ESTABLISHMENT OF A COMMUNITY SEED BANK AND THE SERVICES PROVIDED

ETHIO ORGANIC SEED ACTION (EOSA)

November 2017
Addis Ababa
Ethiopia

Preface

Community seed banking is now a national strategy that supports the agricultural sector by contributing towards ensuring seed security. As such, community seed banks provide seed supply service to food producer small scale farmers by making available diversity of locally adapted seeds within easy access to the community. In case when season variations occur due to climate change related challenges, community seed banks fill gaps of seed shortage by offering access to diversity of short maturing sequential crops as alternative. Having diversity offers farmers to replant their farm plots in case when the first planting fails and strengthens the resilience capacity of farmers to climate changed induced shocks.

Community seed banks play particular importance especially to farmer households who are resource-poor and face seed shortage frequently. By offering access to diversity, CSBs supply seeds that are keys to achieving seed and food security. Along this line, this manuscript is compiled to document the experiences and lessons gained over the last three decades to serve as a reference material. Community seed banking was first conceived, then birthed and was grown in Ethiopia. However, the CSB system is not yet known by many experts, in different localities, and many parts of the country.

The authors, Drs. Bayush Tsegaye and Regassa Feyissa, pooled together their practical experiences and lessons learned in due course so as to share with other interested parties in Ethiopia who would like to replicate the CSB scheme. It is expected to serve as an important reference material.

Finally, the authors, on behalf of EOSA, like to express their gratitude to donor organization especially to USC Canada and DF Norway who supported the CSB scheme over different project phases.

Table of Contents

Page

LIST OF FIGURES

PAGE

PAGE

LIST OF TABLES

PAGE

LIST OF ANNEXES

PAGE

1. INTRODUCTION

Agricultural production is dependent upon the farm ecosystem, crop and animal diversity as well as the production technology of farmer communities. Farmers' local knowledge and strategies are based on practical experience and are the foundations for the development of plant genetic resources (types and the diversity) we are currently using. This diversity is the source of food for mankind. However, as diversity is threatened and narrowed down through time, the food security of humanity is affected.

In line with this, farmer communities who developed and nurtured diversity are classified as **food producers**. Hence, global food security can be ensured only when these food producer farmers are able to have the different types and quantity of seeds of crop genetic resources they want to have and also when these farmers get the necessary support adequately.

Presently, it is small scale farmers living in different continents across the globe (estimated to be about 3.5 billion) who are actually feeding the world population estimated at 7 billion. These farmers produce different types and varieties of crops mainly for food. However, the diversity based farmers - who continue to produce and conserve diverse crop and plant species - are doing this without adequate support. On the contrary, large scale farmers who produce crops for commercial purpose (and not for food) are getting different kinds of support and incentives.

Both small scale and large scale production sectors are important for socio-economic development of a country. But, the reality shows that the small scale food producer sector remains without support and there is strong push to replace these with commodity producer large scale farms. As a result, the world is becoming a place where millions of people continue to live under poverty instead of getting out of poverty. The displacement of diversity-rich food production system means increased food insecurity and threatens diversity of crop/plant genetic resources which are the foundations of food security for both the present and future generations. This is what is happening now.

This unbalanced development path of the agricultural sector became an area of concern since the 1970's and 1980's. One of the main concerns was the danger of displacement of the once rich crop genetic resources diversity from the hands of farmers in favor of commercial agriculture

and technologies developed for that. The United Nations Food and Agriculture (FAO) recognized the threat and started supporting the collection and conservation crop/plant genetic resources in formal *ex situ* gene banks.

Along this line, Ethiopia as a center of diversity was given special attention and the national gene bank named as the Plant Genetic Resources Center of Ethiopia (PGRC/E) was established in 1976. It was the first gene bank in Africa. As time went by, it became very clear that the gene bank structure and system was developed and set-up in a way to serve the interests of agricultural research targeted towards supporting the large scale farms producing crops for commercial purpose. That means, the small scale food producing farming sector is left aside although they are the ones who continue to produce and conserve the crop/plant genetic resources.

Realizing this, the Ethiopian gene bank researchers and experts came up with an innovative scheme that was developed to enable the gene bank work closely in collaboration with small scale farmers. This strategy takes into account the practices, knowledge and production environment of the farmer communities.

The initiative of the Ethiopian gene bank to work with farmer communities regarding the conservation and development of plant genetic resources, led to a new strategy of community seed banking. Currently, community seed banks are built in different parts of the country and are delivering services to their respective communities. Community seed banking is now given recognition and is taken as a national strategy to promote the conservation and use of farmer varieties and as a community institution supporting seed security and as center of research for farmers. Hence, community seed banking system is now spreading through the support of government and Non-government Organizations to reach different agro-ecological zones of the country.

Today, Ethiopia is the only country where community seed banking is a national strategy to promote the conservation, management and use of crop genetic resources and as a biodiversity strategy. The importance of this approach is undisputable. The management and conservation of crop/plant genetic resources needs the involvement of all stakeholders in and the resource needs to be conserved and passed on to the future generation as well.

In view of this, Ethio Organic Seed Action (EOSA) prepared this manuscript in order to document the experiences and lessons learned so far regarding community seed banking. It is assumed that the manuscript will serve as a resource material to those who are interested to engage in community seed banking in the country. It is open to further development and enrichment as new lessons are gained in due course.

2. THE CONCEPTION OF COMMUNITY SEED BANKING AND HISTORY OF ESTABLISHMENT IN ETHIOPIA

The 1960's and 1970's were characterized as a time period when technological advancement and input use has brought a leap in the agricultural production sector. The focus by then was on commercial agriculture and no attempt was made to link the agricultural technology developed with the small scale food producing farming sector. This led to undue displacement of diversity of crop genetic resources from the hands of farmers. Then the issue got global attention and the United Nations Food and Agriculture Organization developed a strategy of collecting seed samples from farmers' field in collaboration with farmers and then conserving these in *ex situ* gene banks. By then, general agreement was reached to give recognition to the role that farmers play in the management and conservation of crop genetic resources, the right of farmers as owners of the genetic resources as well as use rights. Therefore, it became clear that support is needed to enable farmers continue playing the same role.

The *ex situ* gene banks were established in developed countries and these happened to serve the needs and interests of formal researchers in the respective countries. Hence, accessibility to the small scale farmers became an issue of concern. This led to emergence of the concept of community seed banking and its establishment in developing countries so that small scale farmers also get easy access to diversity. The purpose of having community seed banks was to conserve the available crop genetic resources and thereby promote skills and knowledge sharing along with the seeds, and enhancement of these resources. Hence, the community seed banks were designed to serve as suppliers of genetic diversity and also a strategy to ensure seed security of respective communities.

However, there was no prior experience regarding the establishment and functioning of the community seed banking system by then. With modest initiatives taken to practice community seed banking, the Plant Genetic Resources Center of Ethiopia (now the Ethiopian Biodiversity Institute) developed a comprehensive project proposal in early 1990's and received funding support from the United Nations Development Program. Implementation of the proposal led to establishment of 12 community seed banks in different agro-ecological zones of the country and that marked the official launching of community seed banks as a national strategy. Since then, many lessons were learned and rich experiences were gained regarding community seed banking in Ethiopia. This makes Ethiopia unique as the strategy links the formal gene bank and small scale farmers in partnership. Currently, the CSB system is being scaled out to different regions of the country.

The Ethiopian system of community seed banking has the following 4 key elements.

1. **Seed reserve**:– this refers to diversity of crop types and varieties including farmer varieties as well as those developed by the national agricultural research centers so that farmers get access through loan system. The seed stock kept is dependent upon the needs of farmers.

2. **Germplasm reserve**:- these are samples representing crop genetic resources diversity of the locality and neighboring areas. The reserve stock is kept for medium term conservation (up to 5 years), for research and enhancement activities. In case something goes wrong and what is planted in the field fails for one reason or another, the reserve stock will be used to restore on-farm diversity. The stock kept in a CSB could vary from one locality to another based on specific agro-ecological condition and the capacity of the CSB facility. From experience, such reserve stock keeps well for up to 5 years without serious decline in germination potential (seed viability).

3. **Grain reserve**:- community seed banks could also play a role of food grain reserve to stabilize in cases of unexpected shocks resulting in food insecurity. For instance when crop failure is experienced in a given season, farmer households with low income become vulnerable and face food shortage. In such cases, a community seed bank nearby can use

its grain reserve stock and play a rescue role to enable needy households survive the shock.

