Report of the Humidtropics Ethiopia Diga field site farmer field day and second innovation platform meeting

23-24 September 2014

By Zelalem Lema (ILRI) and Teklu Erkossa (IWMI)

Top: farmers on field day; Bottom: Diga innovation platform members

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Farmer Field Day

Morning: Field day at Arjo Kebele to demonstrate effects of soil and water conservation on maize and on livestock feed as well as new sweet potato variety trials

On 23 September a farmer field day was organized by Innovation Platform members at Diga Woreda Arjo kebele to demonstrate Humidtropics research trials to farmers and other stakeholders. The field day was organized such that trials in the lowland areas are visited in the morning and those in the highland areas in the afternoon. Participating farmers in soil and water conservation effect on performance of maize, livestock feed and new sweet potato counts about 80 farmers and other farmers who have not participated in any of the field trials have attended the field day (see Annex 1).

Researchers from IWMI, CIP and ILRI with members of the innovation platform from the woreda, Bako Agricultural Research Centre and Wollega University also attended this field day.

The purpose of the field day was to demonstrate the impact of the improved technologies and management practices on the performance of the crops and feeds as compared to traditional counter parts. The major treatments introduced include soil bunds in the crop field and infiltration trench in the livestock grazing areas. In addition, improved management practices such as intercropping for maize, row planting for teff and over sawing for grazing land were nested within the soil and water conservation treatments. On the grazing land the treatment is to see how much biomass of quality livestock feed can be obtained from the improved soil and water conservation and overs sawing of Rhodes grass to the traditional practice called ‘Kalo’ in which a grazing land is protected from livestock interference.

At the beginning of the day, all participants were briefed before the start of the field visit and the visit went on such that the selected farmers for demonstrating what they have done on their fields including how they implemented the trials, and how they feel as it stands now, including yield estimation in some cases. These is mainly to encourage a farmer to farmer extension system as it takes a trust worthy approach when it comes to technology transfer.

Participants, particularly new farmers, have able to hear and see new management practices and input supplied on the maize farms. Important questions were raised from other farmers on the disease of maize crop, the quality of the seed used and others which were answered by researchers from Bako agricultural research centre and IWMI.

Few farmers from among the 28 farmers participated on livestock feed trials also demonstrated their fields to participants comparing impacts of the improved practices on bio-mass and quality of feeds as compared to their traditional grazing land. In general, the farmers implemented the trials have expressed their happiness about the performance of the Rhodes grass. One farmer stated that
he was looking to buy these new grass seed from farmers who participated in the Nile Basin Development Challenge project but he did not succeed, and this time he is happy that he is able demonstrate the grass growing on his own field, thanks to the Humidtropics program.

The next demonstration was done by few of the farmers representing those 15 farmers participating on maize farm with soil bund as a soil and water conservation structure. The soil bund was also covered by a new livestock grass called Desho which was selected for its biomass and also its roots to protect and sustain the soil bunds as a structure. New farmers show their strong interest on the Desho grass that was planted on the Soil bund as it has dual purpose which is to protect the soil as well as livestock feed by cut and carry system. A visit was also paid by partners to see the new sweet potato varieties introduced by CIP on 20 farmer’s plot of land. The potatoes have grown well and adapted to the agro-ecology of Diga and the silage demonstration is the next step to work with the sweet potato.

The demonstration was completed during the lunch time at Arjo kebele and participants gathered in the village to discuss further on what has been observed from the field day. There were a lot of interesting questions raised for learning and sharing mainly to Innovation Platform members who are researchers on the area of livestock feeds, crop and soil and water. Farmers appreciated the interventions and also the IP members who are coming together to solve
farmers’ problems. They also promised to continue working together for the next season crop rotation. It was agreed that the farmers representatives will participate in an IP meeting on 24th Sep 2014 and their interest for the crop rotation planning will be reflected and considered.

