Appendix 7

Field report on focus group training with farmers - characterization of sorghum and wheat landraces in Ethiopia

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Submitted to:

Food and Agriculture Organization, Rome

Deepak Rijal
Local Initiatives for Biodiversity, Research and Development, P O Box 324, Pokhara, Nepal
Telefax: 977-61-26834
e-mail: info@libird.org

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I am indebted to the Hararghe Catholic Secretariat for providing all facilities to make the program a success. Paolo, Bekele, Zenebe of the HCS are thankfully acknowledged for their cooperation paid during my stay there.

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Part one:

Terms of Reference: **Deepak Rijal**

The consultant will assist in characterizing sorghum and wheat landraces in the Hararghe region of Ethiopia through focus group exercise.

In particular, the consultant will travel to Dire Dawa (Ethiopia) on about 22 November, 2002 for approximately 10 days to:

1. Train development workers in participatory methods using focus groups to elicit and compile information on how farmers characterize, distinguish, and value land races.

2. Train the local team on how to enumerate and compile information collected from farmers and thereafter enter it in spreadsheets in such a way to allow the landrace name and its associated information to be correlated with correspondent socio-economic data.

3. Develop forms or guides for characterizing sorghum and wheat in collaboration with farmers on the basis of consultant's experience in mountain agro-ecosystems and with grain crops like maize and barley.

4. Provide guidance or examples on how to develop a simple community biodiversity register for the target crops so that the communities participating can keep a record of this information and of the participatory process.

5. Provide a final report for presentation of results.

The specific objectives include:

- To orient project staff on importance of understanding peoples' knowledge with regard to the conservation and use of agro-biodiversity resources

- To orient project staff in acquisition and documentation of peoples' knowledge associated with agro-diversity resources at ecosystem, species and intra-species levels through participatory approaches

- Orient project staff in method of farmers' characterization of sorghum and wheat varieties involving farmers

- Familiar to Community Biodiversity Register: the need, challenges in maintenance and use

- Analyze and presentation of data generated through participatory methods

Part two

Structure, content and methods

The training program was divided into two sections. The first section covered topics related to program planning, theoretical perspective and discussion. Through lectures participatory research and development methods and techniques appropriate to on-farm conservation and use of agricultural biodiversity was delivered and shared with the project staff.

To achieve the objective the structure included practical exercise with little theory before hand. Participatory discussion was held on cases picked up also locally as experienced by the project staff. To give insights a number of related articles and publications were provided. A set of LI-BIRD's publications related to on-farm conservation methods and participatory approaches were provided. Ways of preparing social and resource maps of a village along with its significance in R&D programs was discussed. Broadly, the lectures covered the following areas in line with the terms of reference given.

Techniques of knowing farmers' decision process:

- Conventional methods
- Participant Observation
- Participatory approaches some times called as innovative approaches
- Techniques of gathering peoples' response including Farmers' Descriptor
- Focus group exercise: Some challenges and realities
    - Representation and purpose
    - Characters of participants
    - Setting focus group question aside
    - Focus group with four square methods
    - Compilation, analysis and presentation
    - Handling groups or individuals
    - Some dos and some don'ts

Summarizing focus group exercise

- Four squared method
- Matrix systems
- Network analysis
- Kinds of closeness and kinship analysis
- Risk analysis (using a variety and under uncertain weather condition)
- Description of commons

Community Biodiversity Register

- Defining CBR
- Significance and needs and chellanges
- Community benefits and participation
- Uses and values
- Linking CBR information with R&D program
- Ownership, data handling and control over
- Implementation mechanism and maintenance
- How poor people may contribute to on-farm conservation?

The second section of the program was focused onto field exercise. Once the preparatory work for field exercise was over, the team developed checklist. The checklist was discussed with the team for clarification and also re-orient on the types of questions to be asked during the discussion through focus groups. As per set criteria the key informants were pre-informed along with time, place and venue fixed. Since the key informants were paid the team decided to include some more discussion as they can stay longer. The role of each participating staff including extension was re-iterated, and the consultant was assisted when ever needed.

To make all project staff and farmers familiar in terms of social composition, infra-structure and resource distribution within the project areas, resource cum social map involving key farmers was prepared. Overlaying altitude, latitude, longitude and temperature on these maps as a reference point through GPS reading would give us a useful guide. Depending upon the objective one can over lay the hotspots for species and or intra-species diversity. It is not the exact map but gives an over view of the area. It was a good exercise to bring all closer since the exercise demands inputs from the project staff and farmers. Farmers at the end were very happy with their successful sketch with a variety of information, never done before.

Sice these key farmers are influencial of the societies, also because they are progressive and serve as services providers, can be instrumental mobilizing societies, if this network is used while implementing any R&D programs. The challenge however is that whether the right individuals are selected using right approach. It may be difficult to implement in newer setting. Through validation with extension staff in Chelenko it was learned that the process was effective as right individuals were identified.

The team jointly worked to set focus group strategy. It was important to learn the institutional setting through which the project is implemented. The team gave an over view regarding the project. Focus group strategy was then discussed further. Two focus groups were recommended for the highland and three in mid highlands of Chelenko, Asebe Teferi and Dire dawa. There are several peasant associations (PAs) and villages within each PAs. Where possible, *nodal* farmers who hold expert knowledge associated with sorghum were invited for the exercise. Past studies have shown that woman farmers hold better expert knowledge. To capture these expertise both male and female farmers were involved. The detail strategy of the focus group is presented in the diagram below.

