Oromia Agricultural Research Institute (IQQO)
Bedele Agricultural Research Canter (BeARC)

Annual Research Report of 2015 EFY

June, 2015 E.C

BeARC, Bedele, Oromia

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1. Introduction

Bedele Agricultural Research Center is one of the researches Center under Oromia Agricultural Research Institute (IQQO). The Bedele Soil Testing Laboratory Center was established in 1992 E.C. with funding from the World Bank's Fertilizer Sector Project. From 1993 to 1996 E.C., this Center was accountable to the Oromia Bureau of Agriculture and Rural Development (OBAD) and had the following objectives: providing farmers with soil, plant, and water analysis services; determining the soil fertility status and mapping; recommending fertilizer based on soil test results for major crops; and validating soil test fertilizer through demonstrations at farmers' fields. From 1996 to 1999 E.C., it underwent restructuring and was registered as Bedele Soil Research Center within Oromia Agricultural Research Institute (IQQO) with similar goals. After three (3) years, it was once more reorganized and until 2003 E.C. it was known as the Bedele Soil Testing Laboratory Center and reported to the Oromia Bureau of Agriculture and Rural Development (OBAD). It was then reorganized and given the new name Bedele Soil Research Center (BSRC) after operating as Bedele Soil Testing Center from 2004 to 2011 for seven years by offering farmers soil analysis services, assessing the soil fertility status and mapping, advising fertilizer based on the results of soil tests, and validating soil test fertilizer recommendations for major crops through demonstrations at farmers' fields.

Since 2012 E.C., Bedele Soil Research Center has been upgraded to Bedele Agricultural Research Center (BeARC), which has a different research process and teams to deliver sound entire agricultural technologies by adopting, creating, multiplying, and disseminating to end users. Many study recommendations and baseline information’s have already been created and distributed to our farmers, including those for crops, crop protection, livestock, coffee and tea, natural resources, agricultural economics and extension services, and technological advancements.

BeARC is currently working full-time on research projects related to crops, crop protection, livestock, coffee and tea, natural resources, socio-economics and agricultural extension, and technology multiplications research process. With funding from IQQO and Non-IQQO budget sources, the Center conducting a different of research projects and regular operations during this fiscal plan year. The Center directs seven (7) research processes that are composed of eighteen (18) research teams and three (3) supporting teams and provide the basis for these operations. The Center planned and carried out a total of 60 research activities

at various farmers' and research sub sites. About 52 of the research activities were funded by IQQO, while 8 were funded by partnerships (projects). Many promising crop technologies was multiplied and maintained at different research sub sites. Under the irrigated wheat project, the Center multiplies a basic seed of bread wheat on farmer fields on 10 ha's.

Research Activities have been carried out on 65 ha in various farmers' fields as part of demonstration and scale-ups of improved technologies and knowledge sharing. The field day was held at the zonal level with many stakeholders, and experiences were openly discussed and exchanged. The Center released 19 research technologies funded by IQQO and other projects. This year, 61 regular personnel with various levels of education and employment participated in carrying out the planned research and regular activities. There were 13 women and 48 males. About 25 of these workers were researchers with various professionals. This report contains information on the accomplishments of research trials, technology multiplication and center development operations, various trainings, human resource development, ethical promotion initiatives, and anti-corruption campaigns. Additionally, the study discusses efforts on cross-cutting concerns, building implementation and research capability, budget utilization, and other additional works. Overall, the report contains the average actions scheduled and completed throughout this fiscal year and covers the performance from July 2014 E.C to June 2015 E.C.

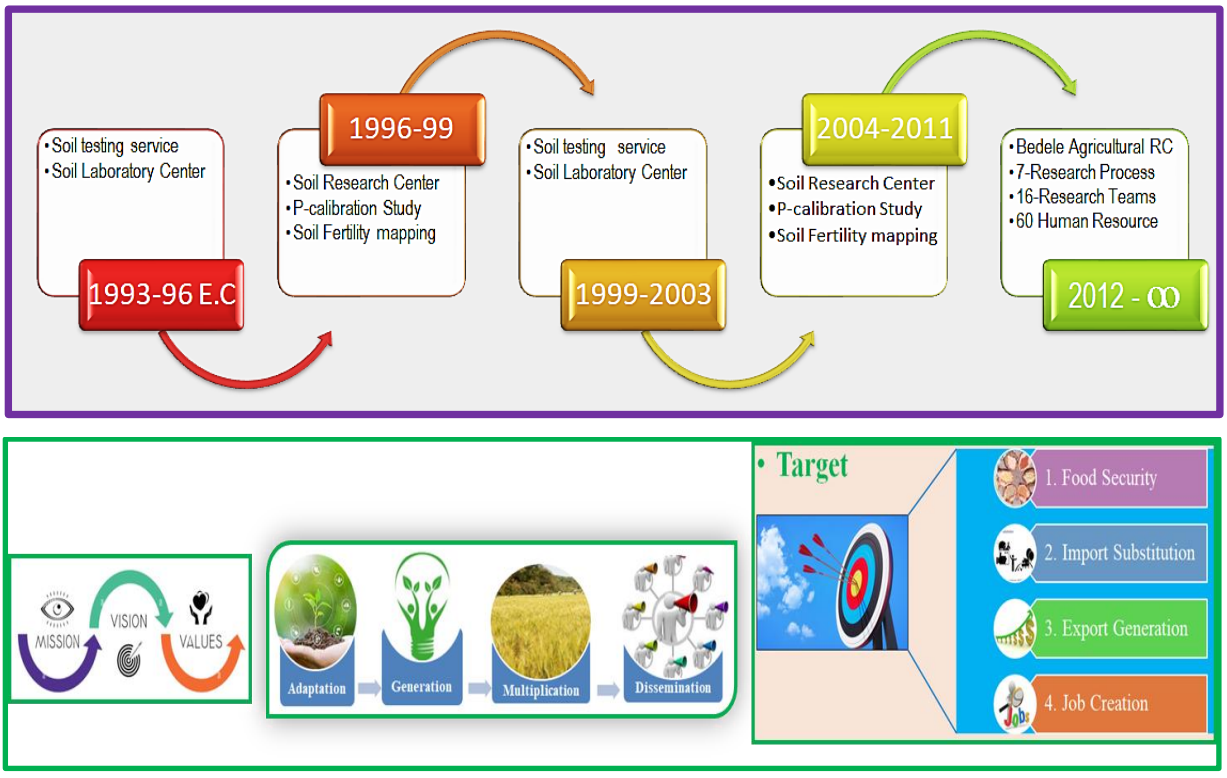

Figure 1. Bedele Agricultural Research Center (BeARC) Establishment

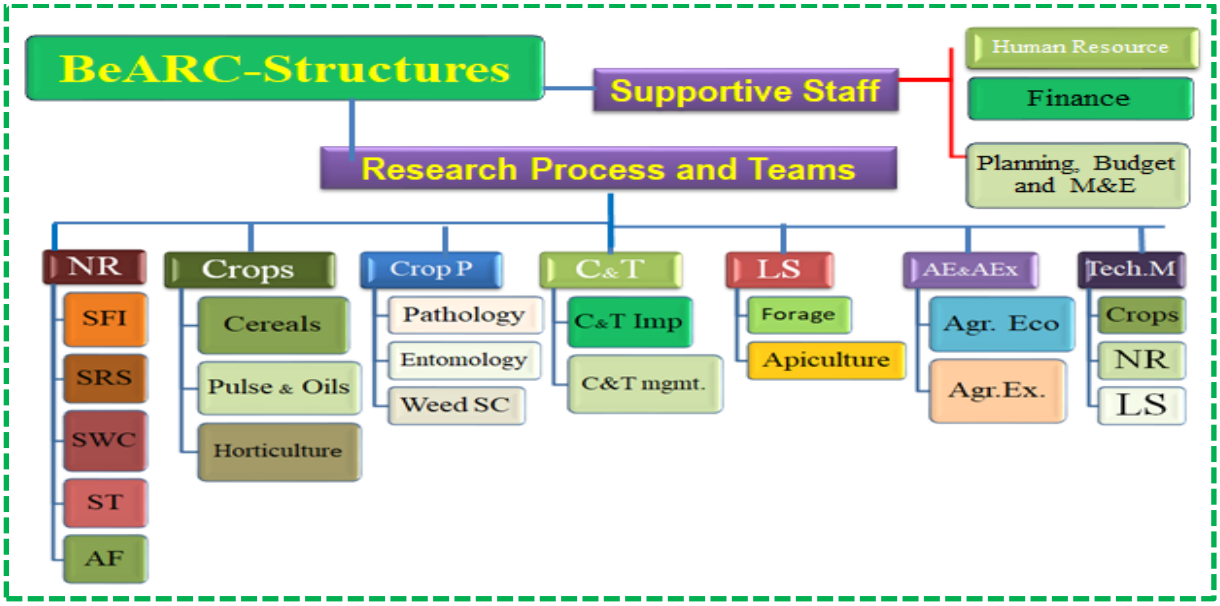

Figure 2. Structures of Bedele Agricultural Research Center (BeARC)

1.1.Vision

The Bedele Agricultural Research Center (BeARC) strives to become a Center of Excellency by improving livelihoods of smallholder farmers' in the mandated areas in a sustainable basis.

1.2.Mission

Utilizing an interdisciplinary and participatory research method, need-based training, and advisory services, to adapt and develop a technical solution that helps farmers' productivity and output rise while also conserving natural resources in an environmentally friendly manner, thereby improving their standard of living.

1.3.Values

- ✓ Creativity and Innovation
- ✓ Research Ethics
- ✓ Professionalism
- ✓ Team spirit
- ✓ Transparency
- ✓ Accountability
- ✓ Responsiveness
- ✓ Integrity and trust
- ✓ Efficiency, effectiveness and flexibility
- ✓ Competitiveness
- ✓ Complementarities
- ✓ Commitment
- ✓ Relevance

1.4. Services we provides

- ✓ Boosting agricultural technologies through adopting, generating, multiplying, and disseminating
- ✓ Deliver training and advice based on the needs of various stakeholders.
- ✓ Providing farmers and other stakeholders with soil testing services.
- ✓ Developing agricultural research guides lines, brochures, short reports and materials

2. Annual Research Performance of the Canter

2.1. Leadership Activities and Roles

During the action of the plan year 2015 E.C, the center intended to hold 19 management committee meetings to review how planned activities were carried out, providing assistance, and guide the team members toward the goals of the center and institute. It was really possible to have ten of the twelve management meetings that were planned, and because decisions were made to remedy any flaws, they were successful in achieving their goals. One of the issues was that the workers and various teams did not review the work plans on a regular basis because of the work loads. The center's management committee intervened, and this was satisfactorily resolved as a result. For instance, the delayed service delivery was rectified, and careful work was done to guarantee that the service operation complies with the primary requirements.

The leadership played a big part in creating the Anti-Corruption Prevention Council, which convened every three months with the goal of bolstering work and property administration in a variety of sectors where deficiencies are apparent and to conduct rigorous monitoring. The early June review on corruption prevention found that the issues with property use and protection procedures have completely improved. In front of members of the management committee and representatives of several teams, instructions were issued to focus on upcoming working activities. The team also received training on professionalism, work ethics, and set criteria for service delivery. The management of the center evaluated the situation and decided to hold discussions once a month because the nature of our study precludes us from reviewing outcomes on a weekly basis, even if group conversations among the various team members should be held once a week. Each employee has now prepared their own monthly, quarterly, and annual work plans in accordance with the minimal service delivery standard and is familiar with the duties of their roles. Every six months, in addition to planning for the next year's evaluation process, the performance of the staff was evaluated twice.

Our center received roughly 2000 m^2 of land from the Bedele City land administration office this fiscal year for office development and other research purposes. AGP-II also supported the construction of a temporary fence that was around 150 meters long. Research sub-sites covering 55.33 hectares, identified as Dhaye, Ilke, Agalo Eko, Toli cheka, Bido Jiren, and

Sekko, were procured, and the site plan was handed over. These sites are located in the districts of Dabo Hana, Bedele, Mettu, Bure, and Gechi, respectively. However, the woredas have just taken hold over around ten hectares (10 ha) of the Dhaye (Dabo Hanna) research sub site. The continuous performance of all research activities and other operations was accomplished by strong commitments and discussions with all management members, process owners, team leaders and the entire staff regarding preventing work disruptions brought on by a lack of resources like human resource, logistics and shortage of budget allocated.

2.2 Implementation of Planned Works in 2015 EFY

The Center planned and carried out a total of 60 research activities at various farmers' and research sites. About 52 of the research activities were funded by IQQO, while 8 were sponsored by partnerships (projects). The intended research activities were successfully carried out on research sub-sites and farmer's farm sites, and they were evaluated at various levels of research review forums. The Center completed 19 research technologies/information's supported by IQQO, in addition to other projects wherein data analysis, interpretation, and final write-up were still being undertaken. Furthermore, a wide range of experts and farmers with varying levels of expertise have been allowed to have access to many research trainings.

The current government's development agenda expressly calls attention to the requirement for demonstrate or scale up agricultural technologies for smallholder farmers farming communities. As a result, our Research Activities were carried out on 65 hectares in various farmers' fields as part of the demonstration and scaling-up of improved technologies and information exchanges. The field day was held at different levels with many stakeholders, farmers, DA's and subject matter specialists (SMS) and experiences were openly discussed and exchanged. As a result, this report compiles and summarizes the achievements of all experiments, trainings, demonstrations, and scaling-up that the Center and its members of staff carried out throughout this fiscal year, as well as information on how much budget was utilized and what advisory services were provided.

Table 1.Summarizes the plan and accomplishment of the IQQO funded Research Activities for 2015 EFY (KIB)

S/N	Research Team	Annual Plan (KIB)	Annual Plan	Annual Implemented	Percentage of (P/I)	Percentage as (KIP)	Remarks
1	Cereals Crops	**4**	**5**	**5**	**100**	**125**	Achieved more than planned
2	Pulse and oil Crops	**2**	**7**	**7**	**100**	**350**	Achieved more than planned
3	Horticultural Crops	**3**	**4**	**4**	**100**	**133**	Achieved more than planned
4	Crop Protection	**5**	**5**	**5**	**100**	**100**	Achieved as planned
5	Coffee and Tea improvement	**2**	**3**	**3**	**100**	**150**	Achieved more than planned
6	Coffee & Tea mgmt. & protection	**2**	**5**	**5**	**100**	**250**	Achieved more than planned
7	Animal Feed & range land mgmt.	**3**	**5**	**5**	**100**	**166**	Achieved more than planned
8	Apiculture	**2**	**2**	**2**	**100**	**100**	Achieved as planned
9	Soil Fertility Improvement	**3**	**3**	**3**	**100**	**100**	Achieved as planned
10	Soil Resource Survey	**2**	**4**	**4**	**100**	**200**	Achieved more than planned
11	Agroforestry	**2**	**3**	**3**	**100**	**100**	Achieved as planned
12	Socio Economics	**2**	**2**	**2**	**100**	**100**	Achieved as planned
13	Agricultural Extension	**4**	**5**	**4**	**80**	**100**	Achieved as planned
Total		**36**	**53**	**52**	**98**	**136**	Achieved more than planned

Agricultural Extension research team underperformed for the following reasons:

1. Due to a lack of seed (Bread Wheat Liban variety) from the Bako ARC, the planned activity was not conducted.

Table 2.Summarizes the plan and accomplishment of the Non-IQQO funded Research Activities for 2015 EFY (KIB)

S/N	Research Team	Source of Budget	Annual Plan (KIB	Annual Plan	Annual Implemented	% (P/I)	% (KIP)
1	Soil Fertility Improvement	CALMP4R	6	6	6	100	100
		GIZ-ISFM	2	2	2	100	100
Total			**8**	**8**	**8**	**100**	**100**

Table 3.Summary of Planned & achievement of technology/information generated in 2015 EFY (IQQO-Budgeted)

S/N	Maqaa garee	Plan KIB	Planned	Achievement	Achieve %n
1	Cereals Crops	2	4	4	100
2	Pulse and oil Crops	2	2	2	100
3	Horticultural Crops	1	1	1	100
4	Crop Pathology	1	2	2	100
5	Weed science	1	1	1	100
6	Animal Feed	2	2	2	100
7	Soil Fertility Improvement	2	2	2	100
8	Soil Resource Survey	1	1	1	100
9	Apiculture	1	1	1	100
10	Agricultural Extension	3	3	3	100
Total		**18**	**19**	**19**	**100**

3. A Short Summary of Completed Research Activities by Research Teams in the 2015 EFY

3.1 Cereal Crops Research Team

3.1.1 Adaptation Trial of Improved Finger millet Varieties

Brief summary of the results

An experiment was conducted in Bedele, D/Hana and Gechi districts of Buno Bedele zone on different farmer's field for two consecutive years in 2021-2022 cropping season in order to identify and recommend better adapted improved finger millet variety/s. accordingly, nine (9) finger millet varieties including local check were used as experimental materials. All important data were collected and analyzed using Genstat 18th edition software. Combined analysis of data revealed that, varieties varied significantly at ($P \leq 0.05$) for days to flowering, days to maturity, plant height, finger length, number of fingers per plant and grain yield (Table 3). Boneya and Gute were the two varieties showed relatively better yield with a value of 34.39qt/ha and 33.44qt/ha respectively. Therefore, Boneya and Gute were the two varieties showed better performance with their mean yield and other measured traits. Therefore, these two varieties are recommended to be demonstrated on farmer's field for further scaling up.

