. The top three leading Bt cotton producers are India (11.6 million ha), USA (5.06 million ha), and China (2.93 million ha). Kenya is now the latest entrant joining South Africa, Sudan, Ethiopia, Malawi, Nigeria, and eSwatini in planting GM cotton in Africa.

For more information, contact Dr. Margaret Karembu at mkarembu@isaaa.org

Source: Crop Biotech Update March 11, 2020

Statement from World Seed Partnership

Global agriculture is expected to deliver on a formidable triple challenge:

- It must provide *food security*, by ensuring that healthy and nutritious food is available and affordable for the world population
- This needs to be done *sustainably*, by protecting and conserving the planet's resources: producing more food on the same amount of land while using less water and other resources
- It must also *generate incomes* and provide livelihoods to farmers worldwide as well as others in the food chain.

Agriculture must respond to these challenges while adapting to climate change and supporting mitigation efforts such as reduced emissions from farming practices and land-use-change. The development of new plant varieties that respond to the effects of climate change, with features such as disease resistance and drought, salt, and flood

tolerance combined with high yields and good eating quality, need to be combined with farmer access to good quality seed.

High-quality seed of new varieties has the potential to improve the sustainability and resilience of farming while raising income for farmers**.** These benefits will be passed on to consumers in the form of improved food security, greater choice, and affordability.

For many countries, agricultural development continues to be central to their wider development prospects. The agricultural sector's potential to drive economic growth, reduce poverty, provide food security, and deliver environmental services is also dependent on government policies and regulations that create and shape an enabling business environment.

The World Seed Partnership

The World Seed Partnership (WSP) aims to promote the development of a seed sector that addresses the challenges of food security, sustainability, and creating livelihoods at national and global levels.

The WSP is built on the principle that countries need innovation to ensure that all farmers have access to good quality seed of high-performing varieties. The WSP works to ensure that farmers have the seed and knowledge they need, that the needs of plant breeders and seed producers are understood and reflected in policies, and that governments have the information and tools they need to develop a regulatory framework that delivers a well-functioning and vibrant seed sector.

Each member of the WSP brings a specific set of skills to the broader challenge:
Organisation for Economic Cooperation and Development (OECD) Seed Schemes provide an international framework for agricultural seed trade by varietal certification, thereby increasing the availability of high-performing varieties.
International Union for the Protection of New Varieties of Plants (UPOV) provides and promotes an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society.
International Seed Testing Association (ISTA) is an international association that represents the seed quality sampling and testing organizations and laboratories at the world level, helping to ensure that the seeds sown by farmers are of the highest quality.
International Seed Federation (ISF) represents the interests of national seed associations and seed companies at a global level. ISF works in partnership with the individuals and organizations shaping the policies, treaties, conventions, and agreements that affect the seed industry, to ensure that the seed industry speaks with one voice.
World Farmers Organization provides access to the voice of food producers on the global scene, enhancing their relevance as economic, social, and environmental actors.

The WSP offers an entry point for countries, by providing them with guidance and expertise to develop a well-functioning seed sector, thereby enabling farmers to have access to high-quality seed of new plant varieties.

Source: *© 2020 International Seed Testing Association, Weekly Newsletter, April 29, 2020*

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

ISTA Concludes a Successful Virtual Ordinary General Meeting and Restarts Audits

Despite the challenges and risks at the beginning of 2020, ISTA succeeded in quickly adapting to the global situation and secure everyday work continues to function at its highest standard.

With its international character, ISTA managed to organize and successfully conclude its Ordinary General Meeting in May 2020 as well as to restart Accreditation Audits as of July 2020.

The 2020 ISTA Rules Session was held on May 19, 2020, in the form of a virtual meeting. This was the first time that such a format had been used to conduct the meeting and it concluded with successful and flawless proceedings!

A full recording of the process of updating ISTA Rules together with the 2020 edition presentation and discussion on the changes proposals by ISTA members have been posted on ISTA YouTube channel.

Furthermore, a recording of an ISTA Information Session held on May 28, 2020, is also available on the Association YouTube channel. This open webinar summarizes and reviews all the information given in the preparatory documents for the Ordinary General Meeting. Of 52 Designated Authorities, 48 cast their votes, which is an all-time high for ISTA.

After the break in performing ISTA Accreditation Audits due to COVID-19 restrictions and social distancing requirements, ISTA will restart auditing the member laboratories and sampling entities from July 2020.

The Accreditation Audits are to be performed in those countries or distinct economies where traveling is safe and not restricted and other specific requirements permit a secure process.

Yoana Uzunova, ISTA, Zuerichstrasse 50, 8303 Bassersdorf, Switzerland; email: yoana.uzunova@ista.ch

News from UPOV

UPOV membership

The purpose of the International Union for the Protection of New Varieties of Plants (UPOV) is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society. UPOV is an intergovernmental organization based in Geneva, with 76 members, covering 95 states.

The members of UPOV are (as of November 2019) two regional organizations (the African Intellectual Property Organization[1] and the European Union[2]) and 74 sovereign countries (see map below for June 2020).

COVID-19 measures for breeders (UPOV website)

In the context of the COVID-19 pandemic, UPOV has created a dedicated webpage (https://www.upov.int/about/en/covid19_measures.html)[3], with links to resources and measures to assist breeders in relation to plant variety protection matters.

