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The Government of National State of Tigray
ቢሮ ሕርሻን ሃፍቲ ተፈጥሮን
Bureau of Agriculture & Natural resources

ዕለት/Date 21/4/2015 ቁፅሪ/No 02/ዝተ-485

To: UN agencies, International and local Non Govermental Organizations, programmes and projects

Mekelle

Subject: BOANR *Emergency and recovery plan of 2022/23*

Due to the prevailing war in the region, the farmers have faced incredible and catastrophic problems which destroy all the irrigation facilities/services. Currently, Bureau of Agriculture and Natural Resources (BOANR) faced critical challenges to support the farmers in many aspects of the extension services. Following the peace agreement, the Bureau has developed an emergency and recovery plan for 2022/23 which has a great impact on food and nutrition security and income generation of the affected farmers/communities.

Hence the bureau is requesting your good office to support and use this document as a mother document for your future planning and support. We are expecting your plan to be presented in the ATF and submitted to the bureau acordingly. To strengthen the Agricultural Task forces and speed up the overall implementation process of the Agricultural sector, your regular participation in the forum is important. We recommend your organization to assign permanent focal person which will participate in the ATF weekly meeting. Currently, the ATF meeting is held at BOANR every Wednesday from 11-12:30 am.

This is, therefore, to share you the 154 pages of the detailed emergency and recovery plans as attached herewith for your action.

The National Regional Government of Tigray Bureau of Agriculture & Natural Resources

With best regards,

Atinkut Mezgebu(PHD)

Bureau Head of Agriculture & Natural Resources

TIGRAY BUREAU OF AGRICULTURE AND NATURAL RESOURCES

EMERGENCY AND RECOVERY SUPPORT PLAN FOR THE 2022/23 BUDGET YEAR

OCTOBER 2022 -MEKELLE

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Introduction

Agriculture is the livelihood of the overwhelming majority of Ethiopia's population. It is the source of food and cash for those who are engaged in the sector and others. It employs 80% of the labor force and contributes 36.3% to the national GDP and 70% of the export earnings (UNDP, 2018). Crop production is a prime contributor as the source of grain and feed for livestock

Tigray National Regional state has nearly 8 million people living in 54,593 km2 areas of different agroecological zones. It has 1.3million hectares of arable land, 7 administrative zones, and 60 rural and 33 urban Woredas. Agriculture is the main backbone of the state economy in which crop production accounts for about 70 % of the economy and it is the source of employment and income for 80% of the population. The contribution of livestock to the economy of the state is about 30%

The conflict in Tigray; which started in November 2020 and which is continuing; is one of the largest humanitarian crises in the world. The conflict has forced millions of people to be displaced and seek security within and outside the region. It also resulted in millions of people being in a critical humanitarian situation.

Most of the institutions established to support extension services are damaged and looted their internal resources like Farmer's Training Centers, Veterinary Clinics (public and private), Coops & Unions, Crop protection storages & Seed quality & Healthy Laboratories, Farm machinery services (private and Cooperatives), Nursery sites (forage, forest trees, and fruit nursery sites), Animal feed processing plants, Animal farms (dairy, fattening, breeding, poultry…), Branded Honey packing plant and ecology of Bee colonies, Irrigation schemes and seed cleaning machines, Privately-owned agricultural input suppliers (Agro-dealers)and Woreda offices and transport facilities

The victims affected by the conflict have lost their physical, social, and economic access to food; and there was an urgent need to respond to the needs of the transitory food insecure households. In response to the crisis, besides the Tigray Government's endeavors, several UN Agencies, INGOs, and local NGOs are being involved in humanitarian food and non-food assistance.

To improve the satiation BONR and its partners have planned to implement Emergency and recovery interventions activities;

Section one: Irrigation and Horticultural Crop Development

In 2020/21 G.C due to war irrigation beneficiaries are looted of their horticultural products from the farm and also poor market linkage made their produce out of use. In addition above 17,964.41 ha of cultivated land (Bureau water resource) has become out of production because the irrigation infrastructure has been damaged. 81% of fruit nurseries have been damaged and looted. Currently, the majority of fruit nurseries are not functional.

Tigray is locked 360 degrees to introduce man-made hunger through blockage of Emergency food and agricultural input and development initiative supports and the entrance of any agricultural inputs (seed, fertilizers, agrochemicals, farm tools, and agro mechanizations, etc.). In addition blockage of the entrance of fuel made not have extension support to farmers and also greater than 10,000 ha of irrigable land by water lifting technologies became out of production.

Therefore to improve the satiation Emergency support on the provision of horticultural inputs (seed and seedling, fertilizers, agrochemicals, farm tools, and agro mechanizations) and recovery of the infrastructure of the irrigation like fruit nursery equipment, irrigation infrastructure maintenance is needed. And the bureau of Agriculture and natural resource has prepared a regional emergency and recovery plan as follows.

1.1 Challenges for Horticultural crop Development

- Due to Tigray being locked 360 degrees no access to improved horticultural seed, agrochemicals, and fertilizers

- 224,000 irrigation beneficiary households are affected by war directly by looting their horticultural product, not being allowed to cultivate their irrigation land, and indirectly by the absence of a market.

- Due to the war,2,503 irrigation schemes that irrigate 17,984.4 ha of 49,543 beneficiaries are damaged and become out of production. In addition, 794 motor pumps have been taken which can irrigate above 1,994 ha of 4,732 beneficiaries.

- 81% of the 45 fruit nurseries are fully and partially damaged,

- Raising fruit seedlings in the damaged nurseries cities is stopped.

- 630 Poor farmers and youths who were employed in the nursery cities become jobless.

- Vegetable farms highly declined from growing vegetables in 70% of the total irrigable land to below 30%

- People of Tigray faced a shortage of horticultural products and therefore the price of one kilogram of produce has been highly increased.

- Even the production and income of farmers were distributed to families and relatives freely that is with no monetary value which made farmers not reserve agricultural products and cash for agricultural inputs and irrigation infrastructure maintenance, even food.

- As a result, the people of Tigray face human-made hunger and malnutrition which are now resulting in death.

1.2 Objective

To contribute to the reduction of hunger and malnutrition by creating farmers' access to quality horticultural inputs and irrigation facilities: and strengthening extension support for farmers

1.2.1 Specific objectives

- To create farmers' access to quality Agricultural inputs and irrigation facilities
- To support seed-insecure households to resume and enhance horticulture production and productivity.

- To capacitate woreda and zonal experts, extension agents, and farmers on technics of horticulture production
- To have efficient and effective extension support to farmers at all levels
- To supply horticultural products to the market.

This plan mainly focused on the supply of Agricultural inputs (improved seeds and/or seedlings, fertilizer, and agrochemicals) maintenance of damaged irrigation infrastructures, the substitution of irrigation technologies (motor pumps and Hip pumps), and fruit nursery equipment and inputs. This plan does not include the next summer season (2023) which will be done after the crop evaluation of 2022.

1.3 Expected output

- Vulnerable farmers have access to improved agricultural inputs such as improved seeds and seedlings, fertilizer,
- Vulnerable farmers have access to irrigation facilities such as the maintenance of irrigation infrastructures, motor pumps, and farm tools.
- Vulnerable farmers have access to agronomic extension support
- People of Tigray will have access to horticultural products

1.4 Emergency and Recovery interventions

1.4.1 Emergency response intervention**:**

1.4.1.1 Provision of vegetable seeds and seedlings

The underlying rationale for seed and seedling provision during emergencies is that it can help to reestablish a 'self-help' mode within communities affected by the situation: once families have seed and farming tools, they can start the process of producing their food and/or making money from selling crops, and thereby reducing their dependence on external sources for their livelihoods. On the other hand, they can supply agricultural products to the market so that non-farm households can have access.

Generally, we plan 85,707 ha of land to be planted by horticultural crops by irrigation of this for emergency support 13,806.24 qt of vegetable seeds, 15 million sweet potato cuttings, and 504,720 fruit seedlings are needed, this will only cover 29,741 ha (35%). During the emergency

support, 204,424 irrigation beneficiaries will be directly benefited from the horticulture production of vegetables, papaya, and banana, 4,351,529 Qt will be obtained in 2022/23. This production will cover the vegetable and fruit nutrition demand of 2.98 million people.

prioritized commodities for an emergency are:

- First Priority crops are Sweet potato and potato
- Second priority crops are pepper, onion, tomato, Swiss chard, and lettuce
- The third priority crops are maize and pulses

The number of vegetable seeds, cereals, and pulses required for the irrigation season of 2022/23 of each woreda, see the Annex-1

Table 1 Vegetables, cereals, and pulses requirement for irrigation season of 2022/23

No	Type crop	unit	Total plan (Qt)	Emergency demand in Qt	unit price in birr	Total Price	Distribute (kg per farmer)	Maximum area per farmer (Ha)	Number of beneficiaries	area to be covered in Ha
1	**Onion**	**Qt**	721.80	573.11	250,000	143,277,500.00	0.94	0.125	61,132	7,641.47
2	**Tomato**	**Qt**	19.12	19.12	430,000	8,221,600.00	0.04	0.125	50,987	6,373.33
3	**Cabbage**	**Qt**	12.69	10	360,000	3,600,000.00	0.06	0.125	17,778	2,222.22
4	**pepper**	**Qt**	13.00	**7.8112**	400,000	3,124,480.00	0.08	0.125	10,415	1,301.87
5	**Swisschard**	**Qt**	120.70	**84**	275,000	23,100,000.00	1.25	0.125	6,720	840.00
6	**Lettuce**	**Qt**	4.61	4.61	275,000	1,267,750.00	0.05	0.125	9,220	1,152.50
7	**Carrot**	**Qt**	43.30	34.64	295,000	10,218,800.00	0.63	0.125	5,542	692.80
8	**potato**	**Qt**	72,360.00	9985.68	6,000	59,914,080.00	250.00	0.125	3,994	499.28
9	**Maize**	**Qt**	2,426.08	1499.31	6,000	8,995,860.00	6.25	0.25	23,989	5,997.24
10	**Wheat**	**Qt**	3,106.95	499.7	8,000	3,997,600.00	37.50	0.25	1,333	333.13
11	**Chick pea**	**Qt**	5,339.20	998.43	9,000	8,985,870.00	25.00	0.25	3,994	998.43
	Sub total	**Qt**	**84,167.44**	**13,716.41**	**2,314,000**	**274,703,540.00**	-		**195,103**	**28,052**
`12	**Sweet potato**	**seedling**	41,332,920	15,000,000	3	45,000,000.00	6,944.375	0.125	2,160	270.00
	Total		40	5388250		**319,703,540.00**			**197,263**	**28,322**

Table 2 lists of varieties of horticulture, cereals, and pulses seeds, possible seed source and quality standards

No	Crop type	Varieties	Possible Seed sources	Quality standards for emergency procurement – Based on FAO Quality Declared Seed

				Varietal purity (min. %)	Germination (min. %)	Moisture content (max. %)
1	Onion	Bomby red, Adama red, Red creole, Nask red, Redcoach F1, Red king F1, Lambada F1, Russet F1, Randah F1, Malbec F1	Tigray seed enterprise (TSE), traders, and/or outside Tigray	98	70(80)	8
2	Tomato	Roma Vf, Sembersana, Gelilama, Venus F1, Galilea F1, Randah F1		98	70(80)	8
3	Cabbage	Copenhagen market, Earlydrum head, Landini F1, Thomas F1, Victorya F1, Gloriya F1		98	70(80)	8
4	pepper	Markofana, Bako local, Paprikanon, elkawazea, Serenade F1, Haraba F1, Mixcitizo F1, Artaele F1		98	70(80)	8
5	Swiss chard	Fordhookgiant		98	70(80)	8
6	Lettuce	Greatleakes, tesfa mekelle		98	70(80)	8
7	Carrot	Nants		98	70(80)	8
8	potato	Belete, Gudeana, Jalani and local	Tigray biotechnology, TSE, traders, and/or local market	Clean and free with Tuber Size 40–70 g		
9	Sweet potato	Tulla, Kulfo, Dila, Cambodia, Alamura		Clean and free Vine with ≥ 3 nodes and ≥ 20 cm length		
10	Maize	melkassa-2, melkassa -3, melkassa -1Q, melkassa 6Q, BH-546, BH-547, BH540, BHQY- 545, BH-661, Gibe-2, Gibe-3 and local	TSE, traders and/or outside Tigray	98	80	13
11	Wheat	King bird, Kekeba and local		98	80	13
12	Chickpea	RRT, Werku, shasho, Marye, and local		98	75	10

- Germination (min.%) in the bracket indicates for international procurements out of the bracket are for local procurements
- In all crop types, if improved varieties are not available, it is possible to shift local varieties from the local market. This can be purchased from cooperatives or provide seed money to farmers so that they can buy from other farmers**.**

1.4.1.2 Fertilizer provision

In many cases where soil nutrients have been depleted due to leaching or continuous cultivation, the addition of even small amounts of fertilizers (organic or inorganic) can increase crop productivity significantly, Fertilizer will be provided for those who will receive horticulture seeds/seedlings for the area to be covered by the support, and in addition to the rest of the irrigable land. The maximum support will be for 0.5 ha depending on the availability of irrigable land that is 0.5 qt NPS and 0.5 qt Urea a total of 1 qt fertilizer for one household.

The fertilizer requirements in each woreda in irrigation season of 2022/23m see in the annex-3

Table 3 type and amount of fertilizer needed

No	Irrigation land coverage		amount of fertilizer needed (Qt)			number of beneficiaries
	irrigation intensity	Ha	NPS	Urea	Total	
1	First round (ha)	67,486	67,486	67,486	134,972	
2	second round (ha)	18,221	18,221	18,221	36,442	
	total (ha)	85,707	85,707	85,707	171,414	224,450

1.4.1.3 Provision of agrochemicals

It is known that horticulture crops are very sensitive to insect pests and diseases. BOANR promotes to use of Integrated Pest Management (IPM). The last option is to use chemical pesticides safely. This time there is no pesticide entry to Tigray due to the siege. Unless farmers are supported by the provision of agrochemicals it is difficult to harvest horticultural crops. Therefore we demand insecticide, fungicide, and rodenticide as stated in the table

1.4.2 Recovery /Rehabilitation interventions

1.4.2.1 Provision of farm tools and water-lifting technologies to households who looted their farm tools

Due to the war, many farmers looted their farm tools such as Hoe, Rake, Axe, Fork, Shovel, Wheelbarrow, watering can, and water pumps. Now they face difficulty to cultivate and irrigate their farmlands. Therefore support for on-farm tools and water-lifting technologies is crucial. Tools must be simple design and ready to use without loss of time due to preparatory adjustments. From the water lifting technologies, solar pump is highly prioritized due to it is renewable energy. In addition, Hip Pump also prioritized during siege in small-scale irrigation

because it works without fuel and is easily portable as recommended by Tigray agriculture and natural resource research institute. Those technology is well recommended for irrigation beneficiaries who looted their water lifting technologies and for most vulnerable farmers whose farmland cannot access river water but can access by this technology.

The number of farm tools and water pumps needed to be distributed to household by each woreda see in the annex-4

Table 4 the number of farm tools and water pumps needed tobe distributed to household

No	Type of instrument	Unit	Amount needed	unit price	Total price	implementation modality	No of beneficiaries
1	Hoe	No	76,820	500.00	38,410,000	one from each equipment or one farmer	76,820
2	Rake	No	76,820	500.00	38,410,000		
3	Axe	No	76,820	500.00	38,410,000		
4	Fork	No	76,820	500.00	38,410,000		
5	Shovel	No	76,820	500.00	38,410,000		
6	watering can	No	76,820	500.00	38,410,000		
7	Wheelbarrow	No	7,688	2,000.00	15,376,000	one for 10 farmers	
8	water pumps	No	1,444	50,000.00	72,200,000	one for 20 farmers	28,880
9	hip pump	No	2,040	10,000.00	20,400,000	one for 5 farmers	10,200
10	Solar pump	No	1,155	100,000.00	115,500,000	one for 5 farmers	5,775
	Total		**473,247**		**453,936,000**	**-**	**121,675**

1.4.2.2 Provision of Fruit seedlings

The amount of fruit seedling required for each woreda in the irrigation season of 2022/23, see annex-2

Table 5 the number of fruit seedlings required for each woreda in the irrigation season of 2022/23

S.N	Fruit type	Unit	Amount of Seedlings	Unit Price in birr	Total Price in birr	No of Seedling per HH	Number of beneficiaries	area to be covered in Ha	Productivity Qt/ha	production in Qt
1	Mango	No	120,000	150	18,000,000	50	2,400	769.2	90.0	69,230.8
2	Avocado	No	80,000	100	8,000,000	50	1,600	192.3	70.0	13,461.5
3	Apple	No	38,000	120	4,560,000	50	760	45.6	70.0	3,193.3
4	Orange	No	20,000	80	1,600,000	50	400	48.1	150.0	7,211.5

5	Papaya	No	100,000	20	2,000,000	100	1,000	90.0	180.0	16,201.6
6	Banana	No	66,720	20	400,000	100	667	60.1	190.0	11,410.3
7	Guava	No	50,000	10	500,000	100	500	180.5	100.0	18,050.5
8	Lime/ lemon	No	30,000	10	300,000	100	300	75.0	90.0	6,750.0
	Total	**No**	**504,720**	**510**	**35,360,000**	**600**	**7,627**	**1,461**	**940**	**145,510**

Remark: sources of seedlings are from Tigray seed enterprises and seedling multipliers

1.4.2.3 Rehabilitation of irrigation infrastructure

Total irrigation potential is 67,486.41 ha out of which 2,503 irrigation infrastructures that can irrigate 17,964.41 ha (26.6% of the total) are damaged by the war. Due to this 49,543 (22%) irrigation beneficiaries become out of production. In addition due to this, the volume of horticultural produce decreased (125 Q/ha * 17964 ha * 1.3 = 2,919,150 qt) as a result, it also affected the supply of horticultural crops to the market. Therefore maintenance of the irrigation infrastructure is crucial. The detailed of Recovery support on damaged irrigation infrastructures needed for each woreda see in the Annex-5

Table 6 Irrigation infrastructures damage and budget needed for maintenance

No	**Type of irrigation infrastructure**	**Number of damaged infrastructure**	**area to be irrigated (ha)**	**total beneficiaries**	**the capital budget needed (birr)**
1	**Dam**	44	4,190	11,623	204,233,188
2	**Shallow hand well**	35	9	25	426,501
3	**deep well**	82	2,465	6,779	120,151,495
4	**manual drilling**	5	24	60	1,169,832
5	**Diversion**	188	6,644	18,271	323,857,792
6	**pond**	1,260	79	252	3,850,697
7	**check dam**	477	1,452	3,994	70,774,836
8	**check dam diversion**	71	86	238	4,191,898
9	**Spring**	48	152	418	7,408,936
10	**Reservoir**	95	13	36	616,599
11	**Traditional diversion**	167	2,507	6,894	122,198,701
12	**canal**	31	344	946	16,771,592
	Total	**2,503**	**17,964**	**49,536**	**875,652,067**

1.4.3. Orange fleshed sweet potato production and utilization promotion

- Sweet potato is a strategic crop which have potential for alleviating food and nutrition insecurity.
- It has significant amount of macro and micro nutrients
- Its tuber and leaves are consumable (support the whole year)
- Once it grow it can multiplied by individuals households and cultivate it three to five years without purchasing additional seedlings.
- But its consumption is not well popular in Tigray. So promotion of its production and consumption is crucial. Accordingly we prepare this plan. Detailed interventions for promotion of promotion and consumption of Orange fleshed sweet potato (OFSP) is shown in table 10

The total budget required for training, provision of vegetable seedlings, and fruit seedling, is 18,711,800 birr, and the number of beneficiaries and area coverage indicated in annex 3

Table 7Orange fleshed sweet potato promotion and budget required

No	intervention	activities	unit	quantity	Unit cost	Total cost	Remark
1	Enhancing sweet potato production	Broadcasting on the nutritional importance of OFSP	times	One in a month			free
		Preparing audio-visual training manual on the production of OFSP	no	4	650	13000	For 5 days
		Broadcasting on agronomic practices of orange-fleshed sweet potato	time	5	5000	15000	One in two weeks
		Creating awareness on the importance of growing and consumption of OFSP for UN, International, and local NGOs	No	50	650	65,000	For 3 days
		Creating awareness on the importance of growing and consumption of OFSP for zonal and wereda political leaders	No	200	650	390000	For three days
		Provide TOT training for wereda experts on agronomic Practices and food preparation of OFSP	No	200	650	520000	For 4 days
	Consumption	Purchasing inputs for food preparation of OFSP recipe	kg	200		30000	
		Developing posters	No	100	1000	100000	
		Develop food preparing manual on OFSP	no	4	650	10400	For 4 days
		Preparing food day	no	100	500	50000	
		Broadcasting on food preparation	times	6	10000	60000	One every two weeks

No	intervention	activities	unit	quantity	Unit cost	Total cost	Remark
							for three months
	Market linkage	Develop retailers in large towns of Tigray and provide training on the preparation of tuber consumption by roasting	no	41	650	79950	For 3 days
		Introducing OFSP to hotels and restaurants	No	12	650	23400	For 3 days
		Assess the production of OFSP	NO	4	650	26000	For 10 days
		Link farmers with traders on the OFSP market	no	10		0	free
	Total					1,382,750	

1.5 Implementation modalities for emergency and recovery support

The following modalities and approaches are recommended:

- Vulnerable households will receive inputs maximum of 0.5 ha and minimum irrigable land holding size
- Vegetable seeds for 0.125 ha and below according to land holding size
- Cereal crops for 0.25 ha and below according to land holding size
- Fertilizer for 0.5 ha and below according to land holding size
- One household only receives one of the seed/seedling of vegetable/cereal crops with the addition of fertilizer, and agrochemicals.
- Fruit seedling distribution will be carried out for those farmers whose fruit orchards are damaged by the war and also for homestead vulnerable families.
- For beneficiaries whose farmland is damaged each household will receive 50 grafted seedlings of Mango, Avocado, Apple, and orange or 100 seedlings of Papaya, Banana, Guava, and lemon
- Each house holds only received one of the fruit types
- Distribution of farm tools will be given to those who have looted their resources
- Motor pumps and farm tools will be given to those who are looted.
- Each household will receive Hoe, Rake, Axe, Fork, Shovel, and watering can
- 10 households will receive one Wheelbarrow (nearby households)

- 20 households will receive one water pump (establish water user association), and nearby farmers who are not looted water pumps may consider a member of the association.
- One Hip pump will be given to the 5 most vulnerable farmers who can access irrigation water and to those who are looted their water lifting technologies.
- Irrigation infrastructures will be maintained by the community through cash for work.
    - The Labour force will be used cash for work
    - Industrial materials will be purchased
- Agricultural inputs such as improved/local seeds, vegetable and fruit seedlings, and agrochemicals bought by UN and international NGOs will be inspected by BOANR – Crop protection and quarantine directorate before being distributed to beneficiaries.

1.6 Institutional support

Bureau of Agriculture and Natural resources (BOANR) with other stakeholders develop possible interventions while the problem of blockage continued but the lack of communication facilities, fuel for transportation, and budget resulted from poor extension support to farmers as a result the possible interventions are not reached to farmers and those are reached are not monitored and supported by knowledge and skill.

Therefore, to have the interventions be implemented by farmers providing extension support and monitoring the interventions are highly needed. As a result, BOANR develop eight monthly action plan to have strong extension support to farmers and monitored the implementation of possible interventions. We kindly request international NGOs to support the implementation of the interventions listed below

Table 8 Resources needed for institution Strengthening

No	Activities	Unit	Quantity	Travel Days	Unit Cost ETB	Total Cost ETB
1	DSA for monitoring team (SMS)	No	30	20	650	390,000
2	Regional workshop	No	244	5	650	915,000
3	Training on horticulture development	No	1,005	10	650	7,788,750
4	Practical training on post-harvest and	No	100	6	650	465,000

No	Activities	Unit	Quantity	Travel Days	Unit Cost ETB	Total Cost ETB
	nutrition of selected crops					
5	1st round Pre-harvest crop assessment	No	25	14	650	227,500
6	Compost & manure preparation assessment	N0	10	10	650	65,000
7	Seed multiplication assessment	No	10	10	650	65,000
8	Consultative workshop with stakeholders on the supply chain of agrochemicals	No	60	5	650	240,000
9	Survey pests on irrigation schemes	No	5	40	650	130,000
10	Provide training about pest identification and control measures for plant protection experts of weredas and zone	No	145	5	650	580,000
11	Fuel for distribution and monitoring activities for 6 rounds in 6 districts	liter	7200		55	396,000.00
	Total					**11,262,250**

1.7. Beneficiary selection, Training, Monitoring, and evaluation

1.7.1 Beneficiary selection and registration

Communities will participate in targeting and beneficiary selection, input/material distribution, monitoring and evaluation and community will be mobilized earlier

Beneficiary selection will be done by farmers themselves facilitated by BOANRs and stakeholders whereas beneficiary registration will be done by BOANR and its underneath institutional arrangements (wereda and kebelle) and at a community and wereda level selection and compliance committee will be established from woreda Adminstration , religious leaders, farmers,

Selection criteria are listed below but will be updated by Agricultural Task force (ATF)

- Irrigation beneficiaries (owned irrigable land and cultivated by his/her own)
- Affected by the war and blockage
- Those have not access to the specific input/farm tools
- Priority to Disabled HH heads, Elderly-headed households, Female-headed households, IDPs

1.7.2 Training and workshops

A workshop to create a common understanding of the early starting of irrigation and focusing on priority crops is needed, similarly technical training to wereda and extension workers on horticulture agronomic practices and Practical training on post-harvest and nutrition of selected crops at the zonal level is also equally important,

Table 9 budget needed for training and workshop

No	Type of Training	Number of trainees	No of training days	Daily DSA	Total DSA	refreshment	Total cost
1	Regional workshop	244	5	650	793,000	122,000	915,000
2	Technical training to wereda and extension workers on horticulture agronomic practices	1005	10	650	6,532,500	1,256,250	7,788,750
3	Practical training on post-harvest and nutrition of selected crops	100	6	650	390,000	100,000	490,000
4	Technical training in urban agriculture	100	6	650	390,000	100,000	490,000
	Total						**9,683,750**

1.7.3 Monitoring and evaluation

- Monitoring activities will be done on beneficiary selection, ongoing and post distribution by BOANR and stakeholders
- Output evaluation will be carried out at the end of budget year by BOANR and stake holders.
- Additional activities on beneficiary selection, monitoring, and evaluation will be done by supporters (International, UN, and local NGOs according to their plan

Table 10 Monitoring and evaluation activities and their budget

No	Activities	Number of participants	No of training days	Daily DSA	Total DSA
1	Beneficiary registration	759	10	650	4,933,500.00

No	Activities	Number of participants	No of training days	Daily DSA	Total DSA
2	Inception workshop	945	4	650	2,457,000.00
3	Monitoring ongoing input distribution	384	8	650	1,996,800.00
4	Post distribution monitoring	384	8	650	1,996,800.00
5	Technical Backstopping	759	10	650	4,933,500.00
6	Output evaluation	495	5	650	1,608,750.00
	Total				**17,926,350.00**

1.8. Pre-urban and urban agriculture

1.8.1. Background

With increasing population natural resource degradation (forest, macro & microflora, soil depth & fertility as well as water sources) also become deteriorated, thereby disturbance in the eco-system and co-existence occur, due to these imbalances, global warming negatively affects the climatic condition of the world, nowadays plant and crop biodiversity is highly affected.

Food demand and supply are inversely proportional (high demand for food but low supply), Climatic change affects crop diversity and productivity, apart from the impact of war on Tigray is also a burning issue for malnutrition & food insecurity, as the result to minimize the effect of food shortage, food security, and nutrition gaps, it is important to effectively and efficiently utilize any available natural resources In doing so innovative agricultural practices in peri-urban and urban areas comes in the forefront.

1.8.2. Objectives

- Strengthen/Introduce a home-based food production system (so food deficit & nutrition of urban household is improved)
- Reduce household costs for foods and create better access to quality and healthy fresh harvest at home
- For dedicated peri and urban dwellers it is also an alternative income (can engage in mini-businesses, production, and selling of products)

- Improves the micro-climate/ecology of urban areas (serves as a Carbon sink)

Why Peri-Urban and Urban Agriculture?

- Like rural agriculture peri-urban & urban including production, distribution, and marketing of products is possible
- Due to **limited space** for production, innovative production methods are required
- Hence, the production of food staffs such as vegetables & fruits on any available spaces such as Rooftops, ground floors (wooden boxes, sacks & open filed), green areas, riversides, and vertically on hanging materials using soil compost and hydroponics are essential.

Peri-Urban:

- These areas have relatively wider spaces/backyards compared to urban areas (big cities) But food sources of most of the dwellers come from surrounding farmers or traders
- Gardening in peri-urban have a better opportunity to grow a wider variety of fruit trees, vegetables, spices, and root crops
- As a result production for home consumption and selling to nearby markets is also possible

Advantages of implementation of Peri-Urban & Urban Agriculture activities:

- **Contribution to food security and nutrition:** Most poor household members can get access to fresh and nutrition-rich food items (Fruits, vegetables…etc)

- **Economic impacts:** Creates access to unaffordable (expensive to get them from markets) and nutrition-rich food sources, Saves money that could be used to purchase food items, reduce the cost of energy that could be used to store/preserve perishable once, and Creates wealth

- **Social impacts**: Urban agriculture is a homestead activity and involves disadvantaged & other community groups such as Disabled people, Elders, and Women caring for children and/or all community members and Creates jobs

Improves urban ecology: With urbanization disposal of wastewater and dry wastes are the major issues and urban agriculture can be taken as a coping mechanism through converting urban waste disposals into Vermi-compost using Vermi-Worms or other composting mechanisms, expansion of biogas for small-scale dairy (Compost and Bio-Slurry), and Poultry wastes as sources of nitrogen applied on homestead farms

1.8.3. Pre-urban and Urban Emergency and Development Intervention

Though urban areas are highly populated with congested spaces to live in, there are also possibilities to undertake Emergency agricultural practices. These include:- Fruit and vegetable gardening, Different spices (Asmarino, Chena Adam, and others), Ornament plan production and landscape works, Mushroom production, Small scale poultry farming (Meat, eggs, and chickens), Productive conservation practices (River banks and up hills, *Chomae*), Livestock production (fattening of beef & shoats), Beekeeping, fishery, swine production, silkworm, Livestock products (milk, butter, yogurt, cheese, silk, skin and hide), Livestock feed processing and supply. Agro-processing of products and Private VET & AI services.

Sweet potato is an emergency crop and the regional government has introduced it at smallholder farms for the past many years. But its impact is very minimal as compared with the effort have done, this is due to less attention being given to the promotion of the sweet potato about its utilization. This year in urban area promotion of sweatpants about their utilization in different ways will take an emphasis.

The Opportunities in implementing urban agriculture are Conducive climatic conditions (Tropical, subtropical, and Temperate Horticultural crops)**,** Access for high yielding fruit & vegetables for the home garden, Presence of advanced tissue culture**,** Government attention to environmentally friendly modern urbanization**,** Presence of research center, universities, ATVET**,** Availability of food and green wastes to recycle/decompose into organic plant nutrient, High demand for nutrient-rich food sources**,** Demand for ornamental plants for the landscape, roadsides, median, residence and community recreation areas and Exposure to the creation of modern green fields (greenery & recreational technologies).

The Major challenges expected during the implementation of urban and pre-urban agriculture are:- Lack of awareness of urban agriculture & its implementation, Lack of knowledge and skill in gardening (with limited land, water, and capital), Attitude towards farming (thinking farming is for rural dwellers only), Limited access or knowledge on types of fruits, vegetables, ornamental plans that better suit for home gardening and food sources that can grow on small spaces (e.g. Mushroom), Land & water scarcity for home gardening, Limited knowledge on Agri-technologies for home gardening on limited resources (land & water), Inadequate consideration given for urban agriculture (Engineers shall give due consideration for infrastructures)and Weak or absence urban agriculture extension system

Fruit, Vegetables & Ornamental Plants Production:

Some fruits are important for peri-urban & urban agri. includes Mango, Avocado, CitrusPapaya and Grapevine, Moringa tree (*Moringa olifera*) & Purselin

Fruit tree planting and production:-In in peri-urban and urban areas fruit trees are planted in free spaces, Like Mangos, Avocado, Citrus can be planted as food & ornamental plants in Public recreation areas (owned by the community), Schools and universities, Government and/or public offices and River banks

Papaya and Grapevine have less impact on buildings and can be planted as ornamental plants as homestead fruit trees (Peri-urban areas with wider compounds) and urban areas with small space, Schools and universities, Government and/or public offices, River banks (privately owned areas) and Green areas

Vegetables seedling production:-Most vegetables are sown and grown in nurseries and then transplanted into their permanent growing areas. In the nursery, they can grow on soil beds or trays filled with peat compost, and the Availability of quality seeds from certified sources is important. The seedling production area needs to be well protected from diseases and insect pests and must be produced by specialized bodies (Tissue culture, youths with a horticulture background). In peri-urban & urban areas where space is limited innovative production system is important, thus vegetables can be grown as home gardens in available spaces such as Peri-

urban areas with wider spaces directly, Within the home compound, Schools, and offices, Private owned open fields and River banks (free from polluted water)

And In small spaces (urban areas) on Rooftops and ground farming using wooden/concrete block framed boxes, sacks, plastic troughs/crates filled with selected soil or compost and Vertical farming using plastic pipe (hydroponic system or compost) is possible, The recommended vegetable types in peri-urban and urban agriculture are: **Leafy Vegetables** like Chinees cabbage, Swiss chard, Lettuce, Broccoli, Cauliflower, head cabbage and **Root** crops like Carrot, Beetroot, Potatoes (Irish and Sweet potatoes) and **Spices: -** Rosemary, parsley, thyme, Basil, Garlic, Romex, leek, Green mint, etc.