Table 4.Combined mean grain yield (qt/ha) of Finger millet varieties tested at Bedele, D/Hana and Gechi districts for two years (2021/22-2022/23)

S/N	Varieties	Bedele			Gechi	D/Hana			Over all combined
		1st yr.	2nd yr.	Combined	1st yr.	1st yr.	2nd yr.	Combined	
1	Addis 01	28.08^{bc}	36.14^{abc}	30.77^{ab}	18.06^{abc}	32.17^{abc}	21.00^{c}	23.17^{c}	25.99^{c}
2	Bareda	23.33^{c}	34.28^{abc}	26.98^{b}	10.94^{d}	26.50^{bc}	35.64^{ab}	27.14^{bc}	24.58^{c}
3	Boneya	44.08^{a}	27.81^{c}	38.66^{a}	22.72^{a}	39.58^{a}	41.78^{a}	38.76^{a}	34.39^{a}
4	Gudetu	37.11^{abc}	37.83^{abc}	37.35^{ab}	21.39^{ab}	30.86^{abc}	28.25^{abc}	27.36^{bc}	28.93^{abc}
5	Gute	32.50^{abc}	43.33^{a}	36.11^{ab}	17.00^{bc}	37.92^{a}	37.03^{ab}	33.84^{ab}	33.44^{ab}

6	Kumsa	34.72^{abc}	31.39^{bc}	33.61^{ab}	17.61^{abc}	25.42^{c}	28.42^{abc}	27.42^{bc}	25.58^{c}
7	Urji	31.92^{abc}	35.33^{abc}	33.06^{ab}	14.22^{cd}	35.78^{ab}	27.31^{bc}	31.03^{abc}	29.25^{abc}
8	Wama	39.08^{ab}	41.50^{ab}	39.89^{a}	17.11^{bc}	35.89^{ab}	33.17^{abc}	34.02^{ab}	33.00^{ab}
9	Local	31.14^{abc}	34.39^{abc}	32.22^{ab}	15.78^{cd}	30.00^{abc}	29.33^{abc}	27.31^{bc}	26.78^{bc}
GM		33.55	35.78	34.29	17.20	32.68	31.32	30.01	29.10
LSD (0.05)		14.40	11.40	10.45	5.21	10.09	13.82	9.51	6.78
CV%		29.90	18.40	32.40	17.50	26.50	25.50	33.7	35.40
P-value		*	*	*	**	*	*	*	**

GM= grand mean, LSD=least significant difference, CV= coefficient of variation, *= significant, ** = highly significant.

3.1.2 Bread Wheat Preliminary Yield Trial (BWPYT) at Bedele

Brief summary of Results

This activity was conducted in 2022 cropping season in simple lattice design at Bedele (Ilke Qararoo on station). Thirty six (36) different bread wheat genotypes which were promoted from Preliminary observation nursery of 2021 and two standard checks (Liben and Ogolcho) were tested and the important data were collected and analyzed by using Genstat statistical software. The analysis of variance result revealed that, there is a significance difference between genotypes for important parameters determining the performances of genotypes except for grain yield. The most important characters considered in the analysis of the genotypes performance were, heading date, Maturity date, plant height, spike length, grain yield and also most economic disease for the reaction of genotypes (Table 1). Among all genotypes tested **twelve (12)** genotypes were better performed than the checks and promoted to the next breeding stage (RVT).

3.1.3 Food Barley Preliminary Yield Trial (FBPYT) at Bedele

Brief summary of Results

The experiment was conducted in 2022 cropping season in simple lattice design at Bedele (Ilke Qararoo on station). Twenty five (25) different food barley genotypes which were promoted from Preliminary observation nursery of 2021 and two standard checks (Adoshe and HB1307) were tested and the important data were collected and analyzed by using Genstat statistical software. The analysis of variance result revealed that, there is a significance difference between genotypes for important parameters determining the performances of genotypes. The most important characters considered in the analysis of the genotypes performance were, heading date, Maturity date, plant height, spike length, grain yield and also most economic disease for the reaction of genotypes (Table 1). Among all

genotypes tested **Eleven (11)** genotypes were better performed than the checks and promoted to the next breeding stage (RVT).

3.1.4 Tef Preliminary Observation Nursery (TON) at Bedele

Brief summary of Results

This experiment was conducted in 2022 cropping season in augmented design at Bedele (Ilke Qararoo on station). One hundred ten (110) different tef genotypes which were brought from Debrezeyit Agricultural Research Center (56 genotypes) and Ethiopian Biodiversity Institute (54 genotypes) and three standard checks (Dursi, Dukem and Guduru) were tested and the important data were collected and analyzed by using RStudio statistical software. The analysis of variance result revealed that, there is a significance difference between genotypes for important parameters determining the performances of genotypes. The most important characters considered in the analysis of the genotypes performance were, heading date, Maturity date, plant height, and panicle length and grain yield of genotypes (Table 1&2). Since the class of the genotypes are brown/red seeded and white seeded in color, we had categorized in two sets as set (white seeded) and set two (brown/red seeded) for the coming PYT stage. Among all genotypes tested **twenty three (23)** genotypes were better performed than the checks and promoted to the next breeding stage (PYT) as white seeded and **twenty three (23)** were promoted as brown/red seeded for the coming PYT. Generally from one hundred ten genotypes tested, forty six (46) genotypes were promoted the next breeding stage (PYT).

3.2 Pulse and Oil Crops Research Team

3.2.1 Faba bean Varieties Adaptation Trial

Brief summary of the results

The experiment was conducted in Chora, Dabo Hana and Didesa districts of Buno Bedele zone on six (6) farmers for two consecutive years in 2021-2022 cropping seasons to identify and recommend better adapted improved Faba bean variety/s. Accordingly, eleven (11) improved Faba bean varieties alongside with one (1) local check were used as experimental materials. All important data were collected and analyzed using Genstat 18th edition software. According to ANOVA combined mean of Grain Yield result shows that the highest grain yield was recorded by **Walki** (**32.17** *Qt/ha*) followed by **Hacalu** (**30.74** *Qt/ha*) variety among tested varieties and the lowest Grain Yield was recorded by **Local** variety (**16.74** *Qt/ha*)

showed below in (**Table 2**). Therefore, Walki and Hacalu varieties were the two varieties showed better performance with their mean yield and other measured traits. Therefore, these two varieties are recommended to be demonstrated on farmer's field for further scaling up.

Table 5.Combined mean grain yield (Qt/ha) of Faba Bean varieties tested at Dabo Hana, Didesa and Chora districts for two years (2021/22-2022/23)

S/N	Varieties	D/Hana district			Didesa district			Chora	Over All
		1st yr.	2nd yr.	Combine	1st yr.	2nd Year	Combined		
1	Alloshe	21.64	6.833^{bc}	30.48^{a}	32.25^{b}	38.94^{ab}	36.43^{a-d}	6.83^{ab}	30.25^{ab}
2	Dagaga	23.26	7.056^{bc}	23.84^{ab}	35.44^{ab}	37.89^{ab}	38.48^{abc}	7.06^{ab}	28.25^{abc}
3	Dosha	21.83	7.111^{bc}	22.63^{bc}	36.71^{ab}	33.56^{abc}	38.35^{abc}	7.11^{ab}	28.13^{abc}
4	Gabalcho	21.46	8.278^{bc}	21.93^{bc}	32.13^{b}	10.39^{e}	26.85^{ef}	8.28^{ab}	23.13^{c}
5	Hachalu	22.82	12.889^{a}	27.67^{ab}	36.89^{ab}	33.22^{abc}	38.22^{abc}	7.56^{ab}	30.40^{ab}
6	Mosisa	24.17	5.889^{bc}	25.19^{ab}	40.50^{a}	29.78^{abc}	39.46^{ab}	5.89^{ab}	29.82^{ab}
7	Moti	20.90	6.333^{bc}	25.94^{ab}	31.89^{b}	29.00^{a-d}	33.19^{b-e}	6.33^{ab}	27.16^{abc}
8	Moyibon	21.34	5.389^{c}	21.92^{bc}	29.87^{b}	27.94^{bcd}	31.56^{cde}	6.33^{ab}	24.84^{bc}
9	Obse	20.14	9.111^{b}	22.59^{bc}	30.19^{b}	24.61^{cd}	30.00^{de}	9.11^{a}	23.95^{c}
10	Tosha	22.08	8.556b^{c}	23.63^{ab}	34.00^{ab}	33.72^{abc}	36.06^{a-d}	8.56^{ab}	26.90^{abc}
11	Walki	22.01	8.056^{bc}	26.85^{ab}	40.95^{a}	40.06^{a}	43.24^{a}	7.06^{ab}	32.17^{a}
12	Local	24.38	9.111^{b}	15.65^{c}	19.97^{c}	17.45^{de}	20.67^{f}	7.01^{ab}	16.74^{d}
GM		22.17	7.88	24.03	33.41	29.71	34.38	7.19	26.81
LSD (0.05)		8.52	3.25	7.50	8.17	11.59	7.76	3.68	5.64
CV %		33.3	25.30	28.30	21.2	23.00	23.8	30.3	29.60
P-value		NS	**	*	*	**	**	*	**

GM= grand mean, LSD=least significant difference, CV= coefficient of variation, *= significant, **= highly significant.

3.2.2 Soybean (*Glycine max L.*) varieties Adaptation Trial

Brief summary of the results

An experiment was conducted in Buno Bedele zone (Dabo Hana & Bedele districts) and Ilubabor Zone(Darimu district) on Center research sub site and different farmers for two consecutive years in 2021-2022 cropping season in order to identify and recommend better adapted improved Soybean variety/s. accordingly, about seven (7) Soybean varieties were used as experimental materials. All important data were collected and analyzed using Genstat 18th edition software. The combined mean of Grain Yield result reveals that the highest grain yield was recorded by **Katta** (**31.38** *Qt/ha*) followed by **Didesa** (**29.46** *Qt/ha*) variety among tested varieties and the lowest Grain Yield was recorded by **Jalale** variety (**18.51** *Qt/ha*) (**Table 2**). Therefore, **Katta** and **Didesa** varieties are recommended for the study areas and similar agro-ecology to be demonstrated for further production.

Table 6.Combined mean grain yield (qt/ha) of Soybean varieties tested at Dabo Hana, Bedele and Darimu districts during 2021 and 2022 cropping seasons

S/N	Varieties	D/Hana (Dhaye sub-site)			Bedele district			Darimu district	Over All
		1st yr.	2nd yr.	Comb.	1st yr.	2nd yr.	Comb.		
1	Boshe	10.56^{bc}	14.82^{c}	12.69^{c}	25.46^{a}	27.08	26.00^{ab}	18.52^{cd}	22.65^{cd}
2	Cheri	20.32^{a}	24.18^{b}	22.25^{ab}	29.41^{a}	26.44	28.69^{a}	23.15^{bcd}	25.40^{bc}
3	Clark 63k	8.75^{c}	14.77^{c}	11.76^{c}	22.54^{ab}	31.76	25.61ab	30.56^{abc}	22.93^{cd}
4	Cocker-240	13.15^{bc}	16.88^{bc}	15.01^{bc}	25.76^{a}	25.14	25.55^{ab}	23.15^{bcd}	23.42^{cd}
5	Didesa	20.32^{a}	22.29^{bc}	21.31^{ab}	30.91^{a}	32.69	31.50^{a}	34.95^{ab}	29.46^{ab}
6	Jalale	7.13^{c}	17.29^{bc}	12.21^{c}	14.96^{b}	31.25	20.21^{b}	12.69^{d}	18.51^{d}
7	Katta	15.65^{ab}	37.50^{a}	26.57^{a}	30.80^{a}	29.86	30.48a	39.35^{a}	31.38^{a}
GM		13.70	21.10	17.40	25.71	29.17	26.86	26.03	24.82
LSD (0.05)		6.52	8.14	8.34	8.82	14.37	8.33	14.32	5.20
CV %		27.20	21.79	30.80	29.20	27.70	32.80	30.9	31.7
P-value		*	**	*	*	Ns	*	*	**

GM= grand mean, LSD=least significant difference, CV= coefficient of variation, *= significant, **= highly significant.

3.3 Horticulture and Spices Research Team

3.3.1 Adaptation Trial of Hot Pepper (*Capsicum annum* L.) Varieties in Buno Bedele and Ilubabor Ababor Zone

Status of the activity

The field experiment was started in 2022 cropping season under rainfall conditions at Dabo Hana and Bure districts. Six Onion varieties were used as experimental material. The result showed that, there was a significance difference between varieties for important parameters determining the performances of varieties. In general among these varieties the Nafis variety is the most outstanding variety and resistant to disease during 2022 cropping season.

Table 7.Combined mean Bulb yield and yield related parameters of onion varieties in 2022 cropping season at Dabo Hana and Bure districts

Varieties	DM (Day)	MY(t/ha)	UMY (t/ha)	Yield (t/ha)	ABW (g)	Disease (PB)
Robaf	122.5^{a}	3.19^{c}	0.34^{d}	3.52^{c}	88.54^{a}	30mr
Nafis	117.17^{b}	9.47^{a}	1.01^{a}	10.56^{a}	91.57^{a}	10r
Nasic	113.17^{c}	3.36^{c}	0.34^{d}	3.69^{c}	84.50^{b}	40ms
Nafid	111.67^{c}	2.82^{c}	0.31^{d}	3.13^{d}	85.12^{b}	40ms
Bombaye red	109.67^{d}	4.14^{c}	0.46^{b}	4.60^{c}	89.89^{a}	40ms
Local	111.83^{c}	6.20^{b}	0.61^{b}	6.81^{b}	90.23^{a}	40ms
LSD (0.05%)	2.41	1.8	0.1	1.8	3.22	
CV (%)	1.78	30.64	10.94	28.02	3.08	
P-Value	***	***	***	***	***	

3.4 Crop Protection Research Team

3.4.1 Assessment of diseases for major Cereal crops in Buno Bedele, Ilu Aba Bora and Jimma zones

Brief Summary of the Result

The Survey were started in cropping season of 2020/2021 and assessment were done for three years on Major Cereal crops (maize, sorghum and tef crops) of Buno Bedele Zone (Bedele, Chora and Gechi districts), Jimma Zone (Shebe Sombo, Saka Chokorsa and Kersa districts) and Ilu Aba Bor Zone (Mattu, Halu and Bure districts). In three years the mean fields assessed of Buno Bedele zone were 68 and Jima 32 and Ilu Aba Bor Zone 45. Disease assessments were done for maize; sorghum and tef with their Prevalence, incidence and severity were recorded for each disease. Disease Assessment was conducted for three years in three zones (Buno Bedele, Jima and Ilu Aba Bor Zone) on major cereal crops. Different diseases were observed through various field surveyed and generally, 7 Maize Diseases, 6 Sorghum Diseases and 3 Tef Diseases were identified from Three Zones (Buno Bedele, Jimma and Ilu Aba Bor Zones). Tef diseases were identified are Leaf Rust, Zonate Eye Spot and head smudge and Maize diseases were identified are common smut, ear rot, gray leaf spot, turcicum leaf blight, common rust, maize streak virus and MLND and Sorghum diseases were identified are grain smut, loose smut, Covered smut, Down mildew, leaf blight and anthracnose in different fields assessed at Buno Bedele, Jima & Ilu Aba Bora Zone.

Table 8.Percentage of Prevalence, Incidence and Severity of Major diseases of major Cereal Crops in Buno Bedele Zone 2020-2022.

Zone	**Districts**	**Crop Types**	**Disease**	**Disease measurement**		
				P%	I%	S%
Buno Bedele Zone	Bedele	Maize	Corn smut	23	14	25
			Ear rot	27	20	25
			GLS	30	73	25
			leaf rust	27	38	25
			MLND	17	24	75
		Sorghum	Anthracnose	30	87	25
			Blight	27	60	50
			covered smut	13	30	25
			loose smut	3.3	35	25
		Teff	Head Smudge	30	40	25
			leaf rust	40	47	25
			Zonate Eye Spot	27	53	25
	Gechi	Maize	Blight	45	44	50
			Ear rot	35	23	25
			GLS	45	82	25
			Leaf rust	45	41	25
			MLND	10	45	75

		Sorghum	Anthracnose	30	78	25
			Blight	30	42	50
			Covered Smut	15	23	25
		Teff	Head Smudge	15	57	25
			Leaf rust	20	50	25
			Zonate Eye Spot	20	50	25
	Chora	Maize	Blight	39	44	46
			corn smut	17	17	25
			Ear rot	28	20	25
			GLS	39	76	25
			Leaf rust	39	37	25
			MLND	17	27	75
		Teff	head smudge	22	28	25
			Leaf rust	56	37	25
			Zonate Eye Spot	44	45	25

Table 9.Percentage of Prevalence, Incidence and Severity of Major diseases of Major Cereal Crops in Ilu Aba Bor Zone 2020-2022.