4. **Market access creation:**- farmers organized under a CSB structure have the opportunity to access a better market outlet and also negotiate on price margins, provided that they act collectively. As individual, a farmer has no capacity to negotiate with industries that require supply of large volumes of grain. Hence, if the CSB members pool their harvest and deal collectively, they can have a better bargaining power. Alternately, the association can keep (store) the harvest for some months within the CSB facility and wait till price increases later during the next planting season. The usual practice is that farmers sell their produce largely right away during harvest season so as to settle financial obligations.

3. IMPORTANT CONDITIONS TO ENSURE SEED SECURITY OF FARMER COMMUNITIES

Often times, farmer communities face seed shortage especially when climate change related seasonal fluctuations occur. In such cases, resource-poor farmers are the prime victims and face challenges to get seed on time. That means the food security of these needy households is at serious stake.

The main challenge faced by resource-poor farmer households is that they cannot get loan from banks and financial institutions for lack of collateral. On the other hand, such households also have difficulty to access loan (either seed or money) from private money-lenders as well because of high risk of default. Hence, their economic situation denies these resource-poor households from accessing loan from private or public banks and micro-finance institutions.

In case private money-lenders decide to give loan, which usually happens after several repeated visits, the interest rate charged is exorbitantly high. That means, what the borrowers pay at harvest is much higher that what they borrowed during the planting season. Therefore, the loan is benefitting more the money-lenders and depletes the harvest of the borrower households. In case a resource-poor household fails to get such loan, the next option is to give the land for a share-cropper. Under this arrangement, the land owner gets 50% of the harvest. In the worst case

scenario, if the household fails to get a share-cropper, the land remains fallow. That means no crop harvest for the season and makes the household highly food insecure.

It is from such practical challenges that the idea of having a community seed banking system emerged. Where a CSB facility is built, it serves as a seed security support strategy. As such CSBs are functional in Ethiopia for the last three decades. Besides giving seed supply service, the community seed banks are increasing choices of planting materials for the farmer communities and also serve as farmers' institution to promote the conservation, management, enhancement and use of crop genetic resources.

4. ORGANIZATIONAL STRUCTURE OF A COMMUNITY SEED BANK

A community seed bank (CSB) is a community based institution that provides seed supply service to its members. A CSB Association can be formed by 20 or more volunteer farmers who like to engage in the conservation, management and use of crop genetic resources. The Association has a legal status and is officially registered by the respective Cooperatives Development and Promotion Department – which is the designated authority to register such cooperatives in Ethiopia. The Association is led by Executive Committee elected from among its members. The General Assembly is the supreme authority and a model organogram is presented below.

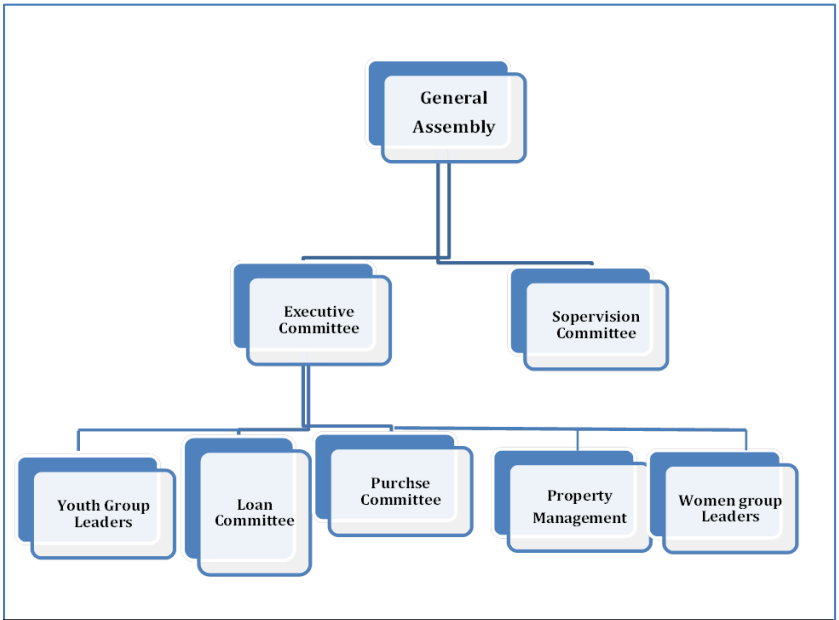

Fig.1. Organogram of a model community seed bank association

A community seed bank (CSB) facility is built in a central location for its members in area that is accessible during both dry and wet seasons. A CSB provides access to diversity of locally adapted materials (i.e. different kinds of crop types and varieties) and contributes towards seed security of members of the association.

The **goal** of a CSB Association is to fill gaps of seed shortage and support resource-poor households by supplying diverse types of seeds adapted to the particular locality where the CSB is located. By doing so, a CSB increases diversity of seed stock in the hands of farmers. Therefore, the prime function of a CSB is service provision to its members and not on money making like profit oriented business organizations.

The **mission** a CSB Association is to promote seed and food security of target communities through conservation and management of crop diversity and also by increasing seed supply capacity of its members.

A model CSB has the following units (Fig 2)

- Office for the CSB leaders,
- Meeting hall,
- Seed store,
- Germplasm unit,
- Office for technical support staff, and
- Community knowledge library.

For the detail dimensions see Annex 1.

Fig 2. Outside view of a model CSB

If resources permit, it is advisable to have office spaces for youth group leaders, women group leaders, and a seed testing laboratory as well. Also, there should be a store for keeping tools and a guard house built separately than the main CSB-complex.

The size of a CSB facility is dependent upon the following key elements:

(a) the number of people expected to use the facility,

(b) financial resource available at hand,

(c) the cost of construction materials, and

(d) the types of services the CSB is intended to provide.

Fig. 3. Inside view of a community seed bank; (Left) seed store and (Right) germplasm unit

As membership of the Association grows over time, a satellite community seed bank supporting the main CSB could be established to ease accessibility especially to communities living far away from the main CSB facility. The size of a satellite CSB is usually smaller and focuses mainly on seed supply provision. A CSB service builds upon the knowledge of farmers, and farmers play central role and create networks to strengthen the informal seed supply system. The informal seed system includes different types of household level seed storages, traditional underground pits, and other types of seed storages in use by the community. Ideally, it is advisable to have a one-room community knowledge library in every CSB facility to make it complete.

From the experience of EOSA, CSB membership grows significantly in about 4-5 years' time. The increment seen varied from triple-folds to up to 5 times more than it was during initial establishment time. Hence, it is important to take this into account in deciding particularly the size of the seed store when building a CSB facility. Because it may not be realistic to build another new CSB or increase the size of the existing seed store in such a short period of time owing to the financial budgetary constraints.

5. ESSENTIAL CONDITIONS TO KEEP SEEDS IN STORAGE

A seed stock kept in storage qualifies as seed based on its viability level. As a general principle, germination capacity should be 85% or more to be used as a seed. That means, out of 100 seeds, 85 of them should have good germination potential. Seed quality is negatively affected when crop is harvested before it attains its full physiological maturity. Another case is when the crop stand is affected by late rains coming at maturity stage right before harvest.

In order to keep seeds well in storage, the determining factors are **seed moisture content** and **relative humidity** of the environment. When relative humidity is high, seed quality deteriorates shortly because the dry seeds tend to absorb moisture from the humid air. When seed moisture content increases above 13%, the seeds are exposed to molding. Seeds affected by mold or insect pests such as weevils, show sharp decline in quality and viability. Hence, such seeds are of poor quality and should not be used as seed for planting.

In areas where the air temperature is greater than 25^0C and seed moisture content is >13%, seed viability declines rapidly. If the seeds are not dried to the right level of moisture content before storage, seed quality declines shortly. Such seeds are exposed to molding, insect pest attack and/or in some cases start germination. This untimely emergence of shoots leads to total loss of viability by the end of the storage period.

The key factors that need attention in seed storage are **air temperature** and **relative humidity** of the environment. To minimize the negative impacts of these, the storage area needs to have cool breeze and should allow good air circulation inside the storage room. Having good air circulation helps to regulate the air temperature and relative humidity to the optimum level.

In line with this, the construction of the CSB facility needs to give due consideration about the positioning of the windows. To allow good air circulation freely within the CSB, height of the windows, number of windows, position of windows, seed piling system, and free walk ways between piles need special attention.

The seed storage space needs to have wooden racks to avoid contact of seeds with the floor. The racks have open spaces to allow air circulation underneath the piles. There should be adequate

walking space between racks so that sacks could be piled and removed with ease (see Fig. 4). This system allows piling seeds orderly and labelling each with the name of crop type and variety. The walk way space also facilitates air circulation and, hence, helps to keep seeds in good condition.