In the context of measures to assist breeders during the COVID-19 situation, UPOV organized in May 2020 a special session of the UPOV DL-205 Course "Introduction to the UPOV System of Plant Variety Protection under the UPOV Convention" with a discounted rate for breeders, intellectual property managers, intellectual property agents, lawyers, and academics.

Organization of virtual UPOV meetings

In order to continue the work of UPOV's Technical Working Parties (TWPs) in the context of the COVID-19 situation, the following TWP sessions were successfully organized by electronic means:

- TWP for Vegetables, hosted by Brazil, May 11–15, 2020
- TWP for Ornamental Plants and Forest Trees, hosted by the Netherlands, June 8–12, 2020
- Technical Working Party for Agricultural Crops, hosted by Canada, June 22–26, 2020.

The following TWPs are also planned to be organized by electronic means:

- TWP for Fruit Crops, hosted by France, July 6–10, 2020
- Joint session of the TWP on Automation and Computer Programs and the Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular, hosted by the USA, September 21–25, 2020.

Meeting documents (including reports of the sessions) are available at: https://www.upov.int/meetings/en/topic.jsp

New version of UPOV PRISMA PBR Application Tool

UPOV PRISMA is an online tool to assist in making plant variety protection (PVP) applications to PVP Offices of participating UPOV members. UPOV PRISMA currently has 35 participating UPOV members, covering 74 countries (see http://www.upov.int/upovprisma/en/index.html).

The new version (Version 2.4) was released in the first quarter of 2020, with a new look and feel and a more intuitive layout, making it easier to navigate through the forms, as well as a direct communication tool to the UPOV PRISMA team.

The UPOV PRISMA fee is CHF 90 per PVP application made using UPOV PRISMA. This fee

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

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

[3] This webpage does not constitute the official source of information for COVID-19 pandemic matters for members of UPOV. To obtain further information on any specific measure or details on the status of plant variety protection matters, please contact the relevant authority of the UPOV member concerned at http://www.upov.int/members/en/pvp_offices.html

is in addition to the PVP application fee(s) for the UPOV member concerned (note: for the UK, the UPOV PRISMA fee is paid by the UK PVP Office).

Benefits of using UPOV PRISMA include (i) online service for PVP applications, (ii) 70+ countries covered, (iii) language choice to read forms, (iv) translation of predefined responses, (v) copying data to other applications, (vi) reminders for Novelty and Priority, (vii) finding all PVP Office procedures, and (viii) overview of all submissions.

PLUTO database

From November 2020, the PLUTO database will provide two levels of service:

- Free service: users will be able to search the PLUTO database and display results
- Premium service: there will be no restriction on the amount of data that can be downloaded, and users will have new features. The annual fee will be CHF 750. Users will be able to try the premium service for free during October 2020.

(Note: UPOV members and data contributors will have free access to all PLUTO database 'premium' features. Access to PLUTO data can also be granted in cases approved by UPOV members).

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

Benjamin Philippe Rivoire, UPOV, Zurich, Switzerland; email: ben.rivoire@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.

Promoting Commercial and Sustainable Supply of Early Generation Seed (EGS) of Food Crops

Farmers' access to quality seed of improved varieties is one of the basic steps to increase crop productivity and production. Among others it depends upon the pace that quality seeds and planting materials of newly developed, better performing, and more adapted varieties are multiplied and become available in the market. Promoting commercial and sustainable supply of EGS of food crops needs a joint public–private partnership solution in a systematic manner to overcome the bottleneck caused by inadequate supplies of high-quality EGS for diverse food crops.

Ethiopia's EGS production system and the broader seed sector are typical of the 'emergence stage' of seed sector development—low-scale seed supply with minimal competition from private sector production. Certified seed currently covers only ~8% of land in Ethiopia and supply of certified seed from Ethiopian Seed Enterprise and regional seed enterprises only meets ~60% of government targets. Production of and access to EGS have been identified as major bottlenecks in the national seed system, with available EGS mainly distributed in public institutions with private firms generally receiving <50% of EGS requested.

Ethiopia cannot transform its seed sector without improving EGS production and supply, thus discussions about the seed sector need to start with EGS. As part of this effort, a study was conducted to understand three main questions: (i) how to increase the production of EGS in Ethiopia? (ii) how to improve access to EGS for both private and public producers? and (iii) where and how to encourage private sector participation and partnership in EGS? The EGS demand and profitability of 15 different crops selected out of 20 demonstrated four market archetypes generally corresponding to more matured seed systems.

a. **Niche private sector**—Crops with niche market demand but are profitable to produce in certain quantities, which are produced by a vertically integrated private sector with minimal public involvement. A good example in this group is malt barley (industrial), and the critical conditions enabling this to operate follow:
   - Relax requirements needed to set up a seed company (both local and multinational) to attract more producers
   - Make land available for producers to achieve scale (for example, minimum ~15 ha required for operations to break even in pre-basic seed production)
   - Strong protection of intellectual property rights for varieties developed by the private sector
   - Strengthen linkages between public and private producers.

b. **Private sector potential**—Seed is attractive for private sector actors to produce for crops that the market demands, resulting in robust

private sector investment with little public sector involvement. Hybrid varieties like maize are a good example, and the critical enabling environment follows:

- Models selected to encourage the production of EGS by allowing private firms to be profitable, while limiting the amount of public support required in other stages of EGS production.

c. **Public sector dependent**—Crops are not highly desirable or profitable to produce but are required to advance food security or seed security; crops are non-industrial. Examples include teff, sorghum, haricot bean, chickpea, and sesame. Critical conditions for this group to function follow:
   - Public institutes have responsibility for breeder seed production to ensure supply
   - In the long term, seed companies with their own varieties should produce their own breeder seeds to supplement public supply.

d. **Public–private collaboration**—Crops have strong market demand but public involvement is needed as cost of production or demand risk creates barriers to private investment. Potato is one example in this category. An important condition for this group to function sustainably follows:
   - Public sector should produce breeder seed, both to ensure quality and to ensure compliance with seed regulations—cost of production is similar between public and private producers as differences are minimal for the small production volume.

