



SEED INFO

Official Newsletter of the WANA Seed Network



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EDITORIAL NOTE

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



The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO) obliges member countries to protect plant varieties by patent, an 'effective *sui generis* system' or a combination of these. Several bilateral trade negotiations and export-oriented agribusinesses call for African countries to adopt the internationally harmonized plant breeders' rights system under UPOV. These trade related pressures do not take into account the complex seed systems in developing countries and appear to bypass responsibilities of African nations to implement farmers' rights. The merger of the different rights on genetic resources in the 'Model Law on the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources' of the then Organization of African Unity (OAU) has not led to national implementation in most of the continent. In the **NEWS AND VIEWS** section, Niels Louwaars from Wageningen University, The Netherlands, provides his views on 'Reconciling UPOV and integrated seed systems'.

There is also news from African Seed Trade Association (AFSTA), International Seed Federation (ISF), International Seed Trade Federation (ISTA) and International Union for the Protection of New Varieties of Plants (UPOV). The AFSTA Annual Congress was held in Bamako, Mali, and provided a forum to promote seed trade within and outside Africa. The conference focused on seed trade and exhibitions, but the program also includes seed-related technical presentations on several themes. Seed companies, service providers, regional and international institutions from Africa, Asia, Europe and USA, were all represented at the conference. The ISF Seed Congress was held in Calgary, Canada, and attended by more than 1200 people from 57 countries. The International Seed Testing Association (ISTA) in Cologne, Germany,

was attended by over 350 participants from 56 countries.

The section on **SEED PROGRAMS** includes news from Ethiopia, Morocco, Pakistan, Tajikistan and Turkey. The news from Ethiopia focuses on wheat variety releases and rapid seed multiplication by the Ethiopian Institute of Agricultural Research (EIAR) and partners. It highlights the progress made in identification, fast track release and popularization of stem rust resistant varieties, coupled with rapid seed multiplication under the USAID Famine Fund supported by ICARDA and CIMMYT. Similar activities are operational in Egypt and Pakistan. News from Pakistan discusses the new seed amendment bill, which aims to encourage broader private sector participation in agriculture. Also discussed are the latest developments in the seed industry and international obligations under the WTO regime. News from Iran, Morocco and Tajikistan cover the release of wheat, chickpea and lentil varieties, developed from germplasm provided by ICARDA through the international nurseries network; the role of the Mesopotamia Seed Company; and other issues.

The **RESEARCH** section aims to capture information on adaptive research or issues relevant to seed program development in the region and beyond. This issue features an article entitled *Forage seed production in Ethiopia* by Jean Hanson and Abate Tedla from the International Livestock Research Institute (ILRI) in Addis Ababa, Ethiopia. The article describes how changes in land use, reduction in available grazing lands and increasing price of feed have led to feed shortages and the need for alternative feeds such as forages. This provides the opportunity for forage seed systems to develop, to meet the needs of small-scale livestock producers.

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

Have a nice read.

Zewdie Bishaw
Editor

WANA SEED NETWORK NEWS

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

Second ECOSA 2010 Seed Conference

In 2009, the Board of Directors of ECO Seed Association (ECOSA) outlined activities to be undertaken in 2010. These include establishing new seed associations and strengthening existing ones; expanding the membership by enlisting private and public seed companies in the region and beyond; seeking financial support from donors for regional activities; and organizing a Second ECOSA Seed Congress. The Second ECOSA Congress is planned for 28-31 October 2010 in Istanbul, Turkey along the Turkish Seed and Seed Technology Fair.

Turkish Seeds and Seed Technology Fair

The Turkish Seeds and Seed Technology Fair will be organized at the World Trade Center from 28-31 October 2010 in Istanbul, Turkey. The fair will help improve communication and collaboration between different seed sector stakeholders to achieve sectoral targets. For more information, please visit their the website:

<http://www.turkiyeto humculukfuari.com/en/about-fair/minister-of-agriculture-post.html>

The fair will be organized in collaboration with the Turkish Seed Union (TÜRK-TOB), a professional umbrella association representing the seed industry. It is composed of sub-unions of seed industrialists and producers, seed growers, seed distributors and dealers, plug plant producers, nurserymen, ornamental plant growers and plant breeders. The Turkish Seed Union provides overall leadership and represents the interests of all stakeholders. According to the law any person or legal entity in the seed business should be a member of the relevant sub unions of the Turkish Seed Union.

NEWS AND VIEWS

News, views and suggestions on the seed industry are included in this section. It is a forum for discussion among seed sector professionals.

Reconciling UPOV and Integrated Seed Systems¹

This article aims at reconciling development, food security and agrobiodiversity policies and their effect on seed systems. It considers integrated approaches to seed systems development, with intellectual property rights (IPR) that countries have to implement following the WTO and bilateral trade agreements. To make IPR contribute optimally to the diversity of seed systems in developing countries requires some minor changes in interpretation of the UPOV Act and a specific exemption in the patent system. This article introduces the current IPR concepts. A following article, which will appear in the next issue of *SeedInfo*, will analyze seed systems and possible solutions to problems that may arise.

1. *IP in plant breeding: patents and breeders' rights*

1.1 *Patents*

The role of intellectual property rights (IPRs) in breeding is relatively recent. It took over a century since the Paris Convention (1883) which laid the foundation for internationally agreed standards for patents before it gradually became relevant to the plant breeding sector. In the 1980s, for the first time a court in the USA allowed patent protection of plant varieties and biotechnological products and processes; this was then taken up by many patent offices around the globe.

There were ethical, technical, legal and political reasons for not granting patents on life forms including plant varieties. First, the ethical argument that life itself is sacrosanct and that life forms or their components should not be privatized. Second, technical reasons; namely, living organisms (particularly populations) inevitably change due to introgression and mutation making it unclear what is protected. Third, legal arguments against patent protection of plant varieties: a variety cannot be described in a way that someone 'skilled in the art' can reproduce it, even when starting from the same parent materials and using the same breeding methods. Fourth, the novelty criterion in patent law is difficult to handle in plant breeding, and in most cases, the choice of parents and the

Editor's note: This article appears in two parts. The first part (in this issue) describes the history of IPRs in plant breeding and the seed systems in CWANA. The second part on IPRs and the concept of integrated seed systems will appear in *Seed Info No 40*.

selection methods used may be rather obvious. Fifth, a political debate whether it would be wise to privatize seed, which is the foundation of food production. These arguments, throughout most of the 20th century, led to the implicit or explicit exclusion of patents for plant varieties.

1.2 Plant Breeders' Rights

The rediscovery of Mendel's laws of heredity in 1900 and the recognition of hybrid vigor a decade later led to an increased commercial interest in plant breeding. Since the 1850s, commercial seed producers in Europe and North America were dependent on their 'selections' of crops, but the scientific approach to breeding created new opportunities. However, any seed producer could easily copy the breeder's work and seed companies had to sell their seed with minimal profit based on reputation. In the USA, some special provisions were developed within the patent system (Plant Patent Act of 1930) to create an incentive for investments in breeding, but only for vegetatively propagated varieties that were not essential for national food security.

In Europe, countries sought to promote and reward plant breeding through various mechanisms, including prizes (Netherlands), 'breeder's seal' (Germany) and since the 1940s through IPR. The promotion of plant breeding was deemed necessary because of food security problems in Europe. In 1961, the Convention for the Protection of New Varieties of Plants adopted, harmonizing the national 'breeder's rights' systems of the (then) European Community countries: Belgium, France, Germany, Italy and the Netherlands.

The Convention, administered by UPOV, was revised in 1972, 1978 and 1991 to gradually strengthen breeders' rights in line with the development of the agricultural and horticultural sector in the member countries. In 1991 when the latest Act was adopted, 20 – mainly industrialized – countries were UPOV members.

Apart from the requirements for protection (distinctiveness, uniformity, stability, novelty and name) that are different from the patent system, three important aspects make Plant Breeder's Rights *sui generis*. These are based on traditional ways of farmers and breeders handling seed:

- The protected subject matter is fixed: one plant variety may be protected by PBR, which differs from the patent system where

the applicant determines what his invention extends to.

- The breeder's exemption: anybody may use the protected variety for further breeding. The research exemption of the patent system normally excludes the use of the invention to create a new commercial product.
- The farmers' privilege: in the 1991 Act it is explicitly restricted to the reuse of seed on a farmer's own farm (of specified crops), 'taking the legitimate interests of the breeder into account'. The patent system requires any reproduction to have the consent of the patent holder.

A common exemption in both systems is the freedom for private and non-commercial use. However, the interpretation in various IPR systems is very different.

1.3 Farmers' Rights

The concept of Farmers' Rights was included in the international debate on genetic resources in the late 1980s, culminating in a Resolution on Farmers' Rights (5/89), adopted by the FAO Conference of 1989. The resolution refers to the need for continuing conservation and use of plant genetic resources, benefit-sharing, and sufficient funding to conserve genetic resources. Farmers' Rights were defined as 'rights arising from the past, present and future contributions of farmers in conserving, improving, and making available plant genetic resources, particularly those in centers of origin/diversity'. The concept initially developed partly in response to the spread of breeders' rights. It was not considered fair that breeders who made minor additions to a variety would get rights, whereas those who developed the crops and maintained the building blocks of breeding, would get nothing. But with time, several additional objectives were included in the debate.

In 2001, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) formally introduced the concept into an international law. It describes the justification and responsibilities towards implementation of the rights by the 'Contracting Parties', and provides a list of rights:

- Protection of traditional knowledge relevant to plant genetic resources for food and agriculture

- The right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture; and
- The right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.

Finally, Article 9.3 concludes that ‘Nothing in this Article shall be interpreted to limit any rights that farmers have to save, use, exchange and sell farm-saved seed/propagating material, subject to national law and as appropriate’.

