



Oromia Agricultural Research Institute

Yabello Pastoral and Dryland Agriculture Research Center

Annual Research Report, August, 2023

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1. Introduction

Yabello pastoral and dryland Agriculture Research Center is located in Yaba, Borana, Oromia; the center is located 570 Km south of Finfinnee on the Moyale-Mombasa asphalt road. The climate of the centre is arid and semi arid with erratic rainfall.

The center has a vision of becoming a center of excellence and seeing the improved livelihood of the pastoral and agro pastoral community by disseminating sustainable and innovative technology. The mission of the center is to increase agricultural production and productivity, reduce poverty and contribute to sustainable livelihoods of pastoralists/agropastoralists in Borana and West Guji by rehabilitating and protecting the natural resources of the region and adapting technology, generation, reproduction and dissemination of suitable technologies. Besides this; the center is currently coordinating southern cluster in Agricultural Transformation in Oromia with aim of bringing together various scholars from the University, Agricultural Research Center, District Agriculture and District Officials to improve and strengthen the economy and take parts in development of the country.

Since its inception, our center has been engaged in agro-ecology based, client-oriented, interdisciplinary, participatory research activities to generate/adapt various technologies (participatory) and integrated in a sustainable manner up to this date. The center has different research processes comprising different research teams as well as support teams. According to prosperity plan the center have a total of 60 activities planned for the 2015 fiscal year. However did 73 budgeted research trials, even though three (3) trials were not done due to prolonged drought occurred in Borana. So the center currently performs 70 trials of the 2015 trials. This is a good performance according to our center. Technology multiplication and center development process also are doing to their best.

2. General reseach performance and leadership

I. Leadership role

The center planned to perform 12 (monthly) management committee meetings throughout the year and we did more than 12. We planned quarerly meeting with all staff and we performed morethan four times. Regarding monitoring and evaluation of the research activities we planned four hoever we only did two. This is due to drought problems aand budget shortage.

II. Center development activities

In this year we finished and handover construction projects we have in the center. We completed fence which was late according to the agreemet and it was a headech of YPDARC and IQQO staffs. In addition to this we did simple maintainance like car and small ruminant farm eventhough not completed due to budget. Our fence was not full finished and we left with two kilometers open. So we need additional budget for this.

3. Activity Performance

3.1. Number of research activities planned and executed in the year (IQQO Funded)

No	Teams	Plan	Quarterly performance			Planning and Execution up to the quarter			percentage of annual plan execution	Number of activities completed		Nubere of activities (discont/Susp.)	
			plan	performance	Performance %	plan	performance	Performance %		quarter	Up to quarter	quarter	Up to quarter
1	Cereal	9	8	7	87.5	9	8	88.89	88.89	1	2	0	0
2	Pulse and oil	8	8	7	87.5	8	7	87.5	87.5	0	1	0	1
3	Horticulture and spice	6	5	6	120	6	8	114.28	114.28	0	2	0	0
4	Crop protection	3	3	3	100	3	3	100	100	1	1	0	0
5	Dairy Team	6	6	4	66.67	6	4	66.67	66.67	2	2	0	0
6	Meat Team	6	6	5	83	6	6	100	100	1	1	0	0
7	Animal Feed	5	5	3	60	5	3	60	60	0	0	0	1
8	Apiculture	3	3	3	100	3	3	100	100	0	0	0	0
9	Agroforestry	3	3	6	200	3	7	233.33	233.33	2	2	0	1
10	Soil fertility improvement	2	2	3	150	2	4	200	200	1	1	0	0
11	SWC and Watershed Management	0	0	2	100	0	2	100	100	0	0	0	0
12	Irrigation	1	1	1	100	1	3	300	300	1	1	0	0
13	Socio economics	2	2	3	150	2	3	150	150	3	3	0	0
14	Agricultural extension	6	6	8	133.3	6	8	133.3	133.3	4	4	0	0
Total		60	58	61	105	60	70	116.6	116.6	16	20	0	3

3.2. Number of research activities planned and executed in the year (Non-IQOO Funded)

No	Teams	Source of fund	Plan	Quarterly performance			Planning and Execution up to the quarter			percentage of annual plan execution	Number of activities completed		Nubere of activities (discont/Susp.)	
				Plan	performanc e	performanc e %	Pla n	performanc e	performanc e %		quarte r	Up to quarte r	quarte r	Up to quarte r
1	Pulse and oils	NEoBOTA B AGRIFAR M	1	1	1	100	1	1	100	100	0	0	0	0
2	Dairy	EIAR	4	2	2	100	4	4	100	100	1	1	0	0
3	Meat	EIAR,&PAP	4	4	4	100	4	4	100	100	1	1	0	0
		ICARDA,	1	1	1	100	1	1	100	100				
4	Animal feed	EIAR &PAP	4	4	3	75	4	3	75	75	0	0	0	1
5	Irrigation	Ministry of Agriculture	1	1	1	100	1	1	100	100	0	0	0	0
		LLRP	1	1	1	100	1	1	100	100	1	1	0	0
Total			16	14	13	92.8	16	15	93.7	93.7	3	3	0	1

4. General status of the activity in the center

4.1 Crop Research Process

4.1.1 Cereal research Team

Activity 1: Bread wheat Regional variety trail for Highland Areas of west Guji, southern Oromia

Brief status of the experiment

This experiment was started during 2019/20 and expected to be completed during 2022/23. Twelve genotypes with three standard checks were evaluated at Bule Hora and Abaya for three years (2019, 2021 and 2022). All Yield and yield related data was collected and analyzed by SAS software (version 9.0).

Pooled ANOVA indicated significant variation for yield and yield related traits

Table 1: Mean Square of ANOVA for Bread Wheat genotypes in 2019, 2020 and 2022

SV	Df	FD	MD	PH	NSPS	TSW	GYld(kg/ha)
Year	2	1120.4**	7168.6**	3578.35**	637.1**	13134.2ns	58513385.1**
Loc	1	21906**	117369.8**	246.6**	550.7**	38507.4ns	465255.3 ns
Rep (loc)	3	43.6**	43.1**	59.17**	3.3ns	13931.1ns	1219446.1**
Genotypes	14	57.6**	45.3**	176**	45.5ns	14894.1ns	1804808.2**
Loc*Gen	14	1.7ns	23.7ns	44.2ns	20.6ns	14343.1ns	312408.3 ns
Year*Loc*Gen	28	11.7*	14.1ns	50.5*	23.8ns	14554.6ns	161386.1ns
Error	207	5.94	15.6	24.3	28.4	14698.761	259269.8
Mean		58.88	112.2	67.50	36	42	3216.1
Cv		4.15	3.6	7.28	14	13.69	12.8

*Ns= non-significant**=highly significant, * = significant, df = degree of freedom, FD= flowering date, MD = maturity date, PH=Plant height, NSPS =number of seed per spike, TSW=thousand seed weight, GY=Grain Yield*

Table 2: Mean value of ANOVA for yield and yield related treats of Bread Wheat genotypes in 2019, 2020 and 2022

Treatment	FD	MD	PH	NSPS	TSW	GYield(kg/ha)
G1	61.8a	113.2ab	63.9ef	36.8abc	35.2b	3039.1def
G2	57.8bc	113.8a	64.2ef	35.6abc	35.7b	3154.2cdef

G3	58.7cb	111.2abc	65.6def	36.7abc	37.5b	3307.1abc
G4	58.2bc	112.4ab	66.3def	39.4a	35b	3233.7abcde
G5	58.2bc	112.8ab	71.7a	38.2ab	36.8b	3608a
G6	58.2bc	112.5ab	69abcd	37.6abc	35b	3133def
10STEMRR	62a	113.1ab	64.1ef	35.9abc	36.8b	3069.7def
Dure	55.2d	108d	70.2abc	34.7bc	32.1b	2856.3ef
261SEPTO	59.4bc	113.2ab	62.9f	33.6c	36.9b	3189.5bcde
491BWSN	59.5b	112.8ab	66.7cde	38.5ab	32.8b	3594.8a
Sanate	57bc	109.2cd	72.3a	36abc	89.8a	2779.2f
27HRWSN	57.6bc	113.8a	70.5ab	38.8ab	36b	3107.6def
Sofumar	61.2a	113ab	71.9a	36.9abc	33.4b	2962.8def
ABW(KLDS	59.1bc	110.2bcd	66.9bcde	38ab	37.2b	3561.1ab
34SAWSN	58.8bc	113.7 a	67bcde	36.2abc	35.9b	3517.7abc

From this experiment, it could be concluded that; Variation among 15 genotypes for most of the traits were observed. Three genotypes (491BWSN (CIMMTY) (#1059), ABW(KLDSN)#64 and 3WYCYT (CIMMTY) (P#7) where promoted to the next breeding stage (VVT).



Picture1: Performance of Bread wheat genotypes

Activity 2: Bread wheat variety adaptation trial for moisture stress area of Borana, Southern Oromia
Brief status of the experiment

Six bread wheat varieties were sown at Yabelo on station.

This experiment was started during 2019/20 and expected to be completed during 2022/23. Six varieties were evaluated at Yabello on station. Two years data (2019 and 2020) were collected while the experiment were affected by drought during 2021 and 2022 cropping seasons. During 2023, the experiment was planted at Yabello and was harvested in at the end of June. The summarized results will be presented after organizing and analyzing all collected data

Cereal crops Ongoing Actives

Activity 1: Effects of NPS and Nitrogen Fertilizer rate on Yield of Bread Wheat (*Triticum aestivum* L.) In West Guji, Southern Ethiopia
Status of the experiment

This experiment was started during 2021 and expected to be completed during 2023/24. In 2022/23, all necessary data were collected from Abaya. This experiment will be planted at both location with the same methodology in next September, 2023.

Sorghum (*sorghum bicolor*) Regional Variety trial
Status of the experiment

This experiment was started during 2021 and expected to be completed during 2023/24. 10 Sorghum genotypes including Standard Checks (Melkam) were sown at Yabelo, Teltele and Abeya. The experiment was planted at three location (Abaya, Yaballo and Taltelle) and currently the genotypes are at maturity stage. Data collection is ongoing



Picture 1: Sorghum RVT at Yaballo during 2023

Activity 3: Sorghum (*sorghum bicolor*) adaptation trial.
Status of the experiment

This experiment was started during 2021/22 and expected to be completed during 2023/24. Six Sorghum varieties including Standard Check (Melkam) was sown at Yabelo, Teltele and Abeya. During 2022/23. Currently it is at maturity stage at all location. Data collection is ongoing



Picture 1: Sorghum Variety adaptation trial at Yaballo during 2023

Activity 4: Evaluation of newly released Teff Varieties for Borana lowlands.

Year started: 2021/22

Expected year of completion: 2023/24

This experiment was started during 2021/22 and expected to be completed during 2023/24. Eight Teff varieties including local check was sown at Yabbelo and Teltele. The varieties are currently harvested and field data collection completed. Some yield related data is underway



Picture 1: Teff Variety adaptation trial at Yaballo during 2023

Cereal Crops Extended activities=2

Activity 1: Determination of appropriate (Intra and Inter) Maize (*Zea mays*.L.) Spacing for moisture stress areas of Borana, Southern Oromia

Started year: 2019/2020

Reason of Extension

This experiment was started during 2020 and expected to be completed during 2021/22. Due to severe drought during 2021/22 all necessary data were not collected and it was decided to be extended by one year during regional review forum. The experiment was sown at Yabelo on station during 2020, 2021 and 2022. During 2020, data was collected from Yabelo. During 2021 poor data was collected from Yabelo (due to moisture stress). During 2022, the experiment was totally affected by drought. During 2023 the experiment was planted at Yaballo and the crop is at harvesting stage. Therefore this experiment will be repeated in next cropping season

Expected year of completions: 2023/24

Activity 2: Bread wheat Regional variety trial for Moisture stress Areas of Borana Zone

Reason of Extension

This experiment was started in 2019/20 and expected to be completed in 2022/23. But due to drought in 2021 and 2022, the necessary data were not collected. Therefore it was decided to be extended by one year to fulfil the requirement of RVT.

Extension year needed: 1 year

Expected year of completions: 2023/24

4.1.2. Pulse and Oil crops Research team

Completed activities=1

Activity 1: Common Bean Variety Adaptation Trial

Brief Summary of Results

This activity was started in 2020 and expected to be completed in 2022. 14 recently released varieties were evaluated at three locations for three consecutive years (2020, 2021 and 2022 at Yabello, Taltele & Abeya). But the experiment at Taltalle and Abaya were totally affected by recurrent drought and relative performance of the crops at Yabello was good. Therefore, it was decided to complete this experiment by analyzing three years data collected from Yabello and recommend better performing varieties to specifically Yabello areas. Hence, the collected data was analyzed by using SAS software and the combined analysis of variance indicated variation for yield and most of yield contributed traits (Table 1). The mean performance of varieties indicated that Ado variety followed by Awash Mitin performed better than the others (Table 2) in Yabello climatic condition and recommended to the area for production.