Findings of EGS study can be further interpreted relevant to crop types. It comprises crops that are similar in terms of (a) seed system, (b) structure of seed value chain, (c) crop reproduction system, (hybrids, open- and cross-pollinated, and vegetatively propagated), and (d) economic viability (profitability) for EGS supply.

Yitbarek Semeane, ATA, Addis Ababa, Ethiopia; email: Yitbarek.Semeane@ata.gov.et

EGS Access and Legislative Support

In Ethiopia, the majority of crop varieties released are predominantly (above 85%) from public sector breeding programs. The Seed Proclamation 782/2013 (Article 6/1) and the "Ministerial Directive 2/2010 for issuance and administration of Competency of Certificate (COC)" (Article 22/1) guarantees equity in accessing EGS of public-bred crop varieties by all registered seed companies, public or private. However, the Seed Proclamation and COC directive do not give details on procedures to access EGS. Cognizant of this is the need for a directive that clearly addresses the administration of EGS (pre-basic and basic seed) production and distribution.

The administrative procedures for accessing public and private sector owned varieties require different approaches. Public-bred varieties may be freely available as national public goods whereas proprietary varieties from the private sector may have legal protection for their use. For public-bred varieties, any seed company with a COC and a trade license has the legal right to buy EGS unless the varieties are exclusively licensed to a specific company. Considering specificity of property right issues, the Ministry of Agriculture (MoA), in collaboration with its partners, developed a directive that administers the utilization of EGS of public-bred crop varieties. The scope of the directive is limited only to the public varieties developed by the federal and regional agricultural research institutes and higher learning institutions. The key objectives are to ensure proper planning of EGS production, equitable utilization of EGS, establish accountability in EGS production and a marketing system through contractual agreements, and to create a centrally governed information system.

To access EGS of public varieties, the directive urges three years of advance planning and contract agreement of the two parties. It also gives details in administration of contract agreement aimed at minimizing the roles of MoA and BoAs in EGS production and marketing. Accordingly, the role of government in EGS supply is always to ensure the availability of EGS of all crop varieties and forage species and manage market factors to ensure sufficient supply of EGS. The directive indicates strategic interventions in ensuring equity in EGS supply during shortage years through allocation and strategic seed reserve mechanisms. For some orphan crops, EGS production is also considered in the directive and gives the responsibility to public seed suppliers. Moreover, the directive enforces EGS supply to seed firms with COC only.

The other key focus of the directive is to enforce the promotion of newly released varieties by all seed companies that use public EGS. As a prerequisite to access EGS of the public sector, every user is expected to submit a promotion plan as a social obligation in utilization of public varieties. Each user is expected to allocate at least

0.5% of their annual net profit for popularization of newly released public varieties. Each promotion plan is evaluated and approved by regional BoAs for regionally registered seed companies and by the MoA for those registered at federal level.

The roles of MoA and regional BoAs are well stated in the directive, demarcating state roles in the directive to avoid any interruption due to unnecessary public intervention. At the federal level, the MoA is responsible for national coordination of EGS planning and contractual agreements, establishing a central EGS information management system, and ensuring implementation of the actions indicated in the directive through regular field monitoring and evaluation. The BoAs of regional states are responsible for EGS planning at the regional level based on the timeframe indicated in the directive, designing regional EGS sufficiency and an exit strategy (from dependency on the federal system) by creating a responsible unit for EGS, and allocating farmland and fulfilling other necessary capacities. Moreover, the directive elaborates respective roles of research institutions and EGS and certified seed producers.

The expected outcome of the directive will be to ensure smooth operation of contract agreement-based EGS production, installing a formal system to ensure all seed companies access EGS equally, minimize government intervention and expenses in facilitation of EGS supply, and ensure that signatory parties fulfil their obligation through administrative and legal procedures. The implementation of the directive primarily depends on the commitment of signatory parties of the contract agreement to enforce signed contracts according to administrative and legal procedures indicated in the directive. The MoA and regional BoAs with relevant development partners, should work to publicize the directive to stakeholders at large and conduct regular review, monitoring, and evaluation for its implementation and design possible amendments if any.

Tefera Zeray, ATA-MoA, Addis Ababa, Ethiopia; email: Tefera.Zeray@ata.gov.et

Demand-based EGS Production and Supply System Getting Foothold in Ethiopia

Availability of and access to EGS is perhaps the single most path limiting factor in seed production and supply in Ethiopia. This in return limits the possibility of exploiting benefits from the genetic gain of the crop improvement programs and hence realizing return on investment in crop research programs. The challenge primarily emanates from lack of clarity of roles and responsibilities among pertinent stakeholders regarding demand-based EGS production and supply systems.