**Afternoon: Field day at Jirata Kebele to demonstrate teff research trials**
In the afternoon the CGIAR partners and IP members traveled to the other highland kebele to visit the trials done on teff. The intervention led by IWMI on the highlands of the Diga woreda field site was on teff with treatments to show the impacts of row planting, improved varieties and management practices. The participating farmers were 20 and 10 with soil bunds and 10 without soil bunds to show its impacts on the yield. On this afternoon field day in addition to the 20 farmers participated other new neighboring farmers participated. Participants able to visit a few farmers’ teff land with and without soil bunds comparing it with the broadcasting planting method. It was heard from visiting farmers that the row planting will have more yield than the broadcasting but the seed rate was raised as an issue to be adjusted for the future. Question and answer on the row planting and its labor taking was raised by the farmers and discussed in relation to the benefits it brings in terms of yield.
Innovation Platform meeting

- **Time**: started at 9 am and completed at 4:30 pm
- **Venue**: Diga Woreda Admin Office
- **Facilitated by**: Zelalem Lema (ILRI)
- **Minutes recorded by**: Wakgari Keba (Bako Agri Research Centre, Tamene Temesgen (ILRI) and Annet Mulema (ILRI), Zelalem Lema (ILRI)
- **Photo** by Desalegn Tadesse (IWMI) and Elias Damtew (ILRI)
- **Participants from Addis**: Teklu Erkossa, Desalegn Tadesse and Kinde Getnet (IWMI), Britta Kowalski (CIP), Annet Mulema, Tamene Temesgen, Elias Damtew and Zelalem Lema (ILRI)

**Agenda:**

- Registration of IP members
- Self-introduction, welcome and brief introduction to the agenda- Zelalem Lema
- Opening speech (by Mr. Ulfina Shiferaw, Woreda Administration Office head)
- Brief re-introduction to the Humidtropics programme and activities done at Diga Field Site so far - Teklu Erkossa
- Learning session: Follow up discussion from the field day on: what works best? What didn’t work?
- Diga Feed Assessment (FEAST) result from NBDC – Dereje Duressa and Wakgari Keba
- CIP suggested intervention for the future - Britta Kowalski
- Brief introduction to the project called Legume-Choice - by Tamene Temesgen
- Suggested intervention for teff, maize and grazing land farms for the next season crop rotation – by Teklu Erkossa

**Welcome and opening remarks**

Mr. Zelalem Lema, from ILRI welcomed the participants from different institutions to this 2nd IP meeting. He facilitated the self-introduction of the IP meeting participants to get to know to other with new participants. He briefly introduced the agenda and the purpose of the meeting and invited Mr. Ulfina Shiferaw, head of the Woreda Administration Office, to make an opening remarks for the meeting.

Accordingly, Mr. Ulfina made speech by appreciating the fodder development intervention works undertaken by NBDC innovation platform in the woreda. He appreciated also the link made by ILRI and IWMI to continue working in the woreda through a Humidtropics program.
He had seen the works done with the farmers on maize, teff, livestock feed and potato and mentioned that it is all aligned with the government key areas to increase production and productivity for better livelihood of farmers. He also pressed a message to IP members from the woreda and representative farmers for both kebeles about the need to make sure that their individual roles are well addressed to make the most out of this program for the benefit of the farmers. He also indicated that the established IP forum is very important to identify their strengths and weaknesses so that they can learn from their mistakes and every weakness will be improved during the next season. The significant contribution of the NBDC and Humidtropics activities towards food self-sufficiency, feed source, and cash source for their farming community in the woreda has also been indicated.

**Brief re-introduction of the Humidtropics program and activities done so far**

He briefly introduced Humidtropics program and its activities as part of the east and central Africa coordination. Progress made so far at Diga Woreda by Humidtropics program was presented by Dr. Teklu Erkossa. He re-emphasized the points raised by the woreda administration head, Diga woreda on the opportunities that the woreda get to be selected as one of very few Humidtropics program field sites.

He introduced activities done by Humidtropics program on maize, teff, livestock feed and soil conservation as follows:

Jirata kebele trials which represent highland agro-ecology:
- Most of the landscapes are very steep plus receiving very high annual rainfall (soil leaching and erosion problem leading to poor soil fertility problem)
- Teff is a major crop cultivated and teff mono-cropping is another problem.

Therefore, teff technology has been given to 20 farmers (10 with and 10 without soil conservation structure). For the problem of soil erosion, integrating teff field with soil conservation structure was taken as part of solution whether really this could be an option, so that its profitability in terms of improving soil fertility restoration would be studied. Management options such as row planting, seed rate, plowing frequency, weeding, fertilizer application etc. are part of the implemented activities to solve the low productivity problem of teff.
For ‘Arjo kebele’ representing lowland agro-ecology

Maize is the major crop but due to very steep slope problem that is leading to drying out of the soil during the off-season, the productivity is very low. Soil erosion, maize mono-cropping, poor soil fertility, low moisture stress, termite incidence and feed shortage are among major problems.