1.4 IPRs – responses from developing countries

Since the 1960s, copyrights, patents and trademarks were protected in many countries. The establishment of the World Trade Organization (1994), however, marked a rapid expansion of all IPR systems. The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) requires all WTO member countries to include at least the prescribed minimum standards for the protection of IPRs. There are some exemptions, notably on the protection of plants and animals, and on moral grounds. However, for plant varieties, protection through ‘patents, an effective *sui generis* system or a combination thereof’ should be provided. TRIPS does not mention UPOV and maintains the basic territoriality principle of IPRs, which are granted at the national level!

In addition to IPRs, countries have to implement the Convention on Biological Diversity (1992) which recognizes sovereignty of states over their genetic resources and recognizes the rights of indigenous and local communities; and the concept of Farmers’ Rights including the protection of traditional knowledge negotiated in the Intergovernmental Committee on Genetic Resources, Traditional Knowledge and Folklore (IGC) of WIPO.

The Organization of African Unity (now African Union) attempted to merge these different obligations from international law into the African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the regulation of Access to Biological Resources. It recognizes the rights of communities over their biological resources, protects indigenous knowledge and provides breeders’ rights for new varieties; includes

guidelines to implement monetary and non-monetary benefit sharing, including a Community Gene Fund. The exclusive rights of breeders should not impinge on the customary practices of seed saving, and permit the exchange and sale of seed of any variety, including protected varieties. Furthermore, it states that the granting of patents on life forms, including parts of organisms (e.g. cells and genes) and biological processes is not recognized in Africa. To date, however, very few African countries have developed a national law that combines genetic resources and IPR issues in one regulatory framework. However, India and Thailand introduced a gene fund in their law which should allow IPR holders to share benefits with farmers who conserve genetic resources. India also includes general provisions that allow farmers to save, exchange and sell farm-saved seed (including that of protected varieties), but is limited to non-commercial transactions i.e. it is not permitted to offer seed for sale in branded packaging.

Today, international pressures increase to adopt the UPOV system. In the Central and West Asia and North Africa region, several countries have become members of UPOV: Kyrgyzstan (2000), Tunisia (2003), Azerbaijan, Jordan (2002?), Uzbekistan (2004), Morocco (2006), Turkey (2007), Georgia (2008) and Oman (2009). Trade negotiations also put pressure on countries to provide patent protection on biotechnological inventions. However, the current interpretation of the farmers’ privilege in the UPOV system does not fully support the needs of the diversity of seed systems, nor the application of the patent system in most countries. This issue will be dealt with further in part two of this contribution.

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African Seed and Biotechnology Program (ASBP)

Background

The Comprehensive Africa Agriculture Development Program (CAADP) report states that 28 million people in Africa have been facing food emergencies due to droughts, floods and strife; some 25 million needed emergency food and agricultural assistance. The report called for

urgent action to create sustainable food security in Africa for which the development of the seed sector is an essential prerequisite.

Rationale for the Development of ASBP

- *Inadequate regional seed marketing:* Lack of collaboration and harmonization at the regional and continental levels concerning the development, movement and use of high-yielding varieties and vegetatively propagated materials
- *Loss of germplasm:* Erosion of plant genetic resources for food and agriculture will significantly affect the availability of seed of a wide range of adapted varieties. Of major concern is the irreversible loss of genes, the basic functional unit of inheritance and the primary source of variation among plants
- *Lack of access to improved seeds and planting material:* More than 80% of seeds planted by African farmers is produced by the informal sector where farmers themselves produce, disseminate and access seed directly from their own harvest or through exchange and barter within the local communities. Many farmers dependent on the local seed system do not have access to seeds of new, improved crop varieties and high value fruit and vegetables that are available from the formal seed sector.
- *Inadequate use of available biotechnology tools:* Biotechnology is an integral feature of modern plant breeding but is not sufficiently well embedded in practical plant breeding and crop improvement in developing countries due to inadequate infrastructure, funding and trained staff. Evidence from developing countries outside Africa suggests that micro-propagation and tissue culturing can be profitably applied to many crops. Assessment of the potential applications of biotechnology tools is essential as is capacity building to enhance use of the available technologies, and to implement appropriate bio-safety measures.
- *Weak disaster management:* Droughts, floods and conflicts are increasing in frequency in Africa. Acute disasters are developing into chronic disasters, which lead to food and seed insecurity. Because of increasing incidence of emergency situations, an increasing proportion of the assistance allocated to Africa is invested in relief operations and a much smaller and decreasing proportion in seed sector

development -- but the latter is essential to increase sustainable seed supply and improve preparedness.

AU Response

Recognizing the importance of quality seed in improving agricultural productivity and food security, the African Union Heads of State in July 2005 recommended the formulation of an Africa-wide seed and biotechnology program as a priority. Subsequently, the FAO in collaboration with the AU developed a concept document for the proposed African Seed and Biotechnology Program (ASBP). A decision endorsing the program was adopted at the 8th Ordinary Session of the Summit in Ethiopia in January 2007. The ASBP is a strategic framework for the development of the African seed sector with 20 components to be implemented at continental, regional and national levels.

Goal of the ASBP

The overall program goal of the ASBP is to contribute to improved food security and nutrition and poverty alleviation in Africa, through the establishment of effective seed systems and enhanced application of biotechnologies and other methodologies.

ASBP objectives

- Enhance national capacity for improved seed production, multiplication and distribution to better supply farmers with high quality seed that enables them to respond to changing environmental conditions and market demands.
- Improve seed quality assurance procedures to ensure sustained production and distribution of high quality seed to farmers.
- Strengthen linkages between the formal and informal seed sectors to better understand and respond to farmer needs, including those of small-scale and women farmers.
- Put in place effective seed policies and regulations to enable and promote increased seed trade among African nations.
- Enhance capacity for the conservation and sustainable use and development of plant genetic resources for food and agriculture, to ensure adapted crop varieties are available to meet future needs.

- Increase capacity to utilize biotechnology tools to enhance plant breeding and production of high quality seed.
- Increase capacity to implement bio-safety measures in relation to seed production and distribution and plant genetic improvement, to protect human health and the environment.
- Establish model codes of conduct for seed used in emergencies.

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University of Nairobi Establishes African Seed Institute

With a grant of US\$ 4.49 million from the Alliance for Green Revolution in Africa (AGRA) the College of Agriculture and Veterinary Sciences in Kabete, Kenya, has established a Seed Enterprise Management Institute at Kabete. It is a joint undertaking of the University of Nairobi (UoN), Iowa State University, the International Maize and Wheat Improvement Center and private business experts.

The Institute's goal is to enhance capacity building in sub-Saharan Africa, where seed supply chains are lacking or inadequate. It will also provide seed training to graduate students who pursue plant breeding in African universities, support the production of improved varieties and create a web-based network for information exchange on seed technology. The Institute will have seed conditioning, storage and drying facilities; training facilities; and a seed laboratory. For more information please contact: Manjit Misra, Seed Science Center, E-mail: mkmisra@iastate.edu.

Source: eNews, April 21, 2010

(http://www.soyatech.com/news_story.php?id=18198)

Consortium for International Seed Technology Training

Ohio State University (OSU), University of California - Davis (UC-Davis) and Lincoln University of Missouri (LUM) from USA; Escola Superior Agricultura Luiz de Queiroz (ESALQ, University of Sao Paulo) in Brazil and Pontificia Universidad Catolica de Chile (PUC) have established a five-member Consortium for International Seed Technology Training (CISTT),

a novel approach to global training in seed technology.

CISTT members are leading global academic institutions with expertise in seed technology training. Together, they can muster a greater variety of faculty expertise, provide greater breadth of academic training, cover a greater diversity of agricultural crops and utilize differences in technological capability of countries which will result in an international curriculum consistent with the technological advances in a global seed industry.

CISTT provides leadership in academic education and training of industry personnel, and agriculturalists in seed science and technology by offering global and comprehensive program, utilizing a variety of educational techniques to advance local seed systems around the world. CISTT draws on the expertise of regional centers of excellence around the world. More information about the local research activities can be found at each of the university seed biology web pages:

- The Ohio State University
- College of Agriculture "Luiz de Queiroz" (ESALQ), University of Sao Paulo
- University of California-Davis
- Pontificia Universidad Catolica de Chile
- Lincoln University of Missouri

In addition to local research activities, the CISTT institutions routinely cooperate in conducting joint research with students traveling to and from the partner institutions. Such collaboration provides students with a global perspective of the differences in cultures for conducting high quality seed production. For more information, please visit the website:

<http://www.seedconsortium.org/index.html>

Tenth AFSTA Annual Seed Congress

The Tenth Annual Congress of the African Seed Trade Association (AFSTA) was held from 1-4 March 2010 in Bamako, Mali. The focus of the Congress was 'strengthening the seed industry in Africa'. Delegates had the opportunity to advance their seed business and reinforce their knowledge on various topics related to seed trade. The need for partnerships to ensure food security and farmer access to quality seed was recognized.



Opening Ceremony of the AFSTA Congress in Bamako, Mali

The Congress, which coincided with AFSTA's 10th Anniversary, attracted 130 delegates from over 34 countries. Delegates included representatives from regional and international bodies such as the International Seed Federation (ISF), ISTA, UPOV, the Food and Agriculture Organization (FAO), the African Organization for Intellectual Property (OAPI), the Common Market for East and Southern Africa (COMESA) and others.

The delegates at the Congress discussed the following topics:

- Information on web-based variety catalogues to support regional seed trade in ECOWAS region
- Status of Bt Cotton seed in West Africa – a case study of Burkina Faso
- Strategy for the implementation of the harmonized seed regulations across the ECOWAS region
- Latest developments in the seed sector from international bodies such as ISTA and OECD
- Better seed production for better food production in Africa
- Strengthening the African seed industry by leveraging strategic partnerships
- Implementation of PVP in OAPI region: practical recommendations for breeders

All the papers presented at the AFSTA Congress are available on request from the AFSTA Secretariat (afsta@afsta.org).

