SEED INFO

Official Newsletter of the WANA Seed Network

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EDITORIAL NOTE

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

The WANA Seed Network corner provides information on activities related to global and/or regional cooperation and collaboration to facilitate the development of a vibrant regional seed industry. In this issue, we highlight the national consultation workshop in Iran that set about to establish a national umbrella seed industry association. This organization would represent the interest and protect the rights of its members, the national seed industry, and networking members, and establish links to the regional and global seed industries. This issue also presents the highlights of the FAO Expert Consultation on Seed Policy Formulation.

In the **NEWS AND VIEWS** section, Rudi Schachl presents a proposal for a Glacial Gene Center for Cereals. The article discusses the gene center theory by Vavilov. It also reflects on the genetic and evolutionary aspects of a gene center, taking into account the origin of domesticated plant species rather than the variation arising from their use in agriculture. In this context, a 'glacial gene center for cereals' in the Arabian peninsula and the emergence and movement of gene centers, most probably before variation created by humans lead to their eventual and gradual domestication, is discussed.

There is news from regional and/or international organizations, such as the African Union Commission (AU), UN Economic Commission for Europe (UNECE), and the International Union for the Protection of New Varieties of Plants (UPOV). UNECE is one of the five regional commissions of the United Nations with the primary goal of encouraging greater economic cooperation among its 56 member states. The UNECE reports on setting standards for seed potato to facilitate fair international trade and prevent technical barriers to trade, improving producers' profitability and encouraging production of high-quality produce, and protecting consumer interests.

The section on **SEED PROGRAMS** includes news from Eritrea, Ethiopia, Iran, and Pakistan. From Eritrea, the report covers the outcomes of a national seed workshop, organized in collaboration with ICARDA and IFAD. The workshop sought to implement the national seed system development project and to prepare a consolidated 2011/12 work plan based on project design documents. Major stakeholders from the Ministry of Agriculture and affiliated departments participated in the meeting. The news from Ethiopia describes the release of wheat rust resistant varieties, developed through collaboration between the Ethiopian Institute of Agricultural Research (EIAR) and ICARDA, and quality protein maize developed in conjunction with CIMMYT. ICARDA, with the USAID Famine Fund Project, is supporting accelerated seed multiplication (off-season and main season) and popularization of these newly released varieties; working with partners including EIAR, Ethiopian Seed Enterprise, etc. to ensure availability and access to seed by farming communities across the country. In Iran, the news covers the efforts made to strengthen plant variety protection within the Seed and Plant Certification and Research Institute (SPCRI), with the assistance of the FAO TCP Project. News from Pakistan focused on the release of various agricultural and horticultural crops in 2011 by the Punjab Seed Council.

The **RESEARCH** section captures information on adaptive research or issues relevant to seed program development in the region and beyond. This issue features an article entitled *'Supporting Local Seed Systems: the Case of Faba Bean in Waterlogged Areas of Central Ethiopia'*, by Wondafrash Mulugeta et al. from the Debre Birhan Agricultural Research Center of the EIAR. The article describes Participatory Variety Selection (PVS) through Farmer Research Groups (FRGs) organized by the center and the support provided to local seed production and marketing to facilitate adoption and diffusion of improved varieties in the central highlands of Ethiopia.

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

Have an enjoyable 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.

Iran Holds Consultation Workshop on Forming National Seed Association

The Seed and Plant Certification and Research Institute (SPCRI) organized a national consultation meeting on the formation of a national seed association on 27 February 2011 in Karaj. Various stakeholders from the national seed sector in Iran participated in the sessions. The workshop was attended by 68 people from different institutions, including the managers of public and private seed companies, leaders of various professional associations (growers, cooperatives), the Seed and Plant Improvement Institute (SPII), SPCRI, etc.

Two presentations were made during the workshop, (i) Overview of the seed sector in Iran (SPCRI) and (ii) The need for a national seed association (ICARDA). The presentation from SPCRI focused on summarizing key policy and regulatory issues pertinent to the seed sector and emphasizing the role of the private sector in Iran. ICARDA's presentation, based on its regional and international experience, focused on the roles of the private sector and national seed association in development of the seed sector. The presentation also outlined the key role of the association at national, regional, and global levels highlighting its mission, objectives, activities, organization, etc. ICARDA presented a road map for the establishment of a national seed association and suggested forming a 'consultative committee'.

Both presentations generated keen interest and discussion among the participants. During the ensuing discussions, most delegates endorsed the idea and formed a 10-member 'Core Group' representing the major stakeholders of the seed sector. The group will undertake further consultations and develop an action plan and timeframe for the formation of a national seed association. The action plan included:

- Developing a list of activities and a
- timeframe for their completion
- Preparing and circulating draft bylaws for the association
- Surveying seed companies interested to join the association
- Organizing a founding congress of the national seed association

Participants of the national consultation workshop in Iran

The formation of a national umbrella organization is crucial to expanding the participation of the private sector by:

- Representing the interests and protecting the rights of its members and the national seed industry
- Participating in national dialogues and contributing to the development of an effective policy and regulatory framework for the seed industry
- Organizing a database of the seed sector and disseminating information to members and stakeholders
- Developing and enforcing ethical standards for the seed industry
- Networking members and establishing links to regional and global seed industry
- Providing training to strengthen the capacity of its members.

ICARDA will provide support in the development of bylaws and the establishment of the national seed association.

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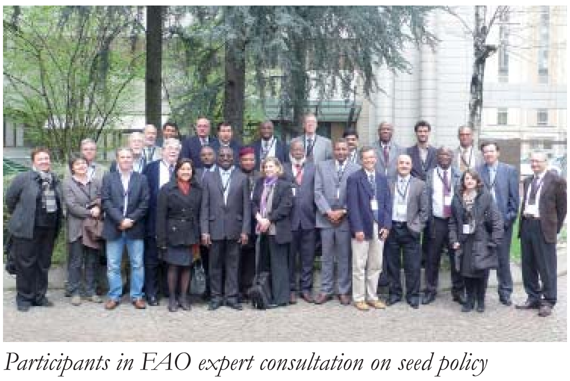
FAO Expert Consultation on Seed Policy Formulation

Important investments in the development of the seed sector were made in developing countries between the 1950s and the 1980s. Seed programs developed during this period were generally based on a dominant role for the State in the various areas of the seed sector. In the following years, approaches based on the disengagement of the State from the seed sector were implemented. In some countries, this led to the development of a dynamic private seed sector, but in many others the public seed sector collapsed and the private sector never took over. Today, many countries have a poorly developed seed sector that cannot provide farmers with adequate access to seed. The 2008 food price crisis, climate change issues, and the recent recognition of the importance of agriculture in economic growth have provoked a renewed interest in investing in the development of the seed sector. This is recognized as being a critical step for the development of agricultural production and productivity.

In 1998/99, FAO undertook a number of regional workshops on seed policy in Africa, Asia Pacific, Eastern Europe, and the Near East to identify the elements that led to the development of the seed industry. In recent years, FAO has received a number of requests for assistance from member countries to develop or review their seed policies. The increased interest in this domain calls for the development of comprehensive guidelines to assist the seed industry in this process. However, recent developments in the general agricultural context, international instruments, development paradigms, and the international seed sector raise issues on the strategic choices to be made by countries.



Participants in FAO expert consultation on seed policy

It has become clear that seed policy must be closely aligned with the level of development of the agriculture sector. The issues to consider range from the link between agriculture research for the development of new varieties, variety release, early generation seed production, certified seed production by the public and private sector, and the national seed service to seed legislation options. Plant variety protection regimes, subsidies, seed prices, biotechnology, the seed saved by farmer, seed extension and strategies for the introduction of new varieties, and the conservation of adapted landraces, all these issues need to be addressed in seed policies. In this context, FAO decided to bring together international seed policy experts to review sector development issues, the component of seed policies, and methodologies for the formulation and implementation of seed policies. The experts would elaborate guidelines for seed policy formulation for the use of FAO member countries.

Within this context, an expert consultation workshop on seed policy formulation was organized by FAO and ENSE/INRAN 28-30 March 2011 in Milan, Italy. The 30 participants included Ministry of Agriculture officials, researchers, seed policy experts, seed experts, representatives of the private sector, and additional FAO officers from the International Treaty Secretariat of Plant Genetic Resources for Food and Agriculture (PGRFA), agriculture policy, economics, and legal services. During the workshop, presentations were made on key issues to stimulate discussion. Case studies of successful seed policies implemented on different continents were also presented. The results of the discussions will be used to improve FAO guidelines to member countries on seed policy formulation and/or review.

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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.

A Glacial Gene Center for Cereals[1]

The question of the origin of plant species and their possible transformation to cultivated forms arises several times. The paper discusses the gene center theory by Vavilov. It reflects on the genetic and evolutionary aspects for a gene center, taking into account the origin of domesticated plant species,

[1]This article is intended to stimulate discussion on a propsotion of 'glacial gene center for cereals'. Anyone interested for responding can send a contribution to the Editor of Seed Info at z.bishaw@cgiar.org. References to the article are also available from the author and editor.

instead of the variation arising from their use in agriculture. In this context, it considers a 'glacial gene center for cereals' in the Arabian Peninsula and the emergence and movement of gene centers, most probably before variation created by humans lead to their gradual domestication.

1. Introduction

At the end of 17th century, the existence of plant and animal species was asserted. J. Ray defined species as group of individual plants or animals that propagate with one another, a definition which is still valid today. While C. de Montesquieu and C. von Linné questioned the invariability of species, P.L.M. de Maupertius, D. Diderot, and M. Adanson accepted the invariability of species, but assumed inheritance of individual variation within species.

E. Darwin, in his book 'Zoönomia', considered the variation of species. J. de Lamark assumed little difference among species, but asserted that species are descended from other species and anticipated the theory of evolution. He considered two factors responsible for the evolutionary process – an internal desire of the individual for perfection leading from a simple to a more complicated organism, and variation due to environmental change. Consequently, he postulated that these variations are inherited.

E.G. de Saint-Hilaire and G. Cuvier rejected the alteration of individuals caused by an internal desire. G. Cuvier believed that catastrophic events might lead to the extinction of species and the creation of new ones. Although the theory of 'catastrophic events' did not hold, Cuvier proposed two important evolutionary processes – species became extinct and newly created species did not succeed one another, but become divergent.

The theory of evolution and variation of species lacked clear evidence and scientific explanation, until Charles Darwin's expedition. This provided him with an opportunity to study and demonstrate the variability of species, and identify the key factors for evolution – adaptation by selection. It clearly demonstrated that species can show divergent development, but can be traced back to common ancestors. All individuals within a species, to a certain extent, differ from each other, offering the possibility to react individually to selective influences in the environment and finally splitting into a new species. However, no plausible explanation was offered earlier for the organism to react individually and differently to selective factors, although it had already been described by G. Mendel. However, 'Mendel's law' was ignored until its discovery by Tschermak-Seysenegg, Correns, and De Vries at the beginning of the last century.

