Ukama Ustawi (UU)- Annual Project report CGIAR Initiative on Diversification in East and Southern Africa 2024 in Ethiopia

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WP1- Scaling Climate Smart Practices and Sustainably Intensify (CSSI) for maize-based farming systems in Ethiopia

O-1. Compiled database on CSSI practices in Ethiopia

Extensive literature review and expert consultation has been done to identify major CSSI practices in Ethiopia. In addition, there were intensive meetings with members of the initiative to consolidate idea and to agree on what has to be done in the selected project area. A desk review of an existing information reveled that CSA practices in Ethiopia includes practices such as conservation agriculture, agroforestry, integrated watershed management, crop rotation, improved varieties, crop residue management, composting, row planting, physical soil and water conservation (SWC), and agroforestry. A catalogue showing all the practices is already developed and distributed. Out of these, a careful selection of three practices; Maize variety selection, maize- legume relay/inter cropping, and the inclusion of minimum/zero tillage as conservation agriculture (CA) practices were implemented during 2024 growing season.

O-3. Agroecological and socio-economic analysis reports

In agreement with all members of the initiative, consultancy call was advertised to hire a knowledgeable expert who can characterize the agroecological and socio-economic set up of the project area. Accordingly, term of reference was developed and application was collated, for which a consultancy firm won and did a very good job. Key informant interview, focus group discussion (both with farmers and experts), field observation, analysis of biophysical data, and supplementation of information with secondary data in consultation with Zonal and district level experts was the methodology deployed to produce the report. In addition, there was frequent meeting with the consultant and finally a document/report having about 100 pages was produced. The report clearly identified that the farming system in the area is crop-livestock mixed farming dominated by maize farming. The major practices in the system, that came out in the due course included minimum tillage, crop rotation, intercropping, solar pump based small scale irrigation, and area exclosure - where by extremely degraded land are protected from farming and free animal grazing.

O-4. Stakeholder-validated list of prioritized technologies for CSSI

A stakeholder validation workshop was organized in Hawassa at Haile resort on March 28, 2024. On this workshop, different stakeholders who have stake on the matter were invited to share their experience and shade light on how to select technologies and practices that are already validated. The major stakeholders invited includes experts from regional and zonal agriculture offices, Hawassa University, Sidama Agricultural Research Institute (SIRARI), FARM Africa, FH-Ethiopia, Terepheza Development Association (TDA), and many more that have interest in the area and are invited by all members of the initiative. In the meantime, members of the initiative have got a chance to know these partners very well and understand their capacity for collaboration. Findings of the agroecological and socio-economic assessment report were presented by the consultant for further clarity and all the members of the initiative have also presented their plan and proven technologies they identified through literature review, from their previous work in different regions of the country, and technologies that work best in similar agroecology from

abroad. CIMMYT also presented feasible technologies and areas where the institution can deliver the best under the umbrella of UU initiative. Following the intensive full day workshop, participants spent one additional day visiting fields on March 29 in Bilate and Hawassa Zuria district to see the opportunities and challenges existing in Hawassa basin and to select potential candidate kebeles for intervention.

Figure 1. Participants discussing in groups to identify and prioritize technologies that best fit the system during the Hawassa meeting (left) and a field visit for preliminary assessment of the area by the participants (right).

O-5. Opportunities, report on partners and entry points for CSSI practices

Following the validation workshop, we identified SIRARI as our potential partner to collaborate with in Hawassa basin and started a process of sub-grant agreement. While the sub-grant was under process, we started to work closely together to identify potential kebeles and feasible technologies for implementation. For comparison, we decided to identify two districts in relatively moisture available and moisture stress areas. Accordingly, Bilate Zureia (moisture deficit area) and Hawassa Zuria (a relatively moisture available) districts were identified in the Hawassa basin. To directly link with what CIMMYT has been previously doing, Toke Kutaye district from West Showa Zone of Oromia region was purposively included in this activity. In this district, CIMMYT has already stablished long term trials station at Abebech Gobena Agricultural Research site, in collaboration with Ambo University, Guder Mamo Mezemir campus. One of the activities include legume-cereal rotation, in which relatively new legumes were introduced in the system to promote legume nitrogen fixation and improve soil condition in the area. Out of the different legumes introduced previously, haricot bean (common bean) performed very good, and farmers were asking for demonstration trials on their field. Grabbing this as an opportunity, we decided to stretch our activities with the university and selected some farmers in the district and established baby trials for further scaling of this promising technology out of the station, that served as a mother trial.