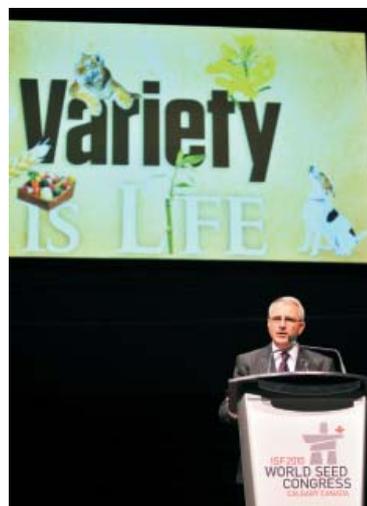
Delegates also toured Sotuba Agronomic Research Station, in Bamako, where they had a one-day seminar on seed treatment.

The General Assembly elected a new Board (see www.afsta.org) and confirmed that the 11th AFSTA Annual Congress 2010 would be held from 7-11 March 2011 in Lilongwe, Malawi.

AFSTA continues to strengthen seed-related technical training, build capacity among its members, and disseminate information to progress harmonization with a view to promoting seed trade in Africa. AFSTA represents the African seed industry with over 86 members in 34 countries.

Annual World Seed Congress in Calgary, Canada

The Annual World Seed Congress was held in Calgary Canada, from 31 May to 2 June 2010. Over 1250 participants from 57 countries were able to meet, network and trade.



Tim Johnson, Chairman of the Breeders Committee, at the Annual World Seed Congress

The opening ceremony included a film titled *Variety is Life* (see www.worldseed.org), to celebrate the International Year of Biodiversity. Tim Johnson, Chairman of the Breeders Committee, spoke of how the ISF supports efforts to protect biodiversity and works on a daily basis to ensure diversity.

The different facets of the Canadian seed industry were presented at the meetings of the ISF Standing Committees and Crop Section Boards. Activities undertaken in the past 12 months by different working groups on intellectual property protection, seed health, harmonization of regulatory procedures on adventitious presence, and phytosanitary matters were also presented. The outcome of such work is a position paper, which will help informing the wider public on where the seed industry stands on various issues.

The ISF Forage and Turf Crops Section approved the technical protocol for assessing genetic distance between two perennial ryegrass varieties. This will help resolve disputes on essentially derived varieties of perennial ryegrass. The Vegetable and Ornamental Crops Section approved papers on seed health testing and definition of terms describing plant-pest relationships.

Seed health testing is an essential tool in disease risk management, and collaboration in developing test methods will benefit the whole seed-supply chain. The paper on seed health underlines a vital principle: development of testing methods is a non-competitive subject for the vegetable industry. Disease resistance is a key breeding goal for the industry. To promote the consistent use of terms that describe the reaction of a plant to a pest or pathogen, the vegetable seed industry adopted a paper on definitions to be used by companies in communicating disease characteristics of their varieties with clients.

The next Congress will take place from 30 May to 1 June 2011 in Belfast, Northern Ireland.

Following the Congress, more than 100 seed industry representatives from different countries attended an ISF conference on adventitious and low level presence of genetically modified (GM) material in seed. In 2009 approximately 14 million farmers in 25 countries grew GM crops on 137 million hectares. To date close to 40 GM events have been approved for commercialization and it is foreseen that in 2015 there will be more than 120 events available for cultivation worldwide.

Twelve speakers covered a range of topics from regulatory aspects of commercializing a GM crop, quality assurance and stewardship to the impact that the unintended presence of a GM trait in non-GM seed may have on the industry. The conference the level of awareness in the industry on adventitious presence and provided clarity on the difference between adventitious presence and low-level presence. Since a threshold of 'zero' was impractical, there was industry-wide consensus that a pragmatic approach to adventitious presence was imperative. To avoid trade disruptions caused by a patchwork of regulatory procedures, the industry called for a policy framework that was global and practical to implement.

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ISTA Congress 2010 in Cologne, Germany

The 29th International Seed Testing Association (ISTA) Congress was held from 16-22 June 2010 in Cologne, Germany, a country with a long history in seed testing – Friedrich Nobbe established the first seed testing station in 1869 in Tharandt, Saxony. About 363 participants from 56 countries attended. The Congress was organized by the Federal Ministry of Food, Agriculture and Consumer Protection in collaboration with the Ministry of the Environment and Nature Conservation, Agriculture and Consumer Protection of the Land of North Rhine-Westphalia and ISTA Secretariat. The Congress preceded by a three day Seed Symposium from 16-18 June 2010; punctuated by presentations of ISTA's technical work on 19 June; a policy forum on harmonized seed testing and global seed trade on 21 June before its final conclusion by ISTA Ordinary Meeting (business meeting) on 22 June.



ISTA Seed Symposium

The 'ISTA Seed Symposium: Application and improvement of established and advanced technologies in seed testing' was convened by Dr Allison Powell from University of Aberdeen in Scotland, UK. The symposium covered five thematic areas: (i) Technologies for improved seed supply, (ii) Aspects of purity: genetic, technical and physical, (iii) Basic approaches to physiological processes in seeds (ISSS collaborative session), (iv) Approaches to the evaluation and improvement of germination, (v) Assessment and improvement of seed performance in practice. There were 35 selected oral presentations and keynote addresses, and 97 posters from 23 countries. The majority of the papers covered key agricultural crops followed by horticultural crops, but there were also papers on wild species and forests. The oral presentations and posters included 33 on new methods for seed

testing, 22 on seed storage, 24 on seed production, 19 on genetic improvement, two on seed morphology and two on seed coating/priming.

Founded in 1924, with the aim to develop and publish standard procedures in the field of seed testing, ISTA is linked with the history of seed testing. With member laboratories in over 70 countries worldwide, ISTA membership is truly a global network with a vision: uniformity in seed testing world. ISTA achieves its vision by producing internationally agreed rules for seed sampling and testing, accrediting laboratories, promoting research, and providing international seed analysis certificates, training and dissemination of knowledge in seed science and technology to facilitate seed trading nationally and internationally.

UPOV Appoints New Secretary-General

The Council of the International Union for the Protection of New Varieties of Plants (UPOV) appointed Mr Peter John Button, from the United Kingdom as Vice Secretary-General. Mr Button succeeds Mr. Rolf Jördens, from Germany, who will leave the position on 1 December 2010, after more than 10 years of service.

In another development the Technical Committee of UPOV adopted Test Guidelines for 16 species and recommended a number of important technical guidance documents for adoption by the Council. There are now 257 Test Guidelines available on the UPOV website. UPOV has also developed the GENIE Database to provide online information on GENera and specIEs (hence GENIE) in relation to protection offered by members of the Union, cooperation in examination, experience in DUS testing and the existence of UPOV Test Guidelines. GENIE is available at:

<http://www.upov.int/genie/en/>

UPOV continues to provide seminars in technical and legal aspects of plant variety protection. A seminar on DUS testing was held from 18-20 March 2010 in Geneva to provide information and facilitate discussion on arrangements for examination of distinctness, uniformity and stability (DUS testing) and guidance for DUS testing. The seminar also included test guidelines, management of variety collections and variety descriptions, with the participation of some 130 experts, including staff

of plant variety protection offices, DUS testing organizations and plant breeders. An International Seminar on *Use of plant variety protection system by the public sector* was also held on 29 April 2010 in Seoul, south Korea. The seminar demonstrated that public breeding institutions are very active users of the UPOV system and that plant variety protection is a key enabler for successful public-private partnership. During the seminar, the International Rice Research Institute (IRRI) made a presentation entitled 'Use of PVP system in the international public sector: IRRI's options'.

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Global Status of Commercialized Biotech Crops: 1996-2009

ISAAA Brief 41 on the status of biotech crops, is dedicated to the late Dr Norman Borlaug. According to the report, there has been record and continuous growth in biotech crops since their commercial introduction in 1996. Following the consistent benefits generated from biotech crops over the last 14 years, millions of large and small resource-poor farmers in both industrial and developing countries, continued to plant more biotech crops in 2009 than ever before.

In 2009, 77% of the 90 million ha of soybean; almost half the 33 million ha of cotton; 26% of the 158 million ha of maize; and 21% of the 31 million ha of canola were biotech crops. Global area of biotech crops reached 134 million ha or 180 million 'trait or virtual hectares'. This translates to an apparent growth of 9 million ha (or 7%) measured in hectares, whereas the actual growth, measured in 'trait or virtual hectares', was 14 million ha (or 8%) annually. The area under biotech crops has increased nearly 80-fold, from 1.7 million ha in 1996 to 134 million ha in 2009. It has increased every year since its first commercialization in 1996, at double digit growth rates consistently for the first twelve years, at 9.4% in 2008, and 7% in 2009 during the economic recession.

The number of countries growing biotech crops has increased from six in 1996 to 25 in 2009. In 2009, the number of farmers benefiting from biotech crops in 25 countries reached 14 million, an increase of 0.7 million over 2008. Of these, over 90% were smallholder resource-poor farmers from developing countries. The 13

million smallholders included 7 million in China (Bt cotton), 5.6 million in India (Bt cotton), and farmers in the Philippines (biotech maize), South Africa (biotech cotton, maize and soybeans) and other developing countries. In India, Bt cotton occupies 87% of total cotton, up from 80% in 2008.

The increased income from biotech crops for small and resource-poor farmers represents an initial modest contribution towards poverty alleviation. During the second decade of commercialization, 2006 to 2015, biotech crops have an enormous potential for contributing to the Millennium Development Goals (MDG) of reducing poverty by 50% by 2015. Initial research in China indicates that up to 10 million more small resource-poor farmers may be secondary beneficiaries of Bt cotton in China.