Darwin´s 'theory of evolution' gave an essential and reasonable scientific explanation for the diversity of life. A.W. Russell, independent of Darwin, concluded that species show variability under natural selection. T.H. Huxley and E. Haeckel refined the theory of evolution and paved the way for its scientific acceptance. Haeckel not only influenced decisively the biological understanding of evolution, but also indirectly contributed to Vavilov´s gene center theory.

A. de Candolle in his book 'Geographie Botanique Raisonnée' was the first botanist who focused on the origin of cultivated plants and searched for the initial stages of species and their geographic origin before they became domesticated. Taking into account the importance of selection in evolution, de Candolle assumed that the existence of plants able to meet the desires of human is a critical factor for the evolution of cultivated plants; and that diversity is the result of human selection after the species has been identified and domesticated. At the end of 19th century, de Candolle listed 247 cultivated plants as compared to the first (1962) and revised (1986) editions of 'Directory of Cultivated Plants' by R. Mansfeld, which listed 1430 and 4800 species/sub-species, respectively (R. Mansfield 1986). Legumes (658 spp.) and Poaceae (600 spp.) constitute about one quarter of the commonly cultivated plants, followed by Rosaceae (226 spp.), Compositae (215 spp.), Euphorbiaceae (136 spp.), Labiatae (127 spp.), and Solanaceae (115 spp.).

2. Gene centers of cultivated plants

2.1 Theory of gene centers

In 1927, at the International Congress of Genetics held in Berlin, N.I. Vavilov presented his paper on 'Geographic Centers of Cultivated Plants' (Vavilov 1928) based on several expeditions during his directorship of the All Union Institute in Leningrad, Russia. The essential tenets of his theory are summarized as follows: (i) there are centers of large variation of cultivated plants; (ii) these centers are also the centers of origin; and (iii) these centers of origin are characterized by the presence of a large number of dominant genes.

Vavilov originally identified five centers, but by 1935, he had expanded the number to eight. These were known as the 'gene centers or centers of variation for cultivated plants' (Vavilov 1935). These centers included (Figure 1) (i) China, (ii) India including Indonesia and Malaysia; (iii) Central Asia including northwest India to Uzbekistan); (iv) the Middle East; (v) the Mediterranean area; (vi) Ethiopia; (vii) southern Mexico and Central America; and (viii) South America (Peru, Ecuador, Bolivia) and the Island of Chiloe. Vavilov assumed that these centers were also the centers of origin of agriculture, where farming started.

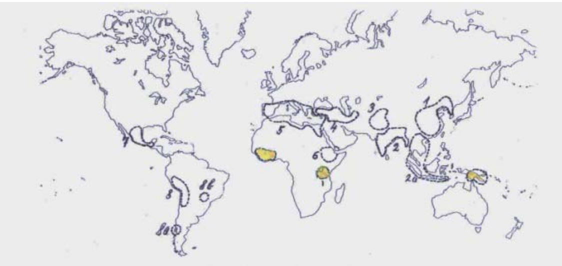

Figure 1. Centers of diversity by Vavilov (modified by Frankel & Bennet and enlarged to equatorial centers (dark color) by Plarre)

Vavilov used the terms 'primary' and 'secondary' centers although he did not clearly formulate the distinction between the two types. He understood 'secondary' centers as centers where weedy plants originally followed cultivated plant species and were later cultivated by men. For example, Iran is a primary center for wheat, but a secondary center for rye, although originally both wheat, as a primary crop, and rye, as a weed, grew together. A gene center could be a 'primary' center for a certain species or a 'secondary' center for another.

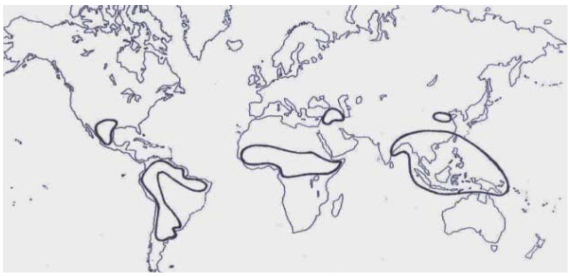

Figure 2. Centers of first agricultural activities for field crops

2.2. Criticism of the theory of gene centers

E. Schiemann (1932, 1939) emphasized that the centers of cultivated plants identified by Vavilov, need not necessarily be the centers of origin. Instead, he used the term 'secondary center' for such gene accumulation centers which are characterized by the lack of wild relatives contributing to the evolution of cultivated plant species. In such centers, the cultivated plant species developed large variations following interventions by humans. The findings were based on a study of *Hordeum vulgare* and *Triticum dicoccum* in Ethiopia, as there were no wild relatives of these crop species in the country. The same would apply to the variations of cereals along the Alps in mid-Europe, which are comparable with the variations in the gene center. The secondary gene center proposed for the Alps by Mayr and Werneck (1935) was criticized by Schachl (1981, 1982, 1998), because the genetic and evolutionary preconditions for a gene center are missing.

Darlington (1945, 1957) concluded that there is a small number of cultivated plant species where the centers of origin are clearly defined and the cultivated plant species show polyploidy. In his opinion, all other plant species have been domesticated from their wild relatives and become cultivated plants in a broader area and over a longer period. He further stressed that the origin of several cultivated plant species, like *Ananas comosus* or *Hevea brasiliensis,* does not show clearly defined boundaries, hence the term 'center' is not applicable. Schiemann and Darlington suggested that a gene center may change its geographic location – it could be the center of origin, but it could also be a center of diversity following human selection after cultivated plants were introduced there.

Darlington and Jannaki Ammal (1954) expanded the theory of gene centers and included Brasilia-Paraguay and the USA – the latter especially for *Heliantus*. Darlington (1973) finally identified 16 centers/regions of origin for cultivated plants. These were (1) southwest Asia, (2) the Mediterranean area, (3) Europe, (4) Ethiopia, (5) Central Africa, (6) West Africa, (7) Central Asia, (8) India and Burma, (9) southeast Asia, (10) China, (11) Mexico, (12) USA, (13) Central America, (14) Peru, (15) Chile, and (16) Brasilia-Paraguay.

Zhukovsky (1970) interpreted the centers as regions when he introduced the term 'mega-centers' and identified 12 centers for about 90 cultivated plant species. In contrast, Brücher (1969) concluded that there are no gene centers based on his observations of cultivated plant species in South America. Among other things, he noted that wild plants turned into domesticated plants through cultivation over a wider region, citing, for example, phaseolus beans and potatoes along the eastern slopes of the Andes Mountains.

2.3 Present view of theory of gene centers

Zeven and Zhukovsky (1975) pursued further the idea of geographic regions for the origin of cultivated plants. They listed about 2300 species, and some of their wild relatives, in relation to the regions of variation, and those species with no certain region of domestication or variation. These regions are identical to the 'mega-centers' already identified by Zhukovsky (Figure 3): (1) Chinese-Japanese, (2) Indochinese-Indonesian, (3) Australian, (4) Hindustani, (5) Central Asian, (6) Near Eastern, (7) Mediterranean, (8) African, (9) European-Siberian, (10) South American, (11) Central American and Mexican, and (12) North American.

To date, the theory of geographical centers of cultivated plants, summarized by Harlan (1975a, b) classifies cultivated plants according to their geographic patterns of variation:

1. Endemic cultivated plants have a small, defined, bounded geographic area; the centers of their domestication and variation coincide
2. Semi-endemic plants appear in a somewhat larger area; the center of variation shows indefinite borders, or has intersections
3. Mono-centric cultivated plants have a large area of spread, but also a clearly distinguishable center of origin, which can also be a center of variation
4. Oligo-centric cultivated plants are spread over a large area; there can be two or several centers of variation
5. Non-centric cultivated plants are spread over a large area without clearly distinguished centers of origin or variation

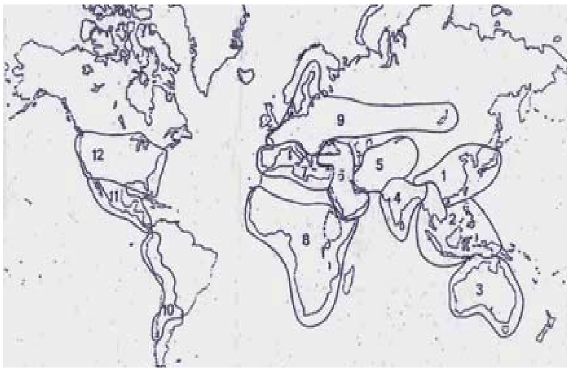

Figure 3. Mega-centers (Regions) of cultivated plants (Zhukovsky & Zeven)

Confusion arises with the terms 'origin' of plant species and 'center of its domestication and variation', as defined by Vavilov. Vavilov focused on gene centers or centers of variation from the perspective of genes that could serve as sources for plant breeding for resistance, improved quality, high yield, etc (Harlan 1975; Lehmann 1984). It makes sense to distinguish between the 'center of origin' and the 'center, area or region' where domestication into the cultivated forms took place. This center of origin could be the same or within the area of domestication as stated by Harlan, or may not be the same. This is true, for instance for phaseolus beans and potatoes which originated from a relatively small area within the region of their domestication (Hawkes 1962, 1966).

3. Proposal for a 'glacial' gene center for cereals

3.1 Factors determining a gene center

Three factors appear to be characteristic of a gene center:

1. Genetic – which favors the emergence of new gene combinations by mutation and/or hybridization
2. Evolutionary – which allows that those combinations survive and reproduce i.e. conditions for emergence of new gene combinations must be higher than the loss by selection
3. Ecological – an environment with optimal conditions for plant growth so that genetic and evolutionary processes take place

Ecological changes, due to environmental change arising from climate change, consequently will have an impact on the gene center. Therefore, a gene center should be understood to be dynamic and can emerge, change, or disappear as the case may be. The latter, however, will happen when the plant population – preferably the cultivated species and their wild relatives – migrate to a new favorable area. This emergence of a new gene center was suggested by Darlington (1957) and demonstrated by Plarre (1972, 1982).

The environment, together with the genetic factor, is considered a key that ensures evolution. Massive intervention in the environment, not only by climate change, but also by human activity, would reduce the required life space and may threaten natural evolution. For such an evolution to happen, however, a certain gene pool, embedded in a plant society typical for the species, it is necessary to include a sufficient number of individuals in the evolutionary process. Reduction of the life space automatically leads to reduction of the gene pool and destruction of the natural environment. This leads to limited plant growth, which may slow down or even interrupt evolution. So far, no plant species has become extinct under such circumstances. Compare this with material kept in a gene bank where it is maintained, but excluded from further evolutionary processes. This could be true for regions where increased land use replaces the original plant society through monoculture – for example, commercial forests (rubber trees, oil palms, or secondary flora) replacing the natural forest. in tropical gene centers, or simply commercial varieties, replacing the landraces and eventually their wild relatives. The problem could be solved by protecting these areas – surrounding them with a buffer zone that is sufficient to host a gene pool big enough to allow far-reaching evolution.