Therefore, 30 farmers (15 with soil conservation structures and 15 without) have planted maize on their farm as per the recommendations. The trials were to test the effect of soil moisture on the termite incidence (that with soil bund structure is expected to reduce the termite incidence and improve soil fertility) and increase the yield. Forage plants (Desho grass) have been planted on the soil bund structure to solve feed shortage as well as to protect the soil and sustain the structure. Beans, as a legume crop, are being intercropped with maize (expected to increase soil fertility).

Other activities involve the grazing land (forage grass versus protected fallowing with (28 farmers). These all are not only to benefit the participant farmers but to study whether the technology is profitable, and acceptable so that we can expand it into millions of farmers with similar agro-ecology.

Three MSc Students are also assigned to collect all necessary data from the experimental farmers’ plots on natural resource management (soil sample), crop yield, forage biomass yield and report to the coordination office for further analysis and interpretation to recommend possible solution/s for the study site.

Learning session: reflection about the Farmers’ field day

The purpose of organizing field day followed by this IP meeting was to give all stakeholders a chance to practically visit the work on farmers’ field and learn from it for the next season activities. What works and what didn’t work were the two main questions asked and participants actively engaged on the reflection of the two questions. Their reflections are summarized in the following bullet points:

Good practices experienced:
- *Desho* grass (livestock feed, soil conservation, beauty, etc)
- Maize planted with soil conservation structure has performed better than that without soil conservation.
- Row planted teff with soil conservation structure has better performed and attracted farmers compared to that without these practices.
- *Desho* grass and other forage plants given to farmers has been indicated as very important for their livestock particularly during the dry season when there is critical feed shortage. Its importance particularly for milk production and for small calf has been indicated.
- Some farmers had bought sheep from selling forage grass seeds.
- Soil, which did not give any product before, has started to be improved in fertility and give yield.

Problems encountered
- Timely planning problem
- Training in every steps of activities (on farm training) for farmers not given
- Since it has to be fenced, farmers leave their cattle into the fallow land that has to be protected and used as control to be compared with forage grasses sown.
- Standards were not kept in preparing soil conservation structure for example, soil bund in the *teff* field (overflowing problem).
- Resource persons from each discipline has to be invited (e.g, maize researchers, zonal experts)
- Technologies given to farmers (maize varieties) were not up to date.
- The orange fleshed sweet potato have low biomass (may be because of late sown)
- The lack of frequent training was reflected on lodged Rhodes grass (possible to cut and give to cattle particularly for milk cows than for fattening) than leaving it lodged, then after, it is possible to keep it for seed production.
- It is profitable if farmers use Rhodes grass for milk production than for fattening, but most farmers are using it for fattening (lack of training).
- Bean intercropped with maize at Bako is very good but not performed here at Diga farmers’ field (lack of training and follow up.....so management problem).
- Teff seed rate is very high (above the recommended rate)
- Lack of all stakeholders representation in the IP members

Finally, it was indicated that most of the problems reflected on the forum would be considered as a learning processes for the IP members’ technical committee and to be solved in the future.

**Diga feed assessment (FEAST) result from NBDC**

The technical committee of the Diga IP members have conducted feed assessment using FEAST tool during the NBDC project in three villages called Dembi, Dapo and Humbo villages of Arjo kebele. The result was presented on this IP meeting for an input for the future livestock feed interventions planned by ILRI and CIP. Dereje Duressa from Wollega University and Wakgari Keba from Bako Agricultural Research Centre presented the result. Some points from his presentation are summaries as follows:

- The system is crop livestock farming system with no landless farmers
- Most farmers have relatively large farm size
- Poor soil fertility is a major problem
- Haricot bean is relatively well compared to others
- Maize is a major crop so that maize residues are the main livestock feed in the area
- Disease problem in coffee and mango was reported by farmers
- Farmers with large farm size have also large number of livestock
- The livestock composition is dominated by cows
- There is no intervention in introducing livestock breeds (all are local breeds)
- The major livestock feed used in the area is natural pasture
- Conserving the existing natural pasture for dry season is not well known (lack of knowledge)
- Feeding grasses after mixing with urea can give good improvement but not known by the farmers
- Children are sent to school and there is critical labor shortage during the dry season
- Other additional source of feeds such as agro-processing byproducts etc.... are not used by the farmers
- Only salt cake is used
- No feed that can be used for the livestock throughout the year (Britta’s idea of silage making could be a solution....)
- Those farmers who have irrigation facility have relatively good source of feed for their livestock
- Un affordable price of the agricultural inputs are main problem
- No credit service facilities
- Selling agricultural products and crop residues in some cases are major source of income
- Shortage of feed, livestock disease, lack of knowledge’s, shortage of drinking water are another major problems.
Intervention options suggested by the study are:
- Horro breeds of both sheep and cows can be introduced into the farmers from Wollega University and Bako research center.
- Collaboration of different stakeholders is a must to solve these and other problems and give trainings to improve the knowledge shortage of the farming community.

**Suggested intervention on silage for the next season by CIP**

A new sweet potato variety, which is orange fleshed and with high ‘vitamin A’ and minerals content has been introduced into Arjo kebele by International Potato Centre (CIP) which can serve both for food and livestock feed.

- A total of 20 farmers participated in this technology to test its suitability to the agro-ecology
- Future direction will be discussed with selected farmers regarding the management method of sweet potato
- Farmers’ access to irrigation can produce sweet potato in dry season while those farmers who are not able to access irrigation can use the potato vine for animal feed by making silage mixing with Desho grass and maize straw.
- Farmers for demonstration will be selected by the technical group members of the IP
- Silage preparation is planned to be demonstrated on the last week of October 2014.
- It can be used for quality silage making
- Since silage making using sweet potato vine is well proven there, an expert for silage preparation will be invited from Kenya for the October demonstration
- 50 kg of vine from new variety of sweet potato and another 50 kg of vine will be required for this purpose
- This silage will be made from locally available biomasses such as grasses, maize straw and sweet potato vines in different recipes (forms) and will be demonstrated to farmers who want to prepare silage.
- The sample recipes will be kept at Woreda for future use.

Experience of Bako Agricultural Research Centre

By Wakgari: The technology is available at the research institution but the problem is extension. Dissemination of this information has not been done. And focus has been on training but not demonstration. It’s important to do demonstration to complement theoretical training. Bako research has mostly used maize Stover, green maize and grasses to make silage.

It was agreed on the IP on the dates and farmers have shown the interest to participate on the suggested intervention. There was a general consensus made by all participants that there is a need to do research on the nutrient content of the different livestock feeds introduced (by ILRI), and the silage making should aim to for diary and fattening business for generating additional income for farmers.

**Brief introduction to Legume CHOICE project**

Tamene Temesgen (ILRI) briefly introduced the Legume CHOICE project objectives, sites and activities done so far. He also mentioned that there is good linkage between this project and Humidtropics program activities and for this ILRI team works together to integrate the activities in both sites through Innovation Platforms (Jeldu and Diga). He introduced the project action kebeles in Diga which were carefully selected not to be overlapped by Humidtropics program field sites. These two kebeles of Legume CHOICE project are:

1. Lelisa Dimtu Kebele - representing lowlands
2. Fromsa Kebele - representing highlands
Suggested interventions and discussion for *teff*, maize and grazing land farms for the next season

During the first IP meeting held in April 2014, IP members have agreed to contribute to the sustainable intensification through integrating crop-livestock activities to increase productivity while improving the natural resources. Crop rotation was agreed as a mechanism to be implemented for the coming three or four years. Because of this the farmers selected for the first crop season was based on the criteria that they will allocate their lands for the coming few years so that the crop rotation will be done to improve the fertility of the crop and grazing farms.

On this IP meeting one of the expected outputs was to jointly discuss and agree on the next interventions for *teff*, maize and feed farm lands to increase the fertility of the soil. After an in-depth and engaging discussions were made then the following intervention for each farm lands were suggested.