After selection of the sites, we proceeded to selection of technologies and protocol development with researchers from SIRARI. As a result, three technologies: i.e maize-legume inter/relay cropping, CA, and maize varietal selection were identified to be implemented in Hawassa basin. While different legumes were inter/relay cropped with maize variety that is suitable for such a practice, seven different maize

varieties were planted as mother and baby trials in both districts. All these demonstrations (both the mother and baby trials) were implemented under CA practices.

O-6. Trained extension agents and farmers equipped with tools for effective adoption of CSSI practices

In consultation with the regional and woreda bureau of agriculture, potential host farmers were selected for implementation. Before implementation of selected technologies, host farmers were called at their respective district center for training of what the technologies are, their benefit after effective implementation, and how farmers can implement them. The training also included farmers, Development Agents (DAs), and Subject Mater Specialists (SMS) from the region and each of the selected districts. While implementing, trainers were purposively combined with translators who can understand local language for ease of communication between farmers and experts. The number of participants were 56 in both Bilate and Hawassa Zuria districts, while they were 71 in Toke Kutaye. This brought the number of total participants to 183, of which 20.77% of the participants were female (Table 1).

Table 1. Number of trainees disaggregated by Woreda and sex

Participants	**Bilate Zuria Woreda**			**Hawassa Zuria Woreda**			**Toke Kutaye Woreda**		
	M	**F**	**Total**	**M**	**F**	**Total**	**M**	**F**	**Total**
Farmers	26	10	36	20	16	36	49	6	55
Development agents	5	1	6	4	2	6	2	2	4
Offices of agriculture	2	0	2	2	0	2	2	0	2
Regional bureau of agriculture	2	0	2	2	0	2	1	1	2
Hawassa University	1	0	1	1	0	1	-	-	-
Ambo University	-	-	-	-	-	-	3	1	4
CIMMYT	1	0	1	1	0	1	1	0	1
Research center	7	0	7	7	0	7	3	0	3
Sub total			56			56			71
Over all total									**183**

Figure 2. Farmers training session organized in different locations before planting. Farmers were keen to know about the technologies and the experts giving the training were also answering their questions.

O-7. Functioning mother and baby demonstration plots showcasing cases for successful adoption

While identifying farmers and giving them a training, we were also developing protocols to establish mother and baby trials for demonstration. As indicated in the above section, three technologies were identified to be implemented, out of which CA (minimum/zero tillage) was superimposed on maize variety selection and maize-legume intercropping practices. The extent of maize production in the cropping system and the level of moisture limitation in the area were criteria for selection of districts. Accordingly, the two districts, named Bilate and Hawassa zuria, were selected in Hawassa basin. In Bilate zuria, the selected kebeles include Shamanagodo, Yirbagangeso and Gonowabulano; and in Hawassa zuria districts, Udowotate, Samaejersa and Galobadiye were the selected kebeles to establish the demonstration sites. Thus, two districts and six kebeles were identified for the activities in Hawassa basin.

After successful identification of the sites, host farmers were selected in collaboration with kebele offices of agriculture and development agents. The criteria used for farmers selection were their willingness to host the trials, availability of mulching materials and untilled land, and their previous record of field manage in comparison with other farmers in the area. Ultimately, 36 farmers were selected to host the variety trials and another 36 farmers were selected to host the intercropping trials, bringing the total

number of farmers willing to host the trials to 72 in both districts during the 2024 growing season in Hawassa basin. The maize varietal selection under CA covered seven different maize varieties released in the country, collected from research centers and seed companies. These includes BH-546, BH-547, Melkassa 2, Gibe-2, Limu, Shone, and Damot. Out of these seven, BH-546 was selected as a variety to be used for intercropping of the different legume varieties. Three legumes – common bean, pigeon pea, and soya bean were selected to be planted as sole and inter cropped with maize. In addition, we also tried common bean as relay cropping that gave us a total of eight different treatments. Though the harvesting from maize legume inter/relay cropping are not yet finalized, the maize varietal selection is harvested from all the sites and the result from participatory selection and expert comparison of the yield is included in this report.