It should be clear that large genetic uniformity, resulting from reduced natural evolution and loss of the natural source of wild and related species, increases the potential for the collapse of a plant species, at least in a larger area. This could even happen with highly developed landraces from subsequent selection by farmers (as happened in Europe) reaching a high level of uniformity as a consequence of regular exchanges of seed by farmers. An exemplar of this is the collapse of spring barley in southern Germany during the first half of the 19th century. A new gene pool needed to be built from materials from the surrounding mountain valleys. These materials possessed a broader genetic base as they had been exposed to natural evolution for a longer period and, therefore, had become better adapted to their environment and tolerant to environmental disturbances.

Although evolution is a continuous process, the 'time' factor plays an important role. Commercial varieties undergo the same evolutionary processes as landraces or the ancestors of cultivated plant species. Commercial varieties, however, are replaced more quickly with new varieties and the time period is too short for evolutionary effects to become visible. Hence, evolution becomes an artificial process manipulated by plant breeding, but it may not fully meet the targets of natural evolution. Nevertheless, in certain cases its evolutionary effects could be clearly demonstrated. For example, a commercial barley variety ('Union') appeared highly adapted and higher yielding after a decade of continuous planting. Similar effects could be observed in hybrid maize, by replanting and tracing them back to natural cross-pollination (Schachl, 1983).

3.2 Gene center for cereals in an ecological context

The locations of today's gene centers for cereals show a remarkable spread around the Arabian Peninsula. There is a common relationship between gene centers despite their spatial isolation. In an ecological context, the gene center is considered as a special form of vegetation that is developed from the prevailing climate and environment. The gene centers for cereals are located in the steppes and semi-deserts of the Middle East and neighboring areas from Iran to Afghanistan in the north to Ethiopia in the south. Here cereals and their wild relatives find ideal growing conditions together with other species of Poaceae (Figure 4). There may be some specificity, for example for *T. monococcum, Ae. speltoides, T. dicoccum,* which show tolerance to low temperatures and which invade high elevation, cooler areas with higher rainfall. However, they did not spread dominantly like the races in the south – for example *H. spontaneum* – which spread widely in the *wadis* of the Arabian desert.

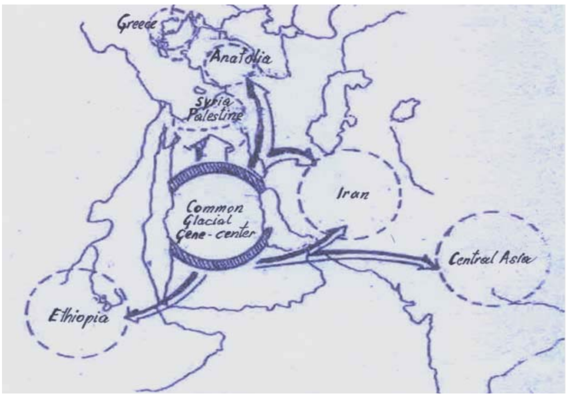

Figure 4. Possible location of a common glacial gene center for cereals

3.3 Gene centers of cereals in a climate change context

During the quaternary era, the climate tended to cool down, although there are indications of warmer periods (Jaranoff 1944). Sedimentation of plankton in the Red Sea during the glacial period (40,000 to 10,000 years), clearly demonstrates that climate change in Europe also affected the Middle East (Deuser *et al.* 1976). The high air pressure above the glaciers in the northern hemisphere diverted the west wind drift with the wet Atlantic front systems to the south, leading to lower temperatures and higher rainfall in the northern Mediterranean region (Brooks 1928). Since small changes in climate have greater impact on plant growth and vegetation (Bryson 1975), the ecological conditions of the northern Mediterranean region became unsuitable for grasses. Instead, it is likely that the forest in the dryer eastern Mediterranean section turned predominantly to savannah, during this period (Zeuner 1967).

According to the dynamics for determining the gene center, the living space for grasses arose during this period. It is assumed that cereals and related grass species might have invaded the gene centers of today following climate change in the post-glacial period. A glacial pre-gene center might be presumed at the point of intersection of the present centers. That would be more or less part of the Arabian Peninsula, which is now covered by barren and dry deserts. A possible focus for a pre-gene center could be the Djebel Shammar and Hedsha ranges, which form natural barriers to the westerly winds with higher rainfall coming from the Mediterranean Sea. Until today, the wadis surrounded by the Arabian desert still offer better growing conditions for wild species, especially for *H. spontaneum*, and wheat and barley landraces are well adapted to the dry areas.

Assuming a glacial pre-gene center in the Arab Peninsula, the present gene centers are considered as displacements to the west (to the eastern Mediterranean region), to the north (to Central Asia), and to the south (to Ethiopia). Whilst the glacial gene center shifted on the continent, the preliminary forms of cereals and their wild relatives would also have migrated as well. It is likely that the Straits of Hormuz and the Bab-el-Mandeb might have had certain selective effects. Not all related species and sub-species would have migrated, especially when humans contributed to such migration – as in the Ethiopian gene center. However, for the Central Asian gene center, a natural migration from the west could be taken into account.

There is also a question of whether a similar displacement took place earlier during the warmer interglacial phases, preferably in the direction of the present gene centers. This would imply that migration from the central pre-gene center to surrounding centers occurred in several waves. There could be loss of races and sub-species by migration, but also a survival and individual evolutionary transformation in ecological niches. This could be a possible answer for missing links in the evolution of cereals or the possibility of new, transformed crossing partners to a larger gene pool. In general, the wild relatives and possible crossing partners may undergo the same evolutionary processes as occur with the cultivated types, which, over time, increase the limited crossability (Feldmann and Sears 1981).

4. Evolution as a continuous process

Evolution is a continuous process. There is some evidence that the evolution of wild cereals preceded the glacial pre-center and that they separated into different species with or without human influence. Zohari (1966) assumes the human use of cereals by 10,000 BC through domestication of *T. monococcum* in southeast Turkey and of *T. dicoccum* in the Jordan valley. It is assumed that at the end of the glacial period the evolution of wild cereals had succeeded and several cereal types could be clearly distinguished, forming a basis for further domestication, though the origin of Triticum suggests certain anomalies. In the Iranian gene center, *T. dicoccum* and *T. dicoccoides* and their crossing partners *T. monococcum* and *T. urartu* are still present today and continue to contribute to the evolution of crop plants (Kuckuck 1959, 1964). During the glacial period, the area might not have been suitable for grasses and for far-reaching evolution to take place.

However, at the end of the glacial period, a southern race of *T. dicoccum* (*T. dicoccoides*) already existed in the Palestine gene center. The assumption of a glacial pre-gene center could explain the wide spread of *T. dicoccum,* which, today, can be found in all gene centers. In this respect, the status of the Ethiopian gene center will come under scrutiny. Is it simply a 'secondary gene center', as defined by Schiemann and Harlan, resulting from human activity or did it originate from a common pre-gene center where the wild relatives did not migrate or were not lost? There are also questions as to whether migration from such a pre-gene center to the surrounding centers is a single or a repeated process during the warming phases of the glacial period. In this context, the hypothesis of Csizmarik (1975) receives attention.

He emphasized that the spread of *H. hexastichon* from Central Asia took place earlier than the spread of *H. distichon* from the Palestine-Syrian gene center, though the distichon is undoubtedly the ancestor of the polystichon barley.

5. Summary

In the late 1920s, Vavilov presented his theory of gene centers for cultivated plants. Though he explicitly speak of centers for 'cultivated plants' (and their wild relatives), confusion arises from including the question of the 'origin' of the domesticated plant species. It is useful to make a clear distinction between the centers of origin and the centers/regions where the plant species were domesticated and cultivated. Three factors are responsible for the gene centers, (i) genetic, (ii) evolutionary, and (iii) ecological. It does not matter if these are centers of origin or centers expanded into a larger region:

The gene centers of today should be viewed within the context of the present day climate and environment, meaning that a gene center has to be understood as a dynamic system. Given that small changes in climate have far-reaching effects on vegetation, the gene centers for cereals of today do not appear to be suitable for the further spread and evolutionary processes of grasses into cereals. This raises questions about the 'living space' of cereals during the glacial period. A possible answer would be a glacial pre-gene center on the point of intersection of the present centers in the Arabian Peninsula, where barren and dry deserts and semi-deserts prevail today. With a climate change (15,000 to 12,000 years ago), a displacement might have taken place from the central pre-gene center site to the present, surrounding centers. Assuming evolution is a continuous process, the first evolutionary steps may have already occurred in a pre-gene center resulting in several forms of wild cereals forming the basis for further domestication.

ISF World Seed Congress 2011: the Seed Industry Celebrates Excellence

About 1250 delegates, exhibitors and guests from 61 countries participated in the ISF World Seed Congress 2011 in Belfast, Ireland. It coincided with the release of the Report by Government Office for Science in London; and the seed industry was in the spotlight, as genetic gain and productivity were recognized as a strategy to address the challenges of global food security and climate change.

The Congress provides the venue for seedsmen and seedswomen to converse, learn, network and do deals in international seed trade. The technical meetings during the Congress were an opportunity for the industry to promote and share best practices; they acted as a forum for debate. The Trading Floor was abuzz with activity in the historic St George's Market, attesting to the importance of seed in international trade. The next Congress will take place in Rio de Janeiro, Brazil in May 2012.

Seed trading floor during ISF congress

The activities by the different bodies within ISF are undertaken in a spirit of collaboration as problems with moving seed are not limited to a few companies or countries; they affect all the industry. In this report two activities specific to vegetable crops are highlighted, plant diseases and resistance and seed health testing.

Plant diseases and resistance

How does my local pathogen strain compare with other reported strains? This is a concern common to breeders all around the world. Strain names can vary from region to region. Incorrect identification of plant pathogen strains or races leads to inconsistent disease resistance claims by companies, a situation that harms the seed industry.

Differential hosts are sets of plant cultivars used to define races of plant pathogens based on known susceptible and resistant reactions. The Working Group (WG) on Pathogen Coding has gathered information on host differentials from peer-reviewed scientific publications to help seed companies and researchers identify selected pathogen races and strains that affect vegetable crops. For some diseases, a protocol to screen for resistance is also provided, along with the possibility of ordering seed of differential hosts and reference pathogens. This activity is in collaboration with the American Phytopathological Society with whom the WG has joined hands in an effort to address inconsistencies in identifying plant pathogen strains and races.