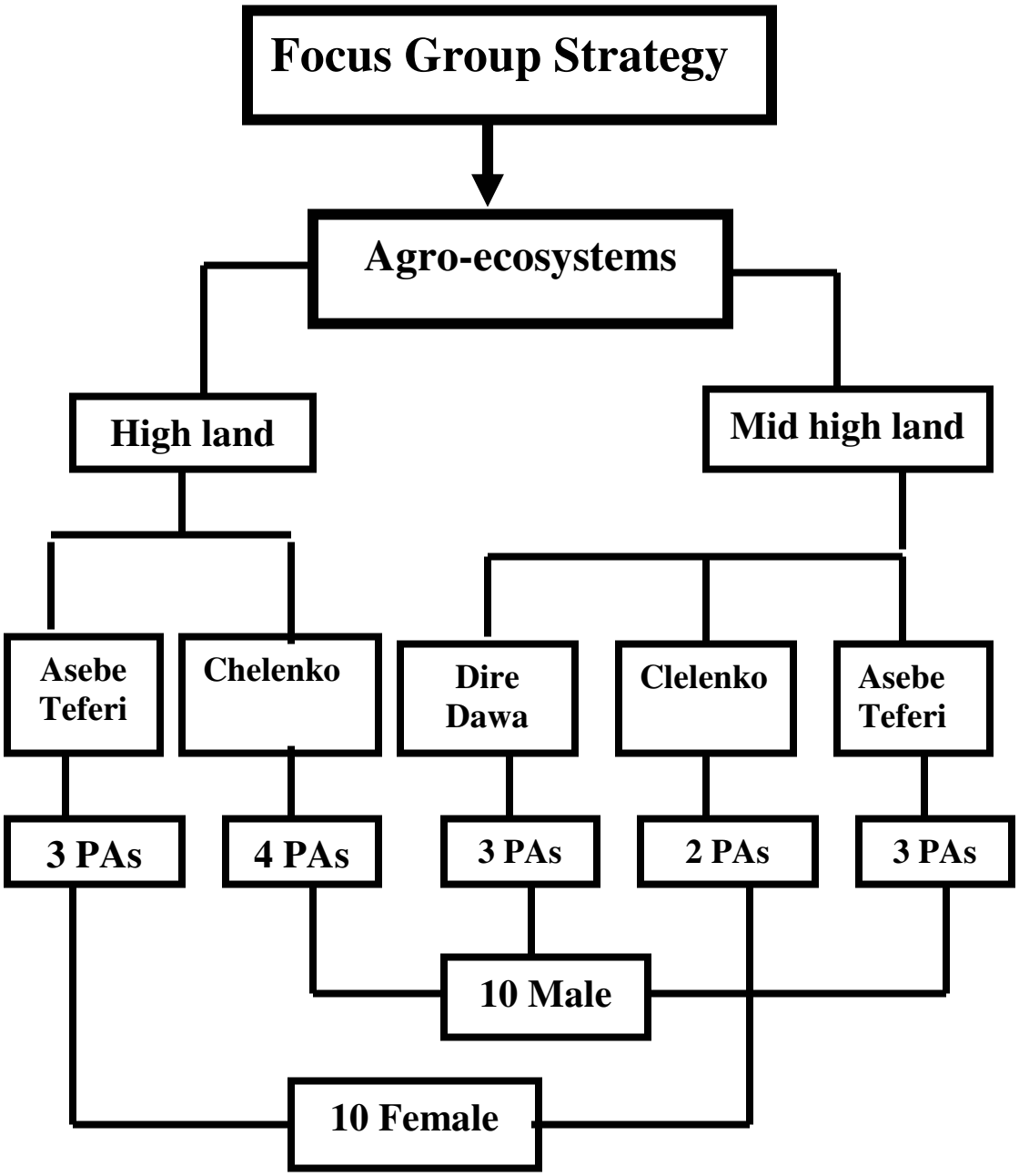


Diagram: 1. Strategy of focus group exercise conducted in project sites

Part three: Presentation and interpretation

Peoples' perception on agro-ecosystems and species selection

Farmers distinctly define agro-ecosystems as scientific communities. These terms carry similar meaning as highland, mid highland and low lands. Farmers distinguish them using a combination of parameters including temperature, altitude and slope aspect, amount of rainfall, indicator species and some sorghum varieties in particular. Because of variation in air temperature, which is further influenced by altitude and slope aspect, crop duration is determined. Access to soil moisture coupled with soil fertility farmers often referred while describing land productivity. With regard to vegetation *Teff* and *Podocarpus* and barley were used as indicators species for high land, *Chat* and sweet potato for mid high lands and *Cactus, Acasia* as low land species. Sorghum varieties, *Chefere* in highland, *Wogere* in mid highland and *Dini* for low lands were some specific examples (Annex 1).

Land types were categorized according to their contribution to peoples' livelihoods. Out of forest, social or public lands and lands under perennial species, farmland provide major supports to peoples' livelihoods (Annex 2 and 3). This was generally observed regardless of agro-ecosystems, however the species contributing to peoples' livelihoods vary. The rapid assessment of species diversity in terms of area (large and small) and farmers (many and few) in highland showed maize, wheat, barley, **sorghum** and teff. Other species grown by many households but in smaller areas, still contribute to peoples' livelihoods include field pea, lentil, sweet potato, fenugreek, potato (Annex 4a). On the other hand, the priority species for mid highland include **sorghum,** maize, wheat, hericot and bean. The other minor species grown in smaller area by many households include potato, garlic, onion, lentil, chickpea, fenugreek and field pea. *Chat* is grown not only as a cash crop but to consume as fresh (Annex 4b). Hence *Chat* is one of the most popular species among mid highland farmers.

Farmers have own ways of describing ecology, species distribution linked to adaptation and potential species to their livelihoods. Through experience farmers assess the extent and distribution of species and intra species both in agro-ecosystems as well in crop ecosystems. Farmers' descriptors found similar as that of scientific communities. The most common

parameters used include soil texture, water-holding capacity, soil color, soil fertility and slope aspect that influence soil quality. Based on soil texture farmers categorized their soils into three strata: fine, coarse and gravel. These types are characterized in terms of fertility, water-holding capacity, which determine land productivity. More over, farmers have identified species as well as varieties adapted specifically to soil types. This suggests that farmers' ways of describing soils and their land types have strong logics that of scientific communities.

Extent and distribution of sorghum diversity

The whole set of sorghum diversity was grouped according to their extent and distribution by area and farmers. The results show a greater diversity in the mid highland compared to the high land. The diversity for highland ranged from 6 (Bekelcha) to 8 (Arberekete). The diversity in mid highland, however went as high as 14 (Lola) followed by 11 (Medhicho) and 9 (Dire Dawa). The results show that, a few varieties are grown by many households and in larger areas. The majority of the varieties found grown by few households in smaller areas. Clearly, the analysis shows that varieties are either grown in large areas by many households or by a few households in smaller areas (Figure 1) and Annexes 5a to 5e. The reasons for such distribution as given by farmers are discussed below.

a. Large area and many households (L x M)

The reasons for growing sorghum varieties either in large or small scales by a few or many households over sites are summarized in annex 5f. The reasons for growing sorghum varieties in above category include, high yielding, good food value, adaptation to drought & stress, early maturity, market value, resistant to bird attack and so on. The reasons vary from one location to another because farmers not necessarily select varieties using all set of criteria. This means that that farmers select varieties for specific traits too. Adaptability of a variety can be a decisive trait for farmers as it is the trait always noted by farmers.

b. Large area and few households (L x F)

There were a very few varieties under this cell. Despite their high degree of failures under drought stresses, these varieties are preferred because of their good eating quality, which fetch

good market price in the local market. Hence the farmers who can take risk are maintaining this variety.

c. Small area x many households (S x M)

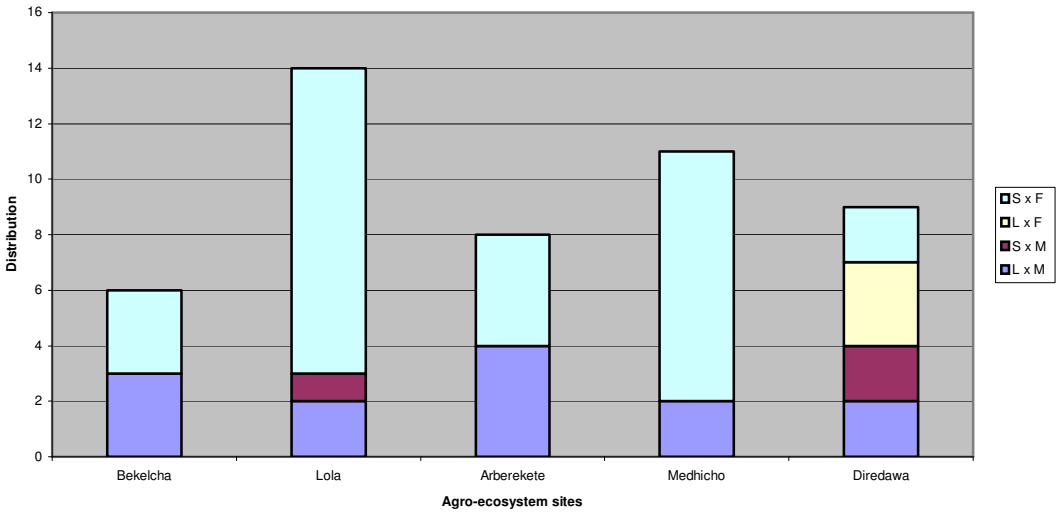
Those varieties are grown in small areas and by many households, which have either specific trait as per farmers' preference or the sets of varieties that have recently been introduced. Sorghum varieties having bitter taste are grown as border soldier where bird attack is problem. Since there are no good reasons, farmers either grow sorghum varieties in large or small areas.

d. Small area and few households (S x F)

Farmers have specific reasons for growing varieties in small scale by a few households. Unlike many other rice growing countries with socio-religious reasons, Ethiopian farmers largely maintain crop diversity that are beneficial in terms of food, feed and/or economic values. The reasons for maintaining some landraces such as Zengada was mainly for local drink (*tela)* preparation and its compatibility under inter-cropped conditions. Good baking quality of Worabi and Yemen, Denga as border soldier are other specific examples. Some of the reasons are presented in box below.