Table 1. Mean squares from combined analyses of variance over three years for 6 traits of Common bean varieties grown at Yabello in 2020, 2021 and 2022 G.C

S/Var	DF	FD	MD	NPB	PH	PPP	GY
Year (Y)	2	4799.82	4548.389***	13.312***	11570.41***	1800.548***	48212733.93***
Varieties(V)	13	48.527	39.414**	0.898***	2670.65***	63.70***	489312.4**

Rep(Y)	6	2.984	160.889***	0.350	134.499	13.961	200255.49
Y*V	25	5.980	15.55128	0.790***	548.458***	47.460***	580849.3***
Error	76	10.94	17.38462	0.191	115.262	13.011	212901.4
CV		6.49	4.475	13.52	19.135	28.95	31.69

*ns, *, **&***, non-significant, significant, highly significant and very highly significant at $P<0.05$, $P<0.01$ and $P<0.001$, respectively. DF= degree of freedom, FD= days to flowering, GY = Grain yield in kilogram per hectare, MD= days to maturity, PH = plant height in centimeter, NPB= number of primary branches, PPP= pods per plant*

Table 2: Mean value of yield and yield related traits of 14 Varieties of Common bean tested at Yabello in **2020, 2021 and 2022 G.C** cropping season

Varieties	FD	MD	NPB	PHT(cm)	PPP	GY/ha
SER	55.778	92.89ab	2.8de	51.067	10.51de	1531.7a-d
Rori	54.222	94.78ab	3.13cd	59.844	13.62bcd	1663.5abc
Waju	52.667	93.44ab	3.78a	101.733	14.8bc	1345.4cde
Ramada	50.889	97a	3.15cd	80.756	9.13e	1337.3cde
Gagebe	50.778	92.56ab	3.62ab	46.044	12.37bcde	1746.1abc
Tatu	49.778	93.89ab	3.09cd	46.533	11.41cde	1393.9b-e
Gorosa	49.333	96.44ab	3.19bcd	63.678	13.91bcd	1038.9de
Brazil	49.333	89.56ab	3.45abc	50.478	10.13de	1284.9cde
Tafach	49.222	92.89ab	3.42bcd	43.844	10.31de	1634.4abc
KATB-9	49.222	92.78ab	3.13cd	37.867	11.42cde	1366.8b-e
Ada	48.889	92.33ab	3.13cd	40.356	8.67e	1521.9a-d
Ado	48.444	90.56ab	3.56abc	46.022	15.922b	1941.2a
Awash	48	81.92c	2.6e	70.358	12.30bcde	903.2e
AwashMetin	47.833	89b	3.22bcd	73.333	19.9a	1855.5ab
Mean	50.37	91.98	3.24	57.92	12.28	1446.24

Conclusions and Recommendations

From this experiment, it could be concluded that; Variation among 14 varieties of Common bean for most of the traits were observed indicating the possibility of selecting adaptable variety/ies for the study areas. Based on the mean performance of the varieties, Ado (1941.2kg ha⁻¹) followed by Awash Metin (1855.5 kg ha⁻¹) provided better grain yield at Yabello than other varieties and selected as promising varieties. Therefore, farmers and common bean producers in moisture stress areas of Yabello and similar agro ecologies can use those varieties for productions

IQOO Funded Ongoing activities=2

Activity 1: Influence of NPS Fertilizer Application rate on Yield and Yield Component of Common Bean (*Phaseolus Vulgaris* L.) Varieties at Southern Oromia
Brief Status of the activity

This experiment was started in 2021/2022 and expected to be completed in 2023/2024. During 2023, the experiment was planted at Yabello, Abaya and Teltellee. This experiment is currently at harvest stage and it is smoothly ongoing

Activity 2: Effect of Blended NPS Fertilizer Levels and Row Spacing on Yield and Yield Components of Chickpea (*Cicer arietinum* L.) at Bule hora, west Guji Zone

Brief Status

This experiment was started in 2021 and expected to be completed in 2022/23. The experiment was planted at Bule hora (Garba). Now, the crop is harvest and all necessary data was collected. The experiment is smoothly ongoing



Picture 1: performance of Chickpea at Garba

Pulse and oil crops extended activities =4

Activity 1: Small Red Common Bean Regional Variety Trial (2019)

Activity 2: Small Red Common Bean Regional Variety Trial (2020)

Activity 2: Small white Common Bean Regional Variety Trial (2020)

Activity 2: Speckled Common Bean Regional Variety Trial (2020)

This four experiments were sown at three location (Yabello, Teltelle and Abaya location) and expected to be completed during 2022. But, Due to drought in 2022, data were not collected from all locations. In 2023, those experiment was planted at all locations (Yabello, Taltalle and Abaya) and data collection is underway.

Suspended activity =1

Activity 1: Desi Type Chickpea Observation Nursery

Reason for suspension

This experiment was conducted at Bule hora during 201/22 cropping season and expected to be completed during 2022/23. About 74 Desi type Chickpea genotypes was collected from DzARC and planted by augmented design. But, all genotypes were not emerged (only check emerged). Therefore, the activity was decided to be suspend during annual regional review foram

Non IQQO activities

Activity 1: Adaptation and Verification Experiment on Macadamia Integrifolia for Local registration

Activity Title: Adaptation and Verification on *Macadamia integrifolia* for local Registration: Activity status: Ongoing

Source of Seedling: Kenya (KARI)

Year of start: 2019

Expected year of completion: 2022/23

Short summary of the activities

Macadamia varieties were 1st introduced from Kenya Agricultural Research Institute (KARI) in 2019 with the objective to test the performance and adaptability of new Macadamia varieties for local registration. The imported macadamia varieties were planted at three districts of East and West Guji zone (Shakiso NeoBOTAB company farm, Ambala wama and Bule hora on farmers land). The performance of the planted macadamia seedlings are good at all districts and give hope to register as new varieties in the country after completion of the performance evaluation of the crops. Currently, near to hundred thousand macadamia varieties were introduced by NeoBOTAB Agrifarm Company and planted on more than hundred hectares of land at Ambala wama district for further expansion and to directly deliver the macadamia products to Bulbula integrated agro-industry Park after completion of registration and verification.





Picture 1: Performance of Macadamia plants

4.1.3. Horticulture and Spice crops Research Team

Completed Activities (2)

Activity 1: Effect of spacing and NPS fertilizer rate on yield and yield components of Irish potato at Bule Hora

Source of fund: IQQO

Year started: 2020

Expected year of completion: 2022/23

Status of the experiment

The experiment was conducted at B/Hora (Gerba) site, and all necessary data were collected, and analyzed (three year data).

Table 1: Combined analyses of variance over three years for 15 treatments of Irish Potato grown at Bule hora in 2020, 2021 and 2022

SV	Df	PH	SC	MTw	UMtw	NtPPt	ATW	MYT/ha	UMYT/ha	TYT/ha
Rep	2	76.27ns	6.10ns	2.89ns	19.93*	3.21ns	0.01ns	99.12**	0.09ns	96.57**
treatment	14	122.95**	32.23*	2.53*	7.72ns	6.51**	0.05**	24.05**	0.27ns	27.26*
Year	2	1061.87***	4861.65***	275.63***	6.96***	303.82***	2.65***	172.90**	21.35***	78.07ns
Trt*Yr	28	91.11ns	28.63*	5.24ns	9.18ns	6.19ns	0.03ns	27.22ns	0.50ns	31.43ns
Error	88	76.32	16.34	4.64	7.95	4.68	0.01	20.54	0.42	22.85
Cv		16.46	16.61	26.88	16.34	17.72	6.84	21.89	11.52	18.82

$p < 0.01$; *significance at $p < 0.05$ ns=not significant; PH=plant height, SC=stand count, MTw= Marketable tuber weight, UMTw= Unmarketable tuber weight, NtPPt=Number of tuber per plant, ATW=Average tuber weight, MYT/ha=Marketable yield tone per hector, UMYT/ha=UNmarketable yield tone per hector, TMYT/ha=Total yield tone per hector., Trt= treatment, yr=year, CV=Coefficient of variation

Table 2: Combined Mean performance of yield and yield related traits of 15'n treatments of Irish Potato at Bule Hora during 2020, 2021 and 2022 cropping season

SV	PH	SC	MTWt	UMTWt	NTPP	ATWt	MYT/ha	UMYT/ha	Tyt/ha
260x85	61.62 ^a	24.22 ^{abc}	24.22 ^{abc}	6.26 ^{ab}	9.80 ^{aa}	0.57 ^{aa}	11.59 ^{ab}	1.35 ^a	37.75 ^{ab}
190x75	57.40 ^a	26.125 ^{abc}	26.125 ^{aa}	7.05 ^{aa}	9.20 ^{ab}	0.39 ^{bc}	12.06 ^{aa}	1.32 ^a	38.38 ^{aa}
0x65	56.46 ^a	25.77 ^{ab}	25.77 ^{ab}	5.03 ^{ab}	8.00 ^{abc}	0.26 ^{cc}	8.87 ^{ab}	1.17 ^a	25.04 ^{bb}
260x65	55.66 ^a	25.22 ^{abc}	25.22 ^{abc}	5.83 ^{ab}	7.53 ^{bb}	0.43 ^{bb}	9.65 ^{ab}	1.33 ^a	35.97 ^{ab}
50x75	54.44 ^a	25.66 ^{abc}	25.66 ^{abc}	5.58 ^{ab}	6.75 ^{cc}	0.32 ^{bc}	8.61 ^{ab}	1.20 ^a	34.74 ^{ab}
190*65	53.95 ^a	24.44 ^{abc}	24.44 ^{abc}	5.05 ^{ab}	8.13 ^{abc}	0.31 ^{bc}	8.75 ^{ab}	0.78 ^a	34.53 ^{ab}
50x85	53.88 ^a	22.11 ^{abc}	22.11 ^{abc}	4.11 ^{ab}	7.57 ^{bb}	0.31 ^{bc}	7.44 ^{ab}	1.07 ^a	33.35 ^{ab}
0*85	53.66 ^a	25.77 ^{abc}	25.77 ^{ab}	4.23 ^{ab}	7.66 ^{bb}	0.34 ^{bc}	6.59 ^{bb}	0.99 ^a	22.44 ^{bb}
120x65	51.71 ^a	26.11 ^{ab}	26.11 ^{aa}	5.15 ^{ab}	7.66 ^{bb}	0.28 ^{bc}	8.94 ^{ab}	1.12 ^a	35.05 ^{ab}
120x75	51.60 ^a	23.77 ^{abc}	23.77 ^{abc}	5.65 ^{ab}	8.71 ^{abc}	0.38 ^{bc}	10.33 ^{ab}	0.98 ^a	36.23 ^{ab}
260x75	51.50 ^{ab}	21.90 ^{bc}	21.90 ^{bc}	4.18 ^{ab}	7.48 ^{abc}	0.36 ^{bc}	7.12 ^{ab}	1.02 ^a	33.06 ^{ab}
190x85	51.22 ^{ab}	21.22 ^{cc}	21.22 ^{cc}	3.79 ^{bb}	7.44 ^{abc}	0.26 ^{cc}	7.44 ^{ab}	1.18 ^a	33.49 ^{ab}
50x65	50.20 ^{ab}	26.556 ^{aa}	26.55 ^{aa}	5.16 ^{ab}	7.62 ^{bb}	0.27 ^{cc}	9.35 ^{ab}	1.32 ^a	35.67 ^{ab}
120x85	46.75 ^{bb}	21.22 ^{cc}	21.22 ^{cc}	4.25 ^{ab}	6.66 ^{cc}	0.29 ^{bc}	8.12 ^{ab}	1.10 ^a	34.06 ^{ab}
0x75	46.28 ^{bb}	25.44 ^{abc}	25.44 ^{abc}	3.99 ^{ab}	7.02 ^{bc}	0.39 ^{bc}	6.63 ^{bb}	1.04 ^a	22.64 ^{bb}
Mean	53.04	24.3	5.004	44.3	7.80	0.34	9.02	1.1362	10.16

Means with the different letters indicate significant differences. ***Significance at $p<0.001$; **significance at $p<0.01$; *significance at $p<0.05$ ns=not significant; PH=plant height, SC=stand count, MTw= Marketable tuber weight, UMTw= Unmarketable tuber weight, NtPPt=Number of tuber per plant ,ATW=Average tuber weight, MYT/ha=Marketable yield tone per hectore, UMYT/ha=UNmarketable yield tone per hectore, TMYT/ha=Total yield tone per hectore., Trt= treatment, yr=year, CV=Coefficient of variation

The result of analysis of variance showed that Yield and yield contributing traits such as, PH ,SC, MTw, NTPPt, and ATW were highly significant among treatments and SC, MTw and TMYT/ha, were significant among treatments ,while UmTw and UmYt/ha were non-significant difference among the treatments and Most parameters such as , PH ,SC, MTw, UmTw, NTPPt, ATW, MYT/ha, UMYt/ha, were showed that very highly significant among the year and TMYT/ha were non-significant among the year. 190kg

NPSx75cm (38.38tone/ha) provided better yield than other treatments followed by 260kg NPSx85cm (37.75tone/ha) and the lowest yield were recorded from 0*85(22.444t/ha), 0x75(22.64t/ha) and 0x65(25.04t/ha).Economic feasibility and soil analyses is under way and Full report writing also underway.



Picture 1: Performance of Irish Potato

Activity 2: Black Cumin (*Nigella sativa* L.) variety adaptation trial at Bule Hora district of Guji zone

Source of fund: IQQO

Year started: 2020/21

Expected year of completion: 2022/23

Status of the experiment

Six Black Cumin varieties were sown at Bule Hora and all necessary data were collected and analyzed (three year data).

Table 3: Combined Mean square values of six Varieties of Black Cumin at B/Hora in 2020, 2021 and 2022 main cropping season. (ANOVA)

Variety	PH	BR	PPP	YKgha	TSW
Kena	40.03 ^a	6.40 ^a	16.93 ^a	866.47 ^a	1.80 ^a
Soresa	36.30 ^a	6.10 ^a	16.93 ^a	495.24 ^b	2.00 ^a
Silgo	39.50 ^a	6.46 ^a	16.06 ^a	738.69 ^{ab}	2.00 ^a
Darbera	39.86 ^a	6.13 ^a	16.40 ^a	557.34 ^{ab}	2.06 ^a
Kanani	37.90 ^a	5.50 ^a	10.13 ^a	609.08 ^{ab}	2.06 ^a
Gemechis	36.60 ^a	5.23 ^a	13.10 ^a	694.99 ^{ab}	2.13 ^a
Mean	38.36	5.64	15.15	660.30	1.8

*Means with the different letters indicate significant differences. ***Significance at $p < 0.001$; **significance at $p < 0.01$; *significance at $p < 0.05$ ns=not significant; PH=plant height, BR= Branch number, PPP=number of pod per plant, Yield kg per hectare and TSW=Thousand seed weight, Var=Variety and Yr=Year*

The result of analysis of variance showed that Yield and yield contributing traits such as Yield kg/ha, were significant among Variety, while Plant height, Number of branches, number of pods per plant and TSW were non-significant among varieties and Plant height, Number of branches, number of pods per plant, and Were highly significant among the year while Yield kilogram per hectare were non-significant among the year.

Plant height, Number of branches, number of pods per plant, Yield kilogram per hectare and thousand seed weight were not significant among year*variety as summarized above in the table.

CONCLUSIONS AND RECOMMENDATIONS

From this experiment, it could be concluded as: There is significant variation among six Black cumin varieties for grain yield. This indicates possibility of selecting good varieties among tested varieties for study areas. Kena(866.47 kg ha⁻¹) and Silgo (738.69 kg ha⁻¹) provided better yield than other varieties and selected as promising variety.

Therefore, farmers and Black Cumin producers around the study area and similar agro ecologies can alternatively use Kena and Silgo varieties for commercial production until new high yielder varieties will be recommended for the study areas. Full report writing is underway.



Picture 1: Performance of Black Cumin varieties

Horticulture and Spice crops Ongoing Activities

Activity 1: Effect of spacing on yield and yield components of sweet potato at Abaya site, West Guji.

Status of the experiment

This experiment was started in 2020 and expected to be completed in 2023. Currently, it was planted at Abaya and the performance of the crop is smoothly ongoing.



Activity 2: Chili Variety adaptation trial at Borana lowland, Yabello district under Irrigation condition

This experiment was started in 2021/22 and expected to be completed in 2023/24. four improved chili varieties were planted at Yabello (Kedale irrigation site). All necessary data was collected and the experiment is smoothly ongoing



**Activity 3: Adaptation trial of improved Mango varieties at Borana lowland, Yaballo districts under Supplementary Irrigation
Status of the experiment**

This experiment was started in 2021/22 and expected to be completed in 2025/26. Three improved Mango varieties were planted at Yabello (Kedale irrigation site) and Crop management is smoothly ongoing

**Activity 4: Adaptability Study of Desert type Banana (Musa Paradisiacal var. Sapiertum) varieties at Borana lowland, Yabello areas under supplementary irrigation
Status of the experiment**

The experiment was started in 2021/2022 and expected to be completed in 2025/26. Seven Banana varieties were planted at Yabello (Kedale irrigation site) and Crop management and Data collection is smoothly ongoing.



Activity 5: Adaptation trial of improved Papaya (*Carica papaya* L.) varieties at Borana lowlands, Yabello districts Under Irrigation.