Zone	**Districts**	**Crop Types**	**Disease**	**Disease measurement**		
				P%	**I%**	**S%**
I/A/Bor	Mattu	Maize	Blight	50	52	50
			Corn smut	17	50	25
			Ear rot	17	45	25
			GLS	42	58	25
			MLND	25	37	75
		Sorghum	Anthracnose	17	90	25
			Blight	17	50	50
		Teff	leaf rust	33	58	25
			Zonate Eye Spot	33	62.5	25
	Bure	Maize	Blight	53	64	50
			corn smut	29	40	25
			Ear rot	35	40	25
			GLS	35	40	25
			MLND	29	48	75
			Streak virus	35	37	25
		Sorghum	Anthracnose	47	64	25
			Blight	35	43	50
	Halu	Maize	Blight	44	74	50
			Corn Smut	31	32	25
			Ear rot	13	30	25
			GLS	44	50	25
			Leaf rust	50	51	25
			MLND	13	60	75
		Sorghum	Anthracnose	50	75	25
			Blight	50	52.5	50

Table 10.Percentage of Prevalence, Incidence and Severity of Major diseases of Major Cereal Crops in Jima Zone 2020-2022

Zone	Districts	Crop Types	Disease	Disease measurement		
				P%	I%	S%
Jimma Zone	Seka Chokorsa	Sorghum	Anthracnose	50	85	25
			Blight	50	55	50
			covered smut	38	23	25
		Teff	Head smudge	25	35	25
			leaf rust	50	58	25
	Karsa	Maize	Blight	47	48	50
			corn smut	35	18	25
			GLS	18	43	25
			Leaf rust	35	42	25
			MLND	29	26	65
		Teff	Blight	41	41	46
			Leaf rust	24	30	25
			ZES	29	36	25
	Shebe Sombo	Sorghum	Anthracnose	57	90	25
			Blight	57	40	50
			Covered Smut	43	20	25
		Teff	Head smudge	43	57	25
			Leaf rust	43	40	25

3.4.2 Assessment of major weeds for cereals and pulses crops in Buno Bedele and Ilu Aba Bora zones

Brief Summary of the Result

The Survey were started in cropping season of 2020/2021 and assessment were done for three years on Major Cereal crops (maize, sorghum and tef crops) of Buno Bedele Zone (Bedele, Chora and Dabo Hana districts) and Ilu Abba Bor Zone (Mattu & Bure districts). Disease assessments were done for maize; sorghum and tef with their Prevalence, incidence and severity were recorded for each disease. Disease Assessment was conducted for three years in two zones (Buno Bedele and Ilu Aba Bor Zone) on major cereal crops. A total of 22 weed species at Ilu Aba Bor and 24 weed species at Buno Bedele Zones were identified from assessed cereal fields. Among the identified Weed species *Galinsoga parviflor, Polygonum nepalense, Guzotia scabra (Vis.) Chiov., Bidens pachyouma and trifolium rueppellianum* were showed dominance >20 and >65 frequency from Maize and *Galinsoga parviflor, Polygonum nepalense, Bidens pachyouma* and *Datura stramonium L.* were showed dominance >8 and >65 frequency from Sorghum and *Galinsoga parviflor, trifolium rueppellianum , Ground evy, Cyperus esculentus L.* and *Setaria pumila* were showed

dominance >10 and >90 frequency from Tef at Buno Bedele Zone. At Ilu Aba Bor Zone *Galinsoga parviflor, Polygonum nepalense, Guzotia scabra (Vis.) Chiov., Datura stramonium L.* and *Bidens pachyouma* were showed dominance >10 and >90 frequency from Maize and *Galinsoga parviflor, Polygonum nepalense, Guzotia scabra (Vis.) Chiov., Bidens pachyouma* and *trifolium rueppellianum* were showed dominance >8 and >90 frequency from Sorghum and *Galinsoga parviflor, Ground evy, Cyperus esculentus L.* and *Setaria pumila* were showed dominance >9 and >90 frequency from Tef. Particularly, *Galinsoga parviflor* and *Polygonum nepalense* are a major broad leaf weed species highly affecting Maize and Sorghum and *Setaria pumila, Galinsoga parviflor, Cyperus esculentus L.* and *Ground evy* are a major weed species highly affecting Tef crops. Even though, Farmers were undertaking several management practices, it was observed that the weed is not effectively controlled. In proper Management practices is one of the major problems in controlling weeds in field and majorly contributed for the occurrence and spreading out of several devastating weed species to the area. From this situation, it was suggested that proper land preparation, using weed free planting materials, absence of scheduled cereal crop rotation, untimely planting that might be creating active season for weed emergence and expansion. Most of the farmers were managing their field by using hand weeding due to several reasons. Because, they perceived that use of herbicides in crop production was considered to be cost, negative effect on animals and other Living things (like Stingless bee, Honey bee, etc.); even grain produced by herbicide is harmful to feed. So, in order to improve the production and productivity of cereal crops at Buno Bedele and Ilu Aba Bor Zones, weed management practices need great attention by concerned staff towards bringing attitudinal change to farmers on using recommended herbicides as well as supplying the herbicides as required.

Table 11. Association of mean Dominance major cereal crops for different parameter during 2021-2022 cropping season in Buno Bedele and Ilu Aba Bor Zones

Zone	Districts	Crops	Altitude	No. field assessed
Buno Bedele Zone	Bedele	Maize	1857-1967	9
		Sorghum	1871-1986	9
		Tef	1873-1960	9
	Chora	Maize	1857-1978	11
		Sorghum	1949-1995	5
		Tef	1859-1957	10
	Dabo Hana	Maize	1874-1980	10
		Sorghum	1853-1913	9
		Tef	1876-1965	10

		Mean	1853-1995	82
Ilu Aba Bor Zone	Mattu	Maize	1680-1754	10
		Sorghum	1693-1743	3
		Tef	1704-1713	5
	Bure	Maize	1499-1775	10
		Sorghum	1499-1726	10
		Mean	1499-1775	38
		Over all mean	1499-1995	120

Table 12.Description of Frequency, Abundance and Dominance ratio of weed species on Maize, Sorghum and Teff fields in Buno Bedele Zone during 2020-2022

Zone	Crop	Weed L/C/S	Frequency	Abundance	Dominance
Buno Bedele Zone	Maize	*Datura stramonium L.*	67	2	2
		Leucas martinicensis	67	2	2
		Galinsoga parviflor	100	11	12
		Pig weed	67	4	5
		Ground Evy	67	10	6
		Eleusine indica (L.)	67	3	3
		Cleome monophylla	67	2	2
		Polygonum nepalense	100	11	13
		Bidens pachyouma	67	5	9
		cuscuta campestris	67	1	2
		Commelina	67	4	5
		Oplismenus hirtellus	67	4	4
		Plantago lanceolata L.	67	3	4
		Cyperus esculentus L.	67	3	4
		Red clover	67	6	9
		Setaria pumila	67	5	6
		Guzotia scabra (Vis.)	100	5	10
		Rottboellia	67	3	3
	Sorghum	Datura stramonium L.	67	*2*	9
		Pennisetum clandestium	67	*3*	3
		Bidens pachyouma	100	*6*	10
		Leucas martinicensis	67	*3*	2
		Galinsoga parviflor	100	*11*	16
		Pig Weed	67	*4*	3
		Ground Evy	67	*12*	6
		Eleusine indica (L.)	67	*2*	3
		Cleome monophylla	67	*2*	2
		Polygonum nepalense	100	*8*	11
		cuscuta campestris	67	*1*	1
		Commelina	67	*4*	4
		Oplismenus hirtellus	67	*9*	5
		Plantago lanceolata L.	67	*2*	2
		Cyperus esculentus L.	67	*9*	6
		Red clover	67	*8*	8
		Setaria pumila	67	*8*	8

		Guzotia scabra (Vis.)	67	*5*	5
		Rottboellia	67	*3*	3
	Teff	Datura stramonium L.	67	*2*	2
		Pennisetum clandestium	67	*4*	11
		Galinsoqa parviflor	100	*7*	20
		Pig weeds	67	*3*	4
		Ground evy	100	*13*	16
		Eleusine indica (L.)	67	*2*	3
		Polygonum nepalense	67	*6*	8
		Bidens pachyouma	67	*3*	4
		Commelina	67	*3*	7
		Oplismenus hirtellus	67	*3*	6
		Plantago lanceolata L.	67	*2*	2
		Cyperus esculentus L.	100	*8*	13
		S.diffusum	67	*6*	9
		Red clover	100	*7*	11
		Setaria pumila	100	*12*	18
		Guzotia scabra (Vis.)	67	*4*	4
		Rottboellia	67	*4*	8

Table 13.Description of Frequency, Abundance and Dominance ratio of weed Species on Maize and Sorghum fields in Ilu Aba Bor Zone during 2020-2022

Zone	Crop	Weed L/C/S	Frequency	Abundance	Dominance
Ilu Aba Bor Zone	Maize	*Datura stramonium L.*	49	1	5
		Bidens pilosa	60	1.1	2
		Galinsoqa parviflor	98	20	26
		Pennisetum clandestium	58	3.3	6
		Pig Weed	43	1	2
		Ground Evy	94	12	13
		Eleusine indica (L.)	48	1	2
		Cleome monophylla	33	0.4	1
		Polygonum nepalense	99	12	23
		Bidens pachyouma	86	5	16
		cuscuta campestris	43	0	1
		Commelina benghalensis	89	6	13
		Oplismenus hirtellus	88	7	6
		Snowdenia polystachya	58	1	2
		Cyperus esculentus L.	67	2.1	5
		trifolium rueppellianum	67	3.7	11
		Guzotia scabra (Vis.)	84	3	8
		Rottboellia	53	1	5
	Sorghum	Datura stramonium L.	61	*1*	2
		Bidens pilosa	63	*8.4*	8
		Galinsoqa parviflor	100	*16*	20
		Pig weeds	44	*0.8*	2
		Pennisetum clandestium	44	*0.8*	2
		Eleusine indica (L.)	46	*1*	2

		Cleome monophylla	50	*1*	2
		Polygonum nepalense	100	*9*	16
		Bidens pachyouma	82	*3*	10
		Commelina benghalensis	74	*3*	10
		Oplismenus hirtellus	81	*6*	5
		Snowdenia polystachya	46	*1*	2
		Cyperus esculentus L.	49	*2*	7
		trifolium rueppellianum	96	*6*	10
		Guzotia scabra (Vis.)	81	*7*	12
		Rottboellia	67	*8*	10

3.4.3 Survey and Quantification of Major Hot Pepper (*Capsicum annum L.*) Diseases

Brief Summary of the Result

The Survey was started in cropping season of 2021/2022 and assessment done twice at different stages (seedling stage and after transplanted) of Hot Pepper at Ilu Aba Bora Zone (Darimu, Bure and Halu Districts) and Jima Zone (Karsa, Nadi Gibe and Omo Nada Districts). Assessments were conducted for two years on major Hot Pepper diseases. Totally 95 HP Fields were assessed at Ilu Aba Bora Zone and 9 HP Disease were identified and 78 HP fields were assessed at Jima zone and 5 HP Disease were identified. Generally, disease observed through various Nursery of Hot Pepper surveyed were Cercospora leaf spot, Root rot, Damping off & Leaf Blight at Seedling Stage on Nursery of Hot pepper and Blossom end rot, Cercospora leaf spot, Fusarium Wilting and Anthracnose are observed after transplanted to field area. Among Two Zones of six surveyed districts of Hot pepper fields, the maximum mean prevalence of *Cercospora Leaf Spot* was 91%, 97% and Damping off was 46% and 52% were recorded at Jima and Ilu Aba Bor respectively; While the minimum prevalence of Phytophtora root rot was 0% and Bacterial leaf spot was 15% were recorded at Jima and Ilu Aba Bor respectively at Seedling stage. In other hand, the maximum mean prevalence of *Cercospora Leaf Spot* was 92.3%, 83.3% and Blossom end rot was 74%, 70.3% were recorded at Jima and Ilu Aba Bor respectively at Transplanted field. While the minimum prevalence of Leaf curly disease was 0%, 24.3% and Bacterial leaf spot was 0%, 17% were recorded at Jima and Ilu Aba Bor respectively at Transplanted Field. Cercospora Leaf Spot and Blossom end rot was widely distributed through in the surveyed area of Jima and Ilu Aba Bor Zones. These diseases are the major disease of the surveyed district under high moisture conditions and the soils have calcium deficiency.

Table 14.Mean Prevalence of Seedling Major Hot pepper diseases at two Zones six districts during 2021 and 2022 consecutive cropping season

Hot Pepper Diseases	Jima Zone								Ilu Aba Bor Zone							
	Karsa		Omo Nada		Nadi Gibe		Mean		Bure		Darimu		Halu		Mean	
	N.F	Pre	N.F	Pre	N.F	Pre	N.F	Pre	N.F	Pre	N.F	Pre	N.F	Pre	N.F	Pre
Dampin	6	21	6.5	40	5.5	76	6	46	6	64	2.5	28	6	63	5	52
CLS	4.5	90	9	93	7.5	90	7	91	9.5	97	8.5	100	9.5	94	9.2	97
BLS	0	0	0	0	0.5	12	0.2	4	1	6.5	0.5	6.5	3	32	1.5	15
PRR	3	0	4.5	0	1.5	0	3	0	2	20	2.5	32	2	17	2.2	23
VD	0.5	0	0	0	0.5	0	0.3	0	0	0	2	25	1	13	1	13

Table 15.Mean Prevalence of Transplanted Major Hot pepper diseases at two Zones six districts during 2021 and 2022 consecutive cropping season

Hot Pepper Diseases	Jima Zone								Ilu Aba Bor Zone							
	Karsa		O/Nada		N/Gibe		Mean		Bure		Darimu		Halu		Mean	
	N.F	Pre (%)	N.F	Pre (%)	N.F	Pre (%)	N.F	Pre (%)	N.F	Pre (%)	N.F	Pre (%)	N.F	Pre (%)	N.F	Pre (%)
BER	7	80	7	70	7	72	7	74	5.5	69	7.5	50	7	92	7	70.3
CLS	8.	95	8.5	90	8	92	8.3	92.3	8	10	9	50	7.5	100	8.2	83.3
DB	7	42	4.5	30	5	33	5.5	35	4.5	28	8	45	1	20	5	31
FW	2	40	3.5	35	6	28	4	34.3	5	61	4	39	7.5	100	5.5	67
LCD	0	0	3	0	0	0	1	0	3.5	45	2	0	2	28	2.5	24.3
BLS	1	0	0.5	0	0	0	0.5	0	0	0	0	0	0.5	5.5	0.2	17
Anthracn	3	0	1.5	0	2	0	2.2	0	2	5.	6	34	2.5	36	3.5	25.2

Table 16.Mean Disease Incidence (DI) of Seedling Major Hot Pepper at two Zones six Districts during 2021 and 2022 consecutive cropping season

Hot Pepper Diseases	Jima Zone							Ilu Aba Bor Zone						
	Karsa		Omo Nada		Nadi		Mean	Bure		Darimu		Halu		Mean
	2021	2022	2021	2022	2021	2022		2021	2022	2021	2022	2021	2022	
Damping	18	13	22	60	28	49	32	23	43	0	34	21	47	28
CLS	64	57	41	47	62	42	52.2	49	63	57	63	48	53	55.5
BLS	25	0	0	0	23	33	13.5	17	0	7	0	24	40	15
PRR	12	0	21	0	0	0	5.5	20	0	33	0	23	0	13
VD	20	0	0	0	8	0	5	0	0	23	0	0	33	9.3

Table 17.Mean Disease Incidence (DI) of Transplanted Major Hot Pepper at two Zones six Districts during 2021 and 2022 consecutive cropping season

Hot Pepper Diseases	Jima Zone							Ilu Aba Bor Zone						
	Karsa		O/Nada		NadiGibe		Mean	Bure		Darimu		Halu		Mean
	2021	2022	2021	2022	2021	2022		2021	2022	2021	2022	2021	2022	
BER	27	25	33	29	35	32	30.2	30	27	20	0	19	25	20.2

CLS	57	52	72	62	54	47	57.3	93	56	94	0	94	49	64.3
DB	18	29	12	29	10	24	20.3	14	0	16	0	10	27	11.2
FW	27	32	20	25	15	38	26.2	37	29	31	0	37	39	29
LCD	5	0	0	0	8	0	2.2	23	30	0	0	15	37	17.5
BLS	11	0	9	0	17	0	6.2	0	0	0	0	20	0	3.3
Anthracnose	22	0	14	0	20	0	9.3	100	0	40	0	40	27	34.5

Table 18.Association of mean severity of major Hot pepper diseases of HP Seedling for different parameters during 2021 and 2022 cropping season

Variables	Class	Major Hot pepper disease severity						
		Jima Zone			I/A/Bor Zone			
		LB	Damp	CLS	LB	Damp	CLS	Viral D+s
Altitude	Mid (1951-2530)	0	68.8	93.8	0	0	0	0
	Low (1500-1950)	9.1	18.2	100	12	76	100	8
Varieties	Improved	3.7	18.5	37	4	28	40	8
	Local	0	29.6	59.3	8	48	60	0
Seed bed types	Flat	3.7	44.4	92.5	12	72	96	4
	Raised	0	3.7	3.7	0	4	4	4
Planting Time	Early	0	0	0	0	0	0	0
	Normal	3.7	48.2	88.9	12	76	100	8
	Lately	0	0	7.4	0	0	0	0
Cropping pattern	Monoculture	0	3.7	11.1	12	64	76	8
	Rotation	3.7	44.4	85.2	0	12	24	0
Planting Methods	Row	3.7	18.5	44.4	0	0	0	0
	Broadcasting	0	29.6	51.8	12	76	100	8

Table 19.Association of mean severity major Hot pepper diseases of Transplanted HP for different parameter during 2021 and 2022 cropping season in South Western Oromia

Variables	Class	Major Hot pepper disease severity									
		Jima Zone				I/A/B Zone					
		BER	C LS	DB	FW	Anthr	BER	CLS	DB	FW	LC
Altitude	Mid (1951-2530)	37	51.8	11.1	40.7	0	0	0	0	0	0
	Low (1500-1950)	44.4	44.4	33.3	29.6	24	40	52	4	36	20
Varieties	Improved	29.6	33.3	22.2	29.6	4	16	16	0	12	8
	Local	51.8	62.9	22.2	40.7	20	24	36	4	24	12
Seed bed types	Flat	81.5	96.3	44.4	70.4	24	40	52	4	36	20
	Raised	0	0	0	0	0	0	0	0	0	0
Planting time	Early	0	0	0	0	0	0	0	0	0	0
	Normal	81.5	96.3	44.4	70.4	24	40	52	4	36	20
	Lately	0	0	0	0	0	0	0	0	0	0
Planting methods	Rows	81.5	96.3	44.4	70.4	24	40	52	4	36	20
	Broadcasting	0	0	0	0	0	0	0	0	0	0
Cropping patterns	Monoculture	22.2	22.2	11.1	11.1	0	8	8	0	8	0
	Rotation	59.3	74.1	33.3	59.3	24	32	44	4	28	20

3.5 Soil Fertility Improvement Research Team

3.5.1 Determination of NPS Fertilizer Rate Based on Calibrated Phosphorus for Bread wheat in Dega District, Western Oromia

Abstract

A study was conducted on farmers' fields, located at Dega district of Buno Bedele Zone of Oromia region in 2022 to determine the optimum NPS fertilizer rate to provide the optimum bread wheat yield in the district. Six farmer's fields were used for the trial in 2022 cropping season. Three replications of a completely randomized block design were used in the experiment. Five rates of P critical levels (Pc) (0, 25, 50, 75, and 100%) determined from NPS fertilizer was tested, along with the previously recommended 100% Pc calculated from DAP fertilizer. Results revealed that the analysis of variance among pc rates showed significant differences ($P \leq 0.05$) on almost all the bread wheat characters tested .The maximum and comparable grain yield (3655.60 $kgha^{-1}$)was recorded for 100% Pc from NPS fertilizer, followed by100% Pc from DAP (3494.40 $kgha^{-1}$). On the other hand, the longest plant height (99.80 cm) obtained from the plot treated with (100% Pc from NPS) as compared to 70.10 cm for unfertilized plot. A partial budget analysis result also showed that 100% Pc from NPS produced the highest (65991.00) ETB net benefit. The fertilizer application rate of 100% Pc from NPS therefore seems to be comparable to that of 100% Pc from NPS fertilizer for bread wheat production in the area.