A disaggregated look at the maize variety selection showed that the highest yield was harvested from Limu variety at Udowatate site (Hwassa Zuria district), but the lowest yield was harvested from Gibe-2 variety at Gonowabulano site (Bilate Zuria district). While all the varieties have shown contrasting performance at Gonowabulano and Udowatate sites, Damot, Shone and Limu have shown the best overall performance in that order of importance in the other study sites and aggregated at both districts (Figure 3 & 4). Experts from Sidama Agricultural Research, host farmers and invited farmers from the nearby areas also undertaken participatory evaluation of the varieties twice- mid season performance evaluation and end season evaluation, just before harvest.

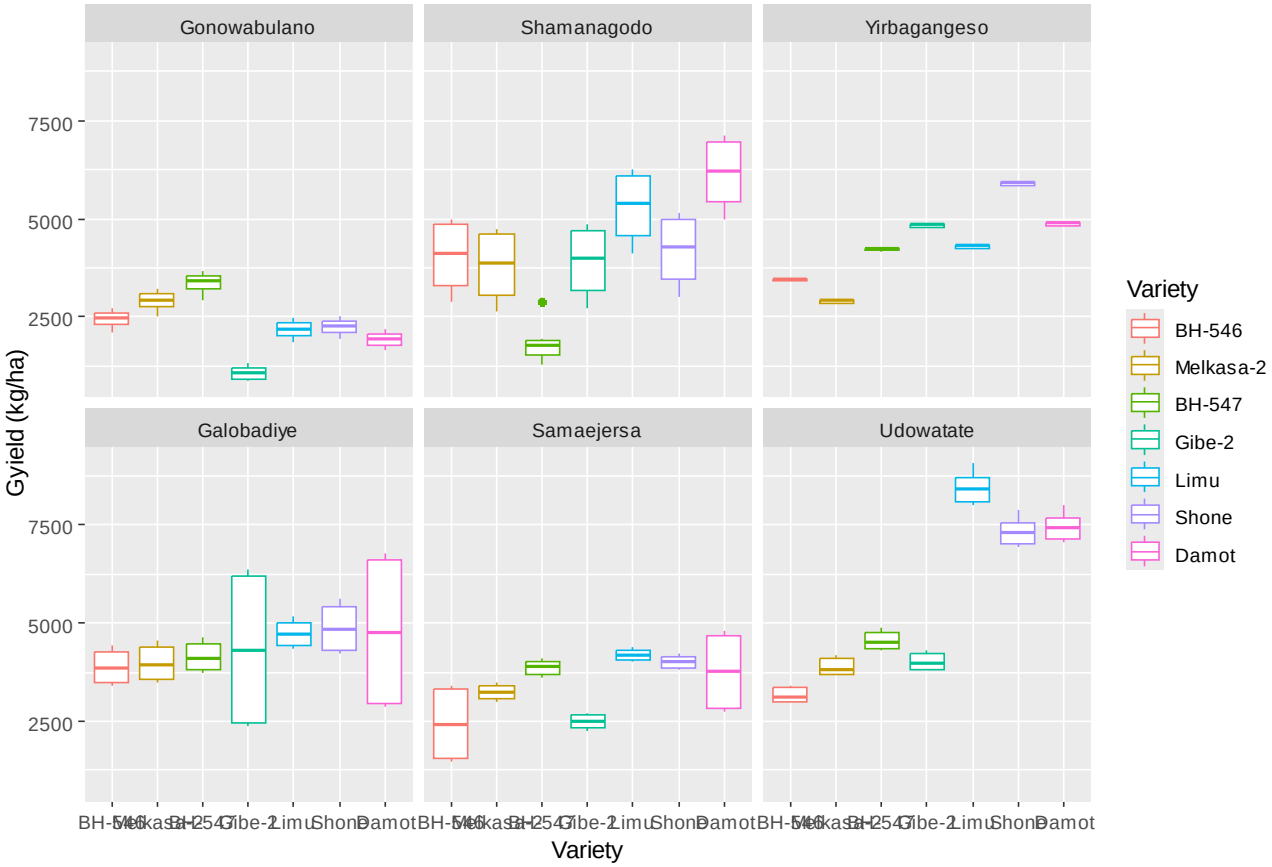

Figure 3. Performance of different maize varieties in the study sites. Bilate Zuria district (upper panel) and Hawassa Zuria district (lower panel).