In support of the vegetable industry's decision on using consistent terminology, the WG assigns codes to pest organisms affecting vegetable crops. The codes are used worldwide by companies in catalogues and other communication with customers and they are posted online and can be consulted along with the outcome of other work done by the WG at www.worldseed.org/isf/diseases_resistance.htm

Seed Health Testing

International Seed Health Initiative for Vegetable crops (ISHI-Veg) is the industry led platform where vegetable companies exchange information on seed-borne pathogens and seed-transmitted diseases, and work together with private and public laboratories on developing test methods for their detection. Twenty methods for detecting different pathogens have been posted online (www.worldseed.org/isf/ ishi_vegetable. html) for the industry worldwide to use. The on-going work covers 31 pest organisms and activities range from preliminary research to comparative tests involving 6-8 laboratories.

Two developments have had a significant impact on ISHI-Veg's work in recent years – the regulatory environment and technological innovations. The seed industry has seen the demand for seed health tests in meeting phytosanitary import requirements for seed is growing. However, as there are no matching efforts to standardize detection methods and the results of a test used in one country may be rejected by another. Second, over the last decade or so traditional techniques used in diagnostic methods have been complemented or replaced by the use of more indirect methods based on serology (IF, ELISA) or recognition of genetic material (nucleic acid hybridization, PCR).

As its methods gain recognition both in the industry and by plant protection authorities ISHI-Veg needs to weigh the merits of using advanced molecular based technology versus simpler (and older) technologies that are more likely to be familiar and available worldwide.

Radha Ranganathan, ISF, Geneva; Switzerland; E-mail: r.ranganathan@worldseed.org

News from UPOV

Membership

The Former Yugoslav Republic of Macedonia deposited its instrument of accession with the UPOV Convention on 4 April 2011, and became the 69th member of the Union on 4 May 2011. The Council also decided that the Draft Law on the Protection of Plant Breeders' Rights of the Republic of Serbia was in conformity with the provisions of the 1991 Act of the UPOV Convention. Once the relevant law, on which the conformity was decided, is in force, Serbia will be in a position to deposit its instrument of accession to the 1991 Act of the UPOV Convention.

Council meeting

The Council of UPOV held its 28th extraordinary session on 8 April 2011. The Council also agreed that a web-based version of the Plant Variety Database – currently only available in CD-ROM format – could be launched on the UPOV website during the course of 2011 and this web-based version should be made freely accessible to all users.

DUS experience of UPOV members

The Council welcomed the report on the number of genera and species for which members of the Union had practical experience in the examination of distinctness, uniformity, and stability (DUS) made at the 47th session of the Technical Committee, held 4-6 April 2011 in Geneva. The number had increased from 2254 in 2010 to 2679 in 2011; an increase of 19%. The Council noted that information on members of the Union with practical experience in DUS examination was freely accessible via the GENIE database (http://www.upov.int/en/documents/c_extr/index_c_extr_28.htm).

Seminar on the Role of PVP in Public-Private Partnerships

A seminar on 'Plant Variety Protection and Technology Transfer: the Benefits of Public-Private Partnership' was held 11-12 April 2011 in Geneva, Switzerland. Copies of presentations are available at http://www.upov.int/en/ documents/pp_seminar_april_2011/upov_sem_ge_11_1_rev.html.

Fifty years of UPOV

A symposium on 'Plant Breeding for the Future' will be held on 21 October 2011 in Geneva as part of the 50th Anniversary of UPOV. The symposium will provide a global view of the latest findings in plant science based on the presentations and consider how that science can be applied to plant breeding in the future.

For further information about UPOV, please contact the UPOV Secretariat, Geneva, Switzerland; Tel: +41-22-338-9155; Fax: +41-22-733-0336; E-mail: upov.mail@upov.int; Website: www.upov.int

AUC Signs MoU with African Seed Network

The African Union Commission (AUC) and the African Seed Network (ASN) signed a Memorandum of Understanding (MoU) on 4 October 2010, at the AUC Headquarters in Addis Ababa, Ethiopia. The MoU provides the ASN with a continental mandate to coordinate implementation of the AUC-African Seed and Biotechnology Program at the regional and national levels. By signing this MoU, the AUC recognizes and appreciates the important role the ASN has been playing particularly in the areas of:

- Strengthening the seed industry in sub-Saharan Africa through networking
- Seed Information Management System for agro-ecological and socioeconomic data on crop varieties
- Regional harmonization of seed rules and regulations
- Support for the improvement of quality seed production and distribution systems
- Building farmers' capacity to restore seed supply systems in disaster situations in sub-Saharan Africa
- Capacity strengthening through training in seed production, management, and information dissemination

These key sectors are aligned with the six components and the already developed project profiles of the AU African Seed and Biotechnology Program.

The ASBP, endorsed and adopted by the Eighth Ordinary Session of the Assembly of the African Union in January 2007, is the continental program/framework for the comprehensive development of the seed sector in Africa.

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United Nations International Standard for Certification and Marketing of Seed Potato

United Nation Economic Commission for Europe

UNECE is one of the five regional commissions of the United Nations with a primary responsibility for encouraging greater economic cooperation among its 56 member states. All interested United Nations member states may participate in its work and over 70 international organizations and NGOs take part in its activities. The standards set by UNECE are designed to facilitate fair international trade, prevent technical barriers to trade, improve producers' profitability, encourage production of high-quality produce, and protect consumer interests.

The Standard for Seed Potatoes is one of hundreds of standards developed by UNECE. Governments use the internationally agreed UNECE standards to set their commercial rules. For seed potatoes, the UNECE Standard is used as a basis for marketing directives and regulates the EU internal market. The Russian Federation has recently made use of the UNECE Standard to update its national seed potato certification scheme. An increasing number of countries are also using the UNECE Specialized Section as a forum to discuss seed potato issues of common interest and to agree on recommended practices for cultivation and certification.

Seed potato standard

Developed by UNECE, the Standard sets common terminology and minimum commercial quality requirements for the certification of seed intended for international marketing (See Table below). It is a unique international framework covering all aspects related to seed potato certification – (a) varietal identity and purity, (b) genealogy and traceability, (c) diseases and pests, (d) external and internal quality, (e) sizing, and (f) labeling.

Quality requirements

The Standard defines the minimum requirements for seed potatoes at the export-control point, after preparation and packaging of the seed. Tolerances for diseases, defects, and faults are prescribed as the maximum proportions allowed in a crop, lot, or succeeding crop (direct progeny). Countries may set additional national requirements to reflect their specific soil, climatic, and other conditions.

Classification

The requirements are set for three categories of seed potato: Pre-basic, Basic and Certified, in descending order of quality. An additional choice of quality is offered through two classes within each of the three categories. Classification by field generation is optional. Within these categories and classes, countries producing seed potatoes are free to create national classes that are subject to specific national requirements. The Designated Authority is responsible for the maintenance of the classification data to provide traceability.

Minimum conditions

The Standard specifies the minimum conditions to be satisfied for potato seed production. These include the soil where the seed potatoes are grown; the seed crop (tolerances for the off-types, plants affected by blackleg or with symptoms of virus diseases, etc); a seed lot; and direct progeny (tolerances for the off-type plants not true to the variety, plants with symptoms of virus diseases).

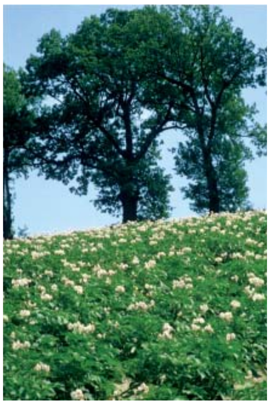
Varieties

Varieties are accepted for trade according to the Standard only if an official description and a reference sample are available from the Designated Authority. The variety should be distinct, uniform, and stable according to UPOV guidelines and has denomination. The Standard prescribes rules for packaging, sealing, and labeling to ensure the identity of the seed. It also provides guidelines for comparative trials of plants grown from the seed potatoes sampled from marketed lots.

A list of diseases and pests, containing a basic description of each disease with illustrative photographs and their status in certification, supplements the Standard.

Recent developments

A regional Workshop on Seed Potatoes for Asian Countries took place 19-21 October 2010, in Bandung, Indonesia. The workshop was organized in partnership with the Directorate General of Horticulture, Ministry of Agriculture. About 90 government officials, growers, traders, and researchers from 23 countries attended the meeting. It was the third regional event organized by the Specialized Section and the UNECE Secretariat to promote the UNECE Standard for Seed Potatoes as an international framework and to encourage the practical application of the Standard in international trade and the production of seed potatoes at the national level.



A seed potato production field in Italy

The presentations and discussions covered a wide range of topics related to the production and certification of seed potatoes. The results of a pre-workshop survey of the potato sector in Asia had shown that yields were highest in those countries that had a developed a seed potato certification system. Since bringing seed from developed countries is costly, many countries are developing their own seed potato production. Thus, the application of the UNECE Standard for Seed Potatoes can provide significant benefits for the region.

A meeting of the Extended Bureau of the Specialized Section took place back-to-back with the workshop, allowing the participants from Asia to contribute to the further development of the Standard and to prepare for the annual meeting of the Specialized Section in Geneva 14-16 March 2011.

The Standard takes into account issues falling under the World Trade Organization Agreements on Technical Barriers to Trade and on Sanitary and Phytosanitary Measures. It is intended for use by national certification authorities to ensure that seed potatoes produced for international markets comply with agreed norms.

The use of the Standard's common terminology and harmonized quality requirements assists buyer and sellers in understanding the quality of seed potatoes marketed in different parts of the world and minimizes the risk of technical barriers to trade. The Standard provides a framework for the joint work of public- and private-sector operators.

Tolerances for seed potato certification in UNECE member countries

	Pre-basic TC	Pre-basic	Basic class I	Basic class II	Certified class I	Certified class II
1. Crop and lot						
Globodera rostochiensis (soil tolerance)	0	0	0	0	0	0
Globodera pallida (soil tolerance)	0	0	0	0	0	0
Synchytrium endobioticum	0	0	0	0	0	0
Clavibacter michiganensis	0	0	0	0	0	0
Ralstonia solanacearum	0	0	0	0	0	0
Potato spindle tuber viroid	0	0	0	0	0	0
Tomato stolbur	0	0	0	0	0	0
Meloidogyne chitwoodi and fallax	0	0	0	0	0	0
Ditylenchus destructor	0	0	0	0	0	0
Phthorimaea operculella	0	0	0	0	0	0
2. Crop (per cent of plants)						
Black leg	0	0	0.5	1	1.5	2
Virus tolerance	0	0.1	0.4 (0.2 severe)	0.8 (0.4 severe)	2 (1 severe)	10 (2 severe)
Other varieties and off-types	0	0.01	0.25	0.25	0.5	0.5
3. Lot (per cent of tubers)						
Earth and extraneous matter	1	1	2	2	2	2
Dry and wet rot (not caused by S. *endobioticum*, C. michiganensis, R. solanasearum)	0	0.2	1	1	1	1
External defects	3	3	3	3	3	3
Shriveled tubers	0	0.5	1	1	1	1
Low-temperature injury	0	0.2	1	1	1	1
Tuber moth damage	0	4 (20)†	4 (20)†	4 (20)†	4 (20)†	4 (20)†
Scab (common and netted)	0	5 (33.3)†	5 (33.3)†	5 (33.3)†	5 (33.3)†	5 (33.3)†
Powdery scab	0	1 (10)†	3 (10)†	3 (10)†	3 (10)†	3 (10)†
Rhizoctonia	0	1 (1)†	5 (10)†	5 (10)†	5 (10)†	5 (10)†
Total tolerances	3	5	6	6	6	6
4. Direct progeny (per cent of plants)						
Other varieties and off-types	0	0.01	0.25	0.25	0.5	0.5
Virus	0	0.5	2 (1 severe)	4 (2 severe)	10 (5 severe)	10

† Figure in brackets is the allowable percentage surface area covered. A tuber is deemed affected by the disease only if the surface area affected exceeds the specified allowable surface tolerance. In case of tuber moth, the area is on a cut surface.