- Specific uses such as local drinks
- Varieties suitable for inter-crop systems
- Preferred varieties such as Fendisha but secrets honey dew
- Varieties that are late maturing
- Varieties that demand more moisture
- Bitter grain that escape bird attack
- Susceptible to drought but good baking quality for *Injera*

Fgure 1.: Distribution of sorghum diversity by area and farmers

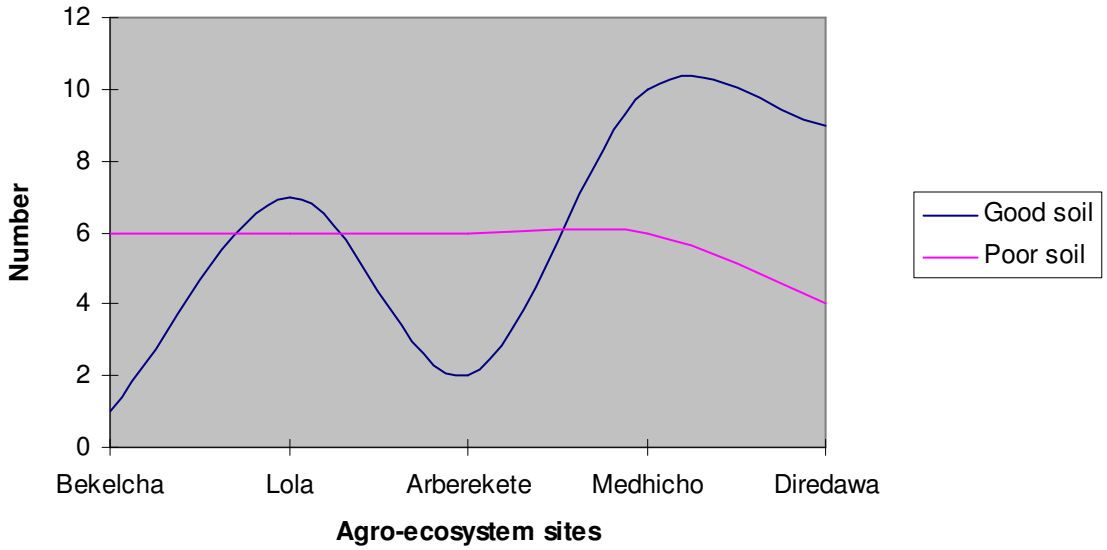


Distribution of sorghum diversity by soil types

Sorghum diversity cultivated over agro-ecosystems found variable. This diversity was also distributed across soil types. In highlands, majority of the varieties found adapted to poor and marginal soils. On the contrary, most of the varieties grown in mid highlands are adapted in a variety of soils and fertile soils in particular. Since sorghum is the main staple crop for mid highland farmers, it is likely that sorghum varieties are selected that are responsive to fertile soils. Sorghum diversity was reported high in mid highland. The reasons were also due to favorable environments than either in highland, marginal and low temperature (Figure 2) or lowlands. Diversity is created also due to a diverse crop ecosystem. The detailed description by variety across sites has been presented (Annexes 6a – 6e).

Rapid assessment of sorghum diversity in highland and mid highland agro-ecosystem shows that varieties grown in highlands are different than those grown in mid highlands except a few repetitions. Compared to highland greater sorghum diversity was found in mid highland areas.

Figure 2.: Sorghum diversity by soil types



Meaning after the name of farmers' varieties

By farmers' descriptors, farmers' named varieties differ from variety to another. It may be a variety recognized by one name in one area might be recognized with different names in other location and vice - versa. To verify this, meaning of the farmers' named variety was explored. The results obtained from farmers over sites have been summarized in Annex 6 a to 6e. On the other hand, farmers of another highland site described meaning of each farmers' named varieties. It seems that some of the varieties are named with rearrangement of the terms. Farmers in Bekelcha did not have idea on the meaning after each variety name. Farmers react that we never thought about it before. However, they wish to explore when they get back to their villages. It was equally difficult for mid highland farmers to describe the meaning of their varieties. They could explain only three varieties i.e. Denga, Hamdiye and Muyra adi. Denga means border as this variety is grown around the main crop just to protect their main crop from bird damage. The other varieties are named after the place from where a variety was first introduced. Medhicho farmers were able to explain the meaning of their varieties. Broadly, the varieties are named according to their descriptive traits including eating quality, after farmers' name who first introduced to their village, the place from where varieties were collected and the names known since time immemorial. The detail for each variety name is presented in Annex 6c. Similar is the case for Dire Dawa. Except a few, all varieties were described their meanings as they perceive.

And some of the names still yet to logically explored. Further detail has been presented in Annex 6d.

The question this exercise has raised several issues, why some farmers' groups were able to describe the meaning of farmers' named varieties than others. Like farmers of Bekelcha and Lola had either little or no idea about the meaning of the sorghum varieties they have been growing. On the other hand, highland farmers gave the meaning for almost all varieties they have been growing. There could be two possible reasons.

1. **Level of farmers' understanding of the participating farmers.** Knowledge level is largely associated with the experience of the farmers. Our participants probably were between 30 and 50 years. It needs to be discussed with senior citizens, who hold long history of their varieties. It is evident that men group was able to provide meaning to more number of varieties than women's group.

2. **History of a variety**. It is important to note that whether these sorghum varieties are recently introduced or being grown for considerable time. In some cases, farmers said some varieties were introduced with the same name as it is now so the meaning after their name will be unknown.

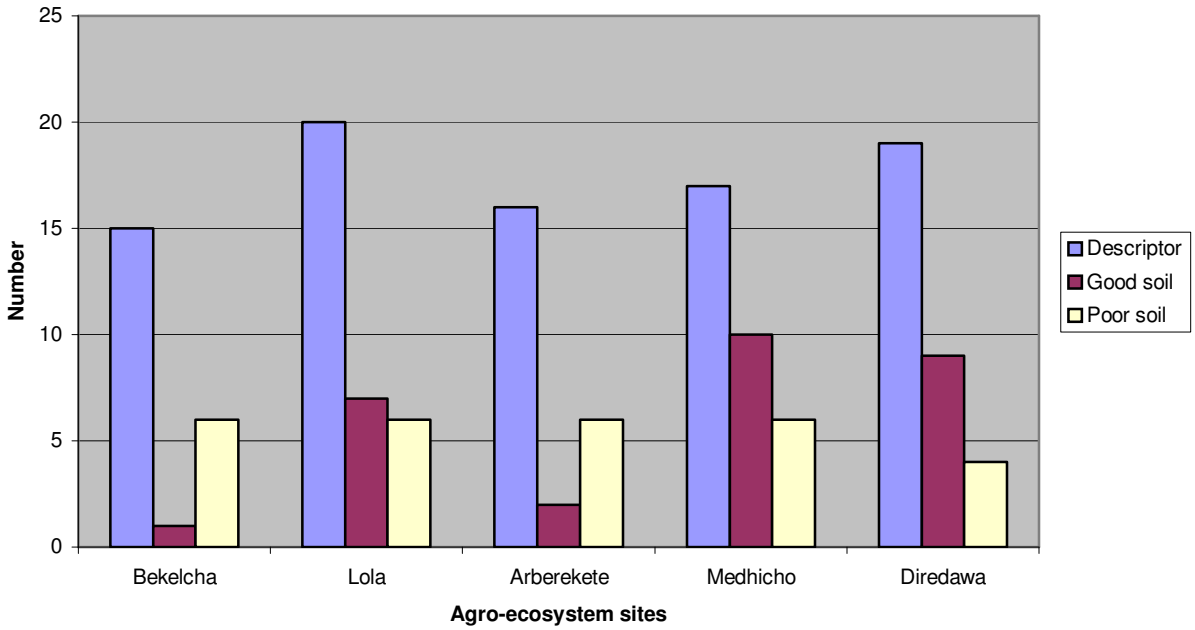
Clearly farmers name varieties using a range of descriptors. Farmers name varieties using a unique or a combination of trait (s) or persons or place. Farmers hardly give any meaning after the name of their varieties that are being grown for generations of farmers.

Description of farmers' varieties

Regardless of the agro-ecosystem sites, farmers used more than 28 descriptors while describing sorghum varieties. Irrespective of gender, mid highland farmers alone use more than 20 descriptors whereas highland farmers described their varieties using less than 16 descriptors. In both cases, women used more descriptors than men. The descriptor to be used was linked with the amount of diversity. Higher the diversity more the descriptors used suggesting that farmers gain more knowledge when they handle more number of sorghum varieties. A slightly higher diversity was reported from good and fertile soils than from marginal and poor soils (Figure 3).

Out of 28, farmers' descriptors can be grouped into traits related to use values with economic importance (10/28), morphological traits basically used to distinguish varieties from each other (13/28) and phonological traits that are linked to farmers' management practices (5/28). In the first category, yield and yield components including quality traits are considered. In the second category traits that are primarily used to differentiate variety from one another but still linked to quality products. Leaf thickness, length of peduncle, and inter-node length root systems and mid rib color are traits particularly used as variety descriptors. These include leaf, root and traits related to adaptation are described. In the third category, traits important to management practices such as inter-cropping, maturity duration, planting time and taste to grain. Bitter grains are preferred for border planting whereas sweet varieties are preferred for home consumption as well as to sell in the market (Annex 7).