In 2017, the federal MoA entrusted the ISSD program to facilitate the establishment of sustainable EGS production and supply system. First, the mandates of five agricultural research institutes (EIAR, OARI, ARARI, SARI, and TARI) and four public seed enterprises (ESE, OSE, ASE, and SSE) have been reviewed and analyzed with regard to the multiplication of the four classes of seeds: breeder seed, pre-basic, basic, and certified. Second, a series of stakeholder consultation workshops were conducted to establish clarity on roles and responsibilities concerning who is accountable for the multiplication of a particular seed class.

Consensus has been built that breeder seed needs to be multiplied and maintained by the breeder at the research center where the variety is developed, released, and maintained. The pre-basic seed is to be multiplied by the technology multiplication directorates of EIAR, OARI, ARARI, SARI, and TARI. The basic seed is to be multiplied by the four public seed enterprises. Seed producers (public, private, and cooperative/unions) are responsible for certified seed production. Third, in all cases, agreement has been reached that multiplication of a particular class of seed is based on demand, in which two parties sign a contract.

This demand-based EGS production and supply system was piloted during the 2018–2020 cropping seasons. The achievements are encouraging, immensely increasing the volume of and access to quality EGS supply of diverse varieties of many crops. Hence, institutionalization guidelines are under development, including the possibility of private sector participation in EGS production and supply.

Amsalu Ayana, ISSD-BENEFIT, Addis Ababa, Ethiopia; email: aga.amsaluayana@gmail.com

Highlights from the Pakistan Seed Sector

The national seed industry in Pakistan has passed through several developmental phases. In 1976, a ‘Seed Industry Project’ was launched through World Bank assistance and this led to promulgation of the Seed Act 1976 and establishment of the Federal Seed Certification Department (FSCD), National Seed Registration Department (NSRD), National/Provincial Seed Councils (N/PSCs), and two independent public seed corporations in Punjab and Sindh provinces. Drastic amendments to the

Seed Act, 1976 were made through the Seed (Amendment) Act, 2015, legally allowing the induction of a private seed sector, new designation of FSCD as the Federal Seed Certification and Registration Department (FSCRD), granting permission for accredited seed testing laboratories in the private sector, integrating the procedure of registration of genetically modified crop varieties into the seed system, and enhancing penalties and punishments for Seed Act violations. Amendments in the Seed Act have been complemented by the promulgation of the Plant Breeders' Rights Act, 2016. The PBR Rules were notified in 2018 and the PBR Registry established in 2019.

State of the private sector

In 1994, the Government declared the seed business as an industry and allowed concessions comparable with other industries. Declaration of seed industry spurred seed activities in the private sector and within 13 years, 665 seed companies including five multinationals were engaged in the seed business in 2007.

The private sector continues to grow in strength and now has a predominant role in agricultural production. To date, the Seed Association of Pakistan (SAP) has 170 regular members and is represented at national and international forums. The SAP is a member of the International Seed Federation (ISF), the Asia Pacific Seed Association (APSA), and the Economic Cooperation Organization Seed Association. Two seed companies are associate members of ISF and 34 seed companies are members of APSA. Pakistan is a member of the International Seed Testing Association (ISTA). The Central Seed Testing Laboratory of FSCRD became an accredited member laboratory of ISTA in July 2019. However, Pakistan is yet to join the OECD Seed Scheme.

In Pakistan, the PSCs that approve new crop varieties for commercial cultivation in respective provinces also represent private seed companies. The private sector is also represented in some professional federal seed forums like the Federal Seed Committee, the Federal Seed Registration Committee, the Variety Evaluation Committee (VEC), and the Working Group of the Ministry of National Food Security and Research, which grants permission for seed businesses in the country. These federal representatives of the private sector are ensured through the Seed (Amendment) Act, 2015, and the Seed (Business Regulation) Rules, 2016.

To facilitate the private sector for seed trade, the new clause in amended rules provided for listings of varieties and hybrids of locally developed or imported crops such as vegetables, flowers, ornamentals, fodder or forages, grasses, forest tree seeds, and medicinal herbs. A subcommittee of the VEC, which includes representatives from seed importers, will evaluate the imported consignments and would recommend on behalf of national VEC for enlisting and general cultivation. This subcommittee is chaired by respective Director of FSCRD. The present state of the public and private seed companies is presented in Table 1.

Table 1. Provincial distribution of seed companies in Pakistan

Provinces	**PSCs**	**NSCs**	**MNCs**	**Total**
Punjab	1	802	4	807
Sindh	1	134	1	136
KP	1	39		40
GB		3		3
ICT		2		2
Baluchistan	1	6		7
Total	**4**	**986**	**5**	**995**

Note: PSCs, public seed corporations; NSCs, national seed companies (private); MNCs, multinational seed companies (private); KP, Khyber Pakhtunkhwa; GB, Gilgit-Baltistan; ICT, Islamabad Capital Territory. About 248 (203 in Punjab, 37 in Sindh, 5 in KP, and 3 in Baluchistan) seed companies remain inactive and their licenses have been canceled. Source: FSCRD, April 2019

Contribution of private sector

During 2018–2019, the contributions by seed sectors (Table 2) reveals that the private sector plays a crucial role in Pakistan's agricultural production, aligned to sustainable development goals in increasing productivity through introduction of superior hybrids of maize, vegetables (such as tomato, cauliflower, cabbage, turnip, radish, persimmon, chilies, water melon, and musk melon), canola, sunflower, and fodders/forages.