Consistent with ISAAA projections, in 2009, developing countries continued to increase their share of global biotech crops by planting 61.5 million ha, close to half (46%) of the global area. The five principal developing countries (with a collective population of 2.8 billion), Argentina, Brazil, China, India and South Africa, planted approximately 57 million ha. The 'big five' are driving global adoption of biotech crops and also provide substantial financial support for biotech crops. The five countries are reviewed in detail in Brief 41, with extensive commentaries on the current adoption of specific biotech crops, impact and future prospects. The research and development investments in crop biotechnology in these countries are substantial, even by multinational company standards.

In 2009, as in the past, the percentage growth in biotech crop area continued to be significantly stronger in the developing countries (13% and 7 million ha) than industrial countries (3% and 2 million ha). This trend is likely to continue, as more countries from the South adopt biotech varieties of crops including rice, 90% of which is grown in developing countries. It is noteworthy that in 2009, the seven countries where biotech crop area grew fastest were developing countries: Burkina Faso (1353% increase), Brazil (35% growth), Bolivia (33%), Philippines (25%), South Africa (17%), Uruguay (14%) and India (11%).

From the US\$51.9 billion additional gain in farmer income generated by biotech crops in the first 13 years of commercialization (1996 to 2008), it is noteworthy that half, US\$26.1 billion,

was generated in developing countries and the other half, US\$25.8 billion in industrial countries.

Herbicide tolerant soybean continued to be the principal biotech crop in 2009 occupying 69.2 million ha (52% of global biotech area of 134 million ha) followed by biotech maize with 41.7 million ha (at 31% up from 37.3 million ha in 2008); biotech cotton with 16.1 million ha (at 12% up from 15.5 million ha in 2008) and biotech canola with 6.4 million ha (at 5% of global biotech crop area up from 5.9 million ha in 2008). From the first commercialization of biotech crops in 1996 to 2009, herbicide tolerance has consistently been the dominant trait. In 2009, herbicide tolerance deployed in soybean, maize, canola, cotton, sugar beet and alfalfa occupied 62% or 83.6 million ha (up from 79 million ha in 2008) of the global biotech area of 134 million ha. For the third year running, in 2009, the stacked double and triple traits occupied a larger area, 28.7 million ha, or 21% of global biotech crop area (up from 26.9 million ha in 2008) than insect resistant varieties which occupied 21.7 million ha at 15% (up from 19.1 million ha in 2008). The stacked trait products and herbicide tolerant products grew at the same rate of 6% whilst insect resistance grew at 14%.

The top eight countries, each of which grew more than 1 million ha, in decreasing order of area were: USA (64 million ha), Brazil (21.4), Argentina (21.3), India (8.4), Canada (8.2), China (3.7), Paraguay (2.2), and South Africa (2.1). Consistent with the trend for developing countries to play an increasingly important role, it is noteworthy that Brazil with a high 35% growth rate between 2008 and 2009 narrowly displaced Argentina for the second ranking position globally in 2009. The remaining 17 countries which grew biotech crops in 2009 in decreasing order of area, were: Uruguay, Bolivia, Philippines, Australia, Burkina Faso, Spain, Mexico, Chile, Colombia, Honduras, Czech Republic, Portugal, Romania, Poland, Costa Rica, Egypt, and Slovakia. The growth in 2009 provides a broad and stable foundation for future global growth of biotech crops. The growth rate between 1996 and 2009 was an unprecedented 79-fold increase making it the fastest adopted crop technology in recent history. This very high adoption rate by farmers reflects the fact that biotech crops have consistently performed well and delivered significant economic, environmental, health and social benefits to both small and large farmers in developing and industrial countries.

This high adoption rate is a strong vote of confidence from millions of farmers around the globe

High re-adoption rates of close to 100% in many cases reflect farmer satisfaction with the products that offer substantial benefits ranging from more convenient and flexible crop management, to lower cost of production, higher productivity and/or higher net returns per hectare, health and social benefits, and a cleaner environment through decreased use of conventional pesticides, which collectively contributed to a more sustainable agriculture. The continuing rapid adoption of biotech crops reflects the substantial and consistent benefits for both large and small farmers, consumers and society in both industrial and developing countries.

While 25 countries planted commercialized biotech crops in 2009, an additional 32 countries, totalling 57 have granted regulatory approvals for biotech crops for import for food and feed use and for release into the environment since 1996.

From the economic gains of US\$51.9 billion during the period 1996 to 2008, 49.6% were due to substantial yield gains, and 50.4% due to a reduction in production costs. The accumulated benefits during the period 1996 to 2008 was US\$51.9 billion with US\$26.1 billion for developing and US\$25.8 billion for industrial countries.

In 2009, the global market value of biotech crops, estimated by Cropnosis, was US\$10.5 billion, (up from US\$9.0 billion in 2008); this represents 20% of the US\$52.2 billion global crop protection market in 2009, and 30% of the approximately US\$34 billion commercial seed market. The US\$10.5 billion biotech crop market comprised US\$5.3 billion for biotech maize (equivalent to 50% of global biotech crop market), US\$3.9 billion for biotech soybean, US\$1.1 billion for biotech cotton, and US\$0.3 billion for biotech canola. Of the US\$10.5 billion biotech crop market, US\$8.2 billion (78%) was in the industrial countries and US\$2.3 billion (22%) was in the developing countries. The market value of the global biotech crop market is based on the sale price of biotech seed plus any technology fees that apply. The accumulated global value for the twelve year period, since biotech crops were first commercialized in 1996, is estimated at US\$62.3 billion. The global value of the biotech

crop market is projected at over US\$11 billion for 2010. The estimated global farm-scale revenues of the harvested commercial 'end product', (the biotech grain and other harvested products) is much greater than the value of the biotech seed alone (US\$10.5 billion) – in 2008, the biotech crop harvested products were valued at US\$130 billion globally, and projected to increase at up to 10-15% annually.

The future adoption of biotech crops from 2010 to 2015, particularly in ISAAA's partner developing countries, will depend on three major factors:

- Establishment and effective operation of appropriate, responsible and cost/time-effective regulatory systems
- Strong political will and financial support for the development and adoption of biotech crops that can contribute to a more affordable and secure supply of food, feed and fiber
- Continuing and expanding supply of appropriate biotech crops, particularly the developing countries of Asia, Latin America and Africa.

Source: ISAAA Report No 41

Ethiopia Forms Committee on Biotech

A Public-Private Partnership Committee on Biotechnology (PPPCB) was formed in Ethiopia to advocate the amendment of the biosafety law and also negotiate cotton biotechnology access from international genetically modified (GM) cotton technology providers. This was agreed upon during the biotechnology stakeholders meeting held on April 14, 2010 in Addis Ababa, Ethiopia. The meeting was organized by the AfriCenter of the International Service for the *Acquisition of Agri-biotech Applications* (ISAAA).

The committee is composed of four cotton and textile industry representatives, two members from the Addis Ababa University and two members from the Ethiopian Agricultural Research Institute. The committee is chaired by the Cotton and Textile Industry Association. Currently about 110,000 ha is planted to cotton in Ethiopia. The industry is expected to grow 550,000 ha of cotton within the next four years. The total cotton production potential of Ethiopia is more than 3 million hectares. For more information, contact: Tilahun Zeweldu; E-mail: zeweldu@gmail.com.

CONTRIBUTIONS FROM SEED PROGRAMS AND PROJECTS

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

Ethiopia Releases Stem Rust (Ug99) Resistant Bread Wheat Varieties

The project on *Accelerated seed multiplication to counter the threat of stem rust* supported by USAID Famine Fund from 2008-2011, is implemented by ICARDA and CIMMYT in six countries: Afghanistan, Bangladesh, Egypt, Ethiopia, Nepal and Pakistan. The primary objective is to ensure fast replacement of existing commercial vulnerable varieties with new rust resistant high yielding varieties in the target countries, aiming at 5-10% variety replacement by the end of the 3 year rapid seed multiplication and distribution scheme.

From the outset, the project focuses on the following key areas to ensure success:

- Identifying stem rust (Ug99) resistant varieties adapted to target countries
- Fast-track release of promising lines through dialog with policy makers
- Popularization and promotion of released varieties
- Accelerated seed multiplication through pre-release and post-release seed

Two wheat variety trials were conducted during the 2009 main crop season in Ethiopia: (i) Variety verification trails for lines identified through regular variety development, evaluation and testing program; and (ii) variety adaptation trials for materials introduced through 'crash' program for Ug99.

Variety verification trials were planted on 100m² (10x10m) at five locations on stations and farmers' fields (2 locations per site) at Kulumsa ARC (and its sub-stations at Assassa and Bekoji), Holetta ARC and Sinana ARC. The two ICARDA lines (Flag 3 and Flag 5) identified through a regular program were included in variety verification trails (Table 1). The average yields of Flag 3 and Flag 5 were 5.03 and 5.2 t ha⁻¹, respectively over the

two years (2008 and 2009) with yield advantage of 17 and 21% over the popular commercial variety HAR1685 (Kubsa). The National Variety Release Committee (NVRC) has 'provisionally' released Flag 5 (ETBW5780) for large-scale seed multiplication and distribution.

The variety adaptation trials were conducted in 2009 (off-season) where five promising lines from CIMMYT were evaluated for stem rust and some agronomic performance on 100m² (10 x10 m) plots at Debre Zeit and Kulumsa ARC. During the 2009 main season variety adaptation trials were planted on 100m² (10x10m) at 10 locations including Kulumsa ARC and its sub-stations in Asasa, Arsi Negelle, Bekoji, Dhera, Sagure as well as in Adet (north-western Ethiopia), Debre Zeit and Holetta (central Ethiopia), and Arsi-Robie, Sinana (south-eastern Ethiopia). Yield data from Kulumsa and its sub-stations at Assasa, Bekoji and Sagure are presented in Table 2. Two CIMMYT lines, Danphe#1 (Danda'a, meaning durable) and Picaflor#1 (Kakaba, meaning early maturing) were recommended for release by the NVRC for large-scale seed multiplication and distribution.