Figure 3: Farmers' descriptor and variety adaptation by soil types



Farmers' perception on adaptive traits

Regardless of agro-ecosystems, farmers listed 12 traits either related to adaptation or traits that are responsive to stressed environments. Farmers clearly described varieties that are adapted to different soil types or land types. Indicative traits for poorer or marginal soils include deep and long root systems, early maturing, pale yellow and thin leaves, short height and inter-node

length. Some traits that respond to alien growing environments include stalk juiciness, grain filling, grain size, leaf thickness, head size and root profuseness. Farmers viewed that seed characters may not be enough to decide their ecological adaptation. It was a common agreement that varieties with coarse and poor quality grains are generally produced in marginal soils. However, it does not universally apply as some varieties are also grown in good soils. This means that no one can exactly say the area of their adaptation by observing seeds. However, this knowledge is used while selecting new varieties (Annex 8).

Farmers' identifiable descriptors for sorghum varieties

Farmers' descriptors were used to distinguish varieties from one another. Farmers' at least 8-10 common traits as to describe their varieties. Descriptive traits are further specified through grouping in terms of plant height, maturity group, grain size, tiller count and grain color. Once the set of diversity is grouped then farmers differentiate varieties using a unique or a combination of distinct trait(s). *Witibile* because of bitter taste is identified for its resistance to bird attack. An exercise carried out to validate farmers' descriptor shows that there are many common traits through which sorghum varieties are described. However, they are distinguished with a few specific traits from one another. The main distinguishing traits used by farmers include grain color, maturity duration and eating quality (Annexes 9a and 9b). This means that farmers use a combination of descriptors, based on a reference variety. This suggests that farmers have clear idea regarding adaptive traits and traits that respond to stresses.

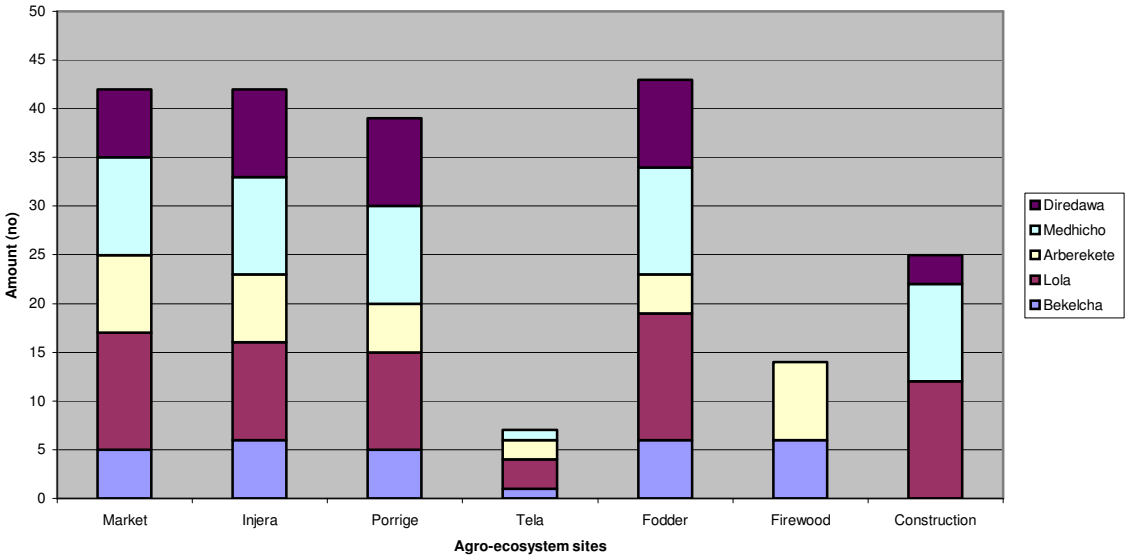
Local uses of sorghum diversity

Farmers consider at least nine different kind of post-harvest characters while selecting a variety. These traits are basically related either to grain quality suitable for a variety of food preparation, and fodder or firewood yield or as construction materials. Market value was consistently raised particularly by mid highland farmers suggesting sorghum to be one of the source of cash incomes.

Figure 4 clearly indicates that farmers' preferred traits include grain quality suitable for *injera,* porridge and bread. Since livestock is an integral part of the farm system, farmers consistently

considered fodder values while selecting varieties. Certain varieties are better for preparing local drinks i.e. *Tela*. Such varieties with specific traits are grown in small area. This indicates however that some landraces are maintained for specific use value. Farmers' varieties are thus described using post-harvest traits that are directly related to peoples' benefits. The detail description of sorghum varieties by their use values over sites has been presented (Annexes 10a to 10e).

Figure 4: Local uses of sorghum diversity over sites



Seed supply systems

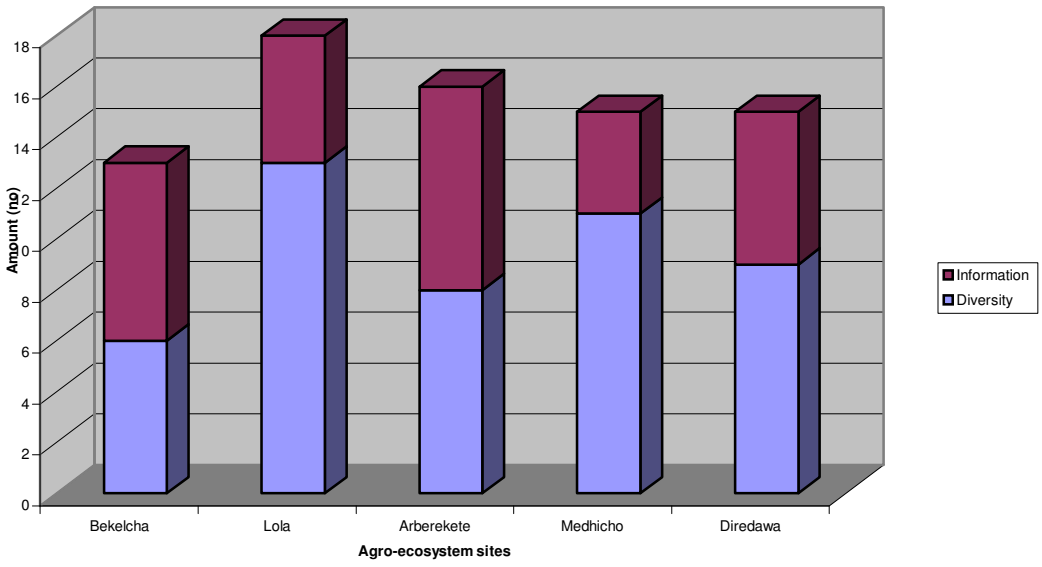
96% seed supply in Ethiopia occurs through informal networks. Formal sector supplies 28-35% seeds of the total demand (Quoted in Romina...). However, it may differ according to the established infra-structure and farmers' access to seed locally. The discussion revealed that seed demand is fulfilled primarily through own source, (70-90%), exchange (7-20%) and exchange including gifts (3-10%). Hence, sharing information along with seed is important (Annex 11).

Dissemination of information and sorghum diversity

It is important to note that farmers not only exchange seeds through their networks but a variety of information primarily related to food, economic and risks including adaptation, use values, and disease / pests (Annex 12). Regardless of gender, highland farmers are more concerned regarding information associated with seed probably because they live in isolation and hence

have poor access to information. Some of the traits are more important than others. Ecological adaptation, food value and grain yield were unanimously asked while introducing new seed materials. However, fodder value for Dire Dawa farmers was another concerned because they lack fodder supply. The amount of information flow also depends upon the amount of sorghum diversity and soil types. More information are included with seed material in agro-ecosystems where sorghum diversity was lower than in the mid highland agro-ecosystems. This suggests that farmers have established norms against which any new varieties are compared for their suitability (Figure 5).

Figure 5: Sorghum diversity and flow of associated information



Farmers' perception on genetic erosion

At least one variety was reported to be lost from each site. The variety lost from the system differs from one location to another. However, farmers strongly argue that any variety lost from our village should be available in other villages. The same variety may appear again through exchange process as we have, farmers raised (Annex 13)

Analysis of farmers' risk bearing capacity

Farmers' response found variable. It neither shows a strong link with gender nor agro-ecosystems. Women group of Asebe Teferi strongly stated that any new introduction will be either rejected or scaled up based on first years' testing (Annex 14). We do not time and resource to test once it is tried. However, men's group agreed that they test at least two times reciprocally in good and poor soils before they discard it. In addition, farmers were asked to choose a variety one that produces best yield in good years but fails if there is a drought. The other variety gives moderate yield in good years and produces some grain even there is a drought. In majority of the cases, farmers often go for variety that gives at least some grain even if there is a drought. The reason was for seed security for the following year. The farmers who selected high yielding variety was because they can either bring seed from outside and even if it failed, they have other varieties.