Fig. 4 (L) Arrangement of racks inside a seed store and (R) proper piling of sacks for storage

As a general principle, the following conditions hold true.

1) When storage room temperature decreases by 5%, the time duration that seeds can be kept viable doubles.

2) When seed moisture content of the stored seed decreases by 1%, the time duration that seeds can be kept without losing viability doubles.

In both cases, the room temperature needs to be less than or equal to 25^0C for the above conditions to be met. In areas where the relative humidity is not greater than 65%, seed moisture content is <13% and with room temperature <25%, seeds can be kept for about 5 years without significant reduction in viability. This holds true for most of the common food crops.

The following figure shows the relationship of seed moisture content and relative humidity of selected food crops (Fig. 5).

Change grpah to english label

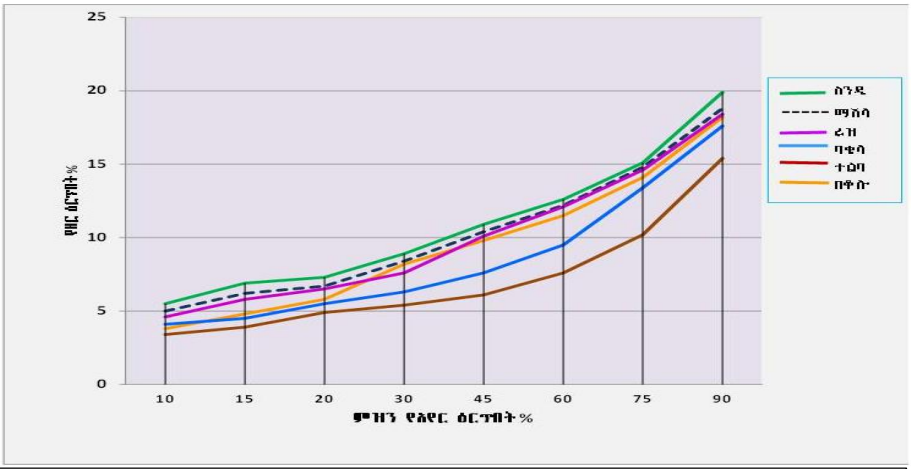

Fig. 5. Relationship of seed moisture content and relative humidity of selected crops

6. NESSARY CONDITIONS FOR SEED STORAGE

The seed store of a community seed bank needs to be clean and free from any dust, insect pests, moisture, fallen seeds from previous year stock, and any other debris. For storing seeds well, jute sacks are preferred than polythene bags. Jute sack has open spaces and allows good air circulation. That means seeds as living things are allowed to breeze properly. Having good air circulation within the store room allows regulation of seed moisture content and room temperature, and that in turn increases life span of seed viability.

Sacks containing seeds need to be piled properly on a wooden rack having a height of about 10cm from the floor (Fig. 6). This helps to avoid contact of seeds with the floor and from absorbing some moisture. It also helps to have good air circulation and control insect pest attack.

Good air circulation within a seed store helps to regulate the room temperature. To facilitate this, the store room needs to have windows on two opposite sides of the wall. The windows should be placed at higher spot below the roof and ideally must have a length of 150cm and a height of 60cm. Depending on the size of the room, a seed store may have up to 4 windows on each wall. The windows need to be covered with mesh wire to protect birds from sneaking in and damaging the stored grain (Fig. 6). The placement of windows is recommended to be at higher level in order to avoid leakage of moisture during the heavy rains that often times are accompanied by

heavy winds. Therefore, higher spots are free from splashing moisture from the heavy rains and help to keep stored seeds in good condition.

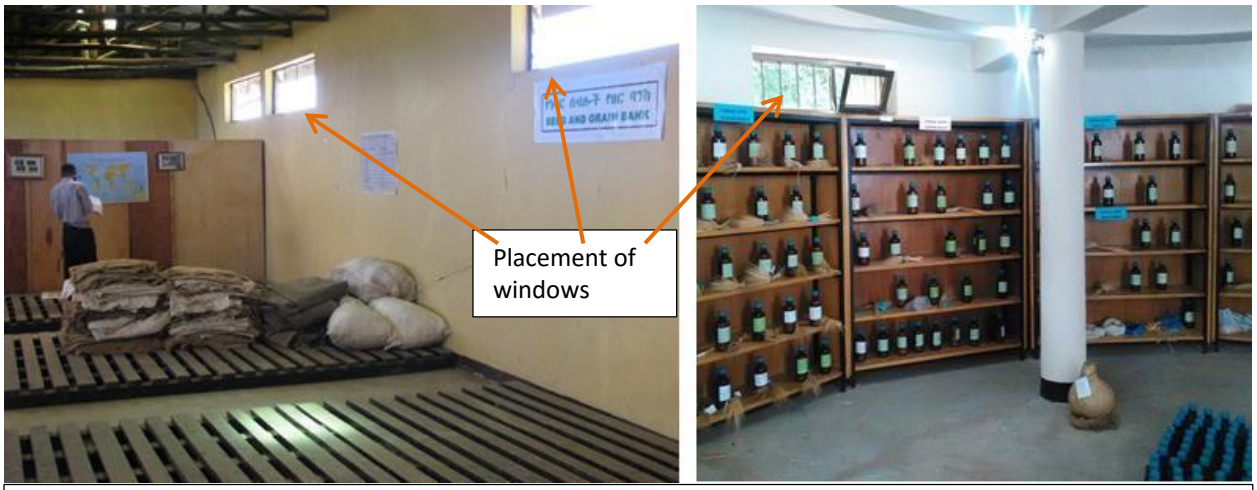

Fig. 6 Placement of windows of (L) a seed store and (R) germplasm unit for good air circulation

Cold air from outside the store is normally heavier in weight than the warm air inside the room. Hence, cold air entering through the windows on one side of the wall pushes away the lighter warm air within the seed store through the windows on the opposite side of the room. Such air movement helps to reduce room temperature of the seed store. This in turn means that seeds stored will keep long without losing viability and, hence, is beneficial.

6.1 Preparation of seed samples for germplasm storage

Seed samples for germplasm storage should be representative of the mother population as much as possible. Some crop varieties have more or less uniform appearance and their genetic diversity is relatively narrow i.e. based on a few genotypes. In such cases, preparing samples for germplasm storage is relatively simple. On the other hand, most of the farmer varieties are heterogeneous and are composed of several genotypes. In such cases, samples collected for germplasm conservation should represent all the genotypes to the greatest extent possible in order to ensure the conservation of the existing diversity.

Sometimes, it may not be possible to distinguish different varieties simply based on grain color. For instance, if a particular wheat variety is composed of three or four genotypes and each has same grain color, it may not be possible to ensure equal representation of all the genotypes in the

sample taken. Therefore, when a variety is composed of several genotypes, it is advisable to take samples from individual plants and then mix together. This way, it is possible to make sure that all genotypes available are represented in the sample collected for germplasm storage.

It is important and advisable to collect and keep herbarium samples of each variety stored for germplasm conservation purpose. This helps to show visitors about the variability of the different materials under storage (Fig. 7). The two complement each other and the herbarium samples give visual information regarding the appearance of each variety in the field.

Fig. 7 Placement of samples for germplasm conservation and herbarium samples

6.2 Regeneration and multiplication of germplasm materials

Regeneration means refreshing viability of seeds stored for germplasm conservation purpose by growing these out on farmers' fields. Then the newly harvested stock is used to replace those previously kept under storage for some time. This refreshment of viability helps to prolong the life span of the conserved seeds. Depending on the particular agro-ecological condition where a CSB facility is present, the time of renewal of seed viability varies from one location to another. In areas where the air temperature is warmer, seed viability keeps for a relatively shorter period of time. Whereas in colder areas with cool breeze, seed samples keep for longer period, up to 5 years simply without any other additional preservative measures.

Seed life (its viability) is measured by its germination potential. Good seed gives healthy shoots, shows good root development, has nice looking appearance and shows normal growth (Fig. 8). If

shoots are not healthy, roots are entangled or the plant shows stunted growth, then it means that seed quality is declining. Such stock is not good for use as seed.

Fig. 8 Maize and lentil seeds showing good germination (emergence)

As seed germination is tested under laboratory conditions, traditionally farmer communities also carry out seed germination tests. Farmers use clay pots or broken pieces of big clay pots to conduct the germination test. They place 25 seeds on a piece of wet cotton cloth or wet cotton lined inside the clay pot. The container is kept in a darker spot inside the room for seven days. Then, they take out the container and count the number of seeds that show good germination. If 20 seeds out of the 25 planted germinate properly, the seed stock qualifies for using as seed.