Status of the experiment

The experiment was started in 2021/2022 and expected to be completed in 2025/26. Three improved Papaya seedlings and one local seedlings of papaya were planted on station and Crop management is underway.

Activity 6: Evaluation of Tomato (*Lycopersicon esculentum* Mill.) Varieties at Borana Lowlands, Yaballo districts Under Irrigation.

Status of the Activity

The experiment was started in 2022/2023 and expected to be completed in 2024/25. Five varieties of Tomato seeds were transplanted at Yabello (kadale irrigation site). But due to irrigation sites' canal problem, the transplanted varieties were not performed well (The admin. of irrigation site locked the water out late). Seedling rise and retranslating of seedling will be conducted in next July/August.

Animal feed team: one activity called **Collection and Evaluation of native forage germplasma for improved feed** production discontinued due to drought prblems

4.2. Livestock Research Process

4.2.1. Dairy Technology Research Team

Activity 1: Current status of Borana cattle breed in Southern Oromia, Ethiopia

- Year of started: 2020/21
- Activities performed to date:
- ✓ All survey data and phenotypic measurement data were collected
- Data entry is on progress

Activity 2: Assessment of Attitudes and Practices Regarding Rabies in pastoral community of Borana Zone, Oromia Regional State, Ethiopia

- Activities performed to date:
- ✓ All survey and secondary data were collected
- Data entry is on progress

Meat technology research Team

Activity Title 1: Participatory study on tick and acaricides resistance in cattle and small ruminant of Borana zone, southern Oromia

Current status

- ✓ Field data collection was completed
- ✓ Acaricides resistance test is left
- ✓ Data entry is not started

4. On-going Research activities**Dairy Research Team****Activity 1: Effect of Dry Season Feed Supplementation on the Performance of Borana Heifers with Partial Grazing Fed Grass Hay-Based Diet in Borana Zone**

- Year of started: 2020/21
- Expected year of completion:2023/24

Major activities performed in the year

- ✓ Feeding experimental animals was started
- ✓ Data collection is underway
- ✓ Monitoring of experimental animals for management case is also on progress



Picture: Forage collection and storage for the coming feeding experimental animals, 2015



Picture: Experimental animals during feeding trail, YPDARC, 2015

Activity 2: Assessment of goat milk production, utilization and quality in Borana Zone, southern Oromia, Ethiopia

- Year of started: 2021/22

- Expected year of completion: 2023/24

Major activities performed in the year

- ✓ Survey data collection was completed

- ✓ About 150 lactating doe were Ear tagged at Yabello and Elwoye districts for M and E

- ✓ On farm milk yield data for the two districts was recorded

4.2.2. Meat Research Team

On-going activities

Those funded by IQQO

Activity1: Epidemiological and Seasonal Dynamicity Studies on major bacterial causes of respiratory diseases of Camel in Selected Districts of Borana zone, Southern Oromia, Ethiopia

Year of started: 2022/23

Expected year of completion: 2024/25

Major activities performed in the year

- ✓ Four site were selected
- ✓ Necessary input were purchased

Activity 2: Genetic Improvement of Borana Goat through Within Breed Selection

Year started: 2016/17

.Expected year of completion: 2023/24

Major activities performed in the year

- Inputs for the experiment were purchased

- From Breeding flock (does & Bucks) selected and mated for major kidding

- 13 kids were born this season

- BWT, WWT, 6MWT, 9MWT and YW data collection is underway



Picture: Kids born (YPDARC, 2015)

Activity 3: Effects of Age and Breed Group on Meat Quality of Black Head Sheep and Their Crosses

Year started: 2016/17

.Expected year of completion: 2023/24

Major activities performed in the year

- ✓ Purchase of input was performed
- ✓ Lambs were ready for slaughtering
- ✓ Data collection and frequent monitoring is underway

Activity title 4: Feed intake, growth performance and carcass characteristics of Borana male Cattle supplemented forage with concentrate under station management condition

Year started: 2021/22

Expected year of completion: 2023/24

Major activities performed in the year

- ✓ Forages and grass were established, harvested and ready for feeding

- ✓ Concentrates were purchased and ready for feeding
- ✓ 20 male cattle were selected for the experiment and their initial body weight was taken
- ✓ Feed formulation was done



Picture: Forages being stored



Picture: Rhodes grass hay stored

Activity 5: Effects of Weaning Age and Weight on Lamb Post Weaning Growth Rate and parturition interval of Black Head Breed Raised under Extensive Production System

Year started: 2019/20

Expected year of completion: 2025/26

Major activities performed in the year

- ✓ Purchasing of input was done
- ✓ Purchased experimental flock have been managed
- ✓ The activity was not done as per plan due to budget shortage for purchasing experimental animal

4.2.3. Animal feeds and Rangeland management Research Team

On-going activities

Those funded by IQQO

Activity 1: Rehabilitation of degraded rangeland through reseeding *Cenchrus ciliaris* with *stylo fructosa* in Borana, Southern Ethiopia

- Year of started: 2022/23
- Expected year of completion: 2025/26
- Activities performed to date:
 - ✓ Site was selected, exclosed, fenced and cleaned
 - ✓ Land ripping, sowing was done

- ✓ Agronomical managements and data collection were being taken



Picture: reseeding rangeland at Dire district, 2015

Activity 2: Adaptation trial of Brachiaria Cultivars in Semi-arid of Borana Zone, South Ethiopia

- Year of started: 2022/23
- Expected year of completion: 2024/25
- Activities performed to date: site selection and cleaning



Picture: Performance of Brachiaria Cultivars at Kadale, 2015

Activity 3: Adaptation Trials of Elephant Grass Cultivars in Borana, Southern Ethiopia

- Year of started: 2022/23
- Expected year of completion: 2024/25
- Activities performed to date: site selection and cleaning



Picture: Elephant Grass Cultivars at Kadale, 2015

4.2.4. Apiculture Research Team

On-going activities

Those funded by IQQO

Activity 1: Effect of honeybee colony (*Apis mellifera*) towards enhancing the yield of sesame (*sesame indicum* L.) in west Guji zone, southern Oromia.

Year of started: 2021/22

Expected year of completion: 2023/24

Activities performed to date: sowing seed and caging was done



Picture: Sesame crop sown and mesh cage constructed, Abaya site, 2015

Activity 2: Introduction of shrub bee forage species for beekeeping development at Arid and semi-arid Borana zone, southern Oromia

Year started: 2022/23

Brief status

- Site was selected
- Available seeds collected and nursery seed bed and pots are prepared

- Planting will be done in the coming rainy season

Activity 3: Modification of traditional basket hive towards improving produced honey and its quality in the Borana zone.

Year started: 2022/23

Brief status

- Site selection was performed
- Apiary site was established
- 48 basket hives were constructed and smeared
- Smoking was done



Picture: Smoked Modified traditional hives at Taltale, 2015

5. Basic technology multiplication

Res. team	Type/name of technologies planned to be multiplied in the year (as per given in KIB) plan	Unit	Amount planned to be multiplied(as per KIB) plan	Amount multiplied	Performance as % of annual plan	Reason for under performance, if any
Animal feeds	Animal forages			20*30m ²		
Apiculture	Bee forages			10*10m ²		



Picture: Basic Seed maintenance (Rhodes and bee forage), YPDARC, 2015

4.3. Natural Resource process

4.3.1 Agroforestry research team

Ongoing Research Activities

Activity 1: Adaptation and Growth Performance Evaluation of Selected Multipurpose Trees and Shrubs at Yaballo District, Borana Zone, Southern Oromia

Project code: YB/NR/AF/2018

Budget source: IQQO

Started year: 2018/19

Expected year of completion: 2023/24

Location: Yaballo On station

Initiators: Siraj Kelil and Sisay Taye.

Responsible persons: Siraj K., Sisay T, Taddese N, Fissaha Geteneh and Zelalem Teku

Objective

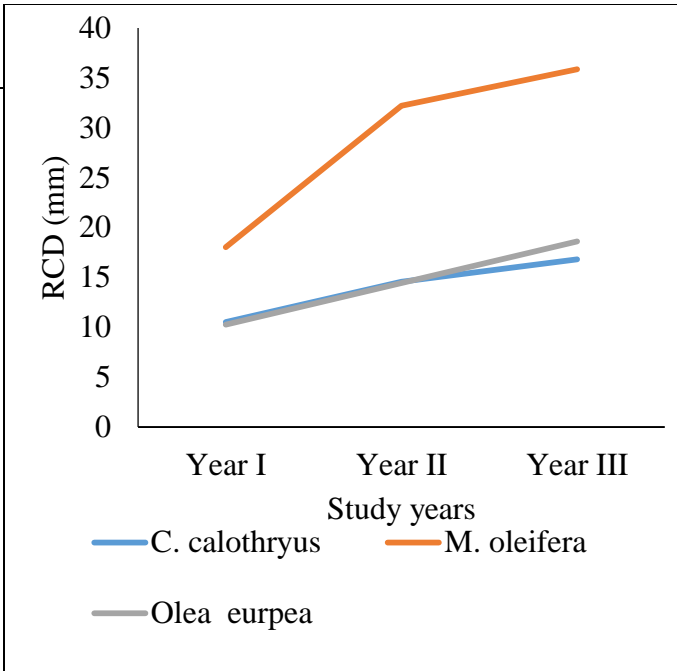
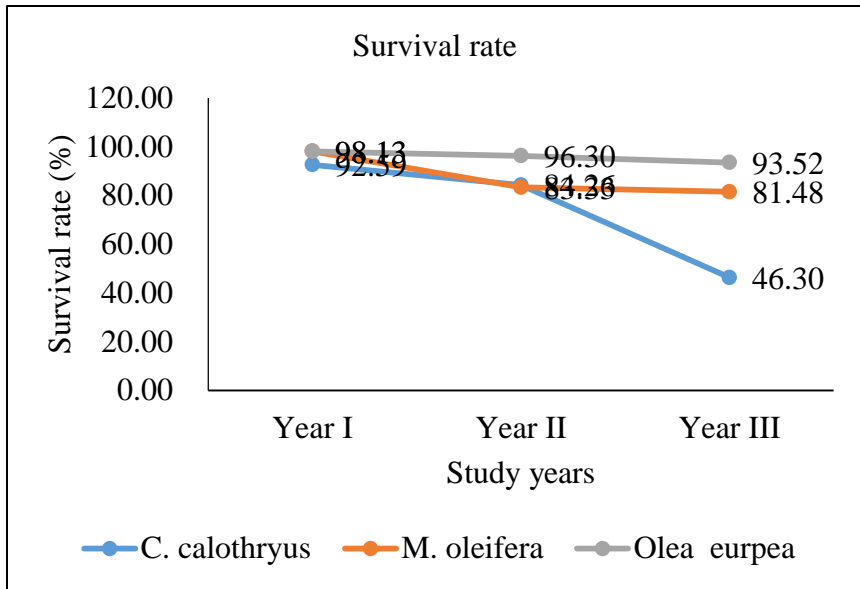
- ▶ To evaluate the adaptability and growth performance of selected multipurpose tree species in the study area.

Expected output

- Adaptable multipurpose tree and shrub species will be identified

Summary

The adaptability and growth performance of selected multipurpose tree species (*Moringa oleifera*, *Olea europea* and *calliandra calothyrsus*) were evaluated at Yaballo on station for the last four years. Survival and growth performance data were collected and analyzed. *Moringa oleifera* and *Olea europea* performing well performed at Yaballo on station, while, *calliandra calothyrsus* could not survived the recurring drought of Borana condition.



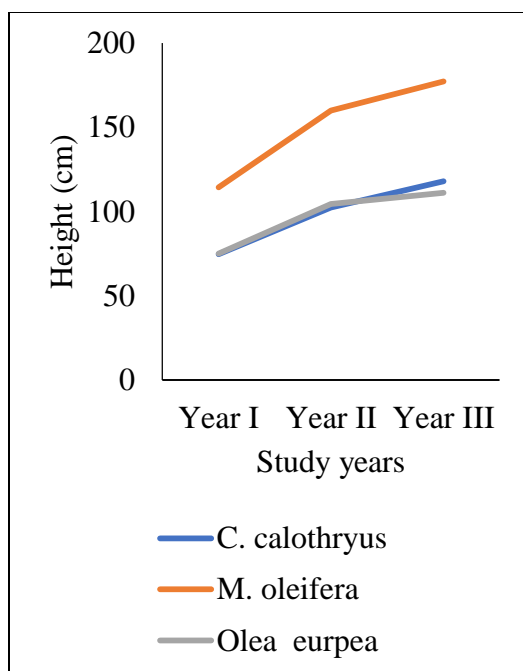


Figure: Average growth performances of MPTs

Activity 2: Evaluation of Seed Pretreatments on Germination of Indigenous Tree/shrubs Species in Yaballo District, Borana Zone, Southern Oromia.

Project code: YB/NR/AF/2020(1)

Budget source: IQQO

Started year: 2020/21

Expected year of completion: 2022/23

Location: Yabello on station

Initiators: Siraj Kelil, Sisay Taye and Taddese Negash

Responsible person: Siraj K., Sisay T., Taddese N., Fisaha Geteneh and Zelalem Teku

Objective

- To identify appropriate seed pre-treatments for the germination of selected indigenous tree/shrub species in study areas.

Summary

The major challenge of indigenous tree seedlings multiplication is seed dormancy. To overcome this challenge different seed pre-treatments were applied on selected indigenous tree/shrub species to improve its germination rate. The treatments have been conducted both under laboratory and tree nursery management. For *Mimusops kummel* the best germination rate (82.22%) was obtained by soaking the seeds in cold water for 36 HRs, while *Grewia villosa* seeds were germinated well under soaking seeds in boiled water for 5 minutes (76.67%). Seeds of *Terminalia brownie* germinated more under mechanical scarification (De-coating) (68.89%).

Table 1: Mean values of tree seeds germination percentage as influenced by treatments under nursery management

Treatments	<i>Mimusops kummel</i> (Qolaatii)	<i>Terminalia brownie</i> (Birreessa)	<i>Grewia villosa</i> (Ogomdii)
	Germination (%)	Germination (%)	Germination (%)
Mechanical scarification (De-coating)	36.67 ^c	68.89 ^a	52.22 ^{cd}
Soaking in concentrated H ₂ SO ₄ for 5 min.	31.11 ^{dc}	40.00 ^{bc}	46.67 ^{cbd}
Soaking in concentrated H ₂ SO ₄ for 15 min.	25.55 ^{de}	36.67 ^c	27.78 ^e
Soaking in boiled water for 5 minutes	27.78 ^{ce}	25.89 ^{cd}	76.67 ^a
Soaking in boiled water for 15 minutes	24.44 ^{de}	26.67 ^{cd}	61.11 ^b
Soaking in cold water for 12 HRs	57.78 ^b	53.33 ^{ab}	35.56 ^{ed}
Soaking in cold water for 36 HRs	82.22 ^a	64.47 ^a	43.33 ^{cd}
Control	21.11 ^e	20.00 ^d	47.78 ^{cbd}
LSD	9.08	16.07	4.03
CV%	13.53	21.85	15.68

Ongoing Research Activities

Activity 1: Evaluation of Selected Woodlot Tree Species in Moisture Stress Area of Yaballo District, Borana Zone, Southern Oromia

Project code: YB/NR/AF/2019(1)

Budget source: IQQO

Started year: 2019/20

Expected year of completion: 2024/25

Location: Yabello on station

Initiators: Sisay Taye, Siraj Kelil and Taddese Negash

Responsible persons: Siraj K., Sisay T, Taddese N., Fisaha Geteneh and Zelalem Teku

Objective

- ▶ To evaluate the growth performance of some selected woodlot tree plantations.