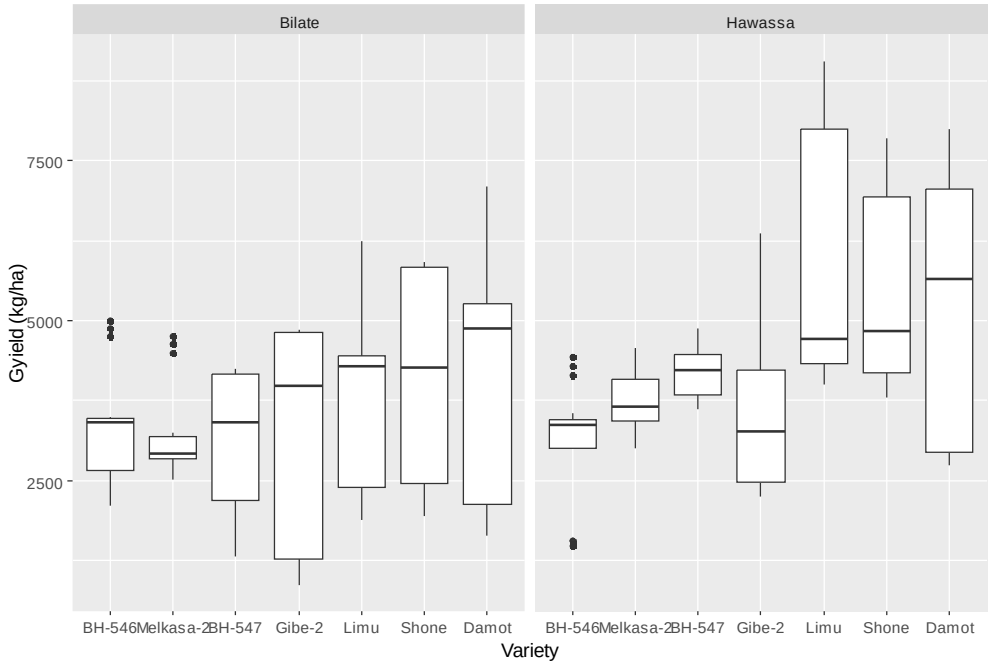

Figure 4. District level aggregate performance of the different maize varieties

In addition to the activities in Hawaassa basin, there were promising result from maize/cereal-legume rotational cropping activities we have been doing in collaboration with Abmo University, Abebech Gobena Agricultural Research Center, in Toke Kutaye district of Oromia region. Out of the different legumes introduced, common bean has shown a very promising result in the first year and considered under this project for scaling practice. While the station served as the mother site, we stablished baby trials in different Kebeles of the district. In the meantime, different varieties were also collected to identify the most suitable variety out of the different common bean varieties released in the country from research centers.

As a result, 55 farmers were selected from three Kebeles, namely Abba Gada, Birbirsa &Dogoma, and Imala Dawe Ajoo kebeles to host the baby trials. Farmers were given a free chance to select a maximum of three varieties out of the eight varieties we collected and provided to host them. This is an effort to somehow introduce randomness in our approach. Then farmers were given training on how to inoculate the common bean varieties and plant them as an important rotational crop that can improve their land through nitrogen fixation and improve their dietary diversity by providing quality protein. At the same time, all the varieties were planted at Abebech Gobena site, replicated three times as mother trial. They are all harvested and the results are included in this report.

A closer look at the performance of the different varieties shows that, Seri 119 lead the performance by giving an average yield of 3.24 t/ha followed by Seri 125 in overall performance, though there is slight difference between the three kebeles (Figure 5). We also compared the performance between the mother and baby trials managed by the researchers and the farmers. Except ‘Tafach’ variety that have shown a relatively higher yield at farmers field, all the varieties performed best under the management of the

researchers. However, the varieties have shown more or less similar trend in overall performance both at station and in the farmers' field, with Seri 119 leading in performance followed by Seri 125 (Figure 6).