In order to determine viability of seed stock of a community seed bank, there are different options to use. It is practical and advisable to use materials that are locally available and easy to obtain for doing the test. For instance, one can use sand from a river bank as a media to do the germination test, if it is locally available. The size of the sand particles should ideally be like the size of a rapeseed or mustard seed (not greater or lesser). To use this for the test, first the sand needs to be washed and be clean from dust/mud. Secondly, the sand needs to be boiled for sterilization (Fig. 9). Boiling helps to kill some micro-organisms that may be present in the sand and later may interfere during seed germination. Thirdly, the sand needs to cool down to normal room temperature before filling the containers made ready for doing the germination test (either clay pot or plastic containers as seen in Fig. 9, if available). Fourthly, seeds for the germination test are planted in the sterilized sand filled in the containers. Make sure that there is enough

space between seeds and then lightly cover with sand. Care should be taken not to put seeds deeper down. Seeds are then checked and watered at some intervals so as to give adequate moisture to enable seeds germinate properly. The containers are kept inside the house in a darker spot to stimulate germination. On the 7th day, the container is taken out and counting takes place. Those showing healthy emergence are counted and the ratio is calculated to see if it qualifies for use as seed or not.

Fig. 9. (L) Boiling sand for sterilization and (R) planting seeds on the sand after cooling

When conducting germination tests, it is advisable to do it in two replicates and plant 50 seeds in each set. On the 7th day, the number of germinating seeds is counted (Fig. 10). If 40 seeds or more germinate properly out of the 50 planted, then the stock qualifies for use as seed. If the number of properly germinating seeds is lower than that, then the stock is not good for use as seed because the viability level is below the minimum standard. During germination test, some kinds of emergence challenges may be encountered as seed in Fig. 10 below.

Fig. 10 a) Samples for seed germination test placed in a dark spot inside house

Fig. 10 b) Conditions that may be encountered during seed germination test

1) **Started shoot growth, no root development at all**
2) **Poor shoot growth, no root development**
3) **Stunted shoot, curved root development**
4) **and 5) good shoot and straight root development**

In case when a germination test is carried out to check viability of stock of seeds stored at a community seed bank, the procedures mentioned earlier could be followed. Out of 100 seeds planted for the test, if the number of germinated seeds happens to be lower than 85%, then the seed stock needs to be regenerated and refreshed the same cropping season. If stored further without regenerating, the seed viability declines rapidly and it cannot be used as seed. Therefore, it is important to check and renew viability of seed stock regularly at certain time intervals. If regeneration is not done timely, then the seed stock in store may end up being a collection of non-viable materials.

7. SERVICES PROVIDED BY A COMMUNITY SEED BANK

In the efforts made towards strengthening and improving seed and food security status of its member households, a Community Seed Bank provides the following services.

a. Primarily a CSB promotes on-farm conservation of farmers' varieties that have descended through generations be conserved through continued use by farmer communities.

b. It promotes restoration of farmer varieties lost due to various reasons, carry out seed multiplication activities and include them into the regular CSB seed distribution system so as to create access for its member farmers.

c. Having a CSB offers access to diverse seeds to its member farmer households. Primarily it focuses on farmer varieties, but could also supply improved varieties from national research centers as desired by the members.

d. A CSB helps particularly resource-poor households who face seed shortage by offering them easy access within their vicinity and relieves them from exploitation by private money lenders.

e. A CSB holds a germplasm reserve in its germplasm unit for conservation purpose. This helps to fill gaps and revive on-farm diversity in cases when what was planted in the field fails for some unexpected reasons. The purpose of germplasm unit is to keep such stock.

f. A CSB system facilitates exchange of experiences and sharing lessons particularly regarding good practices and local knowledge of farmers pertaining to seed management, among others. The knowledge library unit of a CSB plays vital role in this regard.

g. A CSB also helps to facilitate access and distribution of seeds of vegetables and different multipurpose forage species for its members.

h. The CSB system facilitates local seed exchange among farmers and thereby increases on-farm diversity and choices for the member households.

i. The activities of a CSB complement the national level effort of conserving crop plant genetic diversity and passing on to the next generation.

j. A CSB association helps farmers to market their produce in organized manner.

Even though a CSB offers the above mentioned services, it is not a replacement for what individual farmers keep at household level. Rather, it is complementary system and enriches the household stock of diversity over time and favors conservation through use. Members get access to new diversity that they don't have at home based on the established seed loan system. The intention is not to replace household level seed storage system or to make the farmers dependent

on the CSB for their seed supply. This needs to be clearly understood by all the CSB members and others. It is an undisputable fact that increasing diversity and options for farmer communities reduces vulnerability to different production related challenges.

8. HOW TO ESTABLISH A COMMUNITY SEED BANK ASSOCIATION

A community seed bank Association is formed by volunteer farmers who like and are committed to continue to conserve and utilize farmer varieties of food crops, improve food security through seed security, and like to solve common problems jointly by making use of their own knowledge and potentials at hand. The Association could be named as Farmer Conservators Association (FCA) that caters for the conservation of farmer varieties and seed production. To differentiate from other similar associations, the name may include that of the specific locality or any other name that symbolizes the association as agreed by the General Assembly.

The main goals of a CSB association include the following:

- to collectively solve production challenges that members cannot solve as individuals;
- to strengthen the self-confidence of members;
- to conserve and enhance local crop/plant genetic diversity and associated community knowledge;
- to prevent loss of crop/plant varieties and threat of genetic erosion; and
- to promote and strengthen local farming practices that are useful.

Process of establishment

Prior to establishing a community seed bank association, a general community awareness creation meeting is organized for the general public in the target locality. The focus is to inform the community members about community seed banking, its purpose and how it functions. Then individuals discuss at household level and register by making formal application if they are interested to join. Formal establishment and process of electing leaders is facilitated by experts from the local Cooperative Development and Promotion Department - the authorized government body. This helps to fulfill all necessary prerequisites to legalize the association.

During the first community awareness meeting, the main topics addressed include: the value of collective action, legality of the association as institution, possible supports that the association could get form the government, the developmental stages that it may reach progressively, and the possibilities of networking with other associations and linkages it can have with larger Unions. These are addressed by experts of the Cooperative Development and Promotion Department so that all clearly understand and then join the association voluntarily.

When members register and their number reaches adequate size to form an association (minimum is 20), a General Assembly meeting is called. The meeting is chaired by an Expert designated from the district Cooperative Development and Promotion Department. It is during this meeting that the Executive Committee members are elected. Then, the Executive Committee in collaboration with the experts of the Cooperative Development and Promotion Department drafts bylaw of the association. Then, a General Assembly meeting is called to discuss on the draft bylaw, improve and make changes if necessary before final approval. During this meeting, the name of the association and its logo are also discussed and approved. The minute of this meeting is compiled and documented as it is one of the prerequisites for registration.

Some of the basic contents of the bylaw that are approved by the General Assembly meeting include the following:

1. Name of the Association and its physical address
2. Operational area of the association
3. The purpose and functions of the association
4. Application format for membership
5. Requirements for membership
6. Registration fee
7. Value of individual share contribution
8. Responsibilities and privileges of members
9. Number of Executive Committee members and terms of service
10. Duties and responsibilities of Executive Committee
11. Loan disbursement and repayment system
12. Conditions for termination of membership

13. Payment of dividends
14. Formats for financial management, and
15. Formats for loan disbursement and repayment.

For example, conditions for membership and termination of membership are presented in some detail as follows.

Conditions for membership:

He /she should be one who is:-

- living within designated operational area of the association,
- agrees with the goal of the association and is committed to fulfill all the stated responsibilities,
- able to pay registration fee and share contribution,
- be a farmer and has his/her own farmland,
- an adult age-wise,
- free from any mental disorder,
- not denied his/her legal rights, and
- willing to participate in members meetings actively.

Conditions for termination of membership:

- Based on request of the individual member,
- by not obeying the bylaws and decisions of the association after repeated warnings,
- by being engaged in any activity that is against the purpose of the association or that weakens its functions,
- by not fulfilling the responsibility of conserving and multiplying farmer varieties,
- by not repaying seed loan timely,
- by doing something bad against the Association,
- by leaving the locality and moving outside the operational area permanently, and
- by breaking his/her connection with the association for one year.

9. HOW A COMMUNITY SEED BANK OPERATES

A CSB is a community-based organization that provides seed supply service to its members on loan basis and collects repayments in-kind after harvest. As a financial bank offers cash and collects cash, the basic resource that a CSB handles are seeds. Therefore, a CSB offers seed loan during planting season and collects repayments in-kind right after harvest. The prime focus of a CSB is on farmer varieties of food crops, but could also handle materials coming from the national agricultural research system as deemed necessary. The latter are included based on the needs and interest of members.