Brief status

- ▶ Seedlings of selected species were planted in semi-circular SWC structures.
- ▶ Fencing and planted tree species management have been undertaken.
- ▶ Survival and growth performance data have been collected two times per year at the end of the main (Ganna) and short (Hagaya) rainy seasons.
- ▶ In 2015 EC survival and growth performance data were collected at the end of the rainy season.
- ▶ Field management (fence maintenance, weeding, and monitoring) have been conducted
- ▶ *Grevalia rubsta* and *Cardia africna* found on good performing.

Table 1: Average survival (%) height growth (cm) planted woodlot tree species

Planted tree species	2013 EC	2014 EC	2015 EC
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	% Survived	Height (cm)	% Survived	Height (cm)	% Survived	Height (cm)
<i>Cordia africana</i>	67.59	69.59	56.48	135.44	50.2	289.58
<i>Casuarina equisetifolia</i>	69.70	71.50	55.39	65.68	42.5	85.67
<i>Cupressus lusitanica</i>	76.85	60.92	50.00	110.44	45.8	250.67
<i>Grevalia robusta</i>	99.07	126.13	91.67	204.58	90.5	409.87



Figure: Pictures on the field

Activity 2: Assessment, Characterisation and Mapping of Yaballo and Arero Forest Priority Areas in Borana Zone, Southern Ethiopia

Project code: YB/NR/AF/2020(2)

Budget source: IQQQ

Started year: 2020/21

Expected year of completion: 2022/23

Location: Yaballo and Arero

Initiators: Siraj Kelil, Sisay Taye and Taddese Negash

Responsible persons: Siraj K., Sisay T., Taddese N., Fisaha Geteneh and Zelalem Teku

Specific objectives

- To assess the current forest resource status of the Yabello and Arero forest
- To map and describe forest cover change in the Yabello and Arero forest
- To identify factors of deforestation and forest degradation of Yabello and Arero forests
- To map forest coverage of Yabello and Arero forests

Brief Status

- ▶ Image classification was done and forest cover map was produced for Arero forest.

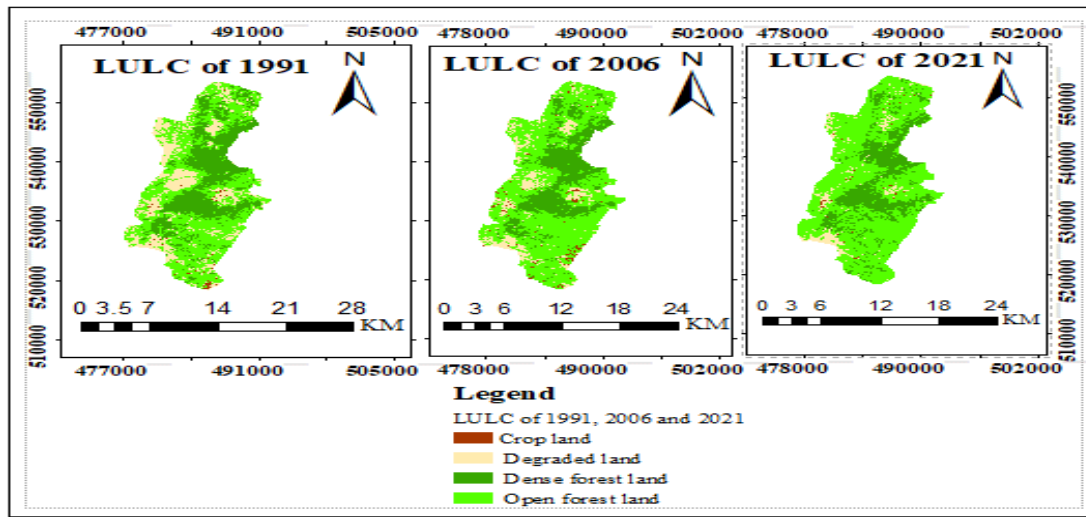


Table 1: LULC classes and their corresponding areas of Arero forest (1991, 2006 and 2021)

LULC types	1991		2006		2021	
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)
Crop land	236.53	0.80	516.11	1.76	136.74	0.47
Degraded land	6105.52	20.78	3579.2	12.18	1905.89	6.48
Dense forest land	8744.8	29.76	7117.39	24.22	7045.83	23.97

Open forest land	14300.98	48.66	18175.4	61.85	20301.38	69.08
Total	29388.59	100.00	29388.59	100.00	29388.59	100.00

Table 2: Land covers classes' areas and change from 1991 to 2021 for Arero forest

LULC types	1991		2021		Gains	Losses	Net change
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (ha)	Area (ha)
Crop land	236.53	0.80	136.74	0.47	124.28	223.78	-99.79
Degraded land	6105.52	20.78	1905.89	6.48	395.04	4590.05	-4199.63
Dense forest land	8744.8	29.76	7045.83	23.97	719.98	2417.8	-1698.97
Open forest land	14301	48.66	20301.38	69.08	7011.2	1018.87	6000.4
Total	29388.59	100.00	29388.59	100.00	-	-	-

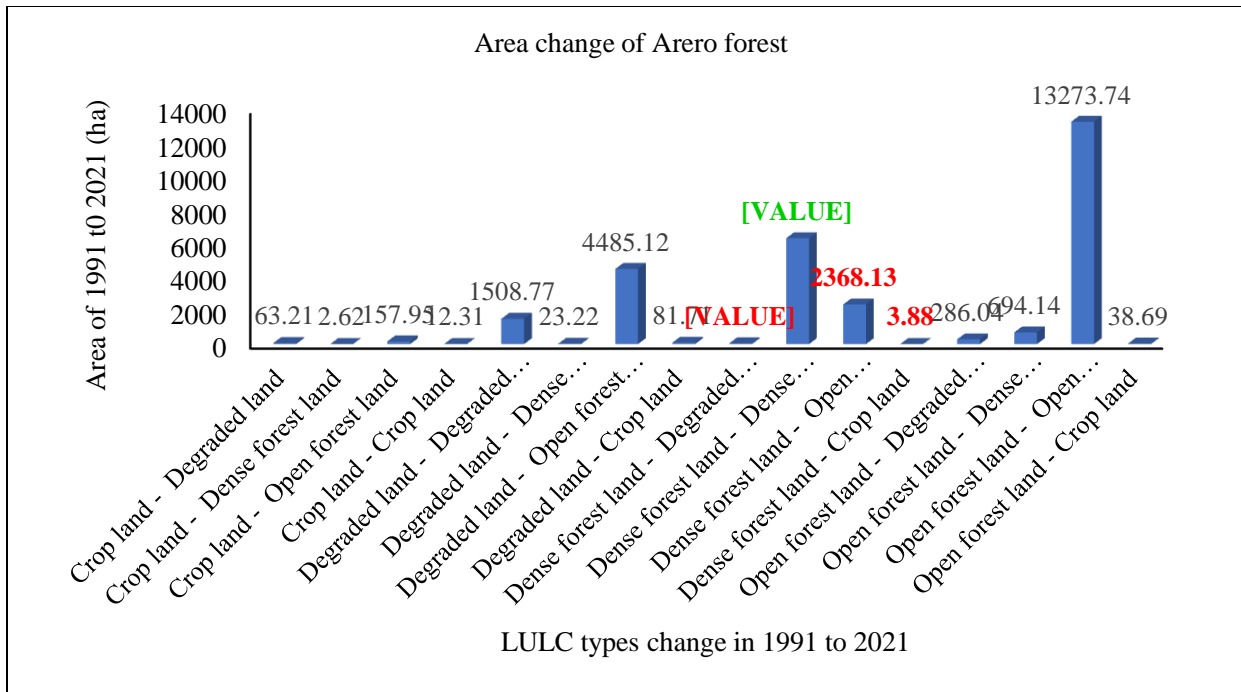


Figure: Land covers classes and their direction of change from 1991 to 2021 for Arero forest

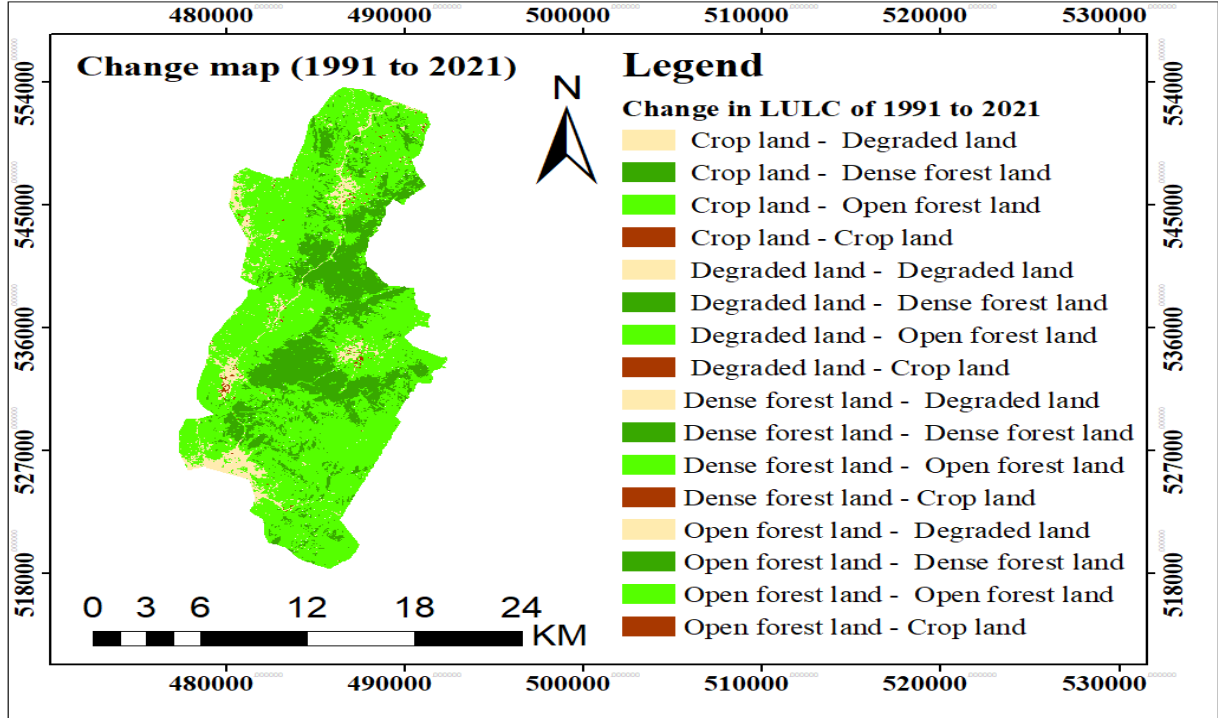


Figure 2: LULC map change detection analysis of 1991 to 2021 for Arero forest

- ▶ Image classification was done and forest cover map was produced for Yabello forest.

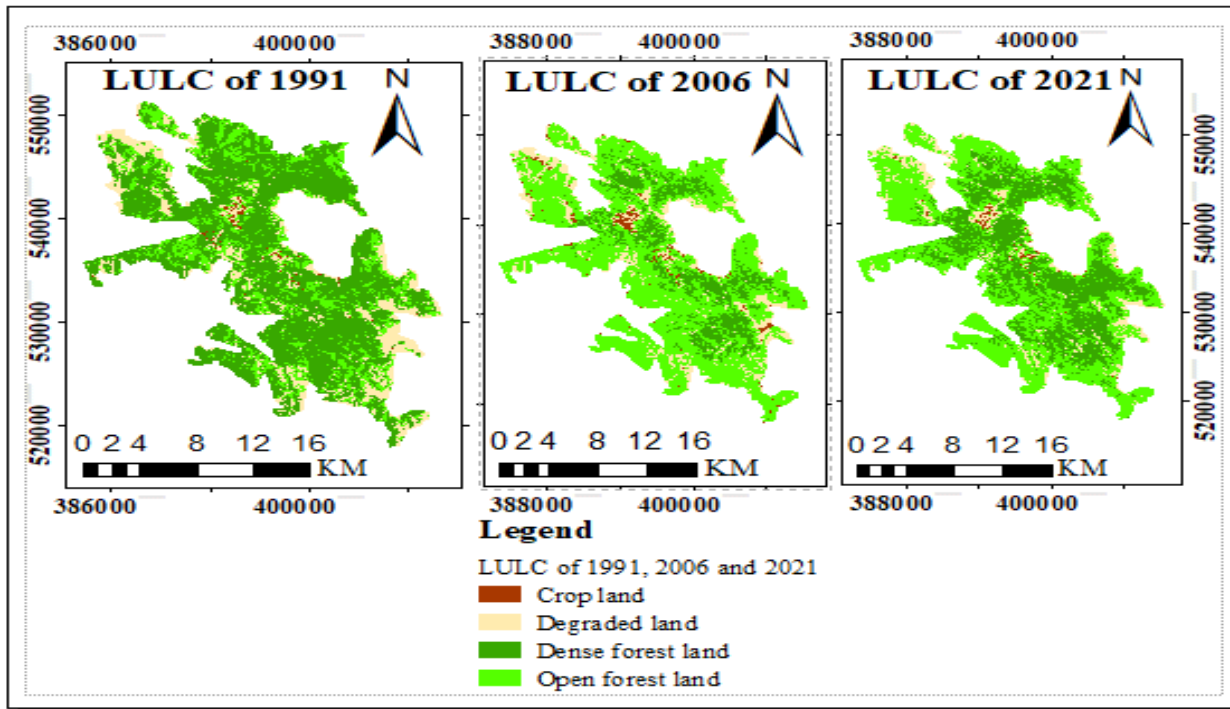


Figure 1: LULC map for the years 1991, 2006 and 2021 of Yabello forest

Table 3: LULC classes and their corresponding areas of Yabello forest (1991, 2006 and 2021)

LULC types	1991		2006		2021	
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)
Crop land	230.70	0.67	687.95	2.00	282.92	0.82
Degraded land	5212.55	15.17	4714.85	13.72	3436.85	10.00
Dense forest land	21129.47	61.48	5793.08	16.86	11716.93	34.09
Open forest land	7792.56	22.68	23172.86	67.42	18929.79	55.08

Total	34366.83	100.00	34366.83	100.00	34366.83	100.00
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Table 4: Land covers classes' areas and change from 1991 to 2021 for Yabello forest

LULC types	1991		2021		Gains	Losses	Net change
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (ha)	Area (ha)
Crop land	230.70	0.67	282.92	0.82	208.6	156.94	52.22
Degraded land	5212.55	15.17	3436.85	10.00	1218.09	2985.41	-1775.70
Dense forest land	21129.47	61.48	11716.93	34.09	1950.39	11349.54	-9412.55
Open forest land	7792.56	22.68	18929.79	55.08	13841.62	2726.81	11137.23
Total	34366.83	100.00	34366.83	100.00	-	-	-