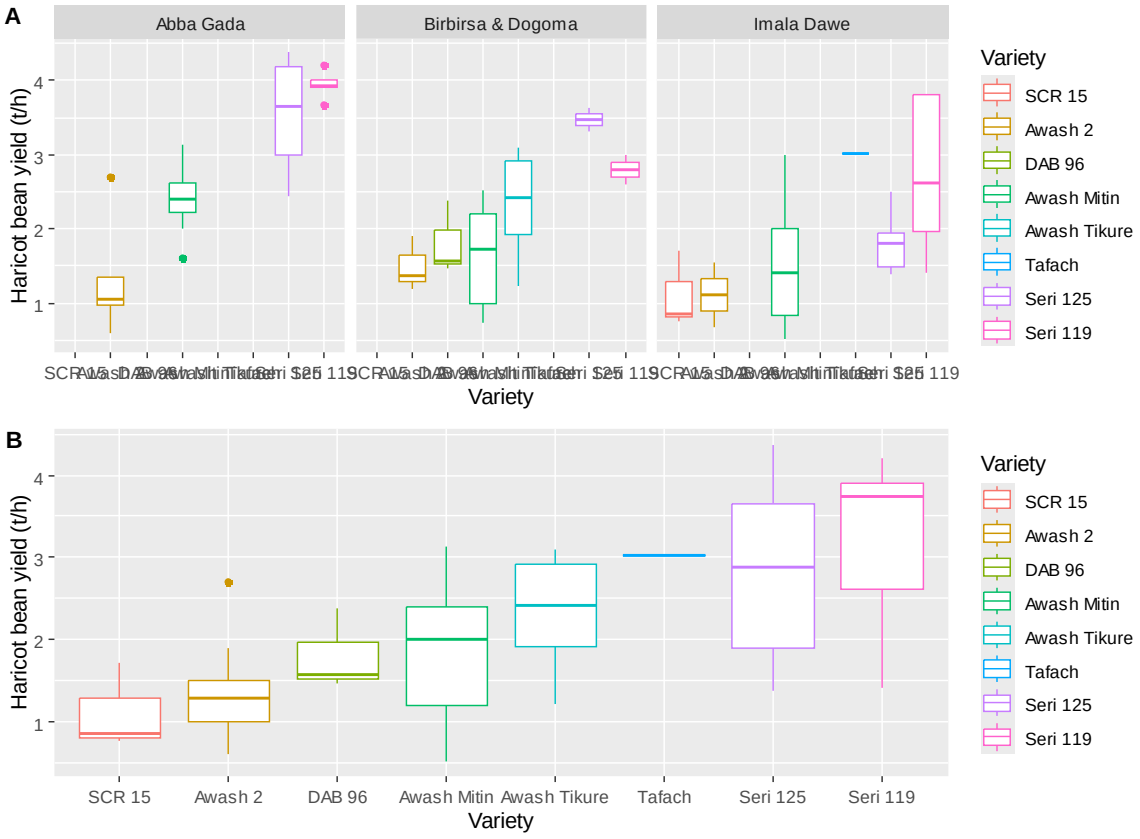

Figure 5. Performance evaluation of different haricot bean varieties in Toke Kutaye district. Kebele level performance (upper panel- A) and overall varietal performance (lower panel- B)