Accelerated seed multiplication during the offseason at Melka Werer Agricultural Research Center.

During 2009 (main season) and 2010 (off-season) promising bread wheat lines from ICARDA (2) and CIMMYT (5) were multiplied at Kulumsa and Melka Worer ARCs as part of accelerated seed multiplication (Table 3).

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Table 1. Performance of promising wheat lines in variety verification trials in 2009 (main season)

Name and origin	Pedigree	Selection history	Grain yield (t/ha)	Yield (% over Kubsa)	Rust resistance		
					Yr	Lr	Sr
Flag 3 (SRRA-EA)	PYN/BAU//Milan (ETBW5514 renamed ETBW5775)	CMSW94WM00188S-03000M- 0100Y-0100M-15Y-4M-0Y-01AP- 0QTAP-0YTAP-0AP	5.030	17	5MS		15MS
Flag 5 (SRRA-EA)	PYN/BAU//Milan (ETBW5519 renamed ETBW 5780)	CMSW94WM00188S-0300M-0100Y- 0100M-15Y-8M-0Y-01AP-0QTAP-0YT	5.198	21	15MS		-
HAR1685 (Kubsa)	Commercial check		4.296				

Table 2. Performance of promising wheat lines in variety adaptation trials during 2009 (main season)

Name	Pedigree	Selection history	Grain yield (t/ha)	Yield (% of Kubsa)	Rust resistance			Septoria
					Rank	Yr	Sr	
Chonte #1	SERI1B*2/3/KAUZ*2/BOW/ /KAUZ/4/PBW343*2/KUKUNA	CGSS03B00169S-099M-099Y- 099M-39WGY-0B	3.7	5.7	4	15S	30SMS	74
Danphe #1	Kiritati//2*PBW65/2*SERI1B	CGSS02B00119T-099B-099Y- 099M-099Y-099M-24WGY-0B	3.7	5.7	5	20MS	15SMS	75
Munal #1	Waxwing*2/kiritati	CGSS01B00054T-099Y-099M- 099M-099Y-099M-13Y-0B	3.8	8.6	2	30S	50SMS	75
Picaflor #1	Kiritati//seri/rayon	CGSS02Y00152S-099M-099Y- 099M-46Y-0B	3.9	11.4	1	20S	20MS	86
QUAIU #2	Babax/LR42//babax*2/3/vivitsi	CGSS01B00046T-099Y-099M- 099M-099Y-099M-30Y-0B	3.7	5.7	3	15S	30SMS	88
Standard check			3.6	2.9	6	20S	50SMS	63
Local check			3.5	-	7	5MS	30MS	63

Note: Standard and local checks vary based on the test sites

Table 3. Amount of seed produced during main season (2009) and off-season (2010)

Name	Main season seed multiplication		Off-season seed multiplication	
	Area planted (ha)	Seed produced (t)	Area planted (ha)	Seed produced (t)
Chonte #1	0.63	2.32	17.01	25.90
Danphe #1	0.98	2.68	17.01	29.35
Munal #1	1.03	3.45	8.50	15.50
Picaflor #1	0.71	2.68	21.25	43.01
Quaiu #2	0.98	3.10	8.14	19.55
Flag 3	0.51	1.35	-	-
Amir-2	0.61	1.73	-	-
Total	6.0	18.2	71.91	133.30

Iran Releases Durum Wheat Variety

Iran released a durum wheat variety named Syrian-4 (Mrb11//Snipe/Magh/3/Rufom-7 ICD91-1251-AB-11AP-0AP-1AP-0AP). Syrian-4 (ICD91-1251) is a complex cross between parents Mrb11 (Omrabi11 a cross between Haurani and Jori: a line developed at ICARDA for dryland areas in West Asia) and Snipe: a line from CIMMYT (Magh: Maghrebi: a cultivar adapted in North Africa and Rufom: a line developed at ICARDA from Fufina and Omrabi for dry areas in West Asia).

The cross was tested and selected in Breda, Lattakia, Tel Hadya (Syria) and Terbol (Lebanon). Syrian-4 carries the combination of drought, cold, and heat tolerance, tolerance to rusts (Yr, Lr, Sr), septoria, root rots, insects (saw fly) and BYDV, with high grain quality and yielding ability in dryland areas. It was tested in multilocational nurseries and trials in CWANA and gave acceptable grain quality.

Morocco Releases Lentil Variety

In 2009, Morocco released a new high-yielding, drought-tolerant, disease-resistant lentil variety, Chakkouf (ILL 6001-81), developed jointly by Institut National de la Recherche Agronomique (INRA) and ICARDA. The new variety is from an ICARDA breeding line sent to Morocco under the international nurseries program and evaluated for nine years.

Chakkouf is an improved plant type with semi-erect growth habit, large seeds (4.75 g per 100 seeds) and yellow cotyledons. It is resistant to the two biggest lentil diseases in Morocco – rust and ascochyta blight – and also tolerant to drought. Data from long-term field trials highlight



the potential of the new variety: early flowering and maturity (135 days to harvest), suitable plant height (50 cm) and high grain yield, 1500 kg ha⁻¹ – 40% higher than the control variety used in the trials. Under favorable conditions and with good management, it can yield up to 2400 kg ha⁻¹.

Lentil is an important crop in Morocco, but cultivation has fallen by 60% in the past two decades, from 87,700 ha in 1985 to 32,700 ha today. Chakkouf, and other new varieties currently being developed, can help restore lentil production to earlier levels, improving food security and nutrition among poor households throughout the country.

Syria Releases Durum Wheat Varieties

The National Committee for Variety Release (NCVR), formed under Decree No 67 of 30 October 2002, is composed of representatives from the Ministry of Agriculture and Agrarian Reform (MAAR) and its affiliated Directorates of Plant Production, Plant Protection, Agricultural Extension, Statistics and Planning, and Agricultural Economics and Investment as well as GSCAR, GOSM and universities (Aleppo, Damascus, Tishreen). NCVR members recommended the release of two durum wheat varieties (Douma 41008 and Acsad 1229) by MAAR in Syria.

Douma 41009, developed in cooperation with the ICARDA, was released as Cham 9 for rianfed areas in Zone 1 of Al-Hasakeh, Aleppo, Daraa, Idleb and Tartus governorates. The average yield was 4440 kg ha⁻¹, 7% higher than two standard varieties, Bohouth7 and Bohouth 11 and 12% higher than Douma 1, in Al Hasakeh, Aleppo and Tartus governorates. It has good agronomic characteristics such as early maturity, good plant height, resistance to lodging and shattering, and tolerance to diseases such as rusts and Septoria.

ACSAD 1229 was developed in collaboration with ACSAD and released as Douma 3 for rainfed

areas of Zone 2 in Aleppo, Daraa, Hama, Idleb and Raqqa governorates. Average productivity was 2328 kg ha⁻¹, i.e. out yielding Douma1 by 16%, Cham 5 by 10%, Cham 3 by 15% and Haurani by 32%. It is early maturing and lodging resistant, with high protein percentage, and specific weight and crystalline; and resistance to yellow rust, stem rust and tolerance leaf rust.

Tajikistan Releases Barley and Chickpea Varieties

Pulodi, a new barley variety developed jointly by Tajikistan's Institute of Crop Husbandry, the Tajik Academy of Agricultural Sciences and ICARDA, has been released for cultivation by Tajikistan's State Variety Testing Commission. The variety is medium-tall, resistant to lodging, with high biomass yield, and resistant to locally important diseases.



Pulodi was developed at ICARDA between 2000 and 2002, and then tested for several years by the Institute of Crop Husbandry and finally by the State Variety Testing Commission. It gave yields of 3 to 3.5 t ha⁻¹ under rainfed conditions, and 4.5 to 5 t ha⁻¹ under irrigation. Barley varieties in Tajikistan are mostly used as forage, harvested during the heading stage. Pulodi is particularly suitable because of its high biomass yield and its earliness – its begins heading 8-10 days earlier than most other varieties, allowing farmers to grow two crops per year, even without irrigation.

Since 1995, ICARDA has been working with NARS of CAC region in introducing food legumes to diversify the agricultural production systems. In Tajikistan, a new chickpea variety Hisor 32 (ILC 3279) was released from ICARDA materials supplied through the international nurseries in 1999/00. In 2009, the State Variety Testing Commission officially released the variety after several years of selection and testing under



different environmental conditions of Tajikistan by NARS partners. The variety is adapted to rainfed areas and has an average plant height of 72-80 cm, a thousand seed weight of 260-270 g, resistant to black stem, and yield of up to 2 t ha⁻¹, an advantage of 14-15% over the standard check. The State Variety Testing Commission has issued the breeders certificate # 62 (in 2006) and patent #62 on 28 February 2010.

NARS has about 400 kg seed of Hisor 32 and efforts are being made to multiply all seed available during the off-season to make it available to farmers for the next planting season.

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Seed Amendment Bill to Encourage Public and Private Investment in Pakistan

In January 2010, Pakistan amended its Seed Act 1976, aiming to conform to WTO seed legislation and to address the requirements of the private sector. The bill, once passed, would increase the role of the private sector through registration of seed companies, seed dealers, etc. It would also enable the provision of pre-basic seed for production of basic and certified seed in the private sector. It would establish accredited seed testing laboratory in the private sector and enhance the capacity of seed law enforcement during marketing. The amendments would strengthen the provision of training for seed industry staff and regulate the quality of transgenic varieties developed through genetic engineering.