1.8.4. Emergency support interventions

- In this emergency plan we focus town residents and Internal Displaced people (IDP) will cultivate up to 6 square meter of land around the house and/or river sides and grow vegetables and fruits (10 sweet potato, 15 Swiss chard, 10 tomato, 5 pepper and 2 fruits). Except the fruits vegetables can grow in different containers.
- By doing this individuals can harvest 70 kg of horticultural products within a year (four times a year). That is sweet potato tuber 14 kg, sweet potato leaf 14 kg, 15 Swiss chard 5 kg, 10 tomato 29 kg, 5 pepper 7 kg.
- Source of water would be from tap water or from nearby rivers by man power transportation.
- Therefore we plan to support 38,850 households (36,200 resident 2,650 IDP). For each House holds a total of 42 horticultural seedlings (10 sweet potato, 15 Swiss chard, 10 tomato, 5 pepper and 2 fruits), 1 kg fertilizer (0.5 kg NPS and 0.5 kg Urea) and one watering can for IDPS. For this 1,559,000 horticultural seedlings (sweet potato 388,500, Swiss chard 582,750, pepper 194,250 388,500, tomato 388,500, fruits 72,400), fertilizer 2,331 qt (NPS 1,166 qt and Urea 1,166 qt) and 2,650 watering cans.
- This all costs 23,840,000 birr

1.8.5. The Outcomes of peri-urban & urban agriculture

- Enables peri-urban and urban dwellers to easily have access to fresh, healthy, and nutrient-rich food sources
- Increase the income of household by reducing the cost that could be used to purchase daily food staffs from market

- Creates jobs for youth and women dwelling in peri-urban and urban areas
- Reduce environmental pollution and create the suitable condition to live in

Overall plays its role in improving the livelihood of urban dwellers, thereby reducing poverty and nutrition gaps

Section two: Seed Development Sector:

2.1. Background

Seed is an indispensable input in crop production. The use of quality seeds of improved varieties contributes up to a 50% increase in yield per hectare. The quality seed also triggers the use of other accompanying agricultural inputs such as fertilizers and pesticides. The success of the Green Revolution in Asian countries is mainly attributed to a combination of factors such as the availability of high-yielding varieties, access to other complementary inputs, investments in irrigation schemes, favorable output markets, and enabling policy environments. In Ethiopia, the increase in crop production is mainly attributed to area expansion (40%), indicating the limited role played by other inputs such as seeds in the overall performance of crop production. The performance of the seed sector in Tigray is far below the desired level, negatively influencing crop productivity. For sustainable agricultural intensification, the performance of the seed system needs to improve considerably. One major factor for the low performance of the seed sector is a limited commitment—the lack of ownership to implement endorsed strategies and legal frameworks at all levels of government structures. In addition, lack of role differentiation, lack of accountability, limited capacity across institutions, and a less favorable business and investment environment in the sector are major challenges in the seed sector. As a result, the seed sector development remains stagnant and lacks competitiveness, despite the increased volume of seed production.

2.2. Justification

For the last two years, the people of Tigray faced many problems Particularly in the rural areas the ongoing best resources of the breeder, pre-basic and basic and certified seed which was planted and followed by TARI, MU, and BOARD by in large have been looted, burned and mixed

with sand hence the farmer was left with nothing at hand to sustain their routine agriculture. On top of this, the current situation has left Tigray with no improved seed supply from the federal government and other related. Based on this it has become very important to design a program that secures improved seed supply by the region as an emergency program. Hence this emergency response program is designed to implement and support smallholder farmers.

Lessons and experiences of existing seed multiplication practices indicate that there are different challenges which are summarized as follows:

- Lack of outstanding preferred varieties:
- Poor variety promotion and adoption,
- Limited availability and access of early generation seed,
- Weak quarantine system due to a limited number of posts and human power:
- Inefficient seed marketing and distribution:
- Poor accessibility of seed to users:
- Limited capacity /absence of independent regulatory body: lack of autonomous regulatory body, Limited resources for seed quality analysis (lab facilities, lack of vehicles for field inspection and supervision, limited number of experts, and limited finance)
- Poor implementation of seed law, regulation, directives, strategy guidelines, and unethical service provision by inspectors:
- limited participation of private and cooperatives

2.3. General Objective

- To sustain and self-support improved seeds(crop and vegetable) supply ***to smallholder farmers***

Specific Objective

- Create access to improved seeds for smallholder farmers,
- To improve the production and productivity of major cereals and vegetables
- Encourage and capacitate private organizations to produce improved seeds
- Improve the skill and knowledge of producers to implement seed laws of the region/country

2.4. Significance of the emergency and recovery intervention plan

Currently, there is a shortage and poor supply of improved seed varieties for small land-holding farmers with similarly limited skill and knowledge of how to produce improved seeds. This situation can be improved and enhanced through the production and productivity of crops. It can also help with job opportunities and improve the income of the farmers who participate in seed production, especially in private sectors and cooperatives.

Previous efforts to support the seed value chain have resulted in 'islands of success but could not bring 'seas of change' to address the underlying causes for poor performance. Sector transformation demands more than just sustaining an increase in production and productivity. It requires a fundamental shift in agricultural practices and re-orienting smallholder farmers toward commercial and sustainable production. To realize this, the seed sector transformation is pivotal.

2.5. Expected output

Because of the war, Tigray has faced many incredible problems of which agriculture, the mainstay of 85 % of the people, is destroyed. Hence

From fruit development

- At the end of this program, the fruit production centers which are going to be supported will have reliable fruit seedlings supply with adequate market facilities.
- Farmers, experts of the enterprise, and the bureau will be with the practical capability of growing fruits.
- The proposed project will contribute to continuing the regional fruit promotion program, improve the income generation of the small-scale farmers and Poverty reduction in the rural community, improve the nutritional status of the community, create job opportunities, and serve as learning and model sites for the region.
- About 300,000 households will be benefited from the project

From crop and vegetable development

- Getting improved seed will support the people and maximize more land with improved seed and then boost their production.
- The seed multiplication program has several advantages that include increased crop yield potential, increase adaptation to environmental conditions, and resistance to insect pests and disease.
- It will help to improve the living standard of the people and the purchasing power of the farmers. Similarly, skill and knowledge of improved seed production technics will be improved.
- The proposed project will contribute to continuing the regional fruit promotion program, improve the income generation of the small-scale farmers and Poverty reduction in the rural community, improve the nutritional status of the community, create job opportunities, and serve as learning and model sites for the region.
- **From forage development**
- Directly increase the productivity of farmers' animals
- Will benefit 14,000 small-holding farmers from the forage seed multiplication
- Point out factors that constrain improved forage production and management practices.
- will benefit livestock owner farmers, investors who are engaged with dairy, live animal governmental and non-governmental organizations that have a stake in improved forage production and want to intervene in it in the future

2.6. Details of Emergency and recovery response interventions:

2.61. Emergency response activities

2.6.1.1. Crop seed multiplication

For the 2022/23 production season, we have planned to plant 2,591 hectares of land in 9 weredas and collect 20,000 quintals of different seeds through the seed multiplication program, and the total budget required for this program is expected to be 179,678,655 Birr. On top of this, the enterprise is expected to collect different levels of seed delivered to farmers through NGOs, and will benefit 102,220 farmers.

2.6.1. 2. Vegetable seed multiplication

In the coming 2022/23 production season 66 hectares of tomato pepper and onion seed multiplication will be held in one wereda to produce 154 qt of seed with **411,775,000.00** birr and benefit 123,200 farmers.

2.6.1.3. Fruit seedling multiplication

In the coming 2022/23 production season 3 million fruit seedlings will be multiplied in 45 nurseries and benefit 300,000 farmers. Intensive damage assessments were conducted to identify the level of damages by the war in terms of equipment, tools, planting materials, buildings, and water supply structures. To rehabilitates these nurseries the following activities are planned for interventions.

- Identifications and Purchase of the required nursery development materials, and equipment including water supply infrastructures,
- Purchase of seeds, rootstocks, and scions
- Capacity building to fill the existing technical gap
- Perform proper nursery management like planting, weeding, grafting, and related activities,
- Regular supporting services and M&E
- Demand assessments of beneficiaries and supply of quality seedlings,

2.6.1. 4. Forage seed multiplication

- Identifications and Purchase of nursery tools
- Purchase of quality seeds
- Capacity building to fill the existing technical gap
- Perform proper nursery management like planting, weeding, and related activities,
- Regular supporting services and M&E
- Demand assessments of beneficiaries and supply of quality seedlings,

Detail activities:

- Field-level verification, collection, and purchase of certified cereal seeds
- Cleaning, grading, packaging, and leveling

- Training of wereda, Das, and farmers to prepare next season's seed multiplication,
- Agreement and distribution of seeds to targeted farmers
- Job-embedded support to targeted farmers
- Monitoring and evaluation at different stages of the project
- Inspect the seeds based on the required seed regulation
- collection and purchase of certified seeds
- Cleaning, grading, packaging, and leveling

2.6.2 Rehabilitation of fruit nurseries

In the region, there are 45 fruit nurseries and 5 ornamental nursery sites under Tigray seed Enterprise, these all were supplying above 1.5 million fruit and ornamental seedling to farmers and town residents at a reasonable cost (20 birr for non-grafted 50 birr for grafted seedlings) every year, but due to the war now, 81% of the fruit nurseries are damaged and all are unfunctional and currently, there is financial constraints for labor and other administration costs. And therefore there is a need to support and rehabilitate the nursery sites

2.7.Detail Budget

Table 11 Crop Seed multiplication budget required

Crop Type	Area in Ha	Productivity in Qt/Ha	Production in Qt	Price in Birr	Budget required
Sorghum	1,135.00	20.00	22,700.00	4,000.00	90,800,000.00
Teff	755.00	15.00	11,325.00	6,500.00	73,612,500.00
Wheat	657.00	25.00	16,425.00	5,500.00	90,337,500.00
Bean	44.00	15.00	660.00	4,500.00	2,970,000.00
total	2,591.00		51,110.00		257,720,000.00

Project main activities on seed collection, cleaning and distribution

No	Activities	Unit	Qty	Estimated Budget **(ETB)**	Time line
1	**Seed collection**	**Qt**	**20,000**		
1.1	Conduct workshop on seed collection with CBSP committee, wereda and zone experts				March
1.1.1	CBSP committee	No	150	135,000	March

1.1.2	Wereda and zone Expert	No	60	207,000	March
1.1.3	Stationary (Exercise book and pen)		210	21000	March
1.2	Purchase of seed sack for seed collection				
1.2.1	Purchase seed collection Sack (large)	No	20000	400000	March
1.2.2	Purchase of seed sack for packaging cleaned seed (small)	No	30000	450000	March
1.2.3	Purchase of other accessories (thread) for seed union	No	2	80000	March
1.3	Support Field vehicles for seed collection				March-April
1.3.1	Vehicle rent cost	No	2	150,000	March-April
1.3.2	Fuel cost	No	2000	86,000	March-April
2	**Seed cleaning**				
2.1	Support maintenance of seed cleaner machine				March
2.1.1	Procure spar part for seed cleaner(estimated budget:-	No	2	500,000	March
2.1.2	Purchase fuel for seed cleaner machine to operate generator (2 union)	lt	1500	126,000	March
3	**Provided training for seed distributors (private and cooperative)**				
3.1	Train of Marketing agent (MA)		250	225000	April -May
3.2	Train wereda and Zone expert	No	70	168,000	April -May
3.3	Stationary (Exercises book and pen)	No	320	32,000	April -May
4	Supply basic and pre basic seed for CBSPs	Qt	2,315	8,350,000	April-June
5	Monitoring and Evolution ?per diem & Fuel cost	No	6	76400	March - June
	G. Total			**11,694,000**	

2023/24 Seed multiplication plan

Wereda	**Seed demand**					**Price birr/Qt**	**Total price Birr**
	Type	**Variety**	**Class**	**Qt**	**Total Area in Ha**		
Ofla	Wheat	Kingbird	Basic	450	375	5500	2475000
		Wane	Pre basic	50	42	5500	275000
	Faba bean	Gebelcho	Basic	50	42	6500	325000
	Barley	Savni	Basic	50	42	4500	225000
		HB1307	Basic	30	25	4500	135000

Wereda	Seed demand					Price birr/Qt	Total price Birr
	Type	Variety	Class	Qt	Total Area in Ha		
	Wheat	Kingbird	Basic	505	421	5500	2777500
	Faba bean	Gebelcho	Basic	50	25	6500	325000
	Pea	Tegegnech	Basic	20	20	6500	130000
	Barley	Savni	Basic	50	42	4500	225000
		HB1307	Basic	30	25	4500	135000
E/Alaje	Wheat	qeqeba	Pre basic	100	83	5500	550000
		Kingbird	Pre basic	400	333	5500	2200000
	Faba bean	Gebelcho	Basic	50	42	6500	325000
	Pea	Tegegnech	Basic	20	20	6500	130000
Ahferom	Wheat	qeqeba	Pre basic	100	83	5500	550000
	Teff	Cr-37	Basic	25	167	6500	162500
L/maichew	Teff	Quncho	Pre basic	25	167	6500	162500
	Teff	Quncho	Basic	25	167	6500	162500
	Chickpea	Arerti	Basic	50	63	6500	325000
T/maichew	Wheat	qeqeba	Basic	60	50	5500	330000
	Teff	Quncho	Basic	50	333	6500	325000
N/adet	Teff	Quncho	Basic	50	333	6500	325000
T/koraro	Teff	Quncho	Basic	50	333	6500	325000
L/koraro	Teff	Quncho	Basic	50	333	6500	325000
ጠ/ድምር				**2340**	**3566**		13,225,000

Table 12 Capacity building for crop seed multiplication budget

SN	Activities	Number of participants	No of days	Perdiem/ day	Total perdiem required
1	Wereda experts	45	5	450	101,250
2	Development agents	36	5	459	81,000
3	Farmers	200	3	200	120,000
4	Trainers /Facilitators /	5	13	650	42,250
5	Note book/medium/	286		50	14,300
6	pen	286		10	2,860
7	Flipchart	10		300	3,000
8	Marker	50		35	1,750
9	Coffee and Tea	86		15*2	12,900
10	kukis	86		15*2	12,900
11	Bottled water	Lamp sam			7,790
	Total required budget				400,000

Table 13 Vegetable seed production contract agreement budget required

No	Vegetable type	Variety	Area in Ha	Expected production in Qt	Price in Birr	Total cost
1	Open-pollinated					
1.1	Onion	Bombay Red	20	120	900	10,800,000.00
1.2	Tomato	Roma VF	20	17	2250	3,825,000.00
1.3	Pepper	Mareko Fana	20	17	2000	3,400,000.00
2	Hybrid		60	154		18,025,000.00
2.1	Tomato	Gelila	1	10,000,000 piece	4.5	45,000,000.00
2.2	Pepper	Serined	1	15,000,000 piece	5.75	86,250,000.00
			2	75,000,000		0.00
	Grand Total		62			167,300,000.00

Table 14 Capacity building for vegetable seed multiplication budget required

SN	Activities	Number of participants	No of days	Perdiem/ day	Total perdiem required
1	Wereda experts	6	5	450	13,500
2	Development agents	8	5	459	19,800
3	Farmers	10	3	200	6,000
4	Trainers /Facilitators /	5	13	650	42,250
5	Note book/medium/	30		50	1,500
6	pen	30		10	300
7	Flipchart	2		300	600
8	Marker	2		35	70
9	Coffee and Tea	30		15*2	900
10	kukis	30		15*2	900
11	Bottled water	Lamp sam			1,500
	Total required budget				1,661,740

7.5. List of equipment for seed testing laboratory

1. Seed Sampling and dividing equipment Seed triers,

2. Boerner divider,
3. Gamet divider and Soil type divider
4. Sample storage boxes and racks
5. Balances – Single pan (top loading), Analytical Balance
6. Purity work boards
7. Germinators – Cabinet germinators and Walk-in-room germinator
8. Refrigerator
9. Hot Air Oven
10. Grinding mill
11. Incubators
12. Autoclave
13. U.V. Lamp
14. Miscellaneous equipment – Seed blower – Seed Scarifier – Moisture meter (electric), Hand sieves, Petridishes with total 4,000,000 birr

Table 15 Fruit Nursery Materials and Equipment's required

No	Nursery tools	45 fruit nursery	5 Ornamental tree nursery	Total materials	Budget in birr	
					Unit price	Total price
1	Hoe	180	20	200		
2	Grub hoe	180	20	200		
3	Fork Hoe	180	20	200		
4	Rake of ten fingers	180	20	200		
5	Wire mesh of 4-5Ø (one wire mesh is 120cm*180cm)	90	10	100		
6	Watering can	450	50	500		
7	Plastic string of 200m	180	20	200		
8	Measuring tape of 50m	90	10	100		
9	Measuring tape of 5m	90	10	100		

No	Nursery tools	45 fruit nursery	5 Ornamental tree nursery	Total materials	Budget in birr	
					Unit price	Total price
10	Cutting axe	90	10	100		
11	Machete or cutlass	135	10	145		
12	Mattock & pick axe	225	10	235		
13	Spade	225	25	250		
14	Shovel	225	25	250		
15	Garden Rake	225	25	250		
16	Sickle	225	25	250		
17	Axe	90	10	100		
18	Wheel barrow	135	15	150		
19	Carpenters saw	90	10	100		
20	Root pruning scissors	225	25	250		
21	Pruning saw	225	25	250		
22	Big Pruning scissors	225		225		
23	Medium pruning scissors	225		225		
24	Pruning knife	225	25	250		
25	Crates	180	10	190		
26	Budding knife	225	0	225		
27	Grafting scissor	225	0	225		
28	Plastic String of 200m	180	20	200		
29	Pruning Shear	225	0	225		
30	Budding/grafting tape	225	0	225		
31	Lopping shear	90	0	90		
32	Hammer of 2 kg	90	10	100		
33	Big hammer					

No	Nursery tools	45 fruit nursery	5 Ornamental tree nursery	Total materials	Budget in birr	
					Unit price	Total price
34	Gloves	450	50	500		
35	Foot wear	450	50	500		
36	Ladder	90	10	100		
37	Shade net	45	0	45		
38	Knapsack sprayer manual	180	20	200		
39	Knapsack sprayer motorized	135	10	145		
40	Water pump	45	5	50		
41	Seed box	450	50	500		
42	Water leveling	90	10	100		
43	Barbed wire and materials for fencing (cement, gravel, sand, tendino etc)					
44	Gabion in					
45	Fruit harvester	45	0	45		

NB: Due to market in accessibility, the exact price of each item is taken as lamp Sam price which is 14,500,000 birr

Table 16 Fruit planting Materials and Inputs (seeds, rootstocks, scions) budget required

No	Type	unit	Quantity	Contingency 5%	Total -No	unit price	Total price in birr
1	For mango rootstock	No	764871	38243.6	803115	3	2409343.65
2	For mango scion	No	764871	38243.6	803115	1	803114.55
3	Avocado rootstock	No	310836	15541.8	326378	3	979133.4
4	Avocado scion	No	310836	15541.8	326378	4	1305511.2

5	Orange root stock	No	234897	11744.9	246642	3	739925.55
6	Orange scion	No	234897	11744.9	246642	1	246641.85
7	Apple root stock	No	246345	12317.3	258662	3	775986.75
8	Apple scion	No	246345	12317.3	258662	1	258662.25
9	Papaya seed(solo)	Kg	30	1.5	31.5	350	11025
10	Poly bags	Qt			126		756000
11	Banana suckers	No			42395		423950
12	Soil, manure and sand purchase	Biojo			5760		1489140
Total							**10,198,434.20**

Table 17 Fruit Nursery inputs and budget for workers required

No	Cost type	Unit	Quantity	Total budget
2	Salary for Forman	Time	45*30*360	486000
3	Salary for technician	Time	45*28*360	453600
4	Salary for guards	Time	45*2*20*360	468000
7	Payment for daily laborers	Time	45*22*16*360	5702400
8	Poly bags	Qt	126	756000
9	Motor pumps maintenance	No	7*2000	14000
10	For training	No		400000
				8,280,000

Table 18 Forage seed multiplication plan

No	Wereda	Forage multiplication				
		Quantity	Area in Ha	Qt	Cutting	Split
1	Raya Alamata	1	1.246	6	720000	2500
2	Raya azebo	1	4	19	140000	50000
3	E/mekoni	1	0.75	3.5	81000	2500

4	Hintalo	1	0.2631	1.2	71000	2500
5	E/Alaje	1	0.5	2.4	8060	25500
6	Enderta		0.738	3.5	0000	30000
7	D/tembien	1	0.25	1	50000	240000
8	Agulae	1	0.08	0.38	40000	2000
9	Atsebi	1	0.62	3	10000	30000
10	K/Awlaelo	1	1.75	12	48000	665000
11	T/Emba	1	0.986	4.7	300000	10000
12	saesie	2	1.65	7.8	300000	30000
13	Hawzen	1	2.75	3	0000	2500
14	T/milash	1	125	6	151000	2500
15	K/Tembien	1	0.32	1.5	71000	2500
16	Ahferom	1	0.4	2	110000	80000
17	Hahayle	1	1.8373	9	1000	10000
18	Rama	1	1.514	7	23000	12500
19	L/maichew	2	1.9779	9	97000	10000
20	Adet	1	0.5	2.4	81000	12500
21	N/Adet		1	7	96000	12500
22	L/Koraro	1	.1377	0.7	1000	32500
23	T/Koraro	2	2.2476	10.5	271000	250000
24	Adinebried	1	0.7759	3.7	351000	22500
25	Tsembla	1	1.07	5	515000	35000
Total		**30**	**27.0605**	**141.3**	**4,138,600**	**1,597,500**

Table 19 Forage Seed multiplication Capacity building budget required

SN	Activities	Number of participants	No of days	Periderm/ day	Total periderm required
1	Wereda experts	30	5	450	67,500
2	Development agents	60	5	459	137,700
3	Farmers	200	3	200	120,000
4	Trainers /Facilitators /	5	13	650	42,250
5	Note book/medium/	295		50	14,750
6	pen	295		10	2,950
7	Flipchart	10		300	3,000
8	Marker	50		35	1,750
9	Coffee and Tea	90		15*2	2,700

10	kukis	90		15*2	2,700
11	Bottled water	Lamp sum			7,790
	Total required budget				403,090

Summary of Detail Budget

No	Activities	Area in Ha	Expected production Qt	Budget required Birr
1	**Crop Seed production and harvest(2022)**	**2,590.00**	**20,000.00**	179,678,655.00
	✓ Crop production(2022/2023)	**2340.00**		13,225,000.00
	✓ Capacity building			400,000.00
	✓ Equipment for seed testing laboratory			4,000,000.00
	✓ seed collection, cleaning and distribution			11,694,000.00
2	**Vegetable seed production 2022**	**62.00**	**154.00**	167,300,000.00
	✓ Vegetable seed production 2022/2023	**150**	**450**	52,750,000.00
	✓ Capacity building			87,320.00
3	**Fruit seed production**	**3 million**		0
	✓ Nursery materials and Equipment's			14,500,000.00
	✓ Nursery inputs and budget for workers			8,280,000.00
	✓ Planting materials and Inputs (seeds, rootstocks, scions)			10,198,434.20
4	**Forage seed multiplication**	**27.00**	**141.30**	7,000,000.00
	✓ Capacity building			403,090.00
	Total			469,516,499.2

Section three: Crop–Production

3.1 Background

The region is classified into 16 livelihoods. The rainfall pattern in this region is predominantly uni-modal (June to early September) and briefly, the Meher season rains are the most important for crops, livestock, and other livelihood means of the people. Meher contributes to a large amount of the annual rain-fed crop production and a few amount of crop production is produced from the belg season. Most

Woredas of the region are summer season dependent and it contributes the same for both crop and livestock production.

This year the yield may not be much better than last year's. Summer rainfall is good both in terms of distribution and amount (as per our field observation and farmers' reflection), but spring rains (*azmera*) have failed. Especially, lack or late arrival of fertilizer has been a challenge. Most of the farmers reported that either they did not apply fertilizer at sowing or used an insufficient amount as compared to what is needed or what they were used to apply over the last years. Recently (when we visited the study areas), FAO has distributed fertilizer to some farmers (that ranges mostly from 25 kg Urea and NPS to 50 kg urea) but too late (last week of Hamle month, which is the first week of August; according to the farmers). However, still this is insufficient and too late. Especially, as the farmers say, DAP is supposed to be incorporated in the soil during the sowing period before the growth of the crops. When they used it now (when the crop is well grown), it is often carried away by runoff that flows from the plots.

The spring (*azmera*) rains were poor, which has affected sorghum, millet, and maize growth. In many places that are suitable for these crops, they had not been planted because the spring rains were insufficient. For instance, in Tsa'ida Imba district, millet and sorghum were widely grown in 2021 but not in 2022. According to the farmers, the reason is that these crops need a longer growing period but there was no or very little rain in spring. Thus, many farmers decided to grow other crops. On a few lands, millet or sorghum was grown but it was either poor or late

In all the areas we visited, it seems that crop productivity will be less, mainly due to late arrival or insufficiency of fertilizer and subsequent waterlogging (Plate 8). We have also similar reports from the farmers. Many crops have failed due to a lack of fertilizer that neutralizes the effects of waterlogging induced by the heavy rain in this rainy season. Again, almost all the interviewees [on non-cereal plots] reported that due to lack of fertilizer, they decided to grow leguminous or oil crops that either need no fertilizer or grow lately instead of growing the usual crops such as teff, barley, and wheat and put themselves at risk of crop failure.

Farmers could generally not buy fertilizer from the market (Plate 9) because: (i) it is not easy to find fertilizer in the market; (ii) they couldn't afford the high price as it is difficult to get cash during this blockade and siege. Even if they get money, they prefer to buy food for immediate consumption for their children instead of buying fertilizer.

The lack of fertilizer forced farmers to keep their farmlands fallow throughout the rainy season, while planning to sow legumes or teff towards the end of the rainy period, hoping that fertilizer would be available by then. This was aggravated by waterlogging in heavy soils, due to strong summer rains.

A unique observation: around Hagereselam, as compared to the status in 2021, this year (in 2022) we observed more following (for legumes) and the crops are relatively late or failed due to waterlogging. Yield will be significantly lower than last year's. the actual planted land is 671,914 ha (88%)out of 765,000ha and the distributed fertilizer is 108,616 quintals and the demand was 600000quintal

The current estimation of the crop production based on the field observation carried out by the BoARD directorates (performance) is poor this is because, On top of the lack of the mentioned factors above, the current conflict since last August results in a devastative effect on the harvesting period. This is being seen especially in all woredas of the Northwest, central and west zone and other bordering woredas throughout all zones including Chila, Rama, Ahsea, Egela, Gulomakeda, Irob, Atsebi, Enderta, Chercher, Raya Alamata, Ofla and Samre (Finarwa)**.** The incidences are **a** Continuation of the war, especially in the potential zones (N.west and Southern) and many woredas in the other zones, and the Eritrea troop had damaged the planted crop

- Sorghum lands are damaged by tanks and other vehicles (Military)
- Using the matured crop for shelter & as a bed
- Cutting and eating immature maize
- Sorghum stalk chewed
- Matured crops taken from Adiabo & Tselemt wereda
- At T/Adiabo Shiglina (Kunama place) maize looted

Generally, the Meher crop production was **below normal** to most Woredas as compared to the crop production annual plans, currently, due to the war northwest, central zone and south zone are much more affected and no production from the Northwestern, central zone, and south due to the war, the people were displaced

The war that erupted for the second time on August 28./2022 and now continued, has disrupted :

- The economic and social fabric of the region**,**
- Driving food insecurity, and malnutrition
- and water shortages all over the region

A report coming from the field observation has indicated that**:**

- Many farms and rural areas have been destroyed,

- Crops burned down or looted,
- Farm equipment and livestock were looted/slaughtered.
- About 2.5 million population has been displaced and a considerable part of the region's social and physical infrastructure was destroyed

The **war exacerbates/aggravates** further the **deterioration of food insecurity and resulted in 6.5 million populations to depend on emergency food aid.**

The Main Reasons for the reduction in crops production are:

- The **war followed by displacement** and the **ban of farmers not to harvested** has **affected the production**
- the Eritrea troop damaged the planted crop in different ways(Sorghum lands are damaged by tanks and other vehicles (Military), Using the matured crop for shelter & as a bed, Cutting and eating immature maize, Sorghum stalk chewed, Matured crops taken from Adiabo & Tselemt wereda , at T/Adiabo Shiglina (Kunama place) maize looted)
- Most of the farmers were forced to plant their farmland in the first ploughing and some in the second ploughing, this is due to a Shortage of oxen and farm tools for ploughing since most of the farmers have been looted, slaughtered, and killed their oxen, the land was not properly prepared**.**
- Delay and improper use of inputs, the supply of both chemical fertilizers and improved seeds was late and very limited due to siege, and farmers were not able to access and use the fertilizer
- Farmers were forced to plant using local seeds and without fertilizer which lead to low yields.
- Instability & displacement of farmers due to the war crisis
- weeds, pests, and disease significantly contributed to yield reduction (lack of proper management b/s of Instability & displacement of farmers)
- Development agents were not able to teach and sensitized rural households since the war deter them to move from the rural area,

  Therefore the regional BOARD has designed an emergency and recovery plan to minimize the food insecurity and malnutrition problems.

3.2 Objectives

- Create agricultural inputs for vegetable farmers
- Improve yield productivity and production
- Improved livelihoods

3.3. Emergency response interventions are:

- Provision of In organic/chemical Fertilizer, (top priority)
- Provision of Cereals seeds, pulses and for seed multiplication
- Provision of Crop protection equipment (sprayer, personal protective & plant doctors equipment, and Farm tools
- Extension services on soil fertility improvement options for increased yields (organic manures and compost) and agronomic management options for production & productivity of crop

Therefore, we have planned an emergency activity which is in the provision of seeds, fertilizer and Agrochemical

- seed for meher season 492,649 quintals
- 3942 Qt EGS (Early Generation Seed)
- fertilizers 800,000 quintals(NPS 400,000 Qt and urea 400,000 qt),
- Agrochemical for meher 228,750 lit & 12,200 Kg

Therefore, considering the situation BOARD have planned an emergency activity which is in the provision of seeds and fertilizer, the regional requirements of seed for meher 2022/23 are 492,648.9 quintals and fertilizers 800,000 quintals (NPS and urea), and the details illustrated below and the seed and fertilizer requirements from each woreda in the Meher season of 2022/23, see annex-5 and annex-6respectively.

Table 20 Crop seed requirement by zone for 2022/23 in kilogram

Crop Type	South	South-East	East	Central	North-West	Western	Total in k/g
Wheat	4,385,574	7,682,088	5,324,790	2,024,028	0	1,792,368	21,208,848
Teff	397,454	29,744	63,333	746,513	512,831	70,281	1,820,156
Barley	2,002,853	2,585,970	3,461,058	0	0	0	8,049,881
Maize	0	0	107,475	1,008,835	1,380,318	498,948	2,995,576
Sorghum	614,155	134,020	90,848	864,802	1,158,194	4,083,571	6,945,590
Fingermillet	0	0	56,809	198,587	592,890	428,667	1,276,953
Chickpea	506,960	481,845	638,416	1,039,925	495,925	0	3,163,071
Field pea	640,313	96,613	0	0	0	0	736,926
Fababean	768,375	152,520	131,588	0	0	0	1,052,483
Grass pea (vetch)	0	671,900	138,631	0	0	0	810,531
Groundnut	0	0	0	449,205	0	0	449,205
Haricotbean	0	0	0	247,748	0	0	247,748

Sesame	0	0	0	0	58,321	449,601	507,922
Total	**9,315,684**	**11,834,700**	**10,012,948**	**6,579,643**	**4,198,479**	**7,323,436**	**49,264,890**

Early Generation Seed (EGS) required for multiplication: as it is well known, seed is the foundation for food production and productivity. Thus, seed is an important agricultural input for the development of the agricultural sector. To do so, the regional government has given due attention for Early Generation seed (EGS) for Seed production next year as well as to maintain seed system. In this coming meher season about 3,942 quintals of different seeds is required by the region to resume seed production and be self-sufficient in seed.

Table-22 Basic and pre basic seed required for seed multiplication

S/N	Seed Type	AMOUNT (Qt)	Area coverage (ha)
1	Wheat	3325	2771
2	Barley	160	107
3	Teff	100	667
4	Pulses	239	239
5	Sorghum	98	817
6	Sesame	20	400
	TOTAL REQUIRED	**3942**	**5000**

Table-23 Fertilizer requirement for meher production season

	Fertilizer Quantity (Qt)		
Zone	**NPS**	**Urea**	**Total**
South	30,630	30,630	61,260
South-East	62,300	62,300	124,600
East	53,574	53,574	107,148
Central	83,150	83,150	166,300
North-West	70,334	70,334	140,668
West	97,100	97,100	194,200
Mekele	2,912	2,912	5,824
Total sum	**400,000**	**400,000**	**800,000**

3.4. Plant protection and quarantine

3.4.1. Introduction

Tigrai National Regional state has nearly 8 million people living in 54,593 km2 areas of different agro ecological zones. It has 1.3million hectares of arable land, 7 administrative zones, and 60 rural and 33 urban Woredas. Agriculture is the main backbone of the state economy in which crop production accounts for about 70 % of the economy and it is the source of employment and

income for 80% of the population. The contribution of livestock to the economy of the state is about 30%

The conflict in Tigray; which started in November 2020 and which is continuing; is one of the largest humanitarian crises in the world. The conflict has forced millions of people to be displaced and seek security within and outside the region. It also resulted in millions of people being in a critical humanitarian situation.

Most of the institutions established to support extension services are damaged and looted their internal resources like Farmer's Training Centers, Veterinary Clinics (public and private), Coops & Unions, Crop protection storages & Seed quality & Healthy Laboratories, Farm machinery services (private and Cooperatives), Nursery sites (forage, forest trees, and fruit nursery sites), Animal feed processing plants, Animal farms (dairy, fattening, breeding, poultry…), Branded Honey packing plant and ecology of Bee colonies, Irrigation schemes and seed cleaning machines, Privately-owned agricultural input suppliers (Agro-dealers)and Woreda offices and transport facilities

The victims affected by the conflict have lost their physical, social, and economic access to food; and there was an urgent need to respond to the needs of the transitory food insecure households. In response to the crisis, besides the Tigray Government's endeavors, several UN Agencies, INGOs, and local NGOs are being involved in humanitarian food and non-food assistance.

To improve the satiation BONR and its partners have planned to implement Emergency and recovery interventions activities; much has to be done towards pest control through integrated pest management (IPM) and needs to provide agro-chemicals for emergency support of irrigated horticultural crops and rain fad.

3.4.2. Challenges of plant protection and quarantine

33 Due to the war erupting, all necessary inputs like agrochemicals, spray machines, and Full set personal protective equipment (PPE), agro-chemical stores, lab equipment, and other materials have been destroyed, looted, and burned. Therefore there is a threat controlling the desert locust and armyworms in the coming season.

- Households are affected by war directly by looting their properties, not being allowed to cultivate their land properly and indirectly by the absence of a market access to inputs.
- Due to the siege, supplies of inputs (agro-chemicals, sprayer equipment and healthy and certified plant materials) are very limited and farmers are not able to access inputs.

- Farmers are forced to plant using local seeds and without fertilizer and agro chemicals which lead to low yields and therefore the price of one kilogram of produce has been highly increased.

- weeds, pests, and disease significantly contributed to yield reduction (lack of proper management b/s of Instability & displacement of farmers) this is because of most of the farmers were forced to plant their farmland in the first ploughing and some in the second ploughing, this is due to a Shortage of oxen and farm tools for ploughing since most of the farmers have been looted, slaughtered, and killed their oxen, the land was not properly prepared create conducive environment to pest infestation,

34 Weak quarantine system due to a limited number of posts and human power:

- Development agents were not ableto teach and sensitized rural households since the war deter them to move from the rural area,

- As a result, the people of Tigray face human-made hunger and malnutrition which are now resulting in death.