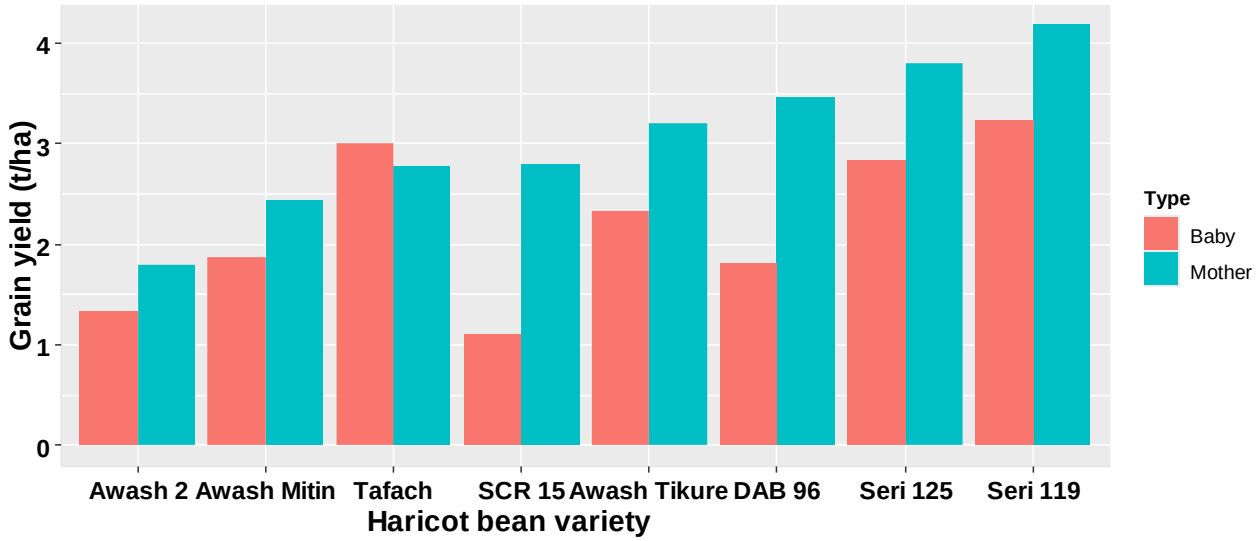

Figure 6. Comparison of the haricot bean varietal performance at farmers' field and at Abebech Gobena research station.

O-8. Awareness and understanding of CSSI practices for key stakeholders, that can serve as a platform for sustainable knowledge sharing and collaboration among key partners

This is mainly a scaling project and knowledge sharing and coevaluation are very much important. As a result, different field days and exchange visits were organized to evaluate the implemented activities, share experience, and to facilitate pear learning (mainly farmer to farmer). The first field day was organized to evaluate crop performance at their vegetative stage (mid-season). On this field visit, hosting farmers were sharing their experience to the non-hosting farmers and the vast majority of the participants were non-hosting farmers including women and youth. This was deliberate to extend the knowledge and practices the hosting farmers have got to the non-hosting farmers. This was done between July 11 to 12, one day at Bilate Zuria and the next day at Hawassa Zuria districts. The field day involved 112 participants, out of which 26 were female. Since CIMMYT has stablished similar practice in adjacent region, we also invited 120 participants (50 farmers- from Sidama region, 30 farmers – from Wolita Zone, and 40 Distreict level SMS, DAs, experts from SIRARI, TDA, and CIMMYT) on Augst 29, 2024 to share experience from our previously implemented SCASI (Scaling Conservation Agriculture based Sustainable Intensification) project in Wolita Zone, Central Ethiopia region.

At crop maturity, field day was organized in the two districts of Sidama region and Toke Kutaye district of Oromia region. The event in Sidama region was organized on 2nd October in Bilate district and on 3rd October in Hawassa Zuria district, involving total participant of 136 farmers and experts, out of which 35 were female. In addition to the knowledge sharing, farmers and experts were evaluating the performance of all the crops on the field. Crops under conservation agriculture have shown outstanding performance both during the mid-season and final evaluation of farmers and experts. When variety evaluation was summed up, the farmers in Bilate district have chosen Damot, Limu, Shone, Gibe and BH-547; but those at Hawassa district preferred Limu, Damot, Shone and BH-547 in that order of preference.

The field day in Toke Kutay district also involved farmers, university staff, and researchers from Bako, Holeta, Debre Zeit, and Ambo agricultural research centers; convening 300 participants, out of which 55 were female. Participants visited haricot bean mother plots at Abebech Gobena research station and the baby trials managed by farmers at different location in the district.

All these organized field days have got media attention; either by regional TV and radio stations or by national television. For example, the mid-season field visit have got coverage by Sidama Media Network (SMN) on Friday night July 12, 2024 in Sidamu Afo language and Saturday night at 9:00 PM in Amahric language. Exchange visit to Wolita - on August 30, 2024, have got SMN news coverage in the Sidamu Afo language, airing a segment that lasted 4 minutes and 40 seconds (between 18:40 and 23:20), three times throughout the day (here is the YouTube link). Wolita TV and Fana FM from Shashamane also covered the exchange visit to Wollita, SCASI project area. The final season field visit to Sidama region have got separate coverage for the two districts. Bilate Zuria district was broadcasted on October 02, 2024 three times a day and a separate news event was set on October 04, 2024 for Hawassa Zuria district (here is the link to YouTube). Fana FM 103.4 from Shashamane also broadcasted both field days in Sidama region. There was similar coverage from Oromia Broadcasting Network (OBN), Fana TV, the National television, and Ambo University Facebook page for the field visit organized in Toke Kutay district.