Limitation for generalization

Focus group exercise found effective to capture farmers' generalized knowledge. Generally the findings are found in line with that of results found elsewhere. Generalization of the information may raise several questions particularly among peoples who are strongly concerned with representative samples. Since the approach *per se* is a hybrid between formal surveys and participant observation, with certain level of field (e.g. characterization) and or laboratory validation (laboratory), these findings should have no problem in using for any R&D programs. To acquire more precise information, one may wish to conduct focus group on specific topic involving key informants from a defined village. The strength of the exercise as well as reliability of the results depends generally with the coverage of the households and geographic distribution. The team realized that farmers' participation may not be significant when we involve farmers who do not know each other and hardly have things in common. Accordingly, more refined knowledge can be acquired when every member in the group know every variety of sorghum in a village. The point those practitioners should rethink is that the methods of data collection depends mainly on the types of information one is going to collect.

Part four: Conclusions

- The program was effectively completed. The participants become able to carry out focus group exercise using skill and knowledge delivered during classroom lectures. The project staffs were oriented with various methods, approaches and techniques appropriate to agro-biodiversity conservation on-farm involving local people. Different methods appropriate to acquire peoples' knowledge along with their strength and limitation was discussed. The concept of Community Biodiversity Register, the needs and challenges was discussed particularly in the context of documenting farmers' knowledge and time line history of bio-resources for future harvest.

- Focus group had been effective to assess and acquire farmers' knowledge associated with agro-ecosystem, land and soil and assessing diversity of species and varieties within species. The use of four-squared method in assessing the status and contributing roles across peasants association was apparent, which guided us to focus the project activities related to research, development and conservation. Through exercise it was learned that sorghum diversity has been playing important role in farmers' livelihood particularly in mid highland.

- The findings indicated that the level of farmers' knowledge is positively correlated with the amount of sorghum diversity. As far as farmers' knowledge regarding varieties, mid highland farmers for example, use more number of descriptors than at high lands. Farmers' knowledge in terms of use value was similar in both agro-ecosystems, even though the amount of diversity was unequal. In this connection, it was known that farmers supply seeds through their own networks. Farmers secure seeds largely through their own source followed by exchange and gifts. The flow of information along with seed material is important as far as farmers' adoption and use of sorghum varieties is concerned. The amount of diversity and the flow of information are inter-linked each other. Accordingly, more sets of information are exchanged among farmers with poor access to information even with less amount of diversity. This suggests that farmers with limited options are more concerned regarding information associated with seeds.

- Social and resource distribution including reference points for the villages may be presented through maps prepared locally. Locally, identified expert and nodal farmers become able to prepare social cum resource map of their respective villages. Their response to that end remained very positive because they had never realized that they sketch map of their villages indicating resource distribution and peoples' livelihood strategies.

- Compared to highland, mid highland found richer in sorghum diversity. Since there was no project site representing lowland, the amount of diversity was unknown. By farmers' names, varieties grown in highland differ than those grown in mid highlands. However, a few landraces were found common. Greater sorghum diversity was reported in mid high areas, which are characterized as more favorable zones either from drier lowlands or cooler highlands. Compared to high or low lands, mid high land is more densely populated zone, which has further enhanced diversity. The finding shows that landraces have specific adaptation in terms of temperature, soil fertility coupled with moisture regimes. This diversity was further influenced by peoples' needs and preferences (niche specific adaptation, foods).

- Farmers grow and maintain sorghum diversity based on comparative benefits. Since there are hardly any landraces with socio-religious values, selection of varieties will be dependent upon the benefits mainly on economic terms that are linked to food and/or feed qualities. People maintain sorghum varieties not only because they are important source of for peoples' livelihoods but also to fulfill their niche specific needs such as local beer i.e. *Tela.* Some varieties with bitter taste are maintained mainly to protect their main crop from bird attack. Varieties that are bitter in taste are grown around the main field and birds get away immediately when they taste bitter. Other sets of varieties are grown as inter-crop that reduces crop failure. Such varieties are often practiced in small scale but almost every year. Not all varieties can be grown as mixed crop because they need varieties that mature early, short plant height and grow well with residual moisture. Livestock is an integral part of the system and it seems more important in the mid highland. For these reasons, these farmers always raise fodder value to be one of the

important criteria while selecting varieties. This suggests that understanding the reasons after sorghum diversity farmers have been maintaining will help us the ways how farmers cope local challenges.

- Extent and distribution of sorghum diversity assessed at community levels over sites revealed that a few landraces are grown by many HH and in larger areas whereas rest of them found grown by many households but in small scale. A few landraces were reported to be lost from the system for reasons like low yield, high risk, poor adaptability and so on. Loss of less competitive sorghum varieties is obvious they added, however, they believe that these landraces should have been maintained elsewhere. Hence, it is difficult to declare that these landraces have been lost from the system.

Part five: Recommendation

1. Capitalize peoples' knowledge through strengthening networks

It is apparent that farmers hold knowledge in a wide range of resources they practice in their every day life. In other words, farm community as a unit is so organized that the required services and expert knowledge are mutually shared and disseminated through networks established locally. There may be several functional networks (including sub-networks) operated by a number of expert and nodal farmers. This expert knowledge can be effectively capitalized if these networks and key individuals are mobilized in a proper manner. The focus group exercise tries to acquire common resources (e.g. knowledge, skill and seed) and their sharing mechanism. As results have indicated, focus group exercise help identify the points of departure and/or entry points both for R&D plans. These networks and key individuals have pivotal roles to play if peoples' knowledge along with their resources has to be preserved on-farm. Even with poor access to information and seeds, these networks and the key individuals are providing services at local levels. The quality of services can be strengthened by improved access to information and seed materials. Project outputs can have many-fold advantages if these networks are treated as community windows. These networks and key individuals are important as long as documentation and/or dissemination of the best practices is concerned. Along with external networks the effective roles these networks can play at grassroots should always be capitalized.

2. Utilization of biodiversity as the main thrust for conservation

The study clearly shows that biodiversity has been the way of peoples' life. In other words, peoples' livelihood has been dependent on the performance of agricultural biodiversity. These bio-resources as instrument provide services in terms of food, income and feed for livestock. Provided farmers have options, quite often they select varieties on the basis of comparative benefits. Those varieties that are competitive in times of pressure and have lowered risks are chosen as the main livelihood option. However, certain varieties are chosen according to peoples' needs and preferences. Unlike *Fendisha*, grown as main variety as staple food, *Zengada*, is maintained mainly for alcoholic drinks. Securing peoples' concerns such as seed, food tradition, cash income and consumptive value of sorghum biomass should be the main

thrust if these resources should be conserved involving farm communities. The underline principle thus has to be utilization for conservation.

3. Capturing biodiversity and agro-ecosystems

The diversity of farmers' named varieties varied over agro-ecosystems and this variation still exists between sites even within the agro-ecosystems. Sorghum in the area is grown in three agro-ecosystems. However, the project is focused on sites representing highland and mid highland but not at lowland. Some sites and or agro-ecosystems can be more important from the point of view of on-farm conservation than others. Like wise, some sites can be more important for certain set of landraces including best practices. In-depth understanding of these representative sites is thus evitable for projects that are linked to development together with strengthening on-farm conservation. Inclusion at least one site representing low land would be necessary not only for comparative studies but also to capture sorghum diversity maintained at lowland agro-ecosystems.

4. Public awareness

Despite several informal networks, farmers' access to seed as well as associated information including best practices is yet a problem. It was learned that farmers are not familiar with varieties that are grown by their neighbors nearby villages. More over one hardly expects peoples' access to seeds maintained a little far distance. Existence of different farmers' named varieties of one location but unknown to farmers of other location, both practicing the same agro-ecosystem shows a communication gap. These varieties (if proved different) can be adapted and acceptable to farmers of similar agro-ecosystem. With an improved farmers' access to seed through certain public awareness techniques (e.g. diversity and or seed fair or exchange visits) not only enhance peoples' livelihoods by providing better options but also enhance the conservation of biodiversity through increased use. As indicated in the four square cell, promotion of certain varieties may mean to replace others. This is in fact a dynamic process operated under real life situation. There should be certain monitoring tool that warns us on time before they are lost from the systems.