Treatments	Grain Yield (kg ha^{-1})
Without fertilizer	565.30^{e}
25% Pc from NPS + Rec N	1629.20^{d}
50% Pc from NPS + Rec N	2419.40^{c}
75% Pc from NPS + Rec N	3205.60^{b}
100% Pc from NPS + Rec N	3655.60^{a}
100% Pc from DAP+ Rec N	3494.40^{ab}
Mean	2494.90
CV (%)	17.66
LSD	324.52

3.5.2 Determination of NPS Fertilizer Rate Based on Calibrated Phosphorus for Tef in Dega District, Western Oromia

Abstract

A study was conducted on farmers' fields, located at Dega district of Buno Bedele Zone of Oromia region in 2022 to determine the optimum NPS fertilizer rate to provide the optimum

tef yield in the district. Five farmer's fields were used for the trial in 2022 cropping season. Three replications of a completely randomized block design were used in the experiment. Five rates of P critical levels (Pc) (0, 25, 50, 75, and 100%) determined from NPS fertilizer was tested, along with the previously recommended 100% Pc calculated from DAP fertilizer. Results revealed that the analysis of variance among pc rates showed significant differences ($P \leq 0.05$) on almost all the tef characters tested .The maximum grain yield (1766.67 $kgha^{-1}$)was recorded for 100% Pc from NPS fertilizer, followed by100% Pc from DAP(1651.67 $kgha^{-1}$).. On the other hand, the longest plant height (109.20 cm) obtained from the plot treated with (50% Pc from NPS) as compared to 98.10 cm for unfertilized plot. A partial budget analysis result also showed that 100% Pc from NPS produced the highest (45868.69) ETB net benefit. The fertilizer application rate of 100% Pc from NPS therefore seems to be comparable to that of 100% Pc from NPS fertilizer for tef production in the area.

Table 20.Mean Grain Yield of Tef in 2022 cropping season

Treatments	**Grain Yield ($kgha^{-1}$)**
Without fertilizer	318.33^{e}
25% Pc from NPS +Rec N	516.67^{d}
50% Pc from NPS +Rec N	761.67^{c}
75% Pc from NPS +Rec N	1473.33^{b}
100% Pc from NPS +Rec N	1766.67^{a}
100% Pc from DAP+Rec N	1651.67^{a}
Mean	1081.38
CV (%)	19.38
LSD	152.24

3.6 Soil Resource Survey Research Team

3.6.1 Soil Resource Characterization, Classification and mapping in Dabo Hana District

Abstract

The study was conducted to characterize classify and mapping soils in Dabo Hanna district with the aim to produce a map of these soils. Thirty one representative pedons were opened and described across the study area. The soils of Dabo Hanna district was characterized based on the results obtained from soil morphological description at field and some laboratory analyzed. The results indicated that theirs variations in morphological, physical, and some chemical properties of the soils. The value of Organic carbon ranged from 0.13 to 8.78%. The value Exchangeable Acidity ranged from 0.06 to 6.43cmolckg-1. The value of Exchangeable Aluminium ranged from 0 to 4.47 cmolc kg^{-}.The results revealed that the pH (H_2O) of soil ranged from 3.90 to 7.20 were categorized extreme acidic to strong acidic except surface

sample of pedons 23 and subsurface samples of pedons 16 and 27 which were slightly acidic to neutral. The percentage of clay content varied from 14 to 88% where soils are sandy loam to clayey in texture. Generally variations in soils properties suggested theirs variation of potential productivity and management requirements for specific soils.

3.7 Animal Feed Resource and Rangeland Management Research Team

3.7.1 Adaptation Trial of Cowpea (*Vigna unguiculata L.*) Varieties in lowland areas of Buno Bedele Zone, South Western Oromia

Brief Summary of the Result

The experiment was conducted to evaluate and identify the best adapted and superior Cowpea varieties for their herbage dry matter yield, seed yield and other agronomic traits under lowland agro ecology of Buno Bedele Zone, South Western Oromia, Ethiopia. The experiment consisted of five Cowpea varieties namely: Adulala, White wonder, Temesgen, Assebot and Bole. The trial was carried out at Bedele, Gechi and Dabo Hana districts which were purposely selected to represent lowland agro-ecologies, for two consecutive years of 2022 and 2023 in the main cropping season. The experiment was laid out in randomized block design with three replications on well prepared and levelled field. Generally, better biomass yield, dry matter yield and seed yield performances were recorded from varieties Bole, Adula and Temesgen. Therefore, these three cowpea varieties were recommended for the study areas and similar agro-ecologies.

3.7.2 Adaptation Trial of Elephant Grasses (*Pennisetum purpureum* L.*)* varieties in Lowland areas of Ilu Aba Bor Zone, South Western Oromia

The experiment was conducted to evaluate and identify the best adapted and superior Elephant grass varieties for their herbage biomass and dry matter yield, leaf stem ratio and other agronomic traits under lowland agro ecology of Ilu Aba Bor Zone, South Western Oromia, Ethiopia. The experiment consisted of four Elephant grass varieties namely: Bako-01, Zehone-02, Zehone-03 and Bako-04.The trial was carried out at Bure district of Toli Cheka sub site and Nabo FTC for three consecutive years of 2021, 2022 and 2023 in the main cropping season. Generally, two varieties of Elephant grass were recommended for the study areas and similar agro-ecologies.

3.8 Apiculture Research Team

3.8.1 Assessment of Honey production systems in Buno Bedele and Ilu Aba Bor Zones, South Western Oromia

This activity was conducted in 2021/22 cropping season in selected districts of both Buno Bedele and Ilu Aba Bor Zones. Survey data was collected and analyzed. Full write up is underway and it will finalize for the completed regional review meeting.

3.9 Agricultural Extension Research Team

3.9.1 Pre-Extension Demonstration of Improved Midland Maize Technologies at Dabo Hana District of Buno Bedele Zone, Southwestern Oromia, Ethiopia

Abstract

The activity was carried out on seven demonstration sites i.e. six farmers' field and one FTC. Three maize varieties which are BH-547 as improved, Damote as standard check and local check which is Boshe were used to evaluate the yield performance and economic profitability across the demonstration sites. The technology promotion events like FRG establishment and training were used while activity implementation. Accordingly, three FRGs were established in each kebeles and about 61 participants were take part on training**.** The mean yield of 88.58, 64.41 and 48.73 qt/ha were obtained from Damote, BH-547 and local maize varieties respectively. Even though the current yield obtained contradict the previous adaption yield, Damote variety with the yield advantage of 81.8% over local and 32.83% over BH-547 was recommended for the study areas and similar agro-ecologies.

3.9.2 Pre-extension Demonstration and Evaluation of Improved Food Barley Technologies at Chora and Gechi Districts of Buno Bedele zone

Abstract

Three varieties of food barley i.e. Adoshe, HB-1307 and Torja were demonstrated with its full packages on 16 different farmers' field and two FTC. Necessary inputs were delivered to farmers from Bedele Agricultural Research Center and every demonstration site management has been conducted by relevant researchers, FRG members and experimental farmers. Technology promotion events like FRG establishment and mini-field day has been organized. About six FRGs having a total of ninety (90) farmers' were established and about 162 stakeholders were participated on the mini-field day. Following the same recommended agronomic practice and managements, the mean yield obtained from HB-1307, Adoshe and local (Torja) varieties were 39.87, 34.14 and 19.68 qt/ha respectively. However, the obtained yield difference between HB-1307 and Adoshe variety was not significant and moreover on the organized field day, farmers prefer Adoshe variety based on different varietal selection criteria's like disease tolerant and high yield performance. Therefore, Adoshe variety is recommended for further scaling up to enhance its adoption and diffusion rate.

3.9.3 Pre-scaling up of Improved Tef (*Eragrostis tef*) Technologies at Chora District of Buno Bedele zone

Abstract

The pre-scaling up was implemented at Chora district of Buno Bedele zone for one year (2022/2023) using Dursi variety. The study was carried out to improve farmers' awareness, enhance the adoption of full package tef production technologies. The activity was implemented on ten farmers' field and about 45 farmers (37 male and 8 female) were benefited from the technologies through FREGs establishment. About 1.024 ha of land was covered by the activity and all the required inputs like tef seed, fertilizers both NPS and Urea and technical advice was delivered by Bedele Agricultural Research Center whereas every activity management were handled by the host farmers within close supervision of the researchers. For further technology promotion, about 52 different stakeholders were participated on the training whereas 57 concerned bodies were take part on the mini-field day that organized at crop maturity stage. The mean yield of 17.24 qt/ha was obtained. Therefore, the improved Dursi variety was recommended for further production and the Unions, Zonal and District Agricultural Offices could be responsible for Dursi seed supply to the farmers in the study areas.

4. A Brief Summary of on-going Research Activities Conducted by Research Teams in the 2015 E.C Fiscal Year

4.1 Cereal Crop Research Teams

4.1.1 Adaptation Trial of Improved Malt barley Varieties

Status of the activity

This Experiment was started in 2022 cropping season in RCBD design with 3 replications at Chora and Gechi districts on a total of four farmers. Nine (9) improved malt barley varieties were started to be tested and the important data were collected and analyzed by using Genstat 18th Edition statistical software. The analysis of variance result revealed that, there is a significance difference between varieties for important parameters determining the performances of varieties. The characters considered in the analysis of the varieties performance were, days to heading, days to maturity, plant height, spike length, number of grains per spike, disease and grain yield (Table 1 and 2). From analysis of variance for yield related parameters, all traits are significantly different. Among varieties tested the highest grain yield were recorded for Singitan (47.81 qt ha^{-1}) followed by Moata (43.20 qt ha^{-1}) and

the lowest Traveller (18.91 qt ha^{-1}) from the combined two districts (Table 2). This activity will be repeated at respective locations and will be completed next year.

Table 21.Combined mean grain yield (qt/ha) of Malt barley varieties tested at Gechi and Chora

		Gechi District			Chora District		
Sr. No	Varieties	Site 1(sh)	Site 2(J)	Combined	Site 1(N)	Site 2(S)	Combined
1	HB 1964	43.16^{a}	18.67^{cd}	30.92^{bc}	52.49^{a}	39.70^{ab}	46.10^{abc}
2	HB 1963	27.12^{b-e}	29.35^{bc}	28.24^{bcd}	43.51^{b}	31.71^{bc}	37.61^{cd}
3	Sabini	23.98^{cde}	11.61^{de}	17.80^{de}	35.00^{c}	32.20^{bc}	33.60^{de}
4	Iftuu	39.20^{abc}	36.71^{ab}	37.95^{ab}	53.90^{a}	43.47^{ab}	48.69^{ab}
5	Ibon 174/03	37.55^{a-d}	29.44^{bc}	33.49^{abc}	49.92^{ab}	50.70^{a}	50.31^{ab}
6	Traveler	17.48^{e}	7.17^{e}	12.33^{e}	32.11^{c}	18.85^{c}	25.48^{e}
7	Singitan	46.33^{a}	41.65^{a}	43.99^{a}	49.99^{ab}	53.26^{a}	51.63^{a}
8	Bekoji-I	22.49^{de}	31.23^{ab}	26.86^{cd}	43.84^{b}	40.00^{ab}	41.92^{bcd}
9	Moata	42.32^{ab}	33.50^{ab}	37.91^{ab}	47.05^{ab}	49.41^{a}	48.23^{ab}
GM		33.29	26.59	29.94	45.31	39.92	42.62
LSD (0.05)		15.73	11.22	10.88	8.24	13.96	8.71
CV%		27.30	24.40	31.20	10.50	20.20	17.60
P-value		**	**	**	**	*	**

GM= grand mean, LSD=least significant difference, CV= coefficient of variation, *= significant, **= highly significant, NS= non-significant.

4.2 Pulse and Oil Research Team

4.2.1 Linseed (*Linum usitassimum* L.) Varieties Adaptation Trial

Status of the activity

This activity was started in 2022 cropping season in RCBD design with 3 replications at Bedele, D/Hana and Gechi districts on a total of six farmers. Twelve (12) improved Linseed varieties including one local check were started to be tested and the important data were collected and analyzed by using Genstat 18^{th} Edition statistical software. From analysis of variance for yield related parameters, all traits are significantly different. Among varieties tested the highest grain yield were recorded for Kuma (21.07Qt ha^{-1}) followed by Bekoji-14 (20.99 Qt ha^{-1}) and the lowest local (13.32 Qt ha^{-1}) (Table 2). This activity will be repeated at respective locations and will be completed next year.

Table 22.Combined mean grain yield (qt/ha) of Linseed varieties tested at Gechi, Dabo Hana and Bedele districts

S/N	Varieties	Gechi district	D/Hana district	Bedele district	Over locations
1	Bekoji-14	24.36^{ab}	22.89^{a}	12.33^{abc}	20.99^{a}
2	Kassa-2	23.64^{ab}	16.11^{bcd}	11.78^{bc}	18.79^{ab}
3	Welen	20.36^{bc}	15.11^{bcd}	11.44^{bc}	16.82^{abc}
4	Bekoji	21.61^{abc}	16.33^{bcd}	10.33^{c}	17.47^{abc}

5	Kuma	25.36[a]	17.89[b]	15.67[a]	21.07[a]
6	Yadano	23.61[ab]	13.22[cd]	10.78[c]	17.81[ab]
7	Furtu	19.56[bcd]	17.56[bc]	14.56[ab]	17.81[ab]
8	Bakalcha	17.28[cd]	15.78[bcd]	11.47[bc]	15.45[bc]
9	Dibanne	20.06[bc]	17.44[bc]	10.78[c]	17.08[abc]
10	Horesoba	21.47[abc]	16.67[bcd]	12.56[abc]	18.04[ab]
11	Jitu	22.61[ab]	18.00[b]	10.78[c]	18.50[ab]
12	Local	15.03[d]	12.56[d]	10.67[c]	13.32[c]
GM		21.25	16.63	11.93	17.76
LSD (0.05)		4.99	4.40	3.78	4.42
CV %		20.4	25.6	18.7	28.8
P-value		**	**	*	*

GM= grand mean, LSD=least significant difference, CV= coefficient of variation, *= significant, ** = highly significant, NS= non-significant.

4.2.2 Groundnut (*Arachis hypogea* L.) varieties Adaptation Trial

Status of the activity

This activity was started in 2022 cropping season in RCBD design with 3 replications at Bedele and D/Hana districts on a total of two sites. Five (5) improved Groundnuts varieties including one (1) local check totally 6 varieties were started to be tested and the important data were collected and analyzed by using Genstat 18th Edition statistical software. From analysis of variance for yield related parameters, all traits are significantly different except Number of seed per pod. Among varieties tested across two locations the highest grain yield were recorded for BaHa jidu (22.62 Qt ha^{-1}) followed by Babile-1 (21.97 Qt ha^{-1}) and the lowest Local (10.44 Qt ha^{-1}) (**Table 2**). This activity will be repeated at respective locations with one additional location and will be completed next year.

Table 23.Combined mean grain yield (Qt/ha) of Groundnut varieties tested at Dabo Hana and Bedele districts

S/N	Varieties	Dabo Hana	Bedele	Over Locations
1	Babile-1	19.61[abc]	19.32[a]	19.47[ab]
2	Babile-2	21.00[ab]	13.97[b]	17.49[ab]
3	BaHa jidu	25.77[a]	15.46[ab]	20.62[a]
4	Werer-961	15.48[bc]	14.00[b]	14.74[bc]
5	BaHa gudo	18.45[ab]	13.03[bc]	17.24[ab]
6	Local	12.96[c]	8.58[c]	10.77[c]
GM		19.38	14.06	16.72
LSD (0.05)		7.28	4.67	5.51
CV %		20.6	18.30	27.80
P-value		*	*	*

GM= grand mean, LSD=least significant difference, CV= coefficient of variation, *= significant, **= highly significant.

4.2.3 Kabuli Type chickpea (*Cicer kabulium* L.) varieties Adaptation Trial

Status of the Experiment

In the main cropping season of 2023, eight (8) enhanced Kabuli type chickpea cultivars were delivered from Debre Zeit ARC and sowed at three areas (Dabo Hana, Chora, and Bure). However, due to flooding caused by intense rainfall in the Chora district and D/Hana region, we were unable to collect complete data from all three locations. All in all, we can say that it was poorly executed and that the Bure district's management issues were to blame. In reality, it had been excellent at the vegetative stage and had been well-performed, but it was unable to fill the seed at the seed-filling stage. As a result, we decided to continue the activity for an additional year for evaluation.

4.2.4 Effect of Blended NPSB Fertilizer Rates and Varieties on Yield and Yield Components of Haricot Bean (*Phaseolus vulgaris* L.)

Summary of the finding

The activity was started in 2022 cropping season at Dabo Hana and Gechi districts. The study was conducted to evaluate the effects of blended NPSB fertilizer rates on growth, yield, and yield components of haricot bean varieties. The treatments have consisted of the factorial arrangements of five rates of blended NPSB fertilizer (0, 50,100,150 and 200 kg/ha) and three varieties of haricot bean (SER119 and SER125). The treatments were laid out in factorial combinations using randomized complete block design (RCBD) and replicated three times. Data on phonological, growth, yield and yield components were collected and analyzed. According to the present study results the main effect of NPSB fertilizer rates was significantly affected on, number of pod per plant, Number of seed per pod and grain yield. Significantly the highest number of pod per plant (25) and seed per pod (4.5) were recorded at the highest rate of 150 kg/ha NPSB blended fertilizer rate; however, it was statistically at par with treatment 200 kg/ha NPSB . Whereas the highest Grain yield (2056.5 kg/ha) was recorded at 200 kg/ha NPSB blended fertilizer rate. Varieties were also significantly affected in, plant height, number of pod per plant and grain yield. From two varieties SER125 gave significantly the highest plant height (53.4cm), number of Pod per plant (23.87) and grain yield (1824.3 kg/ha). The interaction of NPSB blended fertilizer rates and varieties had a non-significant effect on all parameters. Thus, blended fertilizer at the rate of 200 kg NPSB Kg/ha and variety SER125 proved to be superior based grain Yield. This activity will be repeated at respective locations and completed next year.