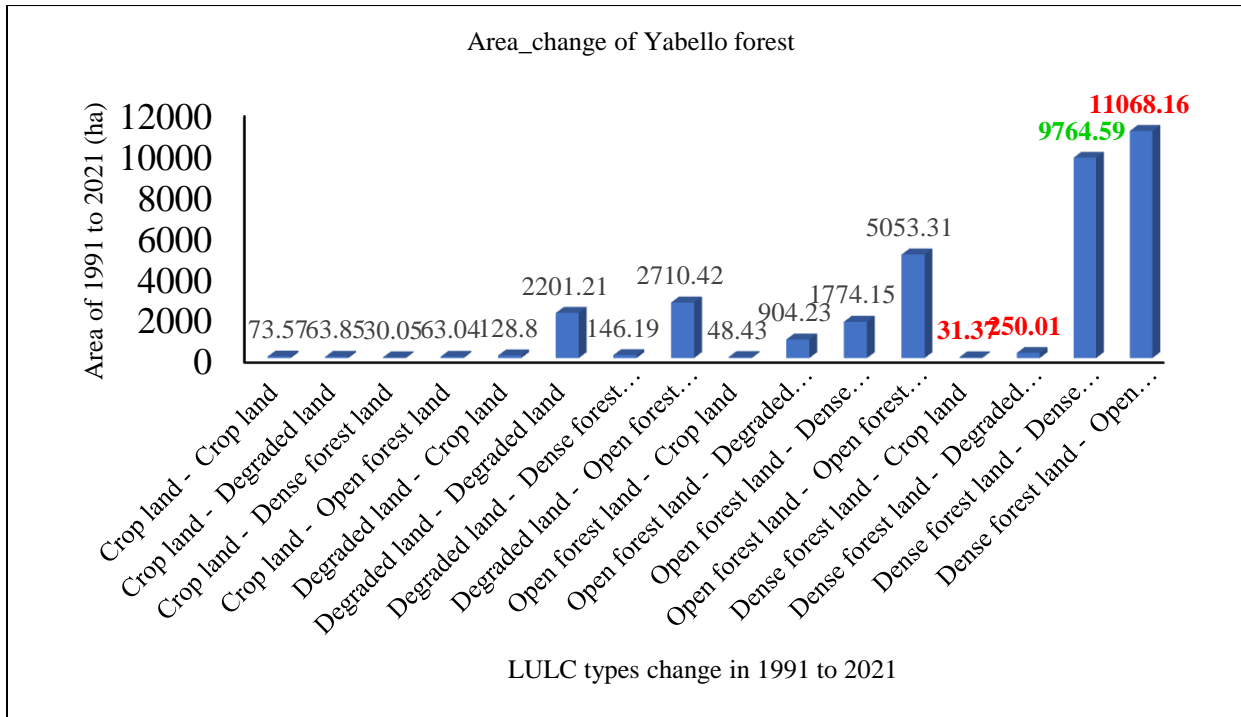


Figure: Land covers classes and their direction of change from 1991 to 2021 for Yabello forest

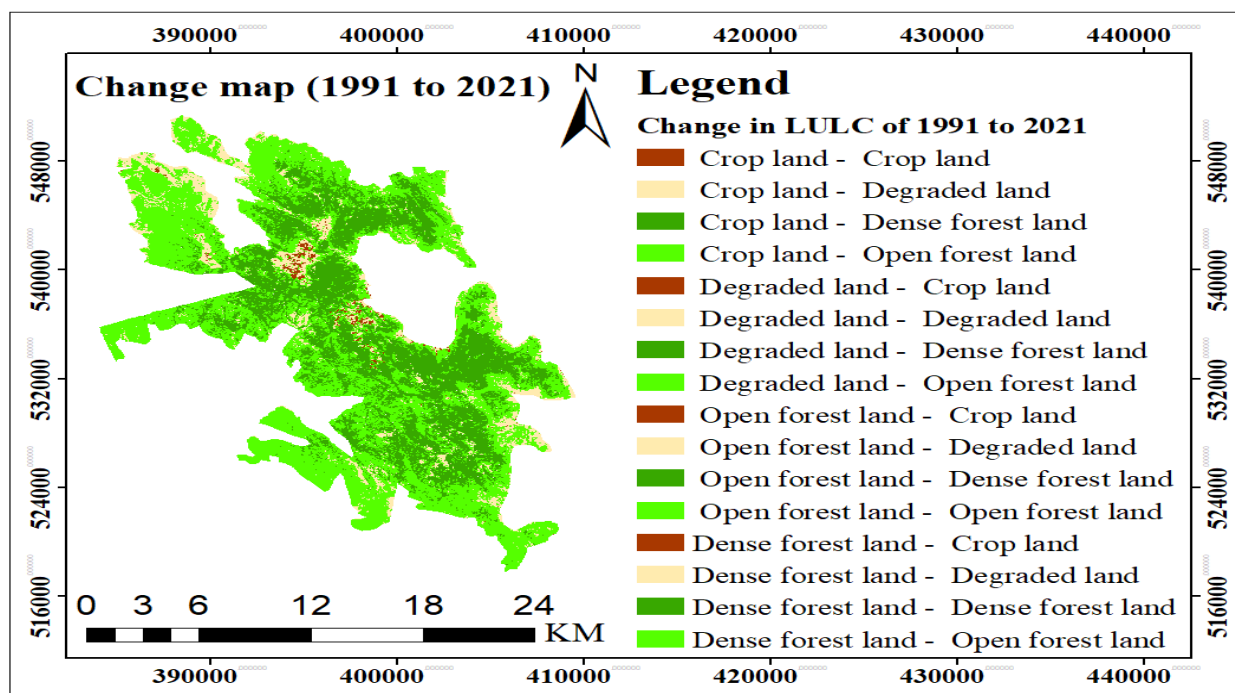


Figure 2: LULC map change detection analysis of 1991 to 2021 for Yabello forest

- ▶ Assessment of factors driving deforestation and forest degradation and validation are the remaining work

Activity 3: Characterization of Trees and Shrubs Species Diversity of Yabello and Arero Forest Priority Areas in Borana Zone, Southern Oromia, Ethiopia

Project code: YB/NR/AF/2020(3)
 Budget source: IQQQ
 Started year: 2020/21
 Expected year of completion: 2022/23
 Location: Yabello and Arero
 Initiators: Siraj Kelil, Sisay Taye and Taddese Negash

Responsible person: Siraj K., Sisay T., Taddese N., Fisaha Geteneh and Zelalem Teku

Specific objectives

- ▶ To assess and characterize tree and shrub species diversity of Yabello and Arero forest
- ▶ To characterize tree and shrub species structure and composition of Yaballo and Arero Forest Priority Areas.
- ▶ To describe regenerating status and density of trees and shrub species in Yaballo and Arero Forest Priority Areas.

Brief Status

- ▶ The study areas were identified (Yabello and Arero forests)
- ▶ Discussion with the Zone and Woreda Environmental, Forest and Climate Change Office was conducted.
- ▶ Forest survey was conducted in Yabello forest areas;
- ▶ Data of trees diameter, height and number and types of trees/shrubs, number of seeding and sapling were collected.
- ▶ Forest disturbance data (tree/shrubs logging/cutting, livestock interference, charcoal kilns in the forest
- ▶ Rate of trees/shrubs cutting for animal feeds, settlement in the forest) were also collected.
- ▶ However, the forest survey was not conducted yet in Arero forest due to security problem.
- ▶ Total of 71 woody species were recorded across Yabello forest.
- ▶ The Shannon diversity index (H), Species evenness (E) and Species richness (S) of Yabello forest was 2.69, 0.63 and 71 respectively.
- ▶ 87.34% of recorded species belonged to only 11 of the families.

Table 1: Major logging tree species and average Number of trees/shrubs logged per hectare in Yabello forest

Species Name Local name	Forest Sites Name													
	El-diimaa		Gomdo diqo		Gombo Guddo		Nyaaroo		Obdaa		Saddiqoo		Yuubdoo	
	No. tree Freshly cut/Ha	No. Old tree stump/Ha	No. tree Freshly cut/Ha	No. Old tree stump/Ha	No. tree Freshly cut/Ha	No. Old tree stump/Ha	No. tree Freshly cut/Ha	No. Old tree stump/Ha	No. tree Freshly cut/Ha	No. Old tree stump/Ha	No. tree Freshly cut/Ha	No. Old tree stump/Ha	No. tree Freshly cut/Ha	No. Old tree stump/Ha

<i>Pappia capensis</i> (Biiqqaa)															50
<i>Rhus ruspoli</i> (Daboobessa)	12.5	12.5			50		25				75				225
<i>Dodonea angustifoli</i> (Dhittacha)	50						91.67	25			275	8.33	191.67	22	
<i>Olea europaea</i> (Ejersa)	133.33	22.22	162.5	27.5	216.67	41.67	87.5	12.5		25	58.33	75	75	58	
<i>Psydrax schimperiana</i> (Gaallee)	25	12.5	37.5		25	12.5	25				58.33				33.33
<i>Juniperus procera</i> (Hindheessa)		122.22	81.25	37.5	83.33	41.67	41.67	12.5	50	25	50	75	16.67	58	
<i>Euclea divinorum</i> (Mi'eessaa)	37.5				75			50	75		50				258.33
<i>Scolopia theifolia</i> (Muka diimaa)	25	100	16.67	8.22	150		25				108.33	25			
<i>A. schimperi</i> (Qaraaruu)	75							50	25		100				100

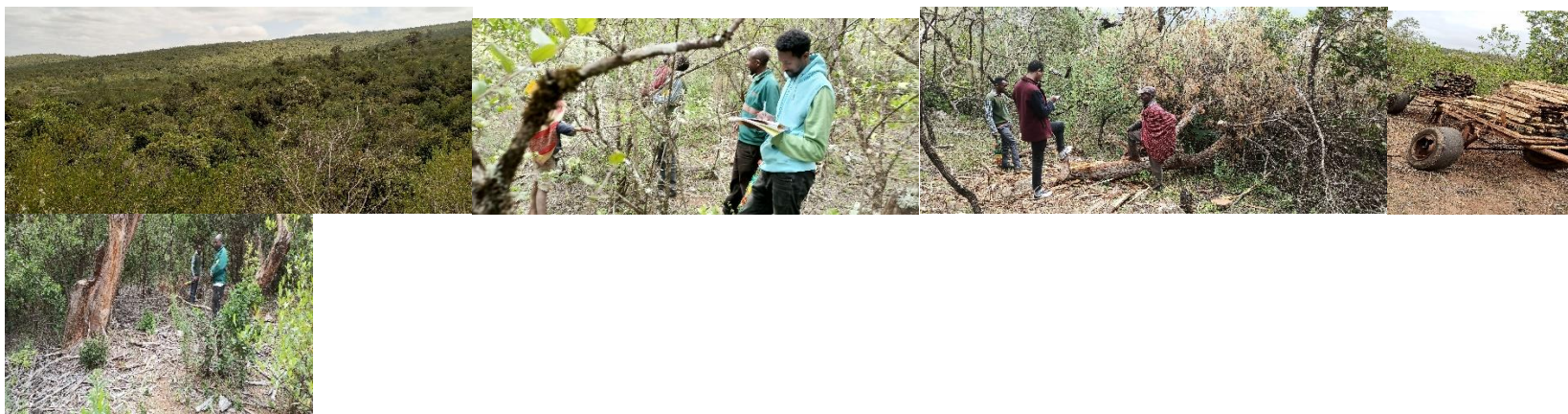


Figure: Photos taken during field activities

Activity 4: Multipurpose Trees Planting Under Smallholder Farmers in Yabello District of Borana Zone, South Oromia

Project code: YB/NR/AF/2022(1)

Budget source: IQQO

Starting year: 2022/23

Expected year of completion: 2026/27

Location: Yabello district

Initiator: Sisay T, Siraj K

Responsible person: Sisay T, Siraj K, Feyisa Dessiso, Teshoma Kasa, Fisaha G, Zelalem T and Guyo Wariyo

Objectives

- ▶ To promote multipurpose agro-forestry tree planting under agro pastoralists and Pastoralists To evaluate the growth performances of planted multipurpose tree species
- ▶ To evaluate the growth performances of planted multipurpose tree species
- ▶ To improve agro pastoralists and pastoralists awareness on multipurpose tree based agro-forestry practice

Expected outputs

- ▶ Multipurpose agro-forestry tree planting under smallholder agro pastoralists and pastoralists promoted
- ▶ Growth performances of planted multipurpose tree species evaluated
- ▶ Agro pastoralists and pastoralists awareness improved on multipurpose tree based agro-forestry practices

Brief status

- ▶ Discussions with district experts was held and site selection was done
- ▶ Secondary data were collected;
 - Selected multipurpose tree species was brought and sown on station nursery
 - Seedling management was done under nursery
 - Two focal group discussions (FGD) having a group of 10-12 members was formed
 - Both theoretical and practical training was given for the members of FGD at YPDARC
 - Soil and water conservation structures and pit preparation was done
 - Plantations was done per house hold head and monitoring and management was done for the planted multipurpose species
 - Data collections will be done following drought seasons



Activity 5: Assessment of Fodder Trees and Shrubs Species Resource in Borana Rangelands, Southern Ethiopia

- Code: **YPDARC/NR/AF/2022/02**
- Source of budget: **IQQO**
- Starting year: **2023**
- Expected year of completion: **2025**

Specific Objectives

- ♣ To assess the major fodder trees/shrub species and its role for local communities
- ♣ To investigate the phenology and regeneration status of the major fodder trees and shrubs species.

Expected outputs

- ▶ The availability and role of fodder trees/shrubs species identified and the phenology and regeneration status of these fodder trees/shrubs species investigated.

Brief status

- ✓ Discussions with district experts were held regarding five indigenous landscapes of Borana rangelands that local called “dheeda”.
- ✓ Five indigenous landscapes were identified (Wayama, Melbe, Gomole, Galbo and Dire).
- ✓ Questionnaire were prepared and household survey was conducted in two landscapes out of five.
- ✓ From Gomole the surey was conducted in three kebele (Areri, Did-Hara and Supha badiya) and from Dirre (Didi Mege, Dibandiba and Dambi Saphante).