The UNECE Specialized Section on Standardization of Seed Potatoes, made up of national certification experts, regularly reviews and updates the Standard to reflect changes in production and marketing, the evolution of harmful organisms, and the development of new techniques for certification. Any member of the United Nations can participate in the activities of the Specialized Section. You can download the Standard and learn more about the UNECE work on seed potatoes from the website: http://live.unece.org/trade/agr/welcomee. html. E-mail: agristandards@unece.org

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Growing Threat of Wheat Rusts

Aggressive new strains of wheat rust diseases – stem rust and stripe rust – have destroyed up to 40% of farmers' wheat fields in recent harvests. Areas affected are North Africa, the Middle East, and Central Asia and the Caucuses. Affected countries include Egypt, Ethiopia, Iran, Kenya, Morocco, Syria, Turkey, Uzbekistan, and Yemen.

In most countries in Africa, the Middle East, and Central Asia and the Caucuses where wheat can constitute more than 40% of people's food calories and 20% of the protein, these epidemics cause economic hardship for farmers and their families. More than 100 scientists and policymakers from 31 countries met at the International Wheat Stripe Rust Symposium 18-20 April 2011 at ICARDA headquarters, Aleppo, Syria, to discuss strategies for wheat rust surveillance and monitoring, the development of rust-resistant wheat varieties, and crop diversity strategies to slow the progress of rust across large areas of Africa, the Middle East, and Asia.

Climate change, in terms of rising temperatures and the timing and increasing variability of rainfall, is contributing to the spread and severity of rust diseases. Emerging races of rust are showing adaptations to extreme temperatures not seen before. Scientists around the globe are working on the monitoring and surveillance of stem rust and stripe rust to insure rapid detection and reporting so that farmers, policymakers, and agricultural research centers can respond more quickly to initial outbreaks.

New rust-resistant varieties are in the pipeline at international and national agricultural research centers. Breeders are selecting for other important characteristics including improved yield performance, drought tolerance, and regional suitability.

Country preparedness for outbreaks of wheat rust involves issues such as the availability of resistant varieties known to and accepted by farmers, the availability of sufficient quality seed of new varieties for farmers to use, and the availability, accessibility, and affordability of effective fungicides together with the capacity of farmers to use them.

In most cases, the bottleneck in getting resistant varieties into the field in time to protect local harvests is local capacity and the ability of national programs to rapidly multiply seed and deliver them to market. Improving country capacity requires long-term planning, funding, and getting farmers involved earlier in the variety selection process.

[2] Chair and Secretary of the Specialized Section on Standardization of Seed Potato of the United Nations Economic Commission for Europe.

The participants urged that policymakers recognize the link between scientific research and food security and invest more in agricultural research.

At present ICARDA is supporting fast track variety release and accelerated seed multiplication of yellow and stem rust (Ug99) resistant varieties through the support of United States Agency for International Development (USAID).

Source:http://icardablog.wordpress.com/2011/04/20/international-scientists-warn-of-growing-threat-of-wheat-rust-epidemics-in-vulnerable-nations-worldwide/

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.

Eritrea Holds National Seed Workshop

Background

A Post-Crisis Rural Recovery Development Program (PCRRDP) was implemented in Gash Barka and Debub with funding from International Fund for Agricultural Development (IFAD). Noting its successful implementation and the implications for national food security, the Government of Eritrea (GoE) requested an expansion of the program by presenting a proposal to its development partners (IFAD, EU, UNDP, and FAO). This led to the development of the PCRRDP Add-on Program in September 2008, including support for seed production in the zobas (regions) of Debub, Gash Barka, Maakel, Anseba, and Northern Red Sea. The seed component of the PCRRDP Add-on Program would extend, expand, and further strengthen the development of a national seed system under the National Agriculture Program (NAP) project.

IFAD requested ICARDA to assist in the design of the National Seed System Development in Eritrea, based on ICARDA's experience of working with Eritrean NARS. IFAD also contracted ICARDA to assist in pre-implementation support to ensure readiness to implement the various activities planned under the NAP among which was the establishment of an efficient national seed system.

The pre-implementation National Workshop on Seed System Development sought to (i) fine-tune the seed system design in light of the national policies and lessons learned from experiences of different seed projects implemented during the last 20 years and (ii) prepare a consolidated project implementation work plan 2011/12 based on the project design document.

Workshop participants

Thirty-eight national experts, six consultants from IFAD, and one resource person from ICARDA participated in the workshop held 26 April 2011 at the Ministry of Agriculture (MoA) premises in Asmara, Eritrea. The national experts were from the MoA and its affiliated departments – the Agricultural Extension Department (AED), Regulatory Services Department (RSD) and the *Zoba* offices, the National Agricultural Research Institute (NARI), and the Hamelmalo Agricultural College (HAC).

The workshop included short presentations on the national seed system design and working group sessions to develop time-bound implementation plans for different components. After presentations on the workshop objectives and seed system design, the participants divided into four working groups to discuss the following issues:

- Strengthening and linking variety improvement and maintenance with certified seed production and distribution for different crops
- Developing a commercial, certified seed production program with functional linkages in different *zobas*
- Strengthening the national seed certification system for locally produced and imported seed for different crops
- Developing an institutional framework at the national level to oversee national seed system development, integration, and diversification

Workshop outputs

The main outcomes of the workshop included institutional arrangements and establishing linkages for national seed sector development. It was agreed to:

1. Establish a National Seed Committee (NSC) to provide oversight and guidance to implement the national seed system development under established government policy and strategy
2. Establish a National Variety Release Committee under the NSC and Variety Evaluation System of RSD
3. Establish a Variety Maintenance Unit under NARI responsible for early generation seed production
4. Establish a National Seed Unit within the MoA and *zoba* seed centers answerable to the National Seed Unit
5. Establish a Seed Certification Agency and zoba sub-centers within RSD responsible for a seed quality-assurance system.

It is envisaged that all new entities will be provided with an adequately trained work force, adequate infrastructure, and facilities to develop, an efficient and effective diversified and sustainable seed sector.

Recommendations

The workshop provided opportunities for stakeholders to discuss all the technical, institutional, and management of a national seed system development. During the workshop, time-bound action plans were developed, potential constraints identified, and preventative measures formulated for all seed system components. For the seed system design to serve as a good road map for effective project implementation, the following recommendations were put forward:

Working group discussions during the national seed workshop in Eritrea

- The institutional framework of the national seed program should promote integration and facilitate the establishment of direct and simplified administrative linkages between the National Seed Unit at MoA headquarters and its subsidiary components located at the *zobas*
- It is necessary to establish mechanisms for prioritizing and consolidating seed interventions across institutions, disciplines,

crops, and *zobas*. It was recommended that a National Seed Committee, National Seed Unit, National Variety Release Committee, Variety Evaluation Committee, and Variety Maintenance Unit be established before the end of May 2011

- Staff recruitment and training, planning, establishment of infrastructure for production and quality control, establishment of contract growers' networks, and linkages with input suppliers are potential constraints to achieving project production targets. Hence, advanced planning is crucial for success. An 18-month plan (15 June 2011 – December 2012) is required. The Director General (DG) of AED may address this requirement
- To avoid duplication of efforts and repetition of mistakes, it is necessary to make an inventory of the locally available seed infrastructures and facilities as well as the national expertise and the lessons learned from previous seed interventions before embarking on project implementation. The DGs of AED and NARI may consider preparing a short report on this by not later than 31 July 2011
- It is necessary to strengthen the national variety evaluation and release committee under the NAP project by establishing a system in which all service providers and beneficiaries are represented and given opportunities to actively participate to the national variety trialing and registration processes.

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Ethiopia Releases Rust Resistant Wheat and Quality Protein Maize Varieties

Rust resistant wheat

Ethiopia is among those countries where the devastating stem rust strain Ug99 was reported. In addition, yellow rust epidemics are very common. In 2010, the yellow rust epidemics led to significant yield losses – up to 80% in some major wheat production zones in the country. Most of the commercially available varieties succumbed to yellow rust. The national wheat breeding program is working closely with international agricultural research centers like ICARDA and CIMMYT to counter the threat by focusing on:

- Screening segregating populations received from ICARDA to identify rust resistant lines
- Introducing and directly testing advanced lines for adaptation, agronomic performance, and disease resistance
- Popularizing and demonstrating resistant wheat varieties
- Accelerating seed multiplication of resistant wheat varieties

ICARDA constituted a special rust-resistance nursery for East Africa to work closely with the Ethiopian Institute of Agricultural Research (EIAR) to fast track, in the key wheat producing regions of the country, the variety release and accelerate seed multiplication of promising bread wheat lines. These lines would have combined resistance to the stem rust strain Ug99 and other major diseases, such as yellow rust and septoria.

EIAR and ICARDA identified several promising lines. Based on their performances in on-farm verification trials across the country during the 2009 and 2010 crop seasons, three were officially released by the National Variety Release Committee on 23 February 2011 (See Table below). These new varieties include Flag 5 (PYN/BAU//MILAN), ETBW5483 (UTQE96 /3/PYN/BAU//Milan), and ETBW5496 (UTQE96/3/PYN/BAU//Milan). Flag 5 (released as 'Hoggana') has a combined resistance to yellow rust, stem rust (Ug99), and septoria and gave a yield of 5.14 t/ha – about 21% more than the most popular standard variety (Kubsa). Similarly, ETBW5483 (released as 'Shorima') and ETBW5496 (provisionally released) gave average yields of 5.41 t/ha and 5.44 t/ha. Both varieties have an average yield advantage of about 21% over the standard check and have a combined resistance to yellow rust, stem rust, and septoria.

This is a significant contribution to ensuring food security at a time when national wheat production is threatened by yellow rust in Ethiopia and elsewhere in East Africa and Middle East region.

ICARDA, together with the USAID Famine Fund Project, is supporting accelerated seed multiplication (off-season and main season) and popularization of these newly released varieties by working with partners, including EIAR, Ethiopian Seed Enterprise, NGOs and others to ensure timely availability and access to quality seed by farming communities across the country.