Table 24.Combined Mean of grain yield Effect of NPSB Fertilizer Haricot bean Varieties during 2022 cropping season at Gechi and Dabo district

Treatments	Locations		Combined
Varieties	Gechi district	Dabo Hana district	
SER-119	1283.3[b]	1561.3	1422.3[b]
SER-125	1706.5[a]	1942.1	1824.3[a]
LSD (0.05)	226.5	NS	246.19
P-value	0.0001	0.086	0.0019
Fertilizer rates (Kg/ha)			
0	559.9[c]	782.1[b]	671[c]
50	1297.6[b]	1710.3[a]	1504.0[b]
100	1777[a]	2156.7[a]	2016.9[a]
150	1779[a]	1956.4[a]	1868.1b[a]
200	1960[a]	2152.8[a]	2056.5[a]
LSD (0.05)	357.52	696.4	389.26
CV %	19.72	32.77	29.21
P-value	0.0031	0.0031	0.0001

4.3 Horticultural Research Team

4.3.1 Adaptation Trial of Orange fleshed Sweet Potato (*Ipomoea batatas* L.) Varieties

Current status of the activity

During the 2022 crop season, the trial was planned for three locations (the Bedele, Dabo Hana, and Bure districts). However, last year, we were unable to obtain the cutting materials from the resource centres (JARC and HARC) in a timely manner; however, this year, the trial has already started.

4.3.2 Effect of Inter Row spacing and NPSB Fertilizer Rate on Tuber Yield of Potato (Solanum tuberosum L.)

Status of the activity

The activity was started in 2022 cropping season at Gachi and Chora districts with objective of to determine optimum NPSB fertilizer rate and inter row spacing on yield and yield related component of Potato. Treatments were consist of four NPSB (50,100 150 and 200 kg/ha) and three levels of inter row spacing (65cm, 75 and 85 cm) with control plot. Accordingly, the important data were collected and analyzed. Accordingly, application of 200 kg NPSB kg/ha resulted maximum marketable tuber yield (50.67t/ha) and total tuber yield (58.13 t/ ha) while lower yield were obtained from control treatment Furthermore, the highest marketable tuber yield (44.55 t/ha) and total tuber yield (51.34t/ha) were obtained from the inter-row spacing of 85cm whereas the lowest result for these parameters were recorded at 65 cm.

Table 25.Main effects of NPSB fertilizer rate and inter-row spacing on combined mean of tuber yield and yield related parameters during 2022 cropping season

Treatment	DF (Day)	DM (Day)	NT (No)	MY (t/ha)	UMY (t/ha)	TY (t/ha)	AVTW (g)
Fertilizer rates (kg/ha)							
Control	59.6[b]	98[b]	12.17[e]	16.79[e]	5.19[e]	20.44[e]	70.67[e]
50	60[b]	98.78[b]	15.44[d]	32.01[d]	5.47[d]	37.49[d]	67.56[d]
100	60[b]	98.72[b]	18.94[c]	39.47[c]	6.47[c]	45.94[c]	88.11[c]
150	61.56[a]	100.94[a]	21.72[b]	46.04[b]	6.60[b]	52.65[b]	94.67[b]
200	62.33[a]	101.83[a]	23.39[a]	50.67[a]	7.47[a]	58.13[a]	100.33[a]
LSD (0.05)	1.03	1.38	1.33	3.59	34.11	3.84	4.18
P-Value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Inter Row Spacing (cm)							
65	60.67	99.67	19.12b[a]	39.12[b]	6.25[bc]	45.39[b]	86.33[b]
75	61.25	100.33	19.83[a]	42.48[a]	6.41[b]	48.95[a]	90.63[a]
85	61.25	100.21	20.67[a]	44.55[a]	6.79[a]	51.34[a]	92.79[a]
LSD (0.05)	NS	NS	1.15	3.1	0.29	3.32	3.62
CV (%)	2.52	2.07	10.05	12.78	7.87	11.85	6.97
P-Value	0.3244	0.4988	0.0342	0.0035	0.0025	0.0028	0.0026

DF=Days to flowering, DM=Days to Maturity, NT=Number of tuber, MY=Marketable yield, UMY=Un Marketable yield, TY=Tuber yield AVTW=Average tuber weight, LSD (0.05)= Least significant differences and CV (%)= coefficient of variation.

Figure 3.Some Photos of Research Activities conducted by Crop Research Process

4.4 Crop Pathology Research Team

4.4.1 Survey of Major Diseases of Fruit Crops at *Buno Bedele, Ilu Abba Bora and Jimma Zones of* South Western Oromia.

Activity code: Be/Cr/pro-2023 (1)
Year Started: 2022
Year of completed: 2024
Objectives
To assess and identify diseases of Fruit Crops in the study areas
To quantify Fruit Crops diseases severity, incidence and prevalence in the study areas

4.4.2 Survey of Major Insect Pests of Fruit Crops at *Buno Bedele, Ilu Abba Bora and Jimma Zones of* South Western Oromia.

Activity code: Be/Cr/pro-2023 (2)

Year Started: 2022

Year of completed: 2024

Objectives

- To assess and identify insect pests of fruit crops in the study areas
- To quantify fruit crops insect pests abundance, relative abundance and Constance (frequency) in the study areas

After this Annual Regional Research Review Forum, the questionnaire will be completed and the survey will be conducted as scheduled. The site has been selected in Jima Zone.

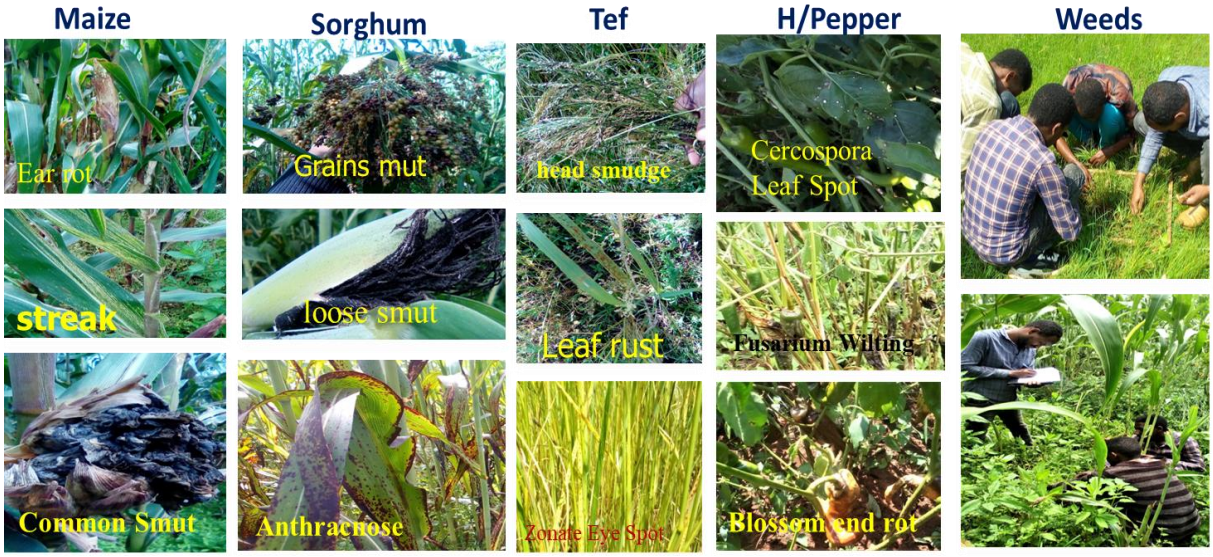

Figure 4.Some photos of Research Activities conducted by Crop Protection Process

4.5 Soil Fertility Improvement Research Team

4.5.1 Soil Test Crop Response Based Phosphorus Calibration Study for Maize in Mettu District

Brief summary of the Result

The interaction effect of N and P fertilizers revealed notable variations in maize grain yield, days to tasseling, biomass, plant height, and thousand grain weight (Tables 3 and 4). The combination of 115 kg N/ha and 40 kg P/ha produced the best maize grain yield (6973.76 kg/ha), followed by 138 kg N/ha and 40 kg P/ha (6090.27 kg ha^{-1}). The effects of N rates between (115 and 138) kg N ha^{-1} on maize grain yield were not statistically different (Table 3). The primary impact of both N and P fertilizers revealed notable variations in maize grain yield. At the highest rate of N, the highest grain yield was observed. On the other hand, non-significant variations in maize grain production were found between N rates of (115 and 138) kg N ha-1 (Table 5). Indicated in (Table 6) are the findings of the economic analysis for nutrient management. The use of 115 kg N ha-1 resulted in the highest marginal rate of return (MRR) of 651% and the largest net profit (105281.79). Therefore, it is economically possible and advised that maize production in the Mettu district use 115 kg N ha-1.

Table 26.Interaction effect of N and P fertilizers application on maize grain yield

	P_2O_5 (kg ha^{-1})		
N (kg ha^{-1})	0	46	92
0	857.25 ^{l}	1425.92^{k}	2429.01^{ji}
46	2329.64^{j}	4067.90^{g}	4781.63^{f}
69	2673.61^{ji}	4836.42^{ef}	5347.99^{cd}
92	2628.85 ^{ji}	5233.79^{de}	5704.47^{bc}
115	2740.67^{i}	5266.97^{d}	6973.76^{a}
138	3239.19^{h}	6014.65^{b}	6090.27^{b}
Mean	4035.66		
LSD (0.05)	406.18		
CV (%)	15.34		

4.6 Soil Resource Survey Research Team

4.6.1 Characterization, Classification and Mapping of Soil Resource at Gechi District

Current status

Soil Map Unit of the study area was prepared by using a Slope class from ETHIO DEM and Ethiopian Soil Geomorphology (FAO-CLASS, Landscape, Land UNT and Major soil). All delineated SMU's and profile points were exported from Google Earth Map to locus map free

Application of Android Mobile for detail field work. Pedons of different soil mapping units (22/22) profiles were opened and characterized. One (1) to six (6) soil samples were collected from each profile, totally eighty eight (88) soil samples were collected from twenty two (22) profiles from cultivated, fallow, grazing, shrubs and wetland.

4.6.2 Characterization, Classification and Mapping of Soil Resource at Borecha District

Current status

Soil Map Unit of the study area was prepared by using a Slope class from ETHIO DEM and Ethiopian Soil Geomorphology (FAO-CLASS, Landscape, Land UNT and Major soil).All delineated SMU's and profile points were exported from Google Earth Map to locus map free Application of Android Mobile for detail field work. Pedons of different soil mapping units (16/17) profiles were opened at Borecha district and pedons 2 was not opened due to steep land form of SMU. One (1) to seven (7) soil samples were collected from each profile, totally sixty three (63) soil samples were collected from sixteen (16) profiles from cultivated, fallow, grazing, shrubs and wetland.

4.6.3 Characterization, Classification and Mapping of Soil Resource at Didesa District

Current status

Soil Map Unit of the study area was prepared by using a Slope class from ETHIO DEM and Ethiopian Soil Geomorphology (FAO-CLASS, Landscape, Land UNT and Major soil). All delineated SMU's and profile points were exported from Google Earth Map to locus map free Application of Android Mobile for detail field work.

Figure 5.Some photos of Research Activities conducted by Natural Resource Process

4.7 Agroforestry Research Team

4.7.1 Adaptation & Growth performance of Moringa stenopetala & Moringa oleifera)

Current status

The first year growth parameter data (Root collar, DBH and height) were collected and coding accordingly. The trial managements will be carried out thoroughly.

Figure 6. Growth performance of Moringa at Dhaye Research sub sites

4.7.2 Assessment, Characterisation and Mapping of Gerba Dima and Gaba forest

Brief Summary

Two forest sites (Baja and Gerba Dima) forest were selected for assessment. The preparation for assessment on selected forest, the require training was taken on some tools. On Baja Forest supervised classification was done by ArcGIS software and Landsat image that provide data were acquired from free available. Based on supervised image classification; four classes Land use land cover of Baja forest was classified by ArcGIS software and area of land use land cover was calculated.

Table 1.Landsat satellite used for the study

Years	Satellite	Composited bands	Spatial Resolution
1989	Landsat 5 TM	Band 1-5	30m
2001	Landsat 7 ETM+	Band 1-5	30m
2011	Landsat 7 ETM+	Band 1-5	30m
2021	Landsat 8 OLI	Band 2-6	30m

Table 27. Land use land cover Area of study area 1989 to 2021

Land use land cover	Years							
	1989		2001		2011		2021	
	Area(ha)	Area(%)	Area (ha)	Area(%)	Area (ha)	Area (%)	Area(ha)	Area (%)
Forest	17424.54	80.83	18644.22	86.48	18289.1	84.83	17859.3	82.84
Agriculture	2016.18	9.35	1485.54	6.89	1726.92	8.02	2211.48	10.26

Grass land	779.67	3.62	809.91	3.76	998.73	4.63	881.01	4.09
Water Body	1337.58	6.20	618.3	2.87	543.24	2.52	606.15	2.81

4.7.3 Characterization of Trees and Shrubs Species Diversity of Gerba Dima and Gaba Forest

Two forest sites (Baja and Gerba Dima) forest were selected for assessment. The preparation for assessment on selected forest, the require training was taken on some tools. In the next time the survey will be conducted at selected site and map status of forest. The Baja forest found in Buno Bedele Zones and Chora district and Gerba Dima forest found in Ilu Abba Bora and Alle, Bacho, and Didu Districts.

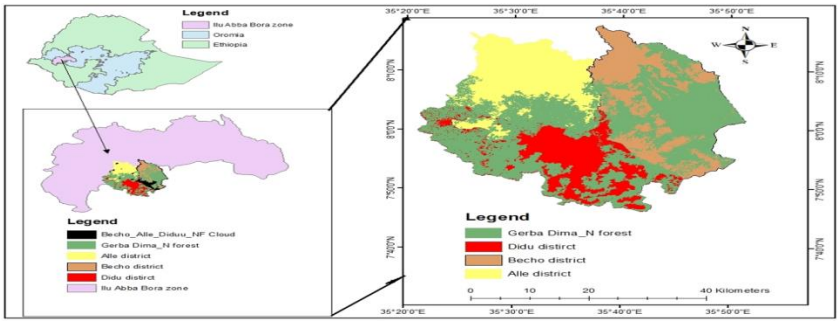

Figure 7.Location map of Gerba Dima forest

4.8 Coffee and Tea Management and Protection Research Team

4.8.1 Effect of spacing on yield and quality of Coffee (*Coffea arabica* L.) Intercropping with Enset (*Ensete ventricosum*)

Year of started: 2021/22

Year of completion: 2026/27

Objective: To identify proper spacing with best coffee enset intercropping for coffee yield and yield components and quality

Brief status of the Activity

Coffee-Enset was planted in 2021 and well managed. Data to be collected are under way. The necessary agricultural management practice has been carried out. This activity conducted on two locations.

4.8.2 Effects of different rate of Vermicompost on growth of Coffee Seedlings in Buno Bedele zone

Year of started: 2022/23

Year of completion: 2024/25

Objective: To determine optimum vermicompost rate on growth of coffee seedlings in the study area.

Brief summary of status

Seed was sown on nursery site in April, 2022. 74110 coffee varieties were used. Vermicompost rates calculated based on laboratory test then applied with the three replication. Randomized block design was used. The treatments were (0g/pot, 10g/pot,

20g/pot, 30g/pot, 40g/pot and 50g/pot). The necessary management practice has been carried out. Data to be collected are underway.

Figure 8.Pictures taken during experimental doing

4.8.3 Effect of Intercropping Coffee with Banana on Coffee yield and yield components in Buno Bedele

Year of started: 2022/23, Year of completion: 2026/27

Objective: To Identify the proper ratios of coffee – banana intercropping on yield and yield components.

1. Summary of Brief status

Improved coffee variety seedling was already raised at nursery site in 2022. Banana sucker was obtained from JARC. Permanent field preparation also prepared and planted. The activity conducted at two locations.

4.8.4 Effect of Coffee husk Compost on acid soils on Coffee yield and yield components in Buno Bedele and Ilu Abba Bora Zones

Year of started: 2022/23, Year of completion: 2026/27

Objective: To evaluate effect of Coffee husk compost fertilizer on acid soil and yield of Coffee (Coffee arabica, L.).

1. Summary of Brief status

Improved coffee variety seedling was already raised at nursery site. Coffee husk compost was already prepared. Land preparation (land clearing, ploughing) is under way. All agronomic practices will be conducted as recommendation. Composite soil and decomposed coffee husk sample were taken then analyzed. Different rate of Coffee Husk Compost was applied.

4.8.5 Effect of Intercropping Coffee with Avocado on Coffee yield and yield components in Buno Bedele

Year of started: 2022/23, Year of completion: 2026/27

Objective: To Identify the proper ratios of coffee – Avocado intercropping on yield and yield components.

1. Summary of Brief Status

Improved coffee variety seedling which used for activity was already prepared at nursery site. Hass Avocado variety was obtained from MARC and planted at two locations.