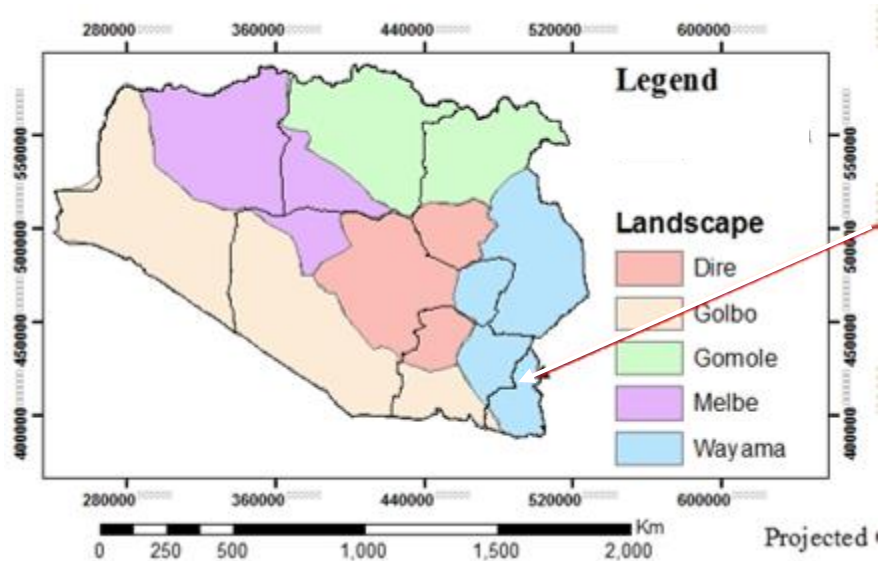


Figure: Map of the five indigenous landscapes of Borana rangelands (Dire, Melbe, Golbo, Gomole, Wayama).

4.3.2. Soil fertility improvement research team

Completed Activity

Activity 1: Assessment and Map of Soil Fertility Status under Different Land Use Systems of Yaballo District, Borana Lowland, Southern Oromia, Ethiopia

- ❖ Code: YPDARC/NRM/SFI/2017(02)
- ❖ Budget source: IQQO
- ❖ Year Started: 2017/18
- ❖ Year of completion: 2021/22

Objectives

- ✓ To study soil fertility status of Yaballo district under different land use systems
- ✓ To develop the map of selected soil fertility parameters in the district

Abstract

Understanding soil fertility status under different land use management have proved to be useful for sustainable development and efficient utilization of limited land resources. The study was conducted for two consecutive years since 2021 to 2022/23 at Yabello District to study soil fertility status under different land use systems and develop the map of selected soil fertility parameters. A GPS device was used for determination of geographical position of soil sampling points. Eighty-six (86) soil map unit were sampled. parameter like EC, PH OM, Texture and Bulk density were analyzed at YPDARC laboratory and the other parameters are underway at Batu soil research center. Accordingly, based on land use type and slope Yabello district was divided into land units a total of 86 composite soil samples was collected and some parameters like EC, PH, OM and Available phosphorous analyzed at Yabello pastoral and dry land agriculture center. For parameter like Na^+ , Ca^{2+} Mg^{2+} CEC and K sample were submitted to Batu soil Research Center. Based on laboratory soil analysis the following result was recorded. Accordingly, Available Phosphorus was from medium to high under forest land, low under grass land, medium under cultivated land and medium under bare land. Organic matter also medium under forest land, low to medium under grass land, low to medium under cultivated land and low under bare land. Soil pH was classified from slightly acid to neutral under forest land, slightly acid to Strong Alkaline under grass land, moderately acid to neutral under cultivated land and moderately acid to moderately Alkaline under bare land. Soil texture was sandy clay under forest, sandy under grass, clay loam under cultivated, and sandy clay loam under bare land.

Key words: - Soil fertility assessment, soil fertility spatial distribution

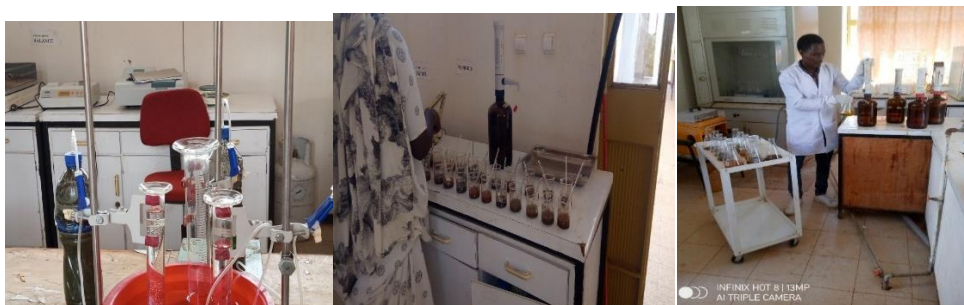


Figure: Photos shows laboratory work in the center

Ongoing Activities

Activity 1: Soil Test Crop Response based P-Calibration Study on Teff in Yaballo District of Borana Zone, Southern Oromia, and Ethiopia.

- ❖ Code YPDARC/NRM/SFI/2020(1)
- ❖ Starting Year: 2020/21
- ❖ Year of Completion: 2023/24

Brief status:

The second year of this activity were coming up with determination of critical phosphorous, were soil p value put on x-axis and relative yield on Y-axis according to (Nelson and Anderson,197). Additionally, phosphorous requirement factor (amount of P in kg needed to raise soil p by 1ppm) will be determined.

- This year ten farmers were selected across the district and, on these 10 farmers field Dzx385 teff variety was sown.
- Treatment applied were optimum single level of N (urea) 46kg/ha combined with five level of phosphorous (TSP).
- Teff were harvested from nine sites
- A single site left and will be harvested soon
- Threshing and weighing is under way

Treatment	Mean PH (cm)	mean SL (cm)	mean Tn	Mean Biomass ton/ha	Mean yield(kg/ha)
P1N	79.7	25.5	1.1	2.9	806

P2N	83.9	27.8	2.3	3.2	1061
P3N	90.3	29.1	2.5	3.4	1127
P4N	92.9	33.3	4.7	3.8	1273
P5N	88.3	27.3	2.4	3.8	1307
P6N	99.1	35.9	3.2	3.9	1383

➤ Soils samples were collected from all sites and reported to YPDARC laboratory
P- phosphorous (TSPP), N -nitrogen(urea), PH- plant height, SL -spike length, TN- Tiller number



Photos taken during filed activities

Activity 2: Characterization, Classification and Mapping of Soil Salinity Status at Small Scale kadale Irrigation project, Yabello district, Borana zone, Southern Ethiopia.

Code: YPDARC/NRM/SFI-2021-01

Budget source: IQQO

The year started: 2021/2022

Expected year of completion: 2023/2024

Initiator: Isihak L. and Fenan T.

Responsible persons: Isihak L. Fenan T. Fayisa G. Daba W. and Genene T.

Objectives

- ✓ To characterize, classify and map small scale kadale irrigation area of the Yabello district
- ✓ To develop a guideline of soil salinity management strategies for small scale Irrigation farms of Yaballo district

Current status

- Representative soil profile sampling sites were selected based on soil color, drainage property of the specific location and relative position in the slope of the study area.
- Four representative soil pits were excavated based on soil type and slope
- Sixteen (16) disturbed and undisturbed soil samples were collected, prepared and ready for analysis
- Soils were also sampled from the surface based on land use history.



Photo taken during field activities

Activity 3: Evaluation of In-situ Moisture Conservation Practices for Sorghum Production in dry land of Taltalle district, Borana, southern Ethiopia

Code: YPDARC/NRM/SFI-2021-02

Budget source: IQQQ

Year started: 2021/2022

Expected year of completion: 2023/2024

Initiator: Fenan T.

Responsible persons: Isihak L., Fenan T., Fayisa G., Daba W. and Genene T.

Objectives

- To increase productivity of sorghum crop through insitu moisture conservation practices.
- To determine soil moisture content through growth stages sorghum
- To investigate the impact of conservation practice on soil physico-chemical properties

Current status

- Sorghums were planted on farmer's field (Solomon Tasfaye).
- Due to heavy rain occurred the structure were damage and plant also destructed
- the second cycle of sowing were held with in short period of time. however, a low population of seed were emerged.
- Moreover, conduct soil test crop response p-calibration activity on ten sites challenged to monitor the other activity at that time.
- Suddenly, we decided to conduct the activities at Yabello. However due to late site selection, appropriate site didn't find
- Stagnation(waterlog) make plant didn't survive well
- Proper data didn't collect from this activity
- Low density of plant left on the filed like below



Photo taken during field work

4.3.3. SWC and Watershed Management Research Team

Ongoing Activities

Activity 1: Evaluation of Selected swc Measures on Maize Productivity at Yabello

- ❖ Year Started: **2022/23**
- ❖ Year of completion: **2024/25**
- ❖ Source of budget: - **IQQO**
- ❖ Initiator: **Fayisa Gurm**
- ❖ Responsible person: **Feyissa G, Fenan T, Isihak L**

Objectives of the study

- ❖ To Evaluate performance of selected soil and water conservation measures on maize yields

Expected out put

- ❖ Enhanced maize Enhanced maize yields under selected soil and water conservation measure

Current status

- This year, this activity was conducted at Kadalle on farmer's field.
- Malkasa1 as test crop, level soil bund, level fanya juu, contour trench and farmers practices were applied treatment.
- Blanket NPS and Urea fertilizers were also used.
- All agronomic and soil data were collected properly.
- Harvesting and some data will be collected near future.



Activity 2: Effect of graded soil bund integrated with grass strip on soil physicochemical properties at Bule Hora district

- ❖ Year Started: **2022/23**

- ❖ Year of completion: **2026/27**
- ❖ Source of fund: **IQQO**
- ❖ Initiator: **Fayisa Gurm**
- ❖ Responsible person: **Feyissa G, Fenan T, Isihak L**

Objectives of the study

- To Evaluate the performance of soil and water conservation measures on soil physicochemical properties

Expected output

- Soil physicochemical properties under graded soil bund with grass species were determined

Work Done

- In this year, this activity was conducted at Garba PA on farmers field(worku).
- The applied treatment were three grass species integrated with graded soil bund.
- Soil sampled before and after activity were conducted.
- Data not yet collected from grasses; it will be collected at the matured stage of the grasses.



4.3.4.Irrigation and water harvestinm team

- **Erosion-control Intervention Associated With Pond Catchment Rehabilitation in selected Borana Districts**



Figure 2: structures and view of pond rehabilitated

4.4. **CROP PROTECTION RESEARCH TEAM**

4.5.1. Plant pathology Research team

Completed activity

Activity 1: Screening of bread wheat genotype for Resistance to wheat Rust diseases at Bule Hora, West Guji Zone, and Southern Oromia.

Objectives

- ❖ To select resistant bread wheat genotypes against wheat rust disease.

Brief Status

Year started 2022, Year of completion 2023.

Summery Result

About 100 bread wheat genotypes were collected from Sinana Agricultural Research center (SARC), While 2 Variety (Kubsa and Digelu) obtained from Kulumsa Agricultural Research center (KARC) were used for this study. Digalu **and** Kubsa: variety were used as spreader rows during this experiment. Genotypes was sown at Bule Hora with augmented experimental design. Each genotype was sown in lines of 2.5 meter long with spaced at 20 cm apart. Out of 100 genotypes that were evaluated; 48 lines had showed IT's from "R" "MR," "M, "for responses to both Yellow and Leaf rust with range of severity level (20-40%).48 lines was Promoted from nursery observation to "preliminary yield trials (PYT)" for further breeding

Field picture: Typical symptom's' for major diseases on bread wheat genotypes

Identified Symptom's on bread wheat lines



Picture: Typical symptom's for Yellow Strip Rust on Bread wheat genotypes at Bule Hora (Gerba) sub site 2022/2023

Major identified Symptom's on bread wheat lines



Picture: Typical symptom's for Yellow Strip Rust and Leaf Rust on Bread wheat genotypes at Bule Hora (Gerba) sub site 2022/2023

Ongoing Activity

4.5.2. Weed science Research team

Activities 2: Integrated Weed Management on Yield and Yield Component of Common Bean at Yaballo and Abaya, Southern, Ethiopia.

Objectives

- ❖ To determine the most appropriate integrated weed management options on yield and yield component of common bean.

Brief Status

Year started 2022, Year of completion 2024.

- ❖ Weed parameter data was collected;
- ❖ Crop parameter data was collected;

❖ Postharvest data (**Laboratory data**) collection is underway;

Field picture: Integrated weed management on common bean

Weedy & Weed free plot



Weed free & Weedy



Picture; *Weedy and weed free plot before and at harvest Yaballo location*

Activities 3: Effect of Weeding Time and Frequency on Yield and Yield Component of Ground nut (*Arachis hypogaea L.*) at Abaya, West Guji, Southern Oromia.

Objectives:

- ❖ To identify most preferable weed management method in ground nut production

Brief Status

Year started 2022, Year of completion 2024

- ❖ Weed parameter data for 15 DAE,30DAE was collected,
- ❖ Data weeding time and frequency for 45&60 and their combination is underway.

Field picture: Weeding time and frequency on ground nut at Abaya

Field picture



*Picture: Weeding time and frequency on Groundnut
at Abaya site 2023*

4.6. Socio-economics and agricultural extension Research Process

Activity1: Analysis of Maize economic efficiency in Borana Zone

Brief description

This activity was conducted in four purposively selected Districts of Borana Zone namely Yabello, Elwaye, Dubluk and Bake Borana from 2021 to 2023 aimed to assess level of economic efficiency and identify the related factors in the study area. Site selection and data collection has been done so far. A total of 152 sample households was selected through random sampling technique. Three FGDs were used for this study. Both primary and secondary data were collected through the respective methods. Currently, data analysis is underway to address the specific objectives of the activity.

Activity 2: Analysis of Teff Economic efficiency in Borana Zone

Brief description

This activity was conducted in four purposively selected Districts of Borana Zone namely Yabello, Teltelle, Elwaye, and Gomole from 2020 to 2023 to address two specific objectives to (1) assess level of economic efficiency (2) identify related factors in the study area. Site selection and data collection has been done so far. A total of 142 sample household was selected using simple random sampling. Three FGDs were used for this study. Currently, data analysis is underway and no problem was reported.

Activity 3: Sheep value chain analysis in Borana zone

Brief description

This activity was conducted in Borana Zone from 2020 to 2023 aimed to release agricultural information on map of sheep value chain, supply and market efficiency problems in the study area. Site selection and data collection has been conducted. Random sampling was used to select target unit under study. A total of 176 household sample was used. Data from three FGDs consists of

minimum of 10 members were collected. Both primary and secondary data were collected through their respective methods. Currently, data entry and analysis for write up is underway in lined with the specific objectives of the activity.

Activity 4: Pre-scaling up of Integrated Bush Control Techniques in Borana Zone, Southern Oromia, Ethiopia

Integrated bush control technique was highly preformed and advantageous than other techniques to cope up with bush encroachment, improve forage quality and control of tick infestation. The objective of this study was to improve rangeland productivity and conservation systems in the study area. The study was conducted in Harwayu kebele of Yabello District and Samaro kebele of Dirre District. The duration of the study covers from 2018/19 to 2023. The sites were selected based on their high severity for its bush encroachment. The sites were fenced with locally available materials. Training was given for 80 participants. To share bush control knowledge, field had organized among stakeholders. Thinning at 50% and 75% were conducted together with the control. The result indicated that 50% and 75% thinning favored more GB, BC and litter cover by 159, 99 and 39.3% compared to the control, respectively. Therefore, both 50% and 75% thinning were recommended for further scaling up and out in the Borana rangeland.