Performance of rust resistant wheat varieties released in Ethiopia

Agronomic traits	Flag 5	ETBW 5483	ETBW 5496
Source	ICARDA	ICARDA	ICARDA
Average yield (t/ha)	5.14	5.41	5.44
Average yield gain (%)	21	20.4	21
Heading (days)		68	78
Maturity (days)		126	133
Plant height (cm)		102	104
Test weight (kg/hL)		75	75
1000 kernel weight (g)		41	38
Grain color		White	White
Stem rust		10RMR	10RMR
Yellow rust	15MS	TMR	5MS

Pre-release seed multiplication of wheat varieties subsequently released in Ethiopia. Flag 5 (Hoggana, top photo) and ETBW5483 (Shorima, bottom photo)

Quality protein maize

In another development, quality protein maize (QPM) variety, AMH760Q, was released through a joint effort of EIAR and CIMMYT. The new variety is a three-way cross hybrid adapted to the mid-altitude to highland agro- ecologies of Ethiopia. It is a nutritionally enhanced version of Ethiopia's most popular maize hybrid, BH660, which was developed at the EIAR's Bako Agricultural Research Center and released in 1994. It is considered important for food security in Ethiopia, as it will address the needs of a large population within a short time period. Oromia Seed Enterprise and Ethiopian Seed Enterprise are among the public sector seed suppliers planning to produce AMH760Q and market it within the region.

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Iran Establishes a PVP System

The establishment of an effective plant variety protection (PVP) system will lead to a range of key benefits for the agricultural sector. Most notably, a functioning PVP system will protect the intellectual property rights of plant breeders, thereby encouraging research and innovation in plant breeding. Additionally, it should encourage foreign breeders to introduce their best varieties into the country. This may lead to the development of improved and better-adapted plant varieties, resulting in improved yields and increased incomes for crop producers.

Iran requested FAO to assist in developing the technical and institutional capacity to implement PVP, in particular, and strengthening the SPCRI, in general, by contributing to the development of an appropriate regulatory framework, in line with international standards and best practices. Consequently, FAO provided SPCRI with a Technical Cooperation Program (TCP) project entitled *Strengthening Capacity on Plant Variety Protection* (TCP/IRA/3101) which was implemented from 2007 to 2009.

The objectives of the TCP project were to:

- Establish technical and institutional capacity for PVP by strengthening the technical capacity of SPCRI training experts on PVP
- Strengthen institutional capacity by providing the necessary equipment
- Establish an information system to monitor PVP
- Finalize the regulations of a PVP act
- Strengthen key technical knowledge

- Raise awareness of PVP among key stakeholders

During the project, key stakeholders from the government, universities, the private sector, and agricultural producers were trained and made aware of PVP. Five regional workshops on *General aspects of PVP with emphasis on DUS testing of regional crops* were held in five provinces. In addition, a *Workshop on Molecular Techniques for Plant Variety Protection* was held at the SPCRI headquarters. These training workshops built the necessary technical knowledge of participants on

- The concept of plant variety protection
- DUS testing of agricultural and horticultural (vegetables, fruit trees, ornamentals) crops
- Information management for DUS testing
- Management of reference collections
- Use of molecular techniques for DUS testing
- Administration of PVP offices and the management of registration processes
- Enforcement of PVP

Additional activities carried out under the project included a national seminar on the following topics:

- PVP and an introduction to geographical indices
- Industrial design
- Innovation registration

One SPCRI expert was trained in the key aspects of PVP in Germany and the Netherlands. Key equipment was provided to SPCRI and the SPCRI technicians were trained in its use. An information system for DUS testing was designed and set up.

One of the major achievements of the project was the publication of the book: *Principles of Plant Variety Protection*, the first reference text on the subject in the Persian language, focusing on different aspects of PVP. The book, covering both the technical and legal aspects, will enrich the literature on breeders' rights in Iran and assist policy makers, researchers, and other stakeholders in the seed sector to become acquainted with PVP. The book has four sections divided into 15 chapters and collaboratively authored by scientists from SPCRI and the national genebank.

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Pakistan Releases New Crop Varieties

In Pakistan, variety release requires both value for cultivation and use (VCU) and distinctness, uniformity and stability (DUS) tests. Pakistan Agricultural Research Council (PARC except for cotton) carries out national uniform yield trials for at least for two years to examine the agronomic performance and regional adaptation as part of VCU test of the candidate variety. The Federal Seed Certification and Registration Department conducts DUS tests for two years or for two cropping seasons for description of the candidate variety. Once the trails are completed, the data of the candidate variety is submitted to the National Seed Council (for national release) or the Provincial Seed Council (provincial release) for approval and release. After its approval by the PSC, then it is submitted to the NSC for notification and commercialization.

Punjab Seed Council (PSC), in its 40th regular meeting, has approved the release of 18 new varieties of various crops for general cultivation. These new crop include varieties of cereals (wheat, (ARRI-10), rice (Basmati-515), maize (MMRI Yellow, Pearl, FH-810 Hybrid, Yousafwala Hybrid)), pulses (Chakwal Masoor, Mash Arooj); and oil crops (groundnut (2-KCG-020)). In addition, new varieties of forages (millet (S-2005)), sorghum (F-9917), rye grass (Rye Grass-1), berseem (Super Late Faisalabad), vegetables (tomato (Hybrid LITTH-514, Line-07001)), melon (Ravi), and industrial crops (sugarcane (CPF-246)) were also released. PSC also extended the one-year provisional approval for the general cultivation of four BT cotton varieties, IR-1524, FH-113, Ali Akbar-802, and Neelam-121. New approved varieties, developed through extensive research, have greater yield potential and resistance to insect pests and diseases. The breeders of these new approved varieties briefed the participants on their production technologies.

In Punjab, substantial resources are allocated to develop the agriculture sector. It is a top priority of the government to achieve self-sufficiency and self-reliance on a sustainable basis. Farmers were urged to grow the latest, high yielding, approved varieties to make the country self-sufficient in agricultural commodities, paving the way for increased exports for earning foreign exchange.

Source:http://www.pakissan.com/english/news/newsDetail.php?newsid=23470.

RESEARCH NOTES

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

Supporting the Local Seed System: the Case of Faba Bean in Waterlogged Areas of Central Ethiopia

Wondafrash Mulugeta, Yaelembirhan Molla[3] and Zewdie Bishaw[4]

Abstract

Food legumes play an important role in rural livelihoods, providing food and nutritional security and agricultural sustainability. In Ethiopia, low production and productivity of food legumes is primarily attributed to a lack of high-yielding varieties with tolerance to biotic (diseases, insect pests) and abiotic (waterlogging) stresses. Moreover, non-availability and lack of access to quality seed by farmers exacerbate the problem. Farmer Research Groups (FRGs) were organized and participatory variety selection (PVS) employed by the Debre Birhan Agricultural Research Center (DBARC) in Siyadeber and Wayu district in central Ethiopia. Nine faba bean varieties, released for different agro-ecologies, were introduced and PVS was initiated with the FRGs. The farmers selected two faba bean varieties tolerant to waterlogging – Dagem (Grar Jarso 89-8) and Lalo (Selale Kasim 89-4) – and were provided with seed to form a cluster and initiate local seed production. This article describes PVS and the support to local seed production and marketing through FRGs to facilitate adoption and diffusion of improved faba bean varieties in waterlogged areas of the central highlands of Ethiopia.

Key words: faba bean, farmer research group, participatory variety selection, local seed system

1. Introduction

Food legumes play an important role in rural livelihoods, providing food and nutritional security and agricultural sustainability. At present, the role of legumes in crop diversification, intensification, and sustainability is well recognized. With increasing demographic pressure, climate change, and a dwindling natural resource base, the production of grain legumes may face serious threats in the future.

Diversifying crops and lowering input costs are the drivers for sustainable agriculture. Legume crops contribute to sustainable agriculture because their biological nitrogen fixing and minimal input requirements act as very effective break crops in cereal-dominant farming systems.

Emerging challenges in promoting food legumes require new vision and strategies. In Ethiopia, faba bean (*Vicia faba L.*), chickpea (*Cicer aritenum L.*), and lentil (*Lens culinaris L.*) are important crops in terms of area and production. According (CSA 2008/09) the area (and production) of these crops are faba bean 538,821 ha (695,984 tonne), chickpea 233,441 ha (312,080 tonne), and lentil 94,946 ha (94,773 tonne). Food legume yields are generally low in farmers' fields – in the range of 1 t/ha to 1.3 t/ha. The low productivity is attributed to the lack of high-yielding varieties with tolerance to biotic (diseases, insect pests) and abiotic stresses (waterlogging).

Quality seed is one of the cheapest and most essential inputs for crop production. In developing countries, including Ethiopia, a successful seed program that supplies sufficient quantities of quality seed of adapted varieties on time and at a reasonable cost remains a major constraint. The situation is far worse for legumes than for cereals, such as wheat, rice, or maize. Most food legumes, like faba bean, field pea, chickpea, and beans, are different from cereals in their multiplication ratio, average number of seeds per plant, etc. Food legumes produce large seeds and the multiplication ratio is usually between 10 and 30, whereas wheat has a multiplication ratio of between 50 and 100, and canola between 200 and 600. Hence, food legumes present special problems for large scale or commercial production (Slinkard *et al.* 2000).

The Ethiopian Seed Enterprise (ESE) and the newly established, regional seed enterprises were unable to provide seed of food legumes; and the majority of farmers depended on the informal sector. Such a local seed system depends on local plant and/or seed selection; seed production, and seed exchange integrated into crop production and compounded with the socioeconomic circumstances of farming communities (Almekinders and Louwars 1999).

Farmers' access to good quality seed depends

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on the availability of a well-functioning seed system (Bengtsson 2007). When and where the formal seed system fails to make adequate amounts of seed of adapted varieties available, it is necessary to encourage an informal seed system through decentralized seed production and marketing. The concept of farmer-based decentralized seed production could best serve as a complement or alternative to the existing capital-intensive and centralized formal seed production (Friis-Hansen 1995; Bishaw and van Gastel 2008).

In Ethiopia, although a number of faba bean varieties have been released by federal and regional agricultural systems, there is limited availability and access to quality seed and a lack of adoption and diffusion of the new varieties. Thus the project, targeting vertisols production systems to (i) introduce and identify adapted faba bean varieties using participatory variety selection, (ii) initiate and support local seed production with farmers, and (iii) link farmers with seed markets to facilitate and promote adoption and diffusion of new varieties through FRGs.

2. Study area and farming system

Siyadeberina Wayu district is located in central Ethiopia at an altitude of 2600 m above sea level (asl). Among the food legumes, chickpea, faba bean, and lentil are the major crops grown in the district. Agriculture is characterized by subsistence farming and small land holdings; and farmers practice a mixed crop-livestock farming system. The soil is black clay vertisols with waterlogging problems. To cope with the excess water, farmers use local knowledge –using the traditional broad bed and furrow (BBF) system and delayed planting (August-September), particularly for chickpea and lentil.