4.9 Coffee and Tea Improvement Team

4.9.1 Evaluation and Characterization of Coffee Landraces from Coffee Growing Areas of Buno Bedele and Ilu Abba Bora Zones

Brief status of Activity

Coffee landraces was collected from Buno Bedele and Ilu Abba Bora Zones during main coffee harvesting season in 2011 **E.C.** The collected landraces accessions of both zones classified into highland, midland and lowland landrace accessions based on national agro-ecology of coffee. A total of 130 Coffee Landraces were collected from 8 districts of Buno Bedele and Ilu Abba Bora Zones. From this 95 highland coffee Landraces accessions and 21 midland coffee landraces accessions with three (3) standard checks were established at Gechi district (Bido Jiren sub site) in Buno Bedele zone. 14 Lowland coffee landraces accessions with two (2) standard checks were established at Bure district (Toli cheka sub site) in Ilu Abba Bora zone. Survival rate of coffee planted landrace accessions in both locations was taken.

Table 28.The survival rate (%) of coffee planted landraces accessions (mid to highland) at Gechi District (Bido Jiren sub site)

S/no	Passport Code	Survival rate (%)		Passport code	Survival rate (%)	S/no	Passport code	Survival rate (%)
1	Bd-04/11	77.78	52	Bd-046/11	55.56	103	Bd-093/11	100
2	Bd-05/11	88.89	53	Bd-047/11	55.56	104	Bd-094/11	77.78
3	Bd-06/11	44.44	54	Bd-048/11	66.67	105	Bd-095/11	88.89
4	74158	33.33	55	7416	55.56	106	74158	77.78
5	Bd-07/11	66.67	56	Bd-049/11	88.89	107	Bd-096/11	77.78
6	Bd-08/11	88.89	57	Bd-050/11	77.78	108	Bd-097/11	66.67
7	Bd-09/11	33.33	58	74110	88.89	109	7416	77.78
8	7416	55.56	59	Bd-051/11	77.78	110	Bd-098/11	66.67
9	Bd-10/11	88.89	60	Bd-052/11	100	111	Bd-099/11	66.67
10	Bd-011/11	44.44	61	Bd-053/11	55.56	112	Bd-100/11	55.56
11	Bd-012/11	100	62	Bd-054/11	100	113	Bd-101/11	88.89
12	74110	77.78	63	74158	100	114	74110	88.89
13	Bd-013/11	22.22	64	Bd-055/11	100	115	Bd-102/11	77.78
14	Bd-015/11	44.44	65	Bd-056/11	77.78	116	Bd-103/11	77.78
15	Bd-016/11	88.89	66	Bd-057/11	55.56	117	Bd-104/11	55.56

16	74158	77.78	67	Bd-058/11	77.78	118	Bd-105/11	88.89
17	Bd-017/11	100	68	74110	100	119	74158	55.56
18	Bd-084/11	100	69	Bd-059/11	88.89	120	Bd-106/11	100
19	Bd-085/11	100	70	Bd-060/11	100	121	Bd-107/11	100
20	7416	55.56	71	Bd-061/11	77.78	122	Bd-108/11	100
21	Bd-086/11	55.56	72	Bd-062/11	77.78	123	Bd-109/11	77.78
22	Bd-087/11	33.33	73	7416	77.78	124	74110	88.89
23	Bd-088/11	66.67	74	Bd-063/11	77.78	125	Bd-110/11	88.89
24	Bd-089/11	88.89	75	Bd-064/11	77.78	126	Bd-111/11	88.89
25	74110	88.89	76	Bd-065/11	55.56	127	Bd-112/11	100
26	Bd-090/11	77.78	77	Bd-066/11	66.67	128	Bd-113/11	88.89
27	74158	33.33	78	74158	66.67	129	Bd-114/11	88.89
28	Bd-091/11	77.78	79	Bd-067/11	66.67	130	7416	77.78
29	Bd-01/11	100	80	74110	66.67	131	Bd-115/11	100
30	Bd-02/11	33.33	81	Bd-068/11	77.78	132	Bd-116/11	66.67
31	74110	55.56	82	Bd-069/11	66.67	133	Bd-117/11	88.89
32	Bd-03/11	77.78	83	Bd-070/11	100	134	74110	100
33	Bd-018/11	100	84	Bd-071/11	77.78	135	Bd-118/11	88.89
34	Bd-019/11	100	85	74158	100	136	Bd-119/11	88.89
35	7416	88.89	86	Bd-072/11	100	137	Bd-120/11	100
36	Bd-020/11	88.89	87	Bd-073/11	66.67	138	74158	77.78
37	Bd-021/11	88.89	88	Bd-074/11	88.89	139	Bd-121/11	44.44
38	Bd-022/11	100	89	Bd-075/11	100	140	Bd-122/11	100
39	Bd-023/11	77.78	90	7416	77.78	141	7416	88.89
40	Bd-037/11	88.89	91	Bd-076/11	88.89	142	Bd-123/11	88.89
41	7416	88.89	92	Bd-077/11	77.78	143	Bd-124/11	88.89
42	Bd-038/11	100	93	Bd-078/11	100	144	74110	77.78
43	Bd-039/11	100	94	Bd-079/11	100	145	Bd-125/11	77.78
44	Bd-040/11	100	95	Bd-80/11	88.89	146	Bd-126/11	88.89
45	Bd-041/11	88.89	96	74158	77.78	147	74158	33.33
46	74158	88.89	97	Bd-081/11	88.89	148	Bd-127/11	44.44
47	Bd-042/11	77.78	98	Bd-082/11	55.56	149	Bd-128/11	44.44
48	Bd-043/11	88.89	99	74110	100	150	7416	77.78
49	Bd-044/11	77.78	100	Bd-083/11	66.67	151	Bd-129/11	66.67
50	74110	66.67	101	Bd-092/11	88.89	152	Bd-130/11	88.89
51	Bd-045/11	77.78	102	7416	77.78			

Table 29. The survival rate (%) of coffee planted landraces accessions (low land landraces) at Bure District (Toli cheka sub site) in Ilu Abba Bora Zone

S/No	Pass port code	Survival rate (%)	S/No	Pass port code	Survival rate (%)
1	**Bd-014/11**	100	14	Bd-035/11	83.3
2	Bd-024/11	66.7	15	Bd-036/11	83.3
3	Bd-025/11	83.3	**16**	**Bd-07/11**	83.3
4	Bd-026/11	50	17	Bd-08/11	100
5	Bd-027/11	66.7	18	Bd-09/11	66.7
6	**Bd-028/11**	16.7	19	Limmu1	100
7	Bd-029/11	100	20	Bd-015/11	66.7
8	Dessu	83.3	**21**	**Bd-016/11**	50
9	Bd-030/11	83.3	22	Bd-084/11	50
10	Bd-031/11	50	23	Bd-085/11	100
11	**Bd-032/11**	66.7	24	Bd-087/11	83.3
12	Bd-033/11	83.3	25	Bd-088/11	83.3
13	Bd-034/11	100			

Figure 9.Pictures of coffee planted landraces on Bido Jiren sub site in Gechi district (mid to highland landraces) Buno Bedele zone

4.9.2 Adaptation trial of released Coffee varieties for different coffee growing agro-ecology of Buno Bedele Zones

Brief status of Activity

Eight (8) Improved Coffee varieties such as Buno-wush, Wush-wush, Yachi, Merdacherko, 741, 74148, 74165, & 75227) with two (2) standard check (74110 & 74158) was planted in Gechi and Didesa district of Buno Bedele Zone. From the (2) district at (5) farmers field was planted. Coffee plants are in a good progress. An agronomic field management practice was carried out uniformly. The survival rate of coffee planted was taken.

Table 30.Survival rate (%) of coffee planted seedling at farmer's field in Didesa District

No	Coffee Varieties	Farmer-01	Farmer-02	Mean
		Survival rate (%)	Survival rate (%)	Survival rate (%)
1	741	94.4	100	97.2
2	74110	100	100	100
3	74148	88.9	100	94.4
4	74165	100	100	100
5	Wush-wush	100	100	100
6	Buno-Wush	100	94.4	97.2
7	Yachi	100	100	100
8	Merdacherko	88.9	100	94.4
9	74158	88.9	88.9	88.9

10	75227	83.3	100	91.67

Table 31.Survival rate (%) of coffee planted seedling at farmer's field in Gechi District

No	Coffee varieties	Farmer-01	Farmer-02	Farmer- 03	Mean
		Survival rate (%)			
1	741	100	100	88.9	96.3
2	74110	100	94.4	100	98.2
3	74148	88.9	94.4	100	94.4
4	74165	100	100	94.4	98.2
5	Wush-wush	83.3	100	100	94.4
6	Buno-Wush	77.8	94.4	88.9	87.04
7	Yachi	88.9	100	83.3	90.7
8	Merdacherko	83.3	94.4	83.3	87.04
9	74158	88.9	100	100	96.3
10	75227	83.3	100	28	70.4

Table 32.The Overall Survival rate (%) of coffee planted seedling at farmers' field in both districts

No	Coffee varieties	Didesa District	Gechi District	Mean
		Survival rate (%)		
1	741	97.2	96.3	96.7
2	74110	100	98.2	98.9
3	74148	94.4	94.4	94.4
4	74165	100	98.2	98.9
5	Wush-wush	100	94.4	96.7
6	Buno-Wush	97.2	87.04	91.1
7	Yachi	100	90.7	94.4
8	Merdacherko	94.4	87.04	90
9	74158	88.9	96.3	93.3
10	75227	91.7	85.2	87.8

4.9.3 Adaptation trial of Tea (*Camellia sinensis* L.) Clones in Buno Bedele Zone

Brief Status of Activities

Eight (8) Tea clones seedling such as L6, 11/56, S-15/10, FNF, BB-35, SR-18, 11/4, 31/11 was prepared at JARC and planted Bido jiren site. All management practices will be applied uniformly as per recommendations.

Figure 10.Some photos of Coffee and Tea Research process research activities conducted

4.10 Animal Forage and Range land Management Research Team

4.10.1 Adaptation Trial of Desho Grass cultivars in mid and lowlands areas of Buno Bedele and Ilu Aba Bor Zones, Western Oromia

This activity was conducted in 2020/21 cropping season in RCBD design with 3 replications at four locations. Four (4) Desho grass Cultivars were tested and the important two year data were collected and all field management practices were applied. Desho grasses are well survived and performed across all locations. The growth parameters data collection is underway.

Figure 11Photos capture on Desho grass

4.10.2 Adaptation Trial of Alfalfa (*Medicago sativa*) Varieties at High and Midland agro ecologies of Buno Bedele Zone.

The activity was conducted in 2021/22 cropping season in RCBD design with 3 replications at three locations. Six (6) Alfalfa varieties were tested and all important first data were collected from one location. The experiment was affected (grazed) by wild animals at two locations. The second required data were collected in 2022/23 cropping from all locations.

Figure 12.Photos of alfalfa adaptation trial

4.10.3 Adaption trial of Lablab (*Lablab purpureus*) Varieties at Lowland areas of Buno Bedele and Ilu Abba Bor Zones, South Western Oromia

This activity was conducted in 2022/23 cropping season in RCBD design with 3 replications at two locations. Four (4) Lablab varieties were tested and performed across all locations. The first year data were collected across all locations. The activity was sown for second year in 2023/24 cropping season and all field management practices were applied.

Figure 13.Photos of lablab adaptation trials

4.11 Apiculture Research Team

4.11.1 Establishing Bee flora Calendar of Buno Bedele and Ilu Aba Bora zones

Current status

This activity was conducted in 2022/23 cropping season in selected districts of both Buno Bedele and Ilu Aba Bor Zones. Three districts were selected purposively from Buno Bedele and Ilu Aba Bora zones based on agro ecologies and beekeeping potential. The materials were purchased; survey and focus group discussion will be done with target farmers next time

4.12 Agricultural Economics Research Team

4.12.1 Analysis and Characterization of Farming System in Major Agro-ecologies of Selected Districts of South Western Oromia

Brief Status of the Activity

This activity has been conducted in seventeen kebeles of six selected districts of Buno Bedele and Ilu Ababor zones of Southwester Ethiopia. In order to select the representative

respondents, a multi-stage sampling procedure was employed. In the first stage, six representative districts namely; Dega, Chora and Didesa from Buno Bedele and Ale, Bure and Becho were selected from Ilu Ababor purposively. On the second stage, seventeen kebeles were kebeles were selected randomly from stratified agro ecologies of the districts. Then, 385 sample respondents were selected randomly from all agro ecologies of the two zones. Semi-structured questionnaire was used for data collection from the sampled households, Key informant and FGD. Both primary and secondary data were collected. Know the data has been on the process of encoding. The remaining activity will be data analysis and full write-ups.

4.12.2 Value Chain Analysis of Maize Grain in the Case of Buno Bedele Zone

Brief Status of Activity

The activity has been planned to conduct in three districts namely, Bedele, Chora and Dabo Hana of Buno Bedele zone. Purposive sampling method was used to select representative districts based on their maize production potential. A semi-structured questionnaire was prepared to collect primary data from maize producers. However the implementation of this activity was only 3 present and so it needs critical attention to complete within the proposed timeframe. The remaining activities will be Questionnaire development for other maize value chain actors more than maize producers, Kebele identification and selection, Maize value chain actor's identification and selection, Data collection, Data encoding, sorting, grouping analysis and full write up will be conducted.

4.13 Seed Research and Technology Multiplication Research Team

At the Bedele Agricultural Research Centre, teams of crop researchers (Cereal, pulse and oils) conducted crop adaptation trials based on crop potentials in various agro ecologies in the study areas. Based on this, the adopted crop varieties were recommended and the seed was kept for future research and multiplication on various research locations and agricultural fields with a limited number of resources (human resource, budget…). Farmers, agricultural extensions (development agents and other subject matter experts), and researchers must all work together to introduce novel crop verities into the local seed system. To raise awareness and promote the adoption of new crop varieties and developed/adapted agricultural technology into the farmer-based seed system, our Centre employs demonstration and popularisation approaches with different stallholders (zones, Woreda's, unions and Seed regulatory body). In accordance with this, we carried out a farmers-based seed multiplication

by cluster on selective crop varieties, such as tef (Kora) and bread wheat on Sanate and Dambal at Chora district. Farmers possessed about 130 quintals of tef and 200 quintals of bread wheat varieties, and Sadetan Chora union purchased the seeds. The other seeds were kept on hand for future research projects, such as seeds for experiments, demonstrations, and larger-scale production.

Table 33.Planned and Achievement of basic technology multiplication

S/N	Crops (Variety)	Seed class	Planned		Achievements	
			Area(ha)	Yld (Qt)	Area (ha)	Yld (Qt)
1	Tef (Kora & Dursi)	Basic	18	170	18	170
2	Bread wheat (Sanate)	Basic	10	200	10	200
3	Maize (BH-547)	Grain	11.5	360	11.5	360
4	Hot Pepper (Marko Fana)	Dry pods	0.25	1	0.25	1
5	Finger millet (Boneya)	Basic	0.09	3	0.09	3
6	Haricot Bean (SER-125/119)	Basic	0.635	14	0.635	14
7	Soybean (Kata)	Basic	0.5	14.5	0.5	14.5
8	Oats (Bonsa)	Basic	0.06	1.5	0.06	1.5
9	Sweet lupine (Walala)	Basic	0.5	6	0.5	6
	Total		41.5	890	41.5	890

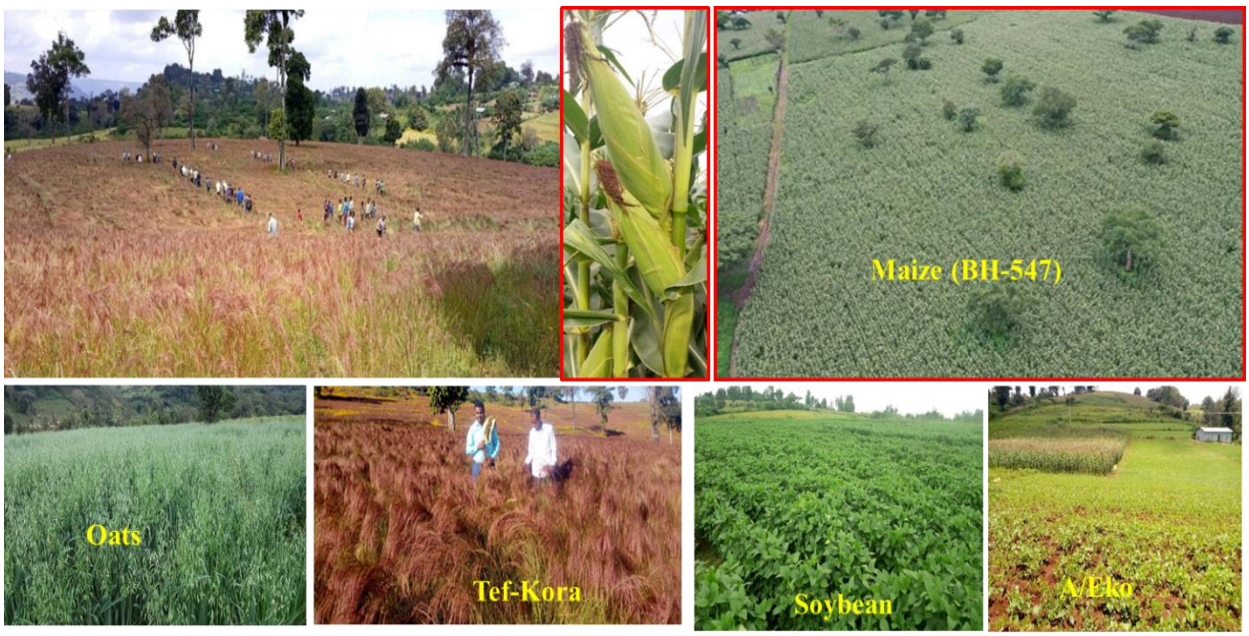

Figure 14.Some photos of Crop Technology Multiplication

3.14 Irrigated Wheat Project

Attention for irrigated wheat production was triggered with an attempt for off-season accelerated early generation seed production of stem rust resistant wheat varieties. The irrigated wheat farming widely undertaken in the Oromia Regional State should be expanded to all zones in order to ensure food self-sufficiency of the region and the country. Based on this initiative, the Bedele Agricultural Research Center of the IQQO multiplied the certified (C1) seeds of the bread wheat varieties by irrigation in the Chora district during the cropping season of 2015. On 10 hectares of farmer land, the certified (C1) seed of bread wheat variety kingbird was multiplied by cluster approach and harvested with 410 quintals that was possessed to cluster farmers.