Before treatment



After treatment



Field day organized at Samaro, Dirre (2015)



Recording data of biomass at Samaro of Dirre District, 2015

Activity 5: Pre-Scaling up of Improved Maize Technology in the Lowlands and Moisture Stress Areas of Borana Zone, Southern Oromia, Ethiopia

Today, maize is one of the most important food crops worldwide. In Ethiopia, maize grows from moisture stress areas to high rainfall areas and from lowlands to the highlands. However, in the agro pastoral areas of the zone the yield obtained from maize is too low due to drought, lack of

early maturing maize varieties, diseases and appropriate agronomic management practices. The purpose of this study was to improve the production and productivity of maize in study area. The study was conducted in Kukuba Katebu and Dherito kabeles. Pastoralist were selected based on their willingness to share cost in terms of land and labour. The duration of the study covers from 2019/20 to 2023. The sites were selected based on their potentiality for maize Production. Two PRG consisting 10 members were established at each kebele. A land size of 0.25 ha was used. A seed rate of 25kg/ha and a fertilizer rate 100 NPS were used. The result of the study revealed that the pooled average yield of Melkassa-1 was 17.3 and 12.5 qt/ha at Kukuba and Dherito, respectively. The variety was chosen for its early maturity, disease resistant and high yielder. Therefore, it recommended for scaling up until alternative variety released.



(a) Performance of maize technology at Kukuba



(b) Performance of Maize at Dharito



Training for exit strategy on maize technology at Yabello District, 2015

Activity 6: Pre-scaling up of Groundnut Technology in Mid-land and Lowlands of West Guji Zone, Southern Oromia, Ethiopia

Groundnut (Arachishypogaea L) is the six most important oilseed crops in the world. Groundnut is a high value crop that can be marketed with little processing; however, it is extremely versatile and can be used in wide range of products. In mid and low lands of districts of West Guji Zone groundnut is one of the major cash crops grown in the area where local late maturing varieties are dominant. However, due to lack of improved seed, adaptable, drought, disease and pest infection, weed and other factors, the yield of groundnut that harvested from farmers field in the area is very low. This was emphasized on three objectives to: (1) improve the production and productivity of participated farmers in the study area. (2) Develop local capacity for future scaling up of groundnut technology. (3) Strengthen stakeholders' linkage and collaboration. The study was conducted Abaya district, Gaunga Badiya and Samaro kabeles. The duration of the study covers from 2019/20 to 2023. The sites were selected based on their potentiality for groundnut Production. Two PRG consisting 10 members were established at each kebele. A seed rate of 90kg/ha Tole-1 was used. A land size of 0.25 ha was used with a fertilizer rate of 100kg NPS/ha. Average mean yield of Tole -1 variety at Guanga Dadiya and Samaro were 26.8 & 24.7 in 2013 and 28.09 and 25.6 qt/ha in 2014, respectively. Therefore, Tole-1 groundnut variety was recommended for further scaling up in Abaya district and similar agro ecology.



Performance of groundnut technology at Abaya District



Mini-field day organized at Abaya District on groundnut technology, 2015



Training for exit strategy on Groundnut technology at Abaya District, 2015

Activity 7: Participatory demonstration and evaluation of Open Pollinated Maize (*Zea mays L.*) technologies for mid altitude areas of West Guji Zone, Southern Oromia, Ethiopia

*Maize is the third most important crop in the world in terms of growing area, production and grain yield and it is important basic crop of trade product and recurring ingredient for millions of people in sub-Saharan Africa. In mid-highland altitude districts of West Guji Zone maize is one of the major staple food crops grown widely where local late maturing varieties are dominant. However, due to different factors influencing maize production in the area the yield that harvest from their farm was very low. The objectives of this study were to: (1) demonstrate and evaluate the productivity of the improved maize varieties. (2) Improve farmers' knowledge and skill on the improved maize varieties. The study was conducted at Abaya district, Gaunga Badiya and Bunnata kebeles. The duration of the study covers from 2019/20 to 2023. Two varieties (Gibe-2 and Kulani) were sown adjacently with the local variety. A plot size of 10m *10m was used. A seed rate of 25kg/ha and fertilizer rate 100 NPS were used. The ANOVA result showed that there is statistically significant mean difference among the three demonstrated varieties. Accordingly, Kulani was significantly higher in mean yield (20.87 Qt/ha) compared to Gibe-2 (17.76 qt/ha) and the local check (13.72).*



Training given on maize technologies at Abaya



Performance of maize technology on farmers' field at Abaya

3.3. Status of ongoing research activities

Activity 1. On farm Demonstration and evaluation of productivity of Buffel (*Cenchrus ciliaris*) Ecotypes grasses through application of Manure in the Borana rangelands, Southern Oromia, Ethiopia

Brief description

Year started: 2019/20

Year of completion: 2023/24

Work done so far:

- The activity was conducted at two districts (Gomole and Arero).
- One Pastoralists Research Groups (PRG) was established at each site.
- Site selection was conducted in the respective Districts.
- Two Buffel grass species namely Rhodes (*Chloris gayana*) and Buffel (*Cenchrus Ciliaris*) were sown on the plot size of 10m*10m at demonstration site.
- The recommended agronomic practices and follow up were conducted.
- All required data including seed germination date, flowering date, growth rate, grass biomass (using 1m*1m quadrant), and weight of dry matter etc were collected.
- Currently, the activity is smoothly ongoing.



(a) Sowing grass seeds



(b) Growth performance of Buffel grass

Activity 2: On farm Participatory Demonstration and Evaluation of beekeeping technologies in low lands of Borana Zone, Southern Oromia, Ethiopia

Brief Description

Year started: 2019/20

Year of completion: 2023/24

Work done so far:

- The activity was conducted at three districts of Borana Zone (Arero, Elwaye and Gomole)
- A total of three Pastoralists Research Groups (PRGs) was established where each site contains one PRG.
- A total of 20 (5 female and 15 male) pastoralists were capacitated on the technology whereas the newly PRG established at Gomole site will be capacitated in the coming season.
- Both transitional (3) and improved box hives (10) were distributed for each group.

- Hive stand constructed for each PRG in the respective sites under study.
- Colony transferred to modern beehives.
- Inspection and follow up have been conducted at Arero and Elwaye sites.
- The activity lacks yield data



A) Box hive distribution at Gomole District



B) Hive stand construction at Elwaye

Activity 3: Participatory Demonstration of Appropriate Maize Haricot Bean Intercropping in lowland of Borana Zone

Brief Description

Year started: 2020

Year of completion: 2023/24

Work done so far:

- The activity was conducted at Dherito and Dida-Yabello kebeles of Yabello District

- Training was given for the selected farmers
- Maize-Haricot bean (OMO-95) intercropping were sown on farmer’s field. A total of four trial farmers were used for the study.
- Yield data was collected and compiled using data sheet.
- The activity was smoothly ongoing



Performance of maize-haricot bean intercropping at Yabello District, 2015

Activity 4. Pre-extension Demonstration of Rehabilitation of Degraded Land with Selected Adaptable Multipurpose Trees and Grass Species at Gomole District

Brief Description

Year started: 2019/20

Year of completion: 2023/24

Work done so far:

- This activity was conducted at Asegora kebele in Gomole District

- In 2014, a total of 219 *Moringa Stenopital* and 52 *Faidhrbia Albida* seedlings were substituted. Additional 512 seedlings also substituted in 2015 EC.
- Enhanced community participation in degraded land conservation.
- Data on survival rate of the seedlings was collected
- Half-moon type structure of soil conservation method was used.
- A 10m*10m plot size was used for demonstration of grass specious.
- Data on germination date, growth performance and flowering, survival rate, grass biomass and weight of dry matter was collected.
- Currently, the area was conserved with good growth performance of the plants.



(b) Planting seedlings in half-moon structure



a) Before treatment



C) Change after treatment

5. Technology and Information released

5.1. Technology released from IQOO funded activyit

No	Teams	Plan	Quarterly performance			Planning and Execution up to the quarter			% of annual plan execution	Reasons for under or above plan
			Plan	performance	performance by %	Plan	performane	Performance by %		
1	Horticulture and spice	1	0	0	0	1	2	200	200	
2	Cereals	1	1	0	0	1	1	100	100	
3	Pulse and oil	0	0	0	0	0	1	100	100	
4	Crop protection	2	2	1	50	2	1	50	50	
5	Dairy	1	1	2	200	1	2	200	200	
6	Meat	2	2	1	50	2	1	50	50	
7	Animal Feed	2	2	0	0	2	0	0	0	
8	Horticulture	2	2	0	0	2	0	0	0	

9	Agroforestry	1	1	2	200	1	2	200	200	
10	Soil Fertility Improvement	1	1	1	100	1	1	100	100-	
11	Socio-Economics	2	2	3	150	2	3	150	150	
12	Extention	3	3	4	133.3	3	4	133	133	
Total		18	17	14	82	18	19	106	106	

5.2. Technology and Information released from non- IQOO funded activity

No	Teams	Plan	Quarterly performance			Planning and Execution up to the quarter			% of annual plan execution	Reasons for under or above plan
			Plan	performance	performance by %	Plan	performane	Performance by %		
1	Horticulture and spice	1	1	1	100	1	1	100	100	
2	Cereals	1	1	1	100	1	1	100	100	
Total		2	2	2	100	2	2	100	100	

6. Pre-extension *demonstration* activities

Lakk	Mata duree	Plan	Quarterly performance			Planning and Execution up to the quarter			% of annual plan execution	Reasons for under or above plan
			Plan	performance	performance by %	Plan	performane	Performance by %		
1	Number of technologies demonstrated	8	0	0	0	8	8	100	100	

1.1.	Crop technology	3	0	0	0	3	3	100	100	
1.2.	Livestock technology	3	0	0	0	3	3	100	100	
1.3.	Natural resource technology	2	0	0	0	2	2	100	100	
1.4.	Agricultural engineering technology	0	0	0	0	0	0	0		
2	Baayina Number FRG established	4	0	0	0	4	4	100	100	
3	Numbers of farmers/pastoralists participated	257	103	80	77.6	257	258	100.4	100.4	
4	Number of FTC included on demonstrator	6	3	3	100	6	6	100	100	

6.1. Types of technology Demonstrated and number of participants

No	Title of technology demonstrated	Name of technology demonstrated	Participation of farmers/pastoralists																			
			plan				Quarter plan				Quarter performance				Up to quarter plan				Up to quarter performance			
			AM	AW	B	G	AM	AW	B	G	AM	AW	B	G	AM	AW	B	G	AM	AW	B	G
1	PED of Beekeeping technology	-Modern beehives	22	15	8	7	0	0	0	0	8	2	4	2	22	15	8	7	14	8	7	5

	s																					
3	PED of OPV maize	Kulani and Gibe-3	21	15	8	7	0	0	0	0	0	0	0	0	21	15	8	7	13	10	6	3
3	PED of Maize haricot bean intercropping	Melkassa-1 and OMO-5	22	15	8	7	0	0	0	0	12	8	6	4	22	15	8	7	30	18	13	7
4	PED of Buffel grasses	Chloros Gayana cenchrs ciliaris	20	15	8	7	0	0	0	0	8	2	4	2	20	15	8	7	31	15	14	7
5	PED of Rehabilitation of degraded rangeland	SWC techniques	22	15	8	7	0	0	0	0	6	4	4	4	22	15	8	7	25	13	14	10
Total			107	75	40	35	0	0	0	0	34	16	18	12	107	75	40	35	113	64	54	32

Note: AM = (Adult men)) 2. AW= (adult women) 3. B=youth boys 4. g= youth girls

7. Pre-Scaling up of technologies

No	Title	Plan	Quarterly performance			Planning and Execution up to the quarter			% of annual plan execution	Reasons for under or above plan
			Plan	performance	performance by %	Plan	performane	Performance by %		
1	Number of technologies pre-scaled	14	2	2	100	13	7	50	50	
1.1.	Crop technology	4	0	0	0	3	3	100	75	
1.2.	Livestock									

	technology	5	2	2	100	5	4	80	80	
1.3.	Natural resource technology	2	0	0	0	2	0	0	0	
1.4.	Agricultural engineering technology	3	0	0	0	3	0	0	0	
2	Number FRG established	6	3	2	67	6	5	83.3	83.3	
3	Number of farmer/pastoralists participated	110	100	200	200	110	120	166.7	109.1	

7.1. Types of technologies pre-scaled and number of participants

Lakk	Title of the activity	name of technology	Participation of farmers/pastoralists																			
			plan				Quarter plan				Quarter performance				Up to quarter plan				Up to quarter performance			
			A M	A W	B	G	AM	A W	B	G	AM	A W	B	G	AM	A W	B	G	AM	A W	B	G
1	Pre scaling up of maize	Melkessa- 1	8	8	5	4	0	0	0	0	0	0	0	0	8	8	5	4	9	6	3	3
2	Pre scaling up of Groundnut	Tole-1	8	8	5	4	0	0	0	0	0	0	0	8	8	5	4	35	14	10	7	
3	Pre scaling up of Integrated Bush control	Thinning, fire prescription and reseedng	25	15	15	5	3	3	2	2	7	3	8	2	25	15	15	5	22	11	22	5
Total			41	31	25	13	3	3	2	2	7	3	8	2	41	31	25	13	66	31	35	15

Note: AM = (Adult men) 2. AW= (adult women) 3. B=youth boys 4. g= youth girls

8. Technology multiplication activities

No	Teams	Annual plan	Quarterly performance			Planning and Execution up to the quarter			Percentage of Planning and Execution up to the quarter	Reasons for under or above plan performance
			Plan	performance	% performance	Plan	% performance	%Up to Quarterly performance		
1	Livestock	4	1	1	100	4	1	25	25	
2	Crop	11	8	9	113	11	9	81.8	82	
3	Natural resource	5	5	5	100	5	5	100	100	
4	cereals	7	2	1	50	7	2	29	29	
5	Pulse and oils	5	0	0	0	5	4	80	80	
6	Horticulture and spice	3	0	0	0	3	0	0	0	
7	Daity	1				1				
8	Meat	2	2	0	0	2	0	0	0	

9	Animal Feed	3	2	2	100	3	3	100	100	
10	Apiculture	1	1	2	200	1	2	200	200	
Total		42	21	20	95	42	26	61.9	61.9	

8.1a. types of basic technology multiplied

No	Teams	Name of technology multiplied	Remark
1	cereals	Seed maintenance of Malkam Sorghum variety	Sanyiin kun Yaabelloo irratti 10m*10m irratti baay'ifamaa jira
		Seed maintenance of Guta Foodbarley variety	5m*5m=25m ² irratti Bulee horatti baay'atee jira
2	Pulse and oils	Seed maintenance of Dicho sesame variety	80m ² irratti Abbayaatti kan baay'ate
		Seed maintenance of Chalasa sesame variety	80m ² irratti Abbayaatti kan baa'ate
		Seed maintenance of Rasa Mung bean variety	100m ² irratti Yaaballoo irratti kan baa'ate
		Seed maintenance of NVL Mung bean variety	100m ² irratti Yaaballoo irratti kan baa'ate
3	Animal feed	Rhodes grass and Buffel grass	50m*50m
4	apiculture	Biqiltuu Nyaata (bee forage)	10m*10m
5	Livestock farm	Loon fooyya'oo	Tekinooloojiin dhiyaate bara kana hin jiru
		Re'ee fooyya'oo	
		Hoolaa fooyya'oo	
		Marga fooyya'aa	Rhodes grass.
6	Crop farm	Pulse and oil crops (H/Dumee, Batu, tole-1, Fayo, NC-4x) Cereal crops (melkassa-2, melkassa-1,Gibe-2, DZ-cr-385)	
7	Natural resource farm	Grevilia robusta, Garcia papaya, Mangifera indica, Cordia africana, Moringa stenopitala and Melia azadirachta	