3. Setting priorities and identifying solutions

Understanding that farming systems in marginal environments are different from those in the favorable areas is crucial in developing and transferring new technologies. From the outset, a general orientation was organized with key informants – district extension agents, development agents, and farmers – at the project sites. A participatory group discussion was held with the farming communities; and the farmers were encouraged to prioritize their problems in food legume production. A consensus was reached on the farmers' priorities to strengthen the local seed system in Siyadebrina Wayu district and its surroundings.

Waterlogged fab bean field in central Ethiopia

Once the problems had been identified and prioritized, possible solutions were listed and the research objectives were defined based on the combined knowledge of the farmers and researchers. The researchers introduced released faba bean varieties from national and/or regional research centers and explained their agronomic merits. Farmers were organized into FRGs and agreed to work with researchers in allotting experimental plots for participatory variety selection.

4. Experimental procedures

The project initiated PVS with faba bean varieties of different agronomic and yield performances released in different agro-ecologies (Table 1). Nine faba bean varieties (including four released for waterlogged vertisols) together with a local landrace were planted in the 2005 and 2006 crop seasons in the fields of four farmers, who were members of the FRG, at Wale and Geregeda peasant associations. Each variety was planted on 6 m^2 plots having handmade, broad bed furrows (40 cm wide and 15 cm deep) to drain excess water from the field. Farmers were trained on new crop varieties, management practices, and the technical aspects of quality seed production. Given the cross-pollination habit of faba bean adequate isolation distance was provided to avoid genetic contamination for quality seed production.

In both crop seasons, FRG member farmers collectively evaluated the varieties at seedling stage, flowering stage, advance podding stage, maturity, and harvest time. They then ranked them using their own selection criteria (Table 2).

Farmers were organized into sub-groups for the first evaluation, and finally the whole group together discussed the results to reach consensus to select the variety(ies). During the evaluation and selection, farmer field days were organized for district agricultural experts, development agents, farmers, and researchers.

Table 1. Faba bean varieties, their agronomic traits and adaptation in Ethiopia

Released variety	Agronomic traits	Production areas	Soil type	Farmer ranking
CS20DK	Large seed size	Mid to high altitude	Nitosols	9
Holeta-2	Tolerant to chocolate spot and rust	High altitude	Nitosols	7
Bulga-70	Medium seed size; chocolate spot and rust tolerant	Mid altitude	Nitosols	10
Tesfa	Chocolate spot and rust tolerant	Mid altitude	Nitosols	7
Mesay	Chocolate spot and rust tolerant	Mid altitude	Nitosols	8
Wayu	Black root rot tolerant	High altitude areas (> 2400 m asl)	Vertisols†	3
Selale	Black root rot tolerant	High altitude areas (>2400 m asl)	Vertisols	4
Lalo	Black root rot tolerant	High altitude areas (>2400 m asl)	Vertisols	2
Dagm	Black root rot tolerant	High altitude areas (>2400 m asl)	Vertisols	1
Local cultivar			Vertisols	5

Note: †Vertisols are characteristically waterlogged and have drainage problems

From the nine varieties planted in farmers' fields, the two varieties released for vertisol areas, Dagm (Grar Jarso89-8) and Lalo (Selale Kasim 89-4), were selected by the farmers. The seed was supplied to farmers free of charge and the harvested seed left with them. The only requirement was that the farmers had to return the amount received for planting to serve as a revolving seed stock. The returned seed was distributed to other farmers not organized in FRGs.

Table 2. Farmers' selection criteria for faba bean varieties on vertisols in Ethiopia

Selection criteria	Rank
Seed yield (visual estimate)	1
Tolerance to waterlogging	2
Tolerance to pests and diseases	3
Straw yield	4
Plant height	5
First pod height	6
Vigor and biomass	7
Number of pods per plant	8
Seed filling	9
Number of branches/plant	

In the 2007 and 2008 crop seasons, seven and nine farmers, respectively, continued with faba bean seed multiplication. Seed was hand broadcasted on traditional, handmade BBF at the rate of 120 kg/ha and covered by ox-drawn plough. At the flowering and podding stages, quality control experts inspected the seed multiplication fields to approve the crop for use as a seed source for the next season for farmers not included in the FRGs. In both seasons, seed multiplication fields were visited during field days by zone and district officials, district agricultural experts, development agents, cooperative union experts, farmers, and researchers.

Field day for demonstration of faba bean varieties

5. Results and discussion

During the 2006 crop season, on-farm evaluation using PVS was initiated to select from among nine faba bean varieties. Selection was carried out in individual farmer's fields and based on the farmer's criteria. Farmers selected the Dagm and Lalo varieties recommended for waterlogged vertisol areas. Farmers emphasized that the major priority constraints are black root rot and adaptation to waterlogged soils. They are interested in new varieties tolerant to biotic and abiotic stresses with better grain and straw yields.

The farmers' choices matched those of the researchers as they also focused on the main constraints of faba bean production in waterlogged vertisol areas – the predisposition of the crop to black root rot disease caused by *Fusarium solani*. The farmers' selection of varieties in the vertisol areas revealed how the stresses in the target environment affect agronomic performance, disease reaction, and farmer's varietal choices. In the 2007 and 2008 crop seasons, farmers started multiplying the two selected varieties on 0.25 ha to 0.5 ha plots. A hands-on, practical training in agronomic practices and seed production of faba bean was organized for 72 farmers. Sixteen farmers agreed to produce the seed in groups, clustering neighboring farmers' fields together to avoid cross contamination from local varieties. Farmers harvested the seed individually and produced 1650 kg in the 2007 crop season and 2150 kg in 2008. The farmers, after saving seed for the next planting season, delivered the remaining seed to the farmer cooperatives for sale to other farmers. Although quality seed production was technically achieved, seed marketing remained a major bottleneck in the following seasons.

In the 2008 crop season, the focus was to market quality seed produced by farmers to support local seed production. Linkages were created with seed inspection offices to supervise the seed multiplication fields to facilitate the purchase of seed from approved fields by farmer cooperative unions. Moreover, efforts were made to reduce admixtures in the field and provide appropriate storage facilities to reduce losses and maintain seed quality. The farmer cooperatives purchased the seed with a 15% premium over the price of the local grain market.

6. Problems encountered and lessons learned

During planting, farmers did not use the full agronomic package, such as seed rates and fertilizers, recommended by the researchers, and did not realize the consequences of not doing so. When farmers broadcast the seed and make furrows, they scoop out the seed in the furrows. The practice increases the plant population and creates competition, reducing seed size and yield.

Local seed production was implemented not only by the research center, but with strong participation of such stakeholders as the Bureau of Agriculture, farmer cooperatives, farmer unions, seed quality laboratories, district administrations, and agricultural and rural development offices. The stakeholders worked together and each played a specific role in supporting the local seed system. The linkage with the local seed system to provide a range of varieties and seeds to small-scale farmers would facilitate further diffusion, complement the formal seed sector, and become more effective (Almekinders and Louwaas, 1999).

Small-scale farmers are not required to meet the 'official seed standards' as they are operating under an informal system. However, they do need to produce good quality seed of a new variety to meet local demand from other farmers.

Moreover, local seed production and marketing will be a conduit not only for faba bean, but also for new varieties of other crops where the formal seed sector fails to function. Often, differences in approach lead to an inability to co-operate across disciplines. Seed specialists in the formal sector may stick with a certification system and may not recognize farmer specialists and rural development workers as their equals. Recognizing those districts with seed production potential helps to address the seed demand in marginal environments, like vertisols.

Grouping farmers to produce quality seed by clustering neighboring fields is a good mechanism for supporting the local seed system and alleviating the problems arising from the small, fragmented land units of individual farmers involved in seed production. Then the improved varieties of food legumes not only increase productivity, but also help to expand the legume production area and allow farmers to test improved varieties with other technologies, such as the broad bed maker (BBM), which is recommended for seedbed preparation in waterlogged vertisol areas.

7. Conclusion and recommendation

In Ethiopia, seed production and the distribution of new crop varieties, particularly of legumes, remains a bottleneck and is considered non-profitable by both public seed enterprises and private seed companies. The overall share of the formal seed system is estimated at between 10% and 20%, while the remaining 90% to 80% is supplied through the informal system (Bishaw *et al.* 2008). Establishing and engaging farmers' groups in decentralized seed production and marketing, providing them with quality seed of adapted, new crop varieties for multiplication, and training them in the technical and financial management of local enterprise is of paramount importance in making seed available for neighboring farmers, surrounding villages, and beyond. Such a decentralized approach would ultimately help fill the gap in seed demand for improved varieties. The importance of both the formal and the informal seed systems should be recognized, taking into account their strengths and weaknesses. They need to operate side-by-side, since they serve the needs of diverse groups of farmers, crops, agro-ecologies, farming systems, etc. (Seed Info 2010). The farmer-produced seed should be labeled to provide basic information on the variety, production year, and place. Stakeholders should provide support to strengthen such approaches.

To enhance the linkages between the formal and informal seed sectors (non-governmental and community-based systems), training should be provided to farmers, farmers' associations, and local seed traders in seed production, processing, and distribution and on developing model, small-scale seed enterprises that are efficient and sustainable. In the future, linkages should be established with regional seed quality testing laboratories and other stakeholders to derive synergies in promoting the local seed business. The experience from the scheme could be used in other areas facing similar situations.

The ESE (federal) and regional seed enterprises could also contract FRGs as growers, since the area is potentially suitable for seed production of specific crops with less risk of disease infection and insect pest infestations. The seed produced could be transported to ESE centers for cleaning and packaging for sale to farmers across the country. Similar approaches require attention if they are to succeed in enhancing seed availability and access in Ethiopia.

Acknowledgements
We would like to thank the Amhara Regional Agricultural Research Institute for financing this research project and Debre Birhan Agricultural Research Cente for its support and assistance during the field experiments. We are extremely grateful to all the farmers for their time and efforts in working with us in participatory variety selection and seed multiplication to strengthen the local seed system.

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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

GMOs in Horticulture, 11-15 September 2011, Mpumalanga, South Africa: The International Society for Horticulture Science, in conjunction with the local organizing committee in South Africa, is pleased to announce the II International Society for Horticulture Science (ISHS): Genetically Modified Organisms in Horticulture (GMO 2011). The theme of the symposium is 'Paving the Way for a Sustainable Future'. This 2011 event will provide updates on the progress and challenges in plant biotechnology for horticulture crops, with an extra focus on developing countries. It will also be an opportunity for plant biotechnologists to share their knowledge on new technologies with the horticultural research community. It will be relevant for research scientists and the industry involved in developing biotechnology products in the world.