For Jirata Kebele – highland *teff* production system

On this meeting IWMI have suggested other stakeholders in IP members to take the lead on *teff* farm lands for the next season production. The reason that IWMI is interested to handover the leading role to other partner is because of lack of technical staff to follow up with the activities. The activities of the next season is that the 20 farmers will continue to use the same land but they will shift their crop from *teff* to legume type crops. There will be another 20 new farmers to be selected for *teff* trials using improved varieties and management practices including raw planting. The following new roles have been agreed by IP members to continue working with farmers at Jirata Kebele.

<table>
<thead>
<tr>
<th>New roles assigned and agreed for next season for <em>teff</em> farm lands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organization</strong></td>
</tr>
</tbody>
</table>
| Woreda Office of Agriculture | To lead the activities and coordinate activities with farmers and partners | - Alemu Biratu (Extension)  
- Tesfaye Bokore (AGP focal person)  
- Zelalem Desta (Natural Resource expert) to facilitate |
| Bako Agricultural Research Centre | Agreed to support by providing two improved varieties of *teff* (Kena and Guduru) and technical support on planting and management | - Bayisa (Socio-economic and Extension Researcher)  
- Chemeda (Agronomy –*teff*-researcher) |
| Wollega University | Agreed to support on training for farmers and technical backstopping for experts | - Dr Hirpha (Agronomic researcher) |
Interventions for Arjo kebele – lowland

As Humidtropics program IWMI agreed to continue leading the intervention in Arjo kebele on maize and livestock feed together with ILRI and CIP as well as IP members. The interventions agreed for the next season for maize and livestock feed is as follows.

Maize farm land

The soil and Water conservation practices (bunds will be maintained, improved if necessary). Desho grass will be replanted on the bunds in areas they are attacked by termites. Sesame was selected by farmers in the IP meeting as a crop rotation to replace maize. We asked why the farmers selected sesame and they said that it has a market and also it is less labor requiring and also improve soil fertility. Experts also agreed to plant sesame after maize on the next season to increase the soil fertility. Farmers agreed to use the existing variety of seed for sesame after Bako research center reported that there is no seed from their canter.

Livestock feed

As a continuation of work of NBDC activities on livestock feed through Humidtropics program encouraging results have been achieved. We have seen that the number of farmers who are interested in livestock feed production are increasing from time to time. Before NBDC project no farmers in the kebele have an experience of allocating land, preparing land and planting improved livestock feeds. Currently most farmers allocate land and continue producing about four types of livestock feed in the kebele not only to solve the series livestock feed shortage they have but also to generate income by selling the seeds and seedling of the feeds. This attract the local government attention to see the kebele as a model kebele to expand the technologies to other kebeles within their woreda. For this there is an Agricultural Growth Program (AGP) program which buys about 170 KG of Rhodes grass from these farmers to distribute it to other farmers.

But the intervention was only focused on biomass production and the IP members urge that there is a need to do analysis of the nutrient content of each feeds introduced so that recommendations for feeding the livestock for dairy farming and fattening will be identified. The intervention suggested by CIP on silage making is a good step to take this forward but still ILRI will work on the other research to identify and document the nutrient value of Rhodes, Chomo and Desho grasses by taking sample to laboratory for analysis.

The 28 farmers involved in the livestock feed will continue for the next season. A training package during planting, managing and utilization will be given by TG members for the farmers.

The suggested interventions are as follows:
- How to maximize the utilization for the existing introduced livestock feeds
- To improve the soil and water conservation structures
- To fence and protect from livestock interference
- To intercrop with legume type of livestock feed
- Oversowing

The purpose of the livestock feed interventions are:
- For fattening
- For dairy farm
New interventions planned on water and potato

Developing shallow wells for providing water for different uses

About ten farmers will be selected to develop shallow wells for providing access to water for farmers to use for multiple uses. In collaboration with IWMI the woreda AGP program agreed to support the activity in finance while the woreda water office as an IP member is agreed to lead on the intervention and also support technically. One shallow well will be also be developed at farmers training centre for demonstration as well as for development agents to use for different farm activities.