During the general discussion and reflection season, farmers from Sidama region raised one important question; i.e they need training on how to prepare food and feed out of the newly introduced legume crops. We introduced new legume crops (mainly soybean and pigeon pea) to break the maize monocropping in the area. But farmers don't know what to do with it. Following this, resources were mobilized to organize unplanned, but very important exchange visit to Humbo area of Wolita Zone, an area where female farmers are organized and involved in food and feed processing business from crops like cassava, pigeon pea, soybean and other crops that exist in the area. This exchange visit was exceptionally dominated by female farmers, because they are the one mainly involved in this activity. However, male DAs and experts at different level were also included. The total participants involved in the exchange visit were 63, out of which 32 were female. As usual this event has got media coverage by SMN TV. This time, Sidama regional TV has got very good interest and broadcasted a five-minute News and 21 minute documentary, for three consecutive days, between 10 to 12 November, 2024. If it was not the willingness of the institution to support this activity, buying this amount of air time is too expensive and we cannot afford to pay the broadcast institution, and for which they deserve special thanks. All the programs can be accessed from each of the institutions, but for the message they posted freely online, and for those that they posted in different media outlets, links are already attached.

In summary, CIMMYT-Ethiopia reached out 1065 direct beneficiaries, of which about 22.8% are female. This number includes farmers who hosted and established mother and baby trials on their field (127 in number), out of which the percentage of female host farmers was 25.2 percentage. This percentage increased to 50.8%, when comparing female farmers getting involved in experience sharing for food and feed processing from the new introduced crops. Though situations were not allowing us to get maximum number, we have tried our level best to include female farmers in our training, farmers' field day and experience sharing visits. We also estimated, on a very conservative bases, that from all our effort to broadcast the planned activities through regional and national TV, radio stations, and institutional media outlets, we have reached to minimum of 100,000 farming beneficiaries indirectly. If only ten percent of these farmers implemented the technologies, then 10,000 farmers could be our indirect beneficiaries (table 2).

Table 2. Number of direct and indirect beneficiaries, reached out through training, hosting trials, farmers field days, experience sharing and media outlets by region and by sex

Participants	Sidama region			Toke Kutaye			Total	
	M	F	Total	M	F	Total	M	F
Host farmers	46	26	72	49	6	55	95	32
Field visit (Mid-season)	86	32	118	-	-	-	86	32
Exchange visit (Farm level)	120	18	138	-	-	-	120	18
Field visit (Final- end of season)	101	35	136	245	55	300	346	90
Exchange visit (Food & feed processing)	31	32	63	-	-	-	31	32
Training	83	29	112	61	10	71	144	39
Sub total			639			426	822	243
Total direct beneficiaries							**1065**	
Conservative estimation of Indirect beneficiaries							**10,000**	
Over all total beneficiaries							**11,065**	