- Limited capacity /absence of independent regulatory body: lack of autonomous regulatory body,

35 Limited resources for seed quality analysis (lab facilities, lack of vehicles for field inspection and supervision, limited number of experts, and limited finance)

36 Poor implementation of seed law, regulation, directives, strategy guidelines,

3.4.3. Justification

For the last two years, the people of Tigray faced many problems Particularly in the rural areas the resources (lot of agrochemicals and sprayer equipment accumulated on zones and weredas for the last 30 years, have been looted, burned hence the farmer was left with nothing at hand to sustain their routine agriculture. On top of this, the current situation has left Tigray with no access to agricultural inputs from the federal government and other related. Based on this it has become very important to design a program that secures agrochemicals and sprayer equipment supply by the region as an emergency program. Hence this emergency response program is designed to implement and support smallholder farmers.

Lessons and experiences of existing practices indicate that there are different challenges regardingplant protection and quarantine issues;therefore the regional BOARD has designed an emergency and recovery plan to minimize the plant protection and quarantine related problems.

3.4.5. General Objective

- Improve agricultural inputs supply to increase production and productivity, hence improved livelihood of smallholder farmers by reducing the contribution of pest infestation on yield reduction.

Specific Objective

- Create access to inputs for smallholder farmers,
- Mobilization of inputs to supply all necessary inputs like supplying
    - Different type of agro-chemicals,
    - Different type of spray machines,
    - Full set personal protective equipment's (PPE)
    - Oil and lubricants for the sprayer machines, cars and motor bike
    - Batteries for ULV sprayers,
    - Detergents and other related inputs use full during the campaign to control sporadic pests (desert locust and army worms)
- Improve the skill and knowledge of producers

3.4.6. Significance of the emergency and recovery intervention plan

Currently, there is a shortage and poor supply of inputs like agrochemicals, spray machines, Full set personal protective equipment (PPE) stores, lab equipment, andother materialsto control sporadic and regular pests. This situation can be improved and enhanced through the production and productivity of crops.

Regarding the humanitarian Consequences sporadic Crop pests such as desert locusts and armyworms brought significant yield reduction cause economic loss through yield reduction and livestock feed/residue palatability problems. High temperature & low moisture conditions are suitable to create favorable conditions and aggravated the overall Desert locust and its epidemic effect. The effect of crop pests is expected to be high on high-yielding crops such as (wheat, Teff, Sesame, Maize, sorghum) and pulses

Taking for example the incidence and experience in 2020 the impact of Desert locust**,** almost all zones of Tigray (55 weredas) were affected by the desert locust, except the western zone. And in 2021 it covered 4 zones of more than 23 weredas in the south, southeast, east, and central zone of Tigray.

So the humanitarian consequences as a result of high production failure would be significantly high. Hence a significant proportion of people become vulnerable to various shocks such as starvation, asset depletion, and related social problems and death as well. So there is a need for emergency response by different non-governmental organizations to mitigate the risks and it requires re-orienting smallholder farmers toward commercial and sustainable production. To realize this, supporting the plant protection and quarantine sector is crucial.

3.4.7. Expected output

- At the end of this program, the inputs which are going to be supported will have reliable supply.
- Vulnerable farmers have access to improved agricultural inputs such agrochemicals, spray machines, Full set personal protective equipment (PPE) stores, lab equipment, andother materials
- Plant doctors at kebelle level will be re –established and proper service is delivered.
- Farmers, experts of the bureau will be with the practical capability of growing healthy crop.
- Seed multiplication area will be well inspected and will have regulated input provision system.
- The proposed project will contribute to continuing the regional Poverty reduction in the rural community, improve
- About 900,000 households will be benefited from the project
- Getting input has several advantages that include increased crop yield potential, increase adaptation to environmental conditions, and resistance to insect pests and disease.
- It will help to improve the living standard of the people and the purchasing power of the farmers. Similarly, skill and knowledge of pest control technics will be improved.

3.4.8. Details of Emergency and recovery response interventions**:**

Emergency response activities

- Provision of Agrochemical,(insecticides/fungicides and herbicides)(top priority)

- Provision of Crop protection equipment (sprayer, personal protective & plant doctors equipment to reestablish the clinics at kebelle level , and
- 13895 different Sprayer machines estimated cost 95,188,600 ETB
- 12448 full set personal protective equipment's estimated cost 6,592,540 ETB
- 22,252 liters' different type of agro chemicals estimated cost 22,252,000 ETB
- 6 looted cars estimated cost 10,800,000 ETB
- 34 pesticide stores partially damaged estimated cost for maintenance 7,000,000 ETB
- Different equipment's of kebelle plant clinics/plant doctor's equipment 737,760 ETB
- 1717 different equipment's of Axum seed laboratory 621,836 ETB
- 61 tablet mobile 610,000 which will be using full to hold reference materials and camera.

Grand total estimated costs 192,659,076 ETB

- Capacity building to fill the existing technical gap
- Regular supporting services and M&E
- Demand assessments of beneficiaries based on the crop type to be planted

Detail activities:

- Establish pest control task forces at all levels from region to kebelle level
- The team shall be facilitated by FAO and capacitate in terms of logistics (including using aircraft to survey and control desert locust in adjacent woredas of Afar, Amara, and Tigray regions
- Strengthening the established committee
- Control measures by chemicals and other cultural options.
- Strong follows up and monitoring at all times and
- Evaluation of the control measure.
- Inspect the seeds based on the required seed regulation
- Training of wereda, Das, and farmers to prepare next season's seed multiplication,

- Monitoring and evaluation at different stages of the project, job-embedded support to targeted farmers

Provision of agrochemicals for irrigable crops emergency response

- It is known that horticulture crops are very sensitive to insect pests and diseases. BOANR promotes to use of Integrated Pest Management (IPM). The last option is to use chemical pesticides safely. This time there is no pesticide entry to Tigray due to the siege. Unless farmers are supported by the provision of agrochemicals it is difficult to harvest horticultural crops. Therefore we demand insecticide, fungicide, and rodenticide as stated in the table
- **Table 1. List of Agrochemicals demand for irrigable crops emergency response**

SN	Chemical category and name	Target pests to control	Amount of pesticide needed (lit/kg)	Unit price	Total price (in Birr)
I	**INSECTICIDES**	**Insect pests**			
1.1.	Dimethoate 40% EC	Aphids, Red spider mite, White fly, leaf miner, cutworm	7,000	950	6,650,000
1.2.	Diazinon 60% EC	Aphids, caterpillars, whiteflies, termites &cutworms. stalk borers mize, DBM	6,500	800	5,200,000
1.3.	Ethiodemethrin 2.5% EC	Cabbage aphids on cabbage & African boll worm on tomato	3,000	700	2,100,000
1.4.	Agro-Lambacin Super 315 EC	African Bollworm	5,000	900	4,500,000
1.5.	Ampligo 150 ZC	Tuta-absoluta	1,000	2,000	2,000,000
1.6.	Apron Star 42 WS	Aphid	500	1,200	600,000
1.7.	Profit 72% EC		3,000	850	2,550,000
1.8.	Tracer 480 SC	Thrips and leaf miners African bollworm tomato leaf miner (Tutaabsoluta) on tomatoes.	3,000	850	2,550,000
1.9.	Trigger	White fly, tutaabsoluta	6,000	1,200	7,200,000
1.10.	Carbaryl 85% WP	Ballworm	2,000	800	1,600,000
1.11.	malathion 50% EC	Thrips, DBM, armyworm	5,000	850	4,250,000
1.12.	Dursban 48% EC	Termite	500	1,000	500,000
II	**FUNGICIDES**	**Disease pests**			
2.1.	Mancozeb 80% WP	late blight on tomato, leaf spot, Downey mildew	7,000	800	5,600,000
2.2.	Ridom 80% WP	lLte blight on potato.	7,000	1,200	8,400,000
2.3.	Bless	rust	2,000	1,000	2,000,000
2.4.	Metalaxyl	Downy mildew	3,000	900	2,700,000

SN	Chemical category and name	Target pests to control	Amount of pesticide needed (lit/kg)	Unit price	Total price (in Birr)
2.5.	Tilt 250 EC	Fungus spp.	2,000	950	1,900,000
2.6.	Kocide 2000	Bacterial blight, bacterial leaf spot on pepper	2,000	900	1,800,000
2.7.	Natura 250 EW	Rust disease	3,000	900	2,700,000
2.8.	Bayleton 25 WP	Anthracnose, fungus spp.	6,000	1,100	6,600,000
2.9.	Agro-Laxyl MZ 63.5 WP	Early blight on tomatoes and Late blight on potato	3,000	760	2,280,000
2.10.	Carbendazim	Powdery mildew	1,000	820	820,000
III	**Rodenticides**	**Rodents**			
3.1.	Zinc phosphide 4%	field rats	500	1,000	500,000
	GRAND TOTAL	**80,000**		**75,000,000**	

TABLE . PESTICIDES DEMAND FOR MEHER SEASONS **EMERGENCY RESPONSE**

Type of chemicals	SPESFIC TYPE	Unit	quantity	price rate	total price
Pesticide/insecticide/	LambedaSayhayloterin 5%	Lit	100,650	1000	100,650,000
Anti-weed	Pallas 45 OD 10000Lit,	Lit	18,000	4000	72,000,000
	2-4-d,	Lit	110,000	600	66,000,000
Anti-fungal	Redomil gold 68%	Kg	6,100	700	4,270,000
Anti – weevils		Kg	6,100	500	3,050,000
			240,950		245,970,000

Table . Chemicals required for outbreaks pestes (Desert locust, Army worms and so on)

s.no	Types of chemicals	unit	quantity	Unit price	Sub total
1	malathain 50%	litter	1,500	750	1,125,000
2	LambedaSayhayloterin 5%	litter	18,000	1000	18,000,000
3	diaznon 60%	litter	1,500	450	675,000
4	Chloropierephos 48%	litter	2,500	700	1,750,000
	TOTAL		23,500		21,550,000

Table 1. DIFFERENT SPRAY EQUIPMENT'S FOR SPORADIC PEST CONTROL

S.N	Item types looted/damaged	unit	the looted /damaged		Total price/cost/
			Looted	unit cost	
1.1	Knapsack sprayer	No	7615	1800	13,707,000
1.2	Motorized sprayer	No	2486	30000	74,580,000
1.3	ULV sprayer	No	3792	1800	6,825,600
1.4	Vehicle mounted sprayer	No	2	38000	76,000

1.5	Tablet mobile for e-Locust data collection & Transfer	birr	61	10,000	610,000
	Sub total		13895		95,798,600

Table 2.PPE+ CAR+STORE MENTENANCE (FOR SPORADIC PEST)

S.N	Item types looted/damaged	measurement	the looted/ Looted	Estimated unit cos	Total price/cost/
2.1	Whole wear	No	2284	1500	3,426,000
2.2	Eye protection	No	2686	200	537,200
2.3	gloves	No	2914	350	1,019,900
2.4	mask	No	2232	180	401,760
2.5	boots	No	1832	550	1,007,600
2.6	Cape/hat	No	156	180	28,080
2.7	Syfen pump	No	344	500	172,000
3	Different chemicals for sporadic pests	Liters	22252	650	14,463,800
4	Cars	No	6	1800000	10,800,000
5	Pesticide store maintenance		34	500,000	17,000,000
	Sub total				34,392,540

Table 3.KEBELLE PLANT CLINICS (FOR MOVABLE PLANT DOCTOR'S CLINICAL SERVICE AT KEBELLE MAJOR IRRIGATION SCHEMES)

S.N	Item types looted/damaged	Unit	REQUIRED quantity	Estimated unit cost	Total price/cost/
6	UMBRELLA	No	174	1000	174,000
6.1	CHAIR	No	435	500	217,500
6.2	TABLE	No	174	800	139,200
6.3	LENS	No	87	800	69,600
6.4	MANUALS	No	522	130	67,860
6.5	PRESCRIPTION SHEET	No	174	400	69,600
	Sub total				737,760

Table 4. MATERIALS FOR AXUM SEED QUALITY LABORATORY (TO REPLACE THE LOOTED/DESTROYED)

S.N	Item types looted/damaged	measurement	quantity	unit cost of the looted or damaged	Total price/cost/
				ETB	ETB
1	Different Sampling Equipment/	No	124	2236	277,264

2	Different Moisture testing Equipments/	No	38	1294	49,172
3	Germination Testing Equipment's/	No	500	100	50,000
4	Seed health testing Equipment's/	No	1034	100	103,400
5	Office chair	No	6	2000	12,000
6	Office table	No	10	2000	10,000
7	Desktop computer	No	3	10000	30,000
8	Printer	No	2	45000	90,000
	Total		1717		621,836

Major activities of regular pest control.

No	Possible interventions	Major activities
4.1	Input (agro-chemical) gap assessment	✓ Maximize use of local agro dealers to supply agro inputs ✓ Contact agro dealers and collect list of chemicals on their stoke (type and amount of the chemicals), then compare with the total need based on crop planned to be planted.
4.2	Re-activate pest control taskforce at all level.	✓ Conduct regional consultative work shop about the supply chain of agro chemicals needed by farmers which will have 25-30 participants. ✓ Design a mechanism of supply, create linkage between hole sellers and retailers and then with farmers. ✓ Work jointly with cooperatives and agro dealers to secure the supply side. ✓ Develop proposals for emergency support at least to support the poor farmers
4.3	Provide training	✓ Provide training about pest identification and control measures for 145 plant protection experts at weredas and zone ✓ Cascading of the training to DAS at wereda level. ✓ Cascading of the training to farmers at scheme level
4.4	Monitoring and technical support	✓ Survey of pests on irrigation schemes and give feedback about the mitigation measures to all stake holders and farmers (five experts for 40 days).
4.5	Provide Support to urban agriculture regarding pest control.	✓ Provide refresher training to the working group on urban agriculture (regarding plant protection). ✓ Promotion of botanical pesticides on urban agriculture.

Table. Budget required for capacity building for regular pest control activities

No	Activities	Unit	Quantity	Travel Days	Unit Cost ETB	Total Cost ETB
1	Consultative work shop with stake holders on the supply chain of agro chemicals	No	60	5	650	195,000
2	Provide training about pest identification and control measures for plant protection experts of weredas and zone	No	145	7	650	659,750
3	Training on plant protection activities to DAs	No	1,005	10	650	6,532,500
4	Conduct survey of pests on irrigation schemes	No	5	40	650	130,000
5	DSA for monitoring team (SMS) specific to crop protection	No	7	23	650	104,650
6	Fuel for distribution of agro chemicals and sprayers and monitoring activities for 3 rounds in 6 districts	liter	2500		55	13,500.00
7	**Conduct seed inspections** which will be multiplied on **3566 hectare**	No	5	30	650	97500
7.1	Train of store keepers on seed marketing		250		900	225000
7.2	Train wereda and Zone expert of seed experts	No	70		2400	168000
7.3	Stationary (Exercises book and pen)	No	320		100	32000
	Total					**8,157,900**

Seed inspection plan for 2023/24

Wereda	Seed demand				
	Type	Variety	Class	Qt	Total Area in Ha
Ofla	Wheat	Kingbird	Basic	450	375
		Wane	Pre basic	50	42
	Faba bean	Gebelcho	Basic	50	42
	Barley	Savni	Basic	50	42
		HB1307	Basic	30	25
	Wheat	Kingbird	Basic	505	421
	Faba bean	Gebelcho	Basic	50	25
	Pea	Tegegnech	Basic	20	20
	Barley	Savni	Basic	50	42
		HB1307	Basic	30	25
E/Alaje	Wheat	qeqeba	Pre basic	100	83
		Kingbird	Pre basic	400	333
	Faba bean	Gebelcho	Basic	50	42
	Pea	Tegegnech	Basic	20	20

Wereda	Seed demand				
	Type	Variety	Class	Qt	Total Area in Ha
Ahferom	Wheat	qeqeba	Pre basic	100	83
	Teff	Cr-37	Basic	25	167
L/maichew	Teff	Quncho	Pre basic	25	167
	Teff	Quncho	Basic	25	167
	Chickpea	Arerti	Basic	50	63
T/maichew	Wheat	qeqeba	Basic	60	50
	Teff	Quncho	Basic	50	333
N/adet	Teff	Quncho	Basic	50	333
T/koraro	Teff	Quncho	Basic	50	333
L/koraro	Teff	Quncho	Basic	50	333
total				**2340**	**3566**

Section Four: Livestock Emergency and Recovery Response Intervention Plan

4. Background

Animal resources in Tigray has been contributing considerable share to the economy of the region and household. In total there are about 18 million animal populations which comprise 4,850,412 cattle, 2,282,746 sheep, 4,232,680 goats, 991,905 equines, 6,190,640 poultry, and 331, 407 Bee colonies (CSA, 2018) and annual 25,000 quintals of fish production (Tigray Bureau of Agriculture and Natural Resources/TBoANR/, 2020). They are sources of draft power, organic fertilizers, livestock products (meat and meat products, milk and milk products, eggs and egg products, honey and honey products) and by-products such as skin and hides and etc. Moreover, they confer a certain degree of security in times of crop failure and financial savings (source of cash) and social prestige. Hence, the resources had been significantly contributing for nearly 7.8 million people, having nearly 1.5 million HHs and tens of thousands of urban dwellers, however, according to the TBoANR rapid assessment findings, the war on Tigray caused to:

- Losses, slaughters, lootings, migration of considerable number of livestock populations,
- Huge losses and/or scarce of animal feed and forage resources,
- Destruction of nursery sites, livestock and wildlife park infrastructures, honey and feed processing plants, livestock breeding units, Begait breeding and conservation ranch
- Interruption of almost all input supplies, cooperatives and markets,
- Significant reduction in production and productivities of livestock,

- Cessation of veterinary service delivery, AI and abattoir services, and destruction of their facilities and systems.
- Psychosocial traumatic impacts on the people of Tigray

Largely, the war devastated the livestock's breed, feed, drugs, vaccines, and other input supplies which are essential for the Livestock and wildlife development.

The above stated damages on livestock, poultry, and apiculture and fishery resources resulted significant reduction of production and productivity. This in turn severely affected the regional and household (HH) economy, livelihoods, food safety and nutrition.

The TBoANR have been engaged in designing emergence response and recovery action plan with the objective of to pave a way for the rehabilitation of the livestock subsector. Accordingly, Emergency response and recovery action plans for Restocking, Animal health services, Poultry, Apiculture, Fishery, Breeding, wildlife and feed have been prepared in team by respective experts. This Emergency response and recovery action plans have been shared for comment and conceptualized during the series of consultative meetings by stakeholders and livestock working groups.

Therefore, this compiled emergency and recovery response action plan has been prepared to address the following overall objectives.

Overall Objectives

- To restock and rehabilitate the damaged animal feed source, livestock, poultry, and apiculture resources and their systems,
- To reinitiate the veterinary, feed and milk processing plant, AI, abattoir and other services,
- To address and provide emergency feed, drug and breed supplies for immediate responses,
- To reconstruct the destructed veterinary clinics, AI breeding units, slaughter house, Begait ranch, feed and milk processing plants, honey processing plant and forage nursery sites

Expected outputs

Upon successful accomplishments of the proposed actions, the following are expected to be met as outputs s:

- Capacity building on human/experts by awareness/workshops and training sessions,

- Livestock owners' awareness and capacity development on livestock and fish management will be developed, and this in turn will help to boost productivity.
- Inputs such as seed, concentrate/roughed feed, medicines and clinical equipment, AI center and units, framed hives, colonies, beeswax, transport facilities, generators, etc. supplies will be self-sustained.
- Recovered feed resources, which increased productivity and utilization of the formulated feed, improved crop residue, feed assistance, natural pasture and rangeland management.
- Maintained animal's healthier and productive and reproductive improved by giving good Veterinary clinical services and reduced prevailing diseases.

4.1.1. Emergency Response and Recovery Intervention Plan of Animal Health Service:

Introduction

Tigray is the home land for many endemic animals and endowed with wider diversity of huge number of animal resources.

To support the overall development and modernization of animal resources, a veterinary service is a priority agenda in Tigray. Tigray had adopted a disease prevent and control policy to keep the health of animals and promote the overall development contributions. The clinical service had been given by 201 rural public veterinary clinics and 162 private drug suppliers and there had been 562 public animal health experts and 162 private animal health experts. On top of the clinical services, Tigray has one central veterinary laboratory and about 30 abattoirs, one AI center and 108 AI service units.

As achievements, with the then existing capacities, the Tigray have been able to vaccinate 19,319,667 animals against major animal diseases by the year 2012 E.C. Moreover, it was able to treat 14,468,743 animals against different diseases in the same year, however, the extended war and siege and blockade on have severely impacted the animal health service system significantly. This is because the veterinary service delivery system has been distorted where there has been stoppage of service provision in all weredas due to the fact that the public and private suppliers and veterinary service providers are not in a position to deliver the services, animal health experts have been abandoned, maltreated, exposed various violence, and many are missing and/or migrated, 176 (88%) out of the 201 existed public veterinary clinics along with all

supplies (drugs, vaccines and other medical supplies), equipment, restraining facilities, machineries and utilities were completely or partially destroyed, looted and damaged, and office facilities (office furniture, vehicles, motor-bikes, computers etc.) were looted and damaged.

As a result of the war-crisis no preventive and curative treatment services; and no veterinary supplies in market and due to which high disease occurrence with severe morbidity, mortality and low productivity have been reported from all over Tigray. Hence, as per July 2021 to June 2022, huge numbers of animals were reported to be sick (273,793) and dead (49,740) by different infectious diseases (including TADs) as well as by zoonotic (anthrax and rabies) and plant toxicities.

Supporting veterinary service implies preventing animal sickness and deaths, and helps to maintain the value of the survivors, that contribute to the livelihood of the society.

This calls for immediate emergency response from the government, development partners, humanitarian agencies and other stakeholders to urgently save the animals remaining from being looted, slaughtered, killed, migrated, missed and destroyed during the war and as the result of siege and blockage, via resuming or revitalizing the veterinary service delivery system and supply veterinary inputs as emergency and humanitarian agenda.

Therefore, this emergency response action plan is developed to serve as a guide for all stakeholders to coordinately respond to the on-going animal health and related issues via the proposed emergency action plan interventions.

General Objective

- To restore and revitalize the veterinary service delivery system,
- To minimize the impacts of animal diseases on animal health, production and public health.

Specific Objectives

- To conduct outbreak surveillance and overall provision of the animal health services,
- To revitalize Tigray's animal health service delivery system through different modalities in all weredas as emergency responses,
- To supply essential vet. inputs (drugs, vaccines, medicine…) as emergency responses,
- To advocate for veterinary supplies, Lab facilities and revitalization of service delivery

- To reconstruct and maintain the damaged veterinary infrastructures/facilities

4.1.2. Proposed Emergency Response Intervention and Recovery Activities on Animal Health Service

Activity 1: Conduct outbreak surveillance and assessment of the current status of Animal Health Service (AHS) delivery

Objectives:

- To collect scientific evidences and respond on outbreak event occurring in various Weredas and measure frequencies, magnitude and impacts of animal diseases,
- To assess the overall status of the veterinary service delivery system and practice on disease control/prevention

Justification:

This Emergency Response Plan is devised as per to the FAO Livestock Emergency manual (FAO, 2016), FAO Livestock Emergency guideline (FAO, 2014) and FAO manual for the management of operation during an Animal Health Emergency (FAO, 2022)for enhanced animal disease surveillance, rapid diagnosis and reporting enabling quick response to Emergency support for disease containment and improve herd health by vaccination and treatment interventions.

Active and passive surveillance systems have been implemented for several year, using blank format to fill information and send to Bureau (Tigrigna) or Federal Offices (OIE format), but since the war outbreak on Tigray, this is inexistent. However, it is important to critically consider and perform disease surveillance for early detection, warning and response for Emergency purposes.

There are reports of disease outbreaks such as anthrax, rabies, plant toxicity, and other TAD disease events in different Weredas. However, no outbreak investigation/verification and disease event assessment has been conducted due to lack of field travel expenses (fuel, DSA), though few paper reports from limited weredas, as per July 2021 to June 2022, evidenced to exist more than 273,793sicknesses and 49,740 animal heads died by different TADs; and reports on zoonotic diseases (transmissible between animal and humans), particularly Anthrax and Rabies revealed for 6,317 and 940, respectively, which exhibited threats and impacts on human.

Provided the report would have been supported by assessment and verification of all weredas the actual disease image/prevalence might be different with serious consequences. Moreover, the overall animal health service delivery and practice, challenges and opportunities have not been objectively assessed and hence, they remain unknown and create difficulty in planning and implementing emergency response by humanitarian and development partners.

Hence, in accordance to FAO Livestock Emergency guideline System (LEGS) the following activities need to be prepared to successfully collect the required data from all over the Tigray.

- Describe what need to be assessed including the outbreak surveillance and infrastructures
- Prepare checklists for the assessment and outbreak investigations,
- Establish technical teams of various veterinary professionals from Mekelle University, TARI and other institutions
- Share the plan with potential partners and ensure fund
- Assign each team of experts to all zones and weredas
- Secure logistics:- vehicles, fuel and DSA and then deploy the teams to the respective zones and weredas to start the assessment and outbreak investigation over a period of a week
- Organize a workshop to share the findings of assessment and outbreak investigations,
- Prepare report and share it with relevant stakeholders and partners for future planning.

Expected outputs

- Early Identified and warned for decision makers and early implement control of diseases,
- Prioritized disease problems, informed and mobilized community to involve in disease prevention

Activity 2: Public awareness and Advocacy for veterinary medical supplies, laboratory supplies and revitalization of veterinary service delivery system

Objective:

- To intensify veterinary medical supplies, laboratory supplies and revitalize veterinary service delivery system, through informing and reminding the relevant international community (UN agencies, other humanitarian agencies/ societies/countries, academia, media, etc.)

Justification:

It is well known that the Tigray lost all its available veterinary supplies during the war and imposed siege and blockage and denied access to veterinary drugs, vaccines, other medical inputs supplied by partners. Because of this problem, there is huge scarcity of veterinary inputs in Tigray and hence, it became difficult to revitalize the veterinary service delivery. This lack of veterinary supplies again has enabled occurrence of various diseases and many animals are being sick and died everywhere in Tigray.

This requires high attentions of the international community so as to play their role to pressurize to end the siege and blockage, and intentional denial of the access. Moreover, the relevant UN agencies such as OCHA, FAO, WHO and other relevant public-spirited partners need to exert extra effort to supplies and support to Tigray as per the International Humanitarian law.

Activity: The advocacy work needs continues efforts to effectively and successfully influence the international community, UN agencies, Ethiopian Government and other partners to solve the problem of access to veterinary supplies to maintain livestock's economic dependent livelihood recovery of the societies in Tigray.

Activity 3: Reinitiating stationed clinical services on implementing animal disease Prevention and Control

Objective:

- To restore preventive and curative animal health care service delivery in all clinics.
- To contain diseases spreading and their consequences on livestock's economic and humans impacts,

Justification

The Public Veterinary Service is responsible to take on all possible measures to contain diseases of economically important animal diseases and zoonotic affecting humans in Tigray. Animal morbidity and mortality are inevitably increasing due to absences of disease prevention/control and no supply of medicines; though disease outbreak assessment of measuring their magnitudes, frequencies, losses, and other consequence of war-crisis associated in animal disease are part of the humanitarian support. Focused intervention on support of clinical service require need

assessment, benefit-cost consideration on scale and type of interventions (required drugs, vaccines, equipment) and any additional training needs.

It is also to be recalled that the Government has set a direction towards commencing the clinical services for human and animals with the least possible physical and human resources. In line to this overall direction, provision of heath service in stationed clinics will be reinitiated. To proceed with this, updated data on the actual statuses of the existing vet clinics, challenges and opportunities will be first obtained through reviewing and analyzing the report of damage assessment, further quick field visits and consultations made with vet experts and administrators. Moreover, Emergency veterinary inputs (drugs, vaccines and other supplies), input distribution and clinical service provisions will be commenced or strengthened as indicated below.

In the identified and prioritized Weredas, there must be provisions of stationed clinical services in all undamaged clinics (25), totally or partially damaged (176) and in any temporary or permanent locations at which there is high demand for veterinary services. The temporary and permanent location serving for the clinical services will be selected in consultation with the local community and government bodies in the respective Weredas. Accordingly, 12 million doses of vaccination services and 11 million treatments services to different animals including cattle, sheep, goats, equines and poultry are expected to be delivered through the stationed clinical service modalities.

a) Prevention and control of Animal diseases:

Disaster surviving animals require the same preventive/control and curative treatment services as in normal times but services may have been disrupted or livestock owners may have no financial resources to pay for treatments. The war-crisis compromised access to animal health services (public/private) which are invariably disrupted; and yet the livestock owners need access to such emergency services to protect their animals from diseases and maintain productivities.

According to the reports received from limited weredas of Tigray on economically important animal disease those cause serious impacts to prevail TADs includes: FMD, PPR, LSD, SGP, NCD, AHS and other diseases like Bovine pasteurellosis, Ovine pasteurellosis, Blackleg, ticks, mange mite, which most of them were contained by the existed policy interventions. As a result of the war crisis the earlier efforts have already been cut off, no supplies and related other

problems contributed for spread of diseases in Tigray. Moreover, humanitarian supports for the animal health services are absent or overlooked and as a consequences livelihood of the society are severely affected. This Emergency response action plan has prepared mother-document for prevention and control of major animal diseases and related activities. Detail requirement of vaccines for disease prevention and antibiotics for curative treatments are presented on Annex I.

b) Prevention and control of Zoonotic Diseases

It is true that nearly 60-70% of human diseases are of animal origin. As per to the FAO Livestock Emergency Manual (FAO, 2016), Emergency Animal Health Service (FAO, 2022)and risk of Zoonotic diseases (transmissible between animals and humans) increases due to sharing of restricted living space (shelters) and water sources. According to the quick assessment reports and local surveillance reports in Tigray, Anthrax and Rabies are being aggressively prevailing, showing severe animal and human morbidity and mortality. A separate emergency plan is produced jointly with Bureau of Health and other stakeholders.

Likewise, required humanitarian support for veterinary service, as per to the Emergency Animal Health Service (FAO, 2022), Livestock Emergency manual (FAO, 2016), the health service requirements explained critical provisions include:

- Examination and treatments of individual and herds,
- Disease control and preventive support for notifiable diseases includes vaccination, deworming and management advices,
- Animal disease surveillances,
- The public veterinary service activity is expected to address control of zoonotic diseases, overall sanitation and carcass disposals,
- Disease surveillance and control of notifiable TADs diseases are key interventions.

The main tools for disease control program comprises: Medicinal and Non-medicinal ways. The medicinal control implies use of conservative specific vaccines and curative treatment, which is now difficult to apply in Tigray, while non-medicinal device, conventionally in practice on ground, implies control of diseases by limiting free animal movements, closing market centers, isolation of sick animals, proper disposal of carcasses, slaughter of sick animals, sanitation of shelters/animal settlements, implementation of Biosecurity, public awareness in churches,

mosques, markets, mass media, schools and posting leaflets or distribution of brochures, working manuals and other intervention methods. The intervention will be commenced along the water shades, PAs, villages, (Tabia and kushet) using the existing administrative and technical arrangements. Inevitably effective coordinating committee from the community, local administration and technical veterinary staffs will be formed that supervises the effectiveness and communicate the scale of animal health service problem and formal informant of the intervention or miss-used disease control activities using the humanitarian resources. Based on the prepared checklists the local committee and livestock technical working group further will involve in assessment of problem identification and revitalize the Emergency planning, preparation, implementation, monitoring and evaluation of the humanitarian supports. In this case, any partner can find its area of interest & concern of humanitarian support where to put in resources.

Table 3: Activities revitalizing of stationed clinical services, responsible body and timeframe

Sn	Activity	Responsible body	Timeframe		
			Immed.	Short	M-L
1	Reviewing and analyzing of damage assessment report	AHS Directorate with senior experts	✓		
2	Further quick field visits and consultations made with animal health experts and administrators serving at Region, Wereda and Tabia levels	AHS Directorate with senior experts	✓		
3	Identification and prioritization of weredas expected to run the planed clinical services.	AHS Directorate with senior experts	✓		
4	Identification and setting minimum emergency veterinary inputs (drugs, vaccines and other supplies), human resources and estimated costs	AHS Directorate with senior experts	✓		
5	Obtaining and distribution of required vet inputs (drugs, vaccines, other supplies)	Gov.,, Partners (NGO, humanitarian agencies)	✓	✓	✓
6	Mobilizing animal health experts and coordinators at Wereda and Tabia levels	AHS Directorate	✓	✓	✓
7	Implementing stationed clinical service provisions	Wereda and Tabia vet. coordinators and experts	✓	✓	✓
8	Reporting and communication	Wereda Vet. service coordinators & B/Head	✓	✓	✓
9	Monitoring and evaluation	AHS Directorate, B/Head, partners, univ, stakeholders	✓	✓	✓

10	Over all coordination and guidance	AHS Directorate/Early warning	✓	✓	✓

Expected outputs

- Restored Veterinary clinical services at stationed clinics,
- A total of 972,937 HHs will have accesses to animal health service, considering equity and gender issues.
- Reduced Morbidity and Mortality caused by the prevailing diseases,
- Prevented and controlled zoonotic diseases,
- Maintained animal's healthier, productive and reproductive,
- Improve/maintain well-being of community livelihoods,

Activity 4: Organizing and Implementing Mobile clinical service delivery (MCSD)

Objective

- To prevent and control the occurrence of economic and public health important animal diseases that are beyond the capacity of stationed clinics in Tigray
- The mobile clinic service will extend only for six months period,

Justification:

To address and maintain the growing demand for veterinary services across Tigray, provision of mobile clinical services is considered to reach animals &/or areas (Wereda, Tabia, villages) where provision of stationed clinical services is not accessible. As it does with the case of provisions of stationed clinical services, the implementation of these mobile veterinary services will depend on the damage assessment reports, consultations with responsible government body and the local community. To proceed with this, actual data on possible implementation and demand for this type of clinical service modality will be first collected and analyzed. Hence, mobile clinical service will target those Wereda/Tabia whose veterinary clinics are completely destructed due to the war crisis and places where provision of veterinary service is unavailable.

This mobile clinical service provision will require establishment of mobile teams of animal health experts, supervisors and clearly designed implementation strategy and job engagement. And the local animal health professionals working at Wereda or Tabia level will be included as part of the team. Additionally, type of services and minimum required veterinary inputs (drugs, vaccines and other medical supplies) will be set for each mobile clinical service mission.

Accordingly, 15 mobile teams of animal health experts (3 team per zone) and 5 supervisors (1 supervisor per zone) will involve. Each will consist of 3 experts (veterinarians and para-veterinarians). The mobile teams of animal health experts will be deployed as follows. Southern, South-Eastern, Eastern, Central and Northwest zones mobile teams of animal health experts. The mobile team's experts will report to the Animal Health Director and evaluated.