AFSTA Congress 2012: The congress will be held at the Zanzibar Beach Resort 5-8 March 2012 in Zanzibar, Tanzania..

ISF World Seed Congress 2012: ISF and the Brazilian Seed Association (ABRASEM) will organize the congress 28-31 May 2011 in Rio de Janeiro, Brazil. For more information, visit http://www.worldseed 2012.com/.

Courses

Postgraduate studies

International Postgraduate Research Scholarship

The scheme seeks to attract postgraduate students to areas of their research strength in higher education institutions to support Australia's research effort. About 15 scholarships may be available in 2012 for international students undertaking postgraduate research in areas of the University of Adelaide's research strengths. The last date to apply is 31 August 2011. Further details on IPRS, eligibility, criteria for selection, and method of application are available at the website: www.adelaide.edu.au/graduatecentre/scholarships/postgrad/international/iprs.html

Master Fellowships in GM Crop Risk Assessment

The International Centre for Genetic Engineering and Biotechnology (ICGEB) is an international, intergovernmental organization conceived as a centre of excellence for research and training in genetic engineering and biotechnology with special regard to the needs of the developing world. The Centre implements a comprehensive program in capacity building and dissemination of scientific information on biosafety. The ICGEB is currently offering five biosafety fellowships in the framework of a capacity building initiative focused on sub-Saharan Africa. ICGEB will fund five fellowships for a one-year M.Sc. course, 'Managing the Environment', which starts on 26 September 2011 and is offered by the Institute of Biological, Environmental and Rural Sciences, Aberystwyth University, UK (http://www.aber.ac.uk/en/ibers/).

MSc in Plant Breeding at Iowa State University (distance program)

The program provides the same rigorous curriculum as the resident program, including access to the plant breeding faculty within the Department of Agronomy. The curriculum consists of 12 courses plus a one-credit workshop and a three-credit creative component, for a total of 40 credits. The one-credit practicum is the only course that requires attendance on campus – four days during one summer. For more information, please contact: Maria Salas-Fernandez, Department of Agronomy, Iowa State University. E-mail: msagron@iastate. edu

Short courses

Pre-breeding for Effective Use of Plant Genetic Resources – a New E-learning Course

The Global Partnership Initiative for Plant Breeding Capacity Building (GIPB) is pleased to announce a new e-learning course – Pre-breeding for Effective Use of Plant Genetic Resources. The course is designed primarily for plant breeders and germplasm curators, but will be useful also to others involved in capacity building in crop improvement. It combines elements of both conventional germplasm management and plant breeding with novel molecular biology and analytical techniques. The course is jointly sponsored by Bioversity International, the FAO, and the Global Crop Diversity Trust, using the GIPB platform. Please note to register, access the course at the GIPB web site http://km.fao.org/gipb/.

Wageningen University and Research Courses

The training programs are organised by Wageningen UR Centre for Development Innovation and the Centre for Genetic Resources, the Netherlands in collaboration with other partners from Wageningen UR. The courses include (1) Genetic Resource Policy and Management Strategies and (2) Integrated Seed Sector Development. The program consists of two three-week courses offered in parallel tracks from 16 April to 4 May 2012 in Wageningen, The Netherlands.

The *Genetic resource policy and management* *strategies* course focuses on the international policy framework (i.e. on the history and contents of international agreements), in particular on the CBD, IT-PGRFA, the WTO-TRIPS and UPOV. The program will address gene flows, economic interests, international agreements, access and benefit-sharing, farmers' rights, intellectual property rights, and the impact of respective policies on genetic resources management at different institutional levels. The second part addresses current perspectives, concepts and strategies regarding the conservation and use of genetic resources.

The *Integrated seed sector development* course will explore opportunities for linking farmers', public and private seed systems, and increase participants knowledge to more effectively and efficiently manage their own seed programs

Topics addressed include

- Seed and genetic resource policies
- Integrated approaches to seed sector development
- Formal and informal seed systems
- Public-private partnerships
- Local seed business development
- Entrepreneurship and agri-business
- The role of knowledge institutes in seed sector development
- Methodologies and tools for participatory learning and action

The first two weeks of the program will focus on theory and concepts. Group assignments aim to translate theory and concepts through examples taken from participants' own working contexts. In the third week of the training, theory and concepts will be tested through their application in a one-week field study in the Netherlands.

Based on professional interests and institutional needs, participants have to make a choice in which course to participate. Preference needs to be indicated on the online application form under "What is the practical use of this course for your work?" After the selection of participants in March 2012, Wageningen UR Centre for Development Innovation will announce the final program.

Interested candidates should always apply to Wageningen UR Centre for Development Innovation for admission to the training. If you are admitted, you will receive an admission letter within a week. Wageningen UR Centre for Development Innovation is unable to assist in obtaining financial support and encourage applicants to search for own funding or apply for Nuffic NFP fellowships.

The admission deadline for application directly to Wageningen UR Centre for Development Innovation (with other funding), is 16 March 2012. The Nuffic NFP fellowship application deadline is 1 October 2011, through the Nuffic Scholarship Online system.

For more information please contact Gareth Borman, Centre for Development Innovation Wageningen UR , P.O. Box 88, 6700 AB, Wageningen, The Netherlands; Tel: +31-317-486800; Fax: +31-317-486801; E-mail: gareth.borman@wur.nl; Web: www.cdi.wur.nl

Training modules

A new series of five educational modules on the *International Treaty on Plant Genetic Resources for Food and Agriculture* was presented to delegates at the Fourth Session of the Governing Body of the Treaty (14-18 March 2011, Bali, Indonesia). The module provides general information on the Treaty and the crop diversity policy, and explains technical terms and concepts. The forthcoming modules focus on the Treaty's main components – Conservation and sustainable use, Farmers' rights, the Multilateral system of access and benefit-sharing, and the Funding strategy. The modules strengthen stakeholders' capacities for the operation of the Treaty and enhance information and raise awareness among the general public. The modules target policy makers, civil servants, gene bank staff, plant breeders, farmers' organizations, other civil society organizations, the media, academia, and prospective donors. For more information, please contact Patrick Mink. E-mail: patrick.mink@fao.org.

Internships

Internships of up to 24 weeks are available at the World Trade Organization for postgraduate university students. The assignments will enhance the interns' knowledge and understanding of the WTO and of trade policy more generally. Potential candidates should be nationals of member countries and customs territories engaged in accession negotiations. They should have completed their undergraduate studies in a relevant discipline (e.g.. economics, law, political science, international relations) and should have completed at least one year of their postgraduate studies. In addition to the regular internship program, the need may also arise to recruit interns at short notice for particular tasks. There is no opening or closing date for applications. For details visit www.wto.org/english/forums_e/students_e/students_e.htm

LITERATURE

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

Books

Turner, Michael. 2011. Seeds. This book provides an understanding of the technical and managerial aspects of seed production and supply with particular reference to tropical conditions which are inherently more challenging than those of temperate environments. The book covers the basic principles of plant breeding and the biology of seeds, together with the management of seed production, harvesting and processing to maintain the best quality. Quality assurance, seed marketing and enterprise management are also dealt with. Whil focusing mainly on staple cereal and legume crops, the auhro also covers the production of specialized crop seeds such as vegetables and forages. Besides helping farmers directly, this book will be invaluable to those who would like to supply improved seed to farmers through small-scale enterprises, growers" associations and cooperatives. The Tropical Agriculturalist series is published in association with the Technical Center for Agricultural and Rural Cooperation (CTA). Published by CTA and MacMillan, ISBN 978-0-230-02239-3 (Pb), 152pp; www.macmillan-africa.com

Mangnus, E. and B. de Steenhuijsen Piters 2010. Dealing with Small-scale Producers. Linking Buyers and Producers. Poor infrastructure and lack of up-to-date market information, technical advisory services, agricultural inputs, and post-harvest facilities make it difficult for small-scale farmers to deliver a consistent supply of high-quality produce to the market. The book states that producer organizations should overcome the obstacles that inhibit cooperation between private sector businesses, but, in many cases, this does not occur. It attempts to remove this confusion by outlining the successes and limitations of different models of producer organizations, in order that the reader will be able to select which approach is most useful. A number of experts also present their personal insights on a range of subjects, including how producer organizations help small-scale farmers to reach supermarkets and entrepreneurship in producer organizations. Published by Royal Tropical Institute, ISBN 978-9-46022-126-2, 80 pp. Price: €25 or free (http://portals.kit.nl/INS/55136/Royal-Tropical-Institute/Publication?item=2914). Website: www.kitpublishers.nl

Websites

Extension

A group of researchers and educators from U.S. land-grant universities, government agencies, and industry has created the first Internet resource designed to quickly put basic research on crop genomes on the Web to support plant breeding programs. The resource is new at eXtension.

Traditional plant breeding focused on the selection of the best plant lines based on traits (phenotypes). In the past decade, research has yielded extensive databases of gene sequences and of the complete genetic makeup (genomes) of entire plants. As sequencing technology improves, information to aide in crop improvement is expanding rapidly. This basic research information is used when linking important agricultural traits to genetic sequence variations and incorporating this knowledge into crop improvement strategies

The goal of the Plant Breeding and Genomics resource on eXtension is to act as a portal to the vast number of public databases for crops and genetic and genomic resources. Another important function of the eXtension resource will be to provide up-to-date production information on new varieties to producers. Members of the Barley Coordinated Agricultural Project (CAP) provided a template for this goal. For more information, please visit the website at http://www.extension.org

WIPO Gold

WIPO Gold is a free public resource that provides a one-stop gateway to WIPO's global collections of searchable IP data. It facilitates universal access to IP information. For more information, visit the website at http://www.visbdev.net/visbdev/fe/loadsite.aspx?url=http://www.wipo.int/wipogold/en

World Agriculture: Problems and Potential

World Agriculture is a new, peer-reviewed, scientific review journal directed towards opinion formers, decision makers, policy makers, and farmers. The first issue was released in April 2010. The journal gives an independent, unbiased assessment of the impact of new technology, population, and climate changes on agriculture. It will also address issues of change and development in ecology, forestry, and fisheries which are economically and culturally important. For more information, please visit the website at http://www.world-agriculture.net/

SeedLiving

SeedLiving is a new online forum for buying, selling and swapping open pollinated seeds and live plants. The objective is to foster biodiversity around the world. Users pay what they can to use the site. You may post news as well. Posting items for sale or trade is free with no limits. You may visit the website at http://www.seedliving. com

Newsletter

Plant Breeding News

Plant Breeding News iis an electronic forum for the exchange of information and ideas about applied plant breeding and related fields. It is a component of the Global Partnership Initiative for Plant Breeding Capacity Building (GIPB), and is published monthly throughout the year. Contributions include technical communications on key plant breeding issues, announcements of meetings, courses, and electronic conferences, book announcements and reviews, web sites of special relevance to plant breeding, announcements of funding opportunities, requests to other readers for information and collaboration, and feature articles or discussion issues brought by subscribers.