8.1b. Plan and performance of technology multiplication and center development team

process / teams	Name of variety	Seed class (Basic, prebasic, verified)	Annual plan		Quarter plan and performance				Plan and performance up quarter				Annual performance (%)	
			Land (ha)	yield (kun/bel)	plan		performance		plan		performance		Land (ha)	yield (kun/bel)
					Land (ha)	yield (kun/bel)	Land (ha)	yield (kun/bel)	Land (ha)	yield (kun/bel)	Land (ha)	yield (kun/bel)		
Crop farm	Rhods grass	basic	3	1100	3	1100	3	0	3	0	3	0	3	0
	H/Dume	basic	2	28	3	40	3	0	3	0	3	0	3	0
	Batu	basic	0.25	4	0.25	4	0.25	0	0.25	0	0.25	0	0.25	0
	Melkassa-1	basic	0.5	8	0.5	8	0.5	0	0.5	0	0.5	0	0.5	0
	Melkassa-2	basic	0	0	1	0	1	0	1	0	1	0	1	0
	Gibe-2	basic	1	15	1	15	1	0	1	0	1	0	1	0
	DZ-cr-385	basic	3.5	0	3.5	0	3.5	0	3.5	0	3.5	0	3.5	0
	Tole-1	basic	0.25	5	0.25	0	0.25	0	0.25	0	0.25	0	0.25	0
	Fayo	basic	0.25	5	0.25	0	0.25	0	0.25	0	0.25	0	0.25	0
	NC-4x	basic	0.25	5	0.25	0	0.25	0	0.25	0	0.25	0	0.25	0
Variety suitable for Env't	basic	0.6	15	0.6	0	0.6	0	0	0.6	0	0	0.6	0	

Pictorial evidence of performed work at different site

1. Teff and maize multiplication at Yabello site



Teff Multiplication at Taltelle site



Haricot bean (Hawasa dume) multiplication at Samero site



Maize multiplication at Samero and Yabello site respectively

8.1c. Multiplication of other technologies (heifers, bee hives, chicken, proto type etc)

No	Teams	Type and name of	unit	Annual	Quarter plan and performance	Plan and performance up quarter	Performa
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		technologies		plan	plan	performance	Perfoemance by %	plan	performance	Perfoemance by %	nce by (%)
1	Natural resource multiplication team	Moringastenopitala	Pcs	5000	5000	3000	60.00	5000	3000	60.00	60
		Oleaeuropea	Pcs	5000	5000	1200	24.00	5000	1200	24.00	24.
		Terminaliamentaly	Pcs	5000	5000	400	8.00	5000	400	8.00	8.
		Grevaliarobusta	Pcs	3000	3000	1200	40.00	3000	1200	40.00	40.
		Meliaazadirachta (neem)	Pcs	3000	3000	3000	100.00	3000	3000	100.00	10
		Garcia papaya	Pcs	3000	3000	1600	53.33	3000	1600	53.33	53
		Mangiferaindica(Mangoo)	Pcs	5000	5000	2000	40.00	5000	2000	40.00	40
		Cordiaafricana(Wodeessa)	Pcs	3000	3000	1800	60.00	3000	1800	60.00	60
		Kooshimmii(for fancing)	Pcs	3000	3000	1600	53.33	3000	1600	53.33	53
		Faidherbiaalbida	Pcs	3000	3000	1800	60.00	3000	1800	60.00	60
		Juniperusprocera	Pcs	1500	1500	1300	86.67	1500	1300	86.67	87
Cupresuslustranica	Pcs	1500	1500	1300	86.67	1500	1300	86.67	87		

9. Different technologies distributed in this team

Name of	unit	Annual	Quarter	Quarter	plan up	Performance	% annual	To whom distributed	Number of	Total
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technology		plan	plan	performance	to quarter	up to quarter	performance		beneficiaries and their sex		
									Men	Women	
plants	Number	25,000	25,000	19800	25,000	19800	79.2	School ,forest association members,urban residents, and Horticulturists, Borana University	210	84	294

10. Training given

No	Teams	Annual plan	Quarter Plan and performance			Up to quarter plan and performance			% performance annual performance	Reasons
			Plan	performance	Performance %	Plan	performance	Performance %		

1	Cereal	48	19	19	100	48	67	140	140	
2	Pulse and oils	48	19	19	100	48	67	140	140	
3	Horticulture	48	0	0	0	48	39	81	81	
4	Crop protection	50	50	23	46	50	23	46	46	
5	Livestock	242	242	0	0	242	109	45	45	
6	Agroforestry	24	24	28	117	24	28	117	117	
7	Soil fertility improvement	24	24	24	100	24	24	100	100	
8	Extension	100	0	0	0	100	63	63	63	
9	Socio-economics	39	39	20	51.3	39	20	51.3	51.3	



Figure 12. Traing on pre-scaling up of Ground nut (Tole 1) variety at variety at Abaya

Figure 13. Traing on pre-scaling up of Maize (Malkassa 1)



Figure 14: traing on Community based breeding program



Figure 15: Training on Agroforestry Practices and Multipurpose Tree Species Plantations



Figure 16: Training given on Groundnut technology for exit strategy at Abaya in 2015 E.C



Figure 17: Training given at Yabello on maize technology for exit strategy in 2015 E.C

9. Training given, titles and participants

Teams	title	Training date	Experts (SMS)			(DAs)			Farmerpastoralists participated				
			M	F	Total	M	F	Total	AM	AF	B	G	Total
Cereal	Pre scaling up of ground Nut technology at Abaya	0	9	0	9	1	1	2	6	2	0	0	8
Pulse and oil	Pre scaling up of Maize technology at Yabello	0	9	0	9	1	1	2	6	2	0	0	8
Crop protection	Training On Integrated Pest Management On Major Field Crops		6	4	10	4	2	6	6	4	0	0	10
Agroforestry	Training on AgroforestryPractices andMultipurpose Tree Species Plantations	4	2	0	2	1	0	1	11	14	0	0	25
Soil fertility improvement	Mala Eegumsa biyyee fi bishaanii fi Fooyyessa xaa ummaa biyyee	4	0	0	0	0	0	0	7	10	5	2	24
extension	Intercropping mgt		6	2	8	6	2	8	15	5	8	2	30

	and its package and rehabilitation of degraded rangelands, productivity of improve maize, productivity of groundnut technology	4											
Socio-economics	Crop marketing	3	0	4	2	6	0	0	6	5	2	1	14
Total		15	32	10	40	19	6	19	57	42	15	5	119

10. Organized field day

Name of technologies	Location	Farmer /pastoralists					Extension experts			Others		
		AM	AW	B	G	Total	M	F	Total	M	F	Total
Groundnut (Tole-1)	Abeya	12	4	2	2	20	1	1	2	5	1	6
Integrated Bush control techniques	Dire, samero	12	5	8	3	28	9	5	14	6	3	9
Teeknooloojii Oomisha muuzii jallisiin hojjetamee	Yabello, kadale	10	5	5	0	20	3	0	3	2	10	12



Figure 17: Mini-field day organized at Bunnata Kebele of Abaya district, West Goji Zone, 2015E.C



Figure 18: Integrated Bush control techniques

11. Farmer /pastoral Groups (FRGS) Involved in Research Activities During quarter and other newly established

Teams	Title	Number 'FRG'			Number og FRG members				
		Former	New	Total	AM	AW	B	G	Total
Extension Teams	PED of Buffel grass	2	2	4	15	7	6	2	30
	PED of Maize Haricot bean Intercropping	2	2	4	15	7	6	2	30
	Pre-scaling up of integrate bush control	0	5	5	18	13	12	7	50
Totals		4	9	13	48	27	24	11	110

12. Publications (jornal, prosidin. etc)

No	Teams	Publication type and title	remark
1	Dairy	Teshome, D., Muluneh, B., Hussien, B. and Asefa, Z., 2023. Prevalence of gastrointestinal parasites in cattle kept under pastoral management system in selected districts of Borana zone, Ethiopia. International Journal of Livestock Production, Vol. 14 (2) ,pp. 31-36	Full length article
2	Meat		
3	extension	Feyissa Desiso, Ahmed Mohammed Abdulla, Yonas Asefa. Pre-scaling up of Improved Haricot Bean Varieties in Lowlands and Mid-Highlands of Borana Zone, Oromia National Regional State, Ethiopia. Science, Technology & Public Policy. Vol. 10, No. 5, 2022, pp. 177-182. doi: 10.11648/j.jps.20221005.12	Full length article
		Feyissa Desiso, Ahmed Mohammed Abdulla, Yonas Asefa. Evaluation of improved sheep breeds in pastoral areas of Yabello district, Southern Oromia, Ethiopia Vol. 14(2), pp.37-43, April-June 2023. DOI: I 0.5897 I I JLP2022.079 6	Full length article

13. Human resource

No .		Ph.D		MSc/MA		MVSC		DVM		BSc/BA		Diploma/level		Certificate		Other		Total		Over all
		Dh i	Du b	Dh i	Du b	Dh i	Du b	Dh i	Du b	Dh i	Du b	Dhi	Du b	Dhi	Du b	Dh i	Du b	dhi	dub	
1	Research	0	0	18	0	1	0	1	0	22	2	20	8	1	0	15	3	78	13	91
2	Supportive	0	0	1	0	0	0	0	0	5	6	11	8	2	1	18	4	37	19	56
	Total	0	0	19	0	1	0	1	0	27	8	31	16	3	1	33	7	115	32	147





14. Budget and budget utilization

No	Teams	Annual budget	Quarter pain and performance			Up to quarter plan and performance			Annual performance	Reason
			Karooora	Raawwii	%	Karooora	Raawwii	%		
1	Cereal	597,100.00	100,800.00	68,374.93	68	597,100.00	567,342.05	95	95	
2	Pulse and oils	465,300.00	118,300.00	124,092.24	105	465,300.00	454,030.06	98	98	
3	Horticulture and spice	604,700.00	101,800.00	88,605.02	87	604,700.00	591,505.02	98	98	
4	Crop protection	406,900.00	56,500.00	37,522.51	66	406,900.00	388,222.51	95	95	
5	Dairy	920,000.00	157,300.00	121,836.01	77	920,000.00	908,334.47	99	99	
6	Meat	893,400.00	74,400.00	133,827.63	180	893,400.00	833,740.43	93	93	
7	Animal feed	440,000.00	53,900.00	60,968.32	113	440,000.00	435,910.52	99	99	
8	Apiculture	350,000.00	64,000.00	49,621.97	78	350,000.00	345,939.97	99	99	
9	Community based SR breeding program	1,000,000.00	90,000.00	292,635.00	325	1,000,000.00	994,195.81	99	99	
10	Agroforestry	520,800.00	110,600.00	92,838.84	84	520,800.00	520,666.90	100	100	
11	Soil fertility	650,000.00	140,000.00	155,428.69	111	650,000.00	643,749.69	99	99	
12	Irrigation and water harv.	188,100.00	41,100.00	43,062.25	105	188,100.00	173,380.54	92	92	
13	extension	609,900.00	50,000.00	131,415.62	263	609,900.00	602,707.00	99	99	
14	Socio-economics	263,500.00	50,000.00	24,000.00	48	263,500.00	250,735.84	95	95	
15	Multiplication team	2,125,700.00	250,500.00	478,220.74	191	2,125,700.00	2,108,528.71	99	99	
	Total	10,035,400	1,459,200	1,902,450	130	10,035,400	9,818,990	98.00	98	

14.1. Non IQOO budget

No	teams	Annual budget	Budget source	Quarter paln and performance			Up to quarter plan and performance			% annua l performace	Reaso n
				Karooora	Raawwii	%	Karooora	Raawwii	%		
1	Dairy	325,145.00	EIAR	81,286.25	325,145.00	400	325,145.00	325,145.00	100	100	
2	Meat	165,000.00	>>	63,750.00	125,000.00	196	165,000.00	125,000.00	76	76	
3	Animal feed	139,141.00	>>	34,785.25	132,321.00	380	139,141.00	132,321.00	95	95	
4	Camel	70,000.00	>>	17,500.00	62,500.00	357	70,000.00	62,500.00	89	89	
5	Health	45,000.00	>>	14,250.00	41,000.00	288	45,000.00	41,000.00	91	91	
6	PAP H/F/G/Ny Bel H/Din	245,394.00	>>	65,960.25	193,841.00	294	245,394.00	193,841.00	79	79	
7	Pulse and oil	160,000.00	NIO BOTOM	160,000.00	0.00	0	160,000.00	48,000.00	30	30	
8	Meat	248,560.90	ICARDA	148,560.90	148,560.00	100	248,560.90	148,560.00	60	60	
9	Wheat irrigation	520,000.00	EIAR	520,000.00	300,000.00	58	520,000.00	300,000.00	58	58	
10	Animal Feed	118,750.00	BMGF	118,750.00	90,000.00	76	118,750.00	90,000.00	76	76	
11	Agricultural engenering	201,410.00	Irrigation	201,410.00	197,879.00	98	201,410.00	197,879.00	98	98	
	Total	2,238,400.90		1,426,252.65	1,616,246.00	113	2,238,400.90	1,664,246.00	74	74	

14.2. regular budget utilization

center name	annual budget	Quarter paln and performance			Up to plan and performance			% annuall performance
		plan	performance	%	plan	performance	%	

	YPDARC	19,946,828.00	4,986,707.00	3,246,634.93	65.11	19,946,828.00	18,206,755.93	91.28	91.28

14.3. Income (birr.)

center name	Annual Plan	Quarter plan	performance	% performance.	Up to quarter plan	Up to quarter plan	Annual Performance		Source of income	
	40,000.00	10,000.00	151,675.00	1,516.75	40,000.00	154,675.00	386.69	386.69	sell of research out put	

15. 2023/24 action Plan

Lakk.	Hojiilee gurguddoo	Safartuu	Ka'uumsa Raawwii 2015	Mannii bara 2016	Qoodama Karoora Hojii kurmaanaan			
					Kur.1 ^{ffaa}	Kur.2 ^{ffaa}	Kurm.3 ^{ffaa}	Kurm. ^{ffaa} 4
1	Yaalii hojii qorannoo gaggeessuu	Lakk	70	71	71	71	71	71
2	Tekinolojii odeeffannoo baasuu	Lakk	15	20				20

3	Baay'ina teknolojiwwan agarsiifamanii	Lakk	8	11		11		
4	Baay'ina FRG hundeefamanii	Lakk	4	7		2	2	3
5	Baayina qonnaan/horsiisee bultoota hirmaatanii	Lakk	257	220		70	100	50

Gabaasa Kan Qindeese

Maqaa (Gaggeessa G/G): **Dr. Darajee Tashoomaa Tufaa** Mallattoo _____ Guyyaa **08/10/2015**