The bill would ensure the availability of quality seed to farmers, reduce dependence on seed import, encourage investment by multinational and domestic private seed firms, and enhance domestic seed production.

The Plant Breeders Rights (PBR) bill, already introduced in Parliament, would ensure IPRs to the breeders for development of new plant varieties. The PBR bill would pave the way for enhanced investment of public sector in breeding programs for development of high yielding hybrid

varieties. The bill would encourage plant breeders and seed organizations from the public and private sectors to invest in research and plant breeding. It would also contribute to the redevelopment and availability of new technologies and make additional resources available to support research in the country. In addition, multinationals and biotech seed companies will be encouraged to contribute to seed system development, through protection of their investment through PBR.

Source: SeedQuest.com

RESEARCH NOTES

Short communications on practical research or relevant information on agriculture or seed technology are presented in this section.

Forage Seed Production in Ethiopia

by Jean Hanson and Abate Tedla²

Abstract

Demand for forage seeds in Ethiopia is very variable and until recently has been linked to forage research and development projects. Issues of uncertain demand resulted in a high degree of risk to seed producers and reduced investment in a more formal seed system. This has led to either lack of seeds of new varieties and species or stimulation of informal forage seed supply systems to fill the gap. However, changes in land use, reduction in available grazing lands and increasing price of feed has led to feed shortages and the need for alternative feeds such as forages. This provides the opportunity for forage seed systems to develop to meet the needs of smallholder livestock producers. The forage seed system has changed in Ethiopia over the last two years with seven new suppliers of forage seeds starting to meet this emerging demand.

Background

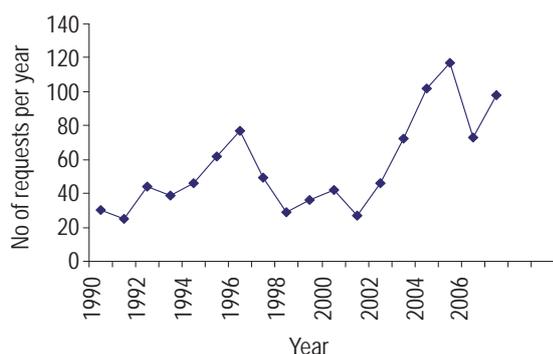
Livestock production in Ethiopia has traditionally depended largely on natural pastures and grazing but recent changes in land use resulting in reduction in available grazing lands, together with increasing price

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of feed, have led to feed shortages and the need for poor smallholder farmers to look for alternative affordable feeds. Interest in forages and forage seed supply and seed marketing has been growing, supported by the recent government focus on agricultural development and market orientation and funding of several development projects on dairy and meat production, where feed is a major constraint. New opportunities for export of meat and alfalfa hay to the Middle East are expected to increase demand for forages and hence forage seeds. Demand for forage seeds from ILRI has doubled since the 1990s (Figure 1) but still remains limited to few traditional and well-known species such as Napier grass, alfalfa and Rhodes grass (Table 1). Many of the forages requested by farmers in Ethiopia, as in much of sub-Saharan Africa, are commercial cultivars developed in Australia during the 1960s (Griffiths 1993, Hanson and Peters in Loch 2003) because these are familiar forages with market recognition.

Although seed systems for major crops such as wheat and barley are well developed in Ethiopia (Bishaw 2004), forage seed systems are only now developing. Uncertain demand, with an associated high degree of risk to seed producers, has been considered as the major reason for poor investment in forage seed supply in many developing countries (Ferguson and Loch in Loch and Ferguson 1999). Market price, linked to quality, availability and consumer preference for specific varieties, is very variable, affecting seed supply and deterring commercial producers from entering the seed market. This lack of investment in a more formal distribution seed system for forage seeds usually results in either lack of seeds

Figure 1. Forage seeds requests from ILRI in Ethiopia 1990-2007



of new varieties and species or stimulation of the informal sector to fill the gap (Ferguson in Loch and Ferguson 1999).

Forage seed systems have been categorized into formal seed supply systems, traditional farmer-saved seed supply systems and integrated community-based seed supply systems (Ferguson in Loch and Ferguson 1999). Rolston (1993) categorized herbage seed supply into centralized seed production by research institutes and state-run farms, forage users producing their own seed and contract multiplication for distribution by commercial seed companies or agencies. Participatory approaches to sustainable seed supply have added a broader socio-economic perspective to seed systems and recognized the role of the farmer in seed production for crops (Cromwell *et al.*, 1992; Bishaw, 2004). Forage seed supply systems in Ethiopia cover formal seed systems in government research institutions, farmer and community seed supply systems and more recently some involvement of private seed producers to meet the growing demand.

Role of ILRI in forage seed production in Ethiopia

As early as 1989, ILRI recognized the constraint of forage seed supply to increased use of forages and established a forage seed unit with funding from the Swiss Development Cooperation in response to the need to promote access to forage seeds and to enhance the incorporation of forages into sustainable farming systems in sub-Saharan

Table 1. Most requested forage planting material from ILRI over 15 years

Common name	Scientific name	Number of requests
Napier grass	<i>Pennisetum purpureum</i>	463
Lablab	<i>Lablab purpureus</i>	346
Alfalfa	<i>Medicago sativa</i>	296
Vetch	<i>Vicia villosa</i>	278
Rhodes grass	<i>Chloris gayana</i>	254
Cowpea	<i>Vigna unguiculata</i>	238
Sesbania	<i>Sesbania sesban</i>	216
	<i>Macroptilium</i>	
Siratiro	<i>atropurpureum</i>	202
Shrubby stylo	<i>Stylosanthes scabra</i>	194
Pigeon pea	<i>Cajanus cajan</i>	185
Desmodium silverleaf	<i>Desmodium uncinatum</i>	184
Desmodium Greenleaf	<i>Desmodium intortum</i>	177
Neonotonia	<i>Neonotonia wightii</i>	174
Axillare	<i>Macrotyloma axillare</i>	168
Oats	<i>Avena sativa</i>	160
Caribbean stylo	<i>Stylosanthes hamata</i>	160
Stylo	<i>Stylosanthes guianensis</i>	136
Setaria grass	<i>Setaria sphaecolata</i>	113
Leucaena	<i>Leucaena leucocephala</i>	95
Round leaf cassia	<i>Chamaecrista rotundifolia</i>	92
Quartin's clover	<i>Trifolium quartianum</i>	91
Stuedner's clover	<i>Trifolium stuedneri</i>	89
Guinea grass	<i>Panicum maximum</i>	88
Klein grass	<i>Panicum coloratum</i>	81

Africa (SSA). The role of the seed unit was to stimulate herbage seed production by providing starter seeds and training national partners in forage seed production.

The seed production unit focuses on providing a source of tropical forage seeds and planting material of selected best-bet species for use in establishing national forage seed production, including 33 species of herbaceous legumes, 10 species of grass and five species of fodder trees. Requesters, who are largely from the Regional Bureau of Agriculture, Ministry of Agriculture and Rural Development Offices, government research centers and NGOs in Ethiopia, are asked to cover the costs of production and shipping to discourage them from relying on ILRI as a continuous source of seeds. However, despite the high costs of seeds, ILRI has remained a major supplier of forage seeds in Ethiopia in the absence of alternative suppliers and

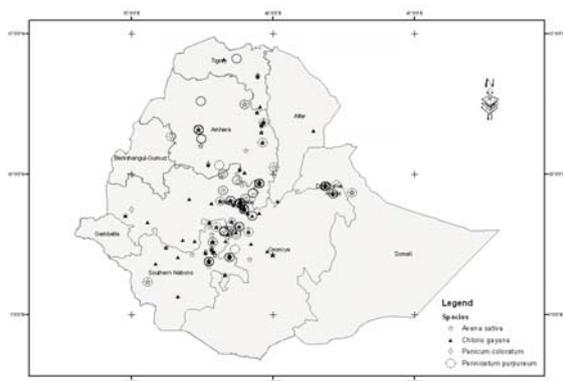
has provided over 7000 samples in response to 1100 orders from 1990 to date throughout much of Ethiopia (Figure 2). These seeds have been distributed to government offices and institutes, NGOs, educational institutions and private farmers and seed producers, providing starter seeds for forage production in the country.

Emerging forage seed systems

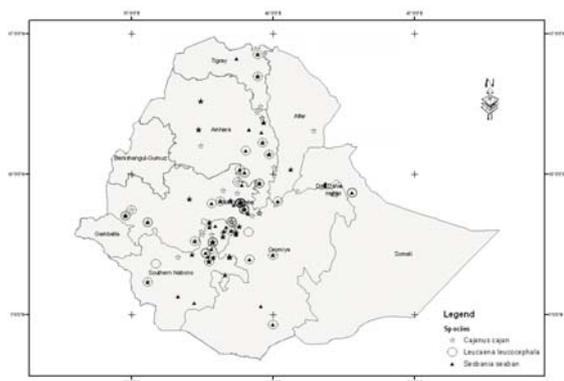
Demand is being stimulated by promoting forage use and specific cultivars, using promotional materials such as fact sheets and posters developed by the ILRI Forage Diversity and Fodder Adoption projects, the Improving Productivity and Market Success for Ethiopia Farmers (IPMS) project and Land O'Lakes, so that farmers know what is available and the benefits of growing forages. Changes in farmer preference as they become used to planting and using sown forages

Figure 2. Planting material distribution of major forage species from ILRI in Ethiopia over 15 years