As a strategy, the implementation of this mobile service provision depends on giving services based on demand and run; make use of all available resources, get local community-engaged.

Moreover, as major activities of mobile service include clinical services, discussion with stakeholders and deliver needed service. Each team will make a field trip at least 12 days per month. Accordingly, through the mobile vet service, a total of 445,000 animals are expected to be treated and 107,500 animals will be vaccinated. Moreover, surveys on major diseases will be made and animal health promotion via media, banners, flyers and public appraisal will be conducted. Additionally, best practices, lessons and success stories will be compiled and disseminated.

Table 5: Activities of the provision of mobile clinical services, responsible body and timeframe (immediate, short and long terms)

Sn	Activity	Responsible body	Timeframe		
			Immediate	Short	Medium-
1	Identify and prioritize target wereda, Tabia or village to be included in the mobile clinical service delivery	AHS Directorate office in collaboration with senior experts from MU-CVS, TARI	✓		
2	Establishing mobile Teams of animal health experts	AHSD in collaboration with senior experts from MU-CVS, TARI	✓		
3	Identification and setting minimum emergency veterinary inputs and type of services for the MCSD	AHS Directorate with senior experts	✓		
4	Obtaining and distribution of required veterinary inputs for MCSD	Government, Partners (NGO, humanitarian agencies)	✓		
5	Deployment of the established mobile teams of animal health experts and commence the MCSD	AHS Directorate in consultation with Woreda animal health coordinators	✓		
6	Community mobilization	Wereda A.H coordinators and experts	✓		
7	Implementing mobile clinical service	Assigned mobile teams of experts	✓		
8	Conduct treatment 445, 000 dose & vaccination 107,500 dose	Wereda/clinic Animal Health experts	✓		
9	Technical supervision	Zonal supervisors, AHSD and BH	✓		

10	Monitoring and evaluation	AHSD, stakeholders & beneficiary	✓		
11	Over all coordination and guidance	AHS Directorate/Bureau Head	✓		

Expected outputs

- Timely responded and managed major animal diseases that have significant consequence on morbidity and mortality,
- Conducted treatment 445, 000 heads & vaccination 107,500 dose
- Accessed health service for 46,600 HHs in their vicinity, considering equity and genders

Activity 5: Purchase and Distribution of Veterinary inputs

Objective

- To address and supply of the shortage of veterinary inputs (drugs, vaccines, medical supplies and equipment)

Justification

For the successful accomplishments of the stationed and mobile veterinary clinical services, the region needs to ensure the availability of the necessary drugs, vaccines, medical supplies and equipment, etc. Vet inputs supply modalities are presented on Annex 1.

Table 7: Activities of purchase, distribution of inputs and responsible body and timeframe

Sn	Activity	Responsible body	Timeframe (term)		
			Immed	Short	Med-long
1	Reviewing and analyzing of damage assessment report	AHS Directorate with senior experts	✓		
2	Identification and prioritization of inputs necessary for the health service.	AHS Directorate with senior experts	✓		
3	Identification and prioritization of minimum emergency veterinary inputs (drugs, vaccines/others),human resources &estimated costs	AHS Directorate with senior experts	✓		
4	Obtaining and distribution of required veterinary inputs (drugs, vaccines and other supplies)	Gov., partners (humanitarian agencies)	✓		
5	Mobilizing animal health experts and coordinators at Wereda and Tabia levels	AHS Directorate	✓	✓	
6	Implementing stationed clinical service provisions (HH 927,937,vac 18 million &treat 16 million)	Wereda and Tabia veterinary experts	✓	✓	
7	Reporting and communication	Wereda &Bureau heads	✓	✓	
8	Monitoring and evaluation	AHS Directorate /Bureau, partners/ Univ, stakeholders	✓	✓	✓

9	Over all coordination and guidance	AHS Director/Bureau	✓	✓	✓

Required resources and estimated budget (Birr) per clinic or stationed clinical service are stated on table 9/ANNEX1

Expected outputs

- Availed necessary medicines and clinical equipment,
- Managed (prevented animal diseases) clinical cases timely and properly,
- Controlled/prevented prevailed animal disease
- Restored clinical services at all levels,
- Immediately covered 12 million and 11 million doses,
- Benefited 927,937 HHs, considering equity and gender issues
- Reduced livestock sickness,
- Maintained animal's healthier, productive and reproductive,

Activity 6: Reconstructing and maintaining the damaged veterinary clinics

Objective

- To reconstruct and maintain the damaged veterinary facilities/infrastructures

Justification

The veterinary service was well organized and established suitable working environment and created demanding community for services. As consequences of War, many infrastructure and resources have been destroyed and looted. The damage assessment analysis demonstrated that out of the 198 rural clinics, 49 and 127 completely and partially damaged, respectively. To reinitiate and restore health services require reconstructing and maintaining activities of the damaged buildings.

Given the current context in Tigray, to mitigate further deterioration of livestock spices focus needs to be given to maintaining the available vet facilities to ensure continuous support to CAHWs at wereda levels to access these services. A number of vet clinics to be prioritized includes; for minor level of damage maintenance 80, for medium level of damage 47 clinics in immediate and short terms, 49 veterinary clinic with major (totally damaged) in short and medium term of reconstruction, while mobilizing resources to rehabilitate all the damaged and/ or partially damaged vet facilities. The total budget required for the reconstruction and maintenance is estimated for about ETB 996, 035,400 (USD 18,445,100).

Table 8: Activities of Reconstruction and maintenance of the veterinary clinics, timeframe

Sn	Activity	Responsible body	Timeframe		
			Immediate	Short	M-L
1	Review, assess, analyze damage assessment data	AHS Directorate	√		
2	Categorize the level of damage of vet clinics (Total or partial damage on buildings…)	AHS Directorate	√		
3	Estimate required resource		√		
4	AHS Directorate with senior experts		√		
5	Prioritize wereda based damage,	Gov., partners (agencies)	√	√	
6	Carry out reconstruction and maintenance of the damaged buildings	AHS Directorate	√	√	
7	Monitoring and evaluation	Wereda, Tabia vet. Experts	√	√	
8	Review, assess, analyze damage assessment data,	Wereda, Bureau heads	√	√	
9	Categorize the level of damage of vet clinics (Totally or partial damage on buildings…)	AHS Directorate/ Bureau, partners…	√	√	
10	Estimate required resource,	AHS Director/Bur	√	√	

Expected outputs

- Standard and Safe building for provision of health service,
- 927,937 HHs will get access to animal health service, considering equity and gender issues
- Suitable to keep hygiene and standardized working environment,
- Create suitable working environment.

The total budget required for the reconstruction and maintenance of minor (80), medium (47) and major (49) damages is estimated for about **ETB 996,035,400 (USD 18,445,100).**

Activity 7: Health education/Training and socio-psychosocial therapy for vet staffs

Objective

- To provide health education/training on disease control and prevention strategies
- To provide and socio-psychological stimulus for vet staffs

Justification

The war affected livelihood of people of Tigray. Many people were discouraged, displaced or migrated to save their life. As a consequence of the war catastrophes many people are anticipated

to develop psychological disorders and scarce food for subsistence, especially the vet staffs to sustain in their working station. .

To successfully implement animal service activities, the Bureau enquires to ensure human resource stability and proper engagement and move away from the war catastrophic social fabrics. Hence, there must be social dialog and trainings that heal human psych setup to normal.

Moreover, as indicated above, the regular disease control and prevention strategy such as vaccination, strategic deworming, spraying, prophylactic therapy etc., have been interrupted due to the impact of the war, siege and blockage. Apart from these, the tool to control and prevent disease in animals and humans is health education combined with vaccinations. Hence, there must be intensive health education activities to sensitize the general public and targeted sections of the society. To achieve this, risk communication strategies need to be devised, key messages must be framed and communicated via mass media (television, radio, leaflets, posters, etc.) and public gathering places (churches, mosques, market places, etc.).

Activities: assess human and resources, set action plan, conduct training, public dialog/ conference/ mobilization and other related actions.

Expected outputs

- Create healthy human mind, thoughts,
- Develop (normal) plenary social interactions/discussion, tolerances to neighborhoods,
- Quickly shift/move to usual engagements,

The total budget required for the reconstruction and maintenance is estimated for about **ETB 8, 126,640 (USD 150,493)**.

Activity 8: Rapid Chemical Toxicity and **Food safety investigation in Food of animal origin & Environment**

Safe food is defined as food free from microbial, chemical and physical hazards. The term “chemical hazards”/toxicities usually refer to metals, pesticides and other chemical residues (e.g., antibiotics) which are the sources of potential foodborne illness or chemical poisonings.

Chemicals hazards can occur in the food chain due to either their existence in the environment through unintentional contamination of the food, or intentional use somewhere along the food production chain.

To control environmental pollution and protect humans and animals from the hazards of environmental contaminants, a concept of persistent organic pollutants has emerged. The term "persistent organic pollutants" (POPs) was defined by the UN Environment Program as those persistent chemicals can accumulate in foods and cause adverse effects to consumers.

Justification for the chemical hazard Investigation

The war in Tigray is expected to result environment pollution/ contaminated by chemical hazards as there were heavy and continues artillery attacks, air strikes and heavy attacks with phosphorus and other chemicals.

The environmental contamination might include soil and water by the chemicals which further might transfer to livestock via animal feed and water. Then, the chemicals may bioaccumulated in the animal body and affects directly to the animal and then indirectly to human being via the food chain that might bring acute or chronic health problems. In Tigray, there are some reports that showed a high mortality and morbidity of animals with signs of toxicosis in areas of history of heavily artillery attacks. Furthermore, the chemicals in the animal body may bioaccumulated and later transferred to human via foods that may lead to human health problems. Hence, this tragic situation calls for urgent investigation of the cases and recommend urgent knowledge-based emergency action.

It's, therefore, important to consider investigation within an emergency response plan to mitigate the challenges that might be later threaten-lives and possibly remain for an extended period.

Objectives

- To detect and quantify the chemical hazards in soil, water and animal feed
- To detect and quantify the chemical hazards in milk, meat, eggs, fish and honey
- To identify the possible risk factors associated with the chemical hazards

Expected outputs

- Identify the type of chemical hazards in food chain and differentiate association with war,
- The risk factors associated with the chemical hazards in the livestock will be identified,

- The chemical hazards in the food will be quantified and will compare with the internationally accepted maximum residual limit (MRL) values.

The required budget for the assessment of Chemical toxicity and food safety is estimated about **ETB 10,817,500 (USD 200,324).** Detail assessment of target areas and testing procedures document is produced on separate version

Activity 9: Emergency pan to resume war affected slaughter services

Justification

It is certain that slaughter service is a public concern. In Tigray, before the war, depending on the capacity of daily performance of slaughters, there were three types: slaughtering slabs, slaughtering houses and abattoirs and all were equipped with facilities. In Tigray, there were 8 slaughter slabs, 22 slaughter houses and 2 abattoirs situated in major cities and small towns. A total of 33 vets were engaged to perform operations, hygiene and conducting ante- and post-mortem meat inspections that enabled community to consume safe and wholesome meat.

However, during the war, the majority of the infrastructures and facilities were damaged, while the transport and other facilities were totally looted and destroyed. This situation led to expose community to high public health risks by consuming unsafe meat and environmental pollutions.

The destruction of the slaughtering infrastructures forced, the community to slaughter animal in open-field that exposed the community to foodborne and zoonosis diseases. Furthermore slaughtering in open-field also created significant waste accumulation and pollution by ruminal content, skin, bone…..etc., which created bad odor and environmental contamination. Furthermore, the accumulation of waste inferred to widen the interface of wildlife animals (hyena, fox and others), which favored spread of Rabies outbreaks.

From public health perspective, this situation is not acceptable as the community is exposed to foodborne and zoonosis diseases. Hence, the emergency response and recovery of the slaughtering facilities needs consider as top priority and due attention.

Objectives

- To reconstruct the ruined rooms and infrastructures of slaughtering facilities in Tigray.
- To supply the looted slaughter equipment and other facilities,

- To conduct focused training and promote the professional competency.

Expected outputs

- The abattoirs' infrastructures will be returned back to status before the war
- The professional will be refreshed and capacitate skills,
- Consumers will be supplied a safe and wholesome meat from the rehabilitated abattoirs
- The environmental pollution of cities will be significantly reduced

The required budget for the reconstruction and maintenance of slaughter slabs, slaughter houses, abattoirs and capacity building is estimated for about **ETB 32,165,000 (USD 595,648).**

4.1.3. Threats and challenges of the Veterinary Service Restoration

- Security issues throughout the Tigray,
- Access to vaccines, medicines, equipment
- Transboundary disease management
- Resource unavailability/ for supply of livestock related commodities (medicine, equip…)
- Access and market fluctuation of inputs
- Transport facilities

Budget Summary

Animal Health Emergency Response Plan Requirement budget Estimates is shown herein below

Budget summary breakdown in Action period

Description	First six months period	Second six months period	Third six months period	Total required fund in **ETB**	Total required in **USD**
Renting for temporary health service provision	7729200	7729200	5580000	22809600	422,400
Vaccination equipment	783849600	---	---	78384960	1451,573
Clinical equipment supply	33916608	---	---	33916608	628,085
Vaccine supply with vaccine diluent)	10929006	10929006	10929006	32787018	607,167
Drug supply	65394000	65394	65394000	196182108	3,633,002
Capacity buildings	27000000	2700000	2708640	8,126,640	150,493
Laboratory chemicals and equipment	20024208	---	---	20024208	370,819
Purchase of Office facilities	27634464	---	---	27634464	511,749
Purchase of machineries, motor bike and vehicle	42177780	21121200	21119940	158400000	2,933,333

Reconstruction & maintenance of damaged clinics	540000000	456035400	---	996035400	18,445,100
Operational cost of mobile clinic	16422210	16422210	16422210	49,266,630	912,345
Operational cost for disease prevention and surveillance (fuel & lubricants, DSA, etc.)	2700000	2700000	2084400	7,484,400	138,600
Rapid Chemical toxicity and food safety investigation	5408750	5408750	0	10,817,500	200,324
Reconstruct and maintenance of slaughter houses	10721667	10721667	10721667	32,165,000	595,648
Total	**1,593,907,493**	**533,832,827**	**134,959,863**	**1,674,034,536**	**31,000,639**

4.2. Emergency and Recovery support need for Animal breeding (AI service)

Justification

To date, AI is recognized as the best biotechnological technique for increasing reproductive capacity and has received widespread application in farm animals. The Artificial Insemination (AI) remains to be the most available and widely applicable reproductive biotechnology available to dairy producers in the Tigray.

TBoANR has established the Livestock Genetic improvement directorate and A.I center to achieve the objective of dairy genetic improvement plan by reinforcing the cross-breeding activities and indigenous cattle selection. The directorate has one Artificial insemination center and four liquid nitrogen plants. The AI center has the capacity of producing 150,000 semen straw per year and 75,000 liters of liquid nitrogen per year. The semen is collected from 12 bulls of three breeds, namely Holstein Friesian, Jersey and Begait. The semen, AI equipment and liquid nitrogen have been distributed to district offices based on their demand. There were about 108 breeding units in 61 districts of Tigray. To run the 108 breeding units, there were 139 AI technicians.

However, the war-crisis has disrupted cruelly the agricultural subsector including AI centers, breeding units and service in Tigray that faced multidimensional damage of infrastructure and AI

facilities. The semen processing laboratory center and four liquid nitrogen plants (one in Maychew, two at Mekelle and one in Shire) are also not functional due to the war.

According to Hailemariam and Gidey (2021) damage assessment report in February 2021, showed that the AI center, breeding units (108) and service systems are disrupted due to damages of infrastructures, looted 508 AI facilities and stopped insemination services.

Different consumable and non- consumable AI inputs/equipment and different medicaments, 1061 different office furniture, 12 machineries, motor bikes and vehicles which were used for AI service are looted/ destroyed. Hence, urgent reconstruction and functioning of AI service delivery is needed to resume the dairy production and productivity in Tigray. Furthermore, the public and private service providers are not in a position to deliver routine AI service.

The assessment report also revealed that 13% of AI technicians were displaced from their working location with their family members. Few of the AI equipment are slightly damaged (maintainable), while others are completely damaged. Liquid Nitrogen containers were looted and damaged, which caused in loss of Liquid nitrogen and semen. Hence, liquid nitrogen and semen cannot be transported; and Transport facilities such as motorbike and vehicles were also looted. The AI bulls of the AI center are in poor condition due to shortage of feeds (forage and concentrate) and semen production is interrupted.

Therefore, this call for an immediate emergency response from the Gov., NGOs, development partners, humanitarian agencies and other stakeholder urgently to keep up survivor animals from any impacts of the war. This emergency response plan has been developed to serve as a guide for all stakeholders to coordinately implement animal breeding/AI service related actions and interventions.

4.2.1. Objectives

General Objective

- To resume AI service delivery system in Tigray region and enhance dairy cattle productivity through improved availability and accessibility to quality semen of high yielding dairy bulls.

Specific Objectives

- To reconstruct and maintain the damaged infrastructures of AI center, breeding units,
- To capacitate and maintain the semen processing laboratory, liquid nitrogen machines and field breeding units with required inputs and equipment to resume the service delivery
- To provide psycho-social-therapy training for livestock professional staffs and AI technicians
- To reestablish the overall dairy breeding system and regional AI database in the region

4.2.2. Emergency Intervention Activities

4.2.2.1. Reconstruct Artificial Insemination (AI) infrastructures and Facilities

AI breeding unit, office buildings and facilities were destroyed due to the war erupted in Tigray. Therefore, reconstruction of the office buildings and fulfilling of office facilities is required. The damaged buildings and office facilities are listed in the table below.

Table 1:**List of damaged infrastructure and office furniture**

No	List of damaged infrastructure and office furniture	Unit	Amount
1	Reconstruct Breeding unit office	pcs	108
2	Office furniture chair	pcs	390
3	Table	pcs	280
4	Shelf	pcs	280

4.2.2.2. Capacitating AI centers with inputs, equipment and human resource

Capacitating the AI center with required inputs, equipment and human resources is very crucial in order to restore a functional AI service delivery system.

4.2.2.3. Supply of Emergency AI inputs and equipment

For immediate restoration and revitalization of AI Emergency service with basic inputs and equipment includes: AI equipment, AI kits, liquid nitrogen, transportation, chemicals for semen processing, laboratory materials, and spare parts for liquid nitrogen plant (machineries), feed and others should be fulfilled to resume the AI service delivery in Tigray. In order to meet the ever-increasing demand of Liquid Nitrogen, it is important to support and maintain the existing LN_2 plants and establish new additional two LN_2 plants. Immediate supply of consumable materials and chemicals required for semen processing laboratory needed urgently are listed below.

Table 2: List of required AI inputs and equipment

No	List of inputs/Equipment/tool	unit	Amount
1	Liquid nitrogen container of 35 litter capacity	pcs	262
2	Liquid nitrogen container of 2 litter capacity	pcs	131
3	Insemination Gun	pcs	262
4	Scissors	pcs	152
5	Forceps	pcs	152
6	AI kit /AI Leather bag/	pcs	131
7	Thermometer	pcs	130
8	Thermo-flask	pcs	150
9	Electrical Sterilizer / stove/	pcs	120
10	Sheath	pcs	150000
11	Glove	pcs	200000
12	Binocular microscope	pcs	108
13	AI Certificate	pad	1200
14	Motor Bikes	pcs	127
15	Lab chemicals, reagents and equipment	set	50
16	liquid nitrogen plant machines	set	2
17	Spare parts for liquid nitrogen plant	set	80
18	Hormones	dose	80000

4.2.2.4. Human Resource (HR)

According to the damage assessment report made by Hailemariam and Gidey (2021), till February 2021, 13% of AI technicians were displaced from their working place with their family members. Therefore, resettlement of the displaced AI technicians and capacity building through continuous training and professional career development should be considered.

Table 3. Activities of the psycho- therapy and professional training of AI technicians

S. No.	Activity	Responsible body	Timeframe term		
			Immediate	Short term	Medium-Long
1	Assess human resources and observe status	BoANR	√		
2	Assess and communicate institute that could be source of trainers	BoANR	√		
3	Preparation of training manuals,	Trainers	√		
4	Conduct training and public dialogs	Trainers	√		
5	Evaluate the impact of the training	HR	√		
6	Overall coordination and guidance	BoANR	√		

- Budget requirement: Lump sum estimate for the capacity building of professionals is **ETB** 950,000 (190*10*500)

4.2.2.4.Restoring AI database and overall system

Due to the war destruction, semen production and distribution in Tigray is interrupted. Most of the dairy cattle breeding is mainly depend on AI service. Dairy productions, (small scale HHs), dairy business enterprises and other beneficiaries involved in the dairy value chain are highly affected. Moreover, the pedigree and performance data is destroyed. Therefore, data retrieving should be started as soon as possible. Furthermore, reestablishing of database for AI services, production and reproduction traits at least for dairy cattle is very urgent. Because, having these inclusive data is very crucial for sustainable genetic improvement through selective breeding.

Beneficiaries

This emergency response plan can include 98,000 HHs youth, women, and farmers will have accesses to AI service in all districts of Tigray and investors, cooperatives and community breeders will be beneficiaries from the ranch. Thus this plan may pave way to solve nutritional, financial and social constraints of all the actors in the dairy and meat value chain.

Expected outputs

- AI breeding units, animal holding crush buildings and facilities refurnished
- AI center and breeding units capacitated with inputs and facilities
- Semen and liquid nitrogen produced
- A total of 98,000 HHs and 104,000 cows acquire accesses to AI service in a year.
- AI center and breeding units capacitated with required human resource
- AI service delivery resumed in 60 rural, 34 urban weredas, 734 Tabias beneficiated in Tigray

Table 4: Budget Summary: Animal Breeding Emergency Response Plan Cost Estimates

	Activities	**Amount**
1	Reconstruct AI breeding unit office buildings	54,000,000
2	Purchase of breeding unit office facilities	3,300,000
3	Purchase of AI center inputs and equipment	43,289,420.00
4	Purchase of Semen production laboratory chemicals, reagents	11,000,000
5	Purchase of motor bike	22,225,000
6	Liquid nitrogen plant machine maintenance and purchase of spare parts and LN2 Plants	55,000,000
7	Capacity building up for AI Professionals	3,650,000
8	Operational cost (Fuel and lubricants, perdiem, etc.)	3,208,000
	Miscellaneous cost	2,359,199.00
	Total Rate 1USD = ETB 54	ETB 198,031,619.00 USD 3,300,526.98

4.3. EMERGENCY SUPPORT REQUIRED FOR RESTOCKING OF LIVESTOCK IN RESPONSE TO DAMAGES INFLICTED BY THE PROLONGED WAR IN TIGRAY

INTRODUCTION AND JUSTIFICATION

Livestock production in Tigray is an integral part of the Agricultural farming system.It is well known that in Tigray nearly 80% farmers own livestock for both crop cultivation and livestock rearing. Indeed, the role of livestock production in food security and food self-sufficiency in the region is important. The rising of livestock is an important, often one of the main, source of income for millions of smallholder farmers in Tigray. Furthermore, they are important sources of milk and meat, which are part of the food chain and, provide high value of protein foods. It is certain that livestock especially cattle, shoats and donkeys also play a crucial role in crop production. As a result, millions of people depend on animal power for cultivation, planting, threshing and transporting.

It is hard fact that the civil war has almost, if not entirely, been surfaced in Tigray, Ethiopia. Due to the war, a considerable number of animals have been lost due to the war. The internally displaced and on-displaced HHs have lost their animals by the war. It has also been observed that cattle, sheep, goats, chicken and donkeys were among the severely affected livestock owned by small scale farms, whereby the soldiers have been using them for their food and for transporting weapons.

Moreover, the war impacted and involved in war affected areas on internally displaced, non-displaced and migrated farmers that triggered for empty-handed of livestock holdings by lootings, slaughtering or killings in battle field areas. In connection to this, the DRM recent information showed that the total numbers of farmers affected by the war-crisis are 593,633 HHs, which is comprised of internally displaced, migrated to Sudan and severely affected but non-displaced HHs showed for 380,077, 13,556 and 200,000, respectively. To improve the livelihood of war-affected HHs intervention modalities is prepared herein bellow.

Likewise, the war-crisis destroyed individual and cooperative dairy farms, milk collection centers, fattening and others. To mention some: Meda Raya dairy farm with milk processing plant and feed plant complex, Timuga dairy and Horticulture farm, Luna Plc Meat farm with

meat processing plant and forage seed multiplication and other dairy and meat farms are among the most important severely affected group, enquiring support to restore their activities.

General objective

- To restore the deteriorated livelihood of war-affected HHs(displaced and non-displaced)

Specific objectives

- To provide minimum livestock packages for the ware-affected people with different livestock size (cow, bulls, sheep/or goats) based on their needs and previous experience
- To rehabilitate the livelihood of war-affected households
- To ensure the normal livelihood of the war-affected households.

Implementation modalities of livestock restocking for small scale Farms at HH level

This implementation modality aims at restoring Livestock (dairy and meat) farms based on the DRM information. Of the total households affected by the war, it is assumed that 80% (474,906 HHs) of them were engaged in agriculture. Then, out of these, only **350,905** HHs, who are severely affected by the war, will be selected to occupy in livestock. The selected HHs will receive either sheep and/or goat, dairy cow, and bull fatting package. Accordingly, only 45%, 35%, and 10% of the selected HHs will receive sheep and/or goat, dairy cow and bull fatting packages, respectively and the packages will be implemented as follows:

- Sheep and/or goat package = 6 sheep or goat (5 F and 1 M) per HH. The HHs expected to involve in this package will be **157,908** and the number of sheep and/or goats needed for restocking will be **947,448**.
- Dairy Cow package = one cow (Begait, crossbreed or other local breed) per household. In the cow package, **122,817** HHs will be supported each with one cow aimed for milk production
- Bull fattening package = two bulls per household. In this package, **70,180** HHs will receive two bulls for each. This package will be given to generate **Quick** farmers' income.

As stated above the farmers required for restocking have no feed resource, drugs and shelters for the intended livestock, which requires to consider before purchase of the livestock.

Restoring dairy and meat farms and farming systems

The war destroyed individual dairy farms and milk collection centers, fattening farms and other dairy and meat small, medium and large scale private investments and cooperatives and overall

infrastructures and farm facilities: for instance Meda Raya dairy farm with milk processing plant and feed plant complex in Raya Azebo Wereda, Timuga dairy and Horticulture farm in Raya Alamata Wereda, Luna Plc Meat farm with meat processing plant and forage seed multiplication in Raya-Azebo Wereda and other dairy and meat farms were actively functioning, that the war severely damaged infrastructures and farm facilities of the livestock investments.

The emergency response requires reinitiating and restoring the livestock investments through technical support, linking credit facilities, re-establishing market systems and other demand driven supports on inputs and technologies.

Psycho-social therapy and professionals training of animal production experts

The war affected both human and economic resources. In many places and residences inhumanly civilian killed and dead bodies were evidenced, and then many people were discouraged, displaced or migrated to save their life and economically severely affected, several families are still missing and animal owners were roamed with their animals away from their residence for about two years. As a consequence of the war catastrophes many people are anticipated to develop psychological disorders, traumas, easily develop confrontations on silly issues, and missed employments even for subsistence. Indeed, the animal production professionals, as part of the tragedy, it's therefore, important to carry out psychotherapy so as to bring back human psycho upset to normal as a whole. (1) Woreda experts (2) Livestock DAs and (3) Regional experts (4) Livestock owners'

Expected outputs

- Livestock (cattle, sheep, goats) populations of war affected HHs replenished
- The livelihood of war affected HHs improved

Table 10: List of activities and Implementation period

S.N	**Activities**	Months	Responsible body
1	Selection of households	6	TBoANR (Directorate)
2	Identification of potential sources and markets	2	"
3	Preparation of essential inputs (shelter, feed and medicine)	3	"
4	Purchasing and Distribution of animals	5	

5	Monitoring and evaluation of performance	16	"

Table 10: Budget required for the proposed action plan (in ETB)

	Description	Unit	Quantity	unit price	Total price
1	Shoats (sheep and/or goat)	Number	947,448	3,000	2,842,344,000
2	Dairy cows		122,817		3,806,314,000
	Indigenous cows	Number	92,113	18,000	1,658,034,000
	Cross breed cows	Number	30,704	70,000	2,148,280,000
3	Fattening of bulls	Number	35,090	20,000	701,800,000
4	Feed (hay or crop residues)	Ton	59,528.55	18000	1,071514,000
5	Feed (concentrate)	Ton	7,581.33	24000	181,951,920
6	Animal drugs	No. of animals	1,140,446	100	114,044,600
7	Transportation	No. of vehicles	14,255	25000	356,389,250
8	Training for livestock production district and regional experts and DAs	-	-	-	1,500,000
9	Operational cost				4453560
	Grand total	-	-	-	9,080,311,330

Threats/Risks

The risk assumptions for livestock restocking in war affected Areas

- Security issues throughout the Tigray,
- Availability of potential and high yielding animals (specially of cross bred animals)
- Finance and Banking services
- Transportation facilities
- Access to vaccines and medicines
- Access to feed specially on biomass and improved feed types
- Access of communication (Telephone, Internet, etc.)

4.4. Rescuing, Emergency Response Intervention Plan for Poultry Restocking

Introduction and Justification

As part of the agricultural and agro-industrial subsectors, the resources and systems of the poultry value chain were severely affected by the war in Tigray. To mention some of the chickens owned by commercial farms were looted or died of feed shortage and diseases, though no actual data are available, it has been resumed that a limited number of chickens have survived the war-crisis and then, poultry value chain and its system has lost its vertical and horizontal communications and networking among poultry value-chain actors (e.g., producers, out growers,

development partners, experts, etc.).It is certain that some of the issues acquiring/ addressing poultry recovery are put down herein below.

- Out of the existed 623 out growers, which were engaged in poultry breed supply, almost 90% of them are partially or completely affected by the war and none of them are functional.
- The 15 poultry feed manufacturers, distributors, and agents as well as the feed supply system have been disrupted and many of them ceased functioning due to lack of premixes and other locally available raw materials.
- All poultry vet services has been completely stopped due to absence of supply of drugs, vaccines, other medical supplies, which led to high chicken mortality, morbidity and associated losses.
- Parent improved breeding stock replacement by Ethio-chicken PLC has stopped due to the siege. Instantly, the farm is unable to supply the already demanded and prepaid for 400,000 chicks by clients.
- Poultry producers are unable to run their business through Bank and Microfinance Institutions, and no telephone, water & other utilities, which have been negatively impacted.

Nevertheless, poultry is the top priority agricultural commodity or resource with multiple importance to immediately address the existing nutrition and food emergency needs of the IDPs as well as the public, generate income and create jobs as a quick win strategy. Poultry is identified as an entry point to help the IDP and other vulnerable farmers and unban. To fully tap the indicated benefits and sustain the poultry resources in Tigray is a top priority agenda.

Therefore, this emergency and recovery response action plan is prepared to respond for immediate and short-term challenges of the poultry subsector of Tigray.

Objectives

- To sustain and recover survivor chickens by providing emergency feed, vet services and conservation activities
- To look for adaptable breed supply and restocking
- To map out feed supply options and address the problem of feed supply
- To find out and devise viable poultry vet services modalities
- To support poultry feed manufacturers, breed suppliers and vet service providers

Emergency Response for Addressing Breed Supply (local, improved) and Recovery

Huge population size of the Tigray's chicken has been reported to be looted, killed, and slaughtered by the soldiers and dead of diseases and yet, the war-survivor chickens, including the superior local breeds are suffering from absence of feed, vet services and shed facilities. Such losses of available chicken breeds coupled with the complete cessation of distribution of improved breeds by hatchery companies (mainly Ethio-chicken PLC) make Tigray suffer from depletion of chicken resource and benefits. Hence, the following emergency interventional activities are proposed to help rescue the available local and improved chicken breeds.

1. Emergency response for addressing breed supply and Recovery

As stated above, huge chickens' population were looted, killed/slaughtered by soldiers and dead of diseases. Moreover, the annual distribution of 1-1.5 million improved chicken breeds in Tigray was halted due to the war; and Ethio-chicken PLC Hatchery Company has also stopped its function and sieges' blackout has worsened supply of new improved chicks. All the indicated phenomena caused a total absence of improved breed supply, which triggered the poultry sector to be severely affected and failed to contribute to the existing economic needs, food and nutrition shortages that Tigray is facing today. Hence, restoring the sector through a sustainable supply of chicken breeds is highly essential. To achieve this, the following interventions are proposed.

1.1. Importation and Reestablishment of Parent Stock:

As far as the Ethio-chicken PLC Hatchery Company is out of grand stock breeds and no alternative hatchery center to supply, a new grand stock source from reliable breeding companies is in need to import from abroad, which require special arrangements and involvement of either Ethio-chicken or other relevant actors/suppliers.

1.2.Purchase and transportation of fertile eggs and/or day-old chickens:

Fertile eggs of different chicken breeds or day-old are required to be purchased and transported from the Ethio-chicken Hatchery Center (Adama) as soon as siege is lifted and/or import fertile eggs or day-old chicks from abroad through special arrangements by relevant actors/supporters is expected. Confidentially, Ethio-chicken has as great experience in performing this task.

1.3.Contract-based Conservation, Multiplication and Distribution of superior local and improved poultry breeds for Emergency and Recovery purposes:

Sufficient number of superior breeds, local and/or improved breeds is required and yet, many of such superior breeds are suffering from a shortage of feed, diseases and management problems. Hence, there is a need to continue of such superior breeds and attain chicken breeds replacement, conservation of the superior breeds either through keeping them in centers having minimum facilities and services or introducing community-based breeding programs to multiply sufficient number. This could be done by contacting producers of superior breeds and agreed to supply day-old chicks of the breeds and/or their fertile eggs. The superior breeds will be searched and identified from the available local and improved breeds (e.g. Koekkoek).

The purpose of conservation of superior local or improved poultry breeds is a side-way in need to collect and save fertile eggs and/or chicks and multiply and then distribute to Model Farmers. To proceed with this, 1) the availability and number of superior local breeds and/or Koekoek breeds will be searched and identified. 2) The identified superior breeds will be kept in centers with hatchery facilities and/or with modern farmers to produce fertile eggs. 3) The obtained fertile eggs will be incubated and hatched using available hatchery facilities. 4) The hatched chicks will be distributed to poultry producers sustainably. 5) Breeding centers and community-based breeding programs with known superior local breeds and/or Koekkoek will be established to sustainably supply improved chicken breeds to poultry producers (Tab1). Upon implementing this intervention, the demand for chicks may be partially satisfied both in the presence of siege and after its lifting.