In a community seed banking scheme, the core activities are: disbursement of seed loan, repayment of loans, and ways of building its seed stock. These are discussed in some detail below.

9.1 Seed Loan Disbursement

Individual members who like to get seed loan make formal written application. The Executive Committee goes through the applications and summarizes requests based on the type of crop and variety specifying the quantity requested.

Before deciding on how much an individual member can receive as a loan, the Executive Committee looks into the following.

1) The number of people who requested seed loan by variety level, and
2) The seed stock available within the CSB, also by variety level (Fig. 11).

Fig. 11. Members of the CSB Executive Committee taking inventory of seed stock

The Executive Committee decides the amount that individuals could access by balancing the requests with the available seed stock. When the time of planting approaches, the Executive Committee makes a schedule for seed distribution and informs the local level coordinators to inform members within their neighborhood. Then members come according to their schedule and collect the seed loan by signing on the format developed for this purpose (Fig 12).

Fig 12. CSB Executive Committee members filling seed loan formats and borrowers signing

When an individual member gets seed loan, another fellow farmer from among the members becomes a guarantor and also signs on the seed loan format. The quantity of seed an individual gets through loan is weighed by scale (available at the CSB) and is filled on the format. The Loan Committee head also signs on the format after checking the information on crop type, variety and quantity delivered to the borrower. The format helps to follow-up and later check during loan repayment to ensure that it is rightly collected.

As one of the strategies in community seed banking, a CSB holds different sequential crops based on the local practices of farmers. Having such crop types and varieties helps farmer households to make choices and use as meets their particular interest. In case what was planted in the field fails for instance lack of enough rains, excess moisture or disease incidence, farmers have a second option to resort to and cover their fields with crops that can mature shortly i.e. within the remaining months of the crop season. In case nothing goes wrong during the season, the seed stock could be sold out later as grain. Then new seed stock will be bought for the next season using the money raised.

9.2 Repayment of Seed Loan

The CSB association has internal bylaw regarding seed loan management. The loan term is normally for one crop season. It extends from time of planting till harvest. A borrower household pays back after harvest with some increment as agreed by the General Assembly and stated in the bylaw. Repayments are made in-kind and the borrower brings back the type he/she received. When a borrower brings the repayment, the Seed Loan Committee checks his/her file to refer as to what the individual member borrowed during planting. The quantity is also checked by weighing (Fig 13). Before weighing, the Loan Committee checks the quality of the seed and makes sure that it is clean and is the right variety. The Committee weighs only when it is clean enough and of acceptable standard. Then, the committee also signs and receives the seed. If the quality has problems (for example, if it is not cleaned well), the committee rejects and asks the borrower to bring back after proper cleaning.

To ease the collection of seed loan repayment, the Executive Committee makes a schedule and informs the respective village level coordinators. The schedule is made by kebele and village level because the management will be difficult if all the members deliver on the same date. Village level coordinators alert members within their respective locality about the schedule and then repayment follows that schedule.

Fig 13. Members repaying seed loan and executive members checking quality and receiving

To ensure functionality of the CSB giving the desired seed supply service rightly, maintaining seed quality is very crucial. From the very beginning, it is mandatory for borrower households to

plant the seeds. Members of the Executive Committee, in collaboration with village level coordinators, can also carry out field supervision and inspection as needed.

Management practices that help to maintain seed quality include: proper land preparation, timely planting, performing field management activities properly, timely weeding, doing field inspection and checking if there are other varieties that are growing voluntarily and removing these before harvest (Fig. 14). Leaving such mixed varieties assuming that they are just a few heads will gradually dilute the seed quality over time. Therefore, careful observation and rouging out unwanted varieties just before harvest is a very crucial task that should not be overlooked.

Fig 14. Woman farmer Birtukan Haile removing mixed varieties before harvesting her wheat crop – Arsi, Debeya Adere kebele

Furthermore, it is advisable to plaster freshly the threshing ground before threshing a new variety (Fig 15). This helps to avoid mixture of left-over seeds from the threshing ground. A few grains mixed during threshing will multiply and increase through repeated plantings and then dilute the identity of the variety as time goes by. Therefore, seed production requires proper care and management right from land preparation, planting, all the way through threshing.

Fig. 15. (L) Plastering the threshing ground and (R) traditional way of threshing harvest

9.3 Ways of Building the Seed Stock of a CSB

The working capital of a CSB is its seed stock. The amount of seed stock available is the main factor that determines the capacity of a CSB to deliver seed loan service and the number of households who can get access in a given year. As seed stock of a CSB grows, the number of members could also grow by recruiting new members and that in turn helps to extend the service outreach.

The seed stock of a CSB grows in three ways.

1) Through **share contribution** of newly recruited members. As stated in the bylaw, a member contributes a share (one or more) in-kind to register as a member.

2) Through **incremental amount** (interest) paid by borrower households during seed loan repayment. This rate is fixed by the members after discussion during the General Assembly meeting and becomes part of the bylaw.

3) Through a **revolving seed fund**. This is budget allocated as a donation by a project and/or government support to build the seed stock of a CSB. The fund is used to purchase additional seed stock for the CSB based on the needs and demands of its members. The budget is allocated to build capacity of the CSB so that it would be able to accept more new members and provide seed loan service to them also. The seeds bought will continue to revolve as individuals borrow and repay back to the CSB. Hence, it remains to be the property of the CSB and that is why it is called a revolving seed fund.

Before making seed purchase, the Executive Committee leader, the Chairperson and the Seed Loan Committee members meet and discuss to decide on what needs to be purchased. The process flow is as follows.

- They summarize and see which types of crops and varieties are in need, are in short supply and/or are requested by the members.
- Identify sources where these seeds would be available.
- Assess market price for each.
- Based on the budget they have at hand for seed purchase, they decide how much to buy for each crop type and variety.

- Fix a date for the seed purchase, and
- Do the actual seed purchase.

During seed purchase, the Purchase Committee members check and verify that it is the right variety and that the seed quality is also to the right standard (Fig. 16). If the seed quality is not good, then they look for other options and make the purchase only when the quality is acceptable.

Fig 16. Purchase committee members of a CSB inspecting seed quality, weighing and making payments issuing financial receipts

The following picture (Figure 17) shows seed stock purchased by a CSB committee by checking seed quality as mentioned above.

Fig. 17. Quality seed stock purchased by CSB Committee members

10. COMMUNITY SEED BANK AS A COMMUNITY CENTER FOR FARMERS

A CSB facility as a center for farmers offers the opportunity to come together, discuss and share their ideas and common concerns related to seeds security and any other agricultural activity, and jointly devise workable solutions. The services that a CSB provides as a social institution could continue to grow stronger and broaden over time.

The main ones include the following.

1) It helps to discuss about favorable conditions in running a CSB and seed management, the challenges faced, and jointly devise practical solutions.

2) It offers an avenue for mutual learning particularly about seed management and conservation practices among the members.

3) It serves as a learning center for farmers coming from other localities, researchers from national agricultural centers, and visitors from other sister CSB associations, etc. on seed management and production practices (Fig. 18 below).

Fig. 18. Farmers and formal researchers coming from other localities visiting a CSB and learning about experiences on CSB management

4) It offers opportunity for graduate and postgraduate students (nationals and foreigners) to do action-oriented research, identify possible options to solve particular problems, and suggest operational strategies.

5) It creates convenient environment for setting a community library. By collecting information about the local knowledge related to seeds and diversity, their use, as well as the production and management aspects, it will be a place to gain knowledge and learn new experiences.

6) It facilitates active engagement of member farmers in participatory crop improvement activities (including participatory varietal selection and evaluation) and enriches their knowledge and skills by learning from their colleagues and formal researchers involved. This process helps to give due recognition to the time-tested knowledge and the valuable role farmers play as informal researchers.

7) It creates space to introduce materials developed through participatory varietal selection (PVS) after carrying out seed increase (Fig 19). The PVS plots, set centrally to exercise participatory variety selection, provide the opportunity for farmers to learn about and disseminate new technology and knowledge as appropriate.

Fig. 19. A seed multiplication field of durum wheat varieties developed through participatory varietal selection being visited by participants of a farmers' field day

8) Through the community seed bank, member farmers can pool their produce and supply collectively for sale in an organized manner. This helps to have better capacity for negotiating prices. Because individual farmers having small volume of supply do not have the opportunity to access better paying central markets and negotiate on prices. Hence, when selling as individuals, the one benefiting from the price margin are middlemen who collect the produce from local markets and supply to wholesalers and/or industries.