Table 2. Area cultivated, seed required, and seed availability 2018–2019

Crop	Area ('000 ha)	Total seed required (metric tons)	Availability of seed (metric tons)				
			Public	Private	Import	Total	Total requirement (%)
Wheat	8,833	1,090,925	53,495	310,474	0	363,969	33
Rice	2,879	42,393	5,211	67,356	9,947	82,515	182
Maize	1,328	39,831	864	2,339	18,901	22,104	53
Pulses	1,185	42,674	45	926		971	2
Oilseeds	830	10,790	5	259	297	562	5
Potato	166	415,000			4,735	4,735	1
Vegetables	280	8,400	105	5,289	5,681	11,075	132
Fodder	2,038	61,140	23	27,136	50,506	77,665	127
Cotton	2,895	57,205	1,464	63,294	-	64,759	113
Total	**20,435**	**1,768,358**	**61,213**	**477,073**	**90,067**	**628,353**	**36**
%			3	27	5	35	

Note: Total requirement (%) refers to available seed compared to potential demand based on area cultivated. All imported seed is by the private sector. For rice and vegetables, the area is constantly shifting and data regarding actual sowing area may not be accurate.

The public sector has also initiated hybrid seed development, and hybrid maize is being offered for sale through the Punjab Seed Corporation. Similarly, tomato hybrids have been developed and a mechanism for commercial distribution was developed through mutually agreed terms with the private sector.

Seed Import

Unfortunately, the national seed import bill is increasing on a yearly basis (Table 3), which is of great concern to the Government and policy makers. In order to encourage the private sector through promulgation of plant breeders' rights and other clauses in the Seed (Amendment) Act, 2015, and subsequent regulations, the private sector may take the initiative in local hybrid seed production through contracts with foreign seed companies. To date, this has only involved a few seed companies such as Suhale Gujranwala (producing watermelon hybrids) and Asia Yuksel at Mamon Kanju (Faisalabad) in a joint venture with Yuksel Seed Company from Turkey. This company breeds, produces, and markets hybrid seeds of cucumber, tomato, sweet peppers, hot peppers, melon, seeded and seedless watermelon, bitter gourd, squash, cucumber cucurbit root stocks, and sweet corn. The company also plans to produce seed of onion, carrots, okra, and potato.

Table 3. Amount and value of seed imported in Pakistan

Crop	2016–2017		2017–2018	
	Quantity (metric tons)	Value (million rupees)	Quantity (metric tons)	Value (million rupees)
Vegetables	9,149	5,104	11,681	5,373
Corn	16,145	5,594	16,653	6,669
Paddy	5,299	2,195	8,907	3873
Alfalfa	744	260	727	324
Berseem	11,761	1,951	15,569	2,290
Sorghum	19,495	1,280	17,293	1,184
Grass	111	77	147	87
Millets	4,376	422	4,520	439
Canola	42	68	35	28
Sunflower	58	35	112	59
Potato	6,837	682	7,126	1,771
Total	**74,016**	**17,669**	**82,787**	**22,099**

Akhlaq Hussein, Islamabad, Pakistan; email: akhlaq7@hotmail.com; *Nazar Iqbal, FSCRD, Islamabad, Pakistan; email:* nazariqbal@yahoo.com; *and Saeed Iqbal, FSCRD, Islamabad, Pakistan; email*: saeediqbal65@hotmail.com;
Note: the contributors are former and current Director Generals and Deputy Director General of FSCRD, respectively

ICARDA Continues Rebuilding the Seed System in Syria

In 2019/2020, a new project *FAO Syria Smallholder Support Program (SSP) for Agriculture Transformation* was started with focus on early generation seed production and establishment of farmer seed producer groups in two target provinces in Aleppo and Hama.

Project launching workshop and consultation meeting

Building a functional seed delivery system for effective adoption of new crop varieties requires established synergies and partnership with the national stakeholders along the seed value chain. To initiate functional partnership building on seed delivery, a project launching and consultation workshop on seed system development with participation of the stakeholders along the seed value chain of winter cereals and legumes was held on January 27, 2020. A total of 23 participants from ICARDA, FAO, Chamber of Agriculture Syndicate, General Commission for Scientific Agricultural Research, General Organization for Seed Multiplication, Aleppo University, and Aleppo and Hama Provincial Governorates and farmer representatives attended the meeting.

The meeting aimed at partnership building for effective seed system diversification and an income generating seed delivery system with active farmer participation. The main objective was supporting farmer-based production and marketing of quality seed of improved varieties at affordable prices.

Project progress and achievements

Some salient achievements of the project follow:

- A total of 6.7 metric tons of source seed of cereals and legumes from ICARDA was provided for further multiplication with 35 farmers in the two project target sites. Part of the source seed was recovered from the ICARDA and the national cooperation program on early generation seed production under the FAO-DFID-ICARDA project of the previous year
- Selection of target farmers was based on a criteria set. There was a total of 23 farmers (three female farmers, 13%) and 12 farmers (two female, 17%) selected in Safireh and Taldu, respectively, to implement the seed production plan
- A total of 67.1 ha planted in the two target sites at Safireh and Taldu covering 46.2 and 20.9 ha, respectively

- Promising germplasm planted in Hemim, Ghab, and Salmieh for demonstration and cross-learning sessions with farmers during May–June 2020
- In consultation with farmers, two seed producer groups were established to be involved in local seed business
- A short course on seed production and certification delivered via video conference
- Field day and cross-learning sessions targeting producers and farmers organized considering COVID-19 precautions
- Field visits were made to project sites by ICARDA and FAO experts.