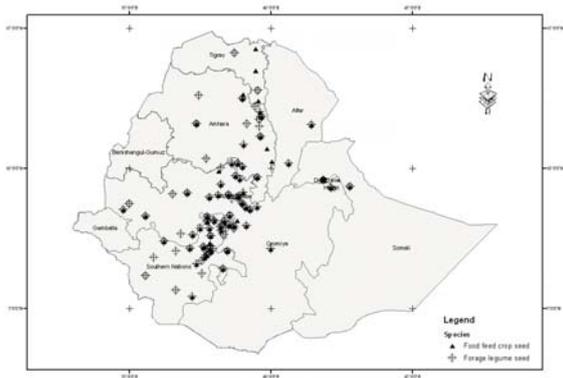
Forage grass planting material distribution



Fodder tree seed distribution



Forage legume seed distribution



Forage species distribution in Ethiopia

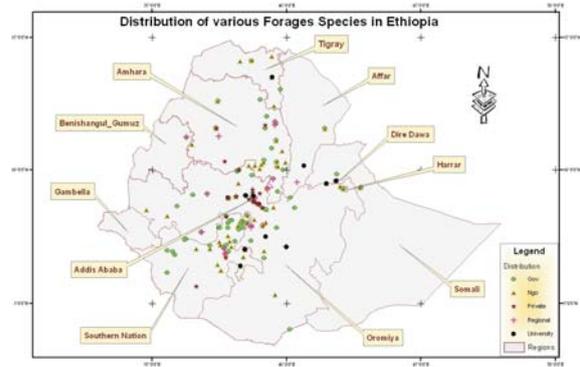


Table 2. Current sources of forage planting material in Ethiopia, 2009

Type of producer	Organization	Species available in large quantities (>100kg)	Species available in small quantities (<20kg)
Government institutions	Kulumsa ARC, Arsi	Fodder beets, Oats, Rhodes grass, Vetch	Alfalfa
	Adami Tulu ARC, Zwai	Cowpea, Lablab, Napier grass, Pigeon pea	Alfalfa, Rhodes grass
	Selale Office of Agriculture and Rural Development	Oats, Vetch	
Projects	Holeta Agricultural Research Center	Oats, Vetch	
	Land O'Lakes/Animal Feed Industry Association, Addis Ababa	Fodder beet, Napier grass, Oats, Vetch	Alfalfa
	ILRI, Addis Ababa	Cowpea, Lablab, Leucaena, Napier grass, Oats, Pigeonpea, Sesbania sesban, Vetch	Alfalfa, Axillare, Centrosema, Desmodium, Pamicum, Rhodes grass, Roundleaf cassia, Setaria, Siratro, Stylos
	Alamata Office of Agriculture and Rural Development	Cowpea, Lablab	Alfalfa, Buffel grass, Rhodes grass
Private sector	Bure Office of Agriculture and Rural Development	Napier grass, Oats, Pigeonpea, Sesbania sesban, Vetch	Alfalfa, Rhodes grass, Desmodium, Phalaris aquatic
	Eden Field Agri-Seed Enterprise, Debre Zeit	Cowpea, Desmodium, Lablab, Leucaena, Napier grass, Oats, Pigeon pea, Sesbania sesban, Siratro, Tree Lucerne, Vetch	Alfalfa, Rhodes grass

are also reflected in demand. Demand is increasing over time but is still very variable from year to year (Figure 1). This may be due to the perennial nature of the forage, changes in farmer preference, alternative suppliers or farmers becoming more aware of new options through improved national extension services, NGOs or other institutions working with participatory selection and extension. The forage seed system has changed in Ethiopia over the last two years with several new suppliers coming into the market to meet this increasing demand. Government research stations have taken over production of a limited range of species and the IPMS project has also started forage seed production in two of the pilot *woredas* (Table 2). Some farmers are also producing limited quantities of a small range of species and it is expected that private seed producers will increase in number in future if demand grows. Due to the growth of the national seed sector, ILRI is now re-evaluating its role in forage seed supply and looking at options and opportunities for both the public and private sector to enter the market. ILRI will continue to focus on capacity strengthening and provision of foundation seeds of new and promising forage types to the public and private sectors, as well as researching the processes and enabling environments that support development of forage seed systems.

The current growth of forage seed systems is expected to continue in Ethiopia as demand for feed increases to support the growing market demand for livestock products. In order to support this, functioning public private partnerships for forage seed production must be established to make sufficient forage seed of key species available. Testing and selection of private sector and community based agri-business models for scaling up is an important step to support seed systems development. It must also be backed by strengthening the capacity of national partners in both the public and private sectors in developing appropriate feeding strategies for the needs of smallholder farmers and forage seed production to meet the anticipated demand.

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MEETINGS AND COURSES

Announcements of meetings, seminars, workshops and training courses appear in this section. Please send in announcements for national, regional, or international workshops, seminars and training courses organized in your country for inclusion in the next issue.

Conferences

Asian Seed Congress 2010 in Kaohsiung Taiwan, 13-17 November 2010. Taiwan has a flourishing agricultural industry that resulted in significant increase in both the volume and quality of seed produced in the country. The revenue of the seed industry is estimated at \$450 million of which the horticultural sector accounts for 68%. Seed exports, mainly to south Asia, accounts for about US\$109 million annually. The Asia Seed Congress will be held in Kaohsiung, the second largest city in Taiwan. For further information please contact: APSA Secretariat, P.O. Box 1030 Kasetsart Post Office, Bangkok 10903, Thailand; Tel: +66-2-940-5464; Fax: +66-2-940-5467; Email: apsa@apsaseed.org or visit: <http://www.apsaseed.org/>

Courses

Distance Learning 2010 Sessions

UPOV runs the Distance Learning Course DL-205 'Introduction to the UPOV System of Plant Variety Protection under the UPOV Convention'. The next session is scheduled for the period 8 Nov to 12 Dec 2010 (on-line registration: 1 Aug to 30 Sep). For more information visit the UPOV website: <http://www.upov.int/en/about/training.html>.

Plant Breeding Academy at UC Davis

The Seed Biotechnology Center at the University of California, Davis has organized a professional development course to teach the principles of

plant breeding to seed industry personnel. This two-year course addresses the reduced numbers of plant breeders being trained in academic programs. Participants meet at UC Davis for six sessions over two years. Readings and exercises continue between sessions via the internet to allow participants to maintain their current positions while being involved in the course.

This course develops the skills of current industry personnel to enable them to become independent breeders or more valuable contributors to larger breeding programs. The course is targeted toward personnel currently involved in plant breeding programs who lack the academic background in genetics theory and practice to advance as independent breeders. Current breeders who desire a refresher course or would like to broaden their expertise would also be potential participants.

Instruction for the 2010-2012 Academy cohort begins in Fall 2010 and runs through Summer 2012. For more information contact: Joy Patterson at jpatterson@ucdavis.edu

LITERATURE

Books and journal articles and other literature of interest to readers are presented here. Please send information on seed and other agriculture related publications on policy, regulation, and technology to the Editor for inclusion in *Seed Info*.

Books

Ceccarelli, S., E.P. Guimaraes, E. Weltzien (eds.). 2009. Plant breeding and farmer participation. FAO, Rome, Italy. The book is aimed at plant breeders, social scientists, students and practitioners, with the hope that they all will find common ground to discuss ways in which plant breeding can be beneficial to all and can contribute to poverty alleviation. This book demonstrates that PPB is in essence no different from conventional plant breeding, being based on the very same principles of Mendelian, quantitative and population genetics, and therefore has complemented the traditional approach to plant breeding with a number of chapters addressing issues specially related to the participation of farmers in a plant breeding program. You can download this publication from: <ftp://ftp.fao.org/docrep/fao/012/i1070e/i1070e.pdf>.

Lipper, L., L. Anderson and T. Dalton (eds.). 2010. Seed trade in rural markets: Implications for crop diversity and agricultural development. Feeding a growing population and improving the management of natural resources are two of the most urgent challenges facing the world today, and agricultural markets, seed systems and crop genetic resources (CGR) lie at the heart of both. To support sustainable development and use of plant genetic resources, this book proposes increasing farmers' access to crop genetic diversity by strengthening the capacity of seed supply systems to provide the range of crops and varieties farmers need, together with information needed to make appropriate selections, delivered at an affordable cost.

With case studies from Bolivia, India, Kenya, Mali and Mexico, this book examines the range of seed varieties on offer in local markets, the information about them and the relative prices. In India, most seed is obtained locally from social networks, but local rural markets are becoming an increasingly important source of traditional and improved millet varieties, particularly when traditional seed systems break down due to drought or conflict. Overall, the five case studies demonstrate that the more developed the markets, the lower the cost of seed and greater the availability of CGR, but that availability of accurate information on seed varieties decreases.

Aimed primarily at policymakers, researchers and development practitioners, *Seed trade in rural markets* concludes that addressing information failures in local markets will significantly improve the capacity of the informal seed sector to meet farmers' needs. Published by FAO (www.fao.org/publications) and Earthscan (www.earthscan.co.uk) 232pp, ISBN 978 1 84407 785 4(Pb), Price: £29.95

Bill R Gregg and Gary L. Billups: 2009. Seed conditioning. Volume 1: Management. Seed conditioning turns raw harvested seed into pure seed that is free of undesirable materials, safe from pests and diseases, and can be planted for a good stand of healthy plants of the desired crop. The cost of conditioning is a major component of the capital investment. Conditioning is the most significant process in the seed industry. It involves machines, engineering, operations, biology, physics, plant physiology and pathology, science, and business. It must be accurate, economic and practical.

To make seed conditioners more efficient, this *Seed Conditioning* compendium was prepared. Based on real-life experiences, trials and efforts of many conditioners were compiled and distilled into brief and easy to understand forms. The compendium is in three volumes: [1] *Management*, essential aspects of organizing and managing a seed conditioning operation; [2] *Technology*, the equipment and processes used in seed conditioning; [3] *Crop seed conditioning*, available information on experiences on conditioning different crop seed. Science Publishers, Edenbridge Ltd., British Isles, P.O. Box 699, Enfield, NH 03748, USA; Email: sales@scipub.net; ISBN 978-1-57808-572-9; 497pp; Price: US \$145/£ 81.