Figure 15.Irrigated wheat at Chora district

5. Training Provided to SMS, DA'S and Farmers in this Fiscal Year

S/N	Research Process/Team	Annual Plan (P)	Achievement (I)				% (P/I)
			SMS	DA's	Far	Tot	
1	Crops (Cereals, Pulse and Oils, Crop protections)	286	81	20	295	396	**151**
2	Coffee and Tea management, protection						
3	Livestock (Animal feed and Apiculture)						
4	Natural Resource (Soil Fertility, AF, SWC, Water shed mgt.)						
5	Agricultural Extension						
6	Irrigated wheat project		8	3	25	36	
	Total	**286**	**89**	**23**	**320**	**432**	

Figure 16.Training provided to SMS, DA'S and Farmers in this fiscal year

6. Number of FRG established and members participated on Technology promotion

S/N	Title	FRG'		Numbers of FRG Members				
		New	Total	Adult (M)	Adult (F)	Youth (M)	Youth (F)	Total
1	PED of food barley technologies	5	5	60	16	14	-	90
2	PED of midland maize and sorghum technologies	4	4	45	10	5	-	60
3	Pre-scaling of tef technologies	3	3	30	6	9	-	45
	Total	-	12	12	135	32	28	195

7. Type of technologies demonstrated, number of stakeholders and famers participated

Technology	District	Farmers				DA's			Others		
		Adult (M)	Adult (F)	Youth (M)	Total	Male	Female	Total	Male	Female	Total
PED Food Barley	Gechi	98	20	17	135	7	4	11	36	8	55
Pre Scaling up of Tef	Chora	72	10	8	90	4	2	6	23	4	33
PED of Maize, sorghum	Dabo Hana	45	10	5	60	3	2	5	17	5	27
Technology Multiplication (tef, soybean, haricot bean, finger millet)	Cora, Ilke research sub site	15	5	10	30	3	1	4	30	15	45
Total		230	45	40	315	17	19	26	106	32	155

Figure 17.Type of technologies demonstrated and field Days Conducted

8. Research Articles published by different research teams in this FY

S/N	Team	Article Title	Type
1	Cereal Crops	Performance Evaluation of Food Barley (*Hordeum vulgare* L.) Varieties for Grain Yield and Other Agronomic Traits in Buno Bedele, South West Oromia, Ethiopia.	Journal
2	Cereal Crops	Performance Evaluation of improved Food barley varieties at Chora and Gechi districts	proceeding
3	Cereal Crops	Performance Evaluation of improved Sorghum varieties at Chora Dabo Hana and Gechi districts	,,
4	Cereal Crops	Performance Evaluation of improved Midland Maize varieties at Dabo Hana district	,,
5	Pulse and Oil Crops	Performance Evaluation of improved Haricot bean varieties at Bure and Dabo Hana districts	,,
6	Pulse and Oil Crops	Performance Evaluation of improved Sesame varieties at Bure and Dabo Hana districts	,,
7	Horticultural Crops	Performance Evaluation of Irish Potato (Solanum tuberosum L.) Varieties for Tuber Yield in Buno Bedele, Southwestern, Ethiopia.	,,
8	Coffee and Tea Magt and Protection	Assessment of Weed Flora Composition in Coffee *(Coffee arabica* L.) Farms at Buno Bedele and Ilu Aba Bora, South Western Oromia, Ethiopia	Proceeding
9	Coffee and Tea	Current status of major Coffee (*Coffee arabica* L.) Diseases in Buno Bedele and Ilu Aba Bora, South Western Oromia, Ethiopia	,,
10	Magt and Protection	Survey of major Coffee (*Coffee arabica* L.) Insect Pests in Buno Bedele and Ilu Aba Bora, Southwestern Oromia, Ethiopia	,,
11	Coffee and Tea	Land Suitability Evaluation for Tea Cultivation using Geographic's Information System (GIS) and analytical hierarchical process (AHP) in Selected Districts of	,,

		Buno Bedele, Southwest Ethiopia	
12	Magt and Protection	Land Suitability Evaluation for Tea Cultivation using Geographic's Information System (GIS) and analytical hierarchical process (AHP) in Selected Districts of Ilu Abba Bora, Southwest Ethiopia	,,
13	Coffee and Tea	Land Suitability Evaluation for Tea Cultivation using Geographic's Information System (GIS) and analytical hierarchical process (AHP) in Selected Districts of Jima Zone, Southwest Ethiopia	,,
14	Soil Fertility Improvement	Verification of Soil Test Crop Response Based Phosphorous Recommendation for Tef in Dega District, Western Oromia	"
15	Soil Fertility Improvement	Verification of Soil Test Crop Response Based Phosphorous Recommendation for Bread Wheat in Dega District, Western Oromia	"
16	Soil Resource Survey	Characterization, Classification and Mapping of Soils of Bedele District, South West Ethiopia	
17	Agricultural Extension	Pre-Extension Demonstration and Evaluation of Improved Tef Technology in Chora District of Buno Bedele Zone, Southwestern Ethiopia	"
18	Agricultural Extension	Cluster Based Pre-Scaling up of Soil Test Based Recommended Fertilizer Rate for Maize in Dabo Hana District of Buno Bedele Zone, Southwestern Ethiopia	"
19	Aminal Forage	Adaptation trial of Oat (Avena sativa) Varieties in Two Agro-ecologies of Buno Bedele and Ilu Abba Bor Zones, South Western Oromia, Ethiopia	"

9. Human Resource and Center Development Works

An institution should spontaneously and absolutely strengthen the competence of its personnel in order to effectively implement plans and goals toward achieving its objectives and goals. After all, institution personnel resources are its most important asset. Our Center carried out the principal activities listed below under capacity building and human resource development:

Table 34.Total number of employees/Researchers on long term training

S/N	Research Process/Team	Educational level	Started in 2015		Started in 2014		Started in 2013		Total	
			M	F	M	F	M	F	M	F
1	Pulse & oil crops	MSc	1	-	-	-		-	1	-
2	Crop Pathology	MSc	1		-	-	-	-	1	-
3	Coffee Imp.	MSc	-	-	1	-	-	-	1	-
4	Accountant			1						1
Total			**2**	**1**	**1**				**3**	**1**

Table 35.Number of Researcher/staff Participated on short term training in this fiscal year

S/N	Team	Title	Number of participants	Place of training	Duration
1	Soil Resource Survey	R-Software & Partial budget Analysis	1	EIAR	Five (5) days
2	Cereal Crops	Training of Plant Breeders on Advanced Plant Breeding with major focus on Mating Designs	2	Adama	Six (6) days
3	Horticulture, Protection, and Agricultural Extension	Giving full information for farmers on any Agricultural information through 8028 SMS	3	Adama	Three (3) days
4	Soil Testing	AAS and Food Lab. Accreditation	2	Batu	Finfine, Batu
5	All Staff	Standard planning and evaluation of the Achievements	50	BeARC	1 day
		Awareness creation and training on staff handling and work ethics	55	BeARC	1 day
Total			**63**		

Table 36. Total human resource of the Center by gender and Educational levels

S/N	**Team**	**PhD**		**MSc**		**BSc/BA**		**Diploma**		**Certificate**		**Others**		**Total**	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F
1	Researcher	-	-	6	-	18	-	1	1	1	-	-	-	26	1
2	Supportive	-	-	-	-	5	8	8	3	8	-	-	-	21	11
Total				**6**		**23**	**8**	**9**	**4**	**9**	**-**	**-**	**-**	**47**	**12**

10. Other activities carried out related to human resource development

The work being done by the Development and Human Resource Management Team in the Center was properly explained to the monitoring and evaluation team from OARI. Our Center experienced personnel have discussed their experiences with the OARI through a variety of

channels (telephone, email and direct discussion). In order to solve the issue with OARI and Center structures relating to JEG, the center worked and participated as a member by nominating a committee member. Our Center was well done on the volunteer efforts to clean up the offices, city, and campus and for the free seedlings planted as a part of the green legacy. For the advancement of researchers, the researcher promotion committee needed data compiled and reviewed, as well as documents from five researchers given to OARI. Coordination and execution of the annual performance evaluation from the general center operations to the specific employee was carried out. The operations of the records and document storage department are being done legally. The efficient implementation of security and property management tasks at research stations as well as office locations has aided the success of capacity building initiatives.

11. Center development activities performed in this fiscal year

Since 2012 E.C., the Bedele Soil Research Center has been upgraded into to the Bedele Agricultural Research Center (BeARC), which has an innovative research process and teams to deliver sound full agricultural technologies by adopting, generating, multiplying, and disseminating to end users with a limitation of many resources like human power, vehicles, offices, furniture, land settlement and the like. One of the most rigorous plans for sustainable land use planning, increasing agricultural production, and sustaining environmental sustainability was the project's provision of our soil laboratory with the necessary lab equipment.

Our center got support from of the AGP-II project in order to provide office maintenance and renovation solutions for the prominent issues mentioned above. With excellent supervision from the Regional Coordinated unit of AGP-II-IQQO, our center also had shown a high level of commitment, cooperation, and performance in three years of this marvelous construction which covers a land of 557 square meters. Almost 13.4 million Ethiopian Birr were spent by this project in total on this spectacular building with spectacular Basement plus Ground One (B+G+1) building including different 35 classrooms (offices, halls, cafeteria, stores, laboratory, baths and toilets) showed as in figure below. A further 2000 square meters of land were secured for additional construction and for enlarging the office space.

However, attention must be paid by our higher institution (IQQO) to managing and planning for other infrastructures (such as buildings, offices, laboratories and warehouses). Research

sub-sites covering 55.33 hectares, identified as Dhaye, Ilke, Agalo Eko, Toli cheka, Bido Jiren, and Sekko, were procured, and the site plan was handed over.

Figure 18.Photos of marvellous building of Bedele ARC and land owned by the center

However, the woredas have just taken hold over around ten hectares (10 ha) of the Dhaye (Dabo Hanna) research sub site. These sites are located in the districts of Dabo Hana, Bedele, Mettu, Bure, and Gechi, respectively. All of these study sites will require a significant deal of maintenance to completely fence it in order to provide their full functionality.

The continuous performance of all research activities and other operations was accomplished by strong commitments and conversations with team leaders and the entire staff regarding preventing work disruptions brought on by a lack of resources. Three vehicles have been repaired and effectively implemented. Maintenance was made to a variety of equipment's. As a result, and 3 computers, 2 printers, shelves, chairs, and tables were bought this fiscal year.

12. Budget allocation and Its Utilization

Table 37.Utilization of different budget sources from IQQO and other projects

SN	Research Process/Teams	Planned	Utilized	% (P/U)
1	Cereal Crops	411,700	410,370	99.7
2	Pulse and oil Crops	465,300	463,602	99.6
3	Horticultural Crops	268,700	267,256	99.5
4	Crop Protections	474,700	473,278	99.7
5	Coffee and Tea	699,300	697,669	99.8
6	Animal Forage	380,000	378,927	99.7
7	Apiculture	198,000	196,377	99.2
8	Soil Fertility I and Soil Survey	576,800	575,003	99.7
9	Agroforestry	268,400	267,391	99.6
10	Socio-Economics	175,500	173,181	98.7
11	Agricultural Extension	331,200	330,244	99.7
12	Technology Multiplication	350,000	347,943	99.4
	Capital Budget	**4,599,600**	**4,581,241**	**99.6**
	Recurrent Budget	**9,534,051**	**8,244,881**	**86.5**
	Internal revenue	**477,203**	**471,931**	**98.9**
Budget allocated and utilized by Collaborative Projects				
	CALM P-4R	1,176,281	947,744	81.0
	GIZ-ISFM+	300,000	298,285	99.4
	AGP-II (Support for Fence construction)	269,000	269,000	100
	Irrigated Wheat	1,998,435	1,906,567	95.4
	FSRP	1,480,000	790,572	53.4
	AECFR	142,500	120,659	85.0

13. Monitoring and Evaluation Activities

In research M&E is highly crucial to ensure the quality of the research, and it is performed on a scheduled basis to evaluate the status of research activities, the method and quality of the data collection, achievements, the use of funding sources, and any challenges encountered. The head of the center planning unit and an interdisciplinary research team were indeed members of the center M&E committee. It has 7 members. This M & E activity was done on

a quarterly basis and takes into account all research that is done on-station and on-farm. Based on this, the M & E committee carried out rigorous oversights and evaluated the research projects carried out as intended. The committee also assessed the research's strengths, weaknesses, and limitations. The committee also evaluated the research activities' strengths, weaknesses, and limitations as well as the directions sent to the appropriate research teams. All research activities evaluated by committee under respective research teams were also reviewed at the center level for the management committee.

Figure 19.Monitoring and Evaluation Committee of Bedele Agricultural Research Center

14. Publicity

One of the top - notch ways to disseminate information and policymakers about our research technologies is via the media and social media advertising. Social media is not merely for broadcasting one-way promotions for our research in an attempt to "get more eyeballs." It's about two-way communication, which entails hearing what people have to say about research technologies done for the communities, responding to or commenting on what people have to say, asking for people's opinions and feedback on the technologies posted, and responding to people when they write comments on your posts so people feel a connection to the center and how these technologies work. Based on this, our research center promotes its research on news and documentaries on public platforms, including Facebook (OARI, BeARC, Zone Communication and OPO), OBN, Walta, Fana, Addis Media Network (AMN), and ETV televisions. We shared and promoted our research technologies with all the communities, Woreda experts, and other Zonal administrations. They provided constructive feedback,

testified, and expressed the want for further dissemination of research technologies for the large populations in the desired locations.

Figure 20. Photos of different media and social media of public plat forms

15. Cross Cutting Issues

Table 38.Implementation of the public service transformation tool package, leadership roles and activities, and manifestations of good governance

SN	Activities Planned	Units	Annual planned	Annual Implemented	% (P/I)
1	Team meeting	No.	12	10	80
2	Process meeting	No.	12	8	60
3	Management meeting	No.	12	10	83
4	M & E planned and implemented	No.	2	1	50
5	Partnership meeting with different stakeholders	No.	2	4	200
6	Work ethics and anti-corruption promotion committee meeting	No.	4	3	75

In terms of public supporting initiatives, 13,600 ETB has been given to those suffering from HIV/AIDS in kinds.

Table 39.Services provided in this fiscal year to different parties

SN	Type of Service provided	Units	Planned	Utilized	%(P/U)
1	People living with *HIV-AIDS* were Supported in kinds (double suffering)	No.	22	22	100
	M	No.	3	3	100
	F	No.	19	19	100
	✓ Powder and food oils	Birr	12,000	12,000	100
3	Training provided how to take a HIV-Viral load test timely	No.	22	22	100
4	Training was provided how to take a tablet	No.	22	22	100

Figure 21.Services provided to People living with HIV-AIDS

14.1 Ethical Promotion Activities

14.1.1 Key activities during the plan year regarding ethical promotion activities

In accordance with the Council Forum on Crime Prevention and Anti-Corruption and Promotion of Good Ethics, our center now feels more responsible. In order to make sure that the government budget is solely used for the purpose at hand and that it can deliver the required results, asset and financial monitoring and auditing have been conducted. When there is a lack of funds, the employees also execute the work by forgoing personal benefits like paying for daily compensation and travel costs out of pocket. To ensure that the equipment provided to the workers was handled properly and used for working purposes, various types of monitoring were carried out. Additionally, through discussions with the staff, a focus on bettering equipment management has been made. Employees have been made aware of any newly identified rules and regulations.

The anti-corruption and ethical development council's monitoring and assistance at all levels has improved workplace ethics and efficiency, which improves the delivery of services in most areas. At various times, on-going training on the efforts being taken to ensure that employees uphold workplace cultures and ethics was conducted. An action plan for 2015 has been created after the performance of the Crime Prevention and Anti-Corruption Council has been assessed. A suggestion box has been set up in a noticeable location to gather grievances, and workers as well as outside organizations and customers have been asked for their

feedback and complaints regarding work ethics and service delivery. Corrective actions were performed as part of the on-going improvement in the regards based on the comments and complaints. The center celebrated the 16th annual Anti-Corruption Day at Center Level with all Staffs

Table 40.Table Performance of Ethical Promotion Activities of the Center

SN	List of main activities	Unit	Plan	Implanted	%(P/I)
1	Collect customer feedback on our services and analyse public satisfaction levels	Quarter	4	4	100
2	Monitoring the use of the government's budget to ensure that it is put to good use and produces the desired outcomes	Monthly	12	12	100
3	Observing how center staff use government equipment and materials to ensure that they are solely used for office tasks	Report	X	X	X
4	Assess any potential ethical dilemmas or difficulties at work, and respond right away if they arise	Quarter	4	4	100
5	Support the ethics and anti-corruption councils of the Center; establish a schedule for debating any ethical issues and processes for resolving them if they arise	Quarter	4	4	100
6	Monitor presence and application of important laws, rules, and regulations	Quarter	4	4	100
7	Collaborate with various groups to encourage moral conduct and a sense of responsibility at all levels in the center	Quarter	4	4	100
8	If any corruption offense has been committed, is suspected of having been committed, or if any third-party complaints have been received, they will be registered and submitted to the center director and OARI	Monthly	X	X	X
9	Keep track of and make corrections to internal and external audit reports	Monthly	-	-	-
10	Employee ethics, those who set an example at work, those whose disciplinary infractions have been advised and who have received disciplinary punishment	Good modal,	-	-	-
		Advised	-	-	-
		Punished	-	3	-
11	Receive and give feedback	Face-to-face	-	-	-
		Telephone	-	-	-
		Written	-	-	-

14.2 Job creation activities for unemployed community groups

Table 41.Job Opportunities on Technology Utilization Created for Unemployed Youth

SN	List of Activities Planned	Units	Annual planned	Implemented	%(P/I)
1	Coffee nursery management	No.	80	61	96
2	Contract for sites guarding	No.	12	12	100
3	Harvesting and Trashing	No.	255	275	122
Total		No.	347	348	100

16. Citizenship Services Provision in this Fiscal Year

The Bedele Agricultural Research Center (BeARC) believed that encouraging the habit of giving back to the community without expecting compensation was vital. Based on this information, our center offered a range of important citizenship services to work toward the objectives shown in the table below, which include maintaining sustainable growth and improving the level of living in the communities.