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

Project inception and consultation meeting in Aleppo, Syria

Chickpea seed production field with farmers in Syria

Abdoul Aziz Niane, ICARDA, Terbol, Lebanon; email: a.niane@cgiar.org; *Majd Jamal, ICARDA, Damascus, Syria; email:* m.jamal@cgiar.org;*and Zewdie Bishaw, ICARDA, Addis Ababa, Ethiopia;* email: z.bishaw@cgiar.org

Research Notes

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

Identification of Farmers' Preferred Bread Wheat (*Triticum aestivum*) Varieties in Southern Ethiopia

Yetsedaw Aynewa[a] Seid Ahmed,[b] and Zewdie Bishaw[a]*[4]

Abstract

Participatory variety selection (PVS) was conducted to evaluate and select bread wheat varieties in the 2018/2019 main cropping season at Lay Gana and Jewe *kebeles*, Lemo District, Hadya Zone in southern Ethiopia. Seven national agricultural research services (NARS) released candidate varieties, which were evaluated with farmers. The experiment was designed as a mother trial and planted each of seven varieties in one replication in three farmers' fields. The varieties were evaluated using a matrix ranking method based on farmers' selection criteria. Significant variation was observed among varieties evaluated for important traits. In the farmers' evaluation the highest total score value was for Daka (661) followed by Ogolcho (654) and the candidate variety (score 554). Farmers' varietal evaluation and preference coupled with sufficient available seed helps in dissemination and adoption of the varieties, thus increasing productivity and production.

Key words: Bread wheat, farmers' preferences, matrix ranking, PVS

Introduction

In Ethiopia, wheat ranks fourth after teff, maize, and sorghum (CSA 2019). Accordingly, about 4.8 million smallholder farmers cultivated wheat on close to 1.8 million ha producing 4.8 million metric tons at a productivity level of 2.76 t ha^{-1}. It is

4 [a]ICARDA, P.O. Box 5689, Addis Ababa, Ethiopia
[b]ICARDA, B.P. 6299, Rabat, Morocco

*corresponding author: email: ayenyetse@gmail.com

widely grown in Amhara, Oromia, SNNP, and Tigray Administrative Regions. It is a principal staple crop used to make *injera*, a daily bread for rural households in the country. Additionally, wheat is also used for producing food products by the agro-processing industry.

The objectives of the PVS conducted were to (i) evaluate and select bread wheat varieties through farmers' participation and (ii) recommend varieties for further seed production and supply based on their performance. Factors that affect selection of elite varieties in conventional breeding are mostly under the control of the researchers and extension agents rather than considering farmers' perspectives and farming conditions. This study investigated the application of PVS to identify bread wheat varieties suitable for farmers and their production environment and agro-industry.

Materials and methods

The study was conducted at Lay Gana and Jewe *kebeles*, Lemo District, Hadya Zone in southern Ethiopia. The experiment was carried out with seven nationally released and candidate bread wheat varieties from NARS: Deka, Hidase, Kingbird, Lemu, Ogolcho, Wane, and a new candidate variety for release. The experiments were carried out in a mother trial type in three farmers' fields under rainfed conditions in the 2018/2019 main cropping season. Each variety was planted in one replication with a plot size of 25 m^2 per variety. A seed rate of 125 kg ha^{-1} was used and fertilizers applied at 100 kg ha^{-1} for NPS and 150 kg ha^{-1} for urea. All of the NPS and a third of the urea were applied during planting, and a third of the urea was top dressed during tillering and again during flag leaf emergence.

The evaluation was performed separately by male and female farmers based on their selection criteria. Both groups used selection criteria like plant height, crop stand, disease tolerance, spike length, and number of kernels. A matrix ranking was prepared of the criteria against the varieties.

Results and discussion

Grain yield and the results of farmers' evaluation based on plant height, crop stand, number of tillers, spike length, and number of kernels of tested varieties are presented. The traits studied were categorized to measure the grain yield, and farmers' scores in participatory evaluation were used to select the varieties.

Matrix score ranking

The categories used were given numerical labels ranging from 1 (poor) to 5 (excellent). Weighted ranking of genotypes was calculated as the product of the values for the criteria, and the scores for each specific variety are presented in Table 1. Farmers' evaluation revealed significance differences in preference among the varieties. The total matrix ranking scores were in the range of 289–661. The highest total score was for Deka (661) followed by Ogolcho (654) and the candidate variety (554).

Table 1. Evaluation of bread wheat varieties by male and female farmers for two sites in the 2018/2019 crop season

Varieties	Lay Gana		Jewe		Total score	Rank
	Male	Female	Male	Female		
Candidate	299	54	136	65	554	3
Lemu	169	54	136	105	464	4
Daka	364	84	168	45	661	1
Hidase	208	42	40	25	315	5
Kingbird	143	44	72	30	289	7
Wane	156	36	48	50	290	6
Ogolcho	390	84	80	100	654	2

Bread wheat varieties planted in PVS trial at grain filling stage at Lay Gana kebele in 2018/2019 cropping season

PVS of bread wheat varieties by male farmers at Lay Gana kebele during 2018/2019 cropping season

It is worth mentioning that although farmer participation is often advocated on the basis of equity, there are sound scientific and practical reasons for farmer involvement to increase the efficiency and effectiveness of a breeding program (Ceccarelli and Grando 2002). Similar results were recorded in grandmother–mother and mother trial

types of malt barley PVS in northwest and northern Ethiopia (Aynewa et al. 2013, 2019b) and mother trials on durum wheat (Aynewa et al. 2016), lentil (Aynewa et al. 2017), food barley (Aynewa et al. 2018b), faba bean (Aynewa et al. 2018a), and linseed (Aynewa et al. 2019a).