Introduction of Horticultural Crops – Potato

- Irish potato for highland kebele in teff production system at Jirata and this need to be linked with the team on teff
- The existing sweet potato introduced will continue for the next season at lowland
- CIP agreed to take the lead on this to introduce the potato and expand the sweet potato
- The planning will be handled during the coming IP meeting in January 2014
- The issue of the potato seed storage will be considered by the woreda AGP
Annex 1: Diga woreda field site research trials information

<table>
<thead>
<tr>
<th>Diga Field Site</th>
<th>Intervention type</th>
<th>No of farmers</th>
<th>No of Female Headed farmers</th>
<th>Size of land /Household</th>
<th>Technologies tested</th>
<th>Lead by</th>
<th>Site name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maize (Soil and Water conservation)</td>
<td>30</td>
<td>8</td>
<td>¼ ha</td>
<td>Effect of soil bund &amp; intercropping of maize with haricot beans on soil quality and yield</td>
<td>IWMI</td>
<td>Arjo Kebele</td>
</tr>
<tr>
<td></td>
<td>Teff (Soil and water conservation and plating method)</td>
<td>20</td>
<td>7</td>
<td>¼ ha</td>
<td>Effect of soil bund and row planting on soil quality and yield of tef</td>
<td>IWMI</td>
<td>Jirata Kebele</td>
</tr>
<tr>
<td></td>
<td>Livestock feed (Soil and water conservation and improved pasture)</td>
<td>28</td>
<td>1</td>
<td>1/8 ha</td>
<td>Effect of soil bund/trench on soil quality and biomass yield</td>
<td>IWMI</td>
<td>Arjo Kebele</td>
</tr>
<tr>
<td></td>
<td>Sweet potato (improve variety)</td>
<td>20</td>
<td></td>
<td>1/20 ha</td>
<td>To test the new variety at Diga agro-ecology</td>
<td>CIP</td>
<td>Arjo Kebele</td>
</tr>
</tbody>
</table>
Annex 2: Diga woreda Technical Committee members

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samuel Tamene</td>
<td>Agricultural office head</td>
<td>TC chairman</td>
</tr>
<tr>
<td>Zelalem Desta</td>
<td>Woreda natural resource</td>
<td>Contact person</td>
</tr>
<tr>
<td>Debela Kene’a</td>
<td>EECMY</td>
<td>Facilitation fund and administration</td>
</tr>
<tr>
<td>Dereje Duresa</td>
<td>Wolleag university</td>
<td>Secretary</td>
</tr>
<tr>
<td>Wagari Kaba</td>
<td>Bako Research center</td>
<td>Member</td>
</tr>
<tr>
<td>Belinal Geneti</td>
<td>Livestock agency</td>
<td>Contact person</td>
</tr>
<tr>
<td>Alemu Biratu</td>
<td>Diga Agricultural office</td>
<td>Agronomist</td>
</tr>
<tr>
<td>Zenbech Teshome</td>
<td>Women affair</td>
<td>Member</td>
</tr>
<tr>
<td>Name</td>
<td>Institution</td>
<td>Responsibility in your Institution</td>
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<tr>
<td>Dereje Duressa</td>
<td>Wollega University</td>
<td>Community Service Director</td>
</tr>
<tr>
<td>Wakgari Keba</td>
<td>Bako Research center</td>
<td>Animal feed researcher</td>
</tr>
<tr>
<td>Debele Kene’a</td>
<td>EECMY-NGO</td>
<td>Head</td>
</tr>
<tr>
<td>Dr. Hirpha Legese</td>
<td>Wollega University</td>
<td>Dean</td>
</tr>
<tr>
<td>Chemeda Birhanu</td>
<td>Backo Research center</td>
<td>Crop Breeder (teff)</td>
</tr>
<tr>
<td>Adisu Tadese</td>
<td>Backo Research center</td>
<td>Natural resource management</td>
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<tr>
<td>Bikila Akase</td>
<td>Backo Research center</td>
<td>Horticulture</td>
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<td>Refisa Leta</td>
<td>Nekemte Soil Research Centre</td>
<td>Researcher</td>
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<td>Mintesenot Desalegn</td>
<td>Nekemte Soil Research Centre</td>
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<td>Woreda Administration office</td>
<td>Head</td>
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<td>Zenbech Teshome</td>
<td>Women &amp; Youth Affairs Office</td>
<td>Head</td>
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<tr>
<td>Gudina Lemessa</td>
<td>Woreda Water office</td>
<td>Head</td>
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<td>Research on crops</td>
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<tr>
<td>Britta Kowalski</td>
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