Table 1: Chick breed and related intervention areas, activities, timeframe and responsible body

Proposed intervention areas and activities	**Time frame**		**Responsible body**
	Imm	Short	
Activity 1: Provision of 90 tons of emergency feed for estimated 1 million chickens available in the region to feed them for 3 months. **NB:** A daily 100 gm feed requirement/chicken is assumed.	✓	✓	FAO, Feed the Future, REST, We Forest, SNV, SLMP, AGP in collaboration with BoARD and technical team. Their share may be determined later.
Activity 2: Provision of emergency veterinary services through supporting private and public service providers	✓	✓	FAO-supported private/public vet service providers
Activity 3: Conserving improved breed such as Koekoek breeds through contractual agreement made among producers, FAO, BoANR	✓	✓	Producers who keep Koekoek breeds or other breeds, BoARD and FAO, Feed the future
Activity 4: Purchasing and transporting of a total of 3.6 million of fertile eggs of dual-purpose breeds or 1.5 million	✓	✓	Ethio-chicken PLC, FAO, Feed the Future, REST, WeForst, SNV, SLMP, AGP in

DOC sourced from Ethio-chicken (Adama)			collaboration with BoARD and technical team. Their share may be determined later.
Activity 5: Introducing 60,000 Parent stock chickens to Ethio-chicken Mekelle Farm from abroad	✓	✓	
Activity 6: Breeding of superior local and or Koekoek breeds to produce and distribute 150,000 chicks. Fertile eggs will be collected from those breeds, incubated in available hatchery facilities and hatched chicks will be distributed,	✓	✓	Ethio-chicken PLC, other incubator owning actors, fertile egg suppliers/farmer and in collaboration with FAO, Feed the Future, BoARD, the technical team.
Activity 7: Conducting quick assessment for evidence-based emergency response on the breed supply (local and improved) and breed system emergency response and determine the role of each partner	✓	✓	Technical Team, FAO, MU, TARI, BoARD

To successfully implement these activities stated above, quick assessments is needed for an evidence-based response on the rescuing of the available chickens, breed supply (local/improved), and breed system emergency response and determine the role of each partner. Hence, the technical team needs to develop TOR: defining what, when &how to assess.

2. Emergency and Recovery response plan for addressing the problem of Feed supply

To-date commercial feed products are absent in Tigray due to the following reasons. 1) The feed products available in the market were finished. 2) Purchasing and transportation of poultry feed products from central Ethiopia to Tigray has been stopped due to the complete siege. 3) Feed manufacturing plants found in Tigray have been damaged and looted, and yet, are not functional. 4) The feed distribution system in Tigray is also concurrently interrupted due to the blackout. Hence, feed suppliers/agents are not communicating with each other and with their clients. 5) Poultry producers/farmers have no money to purchase feeds for chickens because financial institutions are not giving money to their clients. The way out will be as follows:

2.1.Emergency feed support to main poultry producers

Focused efforts is required to emergency feed support for chicken out growers, poultry farms, model chicken growing HHs (farmers), and chicken research institutions. Hence, 50% of the total required feed volume (164,250 tons/year) will be supported as per this proposed intervention. The supported feed products will be used to feed the available and newly joining

chicken breeds kept by different actors. After maintaining feed processing plants of Ethio-chicken, Meda Raya, Birhan and other feed producers could serve as sources of poultry feeds.

2.2.Emergency Substandard Ration Formulation

To solve the shortage of main grains such Maize, Sorghum, soya bean, etc., will be solved by using locally alternative sources of feed raw materials/ingredients as well as preparing substandard ration formulations. The substandard ratio will be formulated considering the availability, price, and level of inclusiveness of the raw feed materials/ingredients (Tab 2).

Table 2: Feed related intervention areas and activities, timeframe and responsible body

Intervention areas and activities	Time frame		Responsible body
	Imm	Short	
Activity 1: Purchase and transportation of 50% of total required feed volume, i.e., 82,125 tons/year. The feed products will be provided to 321 chicken-out-growers, 500 organized poultry farms, 10,000 model chicken growing farmers and 4 chicken research institutions.	√	√	FAO, REST, WeForest, SNV, SLMP, AGP in collaboration with BoANR and technical team. Their share may be determined later
Activity 2: Providing financial, material and equipment supports for war-damaged feed plants. E.g., provision of raw materials and importable items such as premixes.	√	√	
Activity 3: Preparation of substandard ration formulation based on availability, prices and level of inclusiveness of locally available feed raw materials/ ingredients	√	√	Technical Team of Experts in collaboration with FAO and other development partners, BoANR, and feed producers
Activity 4: Quick assessment is needed to do evidence-based response on the feed supply and feed system emergency response, determine share of partner.	√	√	

To achieve the targeted amount of feed production by feed manufacturing plants, efforts must be made by supporters by providing finance, material and equipment for the damaged feed plants. Provision of raw materials and importable items such as premixes could be considered as top priorities for the support. Moreover, assessment of actual feed production and supply gaps, and existing and lacking capacities as well as actual area interventions is needed to do evidence-based feed supply emergency response and determine share of the partner.

3. Addressing the problem of Poultry veterinary service delivery and input supply

Side by side to the problems of breed and feed supply created by war on Tigray, the provision of poultry vet services has been disrupted. Moreover, supply of drugs, vaccines and other medicine, vitamins, mineral supplements, and premixes are also interrupted. This has resulted in high chicken mortalities and morbidities that in turn led to socioeconomic losses, shortage of food and

associated public health concerns. The following activities will solve the problems on vet and other supplies.

3.1.Strengthening of public poultry veterinary service delivery

Veterinary clinics found in rural areas need to be supported with purchase of Emergency and supply of essential poultry vet inputs including (drugs, vaccines, anthelminthic, anticoccidial, vitamin, and mineral premixes), materials (refrigerators, syringe, needle, gloves, lancet, eye droppers, icebox, pox vaccine syringe, icepack, diluents, etc.), transport facilities, human capacity and maintenance of damaged equipment and machinery. With this, 30-50% of the available veterinary clinics will be provided with the indicated support to serve for one year. And from each vet clinics, one expert will be trained on poultry veterinary service and a mobile(door-to-door) poultry vaccination service provision modality (by women that will be introduced and institutionalized).

To facilitate fast poultry vet service delivery, transporting and cold chain (fridges) facilities are needed for the public and private poultry vet service providers. Quick assessment is needed to be evidence-based responses on the vet emergency response and determine share of each partner. Hence, to proceed with the supply of vet inputs and other critical materials the engagement of humanitarian agencies, NGOs and development partners is inevitably required.

3.2.Strengthening private poultry veterinary service delivery

Twenty private vet service providers operating in rural, urban and peri-urban areas will be strengthened by providing poultry vet inputs (drugs, vaccines), materials, transport facilities, human capacity, and capacitate maintenance of equipment and machinery. Demand-driven specialized training on poultry disease diagnosis and treatment as well as business management will be given to the private poultry vet service providers. Moreover, encouraging credit facilities and technical support needs for the private vet service providers to get them organized/networked and deliver better services.

4. Strengthening poultry feed manufacturers, Breed suppliers, and Vet service providers

The war severely damaged the poultry value chain actors, mainly feed manufacturers and suppliers, breed suppliers/out-growers, vet service providers, and other actors. For this reason, almost all of the feed manufacturers (15), 90% of the 623 out-growers, many of the 106 private

vet service providers and 176 of 198 public vet clinics were damaged and looted. This resulted for almost complete disruption of vet services and other supplies. Hence, major actors in the poultry value chains need to be supported by the Gov., development partners/NGOs, humanitarian agencies, and other partners through the following support modalities.

4.1.Equipment and Material support for the main actors:

Poultry research units need support of equipment and materials to maintain superior local and improved breeds. Poultry farm materials such as drinkers, feeders, brooders, crates and others need to be provided to out growers, and producers who are affected by the war. Moreover, the provision of a cold chain facility (Standby generator) to hatchery units, vet service providers, and other main actors is also needed. Hatchery facilities need to be capacitated and strengthened with energy supply and other basic materials/equipment.

4.2.Technical, material, and equipment support for feed manufacturers

The poultry feed manufacturers will be assessed to know the current status of the manufacturers and then, based on this, necessary technical, material, and equipment support will be provided to help manufacturers to recommence manufacturing feed products. Moreover, encouraging credit facilities is also important for feed manufacturers.

5. Training and capacity building

Demand-driven and standardized capacity building and training will be provided to the main feed manufacturers and breed suppliers (Out-growers), and poultry vet service providers. To successfully implement the above proposed interventions, a quick assessment needs to be conducted to generate evidence and identify the roles of each NGO and other partners.

Expected outputs

- ✓ 82,215 tons of emergency feed purchased and distributed to rescued chickens for 321 out-growers, 500 poultry farms, 10,000 model chicken farmers & 4 chicken research institutions.
- ✓ Substandard ration feed formulated,
- ✓ 1.5 million improved chicken breeds introduced and distributed (150,000 chicks from locally available superior breeds and the rest from central Ethiopia/abroad)
- ✓ 60,000 parent stock chickens introduced and established

- ✓ Purchase and supply of drugs, vaccines, other supplies, and materials/equipment required for 100 public poultry vet service providers and 20 private poultry veterinary service providers.
- ✓ 100 fridges purchased and supplied for public and private veterinary service providers.
- ✓ Purchased 70 Standby generators and supplied to 30 hatchery units, 30 vet service providers, 10 feed manufacturers
- ✓ 20,000 drinkers, 20,000 feeders, 1,000 brooders, and 1,000 crates purchased and supplied
- ✓ 10 hatchery facilities with energy supply purchased and set
- ✓ 70 demand-driven and standardized training delivered at all levels

Tab 21: Budget required for the proposed poultry emergency and recovery support (in Birr)

Cost item	Unit	Amount	Unit price	Total cost
Feed	tone	1,500	30,000	45,000,000
Breed (DOC)	Number	500,000	50	25,000,000
Parent stock (Fertile eggs)	Number	60,000	120	7,200,000
Drugs and associated supplies/service provider	Number	60	200,000	12,000,000
Vaccines and associated supplies/service provider	Number	120	50,000	6,000,000
Negative 20^{o}C horizontal fridges	Number	100	50,000	5,000,000
Small standby generators	Number	40	250,000	10,000,000
Drinkers facilities	Number	10,000	250	5,000,000
Feeders facilities	Number	10,000	250	5,000,000
Brooders facilities	Number	500	1,500	1,500,000
Crates	Number	500	150	150,000
Training cost	Number	40	120,000	4,800,000
Other costs	Lump sum			1,500,000
Total				**128,150,000**

4.5. Emergency and Recovery Livestock Feed Support

Justification

The main livestock feed resources in Tigray include crop residues (70%), grazing forages (25%), agro-industrial by-products (3%), and cultivated forages (2%). Crop residues (7 million Tons of leftovers from cereals, pulses, and oil seeds) and grazing forage (pastureland, open grazing, and area closures) provide feed with a total of 8.4 million Tons of feed harvest per annum.

It is certain that the war in Tigray severely affected livestock feed resources, whereby the majority of crop residues in the 2020 to 2022 cropping season were not properly collected and

managed too, whereby in the war affected areas crop residues have been burnt and wasted in many places, grazing lands have been battlefields and were threatened for animals to graze.

As the majority of farmers have been displaced from their homes, the availability of cultivated forages in farmers' homesteads, in irrigated fields and other niches are deteriorated due to a lack of management. Moreover, destruction of the forage nurseries throughout Tigray was observed.

A part from this scarce source of feed ingredients, particularly Nehug cakes, vit-min premixes, molasses, etc. exist in Tigray. The majority of compound feed manufacturing plants and flour mills in Tigray are either non-operational or operating by far below their capacity. Consequently, there is a critical shortage of formulated compound feeds as well as agro-industrial by-products (wheat bran, oil seed cakes, etc.). The war-survivor livestock are now on the verge of extermination due to feed shortage.

It is, therefore, important to address the whole value chain of animal feed (purchase-transport-store and distribution), as well as other relevant interventions. Providing livestock feed assistance to vulnerable households will have a multiplier effects on Tigray's economy.

Objectives

- Technical and material support to fill the existing gap in the livestock feed value chain.
- Farmers' access to forage seeds and seedlings
- Emergency feed assistance to vulnerable farmer HHs in Tigray affected by war.

Emergency response and recovery modalities for Livestock Feed

The Tigray BoANR has been involved in various livestock feed development activities, including plantation of forages in different niches, harvesting and proper collection of forages from pasture lands and enclosures, improving utilization and feeding value of crop residues and others. Accordingly, this emergency response plan on animal feed stipulates to accomplish the stated objectives and activities.

a) Emergency support for Grazing Forage Resources

Grazing forage is the 2nd potential feed resource next to crop residues in providing feed for livestock in Tigray. It includes grass in pasture land, open grazing and area closures.

Natural pasture: Management practices that will be implemented to enhance the supply and feeding value of natural pasture include:

- Over sowing with legumes such as lablab, desmodium, siratro, and cowpea in pasturelands
- Use of urea, lime, and sometimes DAP fertilizer.
- Use of appropriate collection/harvesting stage for conserving grazing forage.
- Bush clearing and weed control in zero grazing areas
- Practice supplementary irrigation (if accessible) of pastureland from the existing rivers

Area closures: Management practices that will be implemented to enhance the supply and feeding value of grazing resources in area closures include a grazing forage resource restoration activities will be implemented in 13 woredas which will address about 80,000 beneficiaries

b) **Restoring nursery sites and supply of forage seeds/seedlings**

In Tigray twelve Forage nursery sites were established and functional intended for seed multiplication and distribution of forage grasses (Elephant grass) and legumes including alfalfa, desmodium, lablab, cowpea, and pigeon pea.

Given the widespread destruction of most of the nurseries in Tigray, urgent actions are needed to source and supply forage seeds and seedlings to farmers. This includes restoring forage nursery sites to grow forage seedlings, through procuring critical inputs and equipment for maintenance of damaged facilities and restoring basic services. Moreover, multiplication of forage seeds and seedlings, and distribution to farmers requires urgent attention. The nursery sites are expected to deliver 177 Qtl of forage seeds, 120,000 seedlings, and 487,000 cuttings/splitting annually.

c) Emergency feed support to economically important livestock species/types

In severely affected areas feed support will be provided to highly productive stocks (breeding animals, draft animals, lactating cows, and emaciated/weak animals) owned by vulnerable HHs. As emergency feed aid, it's proposed sourcing and distribution of bailed grass hay, compound feeds, or accessible agro-industrial by-products (brewery grains, oil seed cakes, brans, molasses, etc.). Priority will be given to the provision of protein source feed ingredients as protein is the most limiting feed ingredient. It's planned to distribute 42,187 Qtl (concentrate, molasses, Urea Molasses, etc.,) of emergency support to 3750 vulnerable HHs in 15 woredas.

d) Encourage Feed Manufacturing Enterprises

In Tigray there were 15 feed manufacturing plants, capable of producing more than 20,000 tons of formulated feed for fattening, dairy and poultry producers, of which 80% of them are damaged. Hence, there is a critical shortage of formulated compound feeds as well as agro-industrial by-products. Support will be given to war affected feed manufacturers including:

- Getting access to ingredients such as oil cakes, vit-min premixes, molasses, etc.
- Facilitating linkage with input suppliers within/out of the region.
- Promoting and Facilitating linkage with credit institutions
- Technical support on feed formulation using locally available alternative ingredients as well as keeping the quality and safety of compound feeds.
- Encouraging feed manufacturing enterprises through certain incentive mechanisms, such as providing subsidized inputs, etc.

e) Effective Management, Utilization & increasing Feeding value of Crop residues

In Tigray, farmers use crop residue for animal feed without any treatment, traditionally and ineffective management, handling, and storage on-open-air and usually spoil, lodged with abundant dust, and sometimes become a source of fungal disease agents. Hence, awareness creation will be conducted on the procedures and benefits of crop residue treatment with Urea and EM as well as proper collection and storage methods of the straw/Stover to maintain the nutritional value & reduce wastages. Farmers will get Hand-touch orientation (learning) techniques on how to improve crop residue quality and material support, such as Urea and EM for 500 HH farmers in 10 weredas. A total of 2,812,500 Qtl crop residue quality or feed value and utilization will be implemented.

f) Enhancing the utilization and feeding value of Cactus

Cactus is a plant with great potential as livestock feed and grown in eastern, southeastern, and southern zones of Tigray. The Cactus in Tigray covers an estimated area of 360,000 hectares. About 82% of farmers in the cactus growing areas plant cactus and traditionally collected, scorched spines, chopped, make silage etc., and fed animals in dry season. Therefore, the intervention will focus to improve its production, productivity and utilization; to introduce processing methods & feeding practices as well as plantation of spineless cactus in areas where

feed deficit is notably eminent. Therefore, about 2394 tons of cactus will be utilized in the daily ration (with 35-50% mixing proportion of cactus) of cattle to save the lives of about 3500 animals owned by 1750 farmers residing in three woredas.

Table 22: List of activities and Implementation period

S/no	Activities	Timeframe		
		Immediate	Short	Med-long
1	Area closure improvement	√	√	
2	Feed assistance (concentrate, hay, EM, etc	√		
3	Restoring nurseries & seed multiplication	√		
4	Technical support for Feed processing plants	√		
5	Crop residue improvement	√		
6	Cactus & other activities development		√	

Table 3: Implementation areas /Target locations for different forage activities

S/No.	Feed assistants	Natural pasture	Area closure	Nursery site	Improve crop residue	Feed processing plant / balanced diet
1	Bora	Ofla	Zata	Raya-Azebo	Ofla	Ofla
2	Wejerat	E/Alege	E/mekoni	Enderta	Raya-Alamata	E/mekoni (Bokra union)
3	Seharti	Seharti	Selewa	K/Awlaelo	Raya-Azebo	R/Azebo/Lemlemraya un
4	Atsbi	Atsibi	D/tenbien	Hawzen	Laelay-qoraro	Enderta/Ederta union
5	S/saesa	K/awlaelo	Hintalo	S/saesa	Laelay-Adyabo	Samre (Samre union)
6	Hawzen	Ts/Emba	Bizet	Hahayle	Welqayt	Ts/Emba
7	Erob	Hawzen	G/mekeda	Ahferom	Tsegedie	G/Afeshum (Wolwalo un
8	Abergelle	SewhaSasea	Adwa	Rama 4+	Kafta-Humera	Adwa/Geteradwa un
9	Hahayle	G/Afeshum	L/koraro	L/maichew	T/diyabo	T/koraro (Rayt)
10	Egela	Adwa	Welkayt	T/koraro	Asgede	
11	Tselemti	T/adiyabo	Tsegedie	Adidaero		
12	K/awlaelo	T/koraro	Kafta-Humera	T/milash		
13	Adiet	Tsegede	T/Adiyabo			
14	Neksege					
15	Gerealta					
Total	15	13	13	12	10	9

Beneficiaries

- Over 135,050 vulnerable farmer HHs will be directly benefited,
- Fifteen feed manufacturing enterprises will be get support material and technical.
- Youth & women groups, urban communities as well as commercial livestock producers will be benefited indirectly through job creation, stabilized livestock feed cost, and cost of livestock products.

Expected outputs

- Enhanced 100,050 farmers, 350 DAs, 50 experts, and 44 livestock coordinators' capacity on forage/feed production and pasture management systems/utilization
- Livestock farmers provided/get access to improved natural pasture and area closure management and utilization, 870 Qtl manure applied, 487,000 cutting/split, 4000 cactus, 120,000 seedlings propagated, and 177 Qtl Over sows of appropriate forage seeds.
- 12 Forage nurseries and 9 feed processing plants resume full operation (Multiplied 25 Qtl seed, 5,000,400 cutting, and splitting & produce)
- Improved 2,812,500 Qtl crop residue quality or feed value and utilization
- Fifteen feed processing plants capable of producing about 20,000 tons of formulated feed resume full operation.
- Vulnerable livestock farmers provided/get with emergency feed assistance for their animals (42,187.5 Qtl concentrate, hay, molasses, etc.)
- 135,050 Livestock owners get 767,188 Qtl Animal feed quality and quantity, for 68,194 livestock and increased livestock production and household income
- Created or strengthened linkage among the actors in the livestock feed value chain

Budget Summary

The total project budget to address livestock feed for 270,000 animals /TLU in 44 woredas, owned by 135,050 HHs, will be **ETB 156,165,375**. Certain part of the budget will be used for technical and material support for critically needed to repair damaged facilities and restore basic services.

Table 23: Summary of budget required for the proposed project

S/	Budget item	Beneficiary	Budget(birr)
1	Pasture improvement	13000	5,866,550
2	Area closure improvement	80000	2,500,000
3	Feed assistance (hay, concentrate, compound feed, molasses, urea etc.)	3750	105,465,750
4	Restoring nurseries & seed/seedling multiplication	15000	9,500,000
5	Technical support for feed processing plant	22000	250,000
6	Crop residue improvement	500	850,000
7	Cactus & other activities development	800	500,000
	Operational cost (15%)		**18,739,845**
	Contingency (10%)		**12,493,230**

	Total		**156,165,375**

4.6. Emergency and recovery intervention of Apiculture:

Justification

Beekeeping is one of the oldest agricultural activities in almost all parts of Tigray. It is endowed with diversified agro-climatic conditions which create favorable environmental conditions for sustaining more than 331, 407 honeybee colonies (CSA 2018). While most of the colonies are nested in traditional hives (60.2%), widely raising modern and transitional hives are becoming a leading source of incomes for livelihood of the rural communities.

Even though the honey production per hive per year from traditional (8-9kg/hive), modern (23 kg/hive) and transitional (15 kg/hive) hives is low, Tigray is well known for its extra white and specialty honey (qualifying international honey quality parameters), which has a premium price in Ethiopia (WEEMA International, 2016). The apiculture subsector provides employment opportunities for many beekeepers (160,000) and other rural and urban communities, and its economic value is very significant. The local beekeepers are estimated to earn about ETB 28,000 annually from honey and used as a source of cash to invest in crop farming, pay school fees, and meet other HHs needs. To boost honey and beeswax production, over the last decades the Tigray government in collaboration with other partners have tried to introduce and expand many modern hives with its accessories, however, since 2020, the apiculture industry in Tigray encountered much more severe shocking conditions from the outbreak of war. According to some reports of the TBoANR, considerable number of honeybee colonies have been absconded, destroyed or looted, lost bee products (honey, beeswax), equipment (smokers, PPE, casting mold, honey extractors, honey pressers). Furthermore, bee forage plants: trees bush and shrubs from reforested areas have been also defrosted for fire-wood and charcoal.

As a matter of chance, the war outbreak coincided with the time of honey harvesting (Oct to Nov/2021), the beekeepers also lost their hive products during the 2020/2021 cropping season. A case study from five beekeeping cooperatives, three honey processors, two beekeeping investors, and three small-scale beekeepers estimated an economic loss of ETB 46,384,500.

Generally, to-date the beekeeper in Tigray has encountered scarcity of bee colonies, beeswax, improved beekeeping technologies, ecological destruction of bee forages and gap on extension services as most FTC holdings were looted or destroyed.

Therefore, to overcome the problems of helping local beekeepers with improved beekeeping technologies emergency and recovery response interventions are needed.

Objectives

- To address bee colonies in Tigray by introducing rapid colony multiplication techniques,
- To enhance beeswax production by introducing transitional hives and solar wax Melter.
- To strengthen the beekeeping extension services through physical and human capitals
- To strengthen beekeeping cooperatives and input suppliers
- To improve income, food and nutrition security, empower female-headed households in the need of emergency food assistance through improved beekeeping technologies.

Emergency Response for Apiculture Implementation Modalities and Activities

Reintroducing rapid colony multiplication techniques

Beekeepers that have bee colonies in framed hives will be selected purposively; accordingly, 25,000 beekeepers having 100, 000 mother colonies will be selected. Each mother colony will be multiplied into 2 nuclei colonies to have a total of 200,000 additional bee colonies. For this purpose, each beekeeper will receive 2 nuclei hives, 1 PP cloth, 1 kg of beeswax, 10kg of sugar, and smoker (1 smoker to 3 beekeepers) as emergency aid in one up to two years implementation period. The activities addressing honeybee colonies through introducing rapid colony multiplication techniques are as follows:

a) Introducing modern bee hives

A total of 25,000 beekeepers that lost their colonies in modern hives will be selected from all the districts in Tigray and then they will receive 4 honey bee colonies nested in framed hives as emergency aid. These colonies will be purchased from local honeybee colony suppliers; and each beekeeper will receive 8 kg of beeswax, 20 kg sugar, 1 PP cloth, and 1smoker per 3 beekeepers. All beneficiaries will be trained for 3 days at their respective Tabia FTCs.

Activities: purchase &distribute beehives and colony, beekeepers' selection & capacity building.

b) Enhancing beeswax production by introducing transitional hives and solar wax Melter

A 20, 000 beekeepers that have colonies in traditional hives will be selected purposively from all districts in Tigray. Two transitional hives/beekeepers will be constructed from the local materials and distributed as emergency aid to beekeepers in emergency food assistance.

To construct the transitional (Ethio-ribrab hive) from local materials, transfer bee colonies from traditional hives to transitional hives, and harvest honey from transitional hives training will be given to all the beneficiaries for a total of 4 days. Materials that are important to construct the hive will be also provided by the project.

To maximize the efficiency of beeswax extraction a total of 688 solar wax Melter will be produced by Agricultural Mechanization and rural energy research center and given to FTC (n=2). Beekeepers who collect old combs will use the solar wax Melter to process their old combs.

To purify the crud honey, which is harvested from transitional hives, one honey presser will be given to each FTC and to minimize bee colony abscondment due to a shortage of bee forage, supplementary feed such as sugar will be given to each beekeeper (5kg/colony).

c) Surveillance of major honey bee diseases and pests and set prevention measures

Honey bee disease and pests surveillance will be performed every six months. For this purpose, samples of adult bees and/or brood will be collected. Then, based on the symptom data, laboratory analysis will be performed. The presence of viruses in sample will be confirmed using the regular PCR. For this purpose reagents for RNA extraction, cDNA synthesis and inferences will be purchased from abroad. The laboratory analysis will be performed in TARI in collaboration with BOA. The occurrence of Nesama will be confirmed by counting their spores under a microscope, while Varroa mites by tacking samples of adult bees.

To control wax moth, a total of 25, 000 wax moth trap will be introduced to small scale beekeepers (i.e. one per beekeeper). Training will be given to beekeepers to prepare the wax moth trap, to prevent bees' exposure to chemicals, and total of 10,000 mesh hive cover will be constructed and given to 2,500 beekeepers (i.e. 4 per beekeeper as emergency aid).

Activities in honey bee health include: Purchase of reagent, Prepare hive mesh cover and wax moth trap, Collect bee samples and Laboratory analysis.

d) Bee forage multiplication using different forage development strategies

To implement this activity, 1 million local seedlings, 100,000 cuttings or splitting and 83,000 kg of seeds will be distributed to the beekeepers and planted in their backyard and closure areas. Each beekeeper will receive 1 kg of seeds. Seedlings/cutting will be raised in nursery sites (natural resource and livestock) in each district in collaboration with BoANR and other partners.
Activities in bee forage development includes: site selection and consultation, beneficiary selection, seed collection, seedlings and cuttings, bed/area preparation and bee forage plantation.

e) Support for strengthen beekeeping extension service: physical and human capitals

A total of 482 FTCs will be selected based on beekeeping potentiality and the degree of damages. Each FTC will be supplied with different basic bee equipment such as beehives, smokers, bee brush, protective clothes, casting mold, honey extractor, honey presser, solar wax Melter and other tools. This could help beekeepers to access beekeeping extension services and boost bee product quality and production. To fill in beekeeping technical gaps and mind set for extension workers; 60 beekeeping experts, 170 bee technicians and 689 DAs will be trained. Moreover, a total of 3,600 supportive beekeepers will be selected from 600 Tabias and trained practically. These beekeepers will be selected based on their previous beekeeping experience and willingness to support others.

f) Support for Establishing and strengthening beekeeping input suppliers in Tigray

250 framed hive makers, 10 smokers and chisel maker, 25 PP clothe tailors, 15 casting mold, honey extractor and honey presser manufacturers and 60 beeswax processors and suppliers will be trained for 4-5 days. These input suppliers will be selected purposively based on their previous experience and asset. Then, after obtaining skill/orientation they will be let to produce the inputs based on the given specifications and standards. Quality control will be held by team of experts from TBoANR, TARI, MU and projects. This team of experts will also create market linkage between the input suppliers and beekeepers.

g) Reorganizing and strengthening beekeeping cooperatives for recovery

In this project 378 beekeeping cooperatives having 4536 members will be reorganized and strengthen. To strengthen the cooperatives, 9000 framed hives (4 for each member), 9000 bee

colonies (4 for each member), 18000 kg beeswax (8 kg for each), 2300 protective cloths (1 for each), 760 smokers (1 for 3 beekeepers) and 45,310 kg of sugar will be given as emergency aid. The cooperatives will be reorganized based on a new modality that enable each member to maximize his/her income and get access for common and private property. Training will be given to cooperative members related to business skill, beekeeping and psychosocial treatment.

h) Empowering Livelihood of female headed HHs affected by the war

A total of 300 female headed HHs will be selected purposively for beekeeping. Each female headed HH will receive 1 PP cloth, 4 beehives with honeybee colony, and 8kg of beeswax and1 smoker to 3 females in emergency aid form. Technical and psycho-social training will be also given for 5 days.

Expected outputs

- directly about 90,300 beekeepers (youth, women, disable communities) will be benefited,
- In directly 25,000 colony suppliers and 300 input suppliers, honey traders, honey processing plc, and honey consumers will be benefited,
- Sustained economically, socially, nutritional and ecological constraints of all the actors

Table 24 : Activity and budget required for Beekeeping

Sn	Activity	Cost in USD
1	Restoring bee colonies in war-affected areas through introducing rapid colony multiplication techniques (200,000)	3,514,840
2	Restoring bee hives in war-affected areas, (200,000)	12,778,271
3	Reinitiating beeswax production through introducing transitional hives(80,000) solar wax Melter (688)	1,124,000
4	Surveillance of economically important honey bee diseases and pests, and set prevention measures	50,000
5	Introducing, multiplying, distributing major honey bee plants **(forage**) using different strategies	127,575
6	Strengthen the beekeeping extension system through physical and human capitals	332,219
7	Strengthen beekeeping cooperatives in Tigray (378)	1,174,028
8	Reinitiating 350 beekeeping input suppliers (350)	10,079
9	Empowering 300 female-HHs who are affected by the war-crisis through beekeeping	55,923

	Rate: 1USD = 54.55 ETB	== ETB **1,043,938,617**	**USD 19,128,493**

4.7. Emergency response plan for Aquaculture and fishery subsector

Justification

Aquaculture and fisheries can be imperative to encourage alternative means of ensuring food security and poverty alleviation, which are currently the agriculture sector have been challenging by different factors mainly climate change. In this regard, aquaculture and capture fishery development stands a potential subsector and can make a direct contribution to food security and poverty alleviation through the provision of high quality food, self-employment and income generation. However, the war critically affected the fish farming in the following ways:

- Almost 70% of the aquaculture and fishery inputs of the fishery sector is looted or affected,
- All fishery input suppliers, fish markets and routes are blocked
- Fish store house owned by fishery cooperatives found near Tekeze site and Yechila are looted and destroyed.
- 200 Qtl fish feed, 20,000 fish fry, fish ponds, water system and store, 2000 Nile tilapia fry, fish ponds, geomembrane and power generator are looted and destroyed.

It is therefore, this emergency and recovery response plan is prepared to restore the war affected fishing farm and system.

Objective

- Assess the water bodies and effect of the war on water bodies for rearing fish
- Technical & input support for restoring & reorganizing of fish cooperatives, shares, farmers..
- Restoring the fish market linkage and minimize the challenges of fish value chain.
- Restocking of mono or both sexes Nile tilapia strains to war affected potential reservoirs, lake, dams and ponds and provides healthy fish seed and feed to investors and small scale farmers engaged in fish farming.

Expected outputs

- Small scale fish farmers, cooperatives and investors will be provided with healthy fry fish,
- Increase fish production and improve fishery livelihoods of the fishery communities.
- The indigenous fish species will be conserved and restocked their natural niches.

Activities: Restoring and reorganizing of the fishery communities for nutritional security and employment opportunity; and Strengthen of the fish hatchery center to increase fish production

Beneficiaries

This emergency response plan will include youth, women, disable communities and will benefit these individuals and their family members (1500 HHs). This subproject will support youth, women, provides job opportunities for about 1200 HHs.