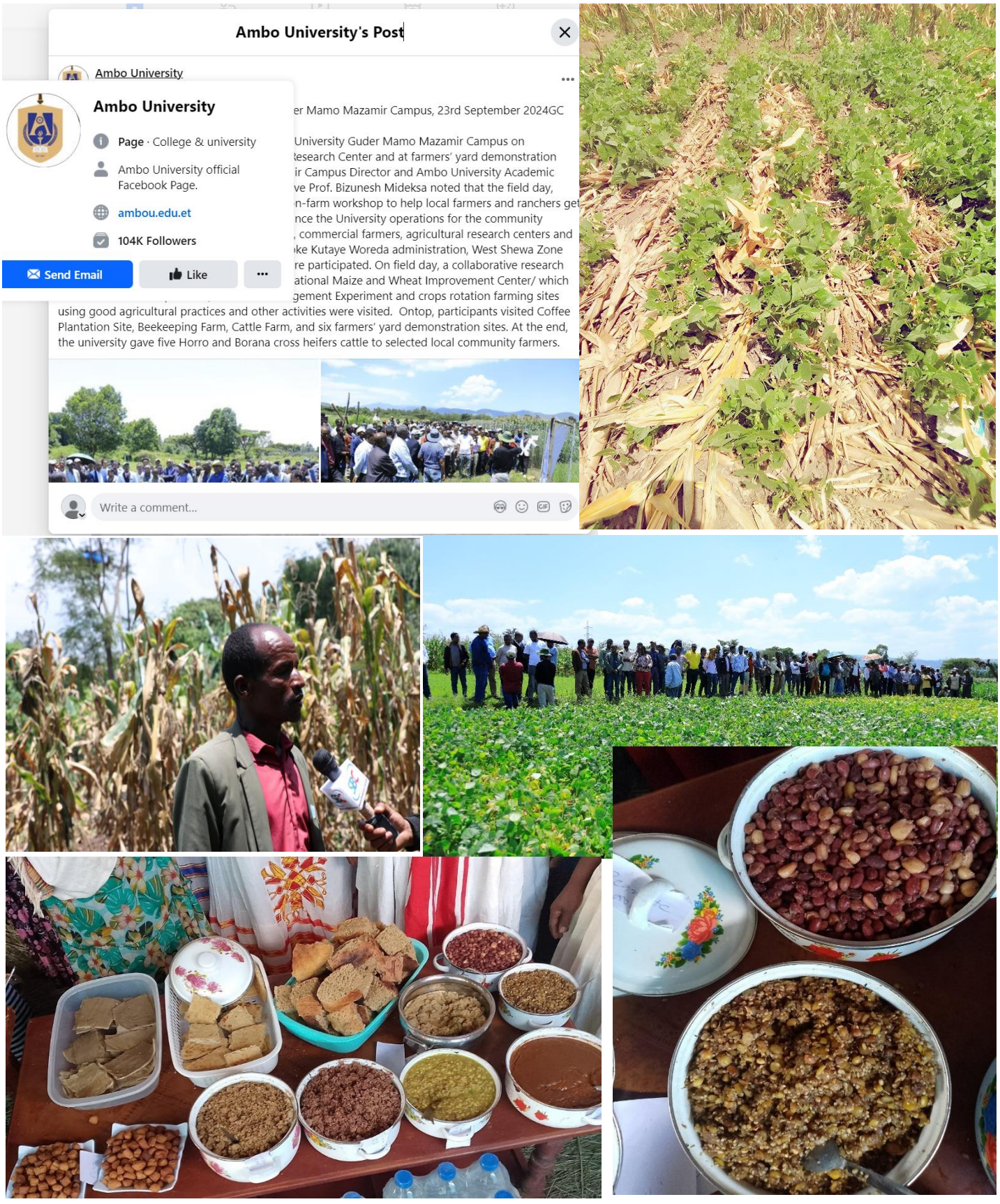

Figure 7. Pictures from the different field/exchange visits and some estimation of indirect beneficiaries

Challenges and lessons learned

- This year was drought season and it magnified the problems smallholder farmers are facing and the importance of CA to solve such problems. Our trials performed well compared to the maize farms managed by other farmers under conventional practice;
- Drought affected maize yield to the level it resulted in total crop loss in some areas;
- Introduction of new practices can immediately result in new demand; e.g quest by farmers to get skills of processing soya and pigeon pea for food and feed. This situation forced us to look for an unplanned budget and to take farmers to another region, where they can share knowledge and experience from;
- Yield performance of common bean at farmers' field (3.24 t/ha) and research station (4.18 t/ha) was so amazing in Toke Kutaye district, which is way above the national average of the crop (0.8 t/ha). This can be a momentum for further scaling, as it can increases organic (farmer to farmer) scaling;
- Management of common bean on vertisol is problematic because of water longing. The crop performs well when there is enough drainage, but will die when the rain becomes intensive;
- Some farmers are very fast in adapting to changes. Eg. farmers from Sidama region tried to bring beehives closer to pigeon pea fields, expecting that the crop will flower in dry season, when there is no flower from other plants in the area.

A photo showing farmers bringing their beehive closer to their pigeon pea farm in Sidam region, expecting the plant will give flower during drought season that can serve as bee forage.