Figure 22.Different public services provided by the staff members

About 15 quintals of maize grain have been delivered to the drought-stricken Borena people.

Table 42.Types of Services provided for this fiscal year

SN	Type of Service provided	Units	Planned	Utilized	%(P/U)
1	Drought problems occurred in Yabello APRC	Birr	20,000	20,000	100
2	Poor farmers and HIV-AIDS Carriers	Birr	73,600	73,600	100
3	Health Insurance for poor farmers	Birr	3,300	3,300	100
4	Bedele ARC Compound Clearing	Estimation	7,000	6,600	94
	Human power Involved	No	41	21	51
	M	No	35	18	51
	F	No	6	3	50
5	Sowing and weed management	Estimation	11,000	9,800	89
	Human power Involved	No	40	22	55
	M	No.	32	20	63
	F	No.	8	2	25
6	Harvesting and Threshing	Estimation	20,000	18,000	90
	Human power Involved	No	52	45	87
	M	No.	40	35	88
	F	No.	12	10	83
	Planting Trees	Estimation	10,500	9,800	93

	Human power Involved	No	40	38	95
	M	No.	32	30	94
	F	No.	8	8	100
7	Peoples with suffering of disease	Cash	15,000	15,000	100
Total			**160,400**	**156,100**	**97**

Figure 23.Tree planted and well managed by Bedele ARC staff starting from 2011-2015 E.C

17. Major Problems Encountered in this fiscal year

Table 43. list of major problems encountered and possible solutions given in this FY

SN	Problems encountered	Efforts made to address the problems	Recommended solution must give by Institute
1	Lack of Human power	✓ Doing additional works ✓ Use as a contract (operator) ✓ Doing overtime & weekends ✓ Received from other center	✓ Hiring New workers on time from the market
2	Shortage of Budget	✓ Used by saving ✓ Budget Reshuffling ✓ Effective communication with Finance head ✓ Sharing the budget from each teams	✓ Allocating the budget with respective of work load and also by consideration of newly upgraded Center
3	No Fences on Research Sub site	✓ Use local materials ✓ Use a field guard	✓ Budget allocation for angle iron
4	No shade on Research sub sites	✓ Use local materials ✓ Use a temporary shade	✓ Budget allocation
5	Lack of Field Guard	✓ Use a contract	✓ Hiring guards
6	Shortage of field vehicles	✓ Team work ✓ Using a transports ✓ Lending from sectors	✓ Purchasing field vehicle and bus services

7	Farm machineries	✓ Lending farm machineries ✓ Use oxen & man power	✓ Purchasing Furrow ridge, tractor trailer, sprays trailer, thresher, row planter…)
8	Boarder of sub site (10 ha)	✓ Mediation made with others	

18. Summary of Main Activities Scheduled for Upcoming 2015/16 Fiscal year

- ✓ For the forthcoming 2015/2016 crop season, work plan Center activities will be prepared.
- ✓ For on-going and new research activities, various data collecting and recording will continue in accordance with the project plan.
- ✓ Based on the budget circumstances, experimental setups, site selection, urea application, weed management, sowing, and data gathering and recording will begin for new activities and other projects.
- ✓ The scheduled times will be implemented for monitoring and evaluation.
- ✓ Inspire and encourage all staff to participate in various discussion workshops, hold team meetings, and meticulously record and document all working
- ✓ According to schedules, a thorough write-up of all completed projects and
- ✓ Concept notes for the upcoming 2015–16 E.C. Fiscal Year will be accomplished.
- ✓ Field day will be conducted as planned for further research promotion

19. Action plan for Main activities for 2016 Fiscal Year Budget

Table 44.Table List of main activities planned for 2016 Fiscal Year

S/N	Major Activities Planned	Units	Achievement of 2015 E.C	Planned for 2016 E.C	Cascaded by Quarters			
					Q1	Q2	Q3	Q4
1	Conducting Research Trials	No	60	102	96	4	2	-
2	Technology Generation	No	19	20		20	-	-
3	Crop Technology Multiplication	No	11	41	41	-	-	-
4	PED of Research activities	No	3	6	6	-	-	-
5	Pre-Scaling up Research activities	No	1	2	2	-	-	-
6	Provision of Training	No	195	149		-	64	85
7	Job Creations	No	337	420	165	93	105	57
8	Ethical Promotion	No	11	11	3	2	3	3
9	HIV/AIDS and Gender	No	20	25			25	
10	M and E Activities	No	1	2	1	1	-	-
11	Citizens ships Services	Birr	**111,900**	**197,870**	**97,420**	**36,250**	**51,800**	**12,400**
12	Internal Revenue	Birr	**327,552.81**	**505,000**	**37,340**	**54,800**	**320,000**	**92,860**
13	Hiring of Human R	No	2	36		36		

Table 45.Research Activities (on going, Extended & New) Planned by IQQO for 2016 EFY

S/N	Research Teams	Number of Activities
1	Cereal	8
2	Pulse & Oil	7
3	Horticultural	10
4	Pathology	4
5	Entomology	2
6	Weed Science	1
7	Coffee & Tea M&P	7
8	Coffee & Tea Improvement	6
9	Animal Feed	5
10	Apiculture	1
11	Soil Fertility	3
12	Soil Resource Survey	11
13	Soil and Water Conservation and Watershed Management	2
14	Agroforestry	4
15	Socio Economics	4
16	Agricultural Extension	6
	Total	**81**
S/N	**Research Activities funded by projects for 2016 EFY**	**Number of Activities**
1	CALMP4R (Natural Resource)	**8**
2	FSRP (Crops, Agricultural Extension, T/Multiplication)	**7**
3	GIZ-ISFM (Soil Fertility Improvement)	**2**
4	AECFR (Soil Fertility Improvement) (	**3**
5	ECONUT (Soil Fertility Improvement)	**2**
6	ATI (Soil Fertility Improvement)	**1**
	Total	**23**

Table 46.List of Research Activities (on going, Extended & New) Planned by IQQO budget for 2016 EFY

Research Teams	Titles of Research Activities planned for 2016 EFY	Status
1. Cereal Crops		
1.1	Adaptation Trial of Malt barley varieties	
1.2	Bread wheat Regional variety trial	
1.3	Food barley Regional variety trial	
1.4	White Seeded Tef PYT	
1.5	Brown Seeded Tef PYT	
1.6	Upland Rice Adaptation Trial	
1.7	Lowland sorghum Adaptation trial	
1.8	Response of food barley variety to NPSB and Seed rate	
2. Pulse and Oil		
2.1	Linseed Adaptation Trial	
2.2	Groundnut Adaptation Trial	
2.3	Kabuli Type Chickpea Adaptation Trial	
2.4	Effect of Blended NPSB Fertilizer Rates and Varieties on Yield and Yield Components of Haricot Bean	
2.5	Field pea Adaptation Trial	
2.6	Small seeded white common bean Adaptation Trial	
2.7	Effect of NPSB and plant population on yield and yield components of Soybean varieties at Bedele	
3. Horticulture		
3.1	Adaptation Trial of Onion (Allium cepa L.) Varieties	
3.2	Adaptation Trial of Orange Fleshed Sweet Potato (Ipomoea batatas L.) Varieties	
3.3	Response of Potato to Inter NPSB Fertilizer Rate and Row Spacing in Buno Bedele Zone	
3.4	Adaptation Trail of Fenugreek Varieties	
3.5	Adaptation Trial of Garlic Varieties	
3.6	Adaptation Trial of Head Cabbage varieties	

3.7	Adaptation Trial of Black cumin Varieties	
3.8	Adaptation Trial of Banana Varieties	
3.9	Adaptation Trial of White Fleshed Sweet Varieties	
3.10	Response of Hot pepper NPSB and N Fertilizer rates	
4. Crop Pathology		
4.1	Survey and Quantify Major Diseases of Fruit Crops at Buno Bedele, Ilu A. Bora and Jimma Zones of south Western	
4.2	Survey of Major Diseases of Vegetable Crops in Buno Bedele, Ilu Aba Bora and Jimma Zones of South Western Oromia.	
4.3	Effects of Fungicides and Seedbed preparation Methods on Seed borne fungi and different growth stages of Hot pepper diseases at Ilu Aba Bor and Buno Bedele Zones	
4.4	Identification of Viciae Species Responsible to Cause Faba Bean Gall in South western Ethiopia	
5. Crop Entomology		
5.1	Survey and Quantify Major Insects Pestes of Fruit Crops at Buno Bedele, Ilu A. Bora and Jimma Zones of south Western	
5.2	Survey of Major Insect Pests of Major Cereal Crops in Buno Bedele, Ilu Aba Bora and Jimma Zones of South Western Oromia	
6. Crop Weed Science		
6.1	Effects of Various Weeds management practices on yield and components of Tef at Buno Bedele Zone.	
7. Coffee & Tea Management & Protection		
7.1	Effect of spacing on yield and quality of Coffee (Coffea arabica L.) - Enset (Ensete ventricosum) Intercropping.	
7.2	Effects of different rate of Vermicompost on growth of Coffee Seedlings in Buno Bedele zone	
7.3	Effect of Intercropping Coffee (Coffee Arabica L.) with Banana (Musa spp.) on	
7.4	Coffee yield and yield components in Buno Bedele and Ilu Abba Bora Zones	
7.5	Effect of Intercropping Coffee (Coffee Arabica L.) with Avocado (Persea americana Miller) on Coffee yield and yield components in Buno Bedele and Ilu Abba Bora Zones	

7.6	Effect of Coffee husk Compost on acid soils on Coffee yield and yield components in Buno Bedele and Ilu Abba Bora Zones	
7.7	Cluster Based Demonstration on Coffee for coffee growers at Buno Bedele zone, south western Oromia	
7.8	Effect of Integrated Fertilizer on Coffee Yield and Yield Components in Buno Bedele and Ilu Aba Bora zones	
8. Coffee and Tea Improvement		
8.1	Collection, Evaluation & Characterization of Coffee landraces in B/B & I/A/B zones	
8.2	Adaptation of Improved Coffee Varieties at Buno Bedele zones	
8.3	Adaptation trial of Tea (Camellia sinensis (L.) Clones in Buno Bedele Zone	
8.4	Coffee Quality Profile Mapping for Buno Bedele Zone	
8.5	Coffee Seed Maintenance on Station	
8.6	Studies on the genetic variability of Buno Bedele Coffee (Coffee arabica L.) landrace in South western Ethiopia	
9. Animal Feed		
9.1	Adaptation trial of Desho Grass (Pennisetum pedicellatum) cultivars in different agro-ecologies of Buno Bedele and Ilu Aba Bor Zones, Western Oromia	
9.2	Adaptation Trial of Alfalfa (Medicago sativa) Varieties at High and Midland agro ecologies of Buno Bedele Zone, South Western Oromia	
9.3	Adaption trial of Lablab (Lablab purpureus) Varieties at Lowland areas of Buno Bedele and Ilu Abba Bor Zones, South Western Oromia	
9.4	Adaptation Trial of Brachiaria Grass cultivars at Midland areas of Buno Bedele Zone, South Western Oromia	
9.5	Adaption trial of Vetch (Vicia sativa L.) varieties at Midland areas of Buno Bedele and Ilu Aba Bor Zones, South Western Oromia	
10. Apiculture		
10.1	Establishing flora calendar of Buno Bedele and Ilu Abba Bora zones, south western Oromia	
10.2	Honey production system in Bedele and Ilu Abba Bora zones	

11. Soil Fertility Improvement		
11.1	Soil Test Crop Response Based Phosphorus Calibration Study for Maize in Mettu District	
11.2	Verification of soil test crop response based calibrated phosphorous for tef in Gechi District of Buno Bedele Zone, West Oromia, Ethiopia	
11.3	Preparation and Characterization of vermicompost nutrient contents prepared from different sources of organic materials	
12. Soil Resource Survey		
12.1	Characterization, Classification and Mapping of Soil Resources in Gechi District	
12.2	Characterization, Classification and Mapping of Soil Resources in Borecha District	
12.3	Characterization, Classification and Mapping of Soil Resources in Didesa District	
12.4	Land suitability Evaluation for Major Agricultural Crops using GIS-based Multi Criteria approach in Borecha, Didesa and Gechi districts of Buno Bedele Zone	
12.5	Land suitability Evaluation for Major Agricultural Crops using GIS-based Multi Criteria approach in Bedele, Chora and Dabo Hana districts of Buno Bedele Zone	
12.6	Fertilizer Requirement Mapping for Maize in Bedele District of Buno Bedele Zone	
12.7	Fertilizer Requirement Mapping for Maize in Chora District of Buno Bedele Zone	
12.8	Fertilizer Requirement Mapping for Maize in Dabo Hanna District of Buno Bedele Zone	
12.9	Fertilizer Requirement Mapping for wheat in Chora District of Buno Bedele Zone	
12.10	Fertilizer Requirement Mapping for Wheat in Gechi District of Buno Bedele Zone	
12.11	Fertilizer Requirement Mapping for Tef in Chora district of Buno Bedele Zone	
13. Soil and Water Conservation and Watershed Management		
13.1	Effects of Tillage Frequency on Selected Soil Properties, Maize Yield and Yield Components in Bedele District, South Western Ethiopia.	
13.2	Evaluation of the Effectiveness of soil and Water Conservation Practices Improving selected Soil Properties, Maize Yield and Yield Components in Dabo Hana District, south western Ethiopia.	
14. Agroforestry		

14.1	Adaptation and growth performance of Moringa stenopetala and Moringaoleifera in Buno Bedele Zone	
14.2	Assessment, Characterization and Mapping of Gerba Dima and Gaba forest in Ilu Abba Bora and Buno Bedele Zones, South West Ethiopia	
14.3	Characterization of Trees and Shrubs Species Diversity of Gerba Dima and Gaba Forest in Ilu Abba Bora and Buno Bedele Zones ,South West Ethiopia	
14.4	Adaptation and Growth performance of multipurpose trees/ shrubs in Buno Bedele Zone	
15. Socio Economics		
15.1	Analysis & Characterization of Farming System in Bu/Bedele Zone	
15.2	Value Chain characterization in Bu/Bed. Zone	
15.3	Coffee Value Chain Analysis in Buno Bedele Zone of South Western Oromia	
15.4	Assessment of Soil Fertility Management Practices in Buno Bedele Zone	
16. Agricultural Extension		
16.1	Pre Extension Demonstration of improved Sorghum in Dabo Hana district	
16.2	Pre-scaling up of Improved Bread Wheat in Chora and Gechi district	
16.3	Pre Extension Demonstration of Improved Irish Potato Gechi district	
16.4	Pre Extension Demonstration of Improved Sesame in Dabo Hana and Bure district	
16.5	Pre scaling up of Improved Food Barely Chora district	
16.6	Pre Extension Demonstration of Improved Oats grass in Chora and Gechi districts	

Table 47.List of Crop Technology Multiplication (basic seeds) Planned for 2016 EFY

Crop Types	Variety	Seed class	Area (Hek) planned	Expected yield qt/ha	total expected yield (Qt)
Sorghum	Melkam	Basic	1	20	20
	Fadis01	Basic	1	20	20
Finger millet	Gute	Basic	0.25	8	2
	Urji	Basic	0.25	8	2

	Boneya	Basic	0.25	8	2
	Wama	Basic	0.25	8	2
Tef	Kora/Dursi	Basic	5	10	50
	Dursi	Basic	5	10	50
Bread wheat	Sanate	Basic	0.5	40	20
	Dambal	Basic	0.5	40	20
	Kingbird	Basic	1	40	40
Food barley	Adoshe	Basic	0.5	25	12.5
	HB 1966	Basic	0.5	25	12.5
Soybean	Kata	Basic	4	20	80
	Chari	Basic	4	20	80
	Dhidhessa	Basic	4	20	80
Haricot bean	SER 119	Basic	2	15	30
	SER 125	Basic	2	15	30
	Awash	Basic	1	15	15
Linseed	Kuma	Basic	0.5	10	5
	Bokoji 1	Basic	0.5	10	5
Ground nut	Babile1	Basic	0.125	10	1.25
	Bagudo	Basic	0.125		1.25

Sesame	Dicho/Yale/Obsa	Basic	0.25	5	1.25
	Yale	Basic	0.25	5	1.25
	Obsa	Basic	0.25	5	1.25
Hot pepper	Melka shote	Basic	1	1	1
	Awaze	Basic	1	1	1
	Marko Fana		1	1	1
Total Sum			38	415	587.25

Crop Types	Variety	Seed class	Planned	Total
Banana	Poyo, (dwarf Cavendish)	Suckers	Seed bed	400
Papaya	Solo varieties	Seedling	Seed bed	250
Avocado	Has	Seedling	Seed bed	200
Coffee	Buno wush	Seedling	Seed bed	2,000
	Yachi	Seedling	Seed bed	2,000
	Wush wush	Seedling	Seed bed	2,000
	74110	Seedling	Seed bed	2,000
Forage	Cowpea (bole/Adulala)	Basic	0.05	1 (Qt)
	Oats (Bonsa)	Basic	0.05	1.5 (Qt)
	Desho grass	Cutting	0.09	100
Sweet lupine	Walala (Green manure)	Basic	3	100kg
Vermi worm	Eisenia fetida (Red colour)	Red	5 boxes (6 m3)	50kg

Prepared by
Name: _____
Signature: _____
Date: _____

Approved by
Name: _____
Signature: _____
Date: _____

Figure: Photos of some Technology Multiplications during 2015 E.C Cropping Season

Figure: Soybean basic seed Multiplication at Dhaye Research Sub site in cropping season of 2015/16 E.C

Figure: Soybean basic seed Multiplication at Dhaye Research Sub site in cropping season of 2015/16 E.C

Figure: photos of tef (Kora) basic seed multiplication by cluster approach at Chora district in 2015 EFY

Figure: Marvellous building of Bedele ARC (supported by AGP-II)