6. Biodiversity register for multiple services

As indicated earlier, the whole set of biodiversity and associated knowledge may not be captured through FG exercise. In the present context, each country needs to register her bio-resources prior to enter into WTO. CBR as a tool particularly documentation of biodiversity, associated knowledge and best practices can be effective. CBR as a technique of participatory documentation process, improves peoples' access to information including farmers, researchers, development workers and conservators. CBR empowers peasant societies through increased awareness and ownership of local crop genetic resources. In other words, CBR creates database, which can be utilized in different ways. Since implementation of CBR can be complex and therefore needs to be simplified in such a way that local institutions will be able to manage locally. There are other techniques that fill out the gaps. Diversity fair is another technique that improves farmers' access to information and seed materials through exhibition. The knowledge documented and displayed during exhibition can be very useful if that is linked to the Community Biodiversity Register. To make CBR practical and usable, peoples' knowledge can be gathered more effectively and efficiently through Diversity Fair. CBR can be implemented simply through the mobilization of present institutional setting.

6. Research needs

Since there are limited improved variety options, peoples' livelihood seems dependent on local crop diversity even for the main staple food crops. Irrespective of the agro-ecosystems majority of the sorghum landraces have been grown in small area by limited number of farmers. The exercise revealed that a few landraces are very popular and therefore are grown in larger scales by many households. This strongly suggests that landraces contributing to peoples' livelihoods can simply be enhanced directly through improved access. The set of sorghum diversity grown in smaller areas by few farmers may be endangered from conservation point of view. These landraces can simply be replaced with a change in peoples' priority, preference and likely change in their ecosystems. To make these varieties competitive, three distinct means:

- Quality improvement through breeding means
- Market methods through which demand of landrace based products can be either created or enhanced

- Strengthen peoples' awareness through advocacy and media

It is a challenge for the project staff to facilitate the work involving a range of stakeholders with different mandates. Since no single institution can be perfect, the project should work closely with private and government organizations so that development and conservation needs are addressed. The present network at grassroots seems excellent and an additional effort may be required to establish similar networks between parties at district and or regional levels.

7. Capacity building

Two aspects are important as far as sustainability of the program is concerned. First, whether the program has been internalized into existing networks with enhanced physical facilities along with policy commitment and second, whether the program is supported enough by trained manpower. Not all partner institutions are well equipped. To carry out research, development and conservation work together, the capacity of the partner organizations needs to be strengthened. Capacity can be enhanced through improved physical facilities such as strengthening laboratory. The core idea behind should therefore be that program will sustain when the approaches and project activities are internalized and operated locally by existing institutions.

There are a number of participatory options through which farm communities may be effectively mobilized. There are recent techniques on which the project staffs are not fully aware. There are a number of innovative approaches applicable to local condition but not yet capitalized can be gradually adopted according to their fits into local situation. Different ways of peoples' capacity building may be adopted to fit into local socio-culture and some are already been in practices, which needs promotion through facilitation. Some periodic hands-on type of training on such innovative approaches would be very effective means to enhance capacity of the institution. To achieve project goal, certain level of staff commitment is necessary. Training can be one of the effective ways of retaining qualified staff. The consultant would prefer the project to be lined with the academic institutions within the country (as it is now) and abroad. There are several courses available in European universities where financial supports are also available. Noragric, the Agricultural University on Norway, Norway can be one of the most appropriate Universities

for such training. NORAD provides a number of such offers to Ethiopia candidates every year. The project benefits if such attempts are successfully made with other institutions abroad. Development and conservation programs may be successful only when they match local needs and preferences. Peoples' participation can be effective only when program will provide benefit to farmers. To make community empower in terms of use, control over and access of bio-resources, a number of ways can be recommended. Locally popular media including electronic media can be used with local contents. Printed materials, posters, exhibition and drama are a few effective techniques already experienced elsewhere. Some of these techniques may be used so that peoples' access to information and seed materials will be further enhanced.

Annex 1. Farmers' description of agro-ecosystems and descriptors

Naming\Parameters	**Highland**	**Mid highland**	**Low land**
Temperature	Low	Intermediate	High
Altitude and slope	Greater slope & altitude	Undulating landscape	Valley bottoms
Rainfall	High rain fall	Intermediate	-
Fertility	Moderate to good	Good	Good
Availability of soil moisture	Good	Poor	Good
Indicator species	Barley, Teff, *Eucalyptus, Podocarpus* spp, Higher forest species diversity	*Chat*, Sweet potato, *Eucalyptus* spp. Less forest species diversity	*Cactus, Acasia* spp, no *chat* and no wheat
Sorghum varieties	Less sorghum diversity, *Chefere* with specific adaptation	High sorghum diversity and *Wogere* red and white to have specific adaptation	*Dini* to be reported to have specific adaptation

Annex 2. Distribution of land types according to their importance in peoples' livelihoods across agro-ecosystem sites (High land and Mid Highland)

Area distribution\ contribution to livelihoods		**Large area**	**Small area**
Peoples' livelihoods	High	Crop or farm land and grazing land applies to across mid highland sites	Annual crop land and land with perennial species e.g. *chat*and social services as in mid land - Asebe Teferi
	Low	Social and public land (School, Offices, Road) and forest land area as mid land of Asebe Teferi	Forest and public land, some times social services as in high land-Asebe Teferi

Annex 3. Farmers' description of their farmlands

Land types\ Descriptor	**Texture**		
	Fine	Coarse	Gravel
Soil productivity	Good	Medium	Poor
Moisture Holding Capacity	High but more vulnerable to water erosion	Poor to medium and high rate of leaching or run off	Low and predominantly run off
Slope aspect (Observation)	Gentle slope with South East aspect as in mid high lands	More eroded soils as in high rain fall areas e.g. high lands	Greater slope and severely eroded soils
Soil color	Red and clayey as in mid high lands	Gray or brown in high rain fall areas as in high lands	Mixed brown in highly eroded soils distributed in patches in either agro-ecosystems

Annex 4a. Distribution of species according to their importance in peoples' livelihoods (High land)

Area distribution \Contribution		Large	Small
Peoples' livelihoods	High	Maize, Barley Wheat, **Sorghum**, Horse bean, Onion, Haricot bean, Oat, coffee, Seet potato,	??
	Low	??	Field pea, Lentil, Teff, Pepper, Fenugreek, Flax, Potato

Annex 4b. Distribution of species according to their importance in peoples' livelihoods (Mid high land)

Area distribution \Contribution		Large	Small
Peoples' livelihoods	High	**Sorghum** Maize, Wheat, Haricot bean, Barley and ground nut generally and tomato in Dire Dawa	Teff, Horse bean, Sweet potato and *Chat*
	Low	???	Potato, Garlic, Onion, Lentil, Chick pea, Fenugreek, Field pea generally and coffee in Dire Dawa

Annex 5a. Distribution of sorghum diversity according to their importance in peoples' livelihoods in Chelenko, High land (Bekelcha, Men's group)

Area distribution \Farmers		Large	Small
Number	Many	Fendisha dhera dima Fendisha gebabe dima Fendisha gebebe adi	??
	Few	??	Zengada, Fendisha dhera adi, Denga

Annex 5b. Distribution of sorghum diversity according to their importance in peoples' livelihoods, Chelenko, Lola women's group (Mid high land)

Distribution \ Farmers		**Large area**	**Small area**
Number	Many	Hamdiye, Muyra dima	Denga
	Few	??	Muyra adi, Fendisha adi gebabe, Fendisha dima gebabe, Fendisha adi dhera, Fendisha dima dhera, Jeldi, Wogere adi, Wogere dima, Witibile, Zengada, Denga

Annex 5c. Distribution of sorghum diversity according to their importance in peoples' livelihoods, Asebe Teferi, High highland, Arberekete women's group

Distribution \ Farmers		Large area	Small area
Number	Many	Chefere, Fendisha dima gebabe, Fendisha adi gebae & Jengetelil	??
	Few	??	Muyra dima, Zengada, Chukure, Dasle

Annex 5d. Distribution of sorghum diversity according to their importance in peoples' livelihoods, Asebe Teferi, Mid highland, Medhicho Men's group

Distribution \ Farmers		Large area	Small area
Number	Many	Masugi dima, Abdelota	*Chat* plantation
	Few	Forest land	Masugi adi, Melate, Tomis, Murya adi, Muyra dima, Bullo, Dasle, Belemilik & Witibile