9) A CSB providing the above mentioned services gives farmer communities a central focus. As such, the CSB system helps to implement the **Farmers Right** issues as stated in Article 9 of the International Treaty on Plant Genetic Resources for Food and Agricultures (ITPGRFA). Hence, it could be part of the national framework that countries have designed towards implementation of the Farmers Right. According to the provisions of the above mentioned article, farmers have the right to use seeds of all kinds of improved varieties, multiply and exchange among themselves (for non-commercial purpose) without any barrier of property right issues.

11. CSB AS A COMMUNITY KNOWLEDGE AND INFORMATION CENTER

Both male and female farmers have deep knowledge about crop types and varieties grown in their locality that is experiential and is tested over time. It is rich being accumulated from what they hear from their fathers and fore-fathers as children, learn from own experience as they become adults and form their own families, and also what they learn from their fellow farmers (neighbors and friends) in due course. This community knowledge is a foundation for participatory crop improvement research works, enhancement and increasing productivity of crop types and varieties, while at the same time ensuring continued conservation of the genetic resources for the future generation as well.

Seeds and the associated local knowledge are the foundation blocks for any agricultural development endeavor. These two are main pillars in all efforts made to enhance productivity of farmer varieties and ensure that they continue to be used and conserved by the community. For instance, it is a pre-requisite to know the details on what the desirable and undesirable traits of a

particular variety are before doing any improvement research work. Only then, it is easy to identify what needs to be given priority attention and what the improvement work is designed to address. Therefore, knowing the detail traits of a particular variety from farmers' perspective gives the future direction of the formal research work. This in turn helps to ensure that the final research output would be adopted and widely used by the farmers, the end users.

Basically knowledge is information tested practically. There are misconceptions and it is not uncommon to classify knowledge as "scientific" and "non-scientific". The traditional/local knowledge of communities is often categorized as "non-scientific". Knowledge is considered scientific when the results could be verified through deep analysis using tools and equipment; and that results are the same when tested by different people and in different locations and at different time periods. The traditional knowledge of farmers, likewise, is tested by different people at different periods and in different locations and when the results are verifiable, then it is considered as knowledge. The only difference between scientific and traditional knowledge is that the traditional one is not based on technological tools and is not in a position to provide deep data as such. It is based on this perception that the traditional knowledge is wrongly labelled as "non-scientific". In reality, there is no knowledge that is non-scientific. Knowledge is not scientific when tested by different people, in different locations and at different time periods and results vary and are not verifiable.

The local knowledge associated with crop types and varieties passes down from one to the next generation through oral tradition. Hence, compiled documents are not available. As learned from practical experiences, when a crop type or variety is lost from a locality, the associated traditional knowledge is also lost. The fact is that, it is not possible to transfer the local knowledge and related information orally in the absence of the crop type or variety under discussion. When it is under cultivation, the knowledge and relevant information is shared and transferred as farmers exchange seeds of that particular crop type and/or variety. Therefore, compiling the local knowledge and documenting properly helps to share with other farmers and the youth so that they also enrich their knowledge and experiences. Therefore, it is highly valuable and timely to document the local knowledge of farmers about agricultural crop diversity.

Importance of having a community knowledge library

Community knowledge is experience-based and is passed down from one generation to another through actual practice. It is important to document this rich knowledge and make use of it as appropriate. Recording relevant information needs engagement of farmer communities. Keeping these documents within the community knowledge library as reference materials needs special attention in order to make the documents accessible to potential users.

Documents for the library are collected by involving community members and the key ones include: information about the types of crops and their varieties grown in the locality, crop production practices, animal husbandly and management practices, the production of forage species, different soil and water conservation practices, good practices on agricultural technologies; folklores, traditional sayings and poems associated with food crop types and varieties, and the like. Examples of folklores from sorghum growing areas show that some varieties with special quality traits (*marute*) is said to be better served for a mom, another one (*gubete*) is said to be better served for a dad. Local names of some sorghum varieties show the special traits e.g. *bird tolerant, one-that-squirts out honey.* Such namings show special quality trait and are expressions of farmers' local knowledge in a non-forgettable manner. These are vital in giving valuable information to direct formal crop improvement research work.

Besides these, documents for knowledge library could include: different production manuals that are relevant for farmers, brochures, flyers, posters, etc. that contain and convey relevant information to farmers should be collected from local agricultural development and other offices as appropriate. Increasing the document collections of the knowledge library is very crucial in order to provide opportunity for farmers and youth of the locality to read and enrich their knowledge. It also serves as a bridge to facilitate transfer of knowledge to the next generation. Therefore, it is necessary to give due attention to continually build the stock of readable materials from time to time both in terms of quantity and content wise.

Moreover, it is equally important to document the good practices of knowledgeable men and women farmers from the community. This helps to serve as educational material for others and also to inspire other farmers. Documenting especially the stories of knowledgeable elderly traditional seed experts, their roles in the conservation and maintenance of crop types/varieties,

their contribution as a source of seed for needy farmers in the community, their role in terms of restoring on-farm diversity, etc. are among the types of information to be documented. Documentation helps to give recognition to the valuable contributions that these resourceful farmers have been making and to make their stories be passed on to the next generation. Therefore, it is essential to document the stories of resourceful individuals using different means such as in writing, supported by photographs and audio visuals (voice recordings on narrations, storytelling, and short documentaries). Keeping these resource materials in the community knowledge library, therefore, helps to have important reference materials and reach wider audience.

For instance, farmer Said Musa (Fig. 20 below) is a farmer researcher who lives in Haik, South Wollo zone in Northern Ethiopia. A sorghum variety developed by him and disseminated in the locality is named after him. The desirable traits of this variety are: high grain yield, long stalk, short maturity, and tolerance to striga - a very problematic parasitic weed that affects sorghum. Currently, the variety is being grown and used by several farmers in the locality because of these attributes.

Fig. 20. Farmer researcher Said Musa and the sorghum variety developed and disseminated by him in South Wollo (named after him as *said musa*)

Farmers' local knowledge about their crop types and varieties are also valuable inputs for formal researchers. Examples are illustrated in Table 1 below.

Table 1. Examples on how local naming and traits of farmer varieties link to formal research work

S.N	Crop Type	Local name of variety	Literal translation	Special traits	Significance for research
1	Sorghum	*Wetet-begunche*	*milk in my cheeks*	Sweet, highly preferred for green consumption	- Has high lysine content - Useful to make supplemental food for children.
2	Sorghum	*Gan-seber*	*that breaks the brewing pot*	Highly preferred for brewing local beer	- Top best in terms of malting quality. - Could be commercialized for use at factory level
3	Sorghum	*Yegenfo-ehil*	*grain for porridge*	Preferred for thick porridge	- Could be used to formulate baby foods or food for the elderly (aged) ones.
4	Barley	*Lij-alkiso*	*as baby cry is over*	Short maturing	- Early maturing trait could be transferred to other varieties.
5	Barley	*Senef-kollo*	*lazy kollo (kollo is roasted snack)*	Soft and highly preferred for snack and for use at different social events	- Seed coat removes easily when pounding after roasting. - This trait could be transferred to others.
6	Tef	*Abish-lemne*	*why bother with fenugreek?*	Injera has very pleasant flavor naturally. No need to add fenugreek for flavoring.	- Trait that gives this unique flavor could be identified and used to transfer to others.
7	Tef	*Wetet-begota*	*milk in an in-door granary*	Special injera quality, highly preferred and quality is equated with milk.	- The quality trait could be identified and transferred to others.
8	Wheat	*Set-akuri*	*Woman's pride*	Good quality traditional bread (*difo dabo*)	- Quality trait could be identified and used to transfer to other varieties.
9	Wheat	*Aybo*	*Like cottage cheese*	Good quality traditional bread, equated with cottage cheese.	- Pleasant flavor and attractive color of bread. - Quality trait could be identified and used to transfer to others.
10	Wheat	*Tikur-sinde*	*Dark seeded wheat*	Highly preferred for brewing. Special taste and flavor when used to make traditional bread (*difo dabo*).	- Could be commercialized for use by malt factories and supplying to brewery. - Bread quality traits (taste and flavor) could be identified and used to transfer to others.

12. CHALLENGES FACED IN COMMUNITY SEED BANKING

Most of the challenges faced are related to lack of awareness and are easily correctable. Others like climate change (late on-set, shortage of rains, excess rains); drought, crop diseases and the like are beyond the control of individual farmers. Challenges that are within farmers' control are discussed below.