Howard, P.H. 2009. Visualizing consolidation in the global seed industry: 1996-2008. Sustainability, 1266-87. The commercial seed industry has undergone tremendous consolidation in the last 40 years as transnational corporations entered this agricultural sector, and acquired or merged with competing firms. This trend is associated with impacts that constrain the opportunities for renewable agriculture, such as reductions in seed lines and a declining prevalence of seed saving. To better characterize the current structure of the industry, ownership changes from 1996 to 2008 are represented visually with information graphics. Since the commercialization of transgenic crops in the mid-1990s, the sale of seeds has become dominated globally by few multinational companies. In addition, the largest firms are increasingly networked through agreements to cross-license transgenic seed traits. Download this article from: <http://www.mdpi.com/2071-1050/1/4/1266/pdf>

Byerlee, D. and Dublin, J. 2010. CGIAR'S Open access and international collaboration. International Journal of Commons 4 (1): 452-480. Derek Byerlee and Jesse Dublin share these insights in crop improvement in the CGIAR as a global success story of open access and international collaboration published in *The International Journal of the Commons*.

Open-source collaboration includes: (i) free distribution and redistribution of the original materials, (ii) free redistribution of materials derived from the originals, (iii) full sharing of information, including pedigrees and grain yield, disease resistance and other information relating to the materials, (iv) non-discrimination in

participation in the networks, and (v) intellectual property rights on final materials that, if used, did not prevent their further use in research.

The history and impacts of the international wheat program are discussed to illustrate the open-source system. It also highlights the challenges of maintaining and evolving such a system over the long-term. For the full article view

<http://www.thecommonsjournal.org/index.php/ijc/article/view/147/147>

Nanda, S. and Arunachalam, S. 2010. reaching the unreached: community-based village knowledge centers and village resource centers. Since 1992, the M.S. Swaminathan Research Foundation (MSSRF) has been using both traditional and modern technologies to provide locally specific information to rural communities in India. Through community owned Village Knowledge Centers (VKCs) and Village Resource Centers (VRCs), the MSSRF provides specially designed websites, in the local language, that present the information requested by the community. Then village volunteers are trained to use and maintain the computers, as well as gather and input information. *Reaching the unreached* provides a detailed account of how the knowledge centres work and the impact they have had. It aims, ultimately, to encourage local government authorities across India to set up similar centres in rural communities.

Website: www.mssrf-nva.org; ISBN 978 1 88355 15 0 (pdf), 106pp, free to download.

Mortimore, M. 2009. Dryland opportunities: A new paradigm for people, ecosystems and development. Drylands cover 41% of the earth's surface, and provide vital services that support agricultural and pastoral livelihoods. But in most countries dryland ecosystems have been neglected in investment and development. *Dryland opportunities* tackles the misconception that drylands are 'economic wastelands', describing how these ecosystems are economically and environmentally valuable and suggesting practical options for development.

To promote sustainable development of dryland communities, the authors recommend: recognizing local knowledge and strengthening research into climate change, adaptation and sustainable land management; re-evaluating and sustaining dryland ecosystem services, including

soil, wetlands, natural pastures, and non-timber forest products; promoting public and private investment; improving access to profitable markets; and prioritizing rights to land and managing risk through insurance and diversification. Published by IUCN, IIED and UNDP; ISBN 978 2 83171 183 6(Pb), 86pp, Price US\$18 or free to download

Websites, Journals, Newsletters

Websites

The Arab Science and Technology Foundation (ASTF) is a new virtual network established by the Arab Materials Science and Nanotechnology Network. It aims at:

- Connecting people and entities from across the regions that share the same discipline
- Creating opportunities for collaborative research
- Promoting 'nano-tech' education as a means of increasing science literacy and public awareness of nanotechnology worldwide
- Serving as a clearinghouse providing resources for the 'nano-tech' community

Visit <http://amsn-network.astf.net>. For further details, contact: Dr. Amal Amin, Coordinator of AMSN at: amsn-network@astf.net

Global Partnership Initiative for Plant Breeding Capacity Building (GIPB)

GIPB announces an online national plant breeding program for 35 countries.

http://km.fao.org/gipb/index.php?option=com_content&view=category&id=43&Itemid=389

The GIPB welcomes readers to check the information and send updates and comments for those countries on the website, and to encourage others not on the website to send their contributions, based on the same format.

World Bank Database

The World Bank Group now provides free, open, and easy access to its comprehensive set of data on living standards around the globe, some 2000 indicators, including hundreds that go back 50 years. The data are available in English, Arabic, French, and Spanish. Apart from giving open access to the World Development Indicators, with nearly 1000 indicators, the initiative also opens up the Global Development Finance (GDF),

Africa Development Indicators (ADI), Global Economic Monitor (GEM), and indicators from the Doing Business report.

Access to these resources is available at data.worldbank.org. A data catalog lists of the databases is also available. For users in areas without internet access, print and CD-ROM editions of WDI, GDF, ADI, and other products will continue to be available, now at a much-reduced cost.

For more information, visit www.worldbank.org. For questions, please email the following addresses: (i) for technical issues on the new data platform (data@worldbank.org); (ii) for existing online database subscription (onlineresources@worldbank.org); (iii) for print and CD-ROM editions of the databases (books@worldbank.org).

FAO database

FAO is granting free and open access to its central data repository, FAOSTAT, the world's largest statistical database on food and agriculture, containing over one million data points covering 210 countries and territories. FAOSTAT includes data on agricultural and food production, usage of fertilizers and pesticides, food aid shipments, food balance sheets, forestry and fisheries production, irrigation and water use, land use, population trends, trade in agricultural products, the use of agricultural machinery, and more.

FAOSTAT is available in English, French or Spanish. It allows users to select and organize the statistical information into tables and charts according to their needs and to download it in Excel format. The original statistic data is supplied by individual countries and regional development organizations in standardized formats. Records go back to 1961, the dawn of the Green Revolution.

This reservoir of knowledge is already being used by economists, planners and national development authorities, donor agencies, international aid organizations, other UN agencies, NGOs, academic researchers, investors – and farmers.

New Journals

World Agriculture

The two big issues facing humanity today are food security and climate change. *World Agriculture*, an

independent, peer-reviewed, non-profit, journal, will explore scientific, economic and social evidence concerning agriculture and its interaction with forestry, climate change, population growth, migration, disease and ecology.

With an expected increase in world population to 9.1 billion over the next few decades, how can the necessary increase in agricultural production be achieved without increasing fossil fuel use, whilst maintaining forests and an adequate natural ecological balance? For further information contact: editor@world-agriculture.net; or visit <http://www.world-agriculture.net>

Educational DVDs

The International Service for the Acquisition of Agri-biotech Applications (ISAAA) has co-produced with Courter Film and Associates a series of six short videos on *Highlights of the Global Status of Biotech Crops*. ISAAA dedicates these videos to the late Nobel Peace Laureate Norman Borlaug, Dr Clive James, ISAAA Founder and Chair, and author of the Annual Review of the Global Status of Biotech Crops, provides a comprehensive analysis of the different themes of the video series. All six videos are available in video streaming or in downloadable format at the ISAAA website (<http://www.isaaa.org>).

Seed Newsletter

The ISTA News Bulletin, 'Seed Testing International', is distributed not only to ISTA members in more than 70 countries, but also to over 2500 addresses world-wide.

It includes reports from the ISTA President, the Technical Committees and the Secretariat. It also includes articles addressing issues of common technical interest and accreditation, reports from various meetings and congresses, regional news, and other issues concerning seed testing in general.

Two issues are published per year, in April and October. Persons interested in submitting an article for publication, or placing an advertisement, can contact the editorial staff at the ISTA Secretariat.

Persons wishing to subscribe to the 'Seed Testing International' may order it online (<http://www.seedtest.org/en/productrubric.html>) free of charge.

About ICARDA and the CGIAR



Established in 1977, the International Center for Agricultural Research in the Dry Areas (ICARDA) is one of 15 centers supported by the CGIAR. ICARDA's mission is to contribute to the improvement of livelihoods of the resource-poor in dry areas by enhancing food security and alleviating poverty through research and partnerships to achieve sustainable increases in agricultural productivity and income, while ensuring the efficient and more equitable use and conservation of natural resources.

ICARDA has a global mandate for the improvement of barley, lentil and faba bean, and serves the non-tropical dry areas for the improvement of on-farm water use efficiency, rangeland and small-ruminant production. In the Central and West Asia and North Africa (CWANA) region, ICARDA contributes to the improvement of bread and durum wheats, kabuli chickpea, pasture and forage legumes, and associated farming systems. It also works on improved land management, diversification of production systems, and value-added crop and livestock products. Social, economic and policy research is an integral component of ICARDA's research to better target poverty and to enhance the uptake and maximize impact of research outputs.



The Consultative Group on International Agricultural Research (CGIAR) is a strategic alliance of countries, international and regional organizations, and private foundations supporting 15 international agricultural Centers that work with national agricultural research systems and civil society organizations including the private sector. The alliance mobilizes agricultural science to reduce poverty, foster human well being, promote agricultural growth and protect the environment. The CGIAR generates global public goods that are available to all.

The World Bank, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP), and the International Fund for Agricultural Development (IFAD) are cosponsors of the CGIAR. The World Bank provides the CGIAR with a System Office in Washington, DC. A Science Council, with its Secretariat at FAO in Rome, assists the System in the development of its research program.

The views published in Seed Info are those of the contributors and do not necessarily imply the expression of any opinion on the part of the Editor, the WANA Seed Network, or ICARDA.