Table 17: Activities and required budget for the proposed project

Description	**1st six mon**	**2nd six mon**	**Total ETB**
Purchase and supply of fishery equipment to cooperatives, shares	12,500,000	3,950,000	16,350,000
Equipment purchase for fish farmers (small scale & investors)	600,000	200,000	800,000
Purchase of equipment for the hatchery center	700,000	100,000	800,000
Purchase and transportation of materials for the reconstruction and maintenance of fish shades and stores	800,000	200,000	1,300,000
Deep water well excavation and pond construction	2,500,000	500,000	3,000,000
Purchase of fish feed ingredients	200,000	100,000	300,000
Vehicle rent	300,000	100,000	400,000
Capacity building	800,000	500,000	1,300,000
Operational cost (fuel & lubricants)	700,000	300,000	1,000,000
Grand total			**25,250,000**

Annex 1: Input Requirement for Stationed veterinary service

List of Vaccination Equipment requirements

S/n.	Vaccination	Unit	Unit price	Qty per clinic	No of clinics	Total required	Total cost in ETB	Total in USD
1	Vaccination syringe 10 cc in pcs	Pcs	1980	4	176	704	1,393,920	25813
2	Vaccination syringe 20 cc in pcs	Pcs	2430	4	176	704	1,710,720	31680
3	Vaccination syringe 30 cc in pcs	Pcs	2880	6	176	1056	3,041,280	56320
4	Vaccination needle in pcs	Pcs	324	10	176	1760	570,240	10560
5	Vaccination spare glass 10 cc in pcs	Pcs	360	10	176	1760	633,600	11733
6	Vaccination spare glass 20 cc in pcs	Pcs	396	10	176	1760	696,960	12907
7	Vaccination spare glass 30 cc in pcs	Pcs	432	10	176	1760	760,320	14080
8	Refrigerator -20 horizontal	Pcs	72000	1	120	120	8,640,000	160000
9	Refrigerator +4oc vertical 250-270 L	Pcs	54000	1	120	120	6,480,000	120000
10	Icebox standard of 10 L vol in pcs	Pcs	3240	2	176	352	1,140,480	21120
12	Icebox small (30 L) in pcs	Pcs	11700	1	176	176	2,059,200	38133

13	Ice bag in pcs	Pcs	216	6	176	1056	228,096	4224
15	Jerrican of 20 L in pcs	Pcs	396	2	176	352	139,392	2581
	Total						**27,494,208**	**509,152**

List of Clinical Treatment equipment requirements

	Treatment	Unit	Unit price	Qty per clinic	No of clinics	Total Qty	Total cost in ETB	Total cost in USD
15	Treatment syringe of 10 cc	Pcs	342	10	176	1760	334400	601920
16	Treatment syringe of 20 cc	Pcs	360	10	176	1760	352000	633600
17	Treatment needle	Dozen	324	20	176	3520	633600	1140480
18	treatment syringe 5ml disposable	Pack	108	2	176	352	21120	38016
19	Small ruminant Burdizzo	Pcs	2700	2	176	352	528000	950400
20	Large ruminant Burdizzo	Pcs	3240	2	176	352	633600	1140480
21	Scissors different type	Pcs	450	6	176	1056	264000	475200
22	forceps different type	Pcs	450	9	176	1584	396000	712800
23	Hoof trimmer for large animals	Pcs	1800	1	176	176	176000	316800
24	Hoof trimmer for small animals	Pcs	1260	1	176	176	123200	221760
25	Trocar and cannula for cattle	Pcs	720	1	176	176	70400	126720
26	Trocar and cattle for equine	Pcs	630	1	176	176	61600	110880
27	stomach tube large	Pcs	1206	1	176	176	117920	212256
28	stomach tube Small	Pcs	1008	1	176	176	98560	177408
29	Cotton (in rolls 500 grams)	Roll	1530	10	176	1760	1496000	2692800
30	Gauze (in rolls 20 m x20 cm)	Roll	1080	10	176	1760	1056000	1900800
31	Arm (hand) length glove	Pck	540	3	176	528	158400	285120
32	Examination glove (pack of 100)	Pck	450	5	176	880	220000	396000
33	Clinical rectal digital thermometer	Pcs	900	5	176	880	440000	792000
34	CP 15 Knapsack sprayer	Pcs	4500	6	176	1056	2640000	4752000
35	Stethoscope	Pcs	1080	1	176	176	105600	190080
36	Bolling gun L/A	Pcs	720	2	176	352	140800	253440
37	Bolling gun S/A	Pcs	540	2	176	352	105600	190080
38	Vaginal speculum (small/large)	Pcs	1800	1	176	176	176000	316800
39	Field bag	Pcs	900	3	176	528	264000	475200
40	Equipment tray	Pcs	900	1	176	176	88000	158400
41	Sterilizer (boiler) electrical	Pcs	1440	1	176	176	140800	253440
42	Teat dilator and lancet	Set	1080	2	176	352	211200	380160
43	Obstetrical rope	Pcs	270	1	176	176	26400	47520
44	Horn wire sow	Pcs	900	1	176	176	88000	158400
45	Suture chromic catgut roll of 100 m	Pack	9000	1	176	176	880000	1584000
46	Nylon suture material of 50 m	Pack	7200	1	176	176	704000	1267200
47	Scalpel blade #3 or 5 of 100 Pcs	Pack	540	2	176	352	105600	190080

48	Scalpel handle #3 or 5	Pcs	450	2	176	352	88000	158400
49	Needle holder	Pcs	900	2	176	352	176000	316800
50	Suture needle atromatic	Pack	324	1	176	176	31680	57024
51	Suture needle non atromatic	Pack	324	1	176	176	31680	57024
52	restraining rope(4m)	Pcs	360	2	176	352	70400	126720
53	Obstetrical kit	Pcs	18000	1	176	176	1760000	3168000
54	Surgical glove (pack of 100 pcs)	Pcs	450	2	176	352	88000	158400
55	Surgical kit	Pcs	18000	1	176	176	1760000	3168000
56	postmortem kit	Pcs	18000	1	176	176	1760000	3168000
57	Kidney dish	Pcs	540	1	176	176	52800	95040
58	Nose holder	Pcs	720	1	176	176	70400	126720
59	None electrical sterilizer	Pcs	990	1	176	176	96800	174240
	Total						**18,842,560**	33,916,608

List of Laboratory chemicals and Equipment requirements

	Laboratory item	Unit	Unit price	Qty/ clinic	Total Qty	Total cost in ETB	Total cost in USD
60	Binocular microscope	Pcs	25200	1	60	840000	15,556
61	Oil immersion(bottle of 50 ml)	Bottle	540	1	60	18000	333
62	Mortar and pestle	Pcs	720	1	60	24000	444
63	Centrifuge (manual)	Pcs	1440	1	60	48000	889
64	Slide (pack of 100)	Pck	360	1	60	12000	222
65	Cover slide pack of 100	Pck	270	1	60	9000	167
66	Electric power divider	Pcs	450	1	60	15000	278
67	Chemicals and reagents	Bottle	1800	1	60	60000	1,111
68	Graduated measuring cylinder of 1 L	Pcs	360	1	176	35200	652
69	Graduated measuring cylinder of 50 ml	Pcs	144	1	176	14080	261
70	Graduated measuring cylinder of 100 ml	Pcs	270	1	176	26400	489
71	Beaker 40 ml	Pcs	90	1	176	8800	163
72	Beaker 250 ml	Pcs	144	1	176	14080	261
	Kits						
	Regional lab chemicals, reagents						
	Total					**1,124,560**	20,825

List of Vaccine requirements

	Vaccines	Unit	unit price	Qty per clinic	No of clinics	Total Qty	Total cost in ETB	Total cost in USD
73	Anthrax vaccine	Dose	0.72	8200	198	1623600	649440	1168992
74	Black leg vaccine	Dose	2.7	2000	198	396000	594000	1069200
75	Ovine pasteurellosis vaccine	Dose	0.99	12000	198	2376000	1306800	2352240
76	Bovine pasteurellosis vaccine	Dose	1.35	12000	198	2376000	1782000	3207600
77	LSD vaccine	Dose	0.792	8000	198	1584000	696960	1254528
78	PPR Vaccine	Dose	0.882	10000	198	1980000	970200	1746360

79	Sheep and goat pox vaccine	Dose	0.99	10000	198	1980000	1089000	1960200
80	Fowl pox vaccine	Dose	0.9	4000	198	792000	396000	712800
81	AHS Vaccine	Dose	0.99	200	198	39600	21780	39204
82	Rabies vaccine	Dose	27	520	198	102960	1544400	2779920
83	Lasota vaccine	Dose	1.26	12000	198	2376000	1663200	2993760
84	Thermostable NCVD Vaccine	Dose	1.26	12000	198	2376000	1663200	2993760
85	Saline (vaccine diluent)	lit		130	198	25740	??	??
						18,002,160	12,317,580	22,171,644

List of required drugs

	Antihelmintics	Unit	Unit price	Qty per clinic	No of clinics	Total Qty	Total cost in ETB	Total cost in USD
85	Albendazole cattle 2500 mg	Bolus	9	6000	198	1188000	10692000	19245600
86	Albendazole sheep 600mg	Bolus	4.5	4000	198	792000	3564000	6415200
87	Nilzan 2400mg	0	15	0	198	0	0	0
88	Tetraclozan cattle 3400 mg	Bolus	14	4000	198	792000	11088000	19958400
89	Tetraclozan sheep 900mg	Bolus	12	3000	198	594000	7128000	12830400
90	Fenbendazole for equine	Bolus	30	100	198	19800	594000	1069200
91	Ivermectin vial of 50 ml	Vial	65	50	198	9900	643500	1158300
92	Diminazineacceturate of 1 g	sachet	24	10	198	1980	47520	85536
93	Isomethamidium of 1g	sachet	120	5	198	990	118800	213840
94	Oxy TTC 10 % of 100 ml	Vial	85	96	198	19008	1615680	2908224
95	Oxy TTC 20 % of 100 ml	Vial	120	96	198	19008	2280960	4105728
96	Tylosin of 100 ml	Vial	400	12	198	2376	950400	1710720
97	Procaine penicillin of 4MIU	Vial	50	100	198	19800	990000	1782000
98	Penstrept of 100 ml	Vial	400	45	198	8910	3564000	6415200
99	Indigestion powder of 100 g	sachet	150	50	198	9900	1485000	2673000
100	Stop stress of 100 g	sachet	140	50	198	9900	1386000	2494800
101	Multivitamine of 100 ml	Vial	150	12	198	2376	356400	641520
102	Diazinone 60% EC	Lit	650	50	198	9900	6435000	11583000
103	Amitrazine 12.5% EC	Lit	720	50	198	9900	7128000	12830400
104	Denatured alcohol 70% of 1 L	bottle	150	2	198	396	59400	106920
105	Tincture Iodine of 1 L	bottle	250	2	198	396	99000	178200
106	Gentian violet solution of 1L	bottle	200	2	198	396	79200	142560
107	Wound spray	Tin	500	2	198	396	198000	356400
108	Amprolium sachet of 100 g	sachet	150	50	198	9900	1485000	2673000
109	Multivet of 100g	sachet	150	50	198	9900	1485000	2673000
110	Oxy TTC powder of 100 g	sachet	170	50	198	9900	1683000	3029400
111	Stop stress(vitachick) of 100g	sachet	150	50	198	9900	1485000	2673000
112	Ethidium	bottle	3000	10	198	1980	5940000	10692000
113	Savlon	bottle	200	2	198	396	79200	142560
	Total					3553308	**72,660,060**	130,788,108

Office facilities requirements

	Office items	Unit	Unit price	Qty per clinic	No of clinic	Total Qty required	Total cost in ETB	Total cost in USD
114	Electric divider	Pcs	300	1	176	176	52800	95040
115	Office Chair	Pcs	850	2	176	352	299200	538560
116	Office Table	Pcs	3100	1	176	176	545600	982080
117	Pen	pack	10	1	176	176	1760	3168
118	A4 sheet paper	Pack	200	1	176	176	35200	63360
119	Case book	Pcs	700	3	176	528	369600	665280
120	Computer	Pcs	40000	1	176	176	7040000	12672000
121	Printer	Pcs	20000	1	176	176	3520000	6336000
122	Shelf	Pcs	6000	3	176	528	3168000	5702400
123	Ruler	Pcs	120	1	176	176	21120	38016
124	Puncher	Pcs	100	1	176	176	17600	31680
125	Bench	Pcs	1600	1	176	176	281600	506880
							15,352,480	27,634,464
126	Motor bike	Pcs		1	176	176	**35,200,000**	63,360,000

Table 5: Budget required for AI equipment and facilities with estimated prices for 108 breeding units and AI center

No	List of Equipment/tool	Unit	Amount	Unit price (ETB)	Total cost (ETB)
1	Liquid nitrogen container of 35 litter capacity	pcs	262	35000	9,170,000
2	Liquid nitrogen container of 2 litter capacity	pcs	131	12000	1,572,000
3	Insemination Gun	pcs	262	400	104,800
4	Scissors	pcs	152	180	27,360
5	Forceps	pcs	152	180	27,360
6	AI kit /AI Leather bag/	pcs	131	1500	196,500
7	Thermometer	pcs	130	180	23,400
8	Thermo-flask	pcs	150	500	75,000
9	Electrical Sterilizer / stove/	pcs	120	450	54,000
10	Sheath	pcs	150000	3	450,000
11	Glove	pcs	200000	2.50	500,000
12	Binocular microscope	pcs	108	40000	4320000
13	AI Certificate	pad	1200	120	144,000
14	Motor Bikes	pcs	127	175000	22,225,000
15	Lab chemicals, reagents and equipment	set	20	11,000,000	11,000,000
16	Spare parts for 4 liquid nitrogen plants & 2 LN2 Plant	set	80	5,000,000	55,000,000
17	Hormone	Dose	80000	55	4,400,000
	Total				109,289,420.00

Table 6. Budget for psychosocial and professional training

No	List of trainees	Unit	Amount	Unit price (ETB)	Total cost (ETB)
1	Refreshment training for AIT	pcs	139	5000	695,000
2	LS Breeders and Coordinators	pcs	51	5000	255,000
3	Training of new AIT	Pcs	60	45,000	2,700,000
	Total				3,650,000

Table 7: List of Damaged infrastructure and office furniture of breeding units with estimated prices

No	List of damaged infrastructure and office furniture	Unit	Amount	Unit price (ETB)	Total cost (ETB)
1	Reconstruct Breeding unit office	pcs	108	500000	54,000,000
2	Office furniture chair	pcs	390	2000	780,000
3	Table	pcs	280	4000	1,120,000
4	Shelf	pcs	280	5000	1,400,000
					57,300,000

Table 8; Purchase of Semen production laboratory chemicals, reagents and equipment

No	List of Equipment/tool	Unit	Amount	Unit price (ETB)	Total cost (ETB)
1	Bovine semen Extender of 250 ml	**PCS**	100	4000	400000
2	Thermal paper for photo meter printer	**PCS**	20	2500	50000
3	Semen Sampling Tube Pack of 1000 (for Photometer)	**PCS**	10	5000	50000
4	Semen aspiration needle long	**PCS**	50	650	32500
5	Semen aspiration needle short	**PCS**	50	650	32500
6	Double distilled water	LIT	150	200	30000
7	*Mini straw different colors pack of 2000*	*pack*	*400*	3000	1200000
8	Lubricant gel for artificial vagina	LIT	30	1000	30000
9	Halogen Lamp For Photometer	**pcs**	1	15000	15000
10	Glass slide Pack of 50	**pack**	30	500	15000
11	Cover Slip Pack of 100	**PACK**	30	500	15000
12	Clear flexible tube for semen filling Pack of 60 of 450 mm long	**pack**	300	2500	750000
13	Semen suction cone pack of 65	**Pack**	50	2500	125000
14	Shoe cover pack of 300	**PACK**	30	1200	36000
15	Domino Ink Reservoir	Litter	2	19000	38000
16	Domino Wash Solution	**litter**	20	9000	180000
17	Domino Make up Solution	**litter**	10	12000	120000
18	Di- ethyl ether of 2.5 liter	**liter**	10	5000	50000
19	Wrist Glove Latex Pack 50	pack	50	500	25000
20	Bottle Brush	Pcs	4	250	1000
21	ALUMINUM FOIL	**roll**	150	450	67500
22	Face mask pack of 50	**pack**	100	500	50000
23	Cuvette pack of 100	**pack**	100	1500	150000
24	Cattle nose ring applicator(S-shape) stainless steel standard type Weight 0.966kg,dimension 31x103x23(mm)	Pcs	2	5,000	10,000

25	Digital analyzer CAZA /Computer Assisted semen analizer	set	1	5000000	5000000
26	Liquid nitrogen transfer pump (LN2 pump)	set	1	260,000	260,000
27	Smart UPS stabilizer of 3000 w	set	2	75,000	150,000
28	Over all (tuta) medium, large. Small size	Pcs	200	500	100000
29	Plastic boot	Pcs	200	250	50000
30	Scrotal circumference measuring tape	Pcs	2	1000	2000
31	Phase contrast stage heated Trinocular microscope dark field Trinocular compound LED microscope +5MP camera	set	1	1200000	1200000
32	Cone for artificial vagina	PCS	20	1500	300000
33	Semen suction cone pack of 10	Pack	50	4000	200,000
34	Live animals bulls for semen production Jersey breed	Pcs	5	200000	1000000
35	Live animals bulls for semen production Holstein Friesian breed	Pcs	10	300000	3000000
36	Live animals bulls for semen production begait breed	Pcs	5	90000	450000
37	Concentrate feed for bulls	kuntal	300	4000	1200000
38	Hay grass	kuntal	1000	500	500000
39	Oxytetracycline 20 % of 100 ml	Vial	110	200	22000
40	Oxytetracycline 10 % of 100 ml	Vial	50	200	10000
41	Penstrep 20/25 injectable of 100 ml	Vial	65	300	19500
42	Ivermectin of 50 ml	Vial	25	100	2500
43	Multivitamin/ Vitamin B-complex solutuion/	Vial	20	200	4000
44	Albedazole 2500 mg	bolus	550	20	11000
45	Tetraclozan 3400mg	Bolus	400	30	12000
46	Vitalyte/ Stopstress/	sachet	50	200	10000
47	Indigestion powder	Sachet	30	200	6000
48	Wound spray	Tin	20	400	8000
49	Plastic syringe of 5,10,20 ml	Pcs	30	100	3000
50	Vaccination syringe of 10,20,30, ml	Pcs	30	300	9000
51	Denatured alcohol 70% of 1 L	bottle	150	200	30000
52	Tincture Iodine of 1 L	bottle	50	200	10000
53	Gentian violet solution of 1L	bottle	20	300	6000
54	Savlon	bottle	200	250	50000
55	Cotton (in rolls 500 grams)	Roll	100	500	50000
56	Gauze (in rolls 20 m x20 cm)	Roll	100	500	50000
57	Hoof trimmer for large animals	Pcs	2	4000	8000
58	Knapsack sprayer of 15 litter	Pcs	5	4500	22500
59	Rope for restrain of 100 meter	roll	3	2000	6000
60	bull Nose ring	pcs	15	500	7500
	Total				17,241,500.00

Table 10: Liquid nitrogen plant machine maintenance and purchase of spare parts and LN2 Plants

No	List of Equipment/tool	Unit	Amount	Unit price (ETB)	Total cost (ETB)
1	Repair kit 12000 Hours for jo-734	PCS	3	100000	300000
2	In take valve 48851900	pcs	4	60000	240000
3	Connection for air hose and oil hose compressor compartment complete set	PCS	1	150000	150000

4	Helium gas cylinder	PCS	2	500000	1000000
5	T-32 turbo oil	Liter	30	1500	45000
6	Sigma fluids z-s 46 lubricant	Liter	50	5000	250000
7	Diethyl ether/1 liter per individual	Liter	20	1800	36000
8	Guide ring displacer 48055900	Pecs	5	25000	125000
9	Sealing ring 48729100	Pecs	5	25000	125000
10	Breaker geisha 380 volt 80A it tightens with screw	PCS	5	2000	10000
11	Breaker geisha 380 volt 63A it tightens with screw	PCS	5	1500	7500
12	Breaker geisha 380 volt 32 A it tightens with screw	PCS	5	800	4000
13	Breaker geisha 380 volt 125A it tightens with screw	PCS	5	2500	7500
14	Breaker geisha 220v 25A	PCS	5	500	2500
15	Breaker geisha 220v 16A	PCS	5	500	2500
16	Breaker geisha 220v 10A	PCS	5	500	2500
17	Breaker gesha220v 25A	PCS	5	500	2500
18	TU-Hose connecters coupling TU joint knee complete as per the plant compressor for –Jo182	set	1	187500	187500
19	TU-Hose connecters coupling TU joint knee complete as per the plant compressor for –Jo734	set	1	187500	187500
20	Re-Generator 40214100	PCS	1	150000	150000
21	Electrical compressor motor fan for Jo=734	PCS	1	180000	180000
22	Dominic Hunter pressure gauge indicator bed B, bed A	PCS	2	40000	80000
23	Unti –freeze (Coolant system protection fluid of 1liter	Liter	20	1000	20000
24	Trade lock(Lock tite)	PCs	10	500	5000
25	Tephlon tape (Large)	PCs	10	500	5000
26	Epoxy sealant	PCs	10	900	9000
27	Liquid Nitrogen production plant /machine/ of 20 Bar	Set	2	20000000	40000000
28	Kaeser control for jo 182, 48770001	pcs	2	80000	160000
29	V belets 48839600	pcs	4	12000	48000
30	V belets jo 734	pcs	4	12000	48000
31	Main flow nozzle	Pcs	2	90000	180000
32	Minimum pressure check valve for	pcs	2	40000	80000
33	Helium pressure indicator 0 - 40 bar	pcs	4	50000	200000
34	Power supply protection unit for jo 182	pcs	2	30000	60000
35	Diaphragm for proportional controller	pcs	4	5000	20000
36	Diaphragm for combined control/ vent valve	pcs	4	1000	4000
37	combined control/ vent valve	pcs	2	15000	30000
38	K1m mains contactor	pcs	1	8000	8000
39	K2m delta contactor	pcs	1	8000	8000
40	K3m star contactor	pcs	1	8000	8000
41	K1.1T star timer relay	pcs	1	8000	8000
42	K2 auxiliary contactor jo 182	pcs	4	5000	20000
43	K9 coupling relay	pcs	1	5000	5000
44	Chiller water pressure flow gauge	pcs	1	6000	6000

45	Air flow pressure gauge 0 - 2.5bar	pcs	2	20000	40000
46	Liquid nitrogen vessel pressure gauge0 - 4 bar	pcs	2	10000	20000
47	Liquid nitrogen gas buffer indicator 0- 16 bar	pcs	2	10000	20000
48	Cooler with water jacket / complete	pcs	2	400000	800000
49	Condenser head /complete	pcs	1	300000	300000
50	Starting valve / complete	pcs	2	100000	200000
51	Displacer	pcs	2	100000	200000
52	Jokomatic with base plate	pcs	2	500000	100000
53	Carbon filter	pcs	4	5000	20000
54	Filter /for oil and helium that drained every 500 hours	pcs	4	20000	80000
55	Helium gas manifold	pcs	4	50000	200000
56	Screw compressor SIGMA O 15 BAR MAT 1.7156.0 SER 29387 BJ 2003 EQU 253416	PCS	1	15000000	1500000
57	Filter S	pcs	5	2000	10000
58	Filter C	pcs	5	2000	10000
59	Plc battery LIBAT- H- EH -150, 44114000	pcs	4	4000	16000
60	Filter mat	Pcs	50	500	25000

Section five: Natural Resources Development/NRD

5.1. Background

Land degradation and consecutive soil erosion resulted in a scarcity of vegetation cover and productivity was a severe challenge for a long time in Tigray before 40 years. Many Efforts have been accomplished to reverse the severe land degradation and forest degradation and to ensure sustainable Natural Resources Development and Management for the past four decades by the people of Tigray in collaborating with different Non-Governmental organizations. The Tigray community has been contributing free labor of 20 to 40 days every year with the approaches of Integrated and participatory watershed management and development. Tigray has been investing in Natural Resources Development and management activities implementation every year with millions of Budgets and free Community labors Contribution to SWC and afforestation/Reforestation programs for almost four decades, Millions of hectares of land treated, Billions of seedlings planted and raised, Millions of community labor mobilized. The most common technologies introduced in the watershed management practices for ensuring degraded land rehabilitation and sustainable land management identified & which

were also helpful for climate change adaption are, soil and water conservation, grazing land degradation control, soil fertility improvement technologies, water harvesting technologies, income generation activities, forestation and afforestation technologies, and Area enclosures, environmental management which comprises modern and traditional techniques.

Based on Tigray Bureau of Agriculture and Rural Development Geo-Referenced data, Tigray has a total number of 7,319 Community watersheds /Micro watersheds with an area coverage of 5,457,187.82 ha of land Micro. Out of these, 4300 in number with an area coverage of 902,460 ha of land the treated and rehabilitated Micro watersheds with different physical and biological NRM interventions/technologies as indicated in NRM study document up to 2011 E.C. These all rehabilitated Micro watersheds have been devastated as a result of the illegal and genocidal war due to. Therefore, since watershed development is a key to the sustainable production of food, fodder, fuel wood, and the effort meaningfully addressed and ensured the social, economic, and cultural status of the rural community.

However, most of the rehabilitated and developed watersheds developed over the last 4 decades in free labor contribution of the community in collaborating with the governmental and non-governmental organization has been damaged and destructed fully/partially due to the war erupted in 2013 E.C in Tigray. State Nursery sites which had a potential of more than 200,000,000 Seedlings production yearly found in the region have almost been destructed, most of the offices, stores, and infrastructures of the nurseries have been demolished, and all their internal equipment, tools, and more than 200 quintals of different forest seeds have been looted. There was no seedling production in the past two war years to carry out Afforestation/reforestation. Deforestation is aggravated mainly due to the Lack of alternative energies and electric power and shifting to firewood in Rural and Urban areas, due to the war's direct and intensive damage on forest areas and natural resources through air attacks and ground heavy gunshots, Forest fire *in the west and Northwest zones due to gunshots*, migration, and loss of Wild Animals. Internally Displaced People (IDPs) collected forest products for their domestic cooking, forest degradation phenomena take place by unemployment of communities as a means of income to cover food gaps, etc. Cutting down of huge tree resources for

Construction of Military Trench's/Ditchs (protection), *4300 treated and rehabilitated Community Micro watersheds with different physical and biological interventions/technologies with an area coverage of 902,460 ha of land had been destructed fully and partially*. Most of the Hand Tools Owned and managed by the rural community and used for the Soil and Water Conservation campaign yearly have been looted

5.2 Proposed Emergence response Intervention

- **Awareness creation** on forest protection and management
- **Strengthening area closure**: widely applied in **semi-arid** areas of Tigray as a means of degraded land rehabilitation significantly contributed to the restoration of the natural resources. Use full in reducing soil erosion, increasing vegetation cover, and soil nutrient status, and improving soil water storage capacity.
- Enforcement of existing community bylaws and forest policy
- Collection and provisions of forest seeds
- Conduct a tree plantation program based on the available seedlings Afforestation/reforestation(**A/R**) is one of the region's ambitious development programs to address the problems, which needs regional ability in tree reproduction and quality supply of tree seeds
- **Rehabilitate the forest nursery by providing nursery tools and materials**: Despite the important contribution of forest **nurseries** which continues to be the main building block in producing seedling for both community and private plantation to land re-habitation and available forest resources is important
- Conduct soil and water conservation campaigns program and provide equipment and tools
- Conduct moisture conservation practices

- Conduct Water harvesting interventions: have played a vital role In improving crop production and in the water balance system

5.3 Budget required:

Table Budget required for Nursery tools and materials

S/No	Types of items	Unit	No of Item	Unit price	Total price
1	Watering can	No	3000	300	900,000
2	Rake	No	4000	130	520,000
3	Root pruning scissor	No	2500	200	500,000
4	Hedge pruning scissor	No	1185	450	533,250
5	pang a/gjra/	No	1185	450	533,250
6	Meter tape 30	No	948	150	142,200
7	Meter tape 50	No	948	200	189,600
8	Meter tape 100 c.m	No	948	250	237,000
9	Soil sieves in roll	No	948	200	189,600
10	Boxes for carrying seedling	No	5000	450	2,250,000
11	Water pump	No	100	109000	10,900,000
12	Table	No	474	5000	2,370,000
13	Cher	No	500	5000	2,500,000
14	Document shelf	No	150	12000	1,800,000
15	Sickle/ማጭ ቂ.ድ	No	2370	350	829,500
16	Picking	No	4740	120	568,800
17	Seed draying mate 4*5m	No	948	1500	1,422,000
18	Seed packing	No	2370	300	711,000
19	Nursery Store	No	50	150000	7,500,000
20	Seed boiling dish	No	200	3000	600,000
21	Knife	No	948	75	71100
22	Spoon soil	No	2370	130	308100
23	Plastic ropes (roll) 100	No	2370	200	474000
24	Fork digging hoes	No	2370	410	971700
25	Small scale	No	711	800	568800
26	Metal shelf	No	100	9000	900000
27	Wheel barrow	No	100	2800	280000
28	Mattock/digging axe	No	2000	320	640000
29	shovel	No	2000	180	360000

30	Normal hoes	No	2370	300	711000
31	Axe	No	711	350	248850
32	Hammer	No	711	880	625680
33	Small axe	No	711	300	213300
34	Bow saw	No	1185	250	296250
35	Steel Fencing /20000	No	50	500000	25000000
36	Nursery Office	No	50	150000	7500000
37	Polythenetube/ Plastic	Qt	1000	16000	16000000
38	Herb /insect sprier/ knapsack	No	300	2000	600000
39	Measuring tape	No	300	3000	900000
40	Shade for soil mixing place	No	50	50000	2500000
	Sub Total				**94,364,980**

Table The required amount of forest seeds

s/No	species	No of seeds/kg	Total Required seeds in Qt	Seed cost		**Seed sources**
				unit cost/kg	Total cost	
1	Moringa oleifera	700	100	**325 ?**	3,250,000	AVRDC Research center, Arush (Tanzania)
2	Ziziphus Mauritania	2000	6	250	150,000	FRC (A.abeba)
3	Ziziphus spina-Christi	1500	4	49	19,600	Tigray
4	Highland bamboo		4	1390	556,000	FRC,(A. Ababa)
5	Lowland bamboo		6	1413	847,800	FRC,(A. Ababa)
6	Eucalyptus globulus	400,000	15	251	376,500	Tigray
7	Eucalyptus Citriodora	110,000	4	248	99,200	FRC,(A.Ababa)
8	Eucalyptus Grandis	200,000	3	253	75,900	FRC,(A. Ababa)
9	Acacia decurrens	70,000	4	133	53,200	FRC(,A.Ababa)
10	Junipers procera	45,000	3	307	92,100	Tigray
11	Cupressus lusitanica	200,000	4	127	50,800	Tigray
12	Grevillea Robusta	90,000	5	1117	558,500	FRC,(A. Ababa)
13	Delonix regia	2000	3	117	35,100	FRC,(A. Ababa)
14	Azadirachta Indica	5000	2	143	28,600	FRC,(A. Ababa)
15	Faidherbia albida	9000	2	91	18,200	Tigray
16	Podocarps falcatus	2000	3	124	37,200	FRC,(A.Ababa)

17	Acacia Senegal	9500	2	133	26,600	Tigray
	sum		**130**	-	**4,721,500**	

Table **Budget required for Soil and water conservation hand tools**

Sr.No	**Equipment's**	**unit**	**amount**	**unit cost**	**total cost**	**Sources**
1	Digging axe	No	350,000	220	77,000,000	A.A.(kality)
2	Shovel	No	350,000	180	63,000,000	A.A.(kality)
3	Hamer	No	140,000	500	70,000,000	A.A.(kality)
4	Crawler (Iron bar)	No	140,000	400	56,000,000	A.A.(kality)
5	Rang pole (pairs)	No	35,000	225	7,875,000	A.Abeba
6	Line level	No	35,000	70	2,450,000	A.Abeba
	Sum				**276,325,000**	

Section Six; Agricultural Extension Emergency and Recovery plan:

6.1 Background

The current agricultural situation in Tigray can only be described as gloomy and dismal. Over 6.5 million rural and urban Tigrayans are under the threat of famine due to the destruction of Tigray's Economy and Food System. Livelihood sources such as the means of production, the market, communication, transportation; micro-finance, off-farm employment, and household property are being destroyed by the war. Among the many atrocities being committed by these invading armies against the Tigrayans people are.

- FTC (Farmer training center) with its facilities has destroyed
- Burning of crops that are ready for harvest and destroying, eating, or taking away already harvested crops accomplished in a well-planned manner
- Killing, eating, or taking away poultry and livestock is a daily activity
- Burning or destroying all tools used for farming is purposely done
- Mass raping of women and young girls
- Preventing farmers from doing any farm work still going on
- Creating malnourished children
- Creating mainly women-led farming households
- Preventing food aid from reaching the needy

As a result of all these atrocities: tens of thousands have migrated to Sudan, Millions of had been internally displaced, and over 6 million are at risk of famine, starvation, and death. In addition to all of the above, some conditions add to the challenge of work ahead:

- Most rural areas are inaccessible as there are military blocks here and there
- Under the existing situations, formal Extension Delivery is impossible. Alternative informal options have to be created
- The ongoing war has placed the continuation of farming in a dire situation. Farmers have been traumatized and are reluctant to farm and collect their production
- There is an information blackout for farmers for the inputs output product

6.2 OBJECTIVES

- The resiliency of households both in rural and urban areas can be strengthened through intensive Emergency Extension Training and Innovative Extension Delivery Services
- The main purpose of this project is, therefore, to use Extension Training & Service Delivery as an effective tool

6.3 Emergency and Recovery intervention;

- Following the war waged on Tigray, the entire extension system collapsed. And the following activities are planned to be implemented in the emergency and Recovery program.
- Rehabilitate FTCs to be used as an extension tool.
- Provision of FTC materials and equipment to be used for teaching and training farmers
- Introduction of different teaching methods like posters, leaflets brochures
- Promot Farmer field school and farmers-research-extension group
- Strengthening Agricultural growth model alternatives (diversification, specialization, cluster-based farming
- Demonstration- a series of FTC-Farmer field participatory demonstrations,
- Designing and introducing gender-sensitive packages (vegetables, spices),
- Promotion of Digitalized & ICT-based extension communication systems (mobile phone Apps, digital greening, or video-based extension system),

- Initiation of rural radio broadcast on major agricultural programs at an appropriate time preferably evenings and weekends,
- Public campaigns by religious leaders on churches on major extension packages,
- Quick treatment of the Agricultural experts' trauma through psycho-social training and mindset education for all Extension professionals),
- Volunteer private extension provision

1.3.1 Strengthen FTCs through rehabilitation and active participation in community and capacity building:

The Tigray agricultural extension system is heavily dependent on Farmer Training Centers (FTCs) and trained DAs that give extension support to farmers. FTCs serve as an entry point for providing effective and efficient extension services. FTCs should also serve as hubs for knowledge and information sharing and centers for promoting best practices. At the same time, it is important to notice that FTCs are self-sustaining, to ensure both commercial viability and developing sense of community ownership. Successful FTCs should focus on developing modern farmers who are able to harness positive changes in farming technology while also being able to cope with changing conditions and stresses. To date, 674 FTCs have been established across the region in which all of them are reported to be found at varying destruction levels (50%-100%) By the war

6.4 ESTIMATED BUDGET

Currently, they are not functional and are not capable of providing the expected services to farmers.

Table –budget required for FTc rehabilitation and provision of material and equipment's

Sr.No	DESCRIPTION	BUDGET(USD)	REMARKS
1	Strengthening and Rehabilitating 674 FTC through maintenance and reconstruction	32,285,853	
2	Provision of FTC materials and Equipment	2,080,191	
	623 computers with Printer		

	674 Laptop		
	402 Tablet		
	600 Bimmer		
	474LCD		
	40 Photocopy		
	650 Digital		
	600 solar television		
	400 DVD		
	400 Bic Projector		
	500Bimer/Digitalsoft		
	27 Generator		
	200 motorcycles		
	1600 Table		
	16200 chair		
	4000 አግዳሚወና ብር		
	1200 shelf		
3	# to be trained at Woreda/Kebelle =200trainees*60woredas*5days*12USD	720000	
4	Cost of radio, tv communications	**20,000.00**	
	Total	**35,106,043.5660377**	

Section seven Agricultural Mechanization:

7.1. Background

Tigray, which is located in northern Ethiopia, is one of the world's historic agricultural centers and the homeland of an ancient civilization (Redda, 1983; Nyssen, et al., 2007). The region holds a complex history of traditional farming practices still used throughout most of rural Ethiopia (Arndt, Robinson & Willenbockel, 2011). Traditional farming systems combine animal husbandry with crop cultivation (Hailu, 2009; Teka, Van Rompaey & Poesen, 2013)

The main historical technological development in agricultural intensification has been the ox plow to reduce human labor (Headey, Dereje & Taffesse, 2014). About 80% of Tigrans' depend on their livelihood in agriculture; which is an extremely power-intensive occupation.

Hence, the availability of farm power is important for the farming community. But still, there is a Mismatch between the actual demand and the availability.