12.1 Inadequate awareness

It is obvious that there is lack of adequate awareness especially during the first years of establishment of a community seed bank. Because it is a new venture, community members may not have the full understanding on how it functions and benefits members as some may have doubts until they see it practically.

This in turn limits participation of individuals and even lowers their interest to join the CSB membership. Some members tend to delay payment of share(s) that they are supposed to be contributed upon joining the CSB association. This in turn weakens the capacity of the CSB as an institution by reducing the seed stock it is supposed to have.

12.2 Access to land where the community seed bank is to be built

It is necessary to select convenient place to build a community seed bank. It should be a place where seeds can be stored properly having good aeration and receiving cool breeze. Seeds should be kept free from damage by getting moist or from effects of high temperatures. The site should be selected jointly involving agricultural experts of the agricultural development office, representatives from relevant woreda and kebele administration as well as CSB leaders. The site should also be central and accessible to all residents of the kebeles expected to get the service. As far as possible, it is preferable not to take away individual land holdings. If there are no other suitable options it becomes the only possibility, then the individual farmer whose land is taken for constructing a CSB shall be given a replacement land by the respective kebele administration.

Basic site selection criteria include the following:

a) representative of the local agro-ecology,
b) accessible both during the dry and wet season,
c) central and accessible to deliver services like:

- meeting place for the members
- collecting seed loan and delivering repayments, and
- accessible for transportation and market out-lets.

d) having good aeration (cool breeze). This helps the seed store to have good air circulation and that helps to keep seeds well in viable condition.

12.3 Accessing land for participatory variety selection and seed multiplication

Whenever possible, it is preferable to have free space where the CSB member farmers would carry out adaptation tests and participatory varietal selection (PVS) practices. A quarter of a hectare is ideal as a minimum size. Having larger size land, if possible, would be better and will help to do some seed multiplication activities. The PVS trials may also include crop types/varieties that come from other localities as well as national agricultural research centers. The space could also be used to do minor seed increase for varieties selected through PVS for which the seed volumes are very small. Later on, seed multiplication could be carried out on individual farmers' field and the harvest will be added to the CSB seed stock for entering the regular seed distribution system.

In some localities, it may not be possible to find such free space within the CSB compound. In such cases, the CSB leaders may discuss with kebele administration and get space elsewhere. Having space for PVS and adaptation tests helps to actively engage farmers in research work and keeps the dynamism of learning. Therefore, having space for PVS within CSB compound shall be given due attention.

12.4 Inadequate attention to seed quality

There were cases where farmers who obtained seed loan from CSB did not give adequate attention on land preparation and other field management activities assuming that the varieties are farmer varieties. This has negative impact on expected yield level and also on the seed quality. Poor management includes the following:

- Inadequate attention to land preparation (the traditional saying goes – "*one who does not prepare his/her land well, he/she ends up harvesting weeds*");
- Not following the right planting time;

- Not following the right seeding rate;
- Not weeding the fields timely and properly;
- Not removing unwanted seeds mixed by rains or by growing voluntarily; and
- Threshing one variety after another without plastering the threshing ground afresh.

Although encountered with a very few individual cases, not removing mixture seeds and threshing together with the main crop contributes to gradual dilution and that eventually reduces seed quality. It is easier to remove heads before harvesting than trying to remove grains by cleaning after threshing. A few heads mixed this season may mean that the seeds grow and multiply (with several tillers) during the following cropping season and that gradually dilutes the identity of the original seed. Therefore, it is necessary to take good care of seeds during harvesting and threshing also.

Another case encountered was that a few households bring back loan repayment without properly cleaning assuming that it will increase grain weight. This is not allowed and should not happen at all. If the CSB leaders accept seeds that are not clean, then it costs the association extra to do the cleaning job. Therefore, to strengthen the CSB Association and allow its smooth functioning continuously, every member needs to be faithful to its association and return back properly cleaned quality seed.

12.5 Delaying seed loan repayment

There were cases when some households fail to deliver seed loan repayment timely as scheduled. Some members bring and repay right away after harvest while some others tend to delay even after repetitive reminders. This basically arises from lack of awareness on how the CSB operates. Not paying seed loan means lowering the seed stock of the CSB and consequently limiting the chances of individuals who could possibly get access to seeds the following season. Therefore, it is desirable that every member of the CSB gets clear understanding of the seed loan system and pays back seed loans timely as scheduled. This helps to progressively broaden the outreach of the CSB services.

In case individuals fail to repay after repeated reminders of the CSB loan committee, then the Committee can bring the case to local court at kebele level. This has fines and involves

unnecessary hassle and resource wastage. It also has negative social implications to the person who is not faithful to its association. It may even cause social exclusion. Hence, it is advisable to be honest and stand firmly for the achievement of the common goals set in establishing a community seed bank.

13. WAYS FOR INSTITUTIONAL SUSTAINABILITY OF A CSB

The services of a community seed bank are expected to be sustainable because it deals with seeds which are central to achieve food security. The following are key points that contribute towards sustainability of a community seed bank.

a) **Adequate awareness on the objectives and services of the CSB**. Every member has to be fully aware that the purpose of community seed bank is primarily service giving and supporting seed security of its members than profit maximization.

b) **Having clear community sense of ownership**. Even though a CSB facility may be constructed through a project support, it is a community institution and full ownership belongs to the community. That is why it is led by Executive Committee members elected from among the General Assembly.

c) **Building strong commitment to work and grow collectively**. This helps individual members to be devoted to strengthening the association and build solidarity for a common goal.

d) **Strengthening the CSB leadership**. To make the CSB function well and continue for the long run, having strong leaders is a pre-requisite. Therefore, capacity building trainings on leadership, property control and management, financial management, record keeping filing documents, and the like are very crucial. When the existing CSB leaders complete their term of service, new ones join. Therefore, the training for capacitating leaders also needs to be continuous.

e) **Proper use of revolving seed fund allocated**. The revolving seed fund should be used to buy additional seed stocks for the CSB. Members access these through seed loan system and more members would get access as years go by. The purpose of the revolving seed

fund is to build the seed stock and thereby open room for more new CSB members to join and access seeds. Hence, the Executive Committee needs to closely follow and ensure utilization of the fund for the desired purpose only.

f) **Ensuring that CSB members are residents of the kebele and have farmland**. When recruiting new members, the leadership committee has to make sure that individuals clearly understand how the CSB functions and each has a farm land. This helps to ensure that seed borrowed from the CSB is actually planted and is not wasted or used for any other purpose. That means borrower households grow and increase seed volume i.e. by paying back slightly higher quantity to increase seed stock of the CSB.

g) **Commitment of the CSB leaders**. The CSB leaders should be faithful and discharge their responsibilities to serve the community with dedication. They shall be prepared to deliver the expected services as individuals and also collectively. CSB leadership is a voluntary service to the community and, therefore, needs genuine commitment.

h) **Creating networks and maintaining good work relations**. The CSB leaders are expected to link with and maintain close work relationship with the relevant offices such as the Cooperatives Development and Promotion Department, Bureau of Agriculture, and others. This helps to create avenue for soliciting technical supports in terms of trainings as well as regular auditing of finances of the association.

i) **Regular annual audit of the association**. The CSB leaders are responsible to arrange for audit service every year and then inform the status (financial and seed stock level) to the General Assembly. This allows all members to be aware of the progress made.

j) **Engaging in income generating activity**. As full-fledged social institution, a CSB Association is encouraged to engage in income generating activity so as to cover its own operational expenses. Some examples from experiences so far include the following.

- *Grain trade:*- purchasing grain when market prices are low at harvest season and selling later when prices rise;
- *Bee keeping:*- keeping modern beehives within the CSB compound and selling the honey harvest;

- *Seed production:*- producing seeds of varieties in high demand in the locality on communal land and selling the harvest; and
- *Cash crop production:*- producing cash crops with high market demand on a communal land and selling the harvest.

It is open for the CSB association to discuss and identify an income generating activity that suits their agro-ecological conditions and socio-economic contexts. The above mentioned ones are examples from different localities. It should be noted here that the FCA as a legal institution has the privilege of accessing financial loan from government institutions if need be to run any other income generating business activity.

k) **Government budgetary support**. The role of CSBs especially in the conservation and maintenance of farmer varieties has national significance (public value) and deserves government support. Therefore, giving due recognition to their invaluable contribution and rewarding the CSBs and/or providing continued budgetary support will contribute positively for sustainability of community seed banks.

14. EXPERIENCES AND LESSONS LEARNED

Overall, there is better understanding nowadays about the valuable role that a community seed bank plays in building seed security not only among CSB members but also among the wider community. The opportunity especially offered to farmer households facing seed shortage to access seed timely within their locality is given high value. Having a CSB also facilitated restoration of the once lost on-farm crop diversity and that is highly appreciated by the members.