Grain yield

Analysis of grain yields revealed significance differences among bread wheat varieties evaluated under PVS. The mean grain yield ranged within 1.31–2.28 t ha^{-1}. Lemu, the candidate variety, and Kingbird recorded first, second, and third grain yields, respectively. The highest mean grain yield was for Lemu (2.28 t ha^{-1}) and the lowest was for Hidase (1.31 t ha^{-1}) (Table 2).

Table 2. Bread wheat grain yield in Lemo District in the 2018/2019 cropping season

Varieties	Yield (t ha^{-1})			Mean
	Farmer^1	Farmer^2	Farmer^3	
Candidate	1.9	2.4	2.32	2.21
Lemu	2.04	2.4	2.4	2.28
Daka	2.0	1.2	1.8	1.7
Hidase	1.63	1.5	0.8	1.31
Kingbird	1.6	2.0	2.8	2.1
Wane	1.2	2.42	1.6	1.74
Ogolcho	1.2	2.0	2.48	1.89

Note: Farmers were used as replicates

Conclusion

Analysis of grain yield data and farmers' evaluations provide information for designing and developing suitable techniques to select varieties better adapted to nutrient deficient environments and provide functional understanding of relevant systems to strengthen future crop and product development in a sustainable way. Farmers and industry preferred varieties help to develop appropriate seed delivery systems to disseminate appropriate technologies that address the local needs of farming communities.

Acknowledgment

This work was supported by Africa RISING project funded by USAID, coordinated by ILR and implemented by ICARDA.

References

Aynewa Y., S. Ahmed, and Z. Bishaw. 2019a. Identification of farmers preferred linseed (*Linum usitatissimum* L.) varieties adapted to southern Ethiopia. *Seed Info* No. 57. ICARDA, Beirut, Lebanon

Aynewa Y., S. Ahmed, and Z. Bishaw. 2019b. Farmers preference of malt barley (*Hordeum vulgare* L.) varieties adapted to northern Ethiopia. *Seed Info* No. 56. ICARDA, Beirut, Lebanon

Aynewa, Y., S. Ahmed, and Z. Bishaw. 2018a. Identification of faba bean (*Vicia faba* L.) varieties adapted to southeastern Ethiopia. *Seed Info* No. 55. ICARDA, Beirut, Lebanon.

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

Aynewa, Y., 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., and S. Grando. 2002. Plant breeding with farmers requires testing the assumptions of conventional plant breeding: Lessons from the ICARDA barley program. In *Farmers, Scientists and Plant Breeding: integrating Knowledge and Practice*, edited by D.A. Cleveland and D. Soleri, 297–332. Wallingford, Oxon, UK: CABI Publishing International.

CSA (Central Statistics Authority). 2019. Central Statistics Agency Report on Area and Production of crops. Statistical Bulletin of Agricultural Sample Survey, Volume I. No. 589, Addis Ababa, Ethiopia.

Meetings and Courses

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

Conferences

With the COVID-19 pandemic continuing to escalate and national and/or international travel restrictions in place, virtual conferences, workshops, meetings, and trainings have become the order of the day replacing the old person–person interactions.

4th International Conference on Global Food Security

The 4th International Conference on Global Food Security under the theme *Achieving Local and Global Food Security: At What Costs?* will be held on December 6–9, 2020, in Montpellier, France. The conference will address the topic of food security at all spatial levels from local to global, and from an interdisciplinary and systemic food systems perspective. It aims to better understand environmental, nutritional, agricultural, demographic, socioeconomic, political, technological, and institutional drivers, and the costs and outcomes of current and future food security. The conference will address the triple burden of malnutrition: hunger, micronutrient deficiencies, and obesity. It will explore the current state of interdisciplinary insight, address the trade-offs that occur—and synergies that can be sought—in transforming food systems.

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

For more details, visit the 4th International Conference on Global Food Security

ISTA Annual Meeting 2021

The ISTA Annual Meeting will be held in Cairo, Egypt, May 31 to June 3, 2021. For more information, please contact: ISTA, Zurichstrasse 50, 8303 Bassersdorf, Switzerland; tel: +41 44 838 6000; fax: +41 44 838 6001; email: ista.office@ista.ch; website: www.seedtest.org

ISF World Seed Congress 2021

The International Seed Federation's (ISF) World Seed Congress 2021 will be held in Barcelona, Spain, 17–19 May 2021. The ISF World Seed Congress is the ISF flagship event which brings together the principal architects and decision-makers of the global seed industry. More than 1,000 seed industry professionals are expected to gather to discuss the global issues facing the seed industry. See the ISF World Seed Congress 2021 website for more information.

Courses

ICARDA Courses

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

UPOV Distance Learning Courses

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

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

The timetable of Session II courses for 2020 follows:

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

The categories for participants are:
Category 1: Government officials or members of the Union endorsed by the relevant representative to the UPOV Council (no fee).