Furthermore, Due to Government & partners' efforts and interventions, there was significantly improved in the past two decades even though further improvement is important that is Human power 7 %, Animal power 81%, Mechanical 12%,

Status of farm power in Tigray before the war:

S.r No	**Types of Farm Machineries**	**Number**
1	Draft oxen	1940045
2	Agricultural tractors 40-189hp	1990
3	Tractor-mounted row seed drills	37
4	PTO driven multi-crop threshers	56
5	Motorized hand-held harvesters	57
6	Walk- behind reaper	29
7	Multi-crop engine-driven threshers	56
8	PTO driven threshers	49

Sources (BoARD & ATA survey 2020,)

7.2. Rationale

- The war started on the 3rd day of November 2020 and the 2nd round of war at the beginning of September 2022, was damaged /looted almost all the farm machinery deliberately, this time for Tigray it was the preparation time for harvesting, So farmers had no chance to harvest their produce hence, (the aggressors harvested and took it)
- This caused food and feed shortage.
- Out of 1,940,045 draft oxen more than 40% (looted, theft, slaughtered)
- Out of 1990 farm tractors only 120 which is 6% only obscured from looting and damage and which are the only mechanization assets of the region now.

- The aggressors have burned/or broken the traditional farm implements

7.3. Objective

- Establishing agricultural mechanization service, maintenance and spare parts supplying firms enables to live smallholder farmers in the war-affected zones and provides packages of agricultural machinery and tools also equally important
- Provide tractor-based agricultural mechanization service to smallholder farmers who lost their draft animals as an immediate solution to gabs resulting due to the war and siege thereby enabling them to perpetuate agricultural activities.
- And if possible, Provide oxen based agricultural mechanization service to smallholder farmers who lost their draft animals as an immediate solution
- Avail budget that is required for agricultural mechanization service to be provided to war-affected smallholder farmers in the form of emergency support

7.4. Interventions needed during the emergency and Recovery period,

- Establishment of 18 AM service-providing firms (sites)
- Establishment of 18 maintenance service-providing firms (sites)
- Establishment of 18 spare parts supplying firms (sites)

- Introducing 1014 tractors to cover 286,000 ha of land (22% of our cultivated land) in one season for emergency and ongoing recovery.
- Introducing 2000 water pumps to irrigate 54,000 of land
- Introducing 200 solar pumps to cover more than 2000 ha of irrigable land
- Helping 80,000 poor household farmers (160,000 ha) by mechanization services (primary, secondary, and planting) in selected sites.
- Supplying traditional farm tools(implements) – with no limit on the amount

7.5. Expected Outcomes:

- Contributed to the Food security of smallholder farmers

- As a transforming tool for the aged farming system
- Encourage innovation, reverse engineering, Adoption…
- Scale up our maintenance and mechanization services management skills

Budget Required for Agricultural Mechanization services (AMS)

Tillage	Farm size(ha)	Field capacity (ha/hr.)	Required operational time (hr.)	Number of tractors	Fuel (liter/hr.)	Oil (liter/hr.)	Total fuel needed (L)	Total oil needed (L)	Total amount (Birr)
1st tillage	160,000	0.4	400,000	445	13	0.06	5,200,000	24,000	263,840,000
2nd tillage	160,000	2	80,000	133	11	0.06	880,000	4,800	44,768,000
Planting	160,000	1	160,000	533	11	0.06	1,760,000	9,600	89,536,000
Total								442,912,000	

2. Budget Required for Purchasing of Tractors and their Accessories

S.r No	Type of machinery	Specification	Quantity	Unit price	Total price
1	tractor	110 hp	338	1,800,000	608400000
2	tractor	120 hp	338	2,000,000	676000000
3	tractor	135 hp	338	2,500,000	845000000
4	Walking tractor	14-22 hp	200	120,000	24,000,000
5	Re/Mould board plow	3 to 4 plow bottom	507	255,000	129285000
6	Disc plow	3 to 4 plow bottom	507	255,000.00	129285000
7	Disc harrow	offset/tandem type)	1014	280,000.00	283,920,000
8	Traditional farm tools	Plow/hand tools	500,000	300	150,000,000
7	Planter	4-6 rows	800	450000	360,000,000
8	Water pump	7 Hp	2000	68,000.00	136,000,000
	Solar pump	20 watt	200	1,000,000	200,000,000
9	PTO driven thresher	-----	230	500000	115,000,000
Total					3,716,810,000

Section eight Appendixes:

Annex-1 **Emergency vegetable seeds, cereals, and pulses required in the irrigation season of 2022/23 by weredas**

No	wereda	pepper	tomato	onion	lettuce	swischard	cabbage	carrot	potato	maize	wheat	chick pea	sum	Sweet potato	area covered (ha)	No of beneficiaries
1	Abergelle	0.076	0.19	5.63	0.05	0.8	0	0	0	10.52	0	6.99	25.13	200,000	224	1,390.00
2	Tanqha Milash	0.156	0.38	11.25	0.09	1.65	0	0	0	21.01	0	13.99	50.32	393,000	447	2,569.00
3	Kola Tmben	0.1456	0.34	10.33	0.08	1.5	0	0.89	0	23.59	0	15.71	54.27	800,000	453	2,623.00
4	Keyih Tekli	0.3104	0.74	22.25	0.18	3.25	0	1.69	0	44.23	14.74	29.45	120.42	500,000	932	5,243.00
5	Enda Felaisit	0.0752	0.19	5.57	0.04	0.8	0	0	0	10.41	3.47	6.94	28.37	195,000	223	2,000.00
6	Endaba Tsahima	0.0624	0.14	4.2	0.03	0.6	0.19	0.6	206.17	16.66	5.55	11.09	246.01	248,000	277	2,900.00
7	Embaseneiti	0.0712	0.18	5.42	0.04	0.8	0	0	0	9.7	3.23	6.47	26.74	30,000	210	1,900.00
8	Egela	0.032	0.08	2.47	0.02	0.35	0	0	0	4.43	1.47	2.94	12.16	50,000	96	457.00
9	Ahferom	0.0832	0.21	6.35	0.05	0.93	0.29	0.92	312.16	25.25	8.4	16.81	372.4	377,000	419	4,200.00
10	Hahaile	0.1304	0.33	9.94	0.08	1.45	0.42	1.34	455.12	36.38	12.13	24.24	543.08	30,000	620	5,620.00
11	Adiwa	0.1456	0.37	11.06	0.09	1.63	0.51	1.6	543.44	43.94	14.64	29.27	648.37	657,000	733	5,808.00
12	Ahisi-a	0.0536	0.14	4.1	0.03	0.6	0	0	0	7.35	2.46	4.88	20.24	30,000	160	1,140.00
13	Rama Adi Arba-ete	0.3752	0.96	28.68	0.23	4.18	0	0	0	53.57	0	35.68	127.98	500,000	1,123	2,985.00
14	Chila	0.0672	0.17	5.1	0.04	0.75	0	0	0	9.15	0	6.08	22.13	150,000	199	1,419.00
15	Laelay Maichew	0.108	0.26	7.65	0.06	1.13	0.33	1.03	349.97	28.3	6.39	14.4	410.86	50,000	477	3,550.00
16	Adet	0.0528	0.13	4.04	0.03	0.6	0	0.32	0	8.51	2.85	5.67	22.82	30,000	168	2,905.00
17	Naeder	0.056	0.14	4.27	0.03	0.63	0	0	0	8.57	2.87	5.7	22.92	30,000	169	2,100.00
18	Tahtay Maichew	0.1272	0.3	8.98	0.07	1.3	0.41	1.3	441.32	35.66	6.8	18.23	515.97	505,000	585	7,500.00
	Centeral zone	**2.13**	**5.25**	**157.29**	**1.24**	**22.95**	**2.15**	**9.69**	**2,308.18**	**397.23**	**85.00**	**254.54**	**3,270.19**	**4,775,000.00**	**7,514.43**	**56,309.00**
19	Laelay Koraro	0.1216	0.28	8.31	0.07	1.23	0.34	1.09	371.22	29.86	9.96	19.88	443.77	50,000	517	4,951.00
20	Zana	0.0448	0.11	3.2	0.03	0.45	0	0	0	6.74	2.27	3.44	16.79	127,000	133	1,436.00
21	Tahtay Koraro	0.1952	0.5	14.85	0.12	2.2	0.45	1.42	0	38.98	7	30.71	98.65	50,000	770	4,124.00
22	Seyamti Adiyabo	0.0096	0.02	0.71	0.01	0.1	0	0	0	1.27	0.43	0.86	3.52	50,000	28	154.00
23	Mimhidar Ketema Adi Da-ero	0.08	0.2	6.11	0.05	0.9	0.2	0.62	0	16.95	5.65	8.71	40.38	284,000	325	1,733.00
24	Maekeley Adiyabo	0.1304	0.33	9.96	0.08	1.45	0	0	0	17.86	5.93	9.13	46.38	100,000	385	1,123.00
25	Tahitay Adiyabo	0.08	0.2	5.88	0.05	0.85	0	0	0	10.52	3.5	5.27	27.26	100,000	231	817.00
26	Tselemti	0.232	0.56	16.74	0.13	2.45	0	0	0	29.99	9.99	19.88	82.64	100,000	654	3,011.00
27	Laelay Tselemti	0.0184	0.05	1.35	0.01	0.2	0	0	0	2.44	0.82	1.61	6.71	50,000	55	705.00
28	Tsimbila	0.048	0.12	3.66	0.03	0.55	0.11	0.27	0	9.49	3.16	6.32	24.31	50,000	187	1,700.00

No	wereda	pepper	tomato	onion	lettuce	swischard	cabbage	carrot	potato	maize	wheat	chick pea	sum	Sweet potato	area covered (ha)	No of beneficiaries
29	Asgede	0.1048	0.27	7.99	0.06	1.15	0	0	0	14.32	3.21	9.54	37.85	50,000	310	1,531.00
	North west	**1.06**	**2.64**	**78.76**	**0.64**	**11.53**	**1.10**	**3.40**	**371.22**	**178.42**	**51.92**	**115.35**	**828.26**	**1,011,000.00**	**3,595.75**	**21,285.00**
30	Awra	0.1008	0.24	7.26	0.06	1.05	0	0	0	13.01	4.34	8.66	35.88	50,000	284	484.00
31	Tsegede	0.2792	0.67	20.14	0.16	2.95	0	0	0	36.09	12.01	24.05	99.57	300,000	790	3,921.00
32	Kafta Humera	0.348	0.84	25.07	0.2	3.65	0	0	0	44.94	2.51	29.92	111.48	500,000	979	1,448.00
33	Welkait	0.1336	0.32	9.66	0.08	1.4	0	0	0	17.3	5.77	11.52	47.73	300,000	382	1,168.00
	Western	**0.86**	**2.07**	**62.13**	**0.50**	**9.05**	**-**	**-**	**-**	**111.34**	**24.63**	**74.15**	**294.66**	**1,150,000.00**	**2,434.13**	**7,021.00**
34	Atsibi wemberta	0.1088	0.28	8.28	0.07	1.2	0.35	1.12	379.5	30.68	13.78	17.11	453.73	-	520	6,200.00
35	Tsirae Wemberta	0.188	0.48	14.37	0.11	2.1	0.53	1.68	570.49	45.61	15.2	30.41	683.33	500,000	843	5,650.00
36	Kilte Awlaelo	0.2256	0.57	17.21	0.14	2.53	0.79	2.49	845.39	68.34	15.87	49.63	1005.77	300,000	1,124	7,484.00
37	Gere Alta	0.0264	0.07	2.02	0.02	0.3	0	0	43.06	4.5	1.5	2.99	54.77	83,000	88	618.00
38	Hawzen	0.1384	0.33	9.79	0.08	1.43	0.45	1.42	481.07	38.89	21.47	18.92	575.57	582,000	650	5,441.00
39	Tsaeda Emba	0.0848	0.22	6.46	0.05	0.95	0.28	0.87	295.6	23.92	10.98	19.64	360	20,000	413	3,013.00
40	Sabuha Tsaesie	0.0472	0.12	3.63	0.03	0.53	0.15	0.49	166.15	13.41	11.6	3.33	200.03	20,000	226	3,445.00
41	Ganta Afeshum	0.0664	0.17	5.06	0.04	0.75	0.22	0.68	231.84	18.74	8.27	15.71	282.32	20,000	323	5,701.00
42	Bizet	0.0416	0.11	3.16	0.03	0.45	0	0	0	5.65	4.9	1.35	16.15	50,000	126	1,697.00
43	Gulo Mekeda	0.056	0.14	4.28	0.03	0.63	0.18	0.58	196.51	15.87	5.72	14.27	238.92	20,000	270	1,850.00
44	Erop	0.0264	0.07	1.99	0.02	0.3	0	0.14	0	3.79	1.28	2.52	10.44	25,000	84	1,010.00
	Eastern	**1.01**	**2.56**	**76.25**	**0.62**	**11.17**	**2.95**	**9.47**	**3,209.61**	**269.40**	**110.57**	**175.88**	**3,881.03**	**1,620,000.00**	**4,666.76**	**42,109.00**
45	Enderta	0.204	0.52	15.55	0.13	2.3	0.71	2.25	763.97	61.74	25.14	34.41	909.26	1,000,000	1,027	7,025.00
46	Degua Temben	0.052	0.13	3.97	0.03	0.6	0.17	0.54	181.61	14.71	12.64	7.5	222.55	-	251	2,107.00
47	Hintalo	0.2552	0.57	17.23	0.14	2.55	0.79	2.49	846.77	68.43	23.11	44.02	1009.3	120,000	1,126	7,673.00
48	Wejerat	0.0216	0.06	1.66	0.01	0.23	0	0	0	3.11	2.58	0.88	8.79	60,000	67	873.00
49	Samre	0.0504	0.12	3.57	0.03	0.53	0.16	0.52	175.81	14.2	10.45	8.79	214.81	213,000	240	2,451.00
50	Sehariti	0.0984	0.25	7.53	0.06	1.1	0.34	1.09	369.84	29.9	13.73	16.89	441.96	447,000	496	4,521.00
	South Eastern	**0.68**	**1.65**	**49.51**	**0.40**	**7.31**	**2.17**	**6.89**	**2,338.00**	**192.09**	**87.65**	**112.49**	**2,806.67**	**1,840,000.00**	**3,206.16**	**24,650.00**
51	Emba Alaje	0.0728	0.19	5.56	0.05	0.9	0.25	0.8	272.69	22.06	19.32	11.15	333.88	328,000	374	4,546.00
52	Bora	0.0928	0.24	7.06	0.06	1.03	0	0	0	13.19	11.34	6.69	40.76	246,000	286	3,522.00
53	Silewa	0.0912	0.23	6.94	0.06	1	0	0	0	12.96	4.32	8.62	35.27	242,000	277	1,381.00
54	Neksege	0.0312	0.08	2.39	0.02	0.35	0.1	0.32	109.57	8.87	2.94	5.91	130.95	50,000	151	1,091.00
55	Enda Mekoni	0.0504	0.13	3.84	0.03	0.7	0.18	0.56	188.51	15.25	12.91	7.89	230.62	228,000	260	3,767.00
56	Ofla	0.2824	0.64	19.2	0.16	2.83	0.82	2.59	879.06	71.07	18.43	41.89	1040.21	-	1,201	14,008.00
57	Zata	0.0264	0.07	2	0.02	0.3	0.09	0.27	91.91	7.4	2.46	4.94	109.77	100,000	130	1,500.00
58	Raya Azebo	0.4568	1.1	32.85	0.26	4.8	0	0	0	61.37	15.49	58.51	180.09	1,150,000	1,329	5,602.00
59	Raya Chercher	0.5824	1.4	41.92	0.33	6.1	0	0	0	78.29	26.1	70.78	232.2	1,200,000	1,689	2,648.00
60	Raya Alamata	0.3192	0.77	22.94	0.18	3.35	0	0	0	42.86	14.28	37.96	126.33	800,000	928	5,324.00
	Southern	**2.0056**	**4.85**	**144.7**	**1.17**	**21.36**	**1.44**	**4.54**	**1541.74**	**333.32**	**127.59**	**254.34**	**2460.08**	**4344000**	**6625.126449**	**43389**

No	wereda	pepper	tomato	onion	lettuce	swischard	cabbage	carrot	potato	maize	wheat	chick pea	sum	Sweet potato	area covered (ha)	No of beneficiaries
61	Mekelle	0.0576	0.15	4.41	0.04	0.65	0.2	0.64	216.38	17.49	5.81	11.65	258.14	260,000	293	2,500.00
	Total	**7.81**	**19.17**	**573.05**	**4.61**	**84.02**	**10.01**	**34.63**	**9,985.13**	**1,499.29**	**493.17**	**998.40**	**13,799.03**	**15,000,000.00**	**28,335.48**	**197,263.00**

Annex-2 Table 2:- Emergency support for Fruit seedlings by werada in 2022/23

Wereda	Mnago	Avocado	Orange	Aple	Banana	Papaya	Guava	Lemon	Sum
Abergelle	3,564	-	-	-	320	5,000			8,884
Tanqha Milash	6,465	-	520	-	500	2,000	1,000	-	10,485
Kola Tmben	4,797	-	400	-	600	2,000	1,000	1,200	9,997
Keyih Tekli	8,520	-	600	-	1,800	1,000	-	1,000	12,920
Enda Felaisit	2,460	-	-	-	-	1,000	1,000	1,300	5,760
Endaba Tsahima	4,500	-	320	-	-	1,000	880	500	7,200
Embaseneiti	-	1,600	200	-	-	1,400	500	-	3,700
Egela	780	-	-	-	-	1,600	500	500	3,380
Ahferom	-	2,000	1,000	-	-	1,000	2,000	500	6,500
Hahaile	-	800	200	-	-	1,000	500	-	2,500
Adiwa	1,200	4,904	1,400	-	-		1,500	1,200	10,204
Ahisi-a	1,770	-	200	-	-	1,000	500	500	3,970
Rama Adi Arba-ete	14,784	-	-	-	2,000			-	16,784
Chila	3,009	-	-	-	-	1,000	3,000	1,800	8,809
Laelay Maichew	600	6,400	1,400	-	-		200	1,300	9,900
Adet	-	-	-	-	-	1,000	200	1,000	2,200
Naeder	2,400	-	-	-	-	1,200	500	1,000	5,100
Tahtay Maichew	-	1,600	800	-	1,600	1,000	200	1,200	6,400
Centeral zone	54,849	17,304	7,040	-	6,820	22,200	13,480	13,000	134,693
Laelay Koraro	-	2,400	400	-	1,000	500	-	-	4,300
Zana	2,403	-	-	-	-	1,000	500	1,100	5,003

Wereda	Mnago	Avocado	Orange	Aple	Banana	Papaya	Guava	Lemon	Sum
Tahtay Koraro	7,149	800	-	-	500	500	1,000	1,400	11,349
Seyamti Adiyabo	624	-	-	-	-	1,000	-		1,624
Mimhidar Ketema Adi Da-ero	-	-	-	-	2,570	1,000	-		3,570
Maekeley Adiyabo	-	-	-	-	2,500	1,000	-	-	3,500
Tahitay Adiyabo	-	-	-	-	10,000	2,000	-		12,000
Tselemti	4,272	-	-	-	4,000	2,000	-		10,272
Laelay Tselemti	867	-	-	-	1,000	1,000	-	1,000	3,867
Tsimbila	1,500	-	-	-	2,000	2,000	-		5,500
Asgede	-	-	-	-	10,000	1,000	-		11,000
North west	16,815	3,200	400	-	33,570	13,000	1,500	3,500	71,985
Awra	4,080	-	-	-	500	2,000	-		6,580
Tsegede	207	-	-	4,226	4,500	2,000	-		10,933
Kafta Humera	-	-	-	-	7,370	4,000	-	-	11,370
Welkait	-	-	-	-	5,000	5,000	-	-	10,000
Western	4,287	-	-	4,226	17,370	13,000	-	-	38,883
Atsibi wemberta	-	-	-	7,600	-	1,000	-		8,600
Tsirae Wemberta	-	12,000	-	3,800	-	1,200	1,000		18,000
Kilte Awlaelo	-	16,000	4,452	-	-	800	2,500	500	24,252
Gere Alta	1,260	264	-	-	-	1,000	-	1,000	3,524
Hawzen	6,642	1,832	592	-	-	1,000	-	-	10,066
Tsaeda Emba	-	-	820	2,280	-	1,000	2,620	1,000	7,720
Sabuha Tsaesie	-	-	1,400	-	-	1,000	1,500		3,900
Ganta Afeshum	-	-	1,000	1,003	-		2,500		4,503
Bizet	2,385	-	-	-	-	-		-	2,385
Gulo Mekeda	5,487	-	-	-	-	100	-		5,587
Erop	-	-	1,296	-	-	-		500	1,796
Eastern	15,774	30,096	9,560	14,683	-	7,100	10,120	3,000	90,333
Enderta	6,415	8,000	200	-	-	1,000	2,000	1,000	18,615

Wereda	Mnago	Avocado	Orange	Aple	Banana	Papaya	Guava	Lemon	Sum
Degua Temben	-	-	-	2,660	-		3,000	1,000	6,660
Hintalo	1,500	5,908	2,800	-	-	1,000	2,000	1,500	14,708
Wejerat	-	-	-	-	-	1,200	4,000		5,200
Samre	-	-	-	-	1,560	5,000		-	6,560
Sehariti	3,060	-	-	-	2,000	4,000			9,060
South Eastern	10,975	13,908	3,000	2,660	3,560	12,200	11,000	3,500	60,803
Emba Alaje	-	-	-	3,040	-	1,030	1,900	-	5,970
Bora	900	-	-	-	1,400	1,730	1,000	2,000	7,030
Silewa	1,800	-	-	-	-	2,240	1,000	-	5,040
Neksege	-	-	-	-	-	1,110	3,000	3,000	7,110
Enda Mekoni	-	-	-	3,040	-	690	1,000	-	4,730
Ofla	-	-	-	10,351	-	2,700	3,500	-	16,551
Zata	1,200	-	-	-	-	5,000	2,000	2,000	10,200
Raya Azebo	2,400	5,200	-	-	2,000	6,000	-	-	15,600
Raya Chercher	10,000	-	-	-	-	6,000	-		16,000
Raya Alamata	-	3,772	-	-	2,000	5,000		-	10,772
Southern	16,300	8,972	-	16,431	5,400	31,500	13,400	7,000	99,003
Mekelle		6,520	-	-	-	1,000	500		8,020
Total	119,000	80,000	20,000	38,000	66,720	100,000	50,000	30,000	503,720

Annex -3 provision of horticultural seedlings, fertilizer, and watering can fo rprei urban and urban agriculture

NO	Wereda	Irrigation potential	Number of beneficiaries Targeted	Number of seedlings	Fertilizer (Qt)	Watering can for	total cost (birr)

		(ha)	resident	IDP	Total	Sweet potato	Swiss chard	Green pepper	Tomato	fruit seedling	total amount of seedling	NPS	Urea	Total	IDPs	
1	Mekelle	703.0	2,500	500	3,000	30,000	45,000	15,000	30,000	5,000	125,000	90	90	180	500	1,900,000
2	Rama	34.0	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
3	Abiyi adi	40.2	900	200	1,100	11,000	16,500	5,500	11,000	1,800	44,000	33	33	66	200	700,000
4	Axum	12.8	1,000	500	1,500	15,000	22,500	7,500	15,000	2,000	60,000	45	45	90	500	1,000,000
5	Edaga Arbi	1.3	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
6	Enticho	29.1	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
7	Adiwa	60.8	800	300	1,100	11,000	16,500	5,500	11,000	1,600	44,000	33	33	66	300	720,000
8	Mai Kinetal	7.9	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
9	Werkamba	-	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
10	Wukro Maray	-	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
11	Mahbere doge	-	250		250	2,500	3,750	1,250	2,500	500	10,000	8	8	15	-	150,000
12	Yechila	2.6	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
13	Merih Senay	-	250		250	2,500	3,750	1,250	2,500	500	10,000	8	8	15	-	150,000
14	Semema	-	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
15	Nebelet	0.3	300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
16	Edega Aebi	1.3	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
17	Gerehu sirnay	-	300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
18	Weyni	403.0	250		250	2,500	3,750	1,250	2,500	500	10,000	8	8	15	-	150,000
19	Chila	12.0	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
20	Hawzen	11.2	700		700	7,000	10,500	3,500	7,000	1,400	28,000	21	21	42	-	420,000
21	Adigrat	629.5	1,000	300	1,300	13,000	19,500	6,500	13,000	2,000	52,000	39	39	78	300	840,000
22	Atsibi Endaselasie	4.5	700		700	7,000	10,500	3,500	7,000	1,400	28,000	21	21	42	-	420,000
23	Wukro	-	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
24	Zalambesa	0.5	300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
25	Fireweyni	-	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000

NO	Wereda	Irrigation potential (ha)	Number of beneficiaries Targeted			Number of seedlings						Fertilizer (Qt)			Watering can for IDPs	total cost (birr)
			resident	IDP	Total	Sweet potato	Swiss chard	Green pepper	Tomato	fruit seedling	total amount of seedling	NPS	Urea	Total		
26	Bizet	-	350		350	3,500	5,250	1,750	3,500	700	14,000	11	11	21	-	210,000
27	Dewhan	21.0	100		100	1,000	1,500	500	1,000	200	4,000	3	3	6	-	60,000
28	Agulae	148.7	300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
29	Fatsi	-	300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
30	Edaga Hamus	1.6	300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
31	Mai Tsebri	99.0	600	250	850	8,500	12,750	4,250	8,500	1,200	34,000	26	26	51	250	560,000
32	Shire	-	1,200	600	1,800	18,000	27,000	9,000	18,000	2,400	72,000	54	54	108	600	1,200,000
33	Shiraro	-	800		800	8,000	12,000	4,000	8,000	1,600	32,000	24	24	48	-	480,000
34	Adi daero	-	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
35	Endabaguna	-	700		700	7,000	10,500	3,500	7,000	1,400	28,000	21	21	42	-	420,000
36	Selekleka	20.0	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
37	dima	-	250		250	2,500	3,750	1,250	2,500	500	10,000	8	8	15	-	150,000
38	Adi nebri Ed		300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
39	Zana	-	300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
40	Emba madre	-	250		250	2,500	3,750	1,250	2,500	500	10,000	8	8	15	-	150,000
41	Semema	-	300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
42	Mekoni	13.5	600		600	6,000	9,000	3,000	6,000	1,200	24,000	18	18	36	-	360,000
43	Maichew	28.5	1,000		1,000	10,000	15,000	5,000	10,000	2,000	40,000	30	30	60	-	600,000
44	Alamata	-	1,000		1,000	10,000	15,000	5,000	10,000	2,000	40,000	30	30	60	-	600,000
45	Korem	-	900		900	9,000	13,500	4,500	9,000	1,800	36,000	27	27	54	-	540,000
46	Dela	64.8	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
47	Bora	80.5	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
48	Adisemro		300		300	3,000	4,500	1,500	3,000	600	12,000	9	9	18	-	180,000
49	Adishihu	56.4	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
50	Chercher		400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
51	Zata	-	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000

NO	Wereda	Irrigation potential (ha)	Number of beneficiaries Targeted			Number of seedlings						Fertilizer (Qt)			Watering can for IDPs	total cost (birr)
			resident	IDP	Total	Sweet potato	Swiss chard	Green pepper	Tomato	fruit seedling	total amount of seedling	NPS	Urea	Total		
52	Hagere selam	3.0	600		600	6,000	9,000	3,000	6,000	1,200	24,000	18	18	36	-	360,000
53	Dengolat andi weyane	315.0	400		400	4,000	6,000	2,000	4,000	800	16,000	12	12	24	-	240,000
54	Samre	0.5	600		600	6,000	9,000	3,000	6,000	1,200	24,000	18	18	36	-	360,000
55	adi gudom	11.0	700		700	7,000	10,500	3,500	7,000	1,400	28,000	21	21	42	-	420,000
56	Bahri tseba	29.0	500		500	5,000	7,500	2,500	5,000	1,000	20,000	15	15	30	-	300,000
57	May Gaba	65.0	800		800	8,000	12,000	4,000	8,000	1,600	32,000	24	24	48	-	480,000
58	Mai Kadra	480.0	1,000		1,000	10,000	15,000	5,000	10,000	2,000	40,000	30	30	60	-	600,000
59	Setit Humera	-	1,200		1,200	12,000	18,000	6,000	12,000	2,400	48,000	36	36	72	-	720,000
60	Korarit	-	600		600	6,000	9,000	3,000	6,000	1,200	24,000	18	18	36	-	360,000
61	Dansha	2.0	800		800	8,000	12,000	4,000	8,000	1,600	32,000	24	24	48	-	480,000
62	Ketema nigus	-	700		700	7,000	10,500	3,500	7,000	1,400	28,000	21	21	42	-	420,000
63	Adiremets	21.5	700		700	7,000	10,500	3,500	7,000	1,400	28,000	21	21	42	-	420,000
		3,414.6	36,200	2,650	38,850	388,500	582,750	194,250	388,500	72,400	1,559,000	1,166	1,166	2,331	2,650	23,840,000

Annex-4 - **Fertilizer demand for Irrigation season by woredas in 2022/23**

No	Wereda	Irrigation Potential (ha)	area to be irrigated in 2nd round	Total fertilizer needed (Qt)			Beneficiaries		
				NPS	Urea	Sum	Male	Female	total
1	Abergelle	463.4	125	588	588	1,176	1,103	287	1,390
2	Tanqau milash	957.4	258	1,215	1,215	2,430	2,128	441	2,569
3	Kola temben	974.1	263	1,237	1,237	2,474	2,131	492	2,623
4	Keyh tekli	2297.7	620	2,918	2,918	5,836	4,342	901	5,243

No	Wereda	Irrigation Potential (ha)	area to be irrigated in 2nd round	Total fertilizer needed (Qt)			Beneficiaries		
				NPS	Urea	Sum	Male	Female	total
5	Enda Felasi	440.2	119	559	559	1,118	2,261	416	2,677
6	Endaba tsahma	696.7	188	885	885	1,770	2,949	671	3,620
7	Embaseneiti	469.6	127	597	597	1,194	563	2,254	2,817
8	Egela	215.0	58	273	273	546	377	80	457
9	Ahferom	1141.3	308	1,449	1,449	2,898	4,727	1,461	6,188
10	Hahayle	1496.8	404	1,901	1,901	3,802	6,032	1,566	7,598
11	Adwa	1839.5	497	2,337	2,337	4,674	6,442	1,227	7,669
12	Ahse-a	410.8	111	522	522	1,044	1,000	140	1,140
13	Rama adi-arbaete	2501.4	675	3,176	3,176	6,352	2,435	550	2,985
14	Chila	408.1	110	518	518	1,036	1,273	359	1,632
15	Laelay Maichew	1325.0	358	1,683	1,683	3,366	3,334	1,371	4,705
16	Adet	420.0	113	533	533	1,066	2,628	2,622	5,250
17	Naeder	372.7	101	474	474	948	1,766	1,766	3,532
18	Tahtay maichew	1428.9	386	1,815	1,815	3,630	8,840	1,711	10,551
	Centeral zone	17,858.44	4,821.78	22,680.00	22,680.00	45,360.00	54,331	18,315	72,646
19	laelay koraro	1,208.01	326	1,534	1,534	3,068	4,569	720	5,289
20	Zana	409.00	110	519	519	1,038	1,274	360	1,634
21	Tahtay koraro	1,558.33	421	1,979	1,979	3,958	3,607	517	4,124
22	Seyemti-adiyabo	63.62	17	81	81	162	145	9	154
23	Adi-aero town administration	789.74	213	1,003	1,003	2,006	1,496	237	1,733
24	ማ/አ ድያ ቦ	803.12	217	1,020	1,020	2,040	991	132	1,123
25	Maekelay adiyabo	654.68	177	832	832	1,664	731	86	817
26	Tselemti	1,798.95	486	2,285	2,285	4,570	2,682	329	3,011
27	laelay tselemti	180.99	49	230	230	460	623	82	705
28	Tsimbila	424.84	115	540	540	1,080	1,639	125	1,764
29	Asgede	1,188.96	321	1,510	1,510	3,020	1,422	109	1,531

No	Wereda	Irrigation Potential (ha)	area to be irrigated in 2nd round	Total fertilizer needed (Qt)			Beneficiaries		
				NPS	Urea	Sum	Male	Female	total
	North west zone	9,080.24	2,451.66	11,533.00	11,533.00	23,066.00	19,179	2,706	21,885
30	Awra	546.15	147	693	693	1,386	428	56	484
31	Tsegede	1,636.06	442	2,078	2,078	4,156	3,112	809	3,921
32	Kafta-humera	2,265.03	612	2,877	2,877	5,754	1,281	167	1,448
33	Welkait	1,266.76	342	1,609	1,609	3,218	1,105	63	1,168
	Western zone	5,714.00	1,542.78	7,257.00	7,257.00	14,514.00	5,926	1,095	7,021
34	Atsibi	1,256.06	339	1,595	1,595	3,190	4,628	1,956	6,584
35	Tsirae wemberta	1,917.90	518	2,436	2,436	4,872	4,472	1,178	5,650
36	Kilte awlaelo	2,712.33	732	3,444	3,444	6,888	5,726	1,758	7,484
37	Gere-alta	183.11	49	232	232	464	533	144	677
38	Hawzen	1,524.43	412	1,936	1,936	3,872	4,167	1,575	5,742
39	Tsaeda emba	990.36	267	1,257	1,257	2,514	2,541	760	3,301
40	Subuha saesie	522.51	141	664	664	1,328	2,550	1,065	3,615
41	Ganta afeshum	732.73	198	931	931	1,862	4,598	1,856	6,454
42	Bizet	262.73	71	334	334	668	1,351	555	1,906
43	Gulo mekeda	656.85	177	834	834	1,668	1,665	536	2,201
44	Erop	199.02	54	253	253	506	1,036	262	1,298
	Eastern zone	10,958.02	2,958.67	13,916.00	13,916.00	27,832.00	33,267	11,645	44,912
45	Enderta	2,447.66	661	3,109	3,109	6,218	6,515	1,098	7,613
46	Degua temben	638.35	172	810	810	1,620	2,182	337	2,519
47	Hintalo	2,836.00	766	3,602	3,602	7,204	**6,38**	1,395	7,782
48	Wejerat	150.83	41	192	192	384	879	163	1,042
49	Samre	792.88	214	1,007	1,007	2,014	2,831	666	3,497
50	Seharti	1,286.68	347	1,634	1,634	3,268	3,684	837	4,521
	South east zone	8,152.40	2,201.15	10,354.00	10,354.00	20,708.00	22,478	4,496	26,974
51	Emba alaje	904.30	244	1,148	1,148	2,296	4,308	1,116	5,424
52	Bora	788.02	213	1,001	1,001	2,002	3,535	670	4,205