By supplying diverse crop types and varieties, a CSB also plays valuable role in terms of adaptation to climate change challenges. For example, when the first planted long maturing crops fail, there are other options with short maturing crops/varieties like tef and pulses such as chick pea, lentils, fenugreek, and grass pea. That means, even in cases when serious challenges occur, farmers manage to get harvest because they have other choices to resort to. Commenting about the services of a CSB, several member households claim that "*a community seed bank is like our mom's kitchen store"*. The expression is to signify that the service of a CSB facility fulfills their

heartily desire i.e. they get seeds when they want it, could access it easily without any hardship or repetitive visit, and without the need for immediate cash payment. They also stress that a CSB is a trusted seed source they count on as a security back-up.

It is also very encouraging to hear the testimonies of households who used to face seed shortage before joining the CSB, but now are seed secure and even managed to reach a stage where they are able to share with others (neighbors and relatives). Such a tangible key change is reported by several households and that encourages EOSA to further strengthen, promote and scale-out the community seed banking initiative.

Another testimony on how farmers value the CSB service is revealed by the continued participation of members from distant kebeles travelling about 3-4 hours one way (6-8 hours round trip). These farmers paid a lot of sacrifice travelling to reach the CSB to collect seed loan and bring back the loan repayments. This shows how worthy the farmer varieties that the CSB holds are to the community. To reduce the burden of travelling long distances and overcome the difficulties encountered to cross rivers during the rainy season, EOSA started building satellite CSBs within close proximity. This also opened up new chance for households who like to participate or join the CSB, but refrained because of the long distance and challenges involved. Hence, the number of CSB members is increasing significantly with the coming up of satellite seed banks.

On another note, a team of high level experts from Amhara Regional state did evaluation in 2014 supported by field visits and community meetings stressed the significant role CSBs play regarding seed security and recommended to scale-out the CSB initiative. EOSA also organized experience exchange visits to experts drawn from different organizations that are interested to learn about and potentially may replicate community seed banking. EOSA provided technical back-up support services and these are highly appreciated by experience exchange participant farmers and accompanying agricultural experts.

Community seed banking currently is receiving due attention by the national government. For instance, the SNNP Regional state allocated budget to build eight CSBs in eight zones.

Accordingly, the eight community seed banks were built and are functional. Agricultural experts, development agents, and farmer leaders selected from these eight woredas received technical trainings and shared practical experiences from EOSA supported older CSBs with long term experience on how a CSB association is formed and how it functions. The SNNP regional government has plans to build some more CSBs.

Internationally, community seed banking is also gaining special recognition and attention nowadays. The contribution of community seed banks to food security of farm households got acceptance after several years of debate and discussions. Ethiopia is taken as a model in community seed banking and EOSA's experience is cited in several articles globally (see Annex 2 for references). The recognition of community seed banking strategy is also gaining attention by other international forums.

As mentioned earlier, EOSA - who has the technical competence and practical experience on community seed banking - likes to share its experience with all interested organizations. Along this line, this manuscript is compiled to serve as a reference material (guideline) for those interested to replicate the initiative in Ethiopia. EOSA learned a lot from the challenges encountered over the last three decades and continued to revise and improve its strategies. EOSA is supporting the CSBs to become a full-fledged and self-sustaining community based organizations.

Ensuring food security of farm households nationally requires the involvement of different stakeholders. Hence, EOSA is willing to provide technical support to those who are already engaged and those who would like to engage in community seed banking venture. As a process, community seed banking is dynamic and EOSA likes to hear and learn from others and improve along the way. EOSA's doors are always open in this regard.

Finally, EOSA likes to acknowledge all farmers and supporting technical staffs who endured the different challenges faced with full commitment in implementing the community seed banking initiative. EOSA is also grateful to all donor organizations that provided financial support in implementing the community seed banking scheme.

Annex- 1

Lay out sketch map of a model community seed bank

Keys

1. Office of field staff (2m x 2m)
2. Office of CSB executive committee (2m x 3m)
3. Community knowledge library (3m x 4m)
4. Community gene bank (2m x 3m)
5. Meeting room (3m x 4m)
6. Seed store (8m x 9m)

Annex - 2

Some articles on community seed banking from the web site

1. Ethiopia seed bank's novel approach to preserving diversity under threat

Source:- http://www.theguardian.com/global-development/2014/feb/19/Ethiopia-seed-bank-preserving-diversity-under-threat-g8-new-alliance

For documentary video, visit :- http://www.theguardian.com/global-development/video/2014/feb/19/custodians-diversity-ethipia-small-farmers-conservation-video

2. Ethiopia's seed banks and the search for food security

Source:- http://www.scidev.net/global/biodiversity/multimedia/ethiopia-s-seed-banks-and-the-search-for-food-security.html

For a short documentary video, visit:- https://youtube.be/7FOgBh0i5GU

3. With crop failure a key cause of the 1984 famine, Ethiopia has set up local seed banks to help farmers adapt to climate shifts

Source:- http://www.trust.org/item/20140704110845-bjkc6/ Ethiopia cultivates seed banks to lay famine ghost to rest

4. Community seed banks in Ethiopia tackle climate-induced food crisis

Source:- http://tcktcktck.org/2014/07/community-seed-banks-ethiopia-push-agricultural-biodiversity-prevent-climate-induced-food-crisis/63541

Annex - 3

Brief overview about EOSA

Ethio-Organic Seed Action (EOSA) is a national technical NGO engaged in agricultural sector development focusing on seed security of small scale farmers and contributes to the national effort made to raise agricultural production and ensure food security of farming communities. To realize this, EOSA's implementation strategies focus on integrated agrobiodiversity management and utilization program. Farmers are central in every aspect and other relevant stakeholders are also engaged as appropriate.

EOSA works towards building farmers' capacity and empowering them to better cope with challenges that may arise due to climate change effects and/or other agricultural production related challenges. To facilitate implementation, EOSA provides capacity building and awareness raising trainings to farmers, agricultural experts at woreda and zonal level, agricultural development agents responsible for the respective kebeles where EOSA is operational. As resources permit, EOSA also provides material and financial supports as well.

Thematic areas of EOSA's integrated agrobiodiversity management program are the following.

1. **Seed security and diversity:-** aimed at promoting on-farm conservation and use of crop diversity.
2. **Adaptation to climate change:-** targeted towards building farmers' capacity for adaptation to climate change through short and long term strategies and management of the natural resources base.
3. **Rural Economic growth**:- aimed at raising income of rural households through different income generating initiatives.
4. **Gender equality**:- promotes women's participation in different program activities as well as their economic and social empowerment.
5. **Rural youth engagement**:- focuses on the creation of livelihood options for landless rural youth (especially school drop outs) by engaging them in agriculture-related income generating activities.

In its endeavors made towards ensuring food security of target communities through conservation and use of crop diversity, EOSA's key program activities are:- re-introduction and

restoration of farmers varieties of food crops, raising productivity of farmer varieties through enhancement, managing the farm environment through soil fertility management practices and soil and water conservation activities. Seeds are keys to food security and it is an undisputable fact that farmers are seed secure only when they have enough and quality seeds at hand that are adapted to their local growing conditions and also meet their socio-economic needs and other requirements including the food culture of respective communities.

The national level activities implemented by the Ethiopian Biodiversity Institute especially the collection, conservation of crops and other plant genetic resources, keeping germplasm reserve, as well as supplying germplasm to national researchers and also to farmer communities through community seed bans to increase on-farm diversity and choices to farmers is exemplary work and needs to be strengthened further.

EOSA is also promoting community seed banking services indifferent parts of the country including South Wollo, East and West Shewa, Arsi and SNNP region. Accordingly, in each program area CSB facilities were built in a centrally accessible location and are providing seed supply services. Moreover, the seed banks are linked to the national gene bank and are accessing different farmer varieties and are doing participatory variety selection and evaluation activities. Therefore, the CSBs also serve as centers for agricultural experimentation in the management and enhancement of farmer varieties.

Contact address:

1) Physical address of EOSA Office

Bole Road
Africa Avenue
Mega House
Office No: 908-910
Addis Ababa

2) Postal Address

Ethio Organic Seed Action (EOSA)

P.O.Box 5512

Addis Ababa

3) Telephone, fax and email addresses:

Ethio Organic Seed Action (EOSA)

Tel. 011 550 2288, or 011 552 9211

Fax No. 011 550 2285

Email:- eosa1@ethionet.et

or regfey88@gmail.com