Annex 5e. Distribution of sorghum diversity according to their importance in peoples' livelihoods, Dire Dawa, Mid highland, Men's group

Distribution \ Farmers		Large area	Small area
Number	Many	Muyra dima, Dini	Amajigita adi, Amajigita dima
	Few	Alisho, Shashemere, Murya adi	Worebi, Yemen

Annex 5f. Farmers' reasons of variety allocation by area and households over sites

Farmers' reasons \ Agro-ecosystems	Women's group		Men's group		
	Lola	Arberekete	Bekelcha	Medhicho	Dire Dawa
Large area x many households					
a. High yielding	Ŷ	ŷ	ŷ	ŷ	ŷ
b. Good food value	Ŷ	ŷ	ŷ	ŷ	0
c. Adaptation to drought & stress	Ŷ	ŷ	ŷ	ŷ	ŷ
d. Early maturity	ŷ	0	0	0	0
e. Market value	ŷ	ŷ	0	ŷ	0
f. Resistant to bird attack	0	0	0	ŷ	0
g. Good storability	0	0	0	ŷ	0
h. Biomass for fodder	0	0	0	0	ŷ
Large area x few households					
a. Drought susceptible but high market value	0	0	0	0	ŷ
Small area x many household					

a. Control bird attack	ŷ	Ŷ	0	0	0
b. Introduced recently	0	0	0	0	ŷ
Small area x few households					
a. Local drink *tela (Zengada)*	0	ŷ	ŷ	0	0
b. Suitable for inter-crop	0	0	ŷ	Ŷ	0
c. Fendisha secrets honey dew - invites pests	0	0	ŷ	0	0
d. Late maturing	ŷ	0	0	0	0
e. Need more moisture	ŷ			0	0
f. Bird control	ŷ	0	0	ŷ	0
g. Susceptible to drought but good baking quality for *Injera*	0	0	0	0	ŷ

Note: ŷ=agreed values by the group, 0=not applicable

Annex 6a. Meaning and ecological adaptation of farmers' named varieties

High lands	Farmers' variety	Meaning	Ecological adaptation
Chelenko	1. Zengada	No idea	Marginal land
	2. Fendisha dhera adi	No idea	Hill side gravely
	3. Fendisha dhera dima	No idea	Hill side gravely
	4. Fendisha gebabe adi	No idea	Hill side gravely
	5. Fendisha gebabe dima	No idea	Hill side gravely
	6. Denga	No idea	Variety of soils
Asebe Teferi	1.Chefere	Open & dispersed head	Fertile and good soils
	2. Muyra dima	Round and dense head	Fertile and good soils
	3. Zengada	Large and erect heads	Fertile and good soils
	4. Fendisha dima gebabe	Short and spread	Fertile and good soils
	5. Fendisha adi gebabe	Short and spread	Fertile and good soils
	6. Chukura	Black color	Gravely soils
	7. Jengatelil	Bold and bitter grain	Fertile and good soils
	8. Dasle	Happiness, grows well even under adverse conditions	Marginal lands

6b. Meaning and ecological adaptation of farmers' named varieties

Mid high lands	Farmers' named variety	Meaning	Ecological adaptation
Chelenko	1. Hamdiye	Name after place from where these were first introduced	Fertile and good soils
	2. Muyra adi		Fertile and good soils
	3. Fendisha adi gebabe	No idea	Fertile and good soils
	4. Fendisha dima gebabe	No idea	Fertile and good soils
	5. Muyra dima	No idea	Fertile and good soils
	6. Fendisha adi dhera	No idea	Poor & marginal soils
	7. Fendisha dima dhera	No idea	Poor & marginal soils
	8. Jeldi	No idea	Poor & marginal soils
	9. Wogere adi	No idea	Poor & marginal soils
	10. Wogere dima	No idea	Poor & marginal soils
	11. Witibile	No idea	Fertile and good soils
	12. Zengada	No idea	Poor & marginal soils
	13. Denga	Border of a field	Fertile and good soils

Annex 6c. Meaning and ecological adaptation of farmers' named varieties

Mid high lands	Farmers' named variety	Meaning	Ecological adaptation
Asebe Teferi	Masugi adi (White)	Ancient landrace and unknown	Fertile and good soils
	Masugi (Red)	Ancient landrace and unknown	Fertile and good soils
	Abdeleta	After two farmers names who first introduced	Both poor and good soils
	Melete	Short height and early maturing	Both poor and good soils
	Tomis	Ancient landrace and unknown	Fertile and good soils
	Muyra (Red & white)	Cut and give me the stalk as they are juicy and sweet	Both poor and good soils
	Muyra dima		
	Bullo	Yellow grain color	Fertile soils
	Dasle	White grain color	Both poor and good soils
	Bele milik	Tolerant to drought	Both poor and good soils
	Witibile	Border soldier	Both poor and good soils

Annex 6d. Meaning and ecological adaptation of farmers' named varieties

Mid high lands	Farmers' variety	Meaning	Ecological adaptation
Dire Dawa	Muyra dima	Cutting	Both poor and good soils
	Muyra adi	Cutting	Fertile soils
	Dini	Place from where seed was introduced	Fertile soils
	Alisho	Person who introduced the seed first time	Fertile soils
	Worabi	Unknown	Both poor and good soils
	Amajigita adi	Strong stalk and resistant to wind	Both poor and good soils
	Amajigita dima	Strong stalk and resistant to wind	Both poor and good soils
	Yemen	Probably brought from Yaman	Fertile soils
	Shashemene	Place from where seed was first introduced	Fertile soils

Annex 7. Farmers' description for sorghum species and varieties

Descriptive traits\ Agro-ecosystems	**Women's group**		**Men's group**		
	Lola	Arberekete	Bekelcha	Medhicho	Dire Dawa
1. Maturity group	ŷ	0	0	ŷ	ŷ
2. Planting time	ŷ	0	0	0	0
3. Head type	0	ŷ	ŷ	ŷ	ŷ
4. Grain formation	0	0	ŷ	ŷ	0
5. Stalk height	ŷ	ŷ	ŷ	ŷ	ŷ
6. Stalk thickness	ŷ	0	0	ŷ	0
7. Uses of stalk	ŷ	ŷ	ŷ	ŷ	ŷ
8. Stalk juiciness	ŷ	0	ŷ	0	ŷ
9. Length of inter-node	0	0	ŷ	0	ŷ
10 Length of peduncle	ŷ	ŷ	0	ŷ	ŷ
11. Uses of leaves	ŷ	ŷ	ŷ	ŷ	ŷ
12. Leaf color	ŷ	ŷ	0	ŷ	ŷ
13. Leaf width	ŷ	ŷ	ŷ	ŷ	ŷ
14. Leaf thickness	0	ŷ	0	0	ŷ
15. Leaf texture	0	0	ŷ	0	ŷ
16. Root systems/Length	ŷ	0	ŷ	0	ŷ
17. Grain size	ŷ	ŷ	ŷ	ŷ	ŷ
18. Grain color	ŷ	ŷ	ŷ	ŷ	ŷ
19. Bitter grain taste	ŷ	ŷ	0	0	0
20. Grain quality for different food traditions (*Tela*, Porrige, Injera)	ŷ	ŷ	ŷ	ŷ	ŷ
21. Grain yield	ŷ	ŷ	ŷ	ŷ	ŷ
22. Leaf size	ŷ	ŷ	0	0	0

23. Mid rib color	0	0	0	ŷ	ŷ
24. Tillering capacity	ŷ	ŷ	ŷ	ŷ	0
25. Biomass yield	ŷ	0	0	0	0
26. Suitability for intercrop	0	0	0	0	0
27. Ecological adaptation	ŷ	ŷ	0	0	0
28. Storability	0	0	0	ŷ	ŷ
Total traits used	**20**	**16**	**15**	**16**	**19**

Annex 8. Do some traits preferred for specific ecosystem or generally?