Category 2: Officials of observer states/intergovernmental organizations endorsed by the relevant representative to the UPOV Council (one non-fee-paying student per state/intergovernmental organization; additional students, CHF 1,000 per student).

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

More detailed information about the courses and online registration is available on the UPOV website.

ISTA Launched Interactive Certificate—Training Tool

ISTA started to introduce electronic tools in recent years (sampling videos, sampling app, and others). With the support of the Executive Committee, the newest member in this family is an interactive ISTA Certificate Tool. This training tool should help ISTA accredited laboratories, and those looking for accreditation, to train their staff on how to use and complete ISTA Orange and Blue International Certificates.

The tool is supported by links to the current ISTA Rules chapters to assist trainees to find the

respective parts in the Rules and may help in understanding how the ISTA Rules are set up.

The tool is complementary support to the written procedure on How to complete ISTA Certificates. This ISTA learning tool is available for free and can be retrieved here. Just have a look and flip through it.

Please do not hesitate to send us ideas for improvement of the tool and its functions! To do so, follow the 'Contact us' button on the tool's web page.

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

Blakeney M., and K.H.M. Siddique (eds). 2020. Local Knowledge, Intellectual Property and Agricultural Innovation

Published by Springer Nature Singapore Pte Ltd (www.springer.org); ISBN 978-981-15-4610-5 (https://doi.org/10.1007/978-981-15-4611-2); Price: € 109.99 (Hardback); 239 pp; ISBN 978-981-15-4611-2 (eBook), Price: €93.08 (eBook)

This book examines the role of local knowledge in promoting agricultural innovation and legislative support for agricultural innovation through intellectual property laws and the protection of farmers' rights. In assessing the role of intellectual property in promoting agricultural innovation, the book examines plant variety rights protection; the patenting of plant varieties and plant breeding methods; gene patents and climate change; open source biotechnology and agricultural innovation and geographical indications and the marketing of agricultural products.

As a test bed for the application of the themes of the book, it applies a case study approach to look at the role of local knowledge and intellectual property rights in the cultivation of traditional rice varieties in Kerala, south west India, and the extent to which this cultivation is supported by Indian legislation. The book concludes with an examination of the success of self-help groups, such as Farmers' Clubs.

This book appeals to all readers interested in policies to promote sustainable agriculture at a time of increasing food insecurity. A special feature of the book is the case study approach. To date, the role of local knowledge and agricultural innovation has been almost entirely ignored and the role of intellectual property in this space has been largely ignored. The book is a result of a research collaboration between the University of Western Australia and Kerala Agricultural University, funded in part by the Australian Research Council.

Islamic Development Bank Group. 2020. Inclusive Growth Making Value Chains Work for Smallholder Farmers

Published by Islamic Development Bank Group (www.isdb.org); ISBN 978-603-8283-07-3; Price: PDF; 123 pp)

This book—Inclusive Growth: Making Value Chains Work for Smallholder Farmers—aims to provide insights into this question and practical solutions for increasing the engagement of smallholders in profitable global value chains. The overall theme and the eight chapters of the book reflect the Islamic Development Bank's 10-Year Strategy and its execution mechanism—the President's Five-Year Program. 'Making Markets Work for Development' is a central theme of this program. It also fits with the Sustainable Development Goals and the commitment made by countries around the world to achieve them by 2030. GVCs have great potential to help with this, but harnessing that potential is not an easy task. It requires strong partnership with many actors, particularly the private sector, with each of them fulfilling their commitment.

Fuhrer, J., and P.J. Gregory (eds). 2019. Climate Change Impact and Adaptation in Agricultural Systems

Published by Springer Nature Singapore Pte Ltd (www.springer.org); ISBN 9781780642895; Price: € 117 (HB); 298 pp; ISBN 9781786395351 (PB), Price: €55; 298 pp

The focus of this book is future global climate change and its implications for agricultural systems which are the main sources of agricultural goods and services provided to society. These systems are either based on crop or livestock production, or on combinations of the two, with characteristics that

differ between regions and between levels of management intensity. In turn, they also differ in their sensitivity to projected future changes in climate, and improvements to increase climate-resilience need to be tailored to the specific needs of each system. The book brings together a series of chapters that provide scientific insights into possible implications of projected climate changes for different important types of crop and livestock systems, and a discussion of options for adaptive and mitigative management.

Websites

IUCN Seed Conservation Specialist Group

The new IUCN Seed Conservation Specialist Group website is now live! Our goal with this newly designed website is to create a user-friendly browsing experience for our members and the general public interested in seed conservation.

The mission of the Seed Conservation Specialist Group is to promote seed conservation by providing a network for knowledge-sharing in different ecosystems around the world, and aiding in prioritization, capacity building, and development of best practices.

CORAF

CORAF is an international non-profit association of national agricultural research systems of 23 countries, covering over 40 percent of Africa's population, thus making it the largest sub-regional agricultural research organization in Africa. It was created in 1987 and assigned the responsibility to coordinate and facilitate the groundbreaking and cutting-edge research outputs needed to unlock the agricultural potential of West and Central Africa.

Newsletters

CORAF This month

CORAF This Month is electronic news published and distributed by the CORAF updating information devoted to news related to the agricultural sector in West and Central Africa.

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, Head of Seed Section and International Nurseries & Country Manager, ICARDA-Ethiopia, Addis Ababa, ICARDA; email: z.bishaw@cgiar.org

Note to Subscribers

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