No	Wereda	Irrigation Potential (ha)	area to be irrigated in 2nd round	Total fertilizer needed (Qt)			Beneficiaries		
				NPS	Urea	Sum	Male	Female	total
53	Silewa	590.21	159	749	749	1,498	997	385	1,382
54	Neksege	355.19	96	451	451	902	1,377	296	1,673
55	Enda mekoni	665.68	180	846	846	1,692	3,656	847	4,503
56	Ofla	2,803.71	757	3,561	3,561	7,122	12,674	3,018	15,692
57	Zata	294.97	80	375	375	750	1,464	267	1,731
58	Raya azebo	2,986.38	806	3,792	3,792	7,584	3,754	1,848	5,602
59	Raya chercher	3,662.60	989	4,650	4,650	9,300	1,777	871	2,648
60	Raya alamata	1,969.24	532	2,501	2,501	5,002	4,009	1,315	5,324
	Southern zone	15,020.31	4,055.48	19,074.00	19,074.00	38,148.00	37,551	10,633	48,184
	Mekelle	703.00	190	893	893	1,786	2,285	548	2,828
	Total	67,486.41	18,221.33	85,707.00	85,707.00	171,414.00	175,017	49,438	224,450

Annex-5 **Emergency support on Irrigation Equipment and technologies by weredas**

No	wereda	Hoe	Rake	Axe	Fork	Shovel	Wheel barrow	watering can	water pumps	Hip pump	Solar pump
1	Abergelle	417	417	417	417	417	42	417		50	30
2	Tanqha Milash	771	771	771	771	771	77	771	18	50	30
3	Kola Temben	787	787	787	787	787	79	787	26	50	30
4	Keyih Tekli	1,573	1,573	1,573	1,573	1,573	157	1,573		20	25
5	Enda Felaisit	803	803	803	803	803	80	803	15	20	25
6	Endaba Tsahima	1,086	1,086	1,086	1,086	1,086	109	1,086	26	20	30
7	Embaseneiti	844	844	844	844	844	84	844	27	30	20
8	Egela	137	137	137	137	137	14	137	13	20	30
9	Ahferom	1,856	1,856	1,856	1,856	1,856	186	1,856	6	30	20
10	Hahaile	2,279	2,279	2,279	2,279	2,279	228	2,279		20	25
11	Adiwa	2,301	2,301	2,301	2,301	2,301	230	2,301	59	25	10
12	Ahisi-a	342	342	342	342	342	34	342	10	30	20

No	wereda	Hoe	Rake	Axe	Fork	Shovel	Wheel barrow	watering can	water pumps	Hip pump	Solar pump
13	Rama Adi Arba-ete	896	896	896	896	896	90	896	18	20	20
14	Chila	490	490	490	490	490	49	490		30	15
15	Laelay Maichew	1,412	1,412	1,412	1,412	1,412	141	1,412	8	20	10
16	Adet	1,575	1,575	1,575	1,575	1,575	158	1,575		20	15
17	Naeder	1,060	1,060	1,060	1,060	1,060	106	1,060		20	15
18	Tahtay Maichew	3,165	3,165	3,165	3,165	3,165	317	3,165	24	25	10
	Centeral zone	**21,794**	**21,794**	**21,794**	**21,794**	**21,794**	**2,181**	**21,794**	**250**	**500**	**380**
19	Laelay Koraro	1,587	1,587	1,587	1,587	1,587	159	1,587		20	15
20	Zana	490	490	490	490	490	49	490	11	25	20
21	Tahtay Koraro	1,237	1,237	1,237	1,237	1,237	124	1,237	12	20	15
22	Seyamti Adiyabo	46	46	46	46	46	5	46	3	10	20
23	Mimhidar Ketema Adi Da-ero	520	520	520	520	520	52	520	5	20	10
24	Maekeley Adiyabo	337	337	337	337	337	34	337	36	10	15
25	Tahitay Adiyabo	409	409	409	409	409	41	409	15	20	20
26	Tselemti	1,506	1,506	1,506	1,506	1,506	151	1,506	5	30	30
27	Laelay Tselemti	423	423	423	423	423	42	423	1	35	15
28	Tsimbila	706	706	706	706	706	71	706	11	30	20
29	Asgede	766	766	766	766	766	77	766	301	25	30
	North west	**8,027**	**8,027**	**8,027**	**8,027**	**8,027**	**805**	**8,027**	**400**	**245**	**210**
30	Awra	387	387	387	387	387	39	387	50	50	10
31	Tsegede	3,137	3,137	3,137	3,137	3,137	314	3,137	150	50	40
32	Kafta Humera	1,158	1,158	1,158	1,158	1,158	116	1,158	300	50	40
33	Welkait	934	934	934	934	934	93	934	150	50	40
	Western	**5,616**	**5,616**	**5,616**	**5,616**	**5,616**	**562**	**5,616**	**650**	**200**	**130**
34	Atsibi wemberta	1,975	1,975	1,975	1,975	1,975	198	1,975	5	50	10
35	Tsirae Wemberta	1,695	1,695	1,695	1,695	1,695	170	1,695	11	50	15
36	Kilte Awlaelo	2,245	2,245	2,245	2,245	2,245	225	2,245	7	50	20

No	wereda	Hoe	Rake	Axe	Fork	Shovel	Wheel barrow	watering can	water pumps	Hip pump	Solar pump
37	Gere Alta	203	203	203	203	203	20	203	1	50	15
38	Hawzen	1,723	1,723	1,723	1,723	1,723	172	1,723	4	50	20
39	Tsaeda Emba	990	990	990	990	990	99	990	5	50	20
40	Sabuha Tsaesie	1,085	1,085	1,085	1,085	1,085	109	1,085		50	20
41	Ganta Afeshum	1,936	1,936	1,936	1,936	1,936	194	1,936	5	50	15
42	Bizet	572	572	572	572	572	57	572		50	10
43	Gulo Mekeda	1,761	1,761	1,761	1,761	1,761	176	1,761	1	50	15
44	Erop	1,298	1,298	1,298	1,298	1,298	130	1,298		50	10
	Eastern	**15,483**	**15,483**	**15,483**	**15,483**	**15,483**	**1,550**	**15,483**	**39**	**550**	**170**
45	Enderta	2,284	2,284	2,284	2,284	2,284	228	2,284		30	15
46	Degua Temben	756	756	756	756	756	76	756	5	20	10
47	Hintalo	2,335	2,335	2,335	2,335	2,335	234	2,335	20	15	15
48	Wejerat	313	313	313	313	313	31	313		10	10
49	Samre	1,749	1,749	1,749	1,749	1,749	175	1,749	12	30	20
50	Sehariti	2,261	2,261	2,261	2,261	2,261	226	2,261	50	50	20
	South Eastern	**9,698**	**9,698**	**9,698**	**9,698**	**9,698**	**970**	**9,698**	**87**	**155**	**90**
51	Emba Alaje	1,627	1,627	1,627	1,627	1,627	163	1,627		10	10
52	Bora	1,682	1,682	1,682	1,682	1,682	168	1,682	5	50	20
53	Silewa	553	553	553	553	553	55	553	3	50	20
54	Neksege	669	669	669	669	669	67	669	4	50	20
55	Enda Mekoni	1,351	1,351	1,351	1,351	1,351	135	1,351	3	30	15
56	Ofla	4,708	4,708	4,708	4,708	4,708	471	4,708	1	20	10
57	Zata	692	692	692	692	692	69	692	1	50	20
58	Raya Azebo	1,681	1,681	1,681	1,681	1,681	168	1,681			10
59	Raya Chercher	794	794	794	794	794	79	794			15
60	Raya Alamata	1,597	1,597	1,597	1,597	1,597	160	1,597	1	30	30
	Southern	**15,354**	**15,354**	**15,354**	**15,354**	**15,354**	**1,535**	**15,354**	**18**	**290**	**170**

No	wereda	Hoe	Rake	Axe	Fork	Shovel	Wheel barrow	watering can	water pumps	Hip pump	Solar pump
61	Mekelle	848	848	848	848	848	85	848		100	5
	Total	**76,820**	**76,820**	**76,820**	**76,820**	**76,820**	**7,688**	**76,820**	**1,444**	**2,040**	**1,155**

Annex-6 Recovery support on damaged irrigation infrastructures

No	Woreda	Dam	SHW	Diversion	Pond	check dam	check dam diversion	Spring	Reservoir	Manual drilling	Traditional diversion	canal	Beneficiaries	Damaged potential area (ha)	Estimation cost
1	Emba-Alage						2		3				847	162	15,089,586.00
2	Enda-Mokoni					1	1		3		4	4	749	163.375	9,660,000.00
3	Ofla			8								5	1726	335.13	30,800,000.00
4	Raya-Alamata		53							5			3860	2519	90,900,000.00
5	Raya-Azebo		17										136	927	693,000.00
6	Raya-Chercher		12										727	420.9	36,000,000.00
7	Bora												0	0	-
8	Selawa						1		1		1	10	1046	162	3,012,750.00
9	Zata			2		4							560	167.5	1,747,000.00
10	Neqsege			1		1						1	219	14	2,345,000.00
	south	0	82	11	0	6	4	0	7	5	5	20	9870	4870.905	190,247,336.00
11	Samre	2	3	2	11	10		1	1				1510	236.9	34,900,000.00
12	Seharti	3	6	3	53	10		0	0				1250	345	27,900,000.00
13	Hintalo	3	3	8	59	10	2	4	6				2979	589	30,200,000.00
14	D/Temben			1	37	10	3	3	7				332	97	17,500,000.00
15	Enderta	1		1		1	1		2				240	162.3	7,600,000.00
16	Wejerat Esra-Adi	1		5	15	7		1					265	69	11,600,000.00
	South East	10	12	20	175	48	6	9	16	0	0	0	6576	1499.2	129,700,000.00

No	Woreda	Dam	SHW	Diversion	Pond	check dam	check dam diversion	Spring	Reservoir	Manual drilling	Traditional diversion	canal	Beneficiaries	Damaged potential area (ha)	Estimation cost
17	Ganta-Afeshume	0	0	1	0	23	0	4	0				662	98.12	190,000.00
18	Bzet			13					3				1118	132	430,000.00
19	Gulo-Mekeda	1			5								99	35	450,000.00
20	Klte-Awulaelo	9	0	14	1	21	0	4	50				6821	2234.145	1,130,000.00
21	Tsirae-Wemberta	1	0	3	0	0	0	0	0				621	229.9	1,850,000.00
22	Geraelta			1									389	75	430,000.00
23	Tsaeda-Emba		2										260	37	2,450,000.00
24	Sewuha-Saesie	1	6	0	0	0	0	4	0				183	61	205,000.00
25	Hawuzen	2	0	1	13	21	0	1	0				466	52	5,224,000.00
26	Atsbi	3	5	2	163	0	1	0	2				392	756	1,003,800.00
27	Erob												0	0	-
	Eastern	17	13	35	182	65	1	13	55	0	0	0	11011	3710.165	13,362,800.00
28	Emba-Sneyti	2		5	94	13	5				13		1006	274	7,493,842.00
29	Endaba-Tsahma	1	1	2			13						1106	276	1,917,000.00
30	Chila														
31	Tahtay-Maichewu			2	12	3							241	71	1,477,000.00
32	Laelay-Maichewu	1	1	4	31								538	191	
33	Naeder														
34	Adwa	2		6	12	56	6					2	1727	391	22,560,000.00
35	Yechila-Abergele			2	19	1	7		10				148	60	40,845,000.00
36	Qeyh-Tekli	0	0	3	0	0	0	0	0				1060	295.46	13,900,000.00
37	Tanqa-Milash	0	0	10	3	2	2	1	0				850	311.4	3,600,000.00
38	Kola-Temben		1	13	51	19	1		5				988	375	7,900,000.00
39	Enda-Felasit	2	3	13	32	2	3	2					954	261.28	1,224,500.00

No	Woreda	Dam	SHW	Diversion	Pond	check dam	check dam diversion	Spring	Reservoir	Manual drilling	Traditional diversion	canal	Beneficiaries	Damaged potential area (ha)	Estimation cost
40	Hahaile	1	1	6	9	24	8	6	1				2045	371	49,065,634.00
41	Egela			4	26	7							343	122	1,084,100.00
42	Ahferom	2		6	4	11		3				4	1452	259	69,750,000.00
43	Rama-Adi Arbaete	1	1			8						1	3637	2,076	996,000.00
44	Ahsea				11	16	4	11			3		975	265	1,119,300.00
45	Adeit			21	25	82					119		1229	313	40,143,555.00
	Centeral	12	8	97	329	244	49	23	16	0	135	7	18299	5912.14	263,075,931.00
46	Asgede			2	303	18					18	1	670	715	106,555,000.00
47	Tahtay-Qoraro	0	2			15							80	37	313,000.00
48	Laelay-Qoraro												0	0	-
49	Tahtay-Adiyabo	1		1	48	16			1				359	56	14,120,000.00
50	Maekel-Adiyabo	1			20	2							196	186	5,040,000.00
51	Seyemti-Adiyabo			2	9	5	1						80	49	1,583,000.00
52	(adidearo ketema)	1		6	60	6							624	158	111,600,000.00
53	Zana				12	7	8						837	41	1,981,000.00
54	Tselemti	1		1	20	27	1						264	421	9,000,000.00
55	Laelay-Tselemti			2				2				3	99	74	2,430,000.00
56	Tsimbla	1		11	102	18	1	1			9		578	235	26,644,000.00
	North west	5	2	25	574	114	11	3	1	0	27	4	3787	1972	279,266,000.00
	Total	44	117	188	1260	477	71	48	95	5	167	31	49,543.00	17,964.41	**875,652,067**

Annex-7 Regional cereal Seed Requirement by woreda in 2022/23 Meher season

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
South	Emba Alaje	18,216	Wheat	Kingbird & Picaflor	6,376	120	765,072
			Barley	HB-1307	1,822	150	273,240
			Field pea	Tegegnech	455	125	56,925
			Fababean	Ashenge & Gebelcho	455	150	68,310
	Silewa	20,764	Wheat	Kingbird & Picaflor	6,229	120	747,504
			Barley	HB-1307	1,038	150	155,730
			Sorghum	Local	1,038	12	12,458
			Field pea	Tegegnech	1,038	125	129,775
			Fababean	Hashenge, Gebelcho	1,038	150	155,730
	Bora	8,078	Wheat	Kingbird & Picaflor	1,616	120	193,872
			Sorghum	Local	1,212	12	14,540
			Barley	HB-1307	606	150	90,878
			Chickepea	Local	606	100	60,585
	Enda Mekoni	25,492	Wheat	Kingbird & Picaflor	7,648	120	917,712
			Barley	HB-1307	2,549	150	382,380
			Field pea	Tegegnech	1,275	125	159,325
			Fababean	Hashenge & Gebelcho	1,275	150	191,190
	Neksege	8,024	Wheat	Kingbird & Picaflor	2,006	120	240,720
			Barley	HB-1307	401	150	60,180

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
			Field pea	Tegegnech	602	125	75,225
			Fababean	Hashenge & Gebelcho	602	150	90,270
			Sorghum	Local	401	12	4,814
	Ofla	35,050	Wheat	Hidase, pickaflor, Wanye	8,763	120	1,051,500
			Barley	HB-1307	5,258	150	788,625
			Field pea	Tegegnech	1,753	125	219,063
			Fababean	Hashenge & Gebelcho	1,753	150	262,875
	Zata	8,394	Wheat	Hidase, pickaflor, Wanye	2,098.50	120	251,820
			Barley	HB-1307	1,678.80	150	251,820
			Chickepea	Local	419.7	100	41,970
	Raya Azebo	13,350	Sorghum	Local	16,020.00	12	192,240
			Teff	Bosset	9,345.00	15	140,175
			Chickepea	Local	1,335.00	100	133,500
	Chercher	8,976	Sorghum	Local	10,771.20	12	129,254
			Teff	Bosset	6,283.20	15	94,248
			Chickepea	Local	897.6	100	89,760
	Raya Alamata	18,115	Sorghum	Local	21,737.40	12	260,849
			Teff	Bosset	10,868.70	15	163,031
			Chickepea	Local	1,811.45	100	181,145

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
			Wheat	Picaflor	1,811.45	120	217,374
		164,459			**142,893.00**		**9,315,684**
South East	Enderta	63,128	Wheat	Picaflor	22,094.80	120	2,651,376
			Barley	Local	6,312.80	150	946,920
			grasspea (vetch)	Local	3,156.40	125	394,550
	Degua Temben	20,336	Wheat	Hidase, pickaflor, Wanye	6,100.80	120	732,096
			Barley	HB-1307	2,033.60	150	305,040
			Chickepea	Local	1,016.80	100	101,680
			Fababean	Hashenge & Gebelcho	1,016.80	150	152,520
	Wajirat	15,458	Wheat	Picaflor	3,864.50	120	463,740
			Barley	Local	1,545.80	150	231,870
			Sorghum	Local	1,545.80	12	18,550
			Field pea	Tegegnech	772.9	125	96,613
	Hintalo	44,376	Wheat	picaflor	13,312.80	120	1,597,536
			Barley	Local	4,437.60	150	665,640
			grasspea (vetch)	Local	2,218.80	125	277,350
			Sorghum	Local	2,218.80	12	26,626
	Seharti	29,100	Wheat	Picaflor	8,730.00	120	1,047,600
			Barley	Local	2,910.00	150	436,500
			Sorghum	Local	1,455.00	12	17,460
			Chickepea	Local	1,455.00	125	181,875

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
	Samre	39,658	Wheat	Picaflor	9,914.50	120	1,189,740
			Teff	Bosset	1,982.90	15	29,744
			Sorghum	Local	5,948.70	12	71,384
			Chickepea	Local	1,982.90	100	198,290
		212,056			**106,028.00**		**11,834,700**
Eastern	Atsibi	17,546	Wheat	Picaflor	4,386.25	120	526,350
			Barley	Local	3,509.00	150	526,350
			Fababean	Local	877.25	150	131,588
	Tsirae Wonberta	22,182	Wheat	Picaflor	5,545.25	120	665,430
			Barley	Local	2,218.10	150	332,715
			Maize	Melkasa-4, Melkasa-6	2,218.10	30	66,543
			grasspea (vetch)	Local	1,109.05	125	138,631
	Kilte Awlaelo	25,106	Wheat	Picaflor	7,531.50	120	903,780
			Barley	Local	2,510.50	150	376,575
			Teff	Bosset	1,255.25	15	18,829
			Chickepea	Local	1,255.25	100	125,525
	Gerealta	13,014	Sorghum	Local	3,253.45	12	39,041
			Fingermillet	Local	1,301.38	15	19,521
			Teff	Bosset	1,301.38	15	19,521
			Maize	Melkasa-4, Melkasa-6	650.69	30	19,521
	Hawzen	28,898	Wheat	Picaflor	7,224.55	120	866,946
			Barley	Local	2,889.82	150	433,473

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
			Sorghum	Local	2,889.82	12	34,678
			Chickepea	Local	1,444.91	100	144,491
	Tsaeda Emba	21,170	Wheat	Picaflor	6,351.00	120	762,120
			Barley	Local	2,117.00	150	317,550
			Fingermillet	Local	1,058.50	15	15,877
			Chickepea	Local	1,058.50	100	105,850
	Sebha Saesie	15,056	Wheat	Picaflor	3,011.20	120	361,344
			Barley	Local	3,011.20	150	451,680
			Teff	Local	752.8	15	11,292
			Chickepea	Local	752.8	100	75,280
	Ganta Afeshum	19,200	Wheat	Picaflor	4,800.00	120	576,000
			Barley	Local	3,840.00	150	576,000
			Chickepea	Local	960	100	96,000
	Bizet	7,138	Fingermillet	Local	1,427.40	15	21,411
			Sorghum	Local	1,427.40	12	17,129
			Maize	Melkasa-4, Melkasa-6	713.7	30	21,411
	Gule Mekeda	18,254	Wheat	Picaflor	4,563.50	120	547,620
			Barley	Local	2,738.10	150	410,715
			Teff	Bosset	912.7	15	13,691
			Chickepea	Local	912.7	100	91,270
	Erob	2,400	Wheat	picaflor	960	120	115,200
			Barley	Local	240	150	36,000
		189,964			**94,980.00**		**10,012,948**

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
Central	Abergele	38,446	Sorghum	Local	11,533.80	12	138,406
			Maize	Melkasa-6, BH 546, BH545	3,844.60	30	115,338
			Haricotbean	Local	1,922.30	80	153,784
			Groundnut	Local	1,922.30	150	288,345
	Tanqua Milash	23,491	Sorghum	Local	7,047.30	12	84,568
			Maize	Melkasa-6, BH 546, BH545	3,523.65	30	105,710
			Haricotbean	Local	1,174.55	80	93,964
	Kola Temben	31,902	Sorghum	Local	7,975.50	12	95,706
			Maize	Melkasa-6, BH 546, BH545	4,785.30	30	143,559
			Teff	Bosset	1,595.10	15	23,927
			Fingermillet	Local	797.55	15	11,963
			Chickepea	Local	797.55	100	79,755
	Keyih Tekli	29,664	Sorghum	Local	7,416.00	12	88,992
			Maize	Melkasa-6, BH 546, BH545	4,449.60	30	133,488
			Teff	Bosset	1,483.20	15	22,248
			Fingermillet	Local	1,483.20	15	22,248
	Mai Kinetal	15,798	Sorghum	Local	4,344.45	12	52,133
			Teff	Bosset	1,579.80	15	23,697
			Maize	Melkasa-6, BH 546, BH545	1,579.80	30	47,394

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
			Chickepea	Local	394.95	100	39,495
	Endaba Tsahima	15,596	Teff	Kuncho & Bosset	1,559.60	15	23,394
			Sorghum	Local	3,119.20	12	37,430
			Maize	Melkasa-6, BH 546, BH545	1,559.60	30	46,788
			Chickepea	Local	779.8	100	77,980
			Wheat	Picaflor	779.8	120	93,576
	Emabasineyti	10,928	Sorghum	Local	2,185.60	12	26,227
			Maize	Melkasa-6, BH 546, BH545	1,639.20	30	49,176
			Wheat	Picaflor	1,092.80	120	131,136
			Teff	Bosset	546.4	15	8,196
	Hahayle	11,572	Wheat	Picaflor	2,893.00	120	347,160
			Teff	Kuncho	1,735.80	15	26,037
			Sorghum	Local	1,157.20	12	13,886
	Ahferom	23,352	Wheat	picaflor, Hidase, kingbird, Wane	5,838.00	120	700,560
			Teff	Kuncho & Bosset	3,502.80	15	52,542
			Sorghum	Local	1,167.60	12	14,011
			Chickepea	Local	1,167.60	100	116,760
	Egela	13,254	Sorghum	Local	3,976.20	12	47,714
			Wheat	Picaflor	662.7	120	79,524
			Fingermillet	Local	1,988.10	15	29,822

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
	Adwa	28,094	Teff	Kuncho	8,428.20	15	126,423
			Wheat	picaflor, Hidase, kingbird, Wane	2,809.40	120	337,128
			Maize	Melkasa-6, BH 546, BH545	1,404.70	30	42,141
			Chickepea	Local	1,404.70	100	140,470
	Ahsea	27,911	Teff	Kuncho	4,186.65	15	62,800
			Sorghum	Local	5,582.20	12	66,986
			Maize	Melkasa-6, BH 546, BH545	1,395.55	30	41,867
			Chickepea	Local	1,395.55	100	139,555
			Fingermillet	Local	1,395.55	15	20,933
	Rama adi-Arbaete	21,448	Sorghum	Local	4,289.60	12	51,475
			Fingermillet	Local	3,217.20	15	48,258
			Maize	Melkasa-6, BH 546, BH545	2,144.80	30	64,344
			Groundnut	Local	1,072.40	150	160,860
	Chila	23,480	Sorghum	Local	5,870.00	12	70,440
			Fingermillet	Local	3,522.00	15	52,830
			Maize	Melkasa-6, BH 546, BH545	1,174.00	30	35,220
			Teff	Bosset	1,174.00	15	17,610
	Tahtai Maichew	22,406	Teff	Kuncho	6,721.80	15	100,827
			Maize	Melkasa-6, BH 546, BH545	2,240.60	30	67,218
			Sorghum	Local	1,120.30	12	13,444

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
			Chickepea	RRT, Worku	1,120.30	100	112,030
	Adet	16,710	Teff	Kuncho	3,342.00	15	50,130
			Sorghum	Local	1,671.00	12	20,052
			Maize	Melkasa-6, BH 546, BH545	1,671.00	30	50,130
			Chickepea	RRT, Worku	835.5	100	83,550
			Fingermillet	Local	835.5	15	12,533
	Naeder	22,154	Teff	Kuncho	5,538.50	15	83,078
			Sorghum	Local	2,215.40	12	26,585
			Maize	Melkasa-6, BH 546, BH545	2,215.40	30	66,462
			Chickepea	RRT, Worku	1,107.70	100	110,770
	Laelai Maichew	27,912	Teff	Kuncho	8,373.60	15	125,604
			Wheat	Picaflor	2,791.20	120	334,944
			Sorghum	Local	1,395.60	12	16,747
			Chickepea	RRT, Worku	1,395.60	100	139,560
Central Total Sum		**404,118**			**202,059.00**		**6,579,643**
North West	Laelai Koraro	4,665	Teff	Kuncho	3,732.40	15	55,986
			Sorghum	Melkam & Dekeba	1,866.20	12	22,394
			Maize	Melkasa-6, BH 546, BH545	1,866.20	30	55,986
			Chickpea	Local	466.55	100	46,655
			Fingermillet	Local	1,399.65	15	20,995
	Zana	5,306	Sorghum	Local	4,244.80	12	50,938
			Teff	Kuncho	2,122.40	15	31,836
			Fingermillet	Local	2,122.40	15	31,836

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
			Maize	Melkasa-6, BH 546, BH545	2,122.40	30	63,672
	Tahtai Koraro	10,383	Teff	Kuncho	9,344.70	15	140,171
			Maize	Melkasa-6, BH 546, BH545	6,229.80	30	186,894
			Fingermillet	Local	2,076.60	15	31,149
			Sorghum	Local	2,076.60	12	24,919
			Chickpea	Local	1,038.30	100	103,830
	Tsimbla	11,936	Teff	Kuncho	9,548.80	15	143,232
			Maize	Melkasa-6, BH 546, BH545	4,774.40	30	143,232
			Sorghum	Melkam & Dekeba	4,774.40	12	57,293
			Fingermillet	Local	2,387.20	15	35,808
			Chickpea	Local	2,387.20	100	238,720
	Asgede	18,281	Sorghum	Local	18,281.00	12	219,372
			Maize	Melkasa-6, BH 546, BH545	7,312.40	30	219,372
			Fingermillet	Local	7,312.40	15	109,686
			Sesame	Setit-1, Setit-2	3,656.00	3	10,968
	Tselemti	9,048	Sorghum	Melkam & Dekeba	9,048.00	12	108,576
			Maize	Melkasa-6, BH 546, BH545	3,619.20	30	108,576
			Fingermillet	Local	3,619.20	15	54,288
			Teff	Bosset	1,809.60	15	27,144

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
	Laelai Tselemti	9,637	Sorghum	Melkam & Dekeba	11,563.80	12	138,766
			Maize	Melkasa-6, BH 546, BH545	3,854.60	30	115,638
			Fingermillet	Local	3,854.60	15	57,819
	Adi-Daero	10,672	Teff	Kuncho & Bosset	6,403.20	15	96,048
			Sorghum	Melkam & Dekeba	4,268.80	12	51,226
			Maize	Melkasa-6, BH 546, BH545	5,336.00	30	160,080
			Fingermillet	Local	4,268.80	15	64,032
			Chickpea	Local	1,067.20	100	106,720
	Seyemti Adiyabo	6,138	Sorghum	Melkam & Dekeba	6,138.00	12	73,656
			Maize	Melkasa-6, BH 546, BH545	2,455.20	30	73,656
			Fingermillet	Local	2,455.20	15	36,828
			Teff	Bosset	1,227.60	15	18,414
	Maekel Adiyabo	7,948	Sorghum	Melkam & Dekeba	7,947.50	12	95,370
			Maize	Melkasa-6, BH 546, BH545	3,179.00	30	95,370
			Fingermillet	Local	4,768.50	15	71,528
	Tahtai Adiyabo	26,307	Sorghum	Melkam & Dekeba	26,307.00	12	315,684

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
			Maize	Melkasa-6, BH 546, BH545	5,261.40	30	157,842
			Sesame	Humera-1, Setit-1, Setit-2	15,784.20	3	47,353
			Fingermillet	Local	5,261.40	15	78,921
North West Total Sum		**120,321**			**240,640.80**		**4,198,479**
Western	Wolkayt	7,809	Sorghum	Local	18,741.60	12	224,899
			Maize	Melkasa-4, Melkasa-6	4,685.40	30	140,562
			Sesame	Setit-1, Setit-2	9,370.80	3	28,112
			Fingermillet	Local	4,685.40	15	70,281
			Teff	Kuncho	4,685.40	15	70,281
			Wheat	Hedase, Kingbird	4,685.40	120	562,248
	Awra	2,825	Sorghum	Local	8,476.00	12	101,712
			Maize	Melkasa-4, Melkasa-6	1,695.20	30	50,856
			Sesame	Setit-1, Setit-2	3,390.40	3	10,171
			Fingermillet	Local	3,390.40	15	50,856
	Tsegede	17,085	Wheat	Hidase, lemo	10,251.00	120	1,230,120
			Sorghum	Local	41,004.00	12	492,048
			Maize	Melkasa-4, Melkasa-6	10,251.00	30	307,530
			Sesame	Setit-1, Setit-2	20,502.00	3	61,506
			Fingermillet	Local	20,502.00	15	307,530

Zone	Woreda	Beneficiary number	Seed type	Seed variety	Area, ha	seeding rate per ha in Kg	Required Seed, KG
	Kafta Humera	64,780	Sorghum	Local	272,076.00	12	3,264,912
			Sesame	Setit-1, Setit-2	116,604.00	3	349,812
Western Zone Total Sum		**92,499**			**554,996.00**		**7,323,436**
	Grand Total	**1,183,417**			**1,341,593.80**		**49,264,884**

Annex-8 Fertilizer required for 2022/23 Meher season

Woreda	Cultivated Land Ha	Population woreda		NPS	UREA	Total
Raya Alamata	36,229			5,360.00	4,000.00	9,360.00
Ofla	16,642			5,000.00	5,000.00	10,000.00
Zata	4,182			2,000.00	1,000.00	3,000.00
Enda Mekhoni	11,591			4,750.00	4,750.00	9,500.00
Neqsege	3,998			1,500.00	1,500.00	3,000.00
Emba Alajie	9,107			5,000.00	5,000.00	10,000.00
Bora	3,950			1,500.00	1,000.00	2,500.00
Selewa	10,381			3,500.00	2,000.00	5,500.00
Raya Azebo	27,446			2,500.00	2,500.00	5,000.00
Raya Chercher	15,004			2,000.00	1,400.00	3,400.00
South Total	**138,530**			**33,110.00**	**28,150.00**	**61,260.00**
Ahferom	11,676			6,000.00	5,000.00	11,000.00
Hahayle	5,786			3,000.00	2,000.00	5,000.00
Egela	6,627			3,250.00	2,250.00	5,500.00
Adwa	14,047			9,000.00	7,000.00	16,000.00
Laelai Maichew	13,956			10,000.00	10,000.00	20,000.00
Tahtai Maichew	11,203			5,750.00	5,250.00	11,000.00

Adet	11,077			5,500.00	5,000.00	10,500.00
Naeder	8,355			4,000.00	3,000.00	7,000.00
Rama	10,724			3,500.00	2,500.00	6,000.00
Ahsea	11,026			4,000.00	3,000.00	7,000.00
Chila	11,740			5,000.00	2,000.00	7,000.00
Endaba Tsahma	7,798			3,500.00	3,500.00	7,000.00
Mai Kinetal	7,898			4,000.00	2,500.00	6,500.00
Emba Seyneyti	5,464			2,400.00	1,600.00	4,000.00
Kola Temben	15,951			7,500.00	5,000.00	12,500.00
Keyeh Tekli	14,832			7,500.00	4,300.00	11,800.00
Abergele	19,223			6,500.00	4,000.00	10,500.00
Tanqua Milash	11,746			4,500.00	3,500.00	8,000.00
Central Zone	**199,128**			**94,900.00**	**71,400.00**	**166,300.00**
Atsbi	8,773			4,250.00	4,250.00	8,500.00
Tsirae Wenberta	11,091			5,600.00	5,600.00	11,200.00
Kilte Awlaelo	12,553			10,250.00	10,250.00	20,500.00
Gerealta	6,507			3,750.00	3,750.00	7,500.00
Tsaeda Emba	10,585			5,325.00	5,325.00	10,650.00
Subeha Saesie	7,528			3,765.00	3,765.00	7,530.00
Hawzen	14,449			8,450.00	7,250.00	15,700.00
Ganta Afeshum	9,600			5,500.00	5,500.00	11,000.00
Beziet	3,569			1,600.00	1,600.00	3,200.00
Gulo Mekeda	9,127			5,500.00	5,500.00	11,000.00
Erob	1,200			268.00	100.00	368.00
Eastern Zone	**94,980**			**54,258.00**	**52,890.00**	**107,148.00**
Samre	19,829			12,500.00	12,500.00	25,000.00
Seharti	14,550			7,250.00	7,250.00	14,500.00
Wajirat	7,729			4,000.00	2,800.00	6,800.00
Hintalo	22,188			10,000.00	10,000.00	20,000.00
Adi gudom area	1,000			1,000.00	800.00	1,800.00

Degua Temben	10,168			7,000.00	7,000.00	14,000.00
Enderta	31,564			21,250.00	21,250.00	42,500.00
South East Zone	107,028			63,000.00	61,600.00	124,600.00
Kafta Humera	388,680			78,411.00	67,000.00	145,411.00
Tsegede	102,510			4,650.00	4,500.00	9,150.00
Awra	16,952			5,000.00	3,000.00	8,000.00
Welkayt	46,854			20,000.00	11,639.00	31,639.00
Western Zone	554,996			108,061.00	86,139.00	194,200.00
Zana	10,612			5,500.00	5,500.00	11,000.00
Tahtai Koraro	17,730			12,500.00	7,500.00	20,000.00
Laelai Koraro	9,333			5,521.00	5,021.00	10,542.00
Asgede	35,519			10,000.00	5,000.00	15,000.00
Tsmbela	23,872			11,000.00	11,000.00	22,000.00
Tselemti	19,273			10,500.00	7,000.00	17,500.00
Laelai Tselemti	18,096			6,000.00	2,500.00	8,500.00
Laelai Adyabo	33,315			7,326.00	5,000.00	12,326.00
Adi Daero area	1,500			1,000.00	800.00	1,800.00
Makhle Adaybo	15,895			4,000.00	3,000.00	7,000.00
Tahtai Adyabo	46,763			10,000.00	5,000.00	15,000.00
North West Zone	**231,908**			**83,347.00**	**57,321.00**	**140,668.00**
Mekelle	3,324			3,324.00	2,500.00	5,824.00
Total Sum	1,329,893			440,000.00	360,000.00	800,000.00
Total Excluding Western Zone				331,939.00	273,861.00	