Traits	**Fertile soils**	**Poor soils**	**Remarks**
Leaf size	Broad	Narrow	
Leaf color	Dark green	Pale yellow	
Leaf thickness	Thick	Thin	Due to lack of nutrition
Grain size	Bold/filled grain	Small and wrinkle	Due to moisture stress
Head size	Large	Small	
Maturity	Early growth and late maturing	Early maturing	Escape from drought
Stalk thickness	Thick and non-lodging	Medium to thin	Lack of nutrition
Stalk height	Tall	Short	Variety trait
Stalk juiciness	Juicy and tastier	Poor taste	Poor taste
Tiller number	Higher tiller count	Low and few	Lack of nutrients
Inter-node length	Long	Short	Adaptive trait
Root profuseness	Spreading	Deep rooted	Adaptive trait

Annex 9a. Farmers' identifiable descriptors for sorghum varieties, Asebe Teferi, Mid highland

Varieties\ Descriptors	Stalk height	Grain color	Market value	Peduncle length	Inflorescence	Grain size	Maturity	Bird res.	Storability	Tiller count
Masugi (White)	M	White	M	M	Droopy	M	E	Sus.	Good	M
Masugi (Red)	M	Red	M	M	Droopy	M	E	Sus.	Good	M
Abdeleta	Tall	Red	M	Long	Droopy	M	M	Sus.	Good	High
Melete	Short	Red	M	Droopy	Droopy	M	E	Sus.	Good	High
Tomis	M	White	M	M	Droopy	M	M	Sus.	Good	High
Muyra (White)	Tall	White	High	Long	Droopy	B	L	Sus.	Good	Low
Muyra (Red)	Tall	Red	High	Long	Droopy	B	L	Sus.	Good	Low
Bullo	Tall	Brown	High	Long	Droopy	B	L	Sus.	Good	Low
Bele milik	Short	White	High	Short	Droopy	M	E	Sus.	Poor	High
Witibile	Tall	Red	Low	Long	Erect	S	L	Res.	Poor	High

Note: M=Medium, E= Early, L=Late, Sus.= Susceptible, Res.=Resistant

Annex 9b. Farmers' identifiable descriptors for sorghum varieties, Asebe Teferi, Highland

Varieties\Descriptors	Stalk height	Grain color	Market value	Food quality	Grain yield	Grain size	Maturity	Tiller count
1.Chefere	Short	Red/white	Best	Sweet	High	Samll	Late	High
2. Muyra (Red)	Tall	Red/White	Medium	Poor	Medium	Bold	Medium	Poor
3. Zengada	Tall	Red	Less	Bitter	Low	Small	Early	High
4. Fendisha dima gebabe	Short	Red/White	Best	Sweet	Medium	Medium	Late	High
5. Fendisha adi gebabe	Short	Red/White	Less	Sweet	Medium	Medium	Late	High
6. Chukura	Tall	Brown	Less	Sweet	Low	Medium	Early	Medium
7. Jengatelil	Tall	Yellow	Less	Bitter	High	Bold	Late	Poor
8. Dasle	Tall	White	Best	Sweet	High	Bold	Early	Medium

Annex 10a. Farmers' assessment of varieties for their use values, Bekelcha, Chelenko, Highland

Varieties\Uses	Market	Injera	Porrige	Tela	Fodder	Firewood
1. Zengada	x	x	0	x	x	x
2. Fendisha dhera adi	x	x	x	0	x	x
3. Fendisha dhera dima	x	x	x	0	x	x
4. Fendisha gebabe adi	x	x	x	0	x	x
5. Fendisha gebabe dima	x	x	x	0	x	x
6. Denga	0	x	x	0	x	x
Total	**5**	**6**	**5**	**1**	**6**	**6**

Annex 10b. Farmers' assessment of varieties for their use values, Arberekete, Asebe Teferi (Highland)

Varieties\Uses	Market	Injera	Porrige	Tela	Fodder	Firewood
: 1.Chefere	x	x	x	0	x	x
2. Muyra dima	x	x	x	0	0	x
3. Zengada	x	0	0	x	0	x
4. Fendisha dima gebabe	x	x	x	0	x	x
5. Fendisha adi gebabe	x	x	x	0	x	x
6. Chukura	x	x	0	0	x	x
7. Jengatelil	x	x	0	x	0	x
8. Dasle	x	x	x	0	x	x
Total	**8**	**7**	**5**	**2**	**4**	**8**

Annex 10c. Farmers' assessment of varieties for their use values in Mid highland site, Lola, Chelenko

Varieties\Uses	Market	Injera/bread	Porrige	Tela	Fodder	Construction
1. Hamdiye	x	x	x	0	x	x
2. Muyra adi	**x**	**x**	**x**	**0**	**x**	**x**
3. Fendisha adi gebabe	x	x	x	0	x	x
4. Fendisha dima gebabe	x	x	x	0	x	x
5. Muyra dima	**x**	**x**	**x**	**0**	**x**	**x**
6. Fendisha adi dhera	x	x	x	0	x	x

7. Fendisha dima dhera	x	x	x	0	x	x
8. Jeldi	0	x	x	0	x	0
9. Wogere adi	x	x	x	0	x	x
10. Wogere dima	x	x	x	0	x	x
11. Witibile	*x*	*0*	*0*	*x*	*x*	*x*
12. Zengada	x	0	0	x	x	x
13. Denga	x	0	0	x	x	x
Total	**12**	**10**	**10**	**3**	**13**	**12**

Annex 10d. Farmers' assessment of varieties for their use values in mid highland site, Medhicho, Abese Teferi:

Varieties\Uses	Market	Injera/bread	Porrige	Tela	Fodder	Construction	Storability
Masugi adi	x	x	x	0	x	x	x
2. Masugi dima	x	x	x	0	x	x	x
3. Abdeleta	x	x	x	0	x	x	x
4. Melete	x	x	x	0	x	x	0
5. Tomis	x	x	x	0	x	x	x
6. Muyra adi	x	x	x	0	x	x	x
7. Muyra dima	x	x	x	0	x	x	x
8. Bullo	x	x	x	0	x	x	x
9. Dasle	x	x	x	0	x	x	0
10. Bele milik	x	x	x	0	x	x	0
11. Witibile	0	0	0	x	x	0	0
Total	**10**	**10**	**10**	**1**	**11**	**10**	**7**

Note: 0=Either not used or not preferred

Annex 10e. Farmers' assessment of varieties for their use values in mid highland site, Dire Dawa

Varieties\Uses	Market	Injera/bread	Porrige	Fodder	Construction	Storability
1. Muyra	4	1	1	2	3	5
2.Muyra adi	2	1	1	3	4	5
3. Dini	3	1	1	2	0	4
4. Alisho	3	1	1	2	0	0
5. Worabi	4	1	1	2	3	5
6. Amajigita adi	0	1	1	2	0	0
7. Amajigita dima	0	1	1	2	0	0
8. Yemen	2	1	1	3	0	4
9. Sheshemere	3	1	1	2	0	0
Total	**7**	**9**	**9**	**9**	**3**	**5**

Note: 0= least or no use

Annex 11. Ways of securing seed demand at household level (% sources)

Source\Sites	Highland		Mid high land		
	Chelenko	Asebe Teferi	Chelenko	Asebe Teferi	Dire Dawa
Own	80	70	NR	90	70
Exchange	10	20	NR	7	20
Relatives	10	10	NR	3	10

Annex 12. Content of information travelling along with seed materials (n=12 sets of information)

Information \ Sites	Highland		Mid high land		
	Chelenko	Asebe Teferi	Chelenko	Asebe Teferi	Dire Dawa
Ecological adaptation	x	x	x	x	x
Maturity days	x	x	x	0	0
Seed purity	x	x	x	x	0
Grain yield	x	x	x	0	x
Disease/pests	x	x	0	0	0
Food value	x	x	0	x	x
Marketability	x	0	0	0	x
Tolerant to bird	0	0	x	0	0
Grain size	0	x	0	x	0
Head compactness	0	x	0	0	0
Construction	0	0	0	0	x
Fodder value	0	0	0	0	x
Total	**7**	**8**	**5**	**4**	**6**

Note: x stands for corresponded information sought along with the seeds

Annex 13. Assessment of sorghum varieties lost from the system

Variety \Sites	Highland		Mid high land		
	Chelenko	Asebe Teferi	Chelenko	Asebe Teferi	Dire Dawa
Fendisha dhera dima	x	0	None	0	0
Fendisha dima dhera	0	x	0	0	0
Wogere Delecha	0	0	0	x	0
Wogere	0	0	0	0	x

Note: x=Varieties reported to be lost from the system

Annex 14. Ways farmers try new varieties in different land types

Trial plot \ Sites	Highland		Mid highland		
	Chelenko	Asebe Teferi	Chelenko	Asebe Teferi	Dire Dawa
First time good soil	0	x	0	x	x
First time poor soil	x	0	x	0	0
Second time good soil	x	0	x	0	0
Second time poor soil	0	0	0	x	x